United States Department of Commerce
Technology Administration
National Institute of Standards and Technology

NIST Monograph 175

Temperature-Electromotive Force Reference Functions and Tables for the Letter-Designated Thermocouple Types Based on the ITS–90

G. W. Burns, M. G. Scroger, G. F. Strouse, M. C. Croarkin, and W. F. Guthrie

The National Institute of Standards and Technology was established in 1988 by Congress to "assist industry in the development of technology . . . needed to improve product quality, to modernize manufacturing processes, to ensure product reliability . . . and to facilitate rapid commercialization . . . of products based on new scientific discoveries."

NIST, originally founded as the National Bureau of Standards in 1901, works to strengthen U.S. industry's competitiveness; advance science and engineering; and improve public health, safety, and the environment. One of the agency's basic functions is to develop, maintain, and retain custody of the national standards of measurement, and provide the means and methods for comparing standards used in science, engineering, manufacturing, commerce, industry, and education with the standards adopted or recognized by the Federal Government.

As an agency of the U.S. Commerce Department's Technology Administration, NIST conducts basic and applied research in the physical sciences and engineering and performs related services. The Institute does generic and precompetitive work on new and advanced technologies. NIST's research facilities are located at Gaithersburg, MD 20899, and at Boulder, CO 80303. Major technical operating units and their principal activities are listed below. For more information contact the Public Inquiries Desk, 301-975-3058.

Technology Services
- Manufacturing Technology Centers Program
- Standards Services
- Technology Commercialization
- Measurement Services
- Technology Evaluation and Assessment
- Information Services

Electronics and Electrical Engineering Laboratory
- Microelectronics
- Law Enforcement Standards
- Electricity
- Semiconductor Electronics
- Electromagnetic Fields[1]
- Electromagnetic Technology[1]

Chemical Science and Technology Laboratory
- Biotechnology
- Chemical Engineering[1]
- Chemical Kinetics and Thermodynamics
- Inorganic Analytical Research
- Organic Analytical Research
- Process Measurements
- Surface and Microanalysis Science
- Thermophysics[2]

Physics Laboratory
- Electron and Optical Physics
- Atomic Physics
- Molecular Physics
- Radiometric Physics
- Quantum Metrology
- Ionizing Radiation
- Time and Frequency[1]
- Quantum Physics[1]

Manufacturing Engineering Laboratory
- Precision Engineering
- Automated Production Technology
- Robot Systems
- Factory Automation
- Fabrication Technology

Materials Science and Engineering Laboratory
- Intelligent Processing of Materials
- Ceramics
- Materials Reliability[1]
- Polymers
- Metallurgy
- Reactor Radiation

Building and Fire Research Laboratory
- Structures
- Building Materials
- Building Environment
- Fire Science and Engineering
- Fire Measurement and Research

Computer Systems Laboratory
- Information Systems Engineering
- Systems and Software Technology
- Computer Security
- Systems and Network Architecture
- Advanced Systems

Computing and Applied Mathematics Laboratory
- Applied and Computational Mathematics[2]
- Statistical Engineering[2]
- Scientific Computing Environments[2]
- Computer Services[2]
- Computer Systems and Communications[2]
- Information Systems

[1]At Boulder, CO 80303.
[2]Some elements at Boulder, CO 80303.

NIST Monograph 175

Temperature-Electromotive Force Reference Functions and Tables for the Letter-Designated Thermocouple Types Based on the ITS–90

G. W. Burns
M. G. Scroger
G. F. Strouse

Process Measurements Division
Chemical Science and Technology Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899

M. C. Croarkin
W. F. Guthrie

Statistical Engineering Division
Computing and Applied Mathematics Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899

Supersedes NBS Monograph 125

April 1993

U.S. Department of Commerce
Ronald H. Brown, Secretary
National Institute of Standards and Technology
Raymond G. Kammer, Acting Director

National Institute of Standards and Technology Monograph 175
Natl. Inst. Stand. Technol. Mono. 175, 630 pages (Apr. 1993)
CODEN: NIMOEZ

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 1993

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402–9325

Contents

Appendices

Page

List of Figures

List of Tables

Certain commercial equipment, instruments, or materials are identified in this monograph in order to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by NIST, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Temperature-Electromotive Force Reference Functions and Tables for the Letter-Designated Thermocouple Types Based on the ITS-90

G. W. Burns, M. G. Scroger, G. F. Strouse, M. C. Croarkin, and W. F. Guthrie

The International Temperature Scale of 1990 (ITS-90) and the new representation of the volt came into effect on 1 January 1990. Those changes required that the then-existing IPTS-68 based temperature-electromotive force reference functions and tables for thermocouples be revised to give values in terms of the ITS-90 and the SI volt. This monograph gives the new reference functions and tables for the eight letter-designated thermocouple types: noble-metal types B, R, and S; and base-metal types E, J, K, N, and T. Also, for these thermocouple types, reference functions and tables of their thermoelements versus the NIST platinum thermoelectric reference standard, Pt-67, are given. The computational methods used to derive each of the new reference functions are described. The temperature ranges of the functions and tables vary for the different types, from a low of −270 °C for types E, K, N, and T to a high of 1820 °C for type B. The functions and tables presented in the main text of this document give thermoelectric voltage as a function of temperature, with values expressed in microvolts and degrees Celsius. Supplementary reference tables presented in the appendices give temperature-voltage values with less precision, with voltages in millivolts and with temperatures expressed in both degrees Celsius and degrees Fahrenheit. Approximate inverse functions that give temperature as a function of thermoelectric voltage for each thermocouple type in various temperature ranges also are given in the appendices. These approximate inverse functions give values of temperature that, with a few exceptions, are in agreement with those given by the reference functions to within 0.05 °C. The Monograph also covers such items as history of development, special precautions regarding usage, recommended temperature ranges of use, calibration tolerances, and nominal chemical compositions of the letter-designated thermocouple types.

Key words: International Temperature Scale of 1990; temperature; thermocouples; thermocouple reference functions; thermocouple reference tables; thermoelectric voltage; thermoelements; thermometry.

1. Introduction

1.1. General Summary

Adoption of the International Temperature Scale of 1990 (ITS-90) [1], which supersedes the International Practical Temperature Scale of 1968, amended edition of 1975 (IPTS-68) [2], requires that the reference functions and tables for thermocouples based on the IPTS-68 be revised to give their thermoelectric voltage-temperature values in terms of the ITS-90. The prominent features of the ITS-90 are described in the next section. Additionally, the new representation of the volt [3] that came into effect on 1 January 1990 requires that the values of thermoelectric voltage given by previous thermocouple standards be adjusted to be consistent with the SI (*Systéme International*) volt.

This monograph gives reference functions and tables, based on the ITS-90 and the SI volt, for the eight letter-designated thermocouple types: noble-metal types B, R, and S; and base-metal types E, J, K, N, and T. Reference functions and tables are given also for the various thermoelements versus the platinum thermoelectric reference standard, Pt-67 (see sec. 1.3). The reference functions and tables for types B, E, J, K, and T are mathematical conversions of those given in NBS Monograph 125 [4]. The reference function for type N is a conversion of functions given in NBS Monograph 161 [5]. The conversions were based on the published differences between the temperatures on the ITS-90 and those on the IPTS-68; these differences are discussed and tabulated in the next section. The reference functions given for types R and S thermocouples are taken directly from recently published research [6-8], and they were used to compute the reference tables presented for those two types. The nominal compositions, representative trade names, and temperature ranges of the letter-designated thermocouple types are given in table 1.1.1. The temperature ranges given in table 1.1.1 are those of the reference functions.

The letter designations used in this monograph follow the recommendations of the Instrument Society of America (ISA) and the American Society for Testing and Materials (ASTM). The practice of identifying each of the commonly used thermocouple types with a letter was originated by the ISA and adopted in 1964 as an American National Standard (C96.1) [9]. As noted in ASTM and ISA standards [10,11], the letter designations actually identify the reference tables and may be applied to any thermocouple that has a temperature - voltage

TABLE 1.1.1. *Compositions, trade names, and letter designations of the standardized thermocouples*

THERMOCOUPLES

Type designation[a]	Temperature range, °C	Materials
B	0 to 1820	*platinum*-30% rhodium versus *platinum*-6% rhodium
E	−270 to 1000	*nickel*-chromium alloy versus a *copper*-nickel alloy
J	−210 to 1200	iron versus another slightly different *copper*-nickel alloy
K	−270 to 1372	*nickel*-chromium alloy versus *nickel*-aluminum alloy
N	−270 to 1300	*nickel*-chromium-silicon alloy versus *nickel*-silicon-magnesium alloy
R	−50 to 1768	*platinum*-13% rhodium versus platinum
S	−50 to 1768	*platinum*-10% rhodium versus platinum
T	−270 to 400	copper versus a *copper*-nickel alloy

SINGLE-LEG THERMOELEMENTS

...N	Denotes the negative thermoelement of a given thermocouple type.
...P	Denotes the positive thermoelement of a given thermocouple type.
BN	*platinum*-nominal 6% rhodium.
BP	*platinum*-nominal 30% rhodium.
EN or TN	a *copper*-nickel alloy, constantan: Cupron[b], ThermoKanthal JN[c], Advance[d]; nominally 55% Cu, 45% Ni; often referred to as Adams constantan.
EP or KP	a *nickel*-chromium alloy: Chromel[e], Tophel[b], ThermoKanthal KP[c], T-1[d]; nominally 90% Ni, 10% Cr.
JN	a *copper*-nickel alloy similar to, but usually not interchangeable with, EN and TN; SAMA specification.
JP	iron: ThermoKanthal JP[c]; nominally 99.5% Fe.
KN	a *nickel*-aluminum alloy: Alumel[e], Nial[b], T-2[d], ThermoKanthal KN[c]; nominally 95% Ni, 2% Al, 2% Mn, 1% Si.
NN	a *nickel*-silicon-magnesium alloy; nisil; nominally 95% Ni, 4-1/2% Si, 1/10% Mg.
NP	a *nickel*-chromium-silicon alloy; nicrosil; nominally 84% Ni, 14% Cr, 1-1/2% Si.
RN, SN	high-purity platinum.
RP	*platinum*-13% rhodium.
SP	*platinum*-10% rhodium.
TP	high-purity copper.

[a] The letter designations used in this Monograph follow the recommendations of the ISA and the ASTM. The letter type, e.g., type T, identifies a specific temperature-voltage relationship, not a particular chemical composition. Thermocouples of a given type may have variations in composition as long as their resultant temperature-voltage relationships remain within specified tolerances.

[b] Trademark – Carpenter Technology Corporation.

[c] Trademark – Kanthal Corporation.

[d] Trademark – Driver-Harris Company.

[e] Trademark – Hoskins Manufacturing Company.

Note: An italicized word indicates the primary constituent of an alloy and all compositions are expressed **in percentages by weight**. All materials manufactured in compliance with the established thermoelectric voltage standards are equally acceptable.

relationship agreeing within the tolerances specified in the standards with the values given by the table, regardless of the composition of the thermocouple. Substantial variations in composition for a given letter type do occur, particularly for types J, K, and E.

Discussions of each thermocouple type are included in the eight chapters that follow this introductory chapter. While it is not appropriate to include in this monograph all of the properties and precautions for each of the thermocouple types, items such as history of development, special precautions on usage, recommended temperature ranges of use, initial calibration tolerances, and nominal chemical compositions are addressed. Alloy compositions in this monograph, unless specifically noted as atomic percent (at.%), are given as **percent by weight**.

The construction of the reference function for each type of thermocouple and thermoelement is described. The functional representations giving the thermoelectric voltage as a function of temperature are presented in tables in the form of coefficients of polynomials, the degree of which ranges from fourth to fourteenth. For type K, additional coefficients for an exponential expression are included also. Additionally, reference tables computed from these functions are included that, with some exceptions, give the thermoelectric voltage, E, (usually to the nearest 0.1 or 0.01 μV), the Seebeck coefficient, S, (0.001 μV/°C), and the temperature derivative of the Seebeck coefficient, dS/dt_{90} (0.01 nV/°C^2), all as a function of temperature. For these tables, values of these quantities are given at one degree intervals for each of the appropriate temperature ranges. Values for type J are given with reduced precision at temperatures which are above the transformation temperature, 760 °C, of the JP material. Since many calibrations are performed at the fixed points of the ITS-90, tables which give values of E, S, and dS/dt_{90} at various fixed points are included also. In addition, figures showing E, S, and dS/dt_{90} as a function of t_{90} are given.

Approximate inverse functions that give temperature as a function of thermoelectric voltage for each thermocouple type are presented in the appendices. The inverse functions range from fourth to tenth degree polynomials and, with a few exceptions, they give values of temperature that match values given by the reference functions presented in the main text to within 0.05 °C.

Supplementary reference tables presenting the same temperature-thermoelectric voltage data in different formats to satisfy special needs are given also in the appendices. They include tables giving the thermoelectric voltage (to the nearest microvolt) as a function of temperature with values of temperature given at one degree intervals, in both degrees Celsius and degrees Fahrenheit. Tables giving temperature as a function of thermoelectric voltage, with values of voltage given at 0.01 mV intervals, are included as well.

All of the reference functions and tables given in this monograph, as well as all of the approximate inverse functions and supplementary reference tables included in the appendices, are based on reference junctions at 0 °C.

1.2. International Temperature Scale of 1990

The ITS-90 [1,12] is realized, maintained and disseminated by NIST to provide a standard scale of temperature for use in science and industry in the United States. This scale was adopted by the International Committee of Weights and Measures (CIPM) at its meeting in September 1989, and it became the official international temperature scale on January 1, 1990. The ITS-90 supersedes the IPTS-68(75) [2] and the 1976 Provisional 0.5 K to 30 K Temperature Scale (EPT-76) [13].

The adoption of the ITS-90 has removed several deficiencies and limitations associated with the IPTS-68. Temperatures on the ITS-90 are in closer agreement with thermodynamic values than were those of the IPTS-68 and the EPT-76. Additionally, improvements have been made in the non-uniqueness and reproducibility of the temperature scale, especially in the temperature range from t_{68} = 630.74 °C to 1064.43 °C, where the type S thermocouple was the standard interpolating device on the IPTS-68.

The ITS-90 extends upward from 0.65 K to the highest temperature measurable in terms of the Planck radiation law using monochromatic radiation. The increased number of temperature subranges and alternative definitions, all of equal status, allows for greater flexibility than was available with the IPTS-68. Temperatures on the ITS-90 are defined in terms of equilibrium states of pure substances (defining fixed points), interpolating instruments, and equations that relate the measured property to t_{90}. The defining fixed points and values of temperature assigned to them are listed in table 1.2.1. The equations that are used to define the ITS-90 are given in Refs. 1, 12, and 14.

Temperatures on the ITS-90 may be expressed in terms of International Kelvin Temperatures, with the symbol T_{90}, or in terms of International Celsius Temperatures, with the symbol t_{90}. The units of T_{90} and t_{90} are the kelvin, symbol K, and degree Celsius, symbol °C, respectively. The relation between T_{90} and t_{90} is:

$$t_{90}/°C = T_{90}/K - 273.15.$$

A given thermodynamic temperature expressed on the ITS-90 has a value that is different from that expressed on the IPTS-68, except at 0 K and 273.16 K, and at a few other points at which the temperatures on the two scales are fortuitously the same. Figure 1.2.1 shows the differences between temperatures on the ITS-90 and the IPTS-68 as a function of t_{90}. The official tabular values of the differences between the ITS-90 and the IPTS-68, and between the ITS-90 and the EPT-76 are given in table 1.2.2. The official $(t_{90} - t_{68})$ values from 14 K to 630.615 °C are the published table values of Preston-Thomas [1]. From 630.615 °C to 1064.18 °C, a fifth degree polynomial, recently developed by Guthrie *et al.* [8] and accepted by the Comité Consultatif de Thermométrie (CCT) of the CIPM, defines $(t_{90} - t_{68})$ as a function of t_{90}. This polynomial was used to compute the $(t_{90} - t_{68})$ values given in table 1.2.2 from 640 °C to 1060 °C and is given by

$$\begin{aligned}\Delta t\,(t_{90}) = \quad & + 7.8687209 \times 10^{1} \\ & - 4.7135991 \times 10^{-1} t_{90} \\ & + 1.0954715 \times 10^{-3} t_{90}^2 \\ & - 1.2357884 \times 10^{-6} t_{90}^3 \\ & + 6.7736583 \times 10^{-10} t_{90}^4 \\ & - 1.4458081 \times 10^{-13} t_{90}^5,\end{aligned}$$

where $\Delta t = t_{90} - t_{68}$. The $(t_{90} - t_{68})$ values given in table 1.2.2 for values of t_{90} above 1064 °C are the same as those of Preston-Thomas [1] and were obtained from the equation [12]:

$$(t_{90} - t_{68})/°C = -0.25\left[\frac{t_{90}/°C + 273.15}{1337.33}\right]^2.$$

TABLE 1.2.1. Defining fixed points of the ITS-90

Material	T_{90}/K	t_{90}/°C
He (VP)	3 to 5	−270.15 to −268.15
e-H_2 (TP)	13.8033	−259.3467
e-H_2 (VP)	≈ 17	≈ −256.15
e-H_2 (VP)	≈ 20.3	≈ −252.85
Ne (TP)	24.5561	−248.5939
O_2 (TP)	54.3584	−218.7916
Ar (TP)	83.8058	−189.3442
Hg (TP)	234.3156	−38.8344
H_2O (TP)	273.16	0.01
Ga (MP)	302.9146	29.7646
In (FP)	429.7485	156.5985
Sn (FP)	505.078	231.928
Zn (FP)	692.677	419.527
Al (FP)	933.473	660.323
Ag (FP)	1234.93	961.78
Au (FP)	1337.33	1064.18
Cu (FP)	1357.77	1084.62

VP indicates vapor pressure point; TP indicates triple point (solid, liquid, and gas phases); MP indicates melting point and FP indicates freezing point (solid and liquid phases at 101325 Pa).

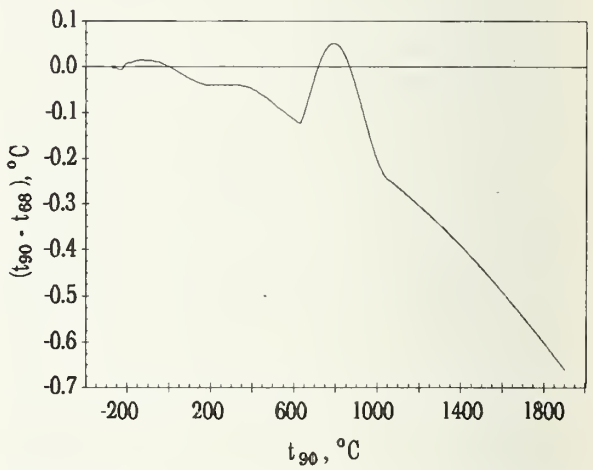

FIGURE 1.2.1. *Differences between t_{90} and t_{68} as a function of t_{90}.*

1.3. Platinum Thermoelectric Reference Standard, Pt-67

Reference functions and tables are given in this monograph for the various letter-designated thermoelements versus platinum, Pt-67, which is the designation for the platinum thermoelectric reference standard that is maintained by the NIST Standard Reference Materials Program. It replaces the former standard, Pt-27, which was used from 1922 until January 1973. A history of Pt-27 was given by Wichers [15]. The high-purity platinum standard reference material, designated SRM 680, that was

TABLE 1.2.2. *Differences between ITS-90 and EPT-76, and between ITS-90 and IPTS-68 for specified values of T_{90} and t_{90}*

$(T_{90} - T_{76})$/mK

T_{90}/K	0	1	2	3	4	5	6	7	8	9
0						−0.1	−0.2	−0.3	−0.4	−0.5
10	−0.6	−0.7	−0.8	−1.0	−1.1	−1.3	−1.4	−1.6	−1.8	−2.0
20	−2.2	−2.5	−2.7	−3.0	−3.2	−3.5	−3.8	−4.1		

$(T_{90} - T_{68})$/K

T_{90}/K	0	1	2	3	4	5	6	7	8	9
10					−0.006	−0.003	−0.004	−0.006	−0.008	−0.009
20	−0.009	−0.008	−0.007	−0.007	−0.006	−0.005	−0.004	−0.004	−0.005	−0.006
30	−0.006	−0.007	−0.008	−0.008	−0.008	−0.007	−0.007	−0.007	−0.006	−0.006
40	−0.006	−0.006	−0.006	−0.006	−0.006	−0.007	−0.007	−0.007	−0.006	−0.006
50	−0.006	−0.005	−0.005	−0.004	−0.003	−0.002	−0.001	0.000	0.001	0.002
60	0.003	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007
70	0.007	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.008	0.008
80	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
90	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009

T_{90}/K	0	10	20	30	40	50	60	70	80	90
100	0.009	0.011	0.013	0.014	0.014	0.014	0.014	0.013	0.012	0.012
200	0.011	0.010	0.009	0.008	0.007	0.005	0.003	0.001		

$(t_{90} - t_{68})$/°C

t_{90}/°C	0	−10	−20	−30	−40	−50	−60	−70	−80	−90
−100	0.013	0.013	0.014	0.014	0.014	0.013	0.012	0.010	0.008	0.008
0	0.000	0.002	0.004	0.006	0.008	0.009	0.010	0.011	0.012	0.012

t_{90}/°C	0	10	20	30	40	50	60	70	80	90
0	0.000	−0.002	−0.005	−0.007	−0.010	−0.013	−0.016	−0.018	−0.021	−0.024
100	−0.026	−0.028	−0.030	−0.032	−0.034	−0.036	−0.037	−0.038	−0.039	−0.039
200	−0.040	−0.040	−0.040	−0.040	−0.040	−0.040	−0.040	−0.039	−0.039	−0.039
300	−0.039	−0.039	−0.039	−0.040	−0.040	−0.041	−0.042	−0.043	−0.045	−0.046
400	−0.048	−0.051	−0.053	−0.056	−0.059	−0.062	−0.065	−0.068	−0.072	−0.075
500	−0.079	−0.083	−0.087	−0.090	−0.094	−0.098	−0.101	−0.105	−0.108	−0.112
600	−0.115	−0.118	−0.122	−0.125*	−0.11	−0.10	−0.09	−0.07	−0.05	−0.04
700	−0.02	−0.01	0.00	0.02	0.03	0.03	0.04	0.05	0.05	0.05
800	0.05	0.05	0.04	0.04	0.03	0.02	0.01	0.00	−0.02	−0.03
900	−0.05	−0.06	−0.08	−0.10	−0.11	−0.13	−0.15	−0.16	−0.18	−0.19
1000	−0.20	−0.22	−0.23	−0.23	−0.24	−0.25	−0.25	−0.25	−0.26	−0.26

t_{90}/°C	0	100	200	300	400	500	600	700	800	900
1000		−0.26	−0.30	−0.35	−0.39	−0.44	−0.49	−0.54	−0.60	−0.66
2000	−0.72	−0.79	−0.85	−0.93	−1.00	−1.07	−1.15	−1.24	−1.32	−1.41
3000	−1.50	−1.59	−1.69	−1.78	−1.89	−1.99	−2.10	−2.21	−2.32	−2.43

* A discontinuity in the first derivative of $(t_{90} - t_{68})$ occurs at a temperature of t_{90} = 630.615 °C, at which $(t_{90} - t_{68})$ = −0.125 °C.

issued in 1967 by the NBS Office of Standard Reference Materials [16] provides the basis for Pt-67. More specifically, Pt-67 is a selected, highly homogeneous portion of SRM 680 that was set aside to serve as the thermoelectric reference standard. This portion of SRM 680 was recertified in 1977 as SRM 1967. The historical development of Pt-67, its characterization and properties are described in NBS Special Publication 260-56 [17].

The material for Pt-67 was prepared by the Sigmund Cohn Corporation by induction melting of high-purity platinum sponge in a zirconium silicate crucible, and by casting into a platinum-lined, water-cooled copper mold. The ingot was trimmed, swaged, and drawn into 0.51 mm diameter wire, taking the utmost precautions to minimize contamination. This lot of platinum wire received extensive characterization under the direction of the NBS Office of Standard Reference Materials. It was satisfactory with respect to homogeneity and was subsequently certified for chemical composition. Cooperating with NBS in this extensive analytical program were the following American and British manufacturers and laboratories: Matthey Bishop, Inc.; Sigmund Cohn Corp.; Engelhard Industries; Johnson Matthey Co., Ltd.; and RCA Laboratories.

The chemical composition of Pt-67 (SRM 1967) is given in table 1.3.1, where the data are recommended values taken from the provisional certificate of analysis for SRM 680. The elemental analyses were made by one or more of the following analytical methods: optical emission spectrography, spark source mass spectrography (with isotopic dilution), polarography, spectrophotometry, activation analysis, and vacuum fusion.

The temperature coefficient of electrical resistance between 0 °C and 100 °C has previously been used as an indicator of the quality of platinum used in thermometry. Two specimens from the lot of Pt-67 wire were tested by each of four cooperating laboratories. The values reported for the temperature coefficient of resistance ranged from $3.926_0 \times 10^{-3}$/°C to $3.927_5 \times 10^{-3}$/°C. The mean value of the ten determinations reported was 3.926_9 (± 0.0011) $\times 10^{-3}$/°C, where the indicated uncertainty is the 2 σ value.

A more sensitive measure of both the effective electrical purity and the state of physical perfection is the residual resistance ratio, RRR = R_{273K}/R_{0K}. Since for most pure metals R_{4K} is experimentally the same as the residual value R_{0K}, measurement of the resistance at liquid helium temperatures determines R_{0K}, and hence, the RRR. Values of RRR, as determined by the Cryogenics Division, NBS, Boulder, for five specimens that were taken at equally separated points along the lot of Pt-67 wire ranged from about 3400 to 3700. The mean of those five measurements was 3496. Specimen preparation prior to the tests consisted of cleaning in aqua regia for 12 minutes at 50 °C, rinsing in distilled water, annealing in air at 600 °C for 1 h, and slow cooling to room temperature.

TABLE 1.3.1. *Chemical composition of platinum, Pt-67*

Element	Concentration in ppm by weight
Copper	0.1
Silver	<0.1
Palladium	0.2
Lead	<1
Iron	0.7
Nickel	<1
Gold	<1
Magnesium	<1
Zirconium	<0.1
Rhodium	<0.2
Iridium	<0.01
Oxygen	4
Platinum	(remainder 99.999 +%)

Each of four cooperating laboratories also determined the thermoelectric voltage, E, of two specimens of Pt-67 against the former standard, Pt-27. For a measuring-junction temperature of 1200 °C and with the reference junctions at 0 °C, values of -9 μV and -10 μV were reported. Because of its higher purity, Pt-67 is thermoelectrically negative relative to Pt-27. The value obtained and used by NIST is -9 μV, based on Pt-27 as it was maintained at NIST since 1950. Measurements at NIST indicate that when the reference junction is at 0 °C, the thermoelectric voltage-temperature relationship of Pt-67 versus Pt-27 can be approximated by

$$E = -7.5 \times 10^{-3} t_{90},$$

where E is expressed in microvolts and t_{90} is in degrees Celsius (ITS-90). This relationship was found to be valid over the range -197 °C to 1200 °C to within the estimated limits of experimental uncertainty (about ± 1 μV below 600 °C, increasing to about ± 2 μV at 1200 °C). Sufficient data were not available to substantiate its validity beyond this temperature range; however, data for other thermometry grade platinum wires support its extrapolation to higher temperatures but **not** to lower temperatures. These results were obtained with specimens of Pt-67 wire which had been electrically annealed in air for 10 min at 1200 °C and slowly cooled to room temperature.

Rhys and Taimsalu [18], Cochrane [19], and Aliotta [20] have studied the effects of trace impurities on the electrical properties of pure platinum. Cochrane discussed the relationship between the chemical composition of Pt-67 and its electrical properties. Cochrane's work showed that when all impurities except gold are added to pure platinum, the platinum becomes more positive thermoelectrically. Gold additions cause it to become more negative.

1.4. Computational Methods

The computational methods used to construct the reference functions based on the ITS-90 and the SI volt for the various thermocouple types are described in detail in the second section of each chapter. The ITS-90 based reference functions for thermocouple types B, E, J, K, N, and T were derived from the IPTS-68 based reference functions [4,5]. Due to the deficiencies of the IPTS-68, there is a discontinuity in the first derivative of $(t_{90} - t_{68})$, with respect to t_{90}, at t_{90}=630.615 °C [8]. This discontinuity, of magnitude 0.14% of the slope, limits the accuracy of the conversion of the functions.

The first step in the conversion of the IPTS-68 functions involved multiplying their coefficients by 0.999990736 in order to correct the values of thermoelectric voltage to the SI volt [3]. Then, these functions, of which types E, K, N, and T were based on the NBS 2-20 Temperature Scale [21] below 20 K, were used to generate new values of emf to be used in deriving the ITS-90 based functions. Values of temperature corresponding to these values of emf were converted to the ITS-90 by using the published differences between temperatures on the NBS 2-20 ($T_{NBS\ 2\text{-}20}$) and the EPT-76 (T_{76}) scales [13], and using the differences (T_{90} -- T_{76}) as given by equation 1.1 in Ref. 22 and $(t_{90} - t_{68})$ as given in table 1.2.2. Finally, the corresponding values of emf and t_{90} were fitted by the method of least-squares using either polynomial or spline fits.

Because of deficiencies in the IPTS-68, an accurate conversion of the reference functions would require separate functions for temperatures above and below 630.615 °C, with a discontinuity in the derivatives at that temperature. However, separate functions are unacceptable because they are not consistent with the known smooth relationship between emf and temperature for thermocouples. Consequently, except for the special case of type B, the data, including the region around 630.615 °C, were fitted with a single polynomial without regard to the discontinuity. For type B, a spline fit was used, yielding two polynomials joined at 630.615 °C, with the first derivatives constrained to have the same value at that temperature. The polynomials obtained for types B, E, J, and T, above 0 °C, give values of emf that agree with the emf data to within the equivalent of 0.025 °C. The functions obtained for types K and N also meet this criterion for most of the temperature range above 0 °C, except at temperatures between 600 °C and 660 °C, where the differences are as much as 0.05 °C and 0.04 °C, respectively.

For each thermocouple type, the ITS-90 reference function covers the same temperature range as the IPTS-68 reference function. Each ITS-90 reference function consists of either two or three equations and, with a few exceptions, the equations are joined at the same temperature(s) as those of the IPTS-68 reference functions. The equations for types E, K, N, and T are joined at 0 °C because, for temperatures below 0 °C, the IPTS-68 functions were determined from material that had a slightly different composition from the material used to determine the IPTS-68 functions above 0 °C. The reference function for type J thermocouples has a break point at 760 °C because the IPTS-68 function above 760 °C was based on material different from that used at temperatures below 760 °C. Additionally, the positive, type JP thermoelement (iron) undergoes a magnetic transition near 760 °C and a solid-solid phase transition near 910 °C. These transitions result in the Seebeck coefficient of the type J thermocouple having a different functional dependence on temperature below and above 760 °C. Since the negative thermoelements of type K thermocouples undergo a magnetic transition between about 150 °C and 200 °C, depending on the composition, an exponential term to account for the perturbation in the Seebeck coefficient due to this transition was included in the IPTS-68 reference function. A similar term is included in the ITS-90 reference function.

The ITS-90 reference functions given in this monograph for noble-metal thermocouple types R and S are those reported recently [6-8]. They were determined from a least-squares fit of a polynomial to new experimental data over the range −50 °C to 1064.18 °C. Above 1064.18 °C, the ITS-90 reference functions were derived from the IPTS-68 reference functions, with modifications to account for a new, recommended value for the freezing-point temperature of platinum (t_{90} = 1768.1°C) [6].

Reference functions for the individual thermoelements of thermocouples versus platinum (Pt-67), based on the ITS-90 and the SI volt, were also constructed. The function for a positive thermoelement was derived as described above for the various thermocouples. The function for the negative thermoelement was obtained from the algebraic difference between the function for the thermocouple and that for the positive

thermoelement. The noble-metal thermocouple types R and S were exceptions: the negative thermoelement of both of these types is already high-purity platinum, which was very nearly the same thermoelectrically as Pt-67. Hence, no thermoelement functions or tables are necessary for these two types.

1.5. References

[1] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10; 1990. *ibid.* p. 107.

[2] The International Practical Temperature Scale of 1968, Amended Edition of 1975. *Metrologia* **12**, 7-17; 1976.

[3] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[4] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[5] Burley, N. A.; Powell, R. L.; Burns, G. W.; Scroger, M. G. The nicrosil versus nisil thermocouple: properties and thermoelectric reference data. *Natl. Bur. Stand. (U.S.) Mongr. 161*; 1978 April. 167 p.

[6] Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. New reference function for platinum-10% rhodium versus platinum (type S) thermocouples based on the ITS-90, Part I and Part II. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 537-546.

[7] Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; Chattle, M. New reference functions for platinum-13% rhodium versus platinum (type R) and platinum-30% rhodium versus platinum-6% rhodium (type B) thermocouples based on the ITS-90. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 559-564.

[8] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 547-552.

[9] American National Standard: Temperature measurement thermocouples, C96.1; Pittsburgh, Pennsylvania: Instrument Society of America; 1964.

[10] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[11] American National Standard: Temperature measurement thermocouples, ANSI-MC96.1-1982; Research Triangle Park, North Carolina: Instrument Society of America; 1982.

[12] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

[13] The 1976 Provisional 0.5 to 30 K Temperature Scale. *Metrologia* **15**, 65-68; 1979.

[14] Mangum, B. W. Special report on the International Temperature Scale of 1990; Report on the 17th session of the Consultative Committee on Thermometry. *J. Res. Natl. Inst. Stand. Technol.* **95**, 69-77; 1990.

[15] Wickers, E. The history of Pt-67. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 3; Herzfeld, C. M.., ed.; New York: Reinhold Publishing Corp.; 1962. Part 1, pp. 259-262.

[16] Anon. New platinum standards. *Natl. Bur. Stand. (U.S.) Tech. News Bull.* **52**, 62; 1968.

[17] Powell, R. L.; Sparks, L. L.; Hust, J. G. Standard reference materials: standard thermocouple material, Pt-67: SRM-1967. *Natl. Bur. Stand. (U.S.) Spec. Publ. 260-56*; 1978 February. 50 p.

[18] Rhys, D. W.; Taimsalu, P. Effect of alloying additions on the thermoelectric properties of platinum. *Engelhard Tech. Bull.* **10**, 41-47; 1969.

[19] Cochrane, J. Relationship of chemical composition to the electrical properties of platinum. *Engelhard Tech. Bull.* **11**, 58-71; 1969. Also in *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4; Plumb, H. H., ed.; Pittsburgh: Instrument Society of America; 1972. 1619-1632.

[20] Aliotta, J. Effects of impurities on the thermoelectric properties of platinum. *Inst. and Control Systems*, 106-107; March 1972.

[21] Plumb, H. H.; Cataland, G. Acoustical thermometer and the National Bureau of Standards Provisional Temperature Scale 2-20 (1965). *Metrologia* **2**, 127-139; 1966.

[22] Bureau International des Poids et Mesures, Supplementary information for the International Temperature Scale of 1990. Pavillion de Breteuil, F-92310 Sevres; 1990 December. 177 p.

2. TYPE B—Platinum-30% Rhodium Alloy Versus Platinum-6% Rhodium Alloy Thermocouples

2.1. Material Specifications and Precautions

This type is sometimes referred to by the nominal chemical composition of its thermoelements: platinum-30% rhodium versus platinum-6% rhodium or "30-6". The positive (BP) thermoelement typically contains 29.60 ± 0.2% rhodium and the negative (BN) thermoelement usually contains 6.12 ± 0.02% rhodium. The effect of differences in rhodium content are described later in this section. An industrial consensus standard [1] (ASTM E1159-87) specifies that rhodium having a purity of 99.98% shall be alloyed with platinum of 99.99% purity to produce the thermoelements. This consensus standard [1] describes the purity of commercial type B materials that are used in many industrial thermometry applications and that meet the calibration tolerances described later in this section. Both thermoelements will typically have significant impurities of elements such as palladium, iridium, iron, and silicon [2].

The 30-6 thermocouple was developed during the early 1950s by Degussa in Hanau, Germany, and it was designated as the "PtRh18" thermocouple. It was developed to meet the needs of temperature measurements in the range 1200 °C to 1800 °C. A reference function and table were determined in 1962 by Obrowski and Prinz of the Degussa laboratories [3]. Their function consisted of a set of cubic equations developed from measurements of the thermoelectric voltage of "PtRh18" thermocouples at various thermometric fixed points.

During the mid-1960s, NIST performed experiments on the 30-6 thermocouples and a reference function and table were prepared to facilitate the use of this thermocouple type throughout U.S. industry. In this investigation, thermocouples were obtained from three manufacturers in the United States and from one in Europe. The thermocouples were calibrated by comparison with platinum resistance thermometers, type S thermomcouples, and optical pyrometers to cover the range 0 °C to 1790 °C. The reference function and table derived from the results of this study were published in 1966 by Burns and Gallagher [2]. In 1967, the American Standards Association Committee C96, sponsored by ISA, approved the 30-6 thermocouple as a letter- designated type and assigned it the letter B. The data of Burns and Gallagher were adjusted by Powell and others at NIST for the change in the temperature scale from the IPTS-48 to the IPTS-68, and a new function and table were published in 1974 in NBS Monograph 125 [4]. In addtion, this IPTS-68 based reference table was incorporated in revised ISA [5] and ASTM [6] standards, as well as in an International Electrotechnical Commission (IEC) standard published in 1977 [7].

Studies by Ehringer [8], Walker *et al.* [9,10], and Glawe and Szaniszlo [11] have demonstrated that thermocouples, in which both legs are platinum-rhodium alloys, are suitable for reliable temperature measurements at high temperatures. Such thermocouples have been shown to offer the following distinct advantages over types R and S thermocouples at high temperatures: (1) improved stability, (2) increased mechanical strength, and (3) higher operating temperatures.

The research by Burns and Gallagher [2] indicated that the 30-6 thermocouple can be used intermittently (for several hours) up to 1790 °C and continuously (for several hundred hours) at temperatures up to about 1700 °C with only small changes in calibration. The maximum temperature limit for the thermocouple is governed, primarily, by the melting point of the Pt-6% rhodium thermoelement which is estimated to be about 1820 °C by Acken [12]. The thermocouple is most reliable when used in a clean oxidizing atmosphere (air) but also has been used successfully in neutral atmospheres or vacuum by Walker *et al.* [9,10], Hendricks and McElroy [13], and Glawe and Szaniszlo [11]. The stability of the thermocouple at high temperatures has been shown by Walker *et al.* [9,10] to depend, primarily, on the quality of the materials used for protecting and insulating the thermocouple. High purity alumina with low iron-content appears to be the most suitable material for the purpose.

Type B thermocouples should not be used in reducing atmospheres, nor those containing deleterious vapors or other contaminants that are reactive with the platinum group metals [14], unless suitably protected with nonmetallic protecting tubes. They should never be used in metallic protecting tubes at high temperatures.

The Seebeck coefficient of type B thermocouples decreases with decreasing temperature below about 1600 °C and becomes almost negligible at room temperature. Consequently, in most applications the reference junction temperature of the thermocouple does not need to be controlled or even known, as long as it is between 0 °C and 50 °C. For example, as shown by the reference table given in section 2.3, the voltage developed by the thermocouple, with the reference junction at 0 °C, undergoes a reversal in sign at about 42 °C, and between 0 °C and 50 °C varies from a minimum of −2.6 μV near 21 °C to a maximum of 2.3 μV at 50 °C. Therefore, in use, if

the reference junction of the thermocouple is within the range 0 °C to 50 °C, then a 0 °C reference junction temperature can be assumed and the error introduced will not exceed 3 μV. At temperatures above 1100 °C, an additional measurement error of 3 μV (about 0.3 °C) would be insignificant in most instances.

In order to study the effect of varying the rhodium content of the alloys, Burns and Gallagher [2] measured the thermoelectric voltages of four wires near 29.60% rhodium and of five wires near 6.12% rhodium. They calculated that a 0.1% change in the rhodium content of the platinum-nominally 30% rhodium thermoelement produces a corresponding change in the thermocouple voltage of about 15 μV at 1500 °C. In contrast a change of only 0.01% in the rhodium content of platinum-nominally 6% rhodium thermoelement also produces a voltage change of about 15 μV at this temperature. In both cases, a decrease in the rhodium content decreases the thermoelectric voltage of that thermoelement with respect to platinum.

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [15] specifies that the initial calibration tolerances for type B commercial thermocouples be ± 0.5 % between 870 °C and 1700 °C. Type B thermocouples can also be supplied to meet special tolerances of ± 0.25 %. Tolerances are not specified for type B thermocouples below 870 °C.

The suggested upper temperature limit of 1700 °C given in the ASTM standard [15] for protected type B thermocouples applies to AWG 24 (0.51 mm) wire. This temperature limit applies to thermocouples used in conventional closed-end protecting tubes and it is intended only as a rough guide to the user. It does not apply to thermocouples having compacted mineral oxide insulation.

2.2. Construction of Reference Functions

2.2.1. Type B thermocouples

The reference function for type B thermocouples is based on the polynomial representations in NBS Monograph 125 [4] and the difference in values of temperatures expressed on the IPTS-68 and the ITS-90 [16] as given by

$$\Delta t = t_{90} - t_{68},$$

where t_{90} and t_{68} indicate temperature (°C) on the ITS-90 and the IPTS-68, respectively.

Monograph 125 gives a single polynomial representation of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the temperature range from 0 °C to 1820 °C. In terms of t_{90}, this is replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i \quad for\ j = 1, 2.$$

Thermoelectric voltages, Y_t, where

$$Y_t = 0.999990736\ g(t_{90} - \Delta t),$$

were generated at 10 °C intervals and fitted by the method of least-squares to corresponding values of t_{90} to obtain the coefficients, c_i, of $f_j(t_{90})$ in terms of the ITS-90 and the SI volt [17]. The Δt data for this analysis came from three sources. For the range 0 °C to 630 °C, Δt values were taken from the table of Preston-Thomas [16]. Between 630 °C and 1064 °C, Δt values were obtained from the fifth degree polynomial in t_{90} given by Guthrie *et al.* [18]. Above 1064 °C, Δt values were generated from the relationship given by Mangum and Furukawa [19], namely,

$$(t_{90} - t_{68})/°C = -0.25[(t_{90}/°C + 273.15)/1337.33]^2.$$

Because it was not possible to produce a single polynomial to cover the temperature range from 0 °C to 1820 °C, the range was broken at 630.615 °C to accommodate the discontinuity [18] in the first derivative of Δt that occurs at that temperature. A separate polynomial is defined for each segment.

The appropriate degree for each polynomial is at issue, and the least-squares criteria for testing the aptness of a model do not strictly apply because the Δt values, derived by smoothing of experimental data, are not contaminated by random error. The approach used instead was to choose the lowest degree polynomial for which the largest absolute difference between a fitted value, $f_j(t_{90})$, and a corresponding datum point, Y_t, was not more than $0.02 f_j'(t_{90})$ μV. Using a criterion based on the Seebeck coefficient, $f_j'(t_{90})$, guarantees that for any value of t_{90} in the data set, the difference between $f_j(t_{90})$ and Y_t will be a voltage difference equivalent to not more than 0.02 °C. For temperatures in the range 0 °C to 630.615 °C a sixth degree polynomial, $f_1(t_{90})$, satisfies the criterion and for the range 630.615 °C to 1820 °C an eighth degree polynomial, $f_2(t_{90})$, is adequate.

The polynomials, $f_1(t_{90})$ and $f_2(t_{90})$, were constructed so that the conditions $f_1(630.615) = f_2(630.615)$ and $f_1'(630.615) = f_2'(630.615)$ are satisfied. This was accomplished by fitting the two polynomials simultaneously as a spline model. The spline model was then expanded for each temperature range to obtain the polynomials. The second derivatives of these polynomials were not constrained because higher degree polynomials would be needed to simultaneously meet the fitting criterion discussed above and the condition $f_1''(630.615) = f_2''(630.615)$.

The coefficients for the polynomials, $f_1(t_{90})$ and $f_2(t_{90})$, are given in section 2.3. Since the coefficients have been rounded to eleven significant digits, the equality of the polynomials at the break-point (630.615 °C) will not be *exact* due to slight round off errors. The reader is cautioned also that further rounding or truncation of the coefficients could adversely affect computations which depend on this reference function.

The uncertainty in the ITS-90 reference function is expressed as its bias relative to the IPTS-68 reference function. The uncertainty for each temperature range is estimated by computing the maximum difference between $f_j(t_{90})$ and Y_t over that range. These biases are tabulated below.

Temperature range °C			Bias μV
0	to	630.615	0.043
630.615	to	1820	0.126

These biases describe the disagreement between the voltage produced by the new reference function for a particular value of t_{90} and the voltage that would be obtained by substituting $t_{90} - \Delta t$ into the IPTS-68 reference function. They do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function. These latter uncertainties, which are not known, would be needed to make a statement about the absolute uncertainty of voltages or temperatures derived using this reference function.

2.2.2. Positive thermoelement, type BP, versus platinum, Pt-67

The construction of the reference function for the positive thermoelement, type BP, versus Pt-67 parallels the conversion outlined for the total thermocouple, type B. For the positive thermoelement, NBS Monograph 125 gives a single polynomial representation of thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the range 0 °C to the platinum melting-point temperature. In terms of t_{90}, this is replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i \quad for\ j = 1, 2.$$

The criterion in section 2.2.1 for determining the lowest degree polynomials which fit the data results in a sixth degree polynomial, $f_1(t_{90})$, for the range 0 °C to 630.615 °C, and an eighth degree polynomial, $f_2(t_{90})$, for the range 630.615 °C to 1768.1 °C. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 2.4 to eleven significant digits.

As in section 2.2.1, the polynomials, $f_1(t_{90})$ and $f_2(t_{90})$, were constructed so that the conditions $f_1(630.615) = f_2(630.615)$ and $f_1'(630.615) = f_2'(630.615)$ are satisfied. The second derivatives of the polynomials were not constrained at 630.615 °C.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum difference between $f_j(t_{90})$ and Y_t for each temperature range is computed as in section 2.2.1. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in section 2.2.1, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
0	to	630.615	0.137
630.615	to	1768.1	0.235

2.2.3. Negative thermoelement, type BN, versus platinum, Pt-67

The reference function for the negative thermoelement, type BN, versus Pt-67 is based on the reference function for the total thermocouple, type B, and the reference function for its positive thermoelement, type BP. Two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i \quad for\ j = 1, 2,$$

are defined to cover the temperature range 0 °C to 1768.1 °C. Each polynomial is the algebraic difference between the reference function for the

type B thermocouple (see sec. 2.2.1) and the reference function for the type BP thermoelement versus Pt-67 (see sec. 2.2.2). This results in a sixth degree polynomial, $f_1(t_{90})$, for the range 0 °C to 630.615 °C and an eighth degree polynomial, $f_2(t_{90})$, for the range 630.615 °C to 1768.1 °C. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 2.5 to eleven significant digits.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum difference between $f_j(t_{90})$ and Y_t for each temperature range is computed as in sections 2.2.1 and 2.2.2. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in sections 2.2.1 and 2.2.2, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
0	to	630.615	0.094
630.615	to	1768.1	0.111

2.3. Reference Function and Table for Type B Thermocouples

The coefficients, c_i, for the sixth degree polynomial and for the eighth degree polynomial that give the thermoelectric voltage, E, of type B thermocouples as a function of temperature, t_{90}, in the 0 °C to 630.615 °C and 630.615 °C to 1820 °C ranges, respectively, are given in table 2.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type B thermocouples at selected fixed points are given in table 2.3.2. The reference values for type B thermocouples are given at 1 °C intervals from 0 °C to 1820 °C in table 2.3.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 2.3.1, 2.3.2, and 2.3.3, respectively. The irregular behavior of the second derivative near 630 °C is a result of the fitting techniques at the junction of two regions; it is not the result of a real physical phenomenon.

TABLE 2.3.1. *Type B thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	0 °C to 630.615 °C	630.615 °C to 1820 °C
c_0 =	0.000 000 000 0 . . .	$-3.893\ 816\ 862\ 1 \times 10^{3}$
c_1 =	$-2.465\ 081\ 834\ 6 \times 10^{-1}$	$2.857\ 174\ 747\ 0 \times 10^{1}$
c_2 =	$5.904\ 042\ 117\ 1 \times 10^{-3}$	$-8.488\ 510\ 478\ 5 \times 10^{-2}$
c_3 =	$-1.325\ 793\ 163\ 6 \times 10^{-6}$	$1.578\ 528\ 016\ 4 \times 10^{-4}$
c_4 =	$1.566\ 829\ 190\ 1 \times 10^{-9}$	$-1.683\ 534\ 486\ 4 \times 10^{-7}$
c_5 =	$-1.694\ 452\ 924\ 0 \times 10^{-12}$	$1.110\ 979\ 401\ 3 \times 10^{-10}$
c_6 =	$6.299\ 034\ 709\ 4 \times 10^{-16}$	$-4.451\ 543\ 103\ 3 \times 10^{-14}$
c_7 =		$9.897\ 564\ 082\ 1 \times 10^{-18}$
c_8 =		$-9.379\ 133\ 028\ 9 \times 10^{-22}$

TABLE 2.3.2. *Thermoelectric values at fixed points for type B thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
Ice MP	0.000	0.00	−0.247	11.81
Water TP	0.01	0.00	−0.246	11.81
Gallium MP	29.7646	−2.14	0.102	11.59
Indium FP	156.5985	101.88	1.524	10.90
Tin FP	231.928	247.36	2.334	10.61
Cadmium FP	321.069	497.15	3.265	10.27
Lead FP	327.462	518.24	3.331	10.25
Zinc FP	419.527	867.77	4.257	9.86
Antimony FP	630.63	1 978.47	6.227	8.28
Aluminum FP	660.323	2 167.04	6.475	8.43
Silver FP	961.78	4 490.67	8.860	7.01
Gold FP	1064.18	5 433.54	9.546	6.40
Copper FP	1084.62	5 629.98	9.675	6.27
Palladium FP	1554.8	10 735.25	11.652	1.29
Platinum FP	1768.1	13 223.85	11.557	−2.22

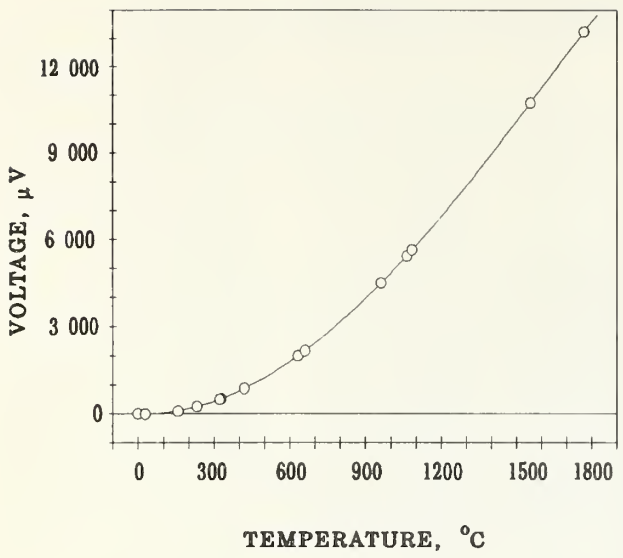

FIGURE 2.3.1. *Thermoelectric voltage for type B thermocouples. The circles indicate values at various thermometric fixed points.*

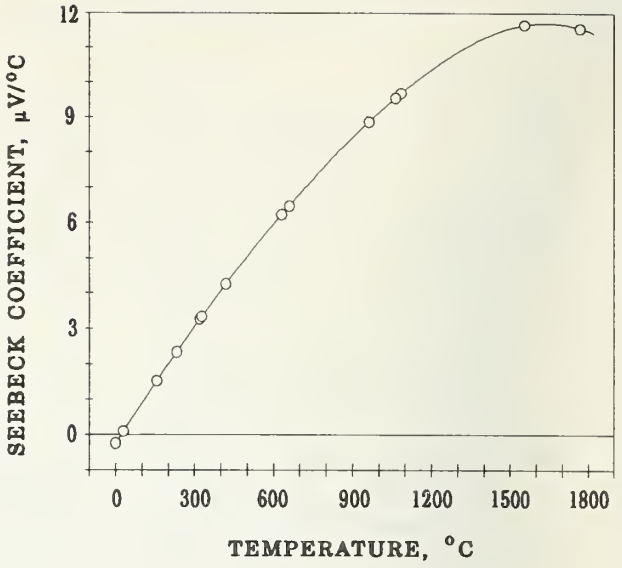

FIGURE 2.3.2. *Seebeck coefficient for type B thermocouples. The circles indicate values at various thermometric fixed points.*

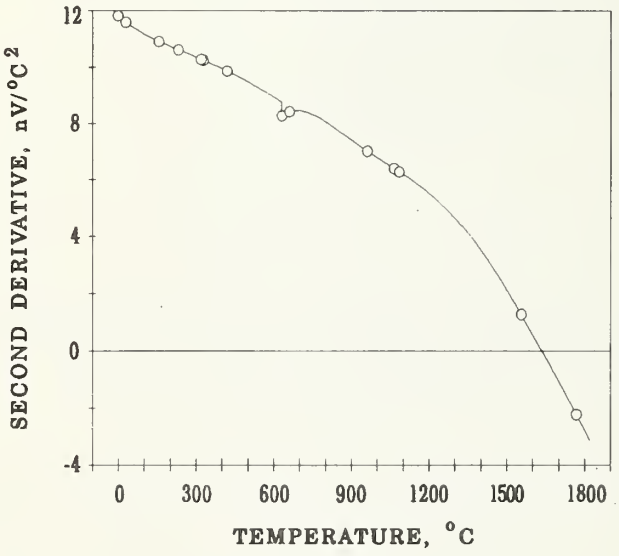

FIGURE 2.3.3. *Second derivative of thermoelectric voltage for type B thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 2.3.3. ***Type B thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.00	−0.247	11.81	50	2.28	0.335	11.45	100	33.20	0.900	11.17
1	−0.24	−0.235	11.80	51	2.62	0.346	11.45	101	34.11	0.911	11.16
2	−0.47	−0.223	11.79	52	2.97	0.358	11.44	102	35.03	0.922	11.16
3	−0.69	−0.211	11.78	53	3.33	0.369	11.43	103	35.95	0.933	11.15
4	−0.89	−0.199	11.78	54	3.71	0.380	11.43	104	36.89	0.945	11.15
5	−1.09	−0.188	11.77	55	4.09	0.392	11.42	105	37.84	0.956	11.14
6	−1.27	−0.176	11.76	56	4.49	0.403	11.42	106	38.80	0.967	11.14
7	−1.44	−0.164	11.75	57	4.90	0.415	11.41	107	39.78	0.978	11.13
8	−1.59	−0.152	11.75	58	5.32	0.426	11.40	108	40.76	0.989	11.13
9	−1.74	−0.141	11.74	59	5.75	0.438	11.40	109	41.76	1.000	11.12
10	−1.88	−0.129	11.73	60	6.20	0.449	11.39	110	42.76	1.011	11.12
11	−2.00	−0.117	11.72	61	6.65	0.460	11.39	111	43.78	1.023	11.11
12	−2.11	−0.105	11.72	62	7.12	0.472	11.38	112	44.81	1.034	11.11
13	−2.21	−0.094	11.71	63	7.59	0.483	11.37	113	45.85	1.045	11.10
14	−2.30	−0.082	11.70	64	8.08	0.494	11.37	114	46.90	1.056	11.10
15	−2.37	−0.070	11.69	65	8.58	0.506	11.36	115	47.96	1.067	11.09
16	−2.44	−0.059	11.69	66	9.09	0.517	11.36	116	49.03	1.078	11.09
17	−2.49	−0.047	11.68	67	9.62	0.528	11.35	117	50.11	1.089	11.08
18	−2.53	−0.035	11.67	68	10.15	0.540	11.34	118	51.21	1.100	11.08
19	−2.56	−0.024	11.66	69	10.70	0.551	11.34	119	52.31	1.111	11.07
20	−2.58	−0.012	11.66	70	11.25	0.563	11.33	120	53.43	1.122	11.07
21	−2.58	−0.000	11.65	71	11.82	0.574	11.33	121	54.56	1.133	11.06
22	−2.58	0.011	11.64	72	12.40	0.585	11.32	122	55.70	1.144	11.06
23	−2.56	0.023	11.63	73	12.99	0.596	11.31	123	56.85	1.156	11.06
24	−2.53	0.035	11.63	74	13.60	0.608	11.31	124	58.01	1.167	11.05
25	−2.49	0.046	11.62	75	14.21	0.619	11.30	125	59.18	1.178	11.05
26	−2.44	0.058	11.61	76	14.83	0.630	11.30	126	60.36	1.189	11.04
27	−2.38	0.070	11.61	77	15.47	0.642	11.29	127	61.56	1.200	11.04
28	−2.30	0.081	11.60	78	16.12	0.653	11.29	128	62.76	1.211	11.03
29	−2.21	0.093	11.59	79	16.78	0.664	11.28	129	63.98	1.222	11.03
30	−2.12	0.104	11.59	80	17.45	0.676	11.28	130	65.21	1.233	11.02
31	−2.01	0.116	11.58	81	18.13	0.687	11.27	131	66.45	1.244	11.02
32	−1.88	0.127	11.57	82	18.82	0.698	11.26	132	67.69	1.255	11.01
33	−1.75	0.139	11.56	83	19.52	0.709	11.26	133	68.96	1.266	11.01
34	−1.61	0.151	11.56	84	20.24	0.721	11.25	134	70.23	1.277	11.00
35	−1.45	0.162	11.55	85	20.96	0.732	11.25	135	71.51	1.288	11.00
36	−1.28	0.174	11.54	86	21.70	0.743	11.24	136	72.80	1.299	11.00
37	−1.10	0.185	11.54	87	22.45	0.754	11.24	137	74.11	1.310	10.99
38	−0.91	0.197	11.53	88	23.21	0.766	11.23	138	75.42	1.321	10.99
39	−0.71	0.208	11.52	89	23.98	0.777	11.23	139	76.75	1.332	10.98
40	−0.49	0.220	11.52	90	24.76	0.788	11.22	140	78.09	1.343	10.98
41	−0.27	0.231	11.51	91	25.56	0.799	11.22	141	79.43	1.354	10.97
42	−0.03	0.243	11.50	92	26.36	0.810	11.21	142	80.79	1.365	10.97
43	0.22	0.254	11.50	93	27.18	0.822	11.21	143	82.16	1.376	10.96
44	0.48	0.266	11.49	94	28.01	0.833	11.20	144	83.54	1.387	10.96
45	0.75	0.277	11.49	95	28.84	0.844	11.19	145	84.94	1.398	10.95
46	1.03	0.289	11.48	96	29.69	0.855	11.19	146	86.34	1.409	10.95
47	1.33	0.300	11.47	97	30.55	0.866	11.18	147	87.75	1.420	10.95
48	1.63	0.312	11.47	98	31.43	0.878	11.18	148	89.18	1.430	10.94
49	1.95	0.323	11.46	99	32.31	0.889	11.17	149	90.61	1.441	10.94
50	2.28	0.335	11.45	100	33.20	0.900	11.17	150	92.06	1.452	10.93

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	92.06	1.452	10.93	200	178.26	1.994	10.73	250	291.28	2.525	10.54
151	93.52	1.463	10.93	201	180.26	2.005	10.72	251	293.81	2.536	10.54
152	94.99	1.474	10.92	202	182.27	2.015	10.72	252	296.35	2.547	10.53
153	96.47	1.485	10.92	203	184.29	2.026	10.72	253	298.90	2.557	10.53
154	97.96	1.496	10.92	204	186.32	2.037	10.71	254	301.47	2.568	10.52
155	99.46	1.507	10.91	205	188.36	2.047	10.71	255	304.04	2.578	10.52
156	100.97	1.518	10.91	206	190.41	2.058	10.71	256	306.62	2.589	10.52
157	102.50	1.529	10.90	207	192.48	2.069	10.70	257	309.22	2.599	10.51
158	104.03	1.540	10.90	208	194.55	2.080	10.70	258	311.82	2.610	10.51
159	105.58	1.551	10.89	209	196.64	2.090	10.69	259	314.43	2.620	10.51
160	107.13	1.561	10.89	210	198.73	2.101	10.69	260	317.06	2.631	10.50
161	108.70	1.572	10.89	211	200.84	2.112	10.69	261	319.70	2.641	10.50
162	110.28	1.583	10.88	212	202.96	2.122	10.68	262	322.34	2.652	10.49
163	111.86	1.594	10.88	213	205.08	2.133	10.68	263	325.00	2.662	10.49
164	113.46	1.605	10.87	214	207.22	2.144	10.67	264	327.67	2.673	10.49
165	115.07	1.616	10.87	215	209.37	2.154	10.67	265	330.34	2.683	10.48
166	116.70	1.627	10.87	216	211.53	2.165	10.67	266	333.03	2.694	10.48
167	118.33	1.638	10.86	217	213.70	2.176	10.66	267	335.73	2.704	10.48
168	119.97	1.648	10.86	218	215.88	2.186	10.66	268	338.44	2.715	10.47
169	121.63	1.659	10.85	219	218.07	2.197	10.66	269	341.16	2.725	10.47
170	123.29	1.670	10.85	220	220.28	2.208	10.65	270	343.89	2.735	10.46
171	124.97	1.681	10.84	221	222.49	2.218	10.65	271	346.63	2.746	10.46
172	126.65	1.692	10.84	222	224.71	2.229	10.64	272	349.38	2.756	10.46
173	128.35	1.703	10.84	223	226.95	2.240	10.64	273	352.14	2.767	10.45
174	130.06	1.714	10.83	224	229.19	2.250	10.64	274	354.92	2.777	10.45
175	131.78	1.724	10.83	225	231.45	2.261	10.63	275	357.70	2.788	10.45
176	133.51	1.735	10.82	226	233.71	2.271	10.63	276	360.49	2.798	10.44
177	135.25	1.746	10.82	227	235.99	2.282	10.62	277	363.30	2.809	10.44
178	137.00	1.757	10.82	228	238.28	2.293	10.62	278	366.11	2.819	10.43
179	138.76	1.768	10.81	229	240.57	2.303	10.62	279	368.93	2.830	10.43
180	140.53	1.778	10.81	230	242.88	2.314	10.61	280	371.77	2.840	10.43
181	142.32	1.789	10.80	231	245.20	2.325	10.61	281	374.61	2.850	10.42
182	144.11	1.800	10.80	232	247.53	2.335	10.61	282	377.47	2.861	10.42
183	145.92	1.811	10.80	233	249.87	2.346	10.60	283	380.34	2.871	10.42
184	147.73	1.822	10.79	234	252.22	2.356	10.60	284	383.21	2.882	10.41
185	149.56	1.832	10.79	235	254.59	2.367	10.59	285	386.10	2.892	10.41
186	151.40	1.843	10.78	236	256.96	2.378	10.59	286	389.00	2.902	10.40
187	153.25	1.854	10.78	237	259.34	2.388	10.59	287	391.90	2.913	10.40
188	155.11	1.865	10.78	238	261.73	2.399	10.58	288	394.82	2.923	10.40
189	156.98	1.876	10.77	239	264.14	2.409	10.58	289	397.75	2.934	10.39
190	158.86	1.886	10.77	240	266.55	2.420	10.58	290	400.69	2.944	10.39
191	160.75	1.897	10.76	241	268.98	2.430	10.57	291	403.64	2.954	10.39
192	162.65	1.908	10.76	242	271.41	2.441	10.57	292	406.60	2.965	10.38
193	164.57	1.919	10.76	243	273.86	2.452	10.56	293	409.57	2.975	10.38
194	166.49	1.929	10.75	244	276.32	2.462	10.56	294	412.55	2.986	10.37
195	168.42	1.940	10.75	245	278.78	2.473	10.56	295	415.54	2.996	10.37
196	170.37	1.951	10.74	246	281.26	2.483	10.55	296	418.54	3.006	10.37
197	172.33	1.962	10.74	247	283.75	2.494	10.55	297	421.55	3.017	10.36
198	174.29	1.972	10.74	248	286.25	2.504	10.55	298	424.57	3.027	10.36
199	176.27	1.983	10.73	249	288.76	2.515	10.54	299	427.61	3.037	10.36
200	178.26	1.994	10.73	250	291.28	2.525	10.54	300	430.65	3.048	10.35

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	430.65	3.048	10.35	**350**	595.89	3.561	10.16	**400**	786.53	4.063	9.95
301	433.70	3.058	10.35	**351**	599.46	3.571	10.15	**401**	790.60	4.073	9.95
302	436.76	3.068	10.34	**352**	603.04	3.581	10.15	**402**	794.68	4.083	9.94
303	439.84	3.079	10.34	**353**	606.62	3.591	10.15	**403**	798.77	4.093	9.94
304	442.92	3.089	10.34	**354**	610.22	3.601	10.14	**404**	802.87	4.103	9.93
305	446.02	3.099	10.33	**355**	613.82	3.611	10.14	**405**	806.97	4.113	9.93
306	449.12	3.110	10.33	**356**	617.44	3.621	10.13	**406**	811.09	4.123	9.92
307	452.24	3.120	10.33	**357**	621.07	3.632	10.13	**407**	815.22	4.133	9.92
308	455.36	3.130	10.32	**358**	624.70	3.642	10.13	**408**	819.36	4.143	9.91
309	458.50	3.141	10.32	**359**	628.35	3.652	10.12	**409**	823.50	4.153	9.91
310	461.64	3.151	10.31	**360**	632.01	3.662	10.12	**410**	827.66	4.163	9.91
311	464.80	3.161	10.31	**361**	635.67	3.672	10.11	**411**	831.83	4.172	9.90
312	467.96	3.172	10.31	**362**	639.35	3.682	10.11	**412**	836.01	4.182	9.90
313	471.14	3.182	10.30	**363**	643.04	3.692	10.11	**413**	840.19	4.192	9.89
314	474.33	3.192	10.30	**364**	646.74	3.702	10.10	**414**	844.39	4.202	9.89
315	477.53	3.203	10.29	**365**	650.44	3.712	10.10	**415**	848.60	4.212	9.88
316	480.73	3.213	10.29	**366**	654.16	3.723	10.09	**416**	852.82	4.222	9.88
317	483.95	3.223	10.29	**367**	657.89	3.733	10.09	**417**	857.04	4.232	9.87
318	487.18	3.233	10.28	**368**	661.63	3.743	10.08	**418**	861.28	4.242	9.87
319	490.42	3.244	10.28	**369**	665.37	3.753	10.08	**419**	865.53	4.252	9.87
320	493.67	3.254	10.28	**370**	669.13	3.763	10.08	**420**	869.78	4.261	9.86
321	496.93	3.264	10.27	**371**	672.90	3.773	10.07	**421**	874.05	4.271	9.86
322	500.20	3.275	10.27	**372**	676.68	3.783	10.07	**422**	878.32	4.281	9.85
323	503.48	3.285	10.26	**373**	680.46	3.793	10.06	**423**	882.61	4.291	9.85
324	506.77	3.295	10.26	**374**	684.26	3.803	10.06	**424**	886.91	4.301	9.84
325	510.07	3.305	10.26	**375**	688.07	3.813	10.06	**425**	891.21	4.311	9.84
326	513.38	3.316	10.25	**376**	691.89	3.823	10.05	**426**	895.53	4.320	9.83
327	516.70	3.326	10.25	**377**	695.72	3.833	10.05	**427**	899.85	4.330	9.83
328	520.03	3.336	10.24	**378**	699.56	3.843	10.04	**428**	904.19	4.340	9.82
329	523.37	3.346	10.24	**379**	703.40	3.853	10.04	**429**	908.53	4.350	9.82
330	526.72	3.357	10.24	**380**	707.26	3.863	10.03	**430**	912.89	4.360	9.82
331	530.08	3.367	10.23	**381**	711.13	3.873	10.03	**431**	917.25	4.370	9.81
332	533.45	3.377	10.23	**382**	715.01	3.883	10.03	**432**	921.63	4.379	9.81
333	536.84	3.387	10.23	**383**	718.90	3.894	10.02	**433**	926.01	4.389	9.80
334	540.23	3.397	10.22	**384**	722.80	3.904	10.02	**434**	930.41	4.399	9.80
335	543.63	3.408	10.22	**385**	726.71	3.914	10.01	**435**	934.81	4.409	9.79
336	547.04	3.418	10.21	**386**	730.62	3.924	10.01	**436**	939.22	4.419	9.79
337	550.47	3.428	10.21	**387**	734.55	3.934	10.01	**437**	943.65	4.428	9.78
338	553.90	3.438	10.21	**388**	738.49	3.944	10.00	**438**	948.08	4.438	9.78
339	557.34	3.449	10.20	**389**	742.44	3.954	10.00	**439**	952.52	4.448	9.77
340	560.80	3.459	10.20	**390**	746.40	3.964	9.99	**440**	956.98	4.458	9.77
341	564.26	3.469	10.19	**391**	750.37	3.974	9.99	**441**	961.44	4.467	9.76
342	567.74	3.479	10.19	**392**	754.35	3.984	9.98	**442**	965.91	4.477	9.76
343	571.22	3.489	10.19	**393**	758.33	3.994	9.98	**443**	970.39	4.487	9.76
344	574.71	3.499	10.18	**394**	762.33	4.003	9.98	**444**	974.88	4.497	9.75
345	578.22	3.510	10.18	**395**	766.34	4.013	9.97	**445**	979.39	4.506	9.75
346	581.73	3.520	10.17	**396**	770.36	4.023	9.97	**446**	983.90	4.516	9.74
347	585.26	3.530	10.17	**397**	774.39	4.033	9.96	**447**	988.42	4.526	9.74
348	588.79	3.540	10.17	**398**	778.43	4.043	9.96	**448**	992.95	4.536	9.73
349	592.34	3.550	10.16	**399**	782.47	4.053	9.95	**449**	997.49	4.545	9.73
350	595.89	3.561	10.16	**400**	786.53	4.063	9.95	**450**	1 002.04	4.555	9.72

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Coninued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
450	1 002.04	4.555	9.72	500	1 241.85	5.035	9.48	550	1 505.35	5.502	9.21
451	1 006.60	4.565	9.72	501	1 246.89	5.045	9.47	551	1 510.85	5.512	9.21
452	1 011.17	4.575	9.71	502	1 251.94	5.054	9.47	552	1 516.37	5.521	9.20
453	1 015.75	4.584	9.71	503	1 257.00	5.064	9.46	553	1 521.89	5.530	9.20
454	1 020.34	4.594	9.70	504	1 262.07	5.073	9.46	554	1 527.43	5.539	9.19
455	1 024.94	4.604	9.70	505	1 267.14	5.083	9.45	555	1 532.97	5.548	9.18
456	1 029.55	4.613	9.69	506	1 272.23	5.092	9.45	556	1 538.53	5.558	9.18
457	1 034.16	4.623	9.69	507	1 277.33	5.101	9.44	557	1 544.09	5.567	9.17
458	1 038.79	4.633	9.68	508	1 282.43	5.111	9.43	558	1 549.66	5.576	9.17
459	1 043.43	4.642	9.68	509	1 287.55	5.120	9.43	559	1 555.24	5.585	9.16
460	1 048.08	4.652	9.67	510	1 292.67	5.130	9.42	560	1 560.83	5.594	9.16
461	1 052.73	4.662	9.67	511	1 297.81	5.139	9.42	561	1 566.43	5.603	9.15
462	1 057.40	4.671	9.67	512	1 302.95	5.149	9.41	562	1 572.04	5.613	9.15
463	1 062.08	4.681	9.66	513	1 308.11	5.158	9.41	563	1 577.65	5.622	9.14
464	1 066.76	4.691	9.66	514	1 313.27	5.167	9.40	564	1 583.28	5.631	9.13
465	1 071.46	4.700	9.65	515	1 318.44	5.177	9.40	565	1 588.92	5.640	9.13
466	1 076.16	4.710	9.65	516	1 323.62	5.186	9.39	566	1 594.56	5.649	9.12
467	1 080.88	4.720	9.64	517	1 328.81	5.196	9.39	567	1 600.21	5.658	9.12
468	1 085.60	4.729	9.64	518	1 334.01	5.205	9.38	568	1 605.88	5.667	9.11
469	1 090.34	4.739	9.63	519	1 339.22	5.214	9.38	569	1 611.55	5.676	9.11
470	1 095.08	4.749	9.63	520	1 344.44	5.224	9.37	570	1 617.23	5.686	9.10
471	1 099.83	4.758	9.62	521	1 349.67	5.233	9.37	571	1 622.92	5.695	9.10
472	1 104.60	4.768	9.62	522	1 354.91	5.242	9.36	572	1 628.62	5.704	9.09
473	1 109.37	4.777	9.61	523	1 360.16	5.252	9.36	573	1 634.33	5.713	9.08
474	1 114.15	4.787	9.61	524	1 365.41	5.261	9.35	574	1 640.05	5.722	9.08
475	1 118.94	4.797	9.60	525	1 370.68	5.270	9.35	575	1 645.77	5.731	9.07
476	1 123.75	4.806	9.60	526	1 375.95	5.280	9.34	576	1 651.51	5.740	9.07
477	1 128.56	4.816	9.59	527	1 381.24	5.289	9.34	577	1 657.25	5.749	9.06
478	1 133.38	4.825	9.59	528	1 386.53	5.298	9.33	578	1 663.01	5.758	9.06
479	1 138.21	4.835	9.58	529	1 391.83	5.308	9.32	579	1 668.77	5.767	9.05
480	1 143.05	4.845	9.58	530	1 397.15	5.317	9.32	580	1 674.54	5.776	9.05
481	1 147.90	4.854	9.57	531	1 402.47	5.326	9.31	581	1 680.32	5.785	9.04
482	1 152.76	4.864	9.57	532	1 407.80	5.336	9.31	582	1 686.11	5.794	9.03
483	1 157.62	4.873	9.56	533	1 413.14	5.345	9.30	583	1 691.91	5.803	9.03
484	1 162.50	4.883	9.56	534	1 418.49	5.354	9.30	584	1 697.72	5.812	9.02
485	1 167.39	4.892	9.55	535	1 423.85	5.364	9.29	585	1 703.53	5.821	9.02
486	1 172.29	4.902	9.55	536	1 429.22	5.373	9.29	586	1 709.36	5.830	9.01
487	1 177.19	4.912	9.54	537	1 434.59	5.382	9.28	587	1 715.20	5.840	9.01
488	1 182.11	4.921	9.54	538	1 439.98	5.392	9.28	588	1 721.04	5.849	9.00
489	1 187.04	4.931	9.53	539	1 445.38	5.401	9.27	589	1 726.89	5.858	9.00
490	1 191.97	4.940	9.53	540	1 450.78	5.410	9.27	590	1 732.75	5.866	8.99
491	1 196.92	4.950	9.52	541	1 456.20	5.419	9.26	591	1 738.63	5.875	8.98
492	1 201.87	4.959	9.52	542	1 461.62	5.429	9.25	592	1 744.51	5.884	8.98
493	1 206.84	4.969	9.51	543	1 467.05	5.438	9.25	593	1 750.39	5.893	8.97
494	1 211.81	4.978	9.51	544	1 472.50	5.447	9.24	594	1 756.29	5.902	8.97
495	1 216.79	4.988	9.50	545	1 477.95	5.456	9.24	595	1 762.20	5.911	8.96
496	1 221.78	4.997	9.50	546	1 483.41	5.466	9.23	596	1 768.12	5.920	8.96
497	1 226.79	5.007	9.49	547	1 488.88	5.475	9.23	597	1 774.04	5.929	8.95
498	1 231.80	5.016	9.49	548	1 494.36	5.484	9.22	598	1 779.97	5.938	8.94
499	1 236.82	5.026	9.48	549	1 499.85	5.493	9.22	599	1 785.92	5.947	8.94
500	1 241.85	5.035	9.48	550	1 505.35	5.502	9.21	600	1 791.87	5.956	8.93

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	1 791.87	5.956	8.93	**650**	2 100.65	6.389	8.39	**700**	2 430.63	6.811	8.47
601	1 797.83	5.965	8.93	**651**	2 107.04	6.397	8.40	**701**	2 437.44	6.820	8.47
602	1 803.80	5.974	8.92	**652**	2 113.44	6.405	8.40	**702**	2 444.27	6.828	8.47
603	1 809.78	5.983	8.92	**653**	2 119.85	6.414	8.41	**703**	2 451.10	6.837	8.46
604	1 815.76	5.992	8.91	**654**	2 126.27	6.422	8.41	**704**	2 457.94	6.845	8.46
605	1 821.76	6.001	8.90	**655**	2 132.69	6.431	8.41	**705**	2 464.79	6.854	8.46
606	1 827.77	6.010	8.90	**656**	2 139.13	6.439	8.42	**706**	2 471.65	6.862	8.46
607	1 833.78	6.019	8.89	**657**	2 145.57	6.447	8.42	**707**	2 478.51	6.870	8.46
608	1 839.80	6.027	8.89	**658**	2 152.02	6.456	8.42	**708**	2 485.39	6.879	8.46
609	1 845.83	6.036	8.88	**659**	2 158.48	6.464	8.43	**709**	2 492.27	6.887	8.45
610	1 851.87	6.045	8.88	**660**	2 164.95	6.473	8.43	**710**	2 499.16	6.896	8.45
611	1 857.92	6.054	8.87	**661**	2 171.43	6.481	8.43	**711**	2 506.06	6.904	8.45
612	1 863.98	6.063	8.86	**662**	2 177.91	6.490	8.44	**712**	2 512.97	6.913	8.45
613	1 870.05	6.072	8.86	**663**	2 184.41	6.498	8.44	**713**	2 519.89	6.921	8.45
614	1 876.13	6.081	8.85	**664**	2 190.91	6.506	8.44	**714**	2 526.81	6.930	8.44
615	1 882.21	6.089	8.85	**665**	2 197.42	6.515	8.45	**715**	2 533.75	6.938	8.44
616	1 888.31	6.098	8.84	**666**	2 203.94	6.523	8.45	**716**	2 540.69	6.947	8.44
617	1 894.41	6.107	8.84	**667**	2 210.47	6.532	8.45	**717**	2 547.64	6.955	8.44
618	1 900.52	6.116	8.83	**668**	2 217.00	6.540	8.45	**718**	2 554.60	6.963	8.43
619	1 906.64	6.125	8.82	**669**	2 223.55	6.549	8.46	**719**	2 561.57	6.972	8.43
620	1 912.77	6.134	8.82	**670**	2 230.10	6.557	8.46	**720**	2 568.54	6.980	8.43
621	1 918.91	6.142	8.81	**671**	2 236.66	6.566	8.46	**721**	2 575.53	6.989	8.43
622	1 925.05	6.151	8.81	**672**	2 243.23	6.574	8.46	**722**	2 582.52	6.997	8.42
623	1 931.21	6.160	8.80	**673**	2 249.81	6.583	8.46	**723**	2 589.52	7.006	8.42
624	1 937.37	6.169	8.80	**674**	2 256.40	6.591	8.46	**724**	2 596.53	7.014	8.42
625	1 943.55	6.178	8.79	**675**	2 262.99	6.599	8.47	**725**	2 603.55	7.022	8.41
626	1 949.73	6.186	8.78	**676**	2 269.60	6.608	8.47	**726**	2 610.58	7.031	8.41
627	1 955.92	6.195	8.78	**677**	2 276.21	6.616	8.47	**727**	2 617.61	7.039	8.41
628	1 962.12	6.204	8.77	**678**	2 282.83	6.625	8.47	**728**	2 624.65	7.048	8.41
629	1 968.33	6.213	8.77	**679**	2 289.46	6.633	8.47	**729**	2 631.71	7.056	8.40
630	1 974.55	6.222	8.76	**680**	2 296.10	6.642	8.47	**730**	2 638.77	7.064	8.40
631	1 980.77	6.230	8.28	**681**	2 302.74	6.650	8.47	**731**	2 645.83	7.073	8.40
632	1 987.01	6.238	8.29	**682**	2 309.40	6.659	8.47	**732**	2 652.91	7.081	8.39
633	1 993.25	6.247	8.29	**683**	2 316.06	6.667	8.47	**733**	2 660.00	7.090	8.39
634	1 999.50	6.255	8.30	**684**	2 322.73	6.676	8.47	**734**	2 667.09	7.098	8.38
635	2 005.76	6.263	8.31	**685**	2 329.41	6.684	8.47	**735**	2 674.19	7.106	8.38
636	2 012.03	6.272	8.31	**686**	2 336.10	6.693	8.47	**736**	2 681.30	7.115	8.38
637	2 018.30	6.280	8.32	**687**	2 342.80	6.701	8.47	**737**	2 688.42	7.123	8.37
638	2 024.59	6.288	8.33	**688**	2 349.50	6.710	8.47	**738**	2 695.55	7.131	8.37
639	2 030.88	6.297	8.33	**689**	2 356.21	6.718	8.47	**739**	2 702.69	7.140	8.37
640	2 037.18	6.305	8.34	**690**	2 362.94	6.727	8.47	**740**	2 709.83	7.148	8.36
641	2 043.49	6.313	8.35	**691**	2 369.67	6.735	8.47	**741**	2 716.98	7.157	8.36
642	2 049.81	6.322	8.35	**692**	2 376.41	6.743	8.47	**742**	2 724.14	7.165	8.35
643	2 056.13	6.330	8.36	**693**	2 383.15	6.752	8.47	**743**	2 731.31	7.173	8.35
644	2 062.46	6.338	8.36	**694**	2 389.91	6.760	8.47	**744**	2 738.49	7.182	8.35
645	2 068.81	6.347	8.37	**695**	2 396.68	6.769	8.47	**745**	2 745.68	7.190	8.34
646	2 075.16	6.355	8.37	**696**	2 403.45	6.777	8.47	**746**	2 752.87	7.198	8.34
647	2 081.52	6.363	8.38	**697**	2 410.23	6.786	8.47	**747**	2 760.07	7.207	8.33
648	2 087.89	6.372	8.38	**698**	2 417.02	6.794	8.47	**748**	2 767.28	7.215	8.33
649	2 094.26	6.380	8.39	**699**	2 423.82	6.803	8.47	**749**	2 774.50	7.223	8.33
650	2 100.65	6.389	8.39	**700**	2 430.63	6.811	8.47	**750**	2 781.73	7.232	8.32

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	2 781.73	7.232	8.32	800	3 153.61	7.641	8.05	850	3 545.61	8.036	7.73
751	2 788.97	7.240	8.32	801	3 161.26	7.649	8.05	851	3 553.65	8.044	7.73
752	2 796.21	7.248	8.31	802	3 168.91	7.657	8.04	852	3 561.70	8.052	7.72
753	2 803.46	7.257	8.31	803	3 176.57	7.665	8.03	853	3 569.76	8.059	7.71
754	2 810.72	7.265	8.30	804	3 184.24	7.673	8.03	854	3 577.82	8.067	7.71
755	2 817.99	7.273	8.30	805	3 191.92	7.682	8.02	855	3 585.89	8.075	7.70
756	2 825.27	7.281	8.29	806	3 199.60	7.690	8.02	856	3 593.97	8.082	7.69
757	2 832.55	7.290	8.29	807	3 207.30	7.698	8.01	857	3 602.05	8.090	7.69
758	2 839.85	7.298	8.28	808	3 215.00	7.706	8.00	858	3 610.15	8.098	7.68
759	2 847.15	7.306	8.28	809	3 222.71	7.714	8.00	859	3 618.25	8.105	7.67
760	2 854.46	7.315	8.27	810	3 230.42	7.722	7.99	860	3 626.36	8.113	7.67
761	2 861.78	7.323	8.27	811	3 238.15	7.730	7.99	861	3 634.48	8.121	7.66
762	2 869.11	7.331	8.26	812	3 245.88	7.738	7.98	862	3 642.60	8.128	7.65
763	2 876.44	7.339	8.26	813	3 253.63	7.746	7.97	863	3 650.73	8.136	7.65
764	2 883.79	7.348	8.25	814	3 261.37	7.753	7.97	864	3 658.87	8.144	7.64
765	2 891.14	7.356	8.25	815	3 269.13	7.761	7.96	865	3 667.02	8.151	7.63
766	2 898.50	7.364	8.24	816	3 276.90	7.769	7.95	866	3 675.18	8.159	7.63
767	2 905.87	7.372	8.24	817	3 284.67	7.777	7.95	867	3 683.34	8.167	7.62
768	2 913.24	7.381	8.23	818	3 292.45	7.785	7.94	868	3 691.51	8.174	7.61
769	2 920.63	7.389	8.23	819	3 300.24	7.793	7.94	869	3 699.69	8.182	7.61
770	2 928.02	7.397	8.22	820	3 308.04	7.801	7.93	870	3 707.87	8.189	7.60
771	2 935.42	7.405	8.22	821	3 315.84	7.809	7.92	871	3 716.07	8.197	7.59
772	2 942.83	7.414	8.21	822	3 323.66	7.817	7.92	872	3 724.27	8.205	7.59
773	2 950.25	7.422	8.21	823	3 331.48	7.825	7.91	873	3 732.48	8.212	7.58
774	2 957.67	7.430	8.20	824	3 339.31	7.833	7.90	874	3 740.69	8.220	7.57
775	2 965.11	7.438	8.20	825	3 347.14	7.841	7.90	875	3 748.91	8.227	7.57
776	2 972.55	7.446	8.19	826	3 354.99	7.849	7.89	876	3 757.15	8.235	7.56
777	2 980.00	7.455	8.19	827	3 362.84	7.857	7.88	877	3 765.38	8.242	7.55
778	2 987.46	7.463	8.18	828	3 370.70	7.864	7.88	878	3 773.63	8.250	7.55
779	2 994.93	7.471	8.18	829	3 378.57	7.872	7.87	879	3 781.88	8.258	7.54
780	3 002.40	7.479	8.17	830	3 386.45	7.880	7.86	880	3 790.15	8.265	7.53
781	3 009.88	7.487	8.16	831	3 394.33	7.888	7.86	881	3 798.41	8.273	7.53
782	3 017.38	7.495	8.16	832	3 402.22	7.896	7.85	882	3 806.69	8.280	7.52
783	3 024.88	7.504	8.15	833	3 410.12	7.904	7.84	883	3 814.98	8.288	7.51
784	3 032.38	7.512	8.15	834	3 418.03	7.912	7.84	884	3 823.27	8.295	7.51
785	3 039.90	7.520	8.14	835	3 425.94	7.919	7.83	885	3 831.57	8.303	7.50
786	3 047.42	7.528	8.14	836	3 433.87	7.927	7.83	886	3 839.87	8.310	7.49
787	3 054.96	7.536	8.13	837	3 441.80	7.935	7.82	887	3 848.19	8.318	7.49
788	3 062.50	7.544	8.12	838	3 449.74	7.943	7.81	888	3 856.51	8.325	7.48
789	3 070.04	7.552	8.12	839	3 457.68	7.951	7.81	889	3 864.84	8.333	7.47
790	3 077.60	7.560	8.11	840	3 465.64	7.958	7.80	890	3 873.17	8.340	7.47
791	3 085.16	7.569	8.11	841	3 473.60	7.966	7.79	891	3 881.52	8.348	7.46
792	3 092.74	7.577	8.10	842	3 481.57	7.974	7.79	892	3 889.87	8.355	7.46
793	3 100.32	7.585	8.10	843	3 489.55	7.982	7.78	893	3 898.23	8.363	7.45
794	3 107.91	7.593	8.09	844	3 497.54	7.990	7.77	894	3 906.59	8.370	7.44
795	3 115.50	7.601	8.08	845	3 505.53	7.997	7.77	895	3 914.97	8.377	7.44
796	3 123.11	7.609	8.08	846	3 513.53	8.005	7.76	896	3 923.35	8.385	7.43
797	3 130.72	7.617	8.07	847	3 521.54	8.013	7.75	897	3 931.74	8.392	7.42
798	3 138.34	7.625	8.07	848	3 529.56	8.021	7.75	898	3 940.13	8.400	7.42
799	3 145.97	7.633	8.06	849	3 537.58	8.028	7.74	899	3 948.54	8.407	7.41
800	3 153.61	7.641	8.05	850	3 545.61	8.036	7.73	900	3 956.95	8.414	7.40

TABLE 2.3.3. ***Type B thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	3 956.95	8.414	7.40	**950**	4 386.79	8.777	7.08	**1000**	4 834.34	9.123	6.78
901	3 965.36	8.422	7.40	**951**	4 395.57	8.784	7.08	**1001**	4 843.46	9.130	6.77
902	3 973.79	8.429	7.39	**952**	4 404.36	8.791	7.07	**1002**	4 852.60	9.136	6.76
903	3 982.22	8.437	7.38	**953**	4 413.15	8.798	7.06	**1003**	4 861.74	9.143	6.76
904	3 990.66	8.444	7.38	**954**	4 421.95	8.805	7.06	**1004**	4 870.88	9.150	6.75
905	3 999.11	8.451	7.37	**955**	4 430.76	8.812	7.05	**1005**	4 880.04	9.157	6.75
906	4 007.57	8.459	7.36	**956**	4 439.58	8.819	7.04	**1006**	4 889.20	9.163	6.74
907	4 016.03	8.466	7.36	**957**	4 448.40	8.826	7.04	**1007**	4 898.36	9.170	6.73
908	4 024.50	8.474	7.35	**958**	4 457.23	8.833	7.03	**1008**	4 907.54	9.177	6.73
909	4 032.98	8.481	7.34	**959**	4 466.06	8.840	7.03	**1009**	4 916.72	9.184	6.72
910	4 041.46	8.488	7.34	**960**	4 474.91	8.847	7.02	**1010**	4 925.91	9.190	6.72
911	4 049.95	8.496	7.33	**961**	4 483.76	8.854	7.01	**1011**	4 935.10	9.197	6.71
912	4 058.45	8.503	7.32	**962**	4 492.62	8.861	7.01	**1012**	4 944.30	9.204	6.70
913	4 066.96	8.510	7.32	**963**	4 501.48	8.868	7.00	**1013**	4 953.51	9.210	6.70
914	4 075.47	8.517	7.31	**964**	4 510.35	8.875	6.99	**1014**	4 962.72	9.217	6.69
915	4 083.99	8.525	7.30	**965**	4 519.23	8.882	6.99	**1015**	4 971.94	9.224	6.69
916	4 092.52	8.532	7.30	**966**	4 528.12	8.889	6.98	**1016**	4 981.17	9.231	6.68
917	4 101.06	8.539	7.29	**967**	4 537.01	8.896	6.98	**1017**	4 990.40	9.237	6.67
918	4 109.60	8.547	7.29	**968**	4 545.91	8.903	6.97	**1018**	4 999.64	9.244	6.67
919	4 118.15	8.554	7.28	**969**	4 554.81	8.910	6.96	**1019**	5 008.89	9.251	6.66
920	4 126.71	8.561	7.27	**970**	4 563.73	8.917	6.96	**1020**	5 018.14	9.257	6.66
921	4 135.27	8.569	7.27	**971**	4 572.65	8.924	6.95	**1021**	5 027.40	9.264	6.65
922	4 143.85	8.576	7.26	**972**	4 581.58	8.931	6.95	**1022**	5 036.67	9.271	6.64
923	4 152.42	8.583	7.25	**973**	4 590.51	8.938	6.94	**1023**	5 045.95	9.277	6.64
924	4 161.01	8.590	7.25	**974**	4 599.45	8.945	6.93	**1024**	5 055.23	9.284	6.63
925	4 169.61	8.598	7.24	**975**	4 608.40	8.952	6.93	**1025**	5 064.51	9.290	6.63
926	4 178.21	8.605	7.23	**976**	4 617.35	8.959	6.92	**1026**	5 073.81	9.297	6.62
927	4 186.81	8.612	7.23	**977**	4 626.32	8.965	6.91	**1027**	5 083.11	9.304	6.62
928	4 195.43	8.619	7.22	**978**	4 635.29	8.972	6.91	**1028**	5 092.41	9.310	6.61
929	4 204.05	8.626	7.21	**979**	4 644.26	8.979	6.90	**1029**	5 101.73	9.317	6.60
930	4 212.68	8.634	7.21	**980**	4 653.24	8.986	6.90	**1030**	5 111.05	9.323	6.60
931	4 221.32	8.641	7.20	**981**	4 662.23	8.993	6.89	**1031**	5 120.37	9.330	6.59
932	4 229.96	8.648	7.20	**982**	4 671.23	9.000	6.88	**1032**	5 129.71	9.337	6.59
933	4 238.62	8.655	7.19	**983**	4 680.23	9.007	6.88	**1033**	5 139.05	9.343	6.58
934	4 247.28	8.662	7.18	**984**	4 689.24	9.014	6.87	**1034**	5 148.39	9.350	6.57
935	4 255.94	8.670	7.18	**985**	4 698.26	9.021	6.87	**1035**	5 157.75	9.356	6.57
936	4 264.61	8.677	7.17	**986**	4 707.28	9.027	6.86	**1036**	5 167.11	9.363	6.56
937	4 273.29	8.684	7.16	**987**	4 716.32	9.034	6.85	**1037**	5 176.47	9.370	6.56
938	4 281.98	8.691	7.16	**988**	4 725.35	9.041	6.85	**1038**	5 185.85	9.376	6.55
939	4 290.68	8.698	7.15	**989**	4 734.40	9.048	6.84	**1039**	5 195.23	9.383	6.54
940	4 299.38	8.705	7.14	**990**	4 743.45	9.055	6.84	**1040**	5 204.61	9.389	6.54
941	4 308.09	8.713	7.14	**991**	4 752.51	9.062	6.83	**1041**	5 214.00	9.396	6.53
942	4 316.80	8.720	7.13	**992**	4 761.57	9.069	6.82	**1042**	5 223.40	9.402	6.53
943	4 325.53	8.727	7.13	**993**	4 770.64	9.075	6.82	**1043**	5 232.81	9.409	6.52
944	4 334.26	8.734	7.12	**994**	4 779.72	9.082	6.81	**1044**	5 242.22	9.415	6.51
945	4 343.00	8.741	7.11	**995**	4 788.81	9.089	6.81	**1045**	5 251.64	9.422	6.51
946	4 351.74	8.748	7.11	**996**	4 797.90	9.096	6.80	**1046**	5 261.06	9.428	6.50
947	4 360.49	8.755	7.10	**997**	4 807.00	9.103	6.79	**1047**	5 270.50	9.435	6.50
948	4 369.25	8.762	7.09	**998**	4 816.11	9.109	6.79	**1048**	5 279.93	9.441	6.49
949	4 378.02	8.769	7.09	**999**	4 825.22	9.116	6.78	**1049**	5 289.38	9.448	6.49
950	4 386.79	8.777	7.08	**1000**	4 834.34	9.123	6.78	**1050**	5 298.83	9.454	6.48

TABLE 2.3.3. ***Type B thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
1050	5 298.83	9.454	6.48	1100	5 779.52	9.771	6.18	1150	6275.65	10.072	5.86
1051	5 308.29	9.461	6.47	1101	5 789.29	9.777	6.17	1151	6285.72	10.078	5.85
1052	5 317.75	9.467	6.47	1102	5 799.07	9.783	6.17	1152	6295.81	10.084	5.85
1053	5 327.22	9.474	6.46	1103	5 808.86	9.789	6.16	1153	6305.89	10.089	5.84
1054	5 336.70	9.480	6.46	1104	5 818.65	9.795	6.15	1154	6315.98	10.095	5.83
1055	5 346.18	9.487	6.45	1105	5 828.45	9.802	6.15	1155	6326.08	10.101	5.83
1056	5 355.67	9.493	6.44	1106	5 838.25	9.808	6.14	1156	6336.19	10.107	5.82
1057	5 365.17	9.499	6.44	1107	5 848.06	9.814	6.14	1157	6346.30	10.113	5.81
1058	5 374.67	9.506	6.43	1108	5 857.88	9.820	6.13	1158	6356.41	10.119	5.81
1059	5 384.18	9.512	6.43	1109	5 867.70	9.826	6.12	1159	6366.53	10.124	5.80
1060	5 393.69	9.519	6.42	1110	5 877.53	9.832	6.12	1160	6376.66	10.130	5.79
1061	5 403.22	9.525	6.41	1111	5 887.37	9.838	6.11	1161	6386.79	10.136	5.79
1062	5 412.75	9.532	6.41	1112	5 897.21	9.844	6.11	1162	6396.93	10.142	5.78
1063	5 422.28	9.538	6.40	1113	5 907.06	9.851	6.10	1163	6407.08	10.148	5.77
1064	5 431.82	9.544	6.40	1114	5 916.91	9.857	6.09	1164	6417.23	10.153	5.77
1065	5 441.37	9.551	6.39	1115	5 926.77	9.863	6.09	1165	6427.38	10.159	5.76
1066	5 450.92	9.557	6.38	1116	5 936.64	9.869	6.08	1166	6437.55	10.165	5.75
1067	5 460.48	9.564	6.38	1117	5 946.51	9.875	6.07	1167	6447.71	10.171	5.75
1068	5 470.05	9.570	6.37	1118	5 956.39	9.881	6.07	1168	6457.89	10.176	5.74
1069	5 479.62	9.576	6.37	1119	5 966.27	9.887	6.06	1169	6468.07	10.182	5.73
1070	5 489.20	9.583	6.36	1120	5 976.16	9.893	6.06	1170	6478.25	10.188	5.72
1071	5 498.79	9.589	6.35	1121	5 986.06	9.899	6.05	1171	6488.44	10.193	5.72
1072	5 508.38	9.595	6.35	1122	5 995.96	9.905	6.04	1172	6498.64	10.199	5.71
1073	5 517.98	9.602	6.34	1123	6 005.87	9.911	6.04	1173	6508.84	10.205	5.70
1074	5 527.58	9.608	6.34	1124	6 015.78	9.917	6.03	1174	6519.05	10.211	5.70
1075	5 537.20	9.614	6.33	1125	6 025.70	9.923	6.02	1175	6529.26	10.216	5.69
1076	5 546.81	9.621	6.32	1126	6 035.63	9.929	6.02	1176	6539.48	10.222	5.68
1077	5 556.44	9.627	6.32	1127	6 045.56	9.935	6.01	1177	6549.70	10.228	5.68
1078	5 566.07	9.633	6.31	1128	6 055.50	9.941	6.00	1178	6559.94	10.233	5.67
1079	5 575.70	9.640	6.31	1129	6 065.44	9.947	6.00	1179	6570.17	10.239	5.66
1080	5 585.35	9.646	6.30	1130	6 075.39	9.953	5.99	1180	6580.41	10.245	5.65
1081	5 595.00	9.652	6.29	1131	6 085.35	9.959	5.99	1181	6590.66	10.250	5.65
1082	5 604.65	9.659	6.29	1132	6 095.31	9.965	5.98	1182	6600.91	10.256	5.64
1083	5 614.31	9.665	6.28	1133	6 105.28	9.971	5.97	1183	6611.17	10.262	5.63
1084	5 623.98	9.671	6.28	1134	6 115.25	9.977	5.97	1184	6621.44	10.267	5.62
1085	5 633.65	9.677	6.27	1135	6 125.23	9.983	5.96	1185	6631.71	10.273	5.62
1086	5 643.34	9.684	6.26	1136	6 135.22	9.989	5.95	1186	6641.98	10.278	5.61
1087	5 653.02	9.690	6.26	1137	6 145.21	9.995	5.95	1187	6652.26	10.284	5.60
1088	5 662.71	9.696	6.25	1138	6 155.21	10.001	5.94	1188	6662.55	10.290	5.60
1089	5 672.41	9.702	6.25	1139	6 165.22	10.007	5.93	1189	6672.84	10.295	5.59
1090	5 682.12	9.709	6.24	1140	6 175.23	10.013	5.93	1190	6683.14	10.301	5.58
1091	5 691.83	9.715	6.23	1141	6 185.24	10.019	5.92	1191	6693.44	10.306	5.57
1092	5 701.55	9.721	6.23	1142	6 195.26	10.025	5.91	1192	6703.75	10.312	5.57
1093	5 711.27	9.727	6.22	1143	6 205.29	10.031	5.91	1193	6714.07	10.318	5.56
1094	5 721.00	9.734	6.22	1144	6 215.32	10.037	5.90	1194	6724.39	10.323	5.55
1095	5 730.74	9.740	6.21	1145	6 225.36	10.042	5.89	1195	6734.71	10.329	5.54
1096	5 740.48	9.746	6.20	1146	6 235.41	10.048	5.89	1196	6745.05	10.334	5.54
1097	5 750.23	9.752	6.20	1147	6 245.46	10.054	5.88	1197	6755.38	10.340	5.53
1098	5 759.99	9.758	6.19	1148	6 255.52	10.060	5.87	1198	6765.73	10.345	5.52
1099	5 769.75	9.765	6.19	1149	6 265.58	10.066	5.87	1199	6776.07	10.351	5.51
1100	5 779.52	9.771	6.18	1150	6 275.65	10.072	5.86	1200	6786.43	10.356	5.51

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1200	6 786.43	10.356	5.51	1250	7 310.96	10.622	5.10	1300	7 848.24	10.866	4.64
1201	6 796.79	10.362	5.50	1251	7 321.59	10.627	5.09	1301	7 859.11	10.870	4.63
1202	6 807.15	10.367	5.49	1252	7 332.21	10.632	5.09	1302	7 869.98	10.875	4.62
1203	6 817.52	10.373	5.48	1253	7 342.85	10.637	5.08	1303	7 880.86	10.879	4.61
1204	6 827.90	10.378	5.48	1254	7 353.49	10.642	5.07	1304	7 891.74	10.884	4.60
1205	6 838.28	10.384	5.47	1255	7 364.13	10.647	5.06	1305	7 902.63	10.889	4.59
1206	6 848.66	10.389	5.46	1256	7 374.78	10.652	5.05	1306	7 913.52	10.893	4.58
1207	6 859.06	10.395	5.45	1257	7 385.44	10.657	5.04	1307	7 924.41	10.898	4.57
1208	6 869.45	10.400	5.45	1258	7 396.10	10.662	5.03	1308	7 935.31	10.902	4.56
1209	6 879.86	10.406	5.44	1259	7 406.76	10.667	5.02	1309	7 946.22	10.907	4.55
1210	6 890.26	10.411	5.43	1260	7 417.43	10.672	5.02	1310	7 957.13	10.911	4.54
1211	6 900.68	10.416	5.42	1261	7 428.11	10.677	5.01	1311	7 968.04	10.916	4.53
1212	6 911.10	10.422	5.41	1262	7 438.79	10.682	5.00	1312	7 978.96	10.920	4.52
1213	6 921.52	10.427	5.41	1263	7 449.47	10.687	4.99	1313	7 989.88	10.925	4.51
1214	6 931.95	10.433	5.40	1264	7 460.16	10.692	4.98	1314	8 000.81	10.930	4.50
1215	6 942.39	10.438	5.39	1265	7 470.86	10.697	4.97	1315	8 011.74	10.934	4.49
1216	6 952.83	10.443	5.38	1266	7 481.56	10.702	4.96	1316	8 022.68	10.938	4.48
1217	6 963.27	10.449	5.38	1267	7 492.26	10.707	4.95	1317	8 033.62	10.943	4.47
1218	6 973.72	10.454	5.37	1268	7 502.97	10.712	4.94	1318	8 044.56	10.947	4.46
1219	6 984.18	10.460	5.36	1269	7 513.68	10.717	4.93	1319	8 055.51	10.952	4.44
1220	6 994.64	10.465	5.35	1270	7 524.40	10.722	4.93	1320	8 066.47	10.956	4.43
1221	7 005.11	10.470	5.34	1271	7 535.13	10.727	4.92	1321	8 077.42	10.961	4.42
1222	7 015.58	10.476	5.34	1272	7 545.86	10.732	4.91	1322	8 088.39	10.965	4.41
1223	7 026.06	10.481	5.33	1273	7 556.59	10.737	4.90	1323	8 099.35	10.970	4.40
1224	7 036.55	10.486	5.32	1274	7 567.33	10.742	4.89	1324	8 110.33	10.974	4.39
1225	7 047.03	10.492	5.31	1275	7 578.08	10.747	4.88	1325	8 121.30	10.978	4.38
1226	7 057.53	10.497	5.30	1276	7 588.83	10.751	4.87	1326	8 132.28	10.983	4.37
1227	7 068.03	10.502	5.30	1277	7 599.58	10.756	4.86	1327	8 143.27	10.987	4.36
1228	7 078.53	10.507	5.29	1278	7 610.34	10.761	4.85	1328	8 154.26	10.991	4.35
1229	7 089.04	10.513	5.28	1279	7 621.10	10.766	4.84	1329	8 165.25	10.996	4.34
1230	7 099.56	10.518	5.27	1280	7 631.87	10.771	4.83	1330	8 176.25	11.000	4.33
1231	7 110.08	10.523	5.26	1281	7 642.64	10.776	4.82	1331	8 187.25	11.004	4.32
1232	7 120.60	10.529	5.26	1282	7 653.42	10.780	4.81	1332	8 198.26	11.009	4.31
1233	7 131.14	10.534	5.25	1283	7 664.20	10.785	4.80	1333	8 209.27	11.013	4.30
1234	7 141.67	10.539	5.24	1284	7 674.99	10.790	4.79	1334	8 220.28	11.017	4.28
1235	7 152.21	10.544	5.23	1285	7 685.78	10.795	4.78	1335	8 231.30	11.022	4.27
1236	7 162.76	10.549	5.22	1286	7 696.58	10.800	4.78	1336	8 242.33	11.026	4.26
1237	7 173.31	10.555	5.21	1287	7 707.38	10.804	4.77	1337	8 253.35	11.030	4.25
1238	7 183.87	10.560	5.21	1288	7 718.19	10.809	4.76	1338	8 264.39	11.034	4.24
1239	7 194.43	10.565	5.20	1289	7 729.00	10.814	4.75	1339	8 275.42	11.039	4.23
1240	7 205.00	10.570	5.19	1290	7 739.82	10.819	4.74	1340	8 286.46	11.043	4.22
1241	7 215.57	10.575	5.18	1291	7 750.64	10.823	4.73	1341	8 297.51	11.047	4.21
1242	7 226.15	10.581	5.17	1292	7 761.46	10.828	4.72	1342	8 308.56	11.051	4.20
1243	7 236.73	10.586	5.16	1293	7 772.30	10.833	4.71	1343	8 319.61	11.055	4.19
1244	7 247.32	10.591	5.15	1294	7 783.13	10.838	4.70	1344	8 330.67	11.060	4.17
1245	7 257.92	10.596	5.15	1295	7 793.97	10.842	4.69	1345	8 341.73	11.064	4.16
1246	7 268.51	10.601	5.14	1296	7 804.81	10.847	4.68	1346	8 352.80	11.068	4.15
1247	7 279.12	10.606	5.13	1297	7 815.66	10.852	4.67	1347	8 363.87	11.072	4.14
1248	7 289.73	10.612	5.12	1298	7 826.52	10.856	4.66	1348	8 374.94	11.076	4.13
1249	7 300.34	10.617	5.11	1299	7 837.38	10.861	4.65	1349	8 386.02	11.080	4.12
1250	7 310.96	10.622	5.10	1300	7 848.24	10.866	4.64	1350	8 397.10	11.084	4.11

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1350	8 397.10	11.084	4.11	1400	8 956.22	11.275	3.51	1450	9 524.09	11.434	2.84
1351	8 408.19	11.089	4.10	1401	8 967.49	11.279	3.50	1451	9 535.53	11.437	2.83
1352	8 419.28	11.093	4.08	1402	8 978.78	11.282	3.48	1452	9 546.96	11.440	2.82
1353	8 430.37	11.097	4.07	1403	8 990.06	11.286	3.47	1453	9 558.41	11.443	2.80
1354	8 441.47	11.101	4.06	1404	9 001.35	11.289	3.46	1454	9 569.85	11.445	2.79
1355	8 452.58	11.105	4.05	1405	9 012.64	11.293	3.44	1455	9 581.30	11.448	2.77
1356	8 463.68	11.109	4.04	1406	9 023.93	11.296	3.43	1456	9 592.75	11.451	2.76
1357	8 474.79	11.113	4.03	1407	9 035.23	11.299	3.42	1457	9 604.20	11.454	2.75
1358	8 485.91	11.117	4.02	1408	9 046.53	11.303	3.41	1458	9 615.65	11.457	2.73
1359	8 497.03	11.121	4.00	1409	9 057.83	11.306	3.39	1459	9 627.11	11.459	2.72
1360	8 508.15	11.125	3.99	1410	9 069.14	11.310	3.38	1460	9 638.57	11.462	2.70
1361	8 519.28	11.129	3.98	1411	9 080.45	11.313	3.37	1461	9 650.04	11.465	2.69
1362	8 530.41	11.133	3.97	1412	9 091.77	11.316	3.35	1462	9 661.50	11.467	2.68
1363	8 541.54	11.137	3.96	1413	9 103.09	11.320	3.34	1463	9 672.97	11.470	2.66
1364	8 552.68	11.141	3.95	1414	9 114.41	11.323	3.33	1464	9 684.44	11.473	2.65
1365	8 563.82	11.145	3.93	1415	9 125.73	11.326	3.32	1465	9 695.92	11.475	2.63
1366	8 574.97	11.149	3.92	1416	9 137.06	11.330	3.30	1466	9 707.39	11.478	2.62
1367	8 586.12	11.153	3.91	1417	9 148.39	11.333	3.29	1467	9 718.87	11.481	2.61
1368	8 597.28	11.157	3.90	1418	9 159.73	11.336	3.28	1468	9 730.35	11.483	2.59
1369	8 608.44	11.160	3.89	1419	9 171.06	11.339	3.26	1469	9 741.84	11.486	2.58
1370	8 619.60	11.164	3.88	1420	9 182.41	11.343	3.25	1470	9 753.32	11.488	2.56
1371	8 630.76	11.168	3.86	1421	9 193.75	11.346	3.24	1471	9 764.81	11.491	2.55
1372	8 641.93	11.172	3.85	1422	9 205.10	11.349	3.22	1472	9 776.31	11.493	2.53
1373	8 653.11	11.176	3.84	1423	9 216.45	11.352	3.21	1473	9 787.80	11.496	2.52
1374	8 664.29	11.180	3.83	1424	9 227.80	11.356	3.20	1474	9 799.30	11.498	2.51
1375	8 675.47	11.184	3.82	1425	9 239.16	11.359	3.18	1475	9 810.80	11.501	2.49
1376	8 686.65	11.187	3.80	1426	9 250.52	11.362	3.17	1476	9 822.30	11.503	2.48
1377	8 697.84	11.191	3.79	1427	9 261.88	11.365	3.16	1477	9 833.80	11.506	2.46
1378	8 709.04	11.195	3.78	1428	9 273.25	11.368	3.14	1478	9 845.31	11.508	2.45
1379	8 720.23	11.199	3.77	1429	9 284.62	11.371	3.13	1479	9 856.82	11.511	2.43
1380	8 731.43	11.202	3.76	1430	9 295.99	11.375	3.12	1480	9 868.33	11.513	2.42
1381	8 742.64	11.206	3.74	1431	9 307.37	11.378	3.10	1481	9 879.85	11.516	2.40
1382	8 753.85	11.210	3.73	1432	9 318.75	11.381	3.09	1482	9 891.36	11.518	2.39
1383	8 765.06	11.214	3.72	1433	9 330.13	11.384	3.08	1483	9 902.88	11.520	2.37
1384	8 776.27	11.217	3.71	1434	9 341.52	11.387	3.06	1484	9 914.40	11.523	2.36
1385	8 787.49	11.221	3.69	1435	9 352.90	11.390	3.05	1485	9 925.93	11.525	2.35
1386	8 798.72	11.225	3.68	1436	9 364.30	11.393	3.04	1486	9 937.45	11.527	2.33
1387	8 809.94	11.228	3.67	1437	9 375.69	11.396	3.02	1487	9 948.98	11.530	2.32
1388	8 821.17	11.232	3.66	1438	9 387.09	11.399	3.01	1488	9 960.51	11.532	2.30
1389	8 832.41	11.236	3.65	1439	9 398.49	11.402	3.00	1489	9 972.05	11.534	2.29
1390	8 843.64	11.239	3.63	1440	9 409.89	11.405	2.98	1490	9 983.58	11.537	2.27
1391	8 854.89	11.243	3.62	1441	9 421.30	11.408	2.97	1491	9 995.12	11.539	2.26
1392	8 866.13	11.247	3.61	1442	9 432.71	11.411	2.95	1492	10 006.66	11.541	2.24
1393	8 877.38	11.250	3.60	1443	9 444.12	11.414	2.94	1493	10 018.20	11.543	2.23
1394	8 888.63	11.254	3.58	1444	9 455.54	11.417	2.93	1494	10 029.75	11.546	2.21
1395	8 899.89	11.257	3.57	1445	9 466.95	11.420	2.91	1495	10 041.29	11.548	2.20
1396	8 911.15	11.261	3.56	1446	9 478.38	11.423	2.90	1496	10 052.84	11.550	2.18
1397	8 922.41	11.265	3.55	1447	9 489.80	11.426	2.89	1497	10 064.39	11.552	2.17
1398	8 933.67	11.268	3.53	1448	9 501.23	11.428	2.87	1498	10 075.95	11.554	2.15
1399	8 944.94	11.272	3.52	1449	9 512.66	11.431	2.86	1499	10 087.50	11.557	2.14
1400	8 956.22	11.275	3.51	1450	9 524.09	11.434	2.84	1500	10 099.06	11.559	2.12

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1500	10 099.06	11.559	2.12	**1550**	10 679.33	11.646	1.36	**1600**	11 263.00	11.694	0.57
1501	10 110.62	11.561	2.11	**1551**	10 690.98	11.647	1.35	**1601**	11 274.70	11.695	0.55
1502	10 122.18	11.563	2.09	**1552**	10 702.63	11.649	1.33	**1602**	11 286.39	11.695	0.53
1503	10 133.75	11.565	2.08	**1553**	10 714.28	11.650	1.31	**1603**	11 298.09	11.696	0.52
1504	10 145.31	11.567	2.07	**1554**	10 725.93	11.651	1.30	**1604**	11 309.78	11.696	0.50
1505	10 156.88	11.569	2.05	**1555**	10 737.58	11.653	1.28	**1605**	11 321.48	11.697	0.49
1506	10 168.45	11.571	2.04	**1556**	10 749.23	11.654	1.27	**1606**	11 333.18	11.697	0.47
1507	10 180.02	11.573	2.02	**1557**	10 760.89	11.655	1.25	**1607**	11 344.88	11.698	0.45
1508	10 191.60	11.575	2.01	**1558**	10 772.54	11.656	1.24	**1608**	11 356.57	11.698	0.44
1509	10 203.17	11.577	1.99	**1559**	10 784.20	11.658	1.22	**1609**	11 368.27	11.699	0.42
1510	10 214.75	11.579	1.98	**1560**	10 795.86	11.659	1.20	**1610**	11 379.97	11.699	0.40
1511	10 226.33	11.581	1.96	**1561**	10 807.52	11.660	1.19	**1611**	11 391.67	11.699	0.39
1512	10 237.91	11.583	1.94	**1562**	10 819.18	11.661	1.17	**1612**	11 403.37	11.700	0.37
1513	10 249.50	11.585	1.93	**1563**	10 830.84	11.662	1.16	**1613**	11 415.07	11.700	0.36
1514	10 261.08	11.587	1.91	**1564**	10 842.50	11.663	1.14	**1614**	11 426.77	11.701	0.34
1515	10 272.67	11.589	1.90	**1565**	10 854.17	11.665	1.13	**1615**	11 438.47	11.701	0.32
1516	10 284.26	11.591	1.88	**1566**	10 865.83	11.666	1.11	**1616**	11 450.17	11.701	0.31
1517	10 295.85	11.593	1.87	**1567**	10 877.50	11.667	1.09	**1617**	11 461.87	11.702	0.29
1518	10 307.45	11.594	1.85	**1568**	10 889.17	11.668	1.08	**1618**	11 473.58	11.702	0.27
1519	10 319.04	11.596	1.84	**1569**	10 900.83	11.669	1.06	**1619**	11 485.28	11.702	0.26
1520	10 330.64	11.598	1.82	**1570**	10 912.50	11.670	1.05	**1620**	11 496.98	11.702	0.24
1521	10 342.24	11.600	1.81	**1571**	10 924.17	11.671	1.03	**1621**	11 508.68	11.703	0.23
1522	10 353.84	11.602	1.79	**1572**	10 935.85	11.672	1.01	**1622**	11 520.38	11.703	0.21
1523	10 365.44	11.604	1.78	**1573**	10 947.52	11.673	1.00	**1623**	11 532.09	11.703	0.19
1524	10 377.05	11.605	1.76	**1574**	10 959.19	11.674	0.98	**1624**	11 543.79	11.703	0.18
1525	10 388.65	11.607	1.75	**1575**	10 970.87	11.675	0.97	**1625**	11 555.49	11.703	0.16
1526	10 400.26	11.609	1.73	**1576**	10 982.54	11.676	0.95	**1626**	11 567.20	11.703	0.14
1527	10 411.87	11.611	1.72	**1577**	10 994.22	11.677	0.93	**1627**	11 578.90	11.704	0.13
1528	10 423.48	11.612	1.70	**1578**	11 005.90	11.678	0.92	**1628**	11 590.60	11.704	0.11
1529	10 435.09	11.614	1.69	**1579**	11 017.57	11.679	0.90	**1629**	11 602.31	11.704	0.10
1530	10 446.71	11.616	1.67	**1580**	11 029.25	11.680	0.89	**1630**	11 614.01	11.704	0.08
1531	10 458.32	11.617	1.66	**1581**	11 040.93	11.681	0.87	**1631**	11 625.72	11.704	0.06
1532	10 469.94	11.619	1.64	**1582**	11 052.61	11.681	0.86	**1632**	11 637.42	11.704	0.05
1533	10 481.56	11.621	1.62	**1583**	11 064.30	11.682	0.84	**1633**	11 649.12	11.704	0.03
1534	10 493.18	11.622	1.61	**1584**	11 075.98	11.683	0.82	**1634**	11 660.83	11.704	0.01
1535	10 504.81	11.624	1.59	**1585**	11 087.66	11.684	0.81	**1635**	11 672.53	11.704	−0.00
1536	10 516.43	11.625	1.58	**1586**	11 099.35	11.685	0.79	**1636**	11 684.24	11.704	−0.02
1537	10 528.06	11.627	1.56	**1587**	11 111.03	11.685	0.78	**1637**	11 695.94	11.704	−0.03
1538	10 539.69	11.628	1.55	**1588**	11 122.72	11.686	0.76	**1638**	11 707.64	11.704	−0.05
1539	10 551.31	11.630	1.53	**1589**	11 134.40	11.687	0.74	**1639**	11 719.35	11.704	−0.07
1540	10 562.95	11.632	1.52	**1590**	11 146.09	11.688	0.73	**1640**	11 731.05	11.704	−0.08
1541	10 574.58	11.633	1.50	**1591**	11 157.78	11.688	0.71	**1641**	11 742.76	11.704	−0.10
1542	10 586.21	11.635	1.49	**1592**	11 169.47	11.689	0.69	**1642**	11 754.46	11.704	−0.12
1543	10 597.85	11.636	1.47	**1593**	11 181.16	11.690	0.68	**1643**	11 766.16	11.704	−0.13
1544	10 609.48	11.637	1.45	**1594**	11 192.85	11.691	0.66	**1644**	11 777.87	11.703	−0.15
1545	10 621.12	11.639	1.44	**1595**	11 204.54	11.691	0.65	**1645**	11 789.57	11.703	−0.17
1546	10 632.76	11.640	1.42	**1596**	11 216.23	11.692	0.63	**1646**	11 801.27	11.703	−0.18
1547	10 644.40	11.642	1.41	**1597**	11 227.92	11.692	0.61	**1647**	11 812.98	11.703	−0.20
1548	10 656.04	11.643	1.39	**1598**	11 239.62	11.693	0.60	**1648**	11 824.68	11.703	−0.22
1549	10 667.69	11.645	1.38	**1599**	11 251.31	11.694	0.58	**1649**	11 836.38	11.702	−0.23
1550	10 679.33	11.646	1.36	**1600**	11 263.00	11.694	0.57	**1650**	11 848.08	11.702	−0.25

TABLE 2.3.3. *Type B thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1650	11 848.08	11.702	−0.25	**1700**	12 432.54	11.669	−1.07	**1750**	13 014.31	11.595	−1.91
1651	11 859.79	11.702	−0.26	**1701**	12 444.21	11.668	−1.09	**1751**	13 025.91	11.593	−1.93
1652	11 871.49	11.702	−0.28	**1702**	12 455.88	11.667	−1.11	**1752**	13 037.50	11.591	−1.95
1653	11 883.19	11.701	−0.30	**1703**	12 467.55	11.666	−1.12	**1753**	13 049.09	11.589	−1.96
1654	11 894.89	11.701	−0.31	**1704**	12 479.21	11.665	−1.14	**1754**	13 060.68	11.587	−1.98
1655	11 906.59	11.701	−0.33	**1705**	12 490.88	11.664	−1.16	**1755**	13 072.26	11.585	−2.00
1656	11 918.29	11.700	−0.35	**1706**	12 502.54	11.662	−1.17	**1756**	13 083.85	11.583	−2.01
1657	11 929.99	11.700	−0.36	**1707**	12 514.20	11.661	−1.19	**1757**	13 095.43	11.581	−2.03
1658	11 941.69	11.700	−0.38	**1708**	12 525.86	11.660	−1.21	**1758**	13 107.01	11.579	−2.05
1659	11 953.39	11.699	−0.40	**1709**	12 537.52	11.659	−1.22	**1759**	13 118.59	11.577	−2.06
1660	11 965.09	11.699	−0.41	**1710**	12 549.18	11.658	−1.24	**1760**	13 130.16	11.575	−2.08
1661	11 976.79	11.699	−0.43	**1711**	12 560.84	11.656	−1.26	**1761**	13 141.74	11.573	−2.10
1662	11 988.49	11.698	−0.45	**1712**	12 572.49	11.655	−1.27	**1762**	13 153.31	11.571	−2.12
1663	12 000.19	11.698	−0.46	**1713**	12 584.15	11.654	−1.29	**1763**	13 164.88	11.568	−2.13
1664	12 011.88	11.697	−0.48	**1714**	12 595.80	11.653	−1.31	**1764**	13 176.44	11.566	−2.15
1665	12 023.58	11.697	−0.49	**1715**	12 607.45	11.651	−1.32	**1765**	13 188.01	11.564	−2.17
1666	12 035.28	11.696	−0.51	**1716**	12 619.10	11.650	−1.34	**1766**	13 199.57	11.562	−2.18
1667	12 046.97	11.696	−0.53	**1717**	12 630.75	11.649	−1.36	**1767**	13 211.13	11.560	−2.20
1668	12 058.67	11.695	−0.54	**1718**	12 642.40	11.647	−1.37	**1768**	13 222.69	11.558	−2.22
1669	12 070.36	11.695	−0.56	**1719**	12 654.05	11.646	−1.39	**1769**	13 234.25	11.555	−2.23
1670	12 082.06	11.694	−0.58	**1720**	12 665.69	11.644	−1.41	**1770**	13 245.80	11.553	−2.25
1671	12 093.75	11.693	−0.59	**1721**	12 677.33	11.643	−1.42	**1771**	13 257.35	11.551	−2.27
1672	12 105.44	11.693	−0.61	**1722**	12 688.98	11.642	−1.44	**1772**	13 268.90	11.548	−2.29
1673	12 117.14	11.692	−0.63	**1723**	12 700.62	11.640	−1.46	**1773**	13 280.45	11.546	−2.30
1674	12 128.83	11.692	−0.64	**1724**	12 712.26	11.639	−1.47	**1774**	13 292.00	11.544	−2.32
1675	12 140.52	11.691	−0.66	**1725**	12 723.89	11.637	−1.49	**1775**	13 303.54	11.542	−2.34
1676	12 152.21	11.690	−0.68	**1726**	12 735.53	11.636	−1.51	**1776**	13 315.08	11.539	−2.35
1677	12 163.90	11.690	−0.69	**1727**	12 747.17	11.634	−1.52	**1777**	13 326.62	11.537	−2.37
1678	12 175.59	11.689	−0.71	**1728**	12 758.80	11.633	−1.54	**1778**	13 338.15	11.534	−2.39
1679	12 187.28	11.688	−0.73	**1729**	12 770.43	11.631	−1.56	**1779**	13 349.69	11.532	−2.41
1680	12 198.97	11.687	−0.74	**1730**	12 782.06	11.630	−1.57	**1780**	13 361.22	11.530	−2.42
1681	12 210.65	11.687	−0.76	**1731**	12 793.69	11.628	−1.59	**1781**	13 372.75	11.527	−2.44
1682	12 222.34	11.686	−0.78	**1732**	12 805.32	11.626	−1.61	**1782**	13 384.27	11.525	−2.46
1683	12 234.02	11.685	−0.79	**1733**	12 816.94	11.625	−1.62	**1783**	13 395.80	11.522	−2.48
1684	12 245.71	11.684	−0.81	**1734**	12 828.57	11.623	−1.64	**1784**	13 407.32	11.520	−2.49
1685	12 257.39	11.683	−0.83	**1735**	12 840.19	11.621	−1.66	**1785**	13 418.84	11.517	−2.51
1686	12 269.08	11.683	−0.84	**1736**	12 851.81	11.620	−1.68	**1786**	13 430.35	11.515	−2.53
1687	12 280.76	11.682	−0.86	**1737**	12 863.43	11.618	−1.69	**1787**	13 441.87	11.512	−2.54
1688	12 292.44	11.681	−0.87	**1738**	12 875.05	11.616	−1.71	**1788**	13 453.38	11.510	−2.56
1689	12 304.12	11.680	−0.89	**1739**	12 886.66	11.615	−1.73	**1789**	13 464.88	11.507	−2.58
1690	12 315.80	11.679	−0.91	**1740**	12 898.28	11.613	−1.74	**1790**	13 476.39	11.505	−2.60
1691	12 327.48	11.678	−0.92	**1741**	12 909.89	11.611	−1.76	**1791**	13 487.89	11.502	−2.61
1692	12 339.16	11.677	−0.94	**1742**	12 921.50	11.609	−1.78	**1792**	13 499.39	11.499	−2.63
1693	12 350.83	11.676	−0.96	**1743**	12 933.11	11.608	−1.79	**1793**	13 510.89	11.497	−2.65
1694	12 362.51	11.675	−0.97	**1744**	12 944.71	11.606	−1.81	**1794**	13 522.39	11.494	−2.67
1695	12 374.18	11.674	−0.99	**1745**	12 956.32	11.604	−1.83	**1795**	13 533.88	11.491	−2.68
1696	12 385.86	11.673	−1.01	**1746**	12 967.92	11.602	−1.84	**1796**	13 545.37	11.489	−2.70
1697	12 397.53	11.672	−1.02	**1747**	12 979.52	11.600	−1.86	**1797**	13 556.86	11.486	−2.72
1698	12 409.20	11.671	−1.04	**1748**	12 991.12	11.598	−1.88	**1798**	13 568.34	11.483	−2.74
1699	12 420.87	11.670	−1.06	**1749**	13 002.72	11.597	−1.89	**1799**	13 579.82	11.480	−2.75
1700	12 432.54	11.669	−1.07	**1750**	13 014.31	11.595	−1.91	**1800**	13 591.30	11.478	−2.77

TABLE 2.3.3. ***Type B thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1800	13 591.30	11.478	−2.77	**1810**	13 705.94	11.449	−2.95	**1820**	13 820.28	11.419	−3.13
1801	13 602.78	11.475	−2.79	**1811**	13 717.39	11.446	−2.97				
1802	13 614.25	11.472	−2.81	**1812**	13 728.83	11.443	−2.99				
1803	13 625.72	11.469	−2.83	**1813**	13 740.27	11.440	−3.00				
1804	13 637.19	11.466	−2.84	**1814**	13 751.71	11.437	−3.02				
1805	13 648.66	11.464	−2.86	**1815**	13 763.15	11.434	−3.04				
1806	13 660.12	11.461	−2.88	**1816**	13 774.58	11.431	−3.06				
1807	13 671.58	11.458	−2.90	**1817**	13 786.01	11.428	−3.08				
1808	13 683.03	11.455	−2.91	**1818**	13 797.44	11.425	−3.09				
1809	13 694.49	11.452	−2.93	**1819**	13 808.86	11.422	−3.11				
1810	13 705.94	11.449	−2.95	**1820**	13 820.28	11.419	−3.13				

2.4. Reference Function and Table for the Positive Thermoelement, Type BP, a Platinum-30% Rhodium Alloy Versus Platinum, Pt-67

The coefficients, c_i, for the sixth degree polynomial and for the eighth degree polynomial that give the thermoelectric voltage, E, of type BP thermoelements versus Pt-67 as a function of temperature, t_{90}, in the 0 °C to 630.615 °C and 630.615 °C to 1768.1 °C ranges, respectively, are given in table 2.4.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type BP thermoelements versus Pt-67 at selected fixed points are given in table 2.4.2. The reference values for type BP thermoelements versus Pt-67 are given at 1 °C intervals from 0 °C to 1768 °C in table 2.4.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 2.4.1, 2.4.2, and 2.4.3, respectively. The irregular behavior of the second derivative near 630 °C is a result of the fitting techniques at the junction of two regions; it is not the result of a real physical phenomenon.

TABLE 2.4.1. *Type BP thermoelements versus platinum, Pt-67 --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	0 °C to 630.615 °C	630.615 °C to 1768.1 °C
c_0 =	0.000 000 000 0 . . .	$-7.968\ 043\ 228\ 2 \times 10^{3}$
c_1 =	4.822 787 568 7 . . .	$6.394\ 111\ 021\ 3 \times 10^{1}$
c_2 =	$1.565\ 116\ 570\ 9 \times 10^{-2}$	$-1.710\ 242\ 141\ 0 \times 10^{-1}$
c_3 =	$-2.223\ 379\ 788\ 2 \times 10^{-5}$	$3.055\ 578\ 252\ 7 \times 10^{-4}$
c_4 =	$2.833\ 324\ 407\ 4 \times 10^{-8}$	$-3.210\ 574\ 449\ 2 \times 10^{-7}$
c_5 =	$-2.025\ 894\ 044\ 7 \times 10^{-11}$	$2.090\ 910\ 279\ 4 \times 10^{-10}$
c_6 =	$6.148\ 870\ 509\ 6 \times 10^{-15}$	$-8.233\ 582\ 542\ 6 \times 10^{-14}$
c_7 =		$1.782\ 284\ 151\ 5 \times 10^{-17}$
c_8 =		$-1.618\ 707\ 418\ 7 \times 10^{-21}$

TABLE 2.4.2. *Thermoelectric values at fixed points for type BP thermoelements versus platinum, Pt-67*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
Ice MP	0.000	0.00	4.823	31.30
Water TP	0.01	0.05	4.823	31.30
Gallium MP	29.7646	156.85	5.698	27.62
Indium FP	156.5985	1068.89	8.467	17.30
Tin FP	231.928	1752.39	9.640	14.13
Cadmium FP	321.069	2664.67	10.798	12.07
Lead FP	327.462	2733.94	10.874	11.97
Zinc FP	419.527	3784.17	11.925	10.97
Antimony FP	630.63	6536.90	14.119	9.01
Aluminum FP	660.323	6960.19	14.395	9.55
Silver FP	961.78	11742.51	17.265	8.57
Gold FP	1064.18	13553.96	18.101	7.74
Copper FP	1084.62	13925.54	18.257	7.56
Palladium FP	1554.8	23109.14	20.105	−1.24
Platinum FP	1768.1	27334.08	19.380	−4.79

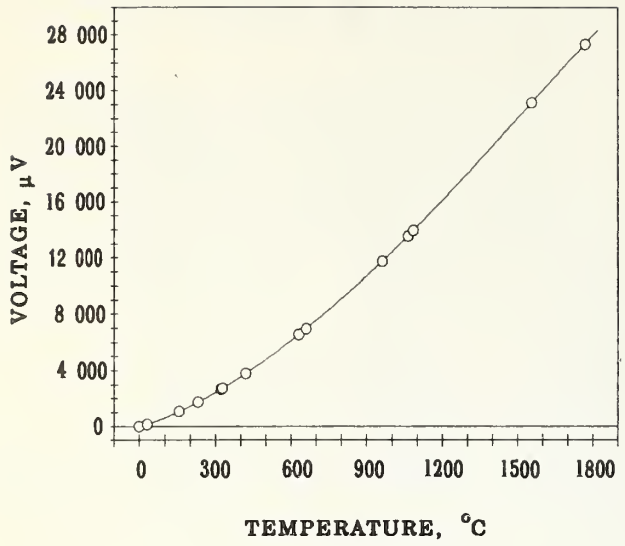

FIGURE 2.4.1. *Thermoelectric voltage for type BP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

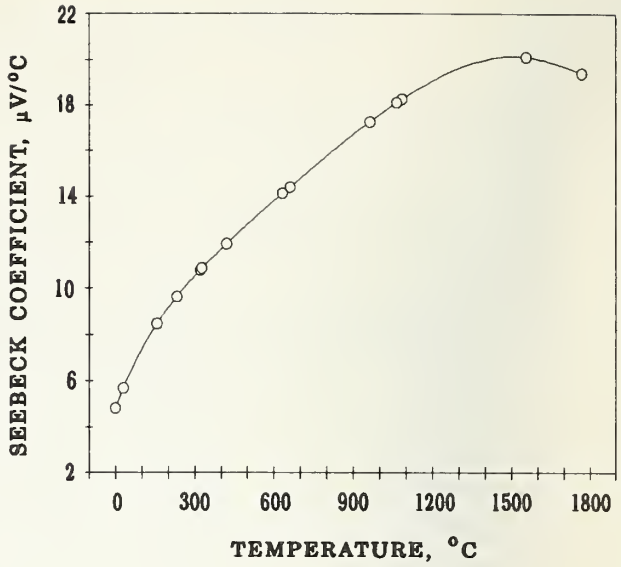

FIGURE 2.4.2. *Seebeck coefficient for type BP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

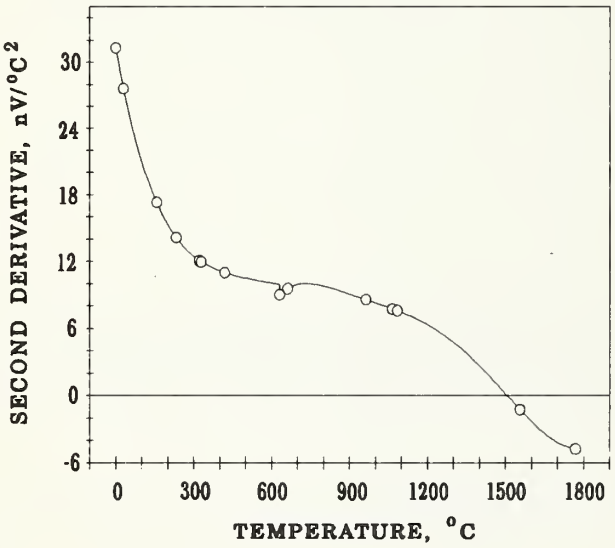

FIGURE 2.4.3. *Second derivative of thermoelectric voltage for type BP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
0	0.00	4.823	31.30	50	277.66	6.235	25.43	100	619.19	7.390	20.98
1	4.84	4.854	31.17	51	283.91	6.260	25.33	101	626.59	7.411	20.90
2	9.71	4.885	31.04	52	290.18	6.285	25.23	102	634.01	7.431	20.82
3	14.61	4.916	30.91	53	296.48	6.311	25.13	103	641.46	7.452	20.75
4	19.54	4.947	30.77	54	302.80	6.336	25.03	104	648.92	7.473	20.67
5	24.50	4.978	30.64	55	309.15	6.361	24.93	105	656.40	7.494	20.60
6	29.50	5.008	30.51	56	315.52	6.385	24.83	106	663.91	7.514	20.52
7	34.52	5.039	30.39	57	321.92	6.410	24.73	107	671.43	7.535	20.45
8	39.57	5.069	30.26	58	328.34	6.435	24.63	108	678.97	7.555	20.38
9	44.66	5.099	30.13	59	334.79	6.460	24.53	109	686.54	7.575	20.30
10	49.77	5.129	30.00	60	341.26	6.484	24.44	110	694.13	7.596	20.23
11	54.92	5.159	29.88	61	347.76	6.508	24.34	111	701.73	7.616	20.16
12	60.09	5.189	29.75	62	354.28	6.533	24.24	112	709.36	7.636	20.09
13	65.29	5.219	29.62	63	360.82	6.557	24.15	113	717.00	7.656	20.01
14	70.53	5.248	29.50	64	367.39	6.581	24.05	114	724.67	7.676	19.94
15	75.79	5.278	29.38	65	373.98	6.605	23.96	115	732.35	7.696	19.87
16	81.08	5.307	29.25	66	380.60	6.629	23.87	116	740.06	7.716	19.80
17	86.40	5.336	29.13	67	387.24	6.653	23.77	117	747.79	7.735	19.73
18	91.75	5.365	29.01	68	393.91	6.676	23.68	118	755.53	7.755	19.66
19	97.13	5.394	28.89	69	400.59	6.700	23.59	119	763.30	7.775	19.60
20	102.54	5.423	28.77	70	407.31	6.724	23.50	120	771.08	7.794	19.53
21	107.98	5.452	28.65	71	414.04	6.747	23.40	121	778.88	7.814	19.46
22	113.45	5.480	28.53	72	420.80	6.770	23.31	122	786.71	7.833	19.39
23	118.94	5.509	28.41	73	427.58	6.794	23.22	123	794.55	7.853	19.33
24	124.46	5.537	28.29	74	434.39	6.817	23.13	124	802.41	7.872	19.26
25	130.02	5.565	28.17	75	441.22	6.840	23.04	125	810.30	7.891	19.19
26	135.59	5.594	28.06	76	448.07	6.863	22.96	126	818.20	7.910	19.13
27	141.20	5.622	27.94	77	454.94	6.886	22.87	127	826.12	7.929	19.06
28	146.84	5.649	27.82	78	461.84	6.909	22.78	128	834.05	7.948	19.00
29	152.50	5.677	27.71	79	468.76	6.931	22.69	129	842.01	7.967	18.93
30	158.19	5.705	27.60	80	475.70	6.954	22.61	130	849.99	7.986	18.87
31	163.91	5.732	27.48	81	482.67	6.977	22.52	131	857.98	8.005	18.80
32	169.66	5.760	27.37	82	489.66	6.999	22.43	132	866.00	8.024	18.74
33	175.43	5.787	27.26	83	496.67	7.022	22.35	133	874.03	8.043	18.68
34	181.23	5.814	27.14	84	503.70	7.044	22.26	134	882.08	8.061	18.62
35	187.06	5.841	27.03	85	510.75	7.066	22.18	135	890.16	8.080	18.55
36	192.91	5.868	26.92	86	517.83	7.088	22.10	136	898.24	8.098	18.49
37	198.80	5.895	26.81	87	524.93	7.110	22.01	137	906.35	8.117	18.43
38	204.70	5.922	26.70	88	532.05	7.132	21.93	138	914.48	8.135	18.37
39	210.64	5.949	26.59	89	539.19	7.154	21.85	139	922.62	8.154	18.31
40	216.60	5.975	26.48	90	546.36	7.176	21.77	140	930.78	8.172	18.25
41	222.59	6.002	26.38	91	553.55	7.198	21.69	141	938.97	8.190	18.19
42	228.60	6.028	26.27	92	560.75	7.219	21.60	142	947.16	8.208	18.13
43	234.65	6.054	26.16	93	567.98	7.241	21.52	143	955.38	8.226	18.07
44	240.71	6.080	26.06	94	575.24	7.262	21.44	144	963.62	8.244	18.01
45	246.81	6.106	25.95	95	582.51	7.284	21.37	145	971.87	8.262	17.95
46	252.92	6.132	25.85	96	589.80	7.305	21.29	146	980.14	8.280	17.90
47	259.07	6.158	25.74	97	597.12	7.326	21.21	147	988.43	8.298	17.84
48	265.24	6.184	25.64	98	604.46	7.347	21.13	148	996.74	8.316	17.78
49	271.44	6.209	25.54	99	611.81	7.369	21.05	149	1 005.06	8.334	17.72
50	277.66	6.235	25.43	100	619.19	7.390	20.98	150	1 013.41	8.351	17.67

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	1 013.41	8.351	17.67	200	1 451.98	9.172	15.28	250	1 928.89	9.891	13.59
151	1 021.77	8.369	17.61	201	1 461.16	9.187	15.24	251	1 938.78	9.904	13.56
152	1 030.14	8.387	17.56	202	1 470.35	9.202	15.20	252	1 948.69	9.918	13.54
153	1 038.54	8.404	17.50	203	1 479.56	9.217	15.16	253	1 958.62	9.931	13.51
154	1 046.95	8.422	17.45	204	1 488.79	9.232	15.12	254	1 968.56	9.945	13.48
155	1 055.38	8.439	17.39	205	1 498.03	9.247	15.08	255	1 978.51	9.958	13.45
156	1 063.83	8.456	17.34	206	1 507.28	9.263	15.04	256	1 988.47	9.972	13.43
157	1 072.29	8.474	17.28	207	1 516.55	9.278	15.00	257	1 998.45	9.985	13.40
158	1 080.78	8.491	17.23	208	1 525.84	9.293	14.96	258	2 008.44	9.999	13.38
159	1 089.28	8.508	17.18	209	1 535.14	9.307	14.93	259	2 018.45	10.012	13.35
160	1 097.79	8.525	17.12	210	1 544.45	9.322	14.89	260	2 028.47	10.025	13.32
161	1 106.33	8.542	17.07	211	1 553.78	9.337	14.85	261	2 038.50	10.039	13.30
162	1 114.88	8.559	17.02	212	1 563.13	9.352	14.81	262	2 048.54	10.052	13.27
163	1 123.45	8.576	16.97	213	1 572.48	9.367	14.78	263	2 058.60	10.065	13.25
164	1 132.03	8.593	16.92	214	1 581.86	9.382	14.74	264	2 068.67	10.078	13.22
165	1 140.63	8.610	16.86	215	1 591.25	9.396	14.70	265	2 078.76	10.092	13.20
166	1 149.25	8.627	16.81	216	1 600.65	9.411	14.67	266	2 088.86	10.105	13.17
167	1 157.89	8.644	16.76	217	1 610.07	9.426	14.63	267	2 098.97	10.118	13.15
168	1 166.54	8.661	16.71	218	1 619.50	9.440	14.60	268	2 109.09	10.131	13.12
169	1 175.21	8.677	16.66	219	1 628.95	9.455	14.56	269	2 119.23	10.144	13.10
170	1 183.89	8.694	16.61	220	1 638.41	9.469	14.53	270	2 129.38	10.157	13.07
171	1 192.60	8.711	16.56	221	1 647.89	9.484	14.49	271	2 139.55	10.170	13.05
172	1 201.32	8.727	16.52	222	1 657.38	9.498	14.46	272	2 149.72	10.183	13.03
173	1 210.05	8.744	16.47	223	1 666.89	9.513	14.42	273	2 159.91	10.196	13.00
174	1 218.80	8.760	16.42	224	1 676.41	9.527	14.39	274	2 170.12	10.209	12.98
175	1 227.57	8.776	16.37	225	1 685.94	9.542	14.36	275	2 180.33	10.222	12.96
176	1 236.36	8.793	16.32	226	1 695.49	9.556	14.32	276	2 190.56	10.235	12.93
177	1 245.16	8.809	16.28	227	1 705.05	9.570	14.29	277	2 200.80	10.248	12.91
178	1 253.97	8.825	16.23	228	1 714.63	9.585	14.26	278	2 211.06	10.261	12.89
179	1 262.81	8.842	16.18	229	1 724.22	9.599	14.22	279	2 221.32	10.274	12.87
180	1 271.66	8.858	16.14	230	1 733.83	9.613	14.19	280	2 231.60	10.287	12.84
181	1 280.52	8.874	16.09	231	1 743.45	9.627	14.16	281	2 241.90	10.300	12.82
182	1 289.40	8.890	16.04	232	1 753.08	9.641	14.13	282	2 252.20	10.312	12.80
183	1 298.30	8.906	16.00	233	1 762.73	9.655	14.10	283	2 262.52	10.325	12.78
184	1 307.22	8.922	15.95	234	1 772.39	9.670	14.06	284	2 272.85	10.338	12.76
185	1 316.15	8.938	15.91	235	1 782.07	9.684	14.03	285	2 283.20	10.351	12.74
186	1 325.09	8.954	15.87	236	1 791.76	9.698	14.00	286	2 293.56	10.363	12.72
187	1 334.05	8.970	15.82	237	1 801.47	9.712	13.97	287	2 303.93	10.376	12.69
188	1 343.03	8.985	15.78	238	1 811.18	9.726	13.94	288	2 314.31	10.389	12.67
189	1 352.02	9.001	15.73	239	1 820.92	9.739	13.91	289	2 324.70	10.402	12.65
190	1 361.03	9.017	15.69	240	1 830.66	9.753	13.88	290	2 335.11	10.414	12.63
191	1 370.06	9.032	15.65	241	1 840.42	9.767	13.85	291	2 345.53	10.427	12.61
192	1 379.10	9.048	15.61	242	1 850.20	9.781	13.82	292	2 355.96	10.439	12.59
193	1 388.15	9.064	15.56	243	1 859.99	9.795	13.79	293	2 366.41	10.452	12.57
194	1 397.22	9.079	15.52	244	1 869.79	9.809	13.76	294	2 376.87	10.465	12.55
195	1 406.31	9.095	15.48	245	1 879.60	9.822	13.73	295	2 387.34	10.477	12.53
196	1 415.41	9.110	15.44	246	1 889.43	9.836	13.70	296	2 397.82	10.490	12.51
197	1 424.53	9.126	15.40	247	1 899.27	9.850	13.68	297	2 408.32	10.502	12.49
198	1 433.67	9.141	15.36	248	1 909.13	9.863	13.65	298	2 418.83	10.515	12.47
199	1 442.81	9.156	15.32	249	1 919.00	9.877	13.62	299	2 429.35	10.527	12.45
200	1 451.98	9.172	15.28	250	1 928.89	9.891	13.59	300	2 439.88	10.540	12.44

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	2 439.88	10.540	12.44	**350**	2 982.04	11.141	11.66	**400**	3 553.40	11.709	11.13
301	2 450.43	10.552	12.42	**351**	2 993.19	11.152	11.64	**401**	3 565.12	11.721	11.12
302	2 460.99	10.564	12.40	**352**	3 004.35	11.164	11.63	**402**	3 576.84	11.732	11.11
303	2 471.56	10.577	12.38	**353**	3 015.52	11.175	11.62	**403**	3 588.58	11.743	11.11
304	2 482.14	10.589	12.36	**354**	3 026.70	11.187	11.61	**404**	3 600.33	11.754	11.10
305	2 492.73	10.601	12.34	**355**	3 037.89	11.199	11.60	**405**	3 612.09	11.765	11.09
306	2 503.34	10.614	12.33	**356**	3 049.10	11.210	11.58	**406**	3 623.86	11.776	11.08
307	2 513.96	10.626	12.31	**357**	3 060.31	11.222	11.57	**407**	3 635.64	11.787	11.07
308	2 524.59	10.638	12.29	**358**	3 071.54	11.233	11.56	**408**	3 647.43	11.798	11.06
309	2 535.24	10.651	12.27	**359**	3 082.78	11.245	11.55	**409**	3 659.24	11.809	11.06
310	2 545.90	10.663	12.25	**360**	3 094.03	11.257	11.54	**410**	3 671.05	11.820	11.05
311	2 556.56	10.675	12.24	**361**	3 105.29	11.268	11.52	**411**	3 682.88	11.831	11.04
312	2 567.25	10.687	12.22	**362**	3 116.57	11.280	11.51	**412**	3 694.72	11.842	11.03
313	2 577.94	10.700	12.20	**363**	3 127.85	11.291	11.50	**413**	3 706.56	11.853	11.02
314	2 588.64	10.712	12.19	**364**	3 139.15	11.303	11.49	**414**	3 718.42	11.864	11.02
315	2 599.36	10.724	12.17	**365**	3 150.46	11.314	11.48	**415**	3 730.29	11.875	11.01
316	2 610.09	10.736	12.15	**366**	3 161.78	11.326	11.47	**416**	3 742.17	11.886	11.00
317	2 620.83	10.748	12.14	**367**	3 173.11	11.337	11.46	**417**	3 754.07	11.897	10.99
318	2 631.59	10.760	12.12	**368**	3 184.45	11.348	11.44	**418**	3 765.97	11.908	10.99
319	2 642.36	10.773	12.10	**369**	3 195.81	11.360	11.43	**419**	3 777.88	11.919	10.98
320	2 653.13	10.785	12.09	**370**	3 207.17	11.371	11.42	**420**	3 789.81	11.930	10.97
321	2 663.93	10.797	12.07	**371**	3 218.55	11.383	11.41	**421**	3 801.74	11.941	10.96
322	2 674.73	10.809	12.05	**372**	3 229.94	11.394	11.40	**422**	3 813.69	11.952	10.96
323	2 685.54	10.821	12.04	**373**	3 241.34	11.406	11.39	**423**	3 825.65	11.963	10.95
324	2 696.37	10.833	12.02	**374**	3 252.75	11.417	11.38	**424**	3 837.62	11.974	10.94
325	2 707.21	10.845	12.01	**375**	3 264.17	11.428	11.37	**425**	3 849.60	11.985	10.93
326	2 718.06	10.857	11.99	**376**	3 275.60	11.440	11.36	**426**	3 861.59	11.996	10.93
327	2 728.92	10.869	11.98	**377**	3 287.05	11.451	11.35	**427**	3 873.59	12.007	10.92
328	2 739.80	10.881	11.96	**378**	3 298.51	11.462	11.34	**428**	3 885.60	12.018	10.91
329	2 750.68	10.893	11.95	**379**	3 309.97	11.474	11.33	**429**	3 897.63	12.029	10.90
330	2 761.58	10.905	11.93	**380**	3 321.45	11.485	11.32	**430**	3 909.66	12.040	10.90
331	2 772.49	10.917	11.92	**381**	3 332.94	11.496	11.31	**431**	3 921.70	12.051	10.89
332	2 783.42	10.929	11.90	**382**	3 344.45	11.508	11.30	**432**	3 933.76	12.062	10.88
333	2 794.35	10.940	11.89	**383**	3 355.96	11.519	11.29	**433**	3 945.83	12.072	10.88
334	2 805.30	10.952	11.87	**384**	3 367.48	11.530	11.28	**434**	3 957.91	12.083	10.87
335	2 816.26	10.964	11.86	**385**	3 379.02	11.541	11.27	**435**	3 969.99	12.094	10.86
336	2 827.23	10.976	11.84	**386**	3 390.57	11.553	11.26	**436**	3 982.09	12.105	10.86
337	2 838.21	10.988	11.83	**387**	3 402.12	11.564	11.25	**437**	3 994.20	12.116	10.85
338	2 849.20	11.000	11.82	**388**	3 413.69	11.575	11.24	**438**	4 006.33	12.127	10.84
339	2 860.21	11.012	11.80	**389**	3 425.28	11.586	11.23	**439**	4 018.46	12.138	10.83
340	2 871.22	11.023	11.79	**390**	3 436.87	11.598	11.22	**440**	4 030.60	12.148	10.83
341	2 882.25	11.035	11.78	**391**	3 448.47	11.609	11.21	**441**	4 042.75	12.159	10.82
342	2 893.29	11.047	11.76	**392**	3 460.09	11.620	11.20	**442**	4 054.92	12.170	10.81
343	2 904.35	11.059	11.75	**393**	3 471.71	11.631	11.19	**443**	4 067.09	12.181	10.81
344	2 915.41	11.070	11.74	**394**	3 483.35	11.643	11.19	**444**	4 079.28	12.192	10.80
345	2 926.49	11.082	11.72	**395**	3 495.00	11.654	11.18	**445**	4 091.48	12.202	10.80
346	2 937.58	11.094	11.71	**396**	3 506.66	11.665	11.17	**446**	4 103.69	12.213	10.79
347	2 948.68	11.106	11.70	**397**	3 518.33	11.676	11.16	**447**	4 115.90	12.224	10.78
348	2 959.79	11.117	11.68	**398**	3 530.01	11.687	11.15	**448**	4 128.13	12.235	10.78
349	2 970.91	11.129	11.67	**399**	3 541.70	11.698	11.14	**449**	4 140.37	12.246	10.77
350	2 982.04	11.141	11.66	**400**	3 553.40	11.709	11.13	**450**	4 152.63	12.256	10.76

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	4 152.63	12.256	10.76	**500**	4 778.77	12.787	10.48	**550**	5 431.14	13.305	10.25
451	4 164.89	12.267	10.76	**501**	4 791.56	12.798	10.48	**551**	5 444.45	13.316	10.24
452	4 177.16	12.278	10.75	**502**	4 804.37	12.808	10.47	**552**	5 457.77	13.326	10.24
453	4 189.44	12.289	10.74	**503**	4 817.18	12.819	10.47	**553**	5 471.10	13.336	10.24
454	4 201.74	12.299	10.74	**504**	4 830.01	12.829	10.46	**554**	5 484.44	13.346	10.23
455	4 214.04	12.310	10.73	**505**	4 842.84	12.840	10.46	**555**	5 497.79	13.357	10.23
456	4 226.36	12.321	10.73	**506**	4 855.68	12.850	10.45	**556**	5 511.15	13.367	10.22
457	4 238.68	12.332	10.72	**507**	4 868.54	12.860	10.45	**557**	5 524.52	13.377	10.22
458	4 251.02	12.342	10.71	**508**	4 881.41	12.871	10.44	**558**	5 537.91	13.387	10.21
459	4 263.37	12.353	10.71	**509**	4 894.28	12.881	10.44	**559**	5 551.30	13.397	10.21
460	4 275.73	12.364	10.70	**510**	4 907.17	12.892	10.43	**560**	5 564.70	13.408	10.21
461	4 288.09	12.374	10.70	**511**	4 920.06	12.902	10.43	**561**	5 578.11	13.418	10.20
462	4 300.47	12.385	10.69	**512**	4 932.97	12.913	10.42	**562**	5 591.54	13.428	10.20
463	4 312.86	12.396	10.68	**513**	4 945.89	12.923	10.42	**563**	5 604.97	13.438	10.19
464	4 325.27	12.406	10.68	**514**	4 958.82	12.933	10.41	**564**	5 618.41	13.448	10.19
465	4 337.68	12.417	10.67	**515**	4 971.76	12.944	10.41	**565**	5 631.87	13.459	10.18
466	4 350.10	12.428	10.67	**516**	4 984.71	12.954	10.40	**566**	5 645.33	13.469	10.18
467	4 362.53	12.438	10.66	**517**	4 997.67	12.965	10.40	**567**	5 658.80	13.479	10.18
468	4 374.98	12.449	10.65	**518**	5 010.64	12.975	10.39	**568**	5 672.29	13.489	10.17
469	4 387.43	12.460	10.65	**519**	5 023.62	12.985	10.39	**569**	5 685.78	13.499	10.17
470	4 399.90	12.470	10.64	**520**	5 036.61	12.996	10.38	**570**	5 699.29	13.509	10.16
471	4 412.37	12.481	10.64	**521**	5 049.61	13.006	10.38	**571**	5 712.80	13.520	10.16
472	4 424.86	12.492	10.63	**522**	5 062.62	13.017	10.38	**572**	5 726.33	13.530	10.16
473	4 437.36	12.502	10.63	**523**	5 075.64	13.027	10.37	**573**	5 739.86	13.540	10.15
474	4 449.86	12.513	10.62	**524**	5 088.67	13.037	10.37	**574**	5 753.41	13.550	10.15
475	4 462.38	12.524	10.62	**525**	5 101.72	13.048	10.36	**575**	5 766.96	13.560	10.14
476	4 474.91	12.534	10.61	**526**	5 114.77	13.058	10.36	**576**	5 780.53	13.570	10.14
477	4 487.45	12.545	10.60	**527**	5 127.83	13.068	10.35	**577**	5 794.10	13.581	10.14
478	4 500.00	12.555	10.60	**528**	5 140.91	13.079	10.35	**578**	5 807.69	13.591	10.13
479	4 512.56	12.566	10.59	**529**	5 153.99	13.089	10.34	**579**	5 821.28	13.601	10.13
480	4 525.13	12.577	10.59	**530**	5 167.08	13.099	10.34	**580**	5 834.89	13.611	10.12
481	4 537.71	12.587	10.58	**531**	5 180.19	13.110	10.33	**581**	5 848.50	13.621	10.12
482	4 550.31	12.598	10.58	**532**	5 193.30	13.120	10.33	**582**	5 862.13	13.631	10.12
483	4 562.91	12.608	10.57	**533**	5 206.43	13.130	10.32	**583**	5 875.77	13.641	10.11
484	4 575.52	12.619	10.57	**534**	5 219.56	13.141	10.32	**584**	5 889.41	13.651	10.11
485	4 588.15	12.629	10.56	**535**	5 232.71	13.151	10.32	**585**	5 903.07	13.661	10.10
486	4 600.78	12.640	10.56	**536**	5 245.87	13.161	10.31	**586**	5 916.74	13.672	10.10
487	4 613.43	12.651	10.55	**537**	5 259.03	13.172	10.31	**587**	5 930.41	13.682	10.10
488	4 626.08	12.661	10.54	**538**	5 272.21	13.182	10.30	**588**	5 944.10	13.692	10.09
489	4 638.75	12.672	10.54	**539**	5 285.40	13.192	10.30	**589**	5 957.80	13.702	10.09
490	4 651.43	12.682	10.53	**540**	5 298.60	13.203	10.29	**590**	5 971.50	13.712	10.09
491	4 664.11	12.693	10.53	**541**	5 311.80	13.213	10.29	**591**	5 985.22	13.722	10.08
492	4 676.81	12.703	10.52	**542**	5 325.02	13.223	10.28	**592**	5 998.95	13.732	10.08
493	4 689.52	12.714	10.52	**543**	5 338.25	13.234	10.28	**593**	6 012.68	13.742	10.07
494	4 702.24	12.724	10.51	**544**	5 351.49	13.244	10.27	**594**	6 026.43	13.752	10.07
495	4 714.97	12.735	10.51	**545**	5 364.74	13.254	10.27	**595**	6 040.19	13.762	10.07
496	4 727.71	12.745	10.50	**546**	5 378.00	13.264	10.27	**596**	6 053.96	13.772	10.06
497	4 740.46	12.756	10.50	**547**	5 391.27	13.275	10.26	**597**	6 067.73	13.782	10.06
498	4 753.22	12.766	10.49	**548**	5 404.55	13.285	10.26	**598**	6 081.52	13.793	10.06
499	4 765.99	12.777	10.49	**549**	5 417.84	13.295	10.25	**599**	6 095.32	13.803	10.05
500	4 778.77	12.787	10.48	**550**	5 431.14	13.305	10.25	**600**	6 109.13	13.813	10.05

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	6 109.13	13.813	10.05	**650**	6 812.10	14.297	9.39	**700**	7 538.98	14.783	9.92
601	6 122.94	13.823	10.04	**651**	6 826.40	14.307	9.41	**701**	7 553.77	14.792	9.93
602	6 136.77	13.833	10.04	**652**	6 840.71	14.316	9.43	**702**	7 568.57	14.802	9.93
603	6 150.61	13.843	10.04	**653**	6 855.04	14.325	9.44	**703**	7 583.38	14.812	9.94
604	6 164.46	13.853	10.03	**654**	6 869.37	14.335	9.46	**704**	7 598.19	14.822	9.94
605	6 178.32	13.863	10.03	**655**	6 883.71	14.344	9.47	**705**	7 613.02	14.832	9.95
606	6 192.18	13.873	10.03	**656**	6 898.05	14.354	9.49	**706**	7 627.86	14.842	9.95
607	6 206.06	13.883	10.02	**657**	6 912.41	14.363	9.50	**707**	7 642.71	14.852	9.95
608	6 219.95	13.893	10.02	**658**	6 926.78	14.373	9.52	**708**	7 657.56	14.862	9.96
609	6 233.85	13.903	10.02	**659**	6 941.16	14.382	9.53	**709**	7 672.43	14.872	9.96
610	6 247.75	13.913	10.01	**660**	6 955.55	14.392	9.55	**710**	7 687.31	14.882	9.96
611	6 261.67	13.923	10.01	**661**	6 969.94	14.401	9.56	**711**	7 702.19	14.892	9.97
612	6 275.60	13.933	10.01	**662**	6 984.35	14.411	9.58	**712**	7 717.09	14.902	9.97
613	6 289.54	13.943	10.00	**663**	6 998.76	14.421	9.59	**713**	7 732.00	14.912	9.97
614	6 303.49	13.953	10.00	**664**	7 013.19	14.430	9.60	**714**	7 746.91	14.922	9.98
615	6 317.44	13.963	10.00	**665**	7 027.62	14.440	9.62	**715**	7 761.84	14.932	9.98
616	6 331.41	13.973	9.99	**666**	7 042.07	14.449	9.63	**716**	7 776.78	14.942	9.98
617	6 345.39	13.983	9.99	**667**	7 056.52	14.459	9.64	**717**	7 791.72	14.952	9.98
618	6 359.38	13.993	9.99	**668**	7 070.99	14.469	9.65	**718**	7 806.68	14.962	9.99
619	6 373.38	14.003	9.98	**669**	7 085.46	14.478	9.66	**719**	7 821.65	14.972	9.99
620	6 387.38	14.013	9.98	**670**	7 099.94	14.488	9.68	**720**	7 836.62	14.982	9.99
621	6 401.40	14.023	9.98	**671**	7 114.44	14.498	9.69	**721**	7 851.61	14.992	9.99
622	6 415.43	14.033	9.97	**672**	7 128.94	14.507	9.70	**722**	7 866.61	15.002	9.99
623	6 429.47	14.043	9.97	**673**	7 143.45	14.517	9.71	**723**	7 881.61	15.012	10.00
624	6 443.52	14.053	9.97	**674**	7 157.97	14.527	9.72	**724**	7 896.63	15.022	10.00
625	6 457.57	14.063	9.96	**675**	7 172.51	14.537	9.73	**725**	7 911.66	15.032	10.00
626	6 471.64	14.073	9.96	**676**	7 187.05	14.546	9.74	**726**	7 926.69	15.042	10.00
627	6 485.72	14.083	9.96	**677**	7 201.60	14.556	9.75	**727**	7 941.74	15.052	10.00
628	6 499.81	14.093	9.96	**678**	7 216.16	14.566	9.76	**728**	7 956.80	15.062	10.00
629	6 513.90	14.103	9.95	**679**	7 230.73	14.576	9.77	**729**	7 971.87	15.072	10.00
630	6 528.01	14.113	9.95	**680**	7 245.31	14.585	9.78	**730**	7 986.94	15.082	10.00
631	6 542.13	14.122	9.01	**681**	7 259.90	14.595	9.79	**731**	8 002.03	15.092	10.00
632	6 556.26	14.131	9.04	**682**	7 274.50	14.605	9.80	**732**	8 017.13	15.102	10.00
633	6 570.39	14.140	9.06	**683**	7 289.11	14.615	9.81	**733**	8 032.23	15.112	10.00
634	6 584.54	14.149	9.08	**684**	7 303.73	14.625	9.81	**734**	8 047.35	15.122	10.00
635	6 598.69	14.158	9.10	**685**	7 318.36	14.634	9.82	**735**	8 062.48	15.132	10.00
636	6 612.85	14.167	9.13	**686**	7 333.00	14.644	9.83	**736**	8 077.61	15.142	10.00
637	6 627.03	14.177	9.15	**687**	7 347.65	14.654	9.84	**737**	8 092.76	15.152	10.00
638	6 641.21	14.186	9.17	**688**	7 362.31	14.664	9.85	**738**	8 107.92	15.162	10.00
639	6 655.40	14.195	9.19	**689**	7 376.98	14.674	9.85	**739**	8 123.08	15.172	10.00
640	6 669.60	14.204	9.21	**690**	7 391.65	14.684	9.86	**740**	8 138.26	15.182	10.00
641	6 683.81	14.213	9.23	**691**	7 406.34	14.693	9.87	**741**	8 153.45	15.192	10.00
642	6 698.02	14.223	9.25	**692**	7 421.04	14.703	9.87	**742**	8 168.64	15.202	10.00
643	6 712.25	14.232	9.27	**693**	7 435.75	14.713	9.88	**743**	8 183.85	15.212	10.00
644	6 726.49	14.241	9.29	**694**	7 450.47	14.723	9.89	**744**	8 199.07	15.222	10.00
645	6 740.73	14.250	9.30	**695**	7 465.20	14.733	9.89	**745**	8 214.29	15.232	9.99
646	6 754.99	14.260	9.32	**696**	7 479.93	14.743	9.90	**746**	8 229.53	15.242	9.99
647	6 769.25	14.269	9.34	**697**	7 494.68	14.753	9.91	**747**	8 244.78	15.252	9.99
648	6 783.53	14.278	9.36	**698**	7 509.44	14.763	9.91	**748**	8 260.03	15.262	9.99
649	6 797.81	14.288	9.38	**699**	7 524.21	14.773	9.92	**749**	8 275.30	15.272	9.99
650	6 812.10	14.297	9.39	**700**	7 538.98	14.783	9.92	**750**	8 290.58	15.282	9.99

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
750	8 290.58	15.282	9.99	800	9 067.08	15.777	9.78	850	9 868.01	16.258	9.45
751	8 305.86	15.292	9.98	801	9 082.86	15.786	9.78	851	9 884.27	16.267	9.44
752	8 321.16	15.302	9.98	802	9 098.65	15.796	9.77	852	9 900.54	16.277	9.43
753	8 336.47	15.312	9.98	803	9 114.45	15.806	9.77	853	9 916.82	16.286	9.42
754	8 351.78	15.322	9.98	804	9 130.26	15.816	9.76	854	9 933.11	16.295	9.42
755	8 367.11	15.332	9.97	805	9 146.08	15.826	9.75	855	9 949.41	16.305	9.41
756	8 382.45	15.342	9.97	806	9 161.91	15.835	9.75	856	9 965.72	16.314	9.40
757	8 397.79	15.352	9.97	807	9 177.75	15.845	9.74	857	9 982.04	16.324	9.39
758	8 413.15	15.361	9.97	808	9 193.60	15.855	9.74	858	9 998.37	16.333	9.39
759	8 428.52	15.371	9.96	809	9 209.46	15.864	9.73	859	10 014.71	16.342	9.38
760	8 443.89	15.381	9.96	810	9 225.33	15.874	9.72	860	10 031.06	16.352	9.37
761	8 459.28	15.391	9.96	811	9 241.21	15.884	9.72	861	10 047.41	16.361	9.36
762	8 474.67	15.401	9.96	812	9 257.10	15.894	9.71	862	10 063.78	16.371	9.36
763	8 490.08	15.411	9.95	813	9 273.00	15.903	9.70	863	10 080.15	16.380	9.35
764	8 505.50	15.421	9.95	814	9 288.91	15.913	9.70	864	10 096.54	16.389	9.34
765	8 520.92	15.431	9.95	815	9 304.82	15.923	9.69	865	10 112.93	16.399	9.33
766	8 536.36	15.441	9.94	816	9 320.75	15.932	9.68	866	10 129.34	16.408	9.33
767	8 551.81	15.451	9.94	817	9 336.69	15.942	9.68	867	10 145.75	16.417	9.32
768	8 567.26	15.461	9.94	818	9 352.64	15.952	9.67	868	10 162.17	16.427	9.31
769	8 582.73	15.471	9.93	819	9 368.59	15.961	9.67	869	10 178.60	16.436	9.30
770	8 598.20	15.481	9.93	820	9 384.56	15.971	9.66	870	10 195.04	16.445	9.29
771	8 613.69	15.491	9.92	821	9 400.53	15.981	9.65	871	10 211.49	16.454	9.29
772	8 629.18	15.501	9.92	822	9 416.52	15.990	9.65	872	10 227.95	16.464	9.28
773	8 644.69	15.511	9.92	823	9 432.52	16.000	9.64	873	10 244.42	16.473	9.27
774	8 660.21	15.521	9.91	824	9 448.52	16.010	9.63	874	10 260.90	16.482	9.26
775	8 675.73	15.530	9.91	825	9 464.54	16.019	9.63	875	10 277.38	16.492	9.26
776	8 691.27	15.540	9.90	826	9 480.56	16.029	9.62	876	10 293.88	16.501	9.25
777	8 706.81	15.550	9.90	827	9 496.59	16.039	9.61	877	10 310.39	16.510	9.24
778	8 722.37	15.560	9.90	828	9 512.64	16.048	9.60	878	10 326.90	16.519	9.23
779	8 737.93	15.570	9.89	829	9 528.69	16.058	9.60	879	10 343.42	16.529	9.22
780	8 753.51	15.580	9.89	830	9 544.75	16.067	9.59	880	10 359.96	16.538	9.22
781	8 769.09	15.590	9.88	831	9 560.82	16.077	9.58	881	10 376.50	16.547	9.21
782	8 784.69	15.600	9.88	832	9 576.91	16.087	9.58	882	10 393.05	16.556	9.20
783	8 800.29	15.610	9.87	833	9 593.00	16.096	9.57	883	10 409.61	16.565	9.19
784	8 815.91	15.619	9.87	834	9 609.10	16.106	9.56	884	10 426.18	16.575	9.19
785	8 831.53	15.629	9.86	835	9 625.21	16.115	9.56	885	10 442.76	16.584	9.18
786	8 847.17	15.639	9.86	836	9 641.33	16.125	9.55	886	10 459.35	16.593	9.17
787	8 862.81	15.649	9.85	837	9 657.46	16.134	9.54	887	10 475.95	16.602	9.16
788	8 878.46	15.659	9.85	838	9 673.60	16.144	9.53	888	10 492.55	16.611	9.15
789	8 894.13	15.669	9.84	839	9 689.75	16.153	9.53	889	10 509.17	16.620	9.15
790	8 909.80	15.679	9.84	840	9 705.90	16.163	9.52	890	10 525.79	16.630	9.14
791	8 925.48	15.688	9.83	841	9 722.07	16.172	9.51	891	10 542.43	16.639	9.13
792	8 941.18	15.698	9.83	842	9 738.25	16.182	9.51	892	10 559.07	16.648	9.12
793	8 956.88	15.708	9.82	843	9 754.44	16.191	9.50	893	10 575.72	16.657	9.11
794	8 972.59	15.718	9.82	844	9 770.63	16.201	9.49	894	10 592.38	16.666	9.11
795	8 988.32	15.728	9.81	845	9 786.84	16.210	9.48	895	10 609.06	16.675	9.10
796	9 004.05	15.737	9.81	846	9 803.05	16.220	9.48	896	10 625.74	16.684	9.09
797	9 019.79	15.747	9.80	847	9 819.28	16.229	9.47	897	10 642.42	16.693	9.08
798	9 035.54	15.757	9.79	848	9 835.51	16.239	9.46	898	10 659.12	16.702	9.08
799	9 051.31	15.767	9.79	849	9 851.75	16.248	9.45	899	10 675.83	16.711	9.07
800	9 067.08	15.777	9.78	850	9 868.01	16.258	9.45	900	10 692.54	16.720	9.06

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
900	10 692.54	16.720	9.06	**950**	11 539.73	17.164	8.66	**1000**	12 408.57	17.587	8.27
901	10 709.27	16.730	9.05	**951**	11 556.90	17.172	8.65	**1001**	12 426.16	17.595	8.26
902	10 726.00	16.739	9.04	**952**	11 574.07	17.181	8.65	**1002**	12 443.76	17.603	8.25
903	10 742.75	16.748	9.04	**953**	11 591.26	17.190	8.64	**1003**	12 461.37	17.612	8.24
904	10 759.50	16.757	9.03	**954**	11 608.45	17.198	8.63	**1004**	12 478.98	17.620	8.23
905	10 776.26	16.766	9.02	**955**	11 625.65	17.207	8.62	**1005**	12 496.61	17.628	8.23
906	10 793.03	16.775	9.01	**956**	11 642.87	17.215	8.62	**1006**	12 514.24	17.636	8.22
907	10 809.81	16.784	9.00	**957**	11 660.09	17.224	8.61	**1007**	12 531.88	17.644	8.21
908	10 826.60	16.793	9.00	**958**	11 677.31	17.233	8.60	**1008**	12 549.53	17.653	8.20
909	10 843.40	16.802	8.99	**959**	11 694.55	17.241	8.59	**1009**	12 567.18	17.661	8.19
910	10 860.20	16.811	8.98	**960**	11 711.80	17.250	8.58	**1010**	12 584.85	17.669	8.19
911	10 877.02	16.820	8.97	**961**	11 729.05	17.258	8.58	**1011**	12 602.52	17.677	8.18
912	10 893.84	16.829	8.96	**962**	11 746.31	17.267	8.57	**1012**	12 620.20	17.685	8.17
913	10 910.67	16.838	8.96	**963**	11 763.58	17.276	8.56	**1013**	12 637.89	17.694	8.16
914	10 927.52	16.847	8.95	**964**	11 780.86	17.284	8.55	**1014**	12 655.59	17.702	8.15
915	10 944.37	16.855	8.94	**965**	11 798.15	17.293	8.54	**1015**	12 673.30	17.710	8.15
916	10 961.23	16.864	8.93	**966**	11 815.45	17.301	8.54	**1016**	12 691.01	17.718	8.14
917	10 978.10	16.873	8.92	**967**	11 832.75	17.310	8.53	**1017**	12 708.73	17.726	8.13
918	10 994.97	16.882	8.92	**968**	11 850.07	17.318	8.52	**1018**	12 726.46	17.734	8.12
919	11 011.86	16.891	8.91	**969**	11 867.39	17.327	8.51	**1019**	12 744.20	17.742	8.11
920	11 028.76	16.900	8.90	**970**	11 884.72	17.335	8.50	**1020**	12 761.95	17.751	8.11
921	11 045.66	16.909	8.89	**971**	11 902.06	17.344	8.50	**1021**	12 779.70	17.759	8.10
922	11 062.57	16.918	8.88	**972**	11 919.41	17.352	8.49	**1022**	12 797.47	17.767	8.09
923	11 079.50	16.927	8.88	**973**	11 936.77	17.361	8.48	**1023**	12 815.24	17.775	8.08
924	11 096.43	16.936	8.87	**974**	11 954.13	17.369	8.47	**1024**	12 833.02	17.783	8.07
925	11 113.37	16.945	8.86	**975**	11 971.50	17.378	8.46	**1025**	12 850.80	17.791	8.07
926	11 130.32	16.953	8.85	**976**	11 988.89	17.386	8.46	**1026**	12 868.60	17.799	8.06
927	11 147.27	16.962	8.85	**977**	12 006.28	17.395	8.45	**1027**	12 886.40	17.807	8.05
928	11 164.24	16.971	8.84	**978**	12 023.67	17.403	8.44	**1028**	12 904.21	17.815	8.04
929	11 181.22	16.980	8.83	**979**	12 041.08	17.411	8.43	**1029**	12 922.03	17.823	8.03
930	11 198.20	16.989	8.82	**980**	12 058.50	17.420	8.43	**1030**	12 939.86	17.831	8.03
931	11 215.19	16.998	8.81	**981**	12 075.92	17.428	8.42	**1031**	12 957.69	17.839	8.02
932	11 232.20	17.006	8.81	**982**	12 093.35	17.437	8.41	**1032**	12 975.54	17.847	8.01
933	11 249.21	17.015	8.80	**983**	12 110.80	17.445	8.40	**1033**	12 993.39	17.855	8.00
934	11 266.23	17.024	8.79	**984**	12 128.24	17.454	8.39	**1034**	13 011.25	17.863	7.99
935	11 283.25	17.033	8.78	**985**	12 145.70	17.462	8.39	**1035**	13 029.11	17.871	7.98
936	11 300.29	17.041	8.77	**986**	12 163.17	17.470	8.38	**1036**	13 046.99	17.879	7.98
937	11 317.34	17.050	8.77	**987**	12 180.64	17.479	8.37	**1037**	13 064.87	17.887	7.97
938	11 334.39	17.059	8.76	**988**	12 198.13	17.487	8.36	**1038**	13 082.76	17.895	7.96
939	11 351.46	17.068	8.75	**989**	12 215.62	17.495	8.35	**1039**	13 100.66	17.903	7.95
940	11 368.53	17.077	8.74	**990**	12 233.12	17.504	8.35	**1040**	13 118.57	17.911	7.94
941	11 385.61	17.085	8.73	**991**	12 250.62	17.512	8.34	**1041**	13 136.48	17.919	7.94
942	11 402.70	17.094	8.73	**992**	12 268.14	17.520	8.33	**1042**	13 154.41	17.927	7.93
943	11 419.80	17.103	8.72	**993**	12 285.67	17.529	8.32	**1043**	13 172.34	17.935	7.92
944	11 436.90	17.111	8.71	**994**	12 303.20	17.537	8.31	**1044**	13 190.28	17.943	7.91
945	11 454.02	17.120	8.70	**995**	12 320.74	17.545	8.31	**1045**	13 208.22	17.951	7.90
946	11 471.14	17.129	8.69	**996**	12 338.29	17.554	8.30	**1046**	13 226.18	17.959	7.89
947	11 488.28	17.138	8.69	**997**	12 355.85	17.562	8.29	**1047**	13 244.14	17.966	7.89
948	11 505.42	17.146	8.68	**998**	12 373.41	17.570	8.28	**1048**	13 262.11	17.974	7.88
949	11 522.57	17.155	8.67	**999**	12 390.99	17.579	8.27	**1049**	13 280.09	17.982	7.87
950	11 539.73	17.164	8.66	**1000**	12 408.57	17.587	8.27	**1050**	13 298.08	17.990	7.86

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	13 298.08	17.990	7.86	1100	14 207.23	18.372	7.42	1150	15 134.91	18.731	6.92
1051	13 316.07	17.998	7.85	1101	14 225.60	18.380	7.41	1151	15 153.65	18.738	6.90
1052	13 334.07	18.006	7.84	1102	14 243.99	18.387	7.40	1152	15 172.39	18.745	6.89
1053	13 352.08	18.014	7.84	1103	14 262.38	18.395	7.39	1153	15 191.14	18.752	6.88
1054	13 370.10	18.021	7.83	1104	14 280.77	18.402	7.38	1154	15 209.89	18.759	6.87
1055	13 388.12	18.029	7.82	1105	14 299.18	18.409	7.37	1155	15 228.66	18.765	6.86
1056	13 406.16	18.037	7.81	1106	14 317.59	18.417	7.36	1156	15 247.42	18.772	6.85
1057	13 424.20	18.045	7.80	1107	14 336.01	18.424	7.35	1157	15 266.20	18.779	6.84
1058	13 442.25	18.053	7.79	1108	14 354.44	18.431	7.34	1158	15 284.98	18.786	6.83
1059	13 460.30	18.060	7.78	1109	14 372.88	18.439	7.34	1159	15 303.77	18.793	6.82
1060	13 478.37	18.068	7.78	1110	14 391.32	18.446	7.33	1160	15 322.57	18.800	6.80
1061	13 496.44	18.076	7.77	1111	14 409.77	18.453	7.32	1161	15 341.37	18.806	6.79
1062	13 514.52	18.084	7.76	1112	14 428.23	18.461	7.31	1162	15 360.18	18.813	6.78
1063	13 532.61	18.092	7.75	1113	14 446.69	18.468	7.30	1163	15 379.00	18.820	6.77
1064	13 550.70	18.099	7.74	1114	14 465.16	18.475	7.29	1164	15 397.82	18.827	6.76
1065	13 568.81	18.107	7.73	1115	14 483.64	18.483	7.28	1165	15 416.65	18.834	6.75
1066	13 586.92	18.115	7.72	1116	14 502.13	18.490	7.27	1166	15 435.49	18.840	6.74
1067	13 605.04	18.122	7.72	1117	14 520.62	18.497	7.26	1167	15 454.33	18.847	6.72
1068	13 623.16	18.130	7.71	1118	14 539.12	18.504	7.25	1168	15 473.18	18.854	6.71
1069	13 641.30	18.138	7.70	1119	14 557.63	18.512	7.24	1169	15 492.04	18.860	6.70
1070	13 659.44	18.146	7.69	1120	14 576.14	18.519	7.23	1170	15 510.90	18.867	6.69
1071	13 677.59	18.153	7.68	1121	14 594.67	18.526	7.22	1171	15 529.77	18.874	6.68
1072	13 695.74	18.161	7.67	1122	14 613.20	18.533	7.21	1172	15 548.65	18.880	6.67
1073	13 713.91	18.169	7.66	1123	14 631.73	18.540	7.20	1173	15 567.53	18.887	6.65
1074	13 732.08	18.176	7.66	1124	14 650.28	18.548	7.19	1174	15 586.43	18.894	6.64
1075	13 750.26	18.184	7.65	1125	14 668.83	18.555	7.18	1175	15 605.32	18.900	6.63
1076	13 768.45	18.192	7.64	1126	14 687.39	18.562	7.17	1176	15 624.23	18.907	6.62
1077	13 786.65	18.199	7.63	1127	14 705.95	18.569	7.16	1177	15 643.14	18.914	6.61
1078	13 804.85	18.207	7.62	1128	14 724.52	18.576	7.15	1178	15 662.05	18.920	6.59
1079	13 823.06	18.214	7.61	1129	14 743.10	18.583	7.14	1179	15 680.98	18.927	6.58
1080	13 841.28	18.222	7.60	1130	14 761.69	18.591	7.13	1180	15 699.91	18.933	6.57
1081	13 859.50	18.230	7.59	1131	14 780.29	18.598	7.12	1181	15 718.84	18.940	6.56
1082	13 877.74	18.237	7.58	1132	14 798.89	18.605	7.11	1182	15 737.79	18.947	6.55
1083	13 895.98	18.245	7.58	1133	14 817.50	18.612	7.10	1183	15 756.74	18.953	6.53
1084	13 914.23	18.252	7.57	1134	14 836.11	18.619	7.09	1184	15 775.69	18.960	6.52
1085	13 932.48	18.260	7.56	1135	14 854.73	18.626	7.08	1185	15 794.66	18.966	6.51
1086	13 950.75	18.268	7.55	1136	14 873.36	18.633	7.07	1186	15 813.62	18.973	6.50
1087	13 969.02	18.275	7.54	1137	14 892.00	18.640	7.05	1187	15 832.60	18.979	6.48
1088	13 987.30	18.283	7.53	1138	14 910.64	18.647	7.04	1188	15 851.58	18.986	6.47
1089	14 005.58	18.290	7.52	1139	14 929.29	18.654	7.03	1189	15 870.57	18.992	6.46
1090	14 023.88	18.298	7.51	1140	14 947.95	18.661	7.02	1190	15 889.57	18.998	6.45
1091	14 042.18	18.305	7.50	1141	14 966.62	18.668	7.01	1191	15 908.57	19.005	6.43
1092	14 060.49	18.313	7.49	1142	14 985.29	18.675	7.00	1192	15 927.58	19.011	6.42
1093	14 078.80	18.320	7.49	1143	15 003.97	18.682	6.99	1193	15 946.59	19.018	6.41
1094	14 097.13	18.328	7.48	1144	15 022.65	18.689	6.98	1194	15 965.61	19.024	6.39
1095	14 115.46	18.335	7.47	1145	15 041.35	18.696	6.97	1195	15 984.64	19.031	6.38
1096	14 133.80	18.343	7.46	1146	15 060.05	18.703	6.96	1196	16 003.67	19.037	6.37
1097	14 152.14	18.350	7.45	1147	15 078.75	18.710	6.95	1197	16 022.71	19.043	6.36
1098	14 170.50	18.357	7.44	1148	15 097.47	18.717	6.94	1198	16 041.76	19.050	6.34
1099	14 188.86	18.365	7.43	1149	15 116.19	18.724	6.93	1199	16 060.81	19.056	6.33
1100	14 207.23	18.372	7.42	1150	15 134.91	18.731	6.92	1200	16 079.87	19.062	6.32

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
1200	16 079.87	19.062	6.32	1250	17 040.60	19.361	5.60	1300	18 015.29	19.620	4.75
1201	16 098.94	19.069	6.30	1251	17 059.96	19.366	5.58	1301	18 034.92	19.625	4.73
1202	16 118.01	19.075	6.29	1252	17 079.33	19.372	5.57	1302	18 054.54	19.629	4.71
1203	16 137.09	19.081	6.28	1253	17 098.71	19.377	5.55	1303	18 074.17	19.634	4.69
1204	16 156.17	19.087	6.26	1254	17 118.09	19.383	5.54	1304	18 093.81	19.639	4.67
1205	16 175.26	19.094	6.25	1255	17 137.47	19.389	5.52	1305	18 113.45	19.643	4.65
1206	16 194.36	19.100	6.24	1256	17 156.86	19.394	5.50	1306	18 133.10	19.648	4.63
1207	16 213.46	19.106	6.22	1257	17 176.26	19.400	5.49	1307	18 152.75	19.653	4.62
1208	16 232.57	19.112	6.21	1258	17 195.66	19.405	5.47	1308	18 172.40	19.657	4.60
1209	16 251.69	19.119	6.20	1259	17 215.07	19.410	5.46	1309	18 192.06	19.662	4.58
1210	16 270.81	19.125	6.18	1260	17 234.48	19.416	5.44	1310	18 211.73	19.666	4.56
1211	16 289.94	19.131	6.17	1261	17 253.90	19.421	5.42	1311	18 231.40	19.671	4.54
1212	16 309.07	19.137	6.16	1262	17 273.33	19.427	5.41	1312	18 251.07	19.676	4.52
1213	16 328.21	19.143	6.14	1263	17 292.75	19.432	5.39	1313	18 270.75	19.680	4.50
1214	16 347.36	19.149	6.13	1264	17 312.19	19.438	5.37	1314	18 290.43	19.685	4.48
1215	16 366.51	19.156	6.12	1265	17 331.63	19.443	5.36	1315	18 310.12	19.689	4.46
1216	16 385.67	19.162	6.10	1266	17 351.08	19.448	5.34	1316	18 329.81	19.694	4.44
1217	16 404.83	19.168	6.09	1267	17 370.53	19.454	5.32	1317	18 349.50	19.698	4.43
1218	16 424.00	19.174	6.07	1268	17 389.98	19.459	5.31	1318	18 369.20	19.702	4.41
1219	16 443.18	19.180	6.06	1269	17 409.44	19.464	5.29	1319	18 388.91	19.707	4.39
1220	16 462.36	19.186	6.05	1270	17 428.91	19.470	5.27	1320	18 408.62	19.711	4.37
1221	16 481.55	19.192	6.03	1271	17 448.38	19.475	5.26	1321	18 428.33	19.715	4.35
1222	16 500.75	19.198	6.02	1272	17 467.86	19.480	5.24	1322	18 448.05	19.720	4.33
1223	16 519.95	19.204	6.00	1273	17 487.34	19.485	5.22	1323	18 467.77	19.724	4.31
1224	16 539.16	19.210	5.99	1274	17 506.83	19.490	5.21	1324	18 487.50	19.728	4.29
1225	16 558.37	19.216	5.97	1275	17 526.32	19.496	5.19	1325	18 507.23	19.733	4.27
1226	16 577.59	19.222	5.96	1276	17 545.82	19.501	5.17	1326	18 526.96	19.737	4.25
1227	16 596.81	19.228	5.95	1277	17 565.33	19.506	5.16	1327	18 546.70	19.741	4.23
1228	16 616.04	19.234	5.93	1278	17 584.83	19.511	5.14	1328	18 566.44	19.745	4.21
1229	16 635.28	19.240	5.92	1279	17 604.35	19.516	5.12	1329	18 586.19	19.750	4.19
1230	16 654.52	19.246	5.90	1280	17 623.87	19.521	5.10	1330	18 605.94	19.754	4.17
1231	16 673.77	19.252	5.89	1281	17 643.39	19.527	5.09	1331	18 625.70	19.758	4.15
1232	16 693.03	19.257	5.87	1282	17 662.92	19.532	5.07	1332	18 645.46	19.762	4.13
1233	16 712.29	19.263	5.86	1283	17 682.45	19.537	5.05	1333	18 665.22	19.766	4.11
1234	16 731.55	19.269	5.84	1284	17 701.99	19.542	5.03	1334	18 684.99	19.770	4.09
1235	16 750.83	19.275	5.83	1285	17 721.54	19.547	5.02	1335	18 704.76	19.774	4.07
1236	16 770.10	19.281	5.81	1286	17 741.09	19.552	5.00	1336	18 724.54	19.778	4.05
1237	16 789.39	19.287	5.80	1287	17 760.64	19.557	4.98	1337	18 744.32	19.782	4.03
1238	16 808.68	19.292	5.78	1288	17 780.20	19.562	4.96	1338	18 764.10	19.787	4.01
1239	16 827.97	19.298	5.77	1289	17 799.76	19.567	4.95	1339	18 783.89	19.791	3.99
1240	16 847.27	19.304	5.75	1290	17 819.33	19.572	4.93	1340	18 803.69	19.794	3.97
1241	16 866.58	19.310	5.74	1291	17 838.91	19.576	4.91	1341	18 823.48	19.798	3.94
1242	16 885.89	19.315	5.72	1292	17 858.49	19.581	4.89	1342	18 843.28	19.802	3.92
1243	16 905.21	19.321	5.71	1293	17 878.07	19.586	4.87	1343	18 863.09	19.806	3.90
1244	16 924.53	19.327	5.69	1294	17 897.66	19.591	4.86	1344	18 882.90	19.810	3.88
1245	16 943.86	19.333	5.68	1295	17 917.25	19.596	4.84	1345	18 902.71	19.814	3.86
1246	16 963.20	19.338	5.66	1296	17 936.85	19.601	4.82	1346	18 922.52	19.818	3.84
1247	16 982.54	19.344	5.65	1297	17 956.45	19.606	4.80	1347	18 942.34	19.822	3.82
1248	17 001.89	19.350	5.63	1298	17 976.06	19.610	4.78	1348	18 962.17	19.826	3.80
1249	17 021.24	19.355	5.61	1299	17 995.68	19.615	4.76	1349	18 981.99	19.829	3.78
1250	17 040.60	19.361	5.60	1300	18 015.29	19.620	4.75	1350	19 001.83	19.833	3.76

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
1350	19 001.83	19.833	3.76	1400	19 997.72	19.993	2.64	1450	21 000.20	20.095	1.42
1351	19 021.66	19.837	3.74	1401	20 017.72	19.996	2.62	1451	21 020.29	20.097	1.40
1352	19 041.50	19.841	3.71	1402	20 037.71	19.999	2.59	1452	21 040.39	20.098	1.37
1353	19 061.34	19.844	3.69	1403	20 057.71	20.001	2.57	1453	21 060.49	20.100	1.35
1354	19 081.19	19.848	3.67	1404	20 077.72	20.004	2.55	1454	21 080.59	20.101	1.32
1355	19 101.04	19.852	3.65	1405	20 097.72	20.006	2.52	1455	21 100.69	20.102	1.30
1356	19 120.89	19.855	3.63	1406	20 117.73	20.009	2.50	1456	21 120.80	20.104	1.27
1357	19 140.75	19.859	3.61	1407	20 137.74	20.011	2.47	1457	21 140.90	20.105	1.25
1358	19 160.61	19.862	3.59	1408	20 157.75	20.014	2.45	1458	21 161.01	20.106	1.22
1359	19 180.47	19.866	3.56	1409	20 177.77	20.016	2.43	1459	21 181.11	20.107	1.20
1360	19 200.34	19.870	3.54	1410	20 197.79	20.019	2.40	1460	21 201.22	20.108	1.17
1361	19 220.21	19.873	3.52	1411	20 217.81	20.021	2.38	1461	21 221.33	20.110	1.15
1362	19 240.09	19.877	3.50	1412	20 237.83	20.023	2.36	1462	21 241.44	20.111	1.12
1363	19 259.97	19.880	3.48	1413	20 257.85	20.026	2.33	1463	21 261.55	20.112	1.10
1364	19 279.85	19.884	3.46	1414	20 277.88	20.028	2.31	1464	21 281.66	20.113	1.07
1365	19 299.73	19.887	3.43	1415	20 297.91	20.030	2.28	1465	21 301.78	20.114	1.05
1366	19 319.62	19.890	3.41	1416	20 317.94	20.033	2.26	1466	21 321.89	20.115	1.02
1367	19 339.51	19.894	3.39	1417	20 337.97	20.035	2.24	1467	21 342.01	20.116	1.00
1368	19 359.41	19.897	3.37	1418	20 358.01	20.037	2.21	1468	21 362.12	20.117	0.97
1369	19 379.31	19.901	3.35	1419	20 378.05	20.039	2.19	1469	21 382.24	20.118	0.94
1370	19 399.21	19.904	3.32	1420	20 398.09	20.042	2.16	1470	21 402.36	20.119	0.92
1371	19 419.12	19.907	3.30	1421	20 418.13	20.044	2.14	1471	21 422.48	20.120	0.89
1372	19 439.02	19.911	3.28	1422	20 438.18	20.046	2.12	1472	21 442.60	20.121	0.87
1373	19 458.94	19.914	3.26	1423	20 458.22	20.048	2.09	1473	21 462.72	20.122	0.84
1374	19 478.85	19.917	3.23	1424	20 478.27	20.050	2.07	1474	21 482.84	20.122	0.82
1375	19 498.77	19.920	3.21	1425	20 498.32	20.052	2.04	1475	21 502.96	20.123	0.79
1376	19 518.69	19.923	3.19	1426	20 518.38	20.054	2.02	1476	21 523.09	20.124	0.77
1377	19 538.62	19.927	3.17	1427	20 538.43	20.056	1.99	1477	21 543.21	20.125	0.74
1378	19 558.55	19.930	3.15	1428	20 558.49	20.058	1.97	1478	21 563.34	20.125	0.72
1379	19 578.48	19.933	3.12	1429	20 578.55	20.060	1.94	1479	21 583.46	20.126	0.69
1380	19 598.41	19.936	3.10	1430	20 598.61	20.062	1.92	1480	21 603.59	20.127	0.66
1381	19 618.35	19.939	3.08	1431	20 618.67	20.064	1.90	1481	21 623.72	20.127	0.64
1382	19 638.29	19.942	3.06	1432	20 638.74	20.066	1.87	1482	21 643.84	20.128	0.61
1383	19 658.23	19.945	3.03	1433	20 658.80	20.068	1.85	1483	21 663.97	20.129	0.59
1384	19 678.18	19.948	3.01	1434	20 678.87	20.069	1.82	1484	21 684.10	20.129	0.56
1385	19 698.13	19.951	2.99	1435	20 698.94	20.071	1.80	1485	21 704.23	20.130	0.54
1386	19 718.08	19.954	2.96	1436	20 719.01	20.073	1.77	1486	21 724.36	20.130	0.51
1387	19 738.04	19.957	2.94	1437	20 739.09	20.075	1.75	1487	21 744.49	20.131	0.48
1388	19 758.00	19.960	2.92	1438	20 759.16	20.077	1.72	1488	21 764.62	20.131	0.46
1389	19 777.96	19.963	2.90	1439	20 779.24	20.078	1.70	1489	21 784.75	20.132	0.43
1390	19 797.92	19.966	2.87	1440	20 799.32	20.080	1.67	1490	21 804.89	20.132	0.41
1391	19 817.89	19.969	2.85	1441	20 819.40	20.082	1.65	1491	21 825.02	20.133	0.38
1392	19 837.86	19.972	2.83	1442	20 839.48	20.083	1.62	1492	21 845.15	20.133	0.36
1393	19 857.83	19.974	2.80	1443	20 859.57	20.085	1.60	1493	21 865.28	20.133	0.33
1394	19 877.81	19.977	2.78	1444	20 879.65	20.086	1.57	1494	21 885.42	20.134	0.31
1395	19 897.79	19.980	2.76	1445	20 899.74	20.088	1.55	1495	21 905.55	20.134	0.28
1396	19 917.77	19.983	2.73	1446	20 919.83	20.090	1.52	1496	21 925.68	20.134	0.25
1397	19 937.75	19.985	2.71	1447	20 939.92	20.091	1.50	1497	21 945.82	20.134	0.23
1398	19 957.74	19.988	2.69	1448	20 960.01	20.093	1.47	1498	21 965.95	20.135	0.20
1399	19 977.73	19.991	2.66	1449	20 980.10	20.094	1.45	1499	21 986.09	20.135	0.18
1400	19 997.72	19.993	2.64	1450	21 000.20	20.095	1.42	1500	22 006.22	20.135	0.15

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1500	22 006.22	20.135	0.15	**1550**	23 012.63	20.111	−1.12	**1600**	24 016.24	20.024	−2.32
1501	22 026.36	20.135	0.13	**1551**	23 032.74	20.109	−1.15	**1601**	24 036.26	20.022	−2.35
1502	22 046.49	20.135	0.10	**1552**	23 052.84	20.108	−1.17	**1602**	24 056.28	20.019	−2.37
1503	22 066.63	20.135	0.07	**1553**	23 072.95	20.107	−1.20	**1603**	24 076.30	20.017	−2.39
1504	22 086.76	20.135	0.05	**1554**	23 093.06	20.106	−1.22	**1604**	24 096.32	20.015	−2.41
1505	22 106.90	20.135	0.02	**1555**	23 113.16	20.105	−1.25	**1605**	24 116.33	20.012	−2.44
1506	22 127.03	20.135	−0.00	**1556**	23 133.27	20.103	−1.27	**1606**	24 136.34	20.010	−2.46
1507	22 147.17	20.135	−0.03	**1557**	23 153.37	20.102	−1.30	**1607**	24 156.35	20.007	−2.48
1508	22 167.31	20.135	−0.05	**1558**	23 173.47	20.101	−1.32	**1608**	24 176.36	20.005	−2.50
1509	22 187.44	20.135	−0.08	**1559**	23 193.57	20.099	−1.34	**1609**	24 196.36	20.002	−2.53
1510	22 207.58	20.135	−0.11	**1560**	23 213.67	20.098	−1.37	**1610**	24 216.36	20.000	−2.55
1511	22 227.71	20.135	−0.13	**1561**	23 233.77	20.097	−1.39	**1611**	24 236.36	19.997	−2.57
1512	22 247.85	20.135	−0.16	**1562**	23 253.86	20.095	−1.42	**1612**	24 256.35	19.994	−2.59
1513	22 267.98	20.135	−0.18	**1563**	23 273.96	20.094	−1.44	**1613**	24 276.35	19.992	−2.62
1514	22 288.12	20.135	−0.21	**1564**	23 294.05	20.092	−1.47	**1614**	24 296.34	19.989	−2.64
1515	22 308.25	20.134	−0.23	**1565**	23 314.14	20.091	−1.49	**1615**	24 316.33	19.987	−2.66
1516	22 328.38	20.134	−0.26	**1566**	23 334.23	20.089	−1.52	**1616**	24 336.31	19.984	−2.68
1517	22 348.52	20.134	−0.28	**1567**	23 354.32	20.088	−1.54	**1617**	24 356.29	19.981	−2.70
1518	22 368.65	20.134	−0.31	**1568**	23 374.41	20.086	−1.57	**1618**	24 376.27	19.979	−2.72
1519	22 388.79	20.133	−0.34	**1569**	23 394.50	20.085	−1.59	**1619**	24 396.25	19.976	−2.75
1520	22 408.92	20.133	−0.36	**1570**	23 414.58	20.083	−1.61	**1620**	24 416.23	19.973	−2.77
1521	22 429.05	20.132	−0.39	**1571**	23 434.66	20.082	−1.64	**1621**	24 436.20	19.970	−2.79
1522	22 449.18	20.132	−0.41	**1572**	23 454.74	20.080	−1.66	**1622**	24 456.17	19.967	−2.81
1523	22 469.31	20.132	−0.44	**1573**	23 474.82	20.078	−1.69	**1623**	24 476.13	19.965	−2.83
1524	22 489.45	20.131	−0.46	**1574**	23 494.90	20.077	−1.71	**1624**	24 496.09	19.962	−2.85
1525	22 509.58	20.131	−0.49	**1575**	23 514.98	20.075	−1.74	**1625**	24 516.06	19.959	−2.87
1526	22 529.71	20.130	−0.51	**1576**	23 535.05	20.073	−1.76	**1626**	24 536.01	19.956	−2.90
1527	22 549.84	20.130	−0.54	**1577**	23 555.12	20.071	−1.78	**1627**	24 555.97	19.953	−2.92
1528	22 569.97	20.129	−0.57	**1578**	23 575.19	20.069	−1.81	**1628**	24 575.92	19.950	−2.94
1529	22 590.10	20.129	−0.59	**1579**	23 595.26	20.068	−1.83	**1629**	24 595.87	19.947	−2.96
1530	22 610.22	20.128	−0.62	**1580**	23 615.33	20.066	−1.86	**1630**	24 615.81	19.944	−2.98
1531	22 630.35	20.127	−0.64	**1581**	23 635.39	20.064	−1.88	**1631**	24 635.76	19.941	−3.00
1532	22 650.48	20.127	−0.67	**1582**	23 655.45	20.062	−1.90	**1632**	24 655.70	19.938	−3.02
1533	22 670.61	20.126	−0.69	**1583**	23 675.52	20.060	−1.93	**1633**	24 675.63	19.935	−3.04
1534	22 690.73	20.125	−0.72	**1584**	23 695.57	20.058	−1.95	**1634**	24 695.57	19.932	−3.06
1535	22 710.86	20.125	−0.74	**1585**	23 715.63	20.056	−1.98	**1635**	24 715.50	19.929	−3.08
1536	22 730.98	20.124	−0.77	**1586**	23 735.69	20.054	−2.00	**1636**	24 735.42	19.926	−3.10
1537	22 751.10	20.123	−0.79	**1587**	23 755.74	20.052	−2.02	**1637**	24 755.35	19.923	−3.12
1538	22 771.23	20.122	−0.82	**1588**	23 775.79	20.050	−2.05	**1638**	24 775.27	19.920	−3.14
1539	22 791.35	20.121	−0.84	**1589**	23 795.84	20.048	−2.07	**1639**	24 795.19	19.917	−3.16
1540	22 811.47	20.121	−0.87	**1590**	23 815.89	20.046	−2.09	**1640**	24 815.10	19.913	−3.18
1541	22 831.59	20.120	−0.90	**1591**	23 835.93	20.044	−2.12	**1641**	24 835.02	19.910	−3.20
1542	22 851.71	20.119	−0.92	**1592**	23 855.98	20.042	−2.14	**1642**	24 854.92	19.907	−3.22
1543	22 871.83	20.118	−0.95	**1593**	23 876.02	20.040	−2.16	**1643**	24 874.83	19.904	−3.24
1544	22 891.94	20.117	−0.97	**1594**	23 896.06	20.038	−2.19	**1644**	24 894.73	19.901	−3.26
1545	22 912.06	20.116	−1.00	**1595**	23 916.09	20.035	−2.21	**1645**	24 914.63	19.897	−3.28
1546	22 932.18	20.115	−1.02	**1596**	23 936.13	20.033	−2.23	**1646**	24 934.53	19.894	−3.30
1547	22 952.29	20.114	−1.05	**1597**	23 956.16	20.031	−2.26	**1647**	24 954.42	19.891	−3.32
1548	22 972.40	20.113	−1.07	**1598**	23 976.19	20.029	−2.28	**1648**	24 974.31	19.887	−3.34
1549	22 992.51	20.112	−1.10	**1599**	23 996.22	20.026	−2.30	**1649**	24 994.19	19.884	−3.36
1550	23 012.63	20.111	−1.12	**1600**	24 016.24	20.024	−2.32	**1650**	25 014.08	19.881	−3.38

TABLE 2.4.3. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1650	25 014.08	19.881	−3.38	1690	25 806.41	19.731	−4.06	1730	26 592.27	19.559	−4.54
1651	25 033.95	19.877	−3.40	1691	25 826.14	19.727	−4.07	1731	26 611.83	19.554	−4.55
1652	25 053.83	19.874	−3.42	1692	25 845.86	19.723	−4.09	1732	26 631.38	19.550	−4.56
1653	25 073.70	19.870	−3.43	1693	25 865.58	19.719	−4.10	1733	26 650.93	19.545	−4.57
1654	25 093.57	19.867	−3.45	1694	25 885.30	19.715	−4.12	1734	26 670.47	19.540	−4.58
1655	25 113.44	19.864	−3.47	1695	25 905.01	19.711	−4.13	1735	26 690.01	19.536	−4.59
1656	25 133.30	19.860	−3.49	1696	25 924.72	19.707	−4.14	1736	26 709.54	19.531	−4.60
1657	25 153.16	19.857	−3.51	1697	25 944.43	19.703	−4.16	1737	26 729.07	19.527	−4.61
1658	25 173.01	19.853	−3.53	1698	25 964.13	19.698	−4.17	1738	26 748.59	19.522	−4.61
1659	25 192.86	19.849	−3.55	1699	25 983.82	19.694	−4.19	1739	26 768.11	19.517	−4.62
1660	25 212.71	19.846	−3.56	1700	26 003.51	19.690	−4.20	1740	26 787.63	19.513	−4.63
1661	25 232.55	19.842	−3.58	1701	26 023.20	19.686	−4.21	1741	26 807.14	19.508	−4.64
1662	25 252.39	19.839	−3.60	1702	26 042.89	19.682	−4.23	1742	26 826.65	19.503	−4.65
1663	25 272.23	19.835	−3.62	1703	26 062.57	19.677	−4.24	1743	26 846.15	19.499	−4.65
1664	25 292.07	19.832	−3.63	1704	26 082.24	19.673	−4.25	1744	26 865.64	19.494	−4.66
1665	25 311.89	19.828	−3.65	1705	26 101.91	19.669	−4.26	1745	26 885.13	19.490	−4.67
1666	25 331.72	19.824	−3.67	1706	26 121.58	19.665	−4.28	1746	26 904.62	19.485	−4.67
1667	25 351.54	19.821	−3.69	1707	26 141.24	19.660	−4.29	1747	26 924.10	19.480	−4.68
1668	25 371.36	19.817	−3.70	1708	26 160.90	19.656	−4.30	1748	26 943.58	19.475	−4.69
1669	25 391.18	19.813	−3.72	1709	26 180.55	19.652	−4.31	1749	26 963.06	19.471	−4.69
1670	25 410.99	19.809	−3.74	1710	26 200.20	19.647	−4.33	1750	26 982.52	19.466	−4.70
1671	25 430.80	19.806	−3.76	1711	26 219.85	19.643	−4.34	1751	27 001.99	19.461	−4.71
1672	25 450.60	19.802	−3.77	1712	26 239.49	19.639	−4.35	1752	27 021.45	19.457	−4.71
1673	25 470.40	19.798	−3.79	1713	26 259.13	19.634	−4.36	1753	27 040.90	19.452	−4.72
1674	25 490.20	19.794	−3.81	1714	26 278.76	19.630	−4.37	1754	27 060.35	19.447	−4.73
1675	25 509.99	19.790	−3.82	1715	26 298.39	19.626	−4.39	1755	27 079.80	19.443	−4.73
1676	25 529.78	19.787	−3.84	1716	26 318.01	19.621	−4.40	1756	27 099.24	19.438	−4.74
1677	25 549.56	19.783	−3.86	1717	26 337.63	19.617	−4.41	1757	27 118.67	19.433	−4.74
1678	25 569.34	19.779	−3.87	1718	26 357.24	19.612	−4.42	1758	27 138.10	19.428	−4.75
1679	25 589.12	19.775	−3.89	1719	26 376.85	19.608	−4.43	1759	27 157.53	19.424	−4.75
1680	25 608.89	19.771	−3.90	1720	26 396.46	19.604	−4.44	1760	27 176.95	19.419	−4.76
1681	25 628.66	19.767	−3.92	1721	26 416.06	19.599	−4.45	1761	27 196.36	19.414	−4.76
1682	25 648.43	19.763	−3.94	1722	26 435.66	19.595	−4.46	1762	27 215.78	19.409	−4.77
1683	25 668.19	19.759	−3.95	1723	26 455.25	19.590	−4.47	1763	27 235.18	19.404	−4.77
1684	25 687.95	19.755	−3.97	1724	26 474.84	19.586	−4.48	1764	27 254.59	19.400	−4.77
1685	25 707.70	19.751	−3.98	1725	26 494.42	19.581	−4.49	1765	27 273.98	19.395	−4.78
1686	25 727.45	19.747	−4.00	1726	26 514.00	19.577	−4.50	1766	27 293.38	19.390	−4.78
1687	25 747.19	19.743	−4.01	1727	26 533.57	19.572	−4.51	1767	27 312.76	19.385	−4.78
1688	25 766.94	19.739	−4.03	1728	26 553.14	19.568	−4.52	1768	27 332.15	19.381	−4.79
1689	25 786.67	19.735	−4.04	1729	26 572.71	19.563	−4.53				
1690	25 806.41	19.731	−4.06	1730	26 592.27	19.559	−4.54				

2.5. Reference Function and Table for the Negative Thermoelement, Type BN, a Platinum-6% Rhodium Alloy, Versus Platinum, Pt-67

The coefficients, c_i, for the sixth degree polynomial and for the eighth degree polynomial that give the thermoelectric voltage, E, of type BN thermoelements versus Pt-67 as a function of temperature, t_{90}, in the 0 °C to 630.615 °C and 630.615 °C to 1768.1 °C ranges, respectively, are given in table 2.5.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type BN thermoelements versus Pt-67 at selected fixed points are given in table 2.5.2. The reference values for type BN thermoelements versus Pt-67 are given at 1 °C intervals from 0 °C to 1768 °C in table 2.5.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 2.5.1, 2.5.2, and 2.5.3, respectively. The irregular behavior of the second derivative near 630 °C is a result of the fitting techniques at the junction of two regions; it is not the result of a real physical phenomenon.

TABLE 2.5.1. *Type BN thermoelements versus platinum, Pt-67 --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	0 °C to 630.615 °C	630.615 °C to 1768.1 °C
c_0 =	0.000 000 000 0 . . .	$-4.074\ 226\ 366\ 2 \times 10^{3}$
c_1 =	5.069 295 752 2 . . .	$3.536\ 936\ 274\ 3 \times 10^{1}$
c_2 =	$9.747\ 123\ 592\ 0 \times 10^{-3}$	$-8.613\ 910\ 931\ 5 \times 10^{-2}$
c_3 =	$-2.090\ 800\ 471\ 8 \times 10^{-5}$	$1.477\ 050\ 236\ 2 \times 10^{-4}$
c_4 =	$2.676\ 641\ 488\ 3 \times 10^{-8}$	$-1.527\ 039\ 962\ 9 \times 10^{-7}$
c_5 =	$-1.856\ 448\ 752\ 3 \times 10^{-11}$	$9.799\ 308\ 780\ 5 \times 10^{-11}$
c_6 =	$5.518\ 967\ 038\ 6 \times 10^{-15}$	$-3.782\ 039\ 439\ 3 \times 10^{-14}$
c_7 =		$7.925\ 277\ 432\ 8 \times 10^{-18}$
c_8 =		$-6.807\ 941\ 157\ 8 \times 10^{-22}$

TABLE 2.5.2. *Thermoelectric values at fixed points for type BN thermoelements versus platinum, Pt-67*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
Ice MP	0.000	0.00	5.069	19.49
Water TP	0.01	0.05	5.069	19.49
Gallium MP	29.7646	158.99	5.597	16.04
Indium FP	156.5985	967.01	6.942	6.40
Tin FP	231.928	1 505.02	7.306	3.52
Cadmium FP	321.069	2 167.52	7.533	1.80
Lead FP	327.462	2 215.71	7.544	1.72
Zinc FP	419.527	2 916.40	7.669	1.11
Antimony FP	630.63	4 558.44	7.892	0.73
Aluminum FP	660.323	4 793.15	7.920	1.12
Silver FP	961.78	7 251.85	8.406	1.56
Gold FP	1064.18	8 120.42	8.555	1.35
Copper FP	1084.62	8 295.57	8.582	1.29
Palladium FP	1554.8	12 373.89	8.453	−2.53
Platinum FP	1768.1	14 110.24	7.823	−2.57

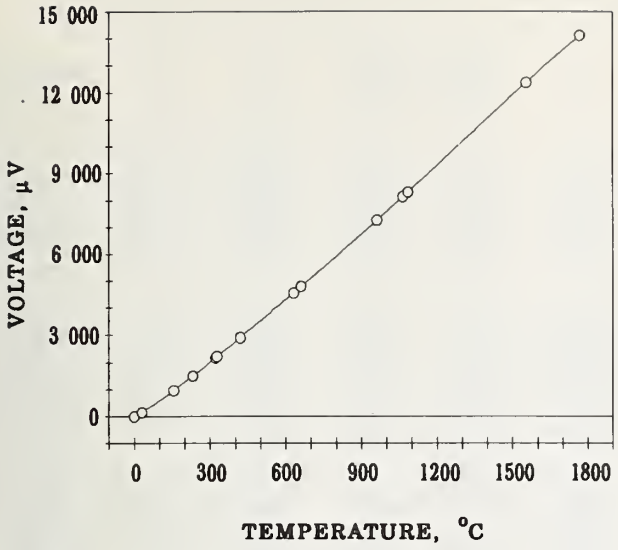

FIGURE 2.5.1. *Thermoelectric voltage for type BN thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

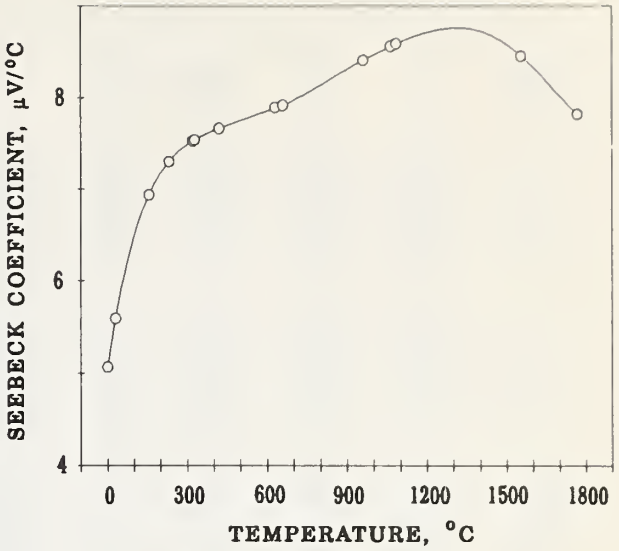

FIGURE 2.5.2. *Seebeck coefficient for type BN thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

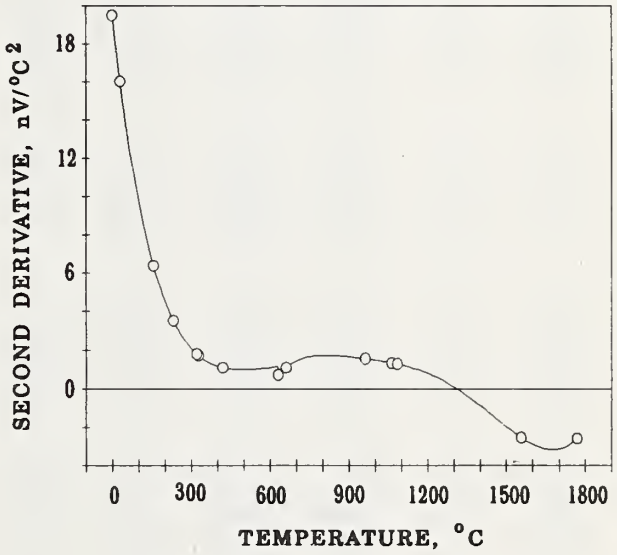

FIGURE 2.5.3. *Second derivative of thermoelectric voltage for type BN thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
0	0.00	5.069	19.49	**50**	275.38	5.900	13.98	**100**	585.99	6.490	9.81
1	5.08	5.089	19.37	**51**	281.29	5.914	13.88	**101**	592.48	6.499	9.74
2	10.18	5.108	19.24	**52**	287.21	5.928	13.79	**102**	598.99	6.509	9.66
3	15.30	5.127	19.12	**53**	293.14	5.942	13.69	**103**	605.50	6.519	9.59
4	20.43	5.146	19.00	**54**	299.09	5.955	13.60	**104**	612.03	6.528	9.52
5	25.59	5.165	18.87	**55**	305.05	5.969	13.51	**105**	618.56	6.538	9.45
6	30.76	5.184	18.75	**56**	311.03	5.982	13.41	**106**	625.10	6.547	9.38
7	35.96	5.203	18.63	**57**	317.02	5.996	13.32	**107**	631.65	6.557	9.32
8	41.17	5.221	18.51	**58**	323.02	6.009	13.23	**108**	638.21	6.566	9.25
9	46.40	5.240	18.39	**59**	329.04	6.022	13.14	**109**	644.78	6.575	9.18
10	51.65	5.258	18.27	**60**	335.06	6.035	13.05	**110**	651.36	6.584	9.11
11	56.91	5.276	18.15	**61**	341.11	6.048	12.96	**111**	657.95	6.593	9.04
12	62.20	5.294	18.03	**62**	347.16	6.061	12.87	**112**	664.55	6.602	8.98
13	67.50	5.312	17.92	**63**	353.23	6.074	12.78	**113**	671.16	6.611	8.91
14	72.82	5.330	17.80	**64**	359.31	6.087	12.69	**114**	677.77	6.620	8.85
15	78.16	5.348	17.68	**65**	365.40	6.099	12.60	**115**	684.40	6.629	8.78
16	83.52	5.366	17.57	**66**	371.51	6.112	12.51	**116**	691.03	6.638	8.71
17	88.89	5.383	17.45	**67**	377.62	6.124	12.42	**117**	697.67	6.646	8.65
18	94.29	5.400	17.34	**68**	383.75	6.137	12.34	**118**	704.32	6.655	8.59
19	99.70	5.418	17.22	**69**	389.90	6.149	12.25	**119**	710.98	6.663	8.52
20	105.12	5.435	17.11	**70**	396.05	6.161	12.16	**120**	717.65	6.672	8.46
21	110.57	5.452	17.00	**71**	402.22	6.173	12.08	**121**	724.33	6.680	8.40
22	116.03	5.469	16.89	**72**	408.40	6.185	11.99	**122**	731.01	6.689	8.33
23	121.50	5.486	16.77	**73**	414.59	6.197	11.91	**123**	737.70	6.697	8.27
24	127.00	5.502	16.66	**74**	420.79	6.209	11.82	**124**	744.40	6.705	8.21
25	132.51	5.519	16.55	**75**	427.01	6.221	11.74	**125**	751.11	6.713	8.15
26	138.04	5.536	16.44	**76**	433.23	6.233	11.66	**126**	757.83	6.722	8.09
27	143.58	5.552	16.33	**77**	439.47	6.244	11.58	**127**	764.56	6.730	8.03
28	149.14	5.568	16.23	**78**	445.72	6.256	11.49	**128**	771.29	6.738	7.97
29	154.72	5.584	16.12	**79**	451.98	6.267	11.41	**129**	778.03	6.746	7.91
30	160.31	5.600	16.01	**80**	458.26	6.279	11.33	**130**	784.78	6.753	7.85
31	165.92	5.616	15.90	**81**	464.54	6.290	11.25	**131**	791.54	6.761	7.79
32	171.54	5.632	15.80	**82**	470.84	6.301	11.17	**132**	798.30	6.769	7.73
33	177.18	5.648	15.69	**83**	477.14	6.312	11.09	**133**	805.08	6.777	7.67
34	182.84	5.664	15.59	**84**	483.46	6.323	11.01	**134**	811.86	6.784	7.61
35	188.51	5.679	15.48	**85**	489.79	6.334	10.93	**135**	818.65	6.792	7.55
36	194.20	5.695	15.38	**86**	496.13	6.345	10.85	**136**	825.44	6.799	7.50
37	199.90	5.710	15.27	**87**	502.48	6.356	10.78	**137**	832.25	6.807	7.44
38	205.62	5.725	15.17	**88**	508.84	6.367	10.70	**138**	839.06	6.814	7.38
39	211.35	5.740	15.07	**89**	515.21	6.377	10.62	**139**	845.87	6.822	7.33
40	217.10	5.755	14.97	**90**	521.60	6.388	10.55	**140**	852.70	6.829	7.27
41	222.86	5.770	14.87	**91**	527.99	6.398	10.47	**141**	859.53	6.836	7.22
42	228.64	5.785	14.77	**92**	534.39	6.409	10.39	**142**	866.37	6.843	7.16
43	234.43	5.800	14.66	**93**	540.81	6.419	10.32	**143**	873.22	6.851	7.11
44	240.24	5.814	14.57	**94**	547.23	6.429	10.24	**144**	880.07	6.858	7.05
45	246.06	5.829	14.47	**95**	553.67	6.440	10.17	**145**	886.93	6.865	7.00
46	251.89	5.843	14.37	**96**	560.11	6.450	10.10	**146**	893.80	6.872	6.95
47	257.74	5.858	14.27	**97**	566.56	6.460	10.02	**147**	900.68	6.879	6.89
48	263.61	5.872	14.17	**98**	573.03	6.470	9.95	**148**	907.56	6.885	6.84
49	269.49	5.886	14.08	**99**	579.50	6.480	9.88	**149**	914.45	6.892	6.79
50	275.38	5.900	13.98	**100**	585.99	6.490	9.81	**150**	921.34	6.899	6.73

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	921.34	6.899	6.73	**200**	1 273.72	7.178	4.55	**250**	1 637.61	7.365	3.05
151	928.25	6.906	6.68	**201**	1 280.90	7.182	4.51	**251**	1 644.97	7.368	3.03
152	935.16	6.912	6.63	**202**	1 288.08	7.187	4.48	**252**	1 652.34	7.371	3.00
153	942.07	6.919	6.58	**203**	1 295.27	7.191	4.44	**253**	1 659.72	7.374	2.98
154	948.99	6.926	6.53	**204**	1 302.47	7.196	4.40	**254**	1 667.09	7.377	2.96
155	955.92	6.932	6.48	**205**	1 309.66	7.200	4.37	**255**	1 674.47	7.380	2.93
156	962.86	6.938	6.43	**206**	1 316.87	7.204	4.33	**256**	1 681.85	7.383	2.91
157	969.80	6.945	6.38	**207**	1 324.07	7.209	4.30	**257**	1 689.24	7.386	2.89
158	976.75	6.951	6.33	**208**	1 331.28	7.213	4.27	**258**	1 696.62	7.389	2.87
159	983.70	6.958	6.28	**209**	1 338.50	7.217	4.23	**259**	1 704.01	7.392	2.84
160	990.66	6.964	6.23	**210**	1 345.72	7.221	4.20	**260**	1 711.41	7.395	2.82
161	997.63	6.970	6.18	**211**	1 352.94	7.226	4.17	**261**	1 718.80	7.397	2.80
162	1 004.60	6.976	6.14	**212**	1 360.17	7.230	4.13	**262**	1 726.20	7.400	2.78
163	1 011.58	6.982	6.09	**213**	1 367.40	7.234	4.10	**263**	1 733.60	7.403	2.76
164	1 018.57	6.988	6.04	**214**	1 374.64	7.238	4.07	**264**	1 741.01	7.406	2.73
165	1 025.56	6.994	5.99	**215**	1 381.88	7.242	4.03	**265**	1 748.42	7.408	2.71
166	1 032.56	7.000	5.95	**216**	1 389.12	7.246	4.00	**266**	1 755.82	7.411	2.69
167	1 039.56	7.006	5.90	**217**	1 396.37	7.250	3.97	**267**	1 763.24	7.414	2.67
168	1 046.57	7.012	5.86	**218**	1 403.62	7.254	3.94	**268**	1 770.65	7.416	2.65
169	1 053.58	7.018	5.81	**219**	1 410.88	7.258	3.91	**269**	1 778.07	7.419	2.63
170	1 060.60	7.024	5.76	**220**	1 418.14	7.262	3.88	**270**	1 785.49	7.422	2.61
171	1 067.63	7.030	5.72	**221**	1 425.40	7.266	3.85	**271**	1 792.91	7.424	2.59
172	1 074.66	7.035	5.68	**222**	1 432.67	7.270	3.81	**272**	1 800.34	7.427	2.57
173	1 081.70	7.041	5.63	**223**	1 439.94	7.273	3.78	**273**	1 807.77	7.429	2.55
174	1 088.74	7.046	5.59	**224**	1 447.22	7.277	3.75	**274**	1 815.20	7.432	2.53
175	1 095.79	7.052	5.54	**225**	1 454.49	7.281	3.72	**275**	1 822.63	7.435	2.51
176	1 102.85	7.058	5.50	**226**	1 461.78	7.285	3.69	**276**	1 830.07	7.437	2.49
177	1 109.91	7.063	5.46	**227**	1 469.06	7.288	3.67	**277**	1 837.51	7.440	2.47
178	1 116.97	7.068	5.41	**228**	1 476.35	7.292	3.64	**278**	1 844.95	7.442	2.45
179	1 124.05	7.074	5.37	**229**	1 483.65	7.296	3.61	**279**	1 852.39	7.444	2.44
180	1 131.12	7.079	5.33	**230**	1 490.94	7.299	3.58	**280**	1 859.84	7.447	2.42
181	1 138.20	7.085	5.29	**231**	1 498.25	7.303	3.55	**281**	1 867.28	7.449	2.40
182	1 145.29	7.090	5.25	**232**	1 505.55	7.306	3.52	**282**	1 874.73	7.452	2.38
183	1 152.38	7.095	5.20	**233**	1 512.86	7.310	3.49	**283**	1 882.19	7.454	2.36
184	1 159.48	7.100	5.16	**234**	1 520.17	7.313	3.47	**284**	1 889.64	7.456	2.35
185	1 166.58	7.105	5.12	**235**	1 527.48	7.317	3.44	**285**	1 897.10	7.459	2.33
186	1 173.69	7.110	5.08	**236**	1 534.80	7.320	3.41	**286**	1 904.56	7.461	2.31
187	1 180.81	7.116	5.04	**237**	1 542.12	7.323	3.38	**287**	1 912.02	7.463	2.29
188	1 187.92	7.121	5.00	**238**	1 549.45	7.327	3.36	**288**	1 919.49	7.466	2.28
189	1 195.05	7.126	4.96	**239**	1 556.78	7.330	3.33	**289**	1 926.95	7.468	2.26
190	1 202.17	7.130	4.92	**240**	1 564.11	7.333	3.30	**290**	1 934.42	7.470	2.24
191	1 209.31	7.135	4.88	**241**	1 571.45	7.337	3.28	**291**	1 941.89	7.472	2.23
192	1 216.45	7.140	4.85	**242**	1 578.78	7.340	3.25	**292**	1 949.37	7.475	2.21
193	1 223.59	7.145	4.81	**243**	1 586.13	7.343	3.23	**293**	1 956.84	7.477	2.19
194	1 230.74	7.150	4.77	**244**	1 593.47	7.347	3.20	**294**	1 964.32	7.479	2.18
195	1 237.89	7.155	4.73	**245**	1 600.82	7.350	3.18	**295**	1 971.80	7.481	2.16
196	1 245.04	7.159	4.69	**246**	1 608.17	7.353	3.15	**296**	1 979.28	7.483	2.15
197	1 252.21	7.164	4.66	**247**	1 615.52	7.356	3.13	**297**	1 986.77	7.485	2.13
198	1 259.37	7.169	4.62	**248**	1 622.88	7.359	3.10	**298**	1 994.25	7.488	2.11
199	1 266.54	7.173	4.58	**249**	1 630.24	7.362	3.08	**299**	2 001.74	7.490	2.10
200	1 273.72	7.178	4.55	**250**	1 637.61	7.365	3.05	**300**	2 009.23	7.492	2.08

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	2 009.23	7.492	2.08	**350**	2 386.15	7.580	1.50	**400**	2 766.87	7.646	1.18
301	2 016.73	7.494	2.07	**351**	2 393.73	7.582	1.49	**401**	2 774.52	7.647	1.18
302	2 024.22	7.496	2.05	**352**	2 401.31	7.583	1.48	**402**	2 782.17	7.649	1.17
303	2 031.72	7.498	2.04	**353**	2 408.90	7.584	1.47	**403**	2 789.82	7.650	1.17
304	2 039.22	7.500	2.02	**354**	2 416.48	7.586	1.47	**404**	2 797.47	7.651	1.17
305	2 046.72	7.502	2.01	**355**	2 424.07	7.587	1.46	**405**	2 805.12	7.652	1.16
306	2 054.22	7.504	2.00	**356**	2 431.66	7.589	1.45	**406**	2 812.77	7.653	1.16
307	2 061.73	7.506	1.98	**357**	2 439.25	7.590	1.44	**407**	2 820.42	7.654	1.15
308	2 069.23	7.508	1.97	**358**	2 446.84	7.592	1.43	**408**	2 828.08	7.656	1.15
309	2 076.74	7.510	1.95	**359**	2 454.43	7.593	1.43	**409**	2 835.73	7.657	1.15
310	2 084.25	7.512	1.94	**360**	2 462.02	7.595	1.42	**410**	2 843.39	7.658	1.14
311	2 091.77	7.514	1.93	**361**	2 469.62	7.596	1.41	**411**	2 851.05	7.659	1.14
312	2 099.28	7.516	1.91	**362**	2 477.22	7.597	1.40	**412**	2 858.71	7.660	1.14
313	2 106.80	7.518	1.90	**363**	2 484.81	7.599	1.40	**413**	2 866.37	7.661	1.13
314	2 114.32	7.520	1.89	**364**	2 492.41	7.600	1.39	**414**	2 874.03	7.662	1.13
315	2 121.84	7.521	1.87	**365**	2 500.01	7.602	1.38	**415**	2 881.69	7.663	1.13
316	2 129.36	7.523	1.86	**366**	2 507.62	7.603	1.37	**416**	2 889.36	7.665	1.12
317	2 136.88	7.525	1.85	**367**	2 515.22	7.604	1.37	**417**	2 897.02	7.666	1.12
318	2 144.41	7.527	1.84	**368**	2 522.83	7.606	1.36	**418**	2 904.69	7.667	1.12
319	2 151.94	7.529	1.82	**369**	2 530.43	7.607	1.35	**419**	2 912.36	7.668	1.11
320	2 159.47	7.531	1.81	**370**	2 538.04	7.608	1.35	**420**	2 920.03	7.669	1.11
321	2 167.00	7.532	1.80	**371**	2 545.65	7.610	1.34	**421**	2 927.70	7.670	1.11
322	2 174.53	7.534	1.79	**372**	2 553.26	7.611	1.33	**422**	2 935.37	7.671	1.10
323	2 182.07	7.536	1.78	**373**	2 560.87	7.612	1.33	**423**	2 943.04	7.672	1.10
324	2 189.60	7.538	1.76	**374**	2 568.48	7.614	1.32	**424**	2 950.71	7.673	1.10
325	2 197.14	7.540	1.75	**375**	2 576.10	7.615	1.31	**425**	2 958.39	7.675	1.09
326	2 204.68	7.541	1.74	**376**	2 583.71	7.616	1.31	**426**	2 966.06	7.676	1.09
327	2 212.22	7.543	1.73	**377**	2 591.33	7.618	1.30	**427**	2 973.74	7.677	1.09
328	2 219.77	7.545	1.72	**378**	2 598.95	7.619	1.30	**428**	2 981.41	7.678	1.09
329	2 227.31	7.546	1.71	**379**	2 606.57	7.620	1.29	**429**	2 989.09	7.679	1.08
330	2 234.86	7.548	1.70	**380**	2 614.19	7.622	1.28	**430**	2 996.77	7.680	1.08
331	2 242.41	7.550	1.68	**381**	2 621.81	7.623	1.28	**431**	3 004.45	7.681	1.08
332	2 249.96	7.552	1.67	**382**	2 629.44	7.624	1.27	**432**	3 012.13	7.682	1.08
333	2 257.51	7.553	1.66	**383**	2 637.06	7.625	1.27	**433**	3 019.82	7.683	1.07
334	2 265.07	7.555	1.65	**384**	2 644.69	7.627	1.26	**434**	3 027.50	7.684	1.07
335	2 272.62	7.557	1.64	**385**	2 652.31	7.628	1.26	**435**	3 035.19	7.685	1.07
336	2 280.18	7.558	1.63	**386**	2 659.94	7.629	1.25	**436**	3 042.87	7.686	1.07
337	2 287.74	7.560	1.62	**387**	2 667.57	7.630	1.24	**437**	3 050.56	7.688	1.06
338	2 295.30	7.561	1.61	**388**	2 675.20	7.632	1.24	**438**	3 058.25	7.689	1.06
339	2 302.86	7.563	1.60	**389**	2 682.84	7.633	1.23	**439**	3 065.94	7.690	1.06
340	2 310.43	7.565	1.59	**390**	2 690.47	7.634	1.23	**440**	3 073.63	7.691	1.06
341	2 317.99	7.566	1.58	**391**	2 698.10	7.635	1.22	**441**	3 081.32	7.692	1.06
342	2 325.56	7.568	1.57	**392**	2 705.74	7.637	1.22	**442**	3 089.01	7.693	1.05
343	2 333.13	7.569	1.56	**393**	2 713.38	7.638	1.21	**443**	3 096.70	7.694	1.05
344	2 340.70	7.571	1.55	**394**	2 721.02	7.639	1.21	**444**	3 104.40	7.695	1.05
345	2 348.27	7.572	1.54	**395**	2 728.66	7.640	1.21	**445**	3 112.09	7.696	1.05
346	2 355.84	7.574	1.54	**396**	2 736.30	7.641	1.20	**446**	3 119.79	7.697	1.05
347	2 363.42	7.575	1.53	**397**	2 743.94	7.643	1.20	**447**	3 127.49	7.698	1.05
348	2 370.99	7.577	1.52	**398**	2 751.58	7.644	1.19	**448**	3 135.18	7.699	1.04
349	2 378.57	7.579	1.51	**399**	2 759.23	7.645	1.19	**449**	3 142.88	7.700	1.04
350	2 386.15	7.580	1.50	**400**	2 766.87	7.646	1.18	**450**	3 150.59	7.701	1.04

TABLE 2.5.3. ***Type BN thermoelements versus platinum, Pt-67*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
450	3 150.59	7.701	1.04	**500**	3 536.92	7.752	1.01	**550**	3 925.79	7.803	1.04
451	3 158.29	7.702	1.04	**501**	3 544.68	7.753	1.01	**551**	3 933.59	7.804	1.04
452	3 165.99	7.703	1.04	**502**	3 552.43	7.754	1.01	**552**	3 941.40	7.805	1.04
453	3 173.69	7.704	1.04	**503**	3 560.18	7.755	1.01	**553**	3 949.20	7.806	1.04
454	3 181.40	7.705	1.03	**504**	3 567.94	7.756	1.01	**554**	3 957.01	7.807	1.04
455	3 189.10	7.706	1.03	**505**	3 575.70	7.757	1.01	**555**	3 964.82	7.808	1.04
456	3 196.81	7.707	1.03	**506**	3 583.45	7.758	1.01	**556**	3 972.63	7.809	1.04
457	3 204.52	7.708	1.03	**507**	3 591.21	7.759	1.01	**557**	3 980.44	7.810	1.05
458	3 212.23	7.709	1.03	**508**	3 598.97	7.760	1.01	**558**	3 988.25	7.811	1.05
459	3 219.94	7.711	1.03	**509**	3 606.73	7.761	1.01	**559**	3 996.06	7.812	1.05
460	3 227.65	7.712	1.03	**510**	3 614.49	7.762	1.01	**560**	4 003.87	7.813	1.05
461	3 235.36	7.713	1.03	**511**	3 622.26	7.763	1.01	**561**	4 011.68	7.814	1.05
462	3 243.07	7.714	1.02	**512**	3 630.02	7.764	1.01	**562**	4 019.50	7.815	1.05
463	3 250.79	7.715	1.02	**513**	3 637.78	7.765	1.01	**563**	4 027.32	7.816	1.05
464	3 258.50	7.716	1.02	**514**	3 645.55	7.766	1.01	**564**	4 035.13	7.818	1.05
465	3 266.22	7.717	1.02	**515**	3 653.32	7.767	1.01	**565**	4 042.95	7.819	1.06
466	3 273.94	7.718	1.02	**516**	3 661.08	7.768	1.01	**566**	4 050.77	7.820	1.06
467	3 281.65	7.719	1.02	**517**	3 668.85	7.769	1.01	**567**	4 058.59	7.821	1.06
468	3 289.37	7.720	1.02	**518**	3 676.62	7.770	1.01	**568**	4 066.41	7.822	1.06
469	3 297.09	7.721	1.02	**519**	3 684.39	7.771	1.01	**569**	4 074.23	7.823	1.06
470	3 304.82	7.722	1.02	**520**	3 692.16	7.772	1.01	**570**	4 082.06	7.824	1.06
471	3 312.54	7.723	1.02	**521**	3 699.94	7.773	1.01	**571**	4 089.88	7.825	1.06
472	3 320.26	7.724	1.02	**522**	3 707.71	7.774	1.01	**572**	4 097.71	7.826	1.07
473	3 327.99	7.725	1.01	**523**	3 715.49	7.775	1.01	**573**	4 105.53	7.827	1.07
474	3 335.71	7.726	1.01	**524**	3 723.26	7.776	1.01	**574**	4 113.36	7.828	1.07
475	3 343.44	7.727	1.01	**525**	3 731.04	7.777	1.02	**575**	4 121.19	7.829	1.07
476	3 351.16	7.728	1.01	**526**	3 738.82	7.778	1.02	**576**	4 129.02	7.830	1.07
477	3 358.89	7.729	1.01	**527**	3 746.60	7.779	1.02	**577**	4 136.85	7.831	1.07
478	3 366.62	7.730	1.01	**528**	3 754.37	7.780	1.02	**578**	4 144.68	7.832	1.08
479	3 374.35	7.731	1.01	**529**	3 762.16	7.781	1.02	**579**	4 152.51	7.834	1.08
480	3 382.08	7.732	1.01	**530**	3 769.94	7.782	1.02	**580**	4 160.35	7.835	1.08
481	3 389.82	7.733	1.01	**531**	3 777.72	7.783	1.02	**581**	4 168.18	7.836	1.08
482	3 397.55	7.734	1.01	**532**	3 785.50	7.784	1.02	**582**	4 176.02	7.837	1.08
483	3 405.28	7.735	1.01	**533**	3 793.29	7.785	1.02	**583**	4 183.86	7.838	1.08
484	3 413.02	7.736	1.01	**534**	3 801.08	7.786	1.02	**584**	4 191.70	7.839	1.09
485	3 420.76	7.737	1.01	**535**	3 808.86	7.787	1.02	**585**	4 199.54	7.840	1.09
486	3 428.49	7.738	1.01	**536**	3 816.65	7.788	1.02	**586**	4 207.38	7.841	1.09
487	3 436.23	7.739	1.01	**537**	3 824.44	7.790	1.02	**587**	4 215.22	7.842	1.09
488	3 443.97	7.740	1.01	**538**	3 832.23	7.791	1.03	**588**	4 223.06	7.843	1.09
489	3 451.71	7.741	1.01	**539**	3 840.02	7.792	1.03	**589**	4 230.90	7.844	1.09
490	3 459.45	7.742	1.01	**540**	3 847.81	7.793	1.03	**590**	4 238.75	7.845	1.10
491	3 467.20	7.743	1.01	**541**	3 855.61	7.794	1.03	**591**	4 246.59	7.847	1.10
492	3 474.94	7.744	1.01	**542**	3 863.40	7.795	1.03	**592**	4 254.44	7.848	1.10
493	3 482.68	7.745	1.01	**543**	3 871.19	7.796	1.03	**593**	4 262.29	7.849	1.10
494	3 490.43	7.746	1.01	**544**	3 878.99	7.797	1.03	**594**	4 270.14	7.850	1.10
495	3 498.18	7.747	1.01	**545**	3 886.79	7.798	1.03	**595**	4 277.99	7.851	1.11
496	3 505.92	7.748	1.01	**546**	3 894.59	7.799	1.03	**596**	4 285.84	7.852	1.11
497	3 513.67	7.749	1.01	**547**	3 902.39	7.800	1.03	**597**	4 293.69	7.853	1.11
498	3 521.42	7.750	1.01	**548**	3 910.19	7.801	1.04	**598**	4 301.55	7.854	1.11
499	3 529.17	7.751	1.01	**549**	3 917.99	7.802	1.04	**599**	4 309.40	7.855	1.11
500	3 536.92	7.752	1.01	**550**	3 925.79	7.803	1.04	**600**	4 317.26	7.857	1.12

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
600	4 317.26	7.857	1.12	650	4 711.46	7.909	1.00	700	5 108.36	7.971	1.45
601	4 325.12	7.858	1.12	651	4 719.37	7.910	1.01	701	5 116.33	7.973	1.46
602	4 332.97	7.859	1.12	652	4 727.28	7.911	1.02	702	5 124.30	7.974	1.47
603	4 340.83	7.860	1.12	653	4 735.19	7.912	1.04	703	5 132.28	7.976	1.47
604	4 348.69	7.861	1.12	654	4 743.10	7.913	1.05	704	5 140.26	7.977	1.48
605	4 356.56	7.862	1.13	655	4 751.01	7.914	1.06	705	5 148.23	7.979	1.48
606	4 364.42	7.863	1.13	656	4 758.93	7.915	1.07	706	5 156.21	7.980	1.49
607	4 372.28	7.864	1.13	657	4 766.84	7.916	1.08	707	5 164.19	7.982	1.50
608	4 380.15	7.866	1.13	658	4 774.76	7.917	1.09	708	5 172.18	7.983	1.50
609	4 388.01	7.867	1.13	659	4 782.68	7.918	1.11	709	5 180.16	7.985	1.51
610	4 395.88	7.868	1.14	660	4 790.59	7.919	1.12	710	5 188.14	7.986	1.51
611	4 403.75	7.869	1.14	661	4 798.51	7.920	1.13	711	5 196.13	7.988	1.52
612	4 411.62	7.870	1.14	662	4 806.43	7.921	1.14	712	5 204.12	7.989	1.52
613	4 419.49	7.871	1.14	663	4 814.36	7.923	1.15	713	5 212.11	7.991	1.53
614	4 427.36	7.872	1.15	664	4 822.28	7.924	1.16	714	5 220.10	7.992	1.53
615	4 435.23	7.873	1.15	665	4 830.20	7.925	1.17	715	5 228.09	7.994	1.54
616	4 443.11	7.875	1.15	666	4 838.13	7.926	1.18	716	5 236.09	7.995	1.54
617	4 450.98	7.876	1.15	667	4 846.06	7.927	1.19	717	5 244.08	7.997	1.55
618	4 458.86	7.877	1.16	668	4 853.98	7.928	1.20	718	5 252.08	7.998	1.55
619	4 466.74	7.878	1.16	669	4 861.91	7.930	1.21	719	5 260.08	8.000	1.56
620	4 474.62	7.879	1.16	670	4 869.84	7.931	1.22	720	5 268.08	8.001	1.56
621	4 482.49	7.880	1.16	671	4 877.78	7.932	1.23	721	5 276.08	8.003	1.57
622	4 490.38	7.882	1.17	672	4 885.71	7.933	1.24	722	5 284.09	8.005	1.57
623	4 498.26	7.883	1.17	673	4 893.64	7.935	1.25	723	5 292.09	8.006	1.57
624	4 506.14	7.884	1.17	674	4 901.58	7.936	1.26	724	5 300.10	8.008	1.58
625	4 514.03	7.885	1.17	675	4 909.51	7.937	1.27	725	5 308.11	8.009	1.58
626	4 521.91	7.886	1.18	676	4 917.45	7.938	1.27	726	5 316.12	8.011	1.59
627	4 529.80	7.887	1.18	677	4 925.39	7.940	1.28	727	5 324.13	8.013	1.59
628	4 537.69	7.889	1.18	678	4 933.33	7.941	1.29	728	5 332.14	8.014	1.60
629	4 545.58	7.890	1.18	679	4 941.27	7.942	1.30	729	5 340.16	8.016	1.60
630	4 553.47	7.891	1.19	680	4 949.22	7.944	1.31	730	5 348.18	8.017	1.60
631	4 561.36	7.892	0.74	681	4 957.16	7.945	1.32	731	5 356.19	8.019	1.61
632	4 569.25	7.893	0.75	682	4 965.11	7.946	1.33	732	5 364.21	8.021	1.61
633	4 577.14	7.894	0.77	683	4 973.05	7.948	1.33	733	5 372.23	8.022	1.61
634	4 585.04	7.894	0.78	684	4 981.00	7.949	1.34	734	5 380.26	8.024	1.62
635	4 592.93	7.895	0.80	685	4 988.95	7.950	1.35	735	5 388.28	8.025	1.62
636	4 600.83	7.896	0.81	686	4 996.90	7.952	1.36	736	5 396.31	8.027	1.62
637	4 608.72	7.897	0.83	687	5 004.85	7.953	1.36	737	5 404.34	8.029	1.63
638	4 616.62	7.898	0.84	688	5 012.81	7.954	1.37	738	5 412.37	8.030	1.63
639	4 624.52	7.898	0.85	689	5 020.76	7.956	1.38	739	5 420.40	8.032	1.63
640	4 632.42	7.899	0.87	690	5 028.72	7.957	1.39	740	5 428.43	8.034	1.64
641	4 640.32	7.900	0.88	691	5 036.68	7.958	1.39	741	5 436.46	8.035	1.64
642	4 648.22	7.901	0.90	692	5 044.63	7.960	1.40	742	5 444.50	8.037	1.64
643	4 656.12	7.902	0.91	693	5 052.60	7.961	1.41	743	5 452.54	8.038	1.65
644	4 664.02	7.903	0.92	694	5 060.56	7.963	1.42	744	5 460.58	8.040	1.65
645	4 671.93	7.904	0.94	695	5 068.52	7.964	1.42	745	5 468.62	8.042	1.65
646	4 679.83	7.905	0.95	696	5 076.49	7.965	1.43	746	5 476.66	8.043	1.65
647	4 687.73	7.906	0.96	697	5 084.45	7.967	1.44	747	5 484.70	8.045	1.66
648	4 695.64	7.907	0.98	698	5 092.42	7.968	1.44	748	5 492.75	8.047	1.66
649	4 703.55	7.908	0.99	699	5 100.39	7.970	1.45	749	5 500.80	8.048	1.66
650	4 711.46	7.909	1.00	700	5 108.36	7.971	1.45	750	5 508.85	8.050	1.67

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	5 508.85	8.050	1.67	**800**	5 913.47	8.135	1.73	**850**	6 322.40	8.222	1.71
751	5 516.90	8.052	1.67	**801**	5 921.60	8.137	1.73	**851**	6 330.62	8.223	1.71
752	5 524.95	8.053	1.67	**802**	5 929.74	8.139	1.73	**852**	6 338.84	8.225	1.71
753	5 533.00	8.055	1.67	**803**	5 937.88	8.141	1.73	**853**	6 347.07	8.227	1.71
754	5 541.06	8.057	1.67	**804**	5 946.02	8.142	1.73	**854**	6 355.30	8.228	1.71
755	5 549.12	8.058	1.68	**805**	5 954.17	8.144	1.73	**855**	6 363.52	8.230	1.71
756	5 557.18	8.060	1.68	**806**	5 962.31	8.146	1.73	**856**	6 371.76	8.232	1.71
757	5 565.24	8.062	1.68	**807**	5 970.46	8.147	1.73	**857**	6 379.99	8.234	1.71
758	5 573.30	8.063	1.68	**808**	5 978.61	8.149	1.73	**858**	6 388.22	8.235	1.71
759	5 581.36	8.065	1.69	**809**	5 986.76	8.151	1.73	**859**	6 396.46	8.237	1.71
760	5 589.43	8.067	1.69	**810**	5 994.91	8.153	1.73	**860**	6 404.70	8.239	1.70
761	5 597.50	8.068	1.69	**811**	6 003.06	8.154	1.73	**861**	6 412.94	8.240	1.70
762	5 605.57	8.070	1.69	**812**	6 011.22	8.156	1.73	**862**	6 421.18	8.242	1.70
763	5 613.64	8.072	1.69	**813**	6 019.37	8.158	1.73	**863**	6 429.42	8.244	1.70
764	5 621.71	8.074	1.69	**814**	6 027.53	8.160	1.73	**864**	6 437.67	8.246	1.70
765	5 629.79	8.075	1.70	**815**	6 035.69	8.161	1.73	**865**	6 445.91	8.247	1.70
766	5 637.86	8.077	1.70	**816**	6 043.85	8.163	1.73	**866**	6 454.16	8.249	1.70
767	5 645.94	8.079	1.70	**817**	6 052.02	8.165	1.73	**867**	6 462.41	8.251	1.70
768	5 654.02	8.080	1.70	**818**	6 060.18	8.166	1.73	**868**	6 470.66	8.252	1.70
769	5 662.10	8.082	1.70	**819**	6 068.35	8.168	1.73	**869**	6 478.91	8.254	1.70
770	5 670.18	8.084	1.70	**820**	6 076.52	8.170	1.73	**870**	6 487.17	8.256	1.69
771	5 678.27	8.085	1.71	**821**	6 084.69	8.172	1.73	**871**	6 495.43	8.257	1.69
772	5 686.35	8.087	1.71	**822**	6 092.86	8.173	1.73	**872**	6 503.68	8.259	1.69
773	5 694.44	8.089	1.71	**823**	6 101.04	8.175	1.73	**873**	6 511.94	8.261	1.69
774	5 702.53	8.091	1.71	**824**	6 109.21	8.177	1.73	**874**	6 520.21	8.262	1.69
775	5 710.62	8.092	1.71	**825**	6 117.39	8.179	1.73	**875**	6 528.47	8.264	1.69
776	5 718.72	8.094	1.71	**826**	6 125.57	8.180	1.73	**876**	6 536.73	8.266	1.69
777	5 726.81	8.096	1.71	**827**	6 133.75	8.182	1.73	**877**	6 545.00	8.268	1.69
778	5 734.91	8.097	1.71	**828**	6 141.94	8.184	1.73	**878**	6 553.27	8.269	1.68
779	5 743.01	8.099	1.72	**829**	6 150.12	8.186	1.73	**879**	6 561.54	8.271	1.68
780	5 751.11	8.101	1.72	**830**	6 158.31	8.187	1.73	**880**	6 569.81	8.273	1.68
781	5 759.21	8.103	1.72	**831**	6 166.49	8.189	1.73	**881**	6 578.08	8.274	1.68
782	5 767.31	8.104	1.72	**832**	6 174.68	8.191	1.73	**882**	6 586.36	8.276	1.68
783	5 775.42	8.106	1.72	**833**	6 182.88	8.192	1.72	**883**	6 594.64	8.278	1.68
784	5 783.52	8.108	1.72	**834**	6 191.07	8.194	1.72	**884**	6 602.92	8.279	1.68
785	5 791.63	8.109	1.72	**835**	6 199.26	8.196	1.72	**885**	6 611.20	8.281	1.68
786	5 799.74	8.111	1.72	**836**	6 207.46	8.198	1.72	**886**	6 619.48	8.283	1.68
787	5 807.85	8.113	1.72	**837**	6 215.66	8.199	1.72	**887**	6 627.76	8.284	1.67
788	5 815.97	8.115	1.72	**838**	6 223.86	8.201	1.72	**888**	6 636.05	8.286	1.67
789	5 824.08	8.116	1.72	**839**	6 232.06	8.203	1.72	**889**	6 644.33	8.288	1.67
790	5 832.20	8.118	1.72	**840**	6 240.26	8.204	1.72	**890**	6 652.62	8.289	1.67
791	5 840.32	8.120	1.73	**841**	6 248.47	8.206	1.72	**891**	6 660.91	8.291	1.67
792	5 848.44	8.122	1.73	**842**	6 256.68	8.208	1.72	**892**	6 669.20	8.293	1.67
793	5 856.56	8.123	1.73	**843**	6 264.89	8.210	1.72	**893**	6 677.50	8.294	1.67
794	5 864.69	8.125	1.73	**844**	6 273.10	8.211	1.72	**894**	6 685.79	8.296	1.67
795	5 872.81	8.127	1.73	**845**	6 281.31	8.213	1.72	**895**	6 694.09	8.298	1.66
796	5 880.94	8.128	1.73	**846**	6 289.52	8.215	1.72	**896**	6 702.39	8.299	1.66
797	5 889.07	8.130	1.73	**847**	6 297.74	8.216	1.72	**897**	6 710.69	8.301	1.66
798	5 897.20	8.132	1.73	**848**	6 305.96	8.218	1.71	**898**	6 718.99	8.303	1.66
799	5 905.33	8.134	1.73	**849**	6 314.17	8.220	1.71	**899**	6 727.29	8.304	1.66
800	5 913.47	8.135	1.73	**850**	6 322.40	8.222	1.71	**900**	6 735.60	8.306	1.66

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
900	6 735.60	8.306	1.66	**950**	7 152.94	8.387	1.58	**1000**	7 574.23	8.464	1.49
901	6 743.90	8.308	1.66	**951**	7 161.33	8.389	1.58	**1001**	7 582.70	8.465	1.49
902	6 752.21	8.309	1.65	**952**	7 169.72	8.390	1.58	**1002**	7 591.16	8.467	1.49
903	6 760.52	8.311	1.65	**953**	7 178.11	8.392	1.58	**1003**	7 599.63	8.468	1.49
904	6 768.84	8.313	1.65	**954**	7 186.50	8.393	1.57	**1004**	7 608.10	8.470	1.48
905	6 777.15	8.314	1.65	**955**	7 194.89	8.395	1.57	**1005**	7 616.57	8.471	1.48
906	6 785.46	8.316	1.65	**956**	7 203.29	8.396	1.57	**1006**	7 625.04	8.473	1.48
907	6 793.78	8.318	1.65	**957**	7 211.69	8.398	1.57	**1007**	7 633.51	8.474	1.48
908	6 802.10	8.319	1.65	**958**	7 220.09	8.400	1.57	**1008**	7 641.99	8.476	1.48
909	6 810.42	8.321	1.64	**959**	7 228.49	8.401	1.57	**1009**	7 650.47	8.477	1.47
910	6 818.74	8.323	1.64	**960**	7 236.89	8.403	1.56	**1010**	7 658.94	8.479	1.47
911	6 827.06	8.324	1.64	**961**	7 245.29	8.404	1.56	**1011**	7 667.42	8.480	1.47
912	6 835.39	8.326	1.64	**962**	7 253.70	8.406	1.56	**1012**	7 675.90	8.482	1.47
913	6 843.72	8.327	1.64	**963**	7 262.10	8.407	1.56	**1013**	7 684.39	8.483	1.46
914	6 852.04	8.329	1.64	**964**	7 270.51	8.409	1.56	**1014**	7 692.87	8.485	1.46
915	6 860.37	8.331	1.64	**965**	7 278.92	8.411	1.56	**1015**	7 701.36	8.486	1.46
916	6 868.71	8.332	1.63	**966**	7 287.33	8.412	1.55	**1016**	7 709.84	8.487	1.46
917	6 877.04	8.334	1.63	**967**	7 295.75	8.414	1.55	**1017**	7 718.33	8.489	1.46
918	6 885.37	8.336	1.63	**968**	7 304.16	8.415	1.55	**1018**	7 726.82	8.490	1.45
919	6 893.71	8.337	1.63	**969**	7 312.58	8.417	1.55	**1019**	7 735.31	8.492	1.45
920	6 902.05	8.339	1.63	**970**	7 320.99	8.418	1.55	**1020**	7 743.80	8.493	1.45
921	6 910.39	8.340	1.63	**971**	7 329.41	8.420	1.55	**1021**	7 752.30	8.495	1.45
922	6 918.73	8.342	1.63	**972**	7 337.83	8.421	1.54	**1022**	7 760.79	8.496	1.45
923	6 927.07	8.344	1.62	**973**	7 346.26	8.423	1.54	**1023**	7 769.29	8.498	1.44
924	6 935.42	8.345	1.62	**974**	7 354.68	8.424	1.54	**1024**	7 777.79	8.499	1.44
925	6 943.76	8.347	1.62	**975**	7 363.10	8.426	1.54	**1025**	7 786.29	8.501	1.44
926	6 952.11	8.349	1.62	**976**	7 371.53	8.428	1.54	**1026**	7 794.79	8.502	1.44
927	6 960.46	8.350	1.62	**977**	7 379.96	8.429	1.53	**1027**	7 803.29	8.503	1.43
928	6 968.81	8.352	1.62	**978**	7 388.39	8.431	1.53	**1028**	7 811.80	8.505	1.43
929	6 977.16	8.353	1.61	**979**	7 396.82	8.432	1.53	**1029**	7 820.30	8.506	1.43
930	6 985.52	8.355	1.61	**980**	7 405.25	8.434	1.53	**1030**	7 828.81	8.508	1.43
931	6 993.87	8.357	1.61	**981**	7 413.69	8.435	1.53	**1031**	7 837.32	8.509	1.43
932	7 002.23	8.358	1.61	**982**	7 422.12	8.437	1.53	**1032**	7 845.83	8.511	1.42
933	7 010.59	8.360	1.61	**983**	7 430.56	8.438	1.52	**1033**	7 854.34	8.512	1.42
934	7 018.95	8.362	1.61	**984**	7 439.00	8.440	1.52	**1034**	7 862.85	8.513	1.42
935	7 027.31	8.363	1.61	**985**	7 447.44	8.441	1.52	**1035**	7 871.37	8.515	1.42
936	7 035.68	8.365	1.60	**986**	7 455.88	8.443	1.52	**1036**	7 879.88	8.516	1.41
937	7 044.04	8.366	1.60	**987**	7 464.33	8.444	1.52	**1037**	7 888.40	8.518	1.41
938	7 052.41	8.368	1.60	**988**	7 472.77	8.446	1.51	**1038**	7 896.92	8.519	1.41
939	7 060.78	8.370	1.60	**989**	7 481.22	8.447	1.51	**1039**	7 905.44	8.520	1.41
940	7 069.15	8.371	1.60	**990**	7 489.67	8.449	1.51	**1040**	7 913.96	8.522	1.41
941	7 077.52	8.373	1.60	**991**	7 498.12	8.450	1.51	**1041**	7 922.48	8.523	1.40
942	7 085.89	8.374	1.59	**992**	7 506.57	8.452	1.51	**1042**	7 931.00	8.525	1.40
943	7 094.27	8.376	1.59	**993**	7 515.02	8.453	1.50	**1043**	7 939.53	8.526	1.40
944	7 102.65	8.378	1.59	**994**	7 523.47	8.455	1.50	**1044**	7 948.06	8.527	1.40
945	7 111.02	8.379	1.59	**995**	7 531.93	8.456	1.50	**1045**	7 956.58	8.529	1.39
946	7 119.40	8.381	1.59	**996**	7 540.39	8.458	1.50	**1046**	7 965.11	8.530	1.39
947	7 127.79	8.382	1.59	**997**	7 548.85	8.459	1.50	**1047**	7 973.65	8.532	1.39
948	7 136.17	8.384	1.58	**998**	7 557.31	8.461	1.49	**1048**	7 982.18	8.533	1.39
949	7 144.55	8.385	1.58	**999**	7 565.77	8.462	1.49	**1049**	7 990.71	8.534	1.38
950	7 152.94	8.387	1.58	**1000**	7 574.23	8.464	1.49	**1050**	7 999.25	8.536	1.38

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	7 999.25	8.536	1.38	1100	8 427.71	8.602	1.24	1150	8 859.26	8.659	1.06
1051	8 007.78	8.537	1.38	1101	8 436.31	8.603	1.24	1151	8 867.92	8.660	1.05
1052	8 016.32	8.539	1.38	1102	8 444.91	8.604	1.23	1152	8 876.58	8.661	1.05
1053	8 024.86	8.540	1.37	1103	8 453.52	8.605	1.23	1153	8 885.25	8.662	1.04
1054	8 033.40	8.541	1.37	1104	8 462.12	8.606	1.23	1154	8 893.91	8.663	1.04
1055	8 041.94	8.543	1.37	1105	8 470.73	8.608	1.22	1155	8 902.57	8.664	1.03
1056	8 050.49	8.544	1.37	1106	8 479.34	8.609	1.22	1156	8 911.24	8.665	1.03
1057	8 059.03	8.545	1.36	1107	8 487.95	8.610	1.22	1157	8 919.90	8.666	1.02
1058	8 067.58	8.547	1.36	1108	8 496.56	8.611	1.21	1158	8 928.57	8.667	1.02
1059	8 076.12	8.548	1.36	1109	8 505.17	8.613	1.21	1159	8 937.24	8.668	1.02
1060	8 084.67	8.549	1.36	1110	8 513.79	8.614	1.21	1160	8 945.91	8.669	1.01
1061	8 093.22	8.551	1.35	1111	8 522.40	8.615	1.20	1161	8 954.58	8.670	1.01
1062	8 101.77	8.552	1.35	1112	8 531.02	8.616	1.20	1162	8 963.25	8.671	1.00
1063	8 110.33	8.554	1.35	1113	8 539.63	8.617	1.20	1163	8 971.92	8.672	1.00
1064	8 118.88	8.555	1.35	1114	8 548.25	8.619	1.19	1164	8 980.59	8.673	0.99
1065	8 127.44	8.556	1.34	1115	8 556.87	8.620	1.19	1165	8 989.27	8.674	0.99
1066	8 135.99	8.558	1.34	1116	8 565.49	8.621	1.19	1166	8 997.94	8.675	0.98
1067	8 144.55	8.559	1.34	1117	8 574.11	8.622	1.18	1167	9 006.62	8.676	0.98
1068	8 153.11	8.560	1.34	1118	8 582.73	8.623	1.18	1168	9 015.30	8.677	0.97
1069	8 161.67	8.562	1.33	1119	8 591.36	8.625	1.18	1169	9 023.97	8.678	0.97
1070	8 170.24	8.563	1.33	1120	8 599.98	8.626	1.17	1170	9 032.65	8.679	0.96
1071	8 178.80	8.564	1.33	1121	8 608.61	8.627	1.17	1171	9 041.33	8.680	0.96
1072	8 187.36	8.566	1.32	1122	8 617.24	8.628	1.17	1172	9 050.01	8.681	0.96
1073	8 195.93	8.567	1.32	1123	8 625.87	8.629	1.16	1173	9 058.69	8.682	0.95
1074	8 204.50	8.568	1.32	1124	8 634.50	8.630	1.16	1174	9 067.38	8.683	0.95
1075	8 213.07	8.570	1.32	1125	8 643.13	8.631	1.15	1175	9 076.06	8.684	0.94
1076	8 221.64	8.571	1.31	1126	8 651.76	8.633	1.15	1176	9 084.75	8.685	0.94
1077	8 230.21	8.572	1.31	1127	8 660.39	8.634	1.15	1177	9 093.43	8.686	0.93
1078	8 238.78	8.573	1.31	1128	8 669.03	8.635	1.14	1178	9 102.12	8.687	0.93
1079	8 247.36	8.575	1.30	1129	8 677.66	8.636	1.14	1179	9 110.81	8.688	0.92
1080	8 255.93	8.576	1.30	1130	8 686.30	8.637	1.14	1180	9 119.49	8.689	0.92
1081	8 264.51	8.577	1.30	1131	8 694.94	8.638	1.13	1181	9 128.18	8.690	0.91
1082	8 273.09	8.579	1.30	1132	8 703.57	8.639	1.13	1182	9 136.87	8.691	0.91
1083	8 281.66	8.580	1.29	1133	8 712.21	8.641	1.12	1183	9 145.56	8.691	0.90
1084	8 290.25	8.581	1.29	1134	8 720.86	8.642	1.12	1184	9 154.26	8.692	0.90
1085	8 298.83	8.583	1.29	1135	8 729.50	8.643	1.12	1185	9 162.95	8.693	0.89
1086	8 307.41	8.584	1.28	1136	8 738.14	8.644	1.11	1186	9 171.64	8.694	0.89
1087	8 316.00	8.585	1.28	1137	8 746.79	8.645	1.11	1187	9 180.34	8.695	0.88
1088	8 324.58	8.586	1.28	1138	8 755.43	8.646	1.10	1188	9 189.03	8.696	0.87
1089	8 333.17	8.588	1.28	1139	8 764.08	8.647	1.10	1189	9 197.73	8.697	0.87
1090	8 341.76	8.589	1.27	1140	8 772.73	8.648	1.10	1190	9 206.43	8.698	0.86
1091	8 350.35	8.590	1.27	1141	8 781.38	8.649	1.09	1191	9 215.12	8.699	0.86
1092	8 358.94	8.591	1.27	1142	8 790.03	8.651	1.09	1192	9 223.82	8.699	0.85
1093	8 367.53	8.593	1.26	1143	8 798.68	8.652	1.08	1193	9 232.52	8.700	0.85
1094	8 376.12	8.594	1.26	1144	8 807.33	8.653	1.08	1194	9 241.22	8.701	0.84
1095	8 384.72	8.595	1.26	1145	8 815.98	8.654	1.08	1195	9 249.93	8.702	0.84
1096	8 393.31	8.597	1.25	1146	8 824.64	8.655	1.07	1196	9 258.63	8.703	0.83
1097	8 401.91	8.598	1.25	1147	8 833.29	8.656	1.07	1197	9 267.33	8.704	0.83
1098	8 410.51	8.599	1.25	1148	8 841.95	8.657	1.06	1198	9 276.03	8.704	0.82
1099	8 419.11	8.600	1.24	1149	8 850.61	8.658	1.06	1199	9 284.74	8.705	0.82
1100	8 427.71	8.602	1.24	1150	8 859.26	8.659	1.06	1200	9 293.45	8.706	0.81

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1200	9 293.45	8.706	0.81	1250	9 729.64	8.739	0.50	1300	10 167.05	8.754	0.11
1201	9 302.15	8.707	0.80	1251	9 738.38	8.739	0.49	1301	10 175.81	8.755	0.10
1202	9 310.86	8.708	0.80	1252	9 747.12	8.740	0.48	1302	10 184.56	8.755	0.09
1203	9 319.57	8.708	0.79	1253	9 755.86	8.740	0.47	1303	10 193.32	8.755	0.08
1204	9 328.28	8.709	0.79	1254	9 764.60	8.741	0.47	1304	10 202.07	8.755	0.07
1205	9 336.99	8.710	0.78	1255	9 773.34	8.741	0.46	1305	10 210.83	8.755	0.06
1206	9 345.70	8.711	0.78	1256	9 782.08	8.742	0.45	1306	10 219.58	8.755	0.06
1207	9 354.41	8.712	0.77	1257	9 790.82	8.742	0.45	1307	10 228.34	8.755	0.05
1208	9 363.12	8.712	0.76	1258	9 799.56	8.743	0.44	1308	10 237.09	8.755	0.04
1209	9 371.83	8.713	0.76	1259	9 808.31	8.743	0.43	1309	10 245.85	8.755	0.03
1210	9 380.55	8.714	0.75	1260	9 817.05	8.744	0.42	1310	10 254.60	8.755	0.02
1211	9 389.26	8.715	0.75	1261	9 825.79	8.744	0.42	1311	10 263.36	8.755	0.01
1212	9 397.97	8.715	0.74	1262	9 834.54	8.744	0.41	1312	10 272.11	8.755	0.00
1213	9 406.69	8.716	0.74	1263	9 843.28	8.745	0.40	1313	10 280.87	8.755	−0.00
1214	9 415.41	8.717	0.73	1264	9 852.03	8.745	0.39	1314	10 289.62	8.755	−0.01
1215	9 424.12	8.718	0.72	1265	9 860.77	8.746	0.39	1315	10 298.38	8.755	−0.02
1216	9 432.84	8.718	0.72	1266	9 869.52	8.746	0.38	1316	10 307.13	8.755	−0.03
1217	9 441.56	8.719	0.71	1267	9 878.27	8.746	0.37	1317	10 315.89	8.755	−0.04
1218	9 450.28	8.720	0.71	1268	9 887.01	8.747	0.36	1318	10 324.64	8.755	−0.05
1219	9 459.00	8.720	0.70	1269	9 895.76	8.747	0.36	1319	10 333.40	8.755	−0.06
1220	9 467.72	8.721	0.69	1270	9 904.51	8.747	0.35	1320	10 342.15	8.755	−0.07
1221	9 476.44	8.722	0.69	1271	9 913.25	8.748	0.34	1321	10 350.91	8.755	−0.08
1222	9 485.16	8.722	0.68	1272	9 922.00	8.748	0.33	1322	10 359.66	8.755	−0.09
1223	9 493.89	8.723	0.67	1273	9 930.75	8.748	0.33	1323	10 368.42	8.755	−0.09
1224	9 502.61	8.724	0.67	1274	9 939.50	8.749	0.32	1324	10 377.17	8.754	−0.10
1225	9 511.33	8.724	0.66	1275	9 948.25	8.749	0.31	1325	10 385.92	8.754	−0.11
1226	9 520.06	8.725	0.66	1276	9 957.00	8.749	0.30	1326	10 394.68	8.754	−0.12
1227	9 528.78	8.726	0.65	1277	9 965.75	8.750	0.30	1327	10 403.43	8.754	−0.13
1228	9 537.51	8.726	0.64	1278	9 974.50	8.750	0.29	1328	10 412.19	8.754	−0.14
1229	9 546.24	8.727	0.64	1279	9 983.25	8.750	0.28	1329	10 420.94	8.754	−0.15
1230	9 554.97	8.728	0.63	1280	9 992.00	8.751	0.27	1330	10 429.69	8.754	−0.16
1231	9 563.69	8.728	0.62	1281	10 000.75	8.751	0.26	1331	10 438.45	8.754	−0.17
1232	9 572.42	8.729	0.62	1282	10 009.50	8.751	0.26	1332	10 447.20	8.753	−0.18
1233	9 581.15	8.730	0.61	1283	10 018.25	8.751	0.25	1333	10 455.95	8.753	−0.19
1234	9 589.88	8.730	0.60	1284	10 027.00	8.752	0.24	1334	10 464.71	8.753	−0.20
1235	9 598.61	8.731	0.60	1285	10 035.75	8.752	0.23	1335	10 473.46	8.753	−0.21
1236	9 607.34	8.731	0.59	1286	10 044.51	8.752	0.22	1336	10 482.21	8.753	−0.22
1237	9 616.07	8.732	0.58	1287	10 053.26	8.752	0.22	1337	10 490.97	8.752	−0.23
1238	9 624.81	8.733	0.58	1288	10 062.01	8.753	0.21	1338	10 499.72	8.752	−0.23
1239	9 633.54	8.733	0.57	1289	10 070.76	8.753	0.20	1339	10 508.47	8.752	−0.24
1240	9 642.27	8.734	0.56	1290	10 079.52	8.753	0.19	1340	10 517.22	8.752	−0.25
1241	9 651.01	8.734	0.56	1291	10 088.27	8.753	0.18	1341	10 525.97	8.751	−0.26
1242	9 659.74	8.735	0.55	1292	10 097.02	8.753	0.17	1342	10 534.72	8.751	−0.27
1243	9 668.48	8.735	0.54	1293	10 105.78	8.753	0.17	1343	10 543.48	8.751	−0.28
1244	9 677.21	8.736	0.54	1294	10 114.53	8.754	0.16	1344	10 552.23	8.751	−0.29
1245	9 685.95	8.736	0.53	1295	10 123.28	8.754	0.15	1345	10 560.98	8.750	−0.30
1246	9 694.68	8.737	0.52	1296	10 132.04	8.754	0.14	1346	10 569.73	8.750	−0.31
1247	9 703.42	8.737	0.52	1297	10 140.79	8.754	0.13	1347	10 578.48	8.750	−0.32
1248	9 712.16	8.738	0.51	1298	10 149.54	8.754	0.12	1348	10 587.23	8.749	−0.33
1249	9 720.90	8.739	0.50	1299	10 158.30	8.754	0.12	1349	10 595.97	8.749	−0.34
1250	9 729.64	8.739	0.50	1300	10 167.05	8.754	0.11	1350	10 604.72	8.749	−0.35

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
1350	10 604.72	8.749	−0.35	**1400**	11 041.50	8.718	−0.87	**1450**	11 476.11	8.661	−1.42
1351	10 613.47	8.748	−0.36	**1401**	11 050.22	8.717	−0.88	**1451**	11 484.77	8.660	−1.43
1352	10 622.22	8.748	−0.37	**1402**	11 058.94	8.717	−0.89	**1452**	11 493.43	8.658	−1.44
1353	10 630.97	8.748	−0.38	**1403**	11 067.66	8.716	−0.90	**1453**	11 502.09	8.657	−1.45
1354	10 639.72	8.747	−0.39	**1404**	11 076.37	8.715	−0.91	**1454**	11 510.74	8.655	−1.46
1355	10 648.46	8.747	−0.40	**1405**	11 085.09	8.714	−0.92	**1455**	11 519.40	8.654	−1.48
1356	10 657.21	8.746	−0.41	**1406**	11 093.80	8.713	−0.93	**1456**	11 528.05	8.652	−1.49
1357	10 665.95	8.746	−0.42	**1407**	11 102.51	8.712	−0.94	**1457**	11 536.70	8.651	−1.50
1358	10 674.70	8.745	−0.43	**1408**	11 111.22	8.711	−0.95	**1458**	11 545.35	8.650	−1.51
1359	10 683.45	8.745	−0.44	**1409**	11 119.93	8.710	−0.97	**1459**	11 554.00	8.648	−1.52
1360	10 692.19	8.745	−0.45	**1410**	11 128.64	8.709	−0.98	**1460**	11 562.65	8.646	−1.53
1361	10 700.93	8.744	−0.46	**1411**	11 137.35	8.708	−0.99	**1461**	11 571.29	8.645	−1.54
1362	10 709.68	8.744	−0.47	**1412**	11 146.06	8.707	−1.00	**1462**	11 579.94	8.643	−1.55
1363	10 718.42	8.743	−0.48	**1413**	11 154.77	8.706	−1.01	**1463**	11 588.58	8.642	−1.57
1364	10 727.17	8.743	−0.49	**1414**	11 163.47	8.705	−1.02	**1464**	11 597.22	8.640	−1.58
1365	10 735.91	8.742	−0.50	**1415**	11 172.18	8.704	−1.03	**1465**	11 605.86	8.639	−1.59
1366	10 744.65	8.742	−0.51	**1416**	11 180.88	8.703	−1.04	**1466**	11 614.50	8.637	−1.60
1367	10 753.39	8.741	−0.52	**1417**	11 189.58	8.702	−1.05	**1467**	11 623.14	8.635	−1.61
1368	10 762.13	8.741	−0.53	**1418**	11 198.28	8.701	−1.06	**1468**	11 631.77	8.634	−1.62
1369	10 770.87	8.740	−0.54	**1419**	11 206.98	8.700	−1.08	**1469**	11 640.40	8.632	−1.63
1370	10 779.61	8.740	−0.55	**1420**	11 215.68	8.699	−1.09	**1470**	11 649.03	8.631	−1.64
1371	10 788.35	8.739	−0.56	**1421**	11 224.38	8.698	−1.10	**1471**	11 657.66	8.629	−1.65
1372	10 797.09	8.738	−0.57	**1422**	11 233.08	8.697	−1.11	**1472**	11 666.29	8.627	−1.67
1373	10 805.83	8.738	−0.58	**1423**	11 241.77	8.695	−1.12	**1473**	11 674.92	8.626	−1.68
1374	10 814.57	8.737	−0.59	**1424**	11 250.47	8.694	−1.13	**1474**	11 683.54	8.624	−1.69
1375	10 823.30	8.737	−0.60	**1425**	11 259.16	8.693	−1.14	**1475**	11 692.17	8.622	−1.70
1376	10 832.04	8.736	−0.61	**1426**	11 267.86	8.692	−1.15	**1476**	11 700.79	8.621	−1.71
1377	10 840.78	8.735	−0.62	**1427**	11 276.55	8.691	−1.16	**1477**	11 709.41	8.619	−1.72
1378	10 849.51	8.735	−0.63	**1428**	11 285.24	8.690	−1.17	**1478**	11 718.03	8.617	−1.73
1379	10 858.24	8.734	−0.64	**1429**	11 293.93	8.689	−1.19	**1479**	11 726.64	8.615	−1.74
1380	10 866.98	8.734	−0.66	**1430**	11 302.62	8.687	−1.20	**1480**	11 735.26	8.614	−1.75
1381	10 875.71	8.733	−0.67	**1431**	11 311.30	8.686	−1.21	**1481**	11 743.87	8.612	−1.77
1382	10 884.44	8.732	−0.68	**1432**	11 319.99	8.685	−1.22	**1482**	11 752.48	8.610	−1.78
1383	10 893.18	8.732	−0.69	**1433**	11 328.67	8.684	−1.23	**1483**	11 761.09	8.608	−1.79
1384	10 901.91	8.731	−0.70	**1434**	11 337.36	8.683	−1.24	**1484**	11 769.70	8.606	−1.80
1385	10 910.64	8.730	−0.71	**1435**	11 346.04	8.681	−1.25	**1485**	11 778.30	8.605	−1.81
1386	10 919.37	8.729	−0.72	**1436**	11 354.72	8.680	−1.26	**1486**	11 786.91	8.603	−1.82
1387	10 928.10	8.729	−0.73	**1437**	11 363.40	8.679	−1.27	**1487**	11 795.51	8.601	−1.83
1388	10 936.83	8.728	−0.74	**1438**	11 372.08	8.677	−1.29	**1488**	11 804.11	8.599	−1.84
1389	10 945.55	8.727	−0.75	**1439**	11 380.75	8.676	−1.30	**1489**	11 812.71	8.597	−1.85
1390	10 954.28	8.726	−0.76	**1440**	11 389.43	8.675	−1.31	**1490**	11 821.30	8.595	−1.86
1391	10 963.01	8.726	−0.77	**1441**	11 398.10	8.674	−1.32	**1491**	11 829.90	8.594	−1.88
1392	10 971.73	8.725	−0.78	**1442**	11 406.77	8.672	−1.33	**1492**	11 838.49	8.592	−1.89
1393	10 980.46	8.724	−0.79	**1443**	11 415.45	8.671	−1.34	**1493**	11 847.08	8.590	−1.90
1394	10 989.18	8.723	−0.80	**1444**	11 424.12	8.670	−1.35	**1494**	11 855.67	8.588	−1.91
1395	10 997.90	8.723	−0.81	**1445**	11 432.79	8.668	−1.36	**1495**	11 864.26	8.586	−1.92
1396	11 006.62	8.722	−0.82	**1446**	11 441.45	8.667	−1.38	**1496**	11 872.84	8.584	−1.93
1397	11 015.35	8.721	−0.84	**1447**	11 450.12	8.665	−1.39	**1497**	11 881.42	8.582	−1.94
1398	11 024.07	8.720	−0.85	**1448**	11 458.78	8.664	−1.40	**1498**	11 890.01	8.580	−1.95
1399	11 032.79	8.719	−0.86	**1449**	11 467.45	8.663	−1.41	**1499**	11 898.58	8.578	−1.96
1400	11 041.50	8.718	−0.87	**1450**	11 476.11	8.661	−1.42	**1500**	11 907.16	8.576	−1.97

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1500	11 907.16	8.576	−1.97	**1550**	12 333.29	8.465	−2.48	**1600**	12 753.24	8.330	−2.89
1501	11 915.74	8.574	−1.98	**1551**	12 341.76	8.462	−2.49	**1601**	12 761.57	8.327	−2.90
1502	11 924.31	8.572	−1.99	**1552**	12 350.22	8.460	−2.50	**1602**	12 769.89	8.324	−2.90
1503	11 932.88	8.570	−2.01	**1553**	12 358.67	8.457	−2.51	**1603**	12 778.21	8.321	−2.91
1504	11 941.45	8.568	−2.02	**1554**	12 367.13	8.455	−2.52	**1604**	12 786.53	8.318	−2.92
1505	11 950.02	8.566	−2.03	**1555**	12 375.58	8.452	−2.53	**1605**	12 794.85	8.315	−2.92
1506	11 958.58	8.564	−2.04	**1556**	12 384.03	8.450	−2.54	**1606**	12 803.16	8.312	−2.93
1507	11 967.15	8.562	−2.05	**1557**	12 392.48	8.447	−2.55	**1607**	12 811.47	8.309	−2.94
1508	11 975.71	8.560	−2.06	**1558**	12 400.93	8.444	−2.56	**1608**	12 819.78	8.306	−2.94
1509	11 984.27	8.558	−2.07	**1559**	12 409.37	8.442	−2.56	**1609**	12 828.09	8.303	−2.95
1510	11 992.82	8.556	−2.08	**1560**	12 417.81	8.439	−2.57	**1610**	12 836.39	8.301	−2.95
1511	12 001.38	8.554	−2.09	**1561**	12 426.25	8.437	−2.58	**1611**	12 844.69	8.298	−2.96
1512	12 009.93	8.552	−2.10	**1562**	12 434.69	8.434	−2.59	**1612**	12 852.98	8.295	−2.97
1513	12 018.48	8.550	−2.11	**1563**	12 443.12	8.432	−2.60	**1613**	12 861.28	8.292	−2.97
1514	12 027.03	8.548	−2.12	**1564**	12 451.55	8.429	−2.61	**1614**	12 869.57	8.289	−2.98
1515	12 035.58	8.546	−2.13	**1565**	12 459.98	8.426	−2.62	**1615**	12 877.85	8.286	−2.98
1516	12 044.12	8.543	−2.14	**1566**	12 468.40	8.424	−2.63	**1616**	12 886.14	8.283	−2.99
1517	12 052.67	8.541	−2.15	**1567**	12 476.82	8.421	−2.64	**1617**	12 894.42	8.280	−2.99
1518	12 061.21	8.539	−2.16	**1568**	12 485.24	8.418	−2.64	**1618**	12 902.70	8.277	−3.00
1519	12 069.74	8.537	−2.17	**1569**	12 493.66	8.416	−2.65	**1619**	12 910.97	8.274	−3.01
1520	12 078.28	8.535	−2.19	**1570**	12 502.08	8.413	−2.66	**1620**	12 919.25	8.271	−3.01
1521	12 086.81	8.533	−2.20	**1571**	12 510.49	8.410	−2.67	**1621**	12 927.51	8.268	−3.02
1522	12 095.34	8.530	−2.21	**1572**	12 518.90	8.408	−2.68	**1622**	12 935.78	8.265	−3.02
1523	12 103.87	8.528	−2.22	**1573**	12 527.30	8.405	−2.69	**1623**	12 944.04	8.262	−3.03
1524	12 112.40	8.526	−2.23	**1574**	12 535.71	8.402	−2.69	**1624**	12 952.30	8.259	−3.03
1525	12 120.93	8.524	−2.24	**1575**	12 544.11	8.400	−2.70	**1625**	12 960.56	8.256	−3.04
1526	12 129.45	8.521	−2.25	**1576**	12 552.51	8.397	−2.71	**1626**	12 968.82	8.253	−3.04
1527	12 137.97	8.519	−2.26	**1577**	12 560.90	8.394	−2.72	**1627**	12 977.07	8.250	−3.05
1528	12 146.49	8.517	−2.27	**1578**	12 569.30	8.392	−2.73	**1628**	12 985.31	8.246	−3.05
1529	12 155.00	8.515	−2.28	**1579**	12 577.69	8.389	−2.74	**1629**	12 993.56	8.243	−3.05
1530	12 163.52	8.512	−2.29	**1580**	12 586.07	8.386	−2.74	**1630**	13 001.80	8.240	−3.06
1531	12 172.03	8.510	−2.30	**1581**	12 594.46	8.383	−2.75	**1631**	13 010.04	8.237	−3.06
1532	12 180.54	8.508	−2.31	**1582**	12 602.84	8.381	−2.76	**1632**	13 018.28	8.234	−3.07
1533	12 189.04	8.505	−2.32	**1583**	12 611.22	8.378	−2.77	**1633**	13 026.51	8.231	−3.07
1534	12 197.55	8.503	−2.33	**1584**	12 619.60	8.375	−2.77	**1634**	13 034.74	8.228	−3.08
1535	12 206.05	8.501	−2.34	**1585**	12 627.97	8.372	−2.78	**1635**	13 042.96	8.225	−3.08
1536	12 214.55	8.498	−2.35	**1586**	12 636.34	8.370	−2.79	**1636**	13 051.19	8.222	−3.08
1537	12 223.05	8.496	−2.36	**1587**	12 644.71	8.367	−2.80	**1637**	13 059.41	8.219	−3.09
1538	12 231.54	8.494	−2.37	**1588**	12 653.07	8.364	−2.80	**1638**	13 067.63	8.216	−3.09
1539	12 240.03	8.491	−2.38	**1589**	12 661.44	8.361	−2.81	**1639**	13 075.84	8.213	−3.10
1540	12 248.52	8.489	−2.39	**1590**	12 669.80	8.358	−2.82	**1640**	13 084.05	8.210	−3.10
1541	12 257.01	8.487	−2.40	**1591**	12 678.15	8.355	−2.83	**1641**	13 092.26	8.206	−3.10
1542	12 265.50	8.484	−2.41	**1592**	12 686.51	8.353	−2.83	**1642**	13 100.46	8.203	−3.11
1543	12 273.98	8.482	−2.42	**1593**	12 694.86	8.350	−2.84	**1643**	13 108.67	8.200	−3.11
1544	12 282.46	8.479	−2.43	**1594**	12 703.21	8.347	−2.85	**1644**	13 116.86	8.197	−3.11
1545	12 290.94	8.477	−2.43	**1595**	12 711.55	8.344	−2.86	**1645**	13 125.06	8.194	−3.12
1546	12 299.41	8.474	−2.44	**1596**	12 719.89	8.341	−2.86	**1646**	13 133.25	8.191	−3.12
1547	12 307.89	8.472	−2.45	**1597**	12 728.23	8.338	−2.87	**1647**	13 141.44	8.188	−3.12
1548	12 316.36	8.470	−2.46	**1598**	12 736.57	8.336	−2.88	**1648**	13 149.63	8.185	−3.12
1549	12 324.83	8.467	−2.47	**1599**	12 744.91	8.333	−2.88	**1649**	13 157.81	8.182	−3.13
1550	12 333.29	8.465	−2.48	**1600**	12 753.24	8.330	−2.89	**1650**	13 165.99	8.178	−3.13

TABLE 2.5.3. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1650	13 165.99	8.178	−3.13	**1690**	13 490.61	8.052	−3.15	**1730**	13 810.21	7.929	−2.97
1651	13 174.17	8.175	−3.13	**1691**	13 498.66	8.049	−3.15	**1731**	13 818.14	7.926	−2.96
1652	13 182.34	8.172	−3.14	**1692**	13 506.70	8.046	−3.15	**1732**	13 826.06	7.923	−2.95
1653	13 190.51	8.169	−3.14	**1693**	13 514.75	8.043	−3.14	**1733**	13 833.98	7.920	−2.95
1654	13 198.68	8.166	−3.14	**1694**	13 522.79	8.040	−3.14	**1734**	13 841.90	7.917	−2.94
1655	13 206.84	8.163	−3.14	**1695**	13 530.83	8.037	−3.14	**1735**	13 849.82	7.914	−2.93
1656	13 215.01	8.160	−3.14	**1696**	13 538.86	8.033	−3.14	**1736**	13 857.73	7.911	−2.92
1657	13 223.16	8.156	−3.15	**1697**	13 546.90	8.030	−3.13	**1737**	13 865.64	7.909	−2.91
1658	13 231.32	8.153	−3.15	**1698**	13 554.92	8.027	−3.13	**1738**	13 873.55	7.906	−2.91
1659	13 239.47	8.150	−3.15	**1699**	13 562.95	8.024	−3.13	**1739**	13 881.45	7.903	−2.90
1660	13 247.62	8.147	−3.15	**1700**	13 570.97	8.021	−3.12	**1740**	13 889.35	7.900	−2.89
1661	13 255.76	8.144	−3.15	**1701**	13 578.99	8.018	−3.12	**1741**	13 897.25	7.897	−2.88
1662	13 263.91	8.141	−3.15	**1702**	13 587.01	8.015	−3.12	**1742**	13 905.15	7.894	−2.87
1663	13 272.05	8.138	−3.16	**1703**	13 595.02	8.011	−3.11	**1743**	13 913.04	7.891	−2.86
1664	13 280.18	8.134	−3.16	**1704**	13 603.03	8.008	−3.11	**1744**	13 920.93	7.888	−2.85
1665	13 288.31	8.131	−3.16	**1705**	13 611.04	8.005	−3.11	**1745**	13 928.82	7.885	−2.84
1666	13 296.44	8.128	−3.16	**1706**	13 619.04	8.002	−3.10	**1746**	13 936.70	7.883	−2.83
1667	13 304.57	8.125	−3.16	**1707**	13 627.04	7.999	−3.10	**1747**	13 944.58	7.880	−2.82
1668	13 312.69	8.122	−3.16	**1708**	13 635.04	7.996	−3.10	**1748**	13 952.46	7.877	−2.81
1669	13 320.81	8.119	−3.16	**1709**	13 643.03	7.993	−3.09	**1749**	13 960.34	7.874	−2.80
1670	13 328.93	8.115	−3.16	**1710**	13 651.02	7.990	−3.09	**1750**	13 968.21	7.871	−2.79
1671	13 337.04	8.112	−3.16	**1711**	13 659.01	7.987	−3.08	**1751**	13 976.08	7.869	−2.78
1672	13 345.16	8.109	−3.16	**1712**	13 667.00	7.984	−3.08	**1752**	13 983.95	7.866	−2.77
1673	13 353.26	8.106	−3.16	**1713**	13 674.98	7.981	−3.07	**1753**	13 991.81	7.863	−2.76
1674	13 361.37	8.103	−3.16	**1714**	13 682.96	7.977	−3.07	**1754**	13 999.67	7.860	−2.75
1675	13 369.47	8.100	−3.16	**1715**	13 690.93	7.974	−3.06	**1755**	14 007.53	7.858	−2.73
1676	13 377.57	8.096	−3.16	**1716**	13 698.91	7.971	−3.06	**1756**	14 015.39	7.855	−2.72
1677	13 385.66	8.093	−3.16	**1717**	13 706.88	7.968	−3.05	**1757**	14 023.24	7.852	−2.71
1678	13 393.75	8.090	−3.16	**1718**	13 714.84	7.965	−3.05	**1758**	14 031.09	7.849	−2.70
1679	13 401.84	8.087	−3.16	**1719**	13 722.81	7.962	−3.04	**1759**	14 038.94	7.847	−2.69
1680	13 409.93	8.084	−3.16	**1720**	13 730.77	7.959	−3.04	**1760**	14 046.79	7.844	−2.68
1681	13 418.01	8.081	−3.16	**1721**	13 738.73	7.956	−3.03	**1761**	14 054.63	7.841	−2.66
1682	13 426.09	8.077	−3.16	**1722**	13 746.68	7.953	−3.02	**1762**	14 062.47	7.839	−2.65
1683	13 434.16	8.074	−3.16	**1723**	13 754.63	7.950	−3.02	**1763**	14 070.31	7.836	−2.64
1684	13 442.24	8.071	−3.16	**1724**	13 762.58	7.947	−3.01	**1764**	14 078.14	7.833	−2.62
1685	13 450.31	8.068	−3.16	**1725**	13 770.53	7.944	−3.00	**1765**	14 085.97	7.831	−2.61
1686	13 458.37	8.065	−3.16	**1726**	13 778.47	7.941	−3.00	**1766**	14 093.80	7.828	−2.60
1687	13 466.44	8.062	−3.15	**1727**	13 786.41	7.938	−2.99	**1767**	14 101.63	7.826	−2.58
1688	13 474.50	8.059	−3.15	**1728**	13 794.35	7.935	−2.98	**1768**	14 109.45	7.823	−2.57
1689	13 482.55	8.055	−3.15	**1729**	13 802.28	7.932	−2.98				
1690	13 490.61	8.052	−3.15	**1730**	13 810.21	7.929	−2.97				

2.6. References

[1] ASTM, American Society for Testing and Materials, Standard E1159-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 388-389.

[2] Burns, G. W.; Gallagher, J. S. Reference tables for the Pt–30 percent Rh versus Pt–6 percent Rh thermocouple. *J. Res. Natl. Bur. Stand. (U.S.)* **70C**, 89-125; 1966.

[3] Obrowski, W.; Prinz, W. Neu bestimmte grundwerte für die thermopaarkombination Pt 30% Rh–Pt 6% Rh. *Arch. Eisenhüttenwesen* **33**, 1-4; 1962.

[4] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[5] American National Standard: Temperature measurement thermocouples, ANSI-MC96.1-1975; Pittsburgh: Instrument Society of America; 1975.

[6] ASTM, American Society for Testing and Materials, Standard E230-72, *1972 Annual Book of ASTM Standards*. Part 30; Philadelphia: ASTM; 1972. 617-716.

[7] International Electrotechnical Commission Standard, Thermocouples, Part 1: Reference tables. *IEC Publication 584-1*; Geneva, Switzerland: Bureau Central de la Commission Electrotechnique Internationale; 1977.

[8] Ehringer, H. Uber die lebensdauer von PtRh-themoelementen. *Metall* **8**, 596-598; 1954.

[9] Walker, B. E.; Ewing, C. T.; Miller, R.R. Thermoelectric instability of some noble metal thermocouples at high temperatures. *Rev. Sci. Instrum.* **33**, 1029-1040; 1962.

[10] Walker, B. E.; Ewing, C. T.; Miller, R.R. Study of the instability of noble metal thermocouples in vacuum. *Rev. Sci. Instrum.* **36**, 601-606; 1965.

[11] Glawe, G. E.; Szaniszlo, A. J. Long-term drift of some noble- and refractory-metal thermocouples at 1600 K in air, argon, and vacuum. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4; Plumb, H. H.., ed.; Pittsburgh: Instrument Society of American; 1972. 1645-1662.

[12] Acken, J. S. Some properties of platinum-rhodium alloys. *J. Res. Natl. Bur. Stand. (U.S.)* **12**, 249; RP650; 1934.

[13] Hendricks, J. W.; McElroy, D. L. High temperature-high vacuum thermocouple drift tests. *Environmental Quarterly*, 34-38; March 1967.

[14] Zysk, E. D. Platinum metal thermocouples. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 3; Herzfeld, C. M.., ed.; New York: Reinhold Publishing Corp.; 1962. Part 2, pp. 135-156.

[15] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[16] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10; 1990. *ibid.* p. 107.

[17] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[18] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 547-552.

[19] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

3. TYPE R—Platinum-13% Rhodium Alloy Versus Platinum Thermocouples

3.1. Material Specifications and Precautions

This type is often referred to by the nominal chemical composition of its positive (RP) thermoelement: platinum-13% rhodium. The negative (RN) thermoelement is commercially-available platinum that has a nominal purity of 99.99% [1]. An industrial consensus standard (ASTM E1159-87) specifies that rhodium having a nominal purity of 99.98% shall be alloyed with platinum of 99.99% purity to produce the positive thermoelement, which typically contains 13.00 ± 0.05% rhodium by weight. This consensus standard [1] describes the purity of commercial type R materials that are used in many industrial thermometry applications and that meet the calibration tolerances described later in this section. It does not cover, however, the higher-purity, reference-grade materials that traditionally were used to construct thermocouples used as transfer standards and reference thermometers in various laboratory applications and to develop reference functions and tables [2,3]. The higher purity alloy material typically contains less than 500 atomic ppm of impurities and the platinum less than 100 atomic ppm of impurities [2]. Differences between such high purity commercial material and the platinum thermoelectric reference standard, Pt-67, are described in [2] and [3].

During the early years of this century the platinum-13% rhodium versus platinum thermocouple was developed and tested in this country to give agreement with the British platinum-10% rhodium versus platinum thermocouples which had been found to have significant iron contamination. Fairchild and Schmitt [4] discovered during prolonged high-temperature tests that American and British platinum-10% rhodium versus platinum thermocouples differed significantly from each other in thermoelectric output and stability. The main chemical difference was traced to a 0.34% iron impurity in the British positive thermoelement, which presumably was caused by the use of impure rhodium. Many instruments and systems were calibrated on the basis of the thermoelectric voltages of the older, impure platinum-10% rhodium material. When purer rhodium was used for alloying in order to improve the stability characteristics, the composition had to be changed to give thermoelectric values near the previous ones [5]. When the purer rhodium was used, it was found that about 13 percent rhodium had to be alloyed with the platinum to approximately match the previous platinum-10% rhodium British wire. That was the reason for the development of the Type R thermocouple.

The first reference table used in this country with type R thermocouples was published in 1933 by Roeser and Wensel [6]. They based their function and table on four thermocouples that were calibrated by comparison with type S thermocouples. Their tabular values, which covered the range t_{27} = 0 °C to 1700 °C, were corrected in 1951 by Shenker and others at NBS to account for changes in the international temperature scale (from the ITS-27 to the ITS-48) and in the electrical units (from international to absolute). The revised tables were presented in NBS Circular 508 [7] and again, several years later, in NBS Circular 561 [8].

During the early 1960s, the reference tables from NBS Circular 561 were used to prepare the first ASTM (E230-63) and ISA (C96.1) standards giving tables for the letter-designated thermocouple types. At the time, a different reference table for type R thermocouples, based on research conducted at the National Physical Laboratory (NPL) by Barber [9] and published in 1952 by the British Standards Institution (BSI) as B.S. 1826:1952 [10], was used in the United Kingdom and promulgated widely in Europe. There were appreciable differences (equivalent to about 3 °C at 1000 °C and about 9 °C at 1600 °C) between the American and British reference tables because of small differences in rhodium content and different realizations of the temperature scales. Additionally, there were various deficiencies in both tables, as described by Bedford [11], that led to inaccuracy in values interpolated and extrapolated from calibration data.

An international cooperative program was initiated in 1968 to rectify the unsatisfactory disagreements between the British and American standards and to establish a more accurate reference table for type R thermocouples. The program involved cooperation of the NBS, the NPL, and the National Research Council (NRC, Canada), and seven manufacturers in the United Kingdom and the United States. Each of four American and three British manufacturers provided 12 m of each thermoelement. The alloy thermoelements were manufactured to contain 13% rhodium, as closely as possible, even though it was recognized that this would result in higher emf values for given temperatures than those given by the existing American and British reference tables. Thermocouples were calibrated at NBS and NRC from −50 °C to the freezing-point temperature of gold; eight selected thermocouples were then calibrated at NPL from the gold freezing-point to the platinum freezing-point temperatures against a photoelectric optical pyrometer using blackbody comparators. The thoroughly documented results of

this program were published in 1972 by Bedford *et al.* [2]. Their reference function and table, which were based on the IPTS-68 and which covered the range $t_{68} = -50$ °C to 1767.6 °C (their measured value of the platinum freezing-point temperature on the IPTS-68), were published in NBS Monograph 125 [12]. In addition, their reference table was included in revised ASTM (E230-72), ISA (ANSI-MC96.1-1975) and BSI (BS 4937:Part 2:1973) standards, as well as in an International Electrotechnical Commission (IEC) standard (584-1) published in 1977 [13].

A reference function for the type R thermocouple, based on the ITS-90 and the SI volt, was determined recently from new data obtained in a collaborative effort by NIST and NPL. The results of this international collaboration were reported by Burns *et al.* [3]. The function was used to compute the reference table given in section 3.3 of this monograph. The measurement methods, as well as the construction of the reference function and the differences between it and the IPTS-68 based reference function, are discussed in the next section.

Type R thermocouples have about a 12% larger Seebeck coefficient than do Type S thermocouples over much of the range. Type R thermocouples were not standard interpolating instruments on the IPTS-68 for the 630.74 °C to gold freezing-point range. Other than these two points, and remarks on the history of development and the composition, all of the precautions and restrictions on usage given in the next chapter on type S thermocouples also apply to type R thermocouples. Glawe and Szaniszlo [14], and Walker et al. [15,16] have determined the effects that prolonged exposure at elevated temperatures (>1200 °C) in vacuum, air, and argon atmospheres have on the thermoelectric voltages of type R thermocouples.

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [17] specifies that the initial calibration tolerances for type R commercial thermocouples be ± 1.5 °C or ± 0.25% (whichever is greater) between 0 °C and 1450 °C. Type R thermocouples can be supplied to meet special tolerances of ± 0.6 °C or ± 0.1% (whichever is greater).

The suggested upper temperature limit, 1480 °C, given in the ASTM standard [17] for protected type R thermocouples applies to AWG 24 (0.51 mm) wire. This temperature limit applies to thermocouples used in conventional closed-end protecting tubes and it is intended only as a rough guide to the user. It does not apply to thermocouples having compacted mineral oxide insulation.

3.2. Construction of Reference Function

The reference function for type R thermocouples is taken directly from the research published by Burns *et al.* [3]. Their reference function was based on the ITS-90 and the SI volt. The *emf*-t_{90} relationships of type R thermocouples were measured at both NIST and NPL, using different thermocouples and different experimental procedures. Altogether, measurements were obtained for nine thermocouples acquired from five sources. At both laboratories, measurements were made of the *emf* of the thermocouples as a function of t_{90} over the range 600 °C (500 °C, at NIST) to 962 °C, with t_{90} being determined with high-temperature standard platinum resistance thermometers (HTSPRTs) calibrated according to the ITS-90. At NIST, measurements were extended to 1070 °C, using an approximate interpolation method for HTSPRTs [18], and similar measurements with standard platinum resistance thermometers (SPRTs) were conducted also over the range -50 °C to 550 °C. In addition, at both laboratories, the thermocouples were calibrated at various thermometric fixed points as realized in metal freezing-point cells.

The new reference function giving the *emf* as a function of t_{90} over the range from −50 °C to 1064.18 °C was based upon the experimental data for NIST thermocouple R5. The rationale for this choice and the analysis of the data are given in [3]. A 9th degree polynomial was fitted by the method of least squares to the *emf*-t_{90} data for thermocouple R5. The residual standard deviation from the fit was 0.087 μV with 351 degrees of freedom. The 9th degree polynomial was used because lower degree polynomials did not adequately remove cyclic structure from the residuals. The 9th degree fit proved successful in removing cyclic structure from data obtained in different pieces of equipment, although retaining some structure in data obtained within a given apparatus. Polynomials of higher degree were not warranted because the structure in the residuals suggested that small changes occurred in the thermocouple with increasing temperature. Those changes are not reflected in the reference function.

The linear and quadratic terms of the fitted polynomial were adjusted to obtain the reference function. As a consequence of this adjustment, the reference function gives the same values of *emf* at the freezing points of gold and zinc as those of the reference function [12] based on the IPTS-68, after the latter function was corrected to be consistent with the SI volt [19].

Above 1064.18 °C, the new reference function is based upon a mathematical conversion of the IPTS-68 based reference function [12]. The previous

function consisted of two cubics which joined at t_{68} = 1665 °C. The use of two functions was necessary to accommodate the rapid decrease of the Seebeck coefficient above 1700 °C. Direct substitution of $t_{68} = t_{90} - \Delta t$ in the cubics, where Δt is given by Eq. (42) in Ref. 20, produced two 6th degree polynomials that give the *emf* as a function of t_{90}. The coefficients of both polynomials were multiplied by 0.999990736 to correct the values of *emf* to the SI volt [19]. These polynomials were then modified by Burns *et al.* [3] to obtain the reference function according to the following discussion.

The 6th degree polynomial for the range 1064.18 °C to 1664.5 °C was truncated to a 5th degree polynomial. The coefficients of the 5th degree polynomial were then adjusted to obtain a polynomial that produces the same values of *emf* (E) and dE/dt_{90} at 1064.18 °C as the reference function for the −50 °C to 1064.18 °C range and the same values of E and dE/dt_{90} at 1664.5 °C as the 6th degree polynomial before it was truncated. The resulting bias in the adjusted 5th degree polynomial relative to the 6th degree polynomial was ≤0.119 μV. The adjusted 5th degree polynomial is the reference function in this range.

Burns *et al.* pointed out that the IPTS-68 based reference function in the range above 1664.5 °C was based on t_{68} = 1767.6 °C [2] for the freezing point of Pt. More recent determinations of the Pt freezing-point temperature, however, have resulted in a recommended value [21] of t_{68} = 1768.7 °C for that point. The corresponding value of t_{90}, according to Eq. (42) in Ref. 20, is 1768.117 °C. Hence, in order for the new and old reference functions to give the same values of E at the freezing point of Pt, a corrective function was added for this range. First, the 6th degree polynomial for this range was truncated to a 4th degree polynomial, thereby incurring a bias of ≤0.023 μV. This 4th degree polynomial was then corrected by adding a cubic so that the resulting 4th degree polynomial produces the same values of E, dE/dt_{90}, and d^2E/dt_{90}^2 at 1664.5 °C as the reference function for the 1064.18 °C to 1664.5 °C range, and it also gives the same value of E at 1768.117 °C that the IPTS-68 based reference function gives at t_{68} = 1767.6 °C, after the latter function was corrected to be consistent with the SI volt.

The new ITS-90 based reference function for type R thermocouples therefore consists of three polynomials that cover the range −50 °C to 1768.1 °C, with joins at 1064.18 C and 1664.5 °C. The form of the polynomials and the coefficients for the three temperature ranges are given in the next section. Figure 3.2.1 shows the *emf* differences between the ITS-90 reference function and the reference function based on the IPTS-68. In this figure the IPTS-68 based reference function was adjusted to the ITS-90 and the SI volt.

3.3. Reference Function and Table for Type R Thermocouples

The coefficients, c_i, for the ninth degree polynomial that gives the thermoelectric voltage, E, of type R thermocouples as a function of temperature, t_{90}, in the −50 °C to 1064.18 °C range are given in table 3.3.1. The coefficients for the fifth and fourth degree polynomials that give the thermoelectric voltage in the 1064.18 °C to 1664.5 °C and 1664.5 °C to 1768.1 °C ranges, respectively, are also given in table 3.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type R thermocouples at selected fixed points are given in table 3.3.2. The reference values for type R thermocouples are given at 1 °C intervals from −50 °C to 1768 °C in table 3.3.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 3.3.1, 3.3.2, and 3.3.3, respectively.

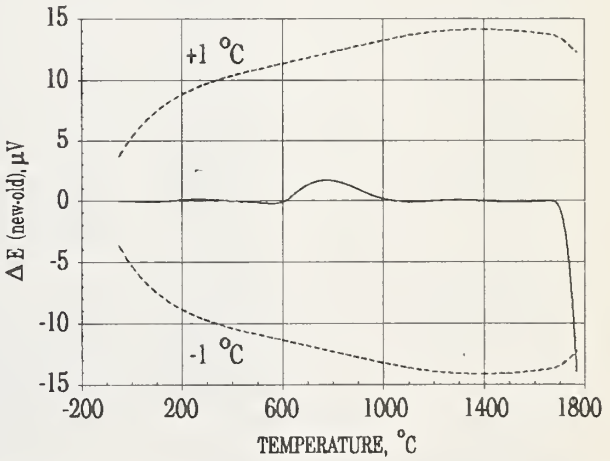

FIGURE 3.2.1. *Difference in thermoelectric voltages (ΔE) of old and new reference functions for type R thermocouples − comparison of values given in this Monograph to those given in NBS Monograph 125. Values from Monograph 125 are adjusted to the ITS-90 and the SI volt. The dashed lines indicate voltage differences equivalent to ± 1 °C.*

TABLE 3.3.1. *Type R thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−50 °C to 1064.18 °C	1064.18 °C to 1664.5 °C	1664.5 °C to 1768.1 °C
c_0 =	0.000 000 000 00 . . .	$2.951\ 579\ 253\ 16 \times 10^{3}$	$1.522\ 321\ 182\ 09 \times 10^{5}$
c_1 =	5.289 617 297 65 . . .	−2.520 612 513 32 . . .	$-2.688\ 198\ 885\ 45 \times 10^{2}$
c_2 =	$1.391\ 665\ 897\ 82 \times 10^{-2}$	$1.595\ 645\ 018\ 65 \times 10^{-2}$	$1.712\ 802\ 804\ 71 \times 10^{-1}$
c_3 =	$-2.388\ 556\ 930\ 17 \times 10^{-5}$	$-7.640\ 859\ 475\ 76 \times 10^{-6}$	$-3.458\ 957\ 064\ 53 \times 10^{-5}$
c_4 =	$3.569\ 160\ 010\ 63 \times 10^{-8}$	$2.053\ 052\ 910\ 24 \times 10^{-9}$	$-9.346\ 339\ 710\ 46 \times 10^{-12}$
c_5 =	$-4.623\ 476\ 662\ 98 \times 10^{-11}$	$-2.933\ 596\ 681\ 73 \times 10^{-13}$	
c_6 =	$5.007\ 774\ 410\ 34 \times 10^{-14}$		
c_7 =	$-3.731\ 058\ 861\ 91 \times 10^{-17}$		
c_8 =	$1.577\ 164\ 823\ 67 \times 10^{-20}$		
c_9 =	$-2.810\ 386\ 252\ 51 \times 10^{-24}$		

TABLE 3.3.2. *Thermoelectric values at fixed points for type R thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dT nV/°C^2
Mercury TP	−38.8344	−182.95	4.092	34.10
Ice MP	0.000	0.00	5.290	27.83
Water TP	0.01	0.05	5.290	27.83
Gallium MP	29.7646	169.17	6.058	23.92
Indium FP	156.5985	1095.67	8.325	13.11
Tin FP	231.928	1756.23	9.168	9.52
Cadmium FP	321.069	2607.33	9.888	6.88
Lead FP	327.462	2670.69	9.932	6.74
Zinc FP	419.527	3611.30	10.480	5.34
Antimony FP	630.63	5933.51	11.501	4.71
Aluminum FP	660.323	6277.09	11.641	4.75
Silver FP	961.78	10003.43	13.065	4.42
Gold FP	1064.18	11363.74	13.497	4.01
Copper FP	1084.62	11640.43	13.575	3.68
Palladium FP	1554.8	18219.18	13.979	−1.86
Platinum FP	1768.1	21102.70	12.255	−24.74

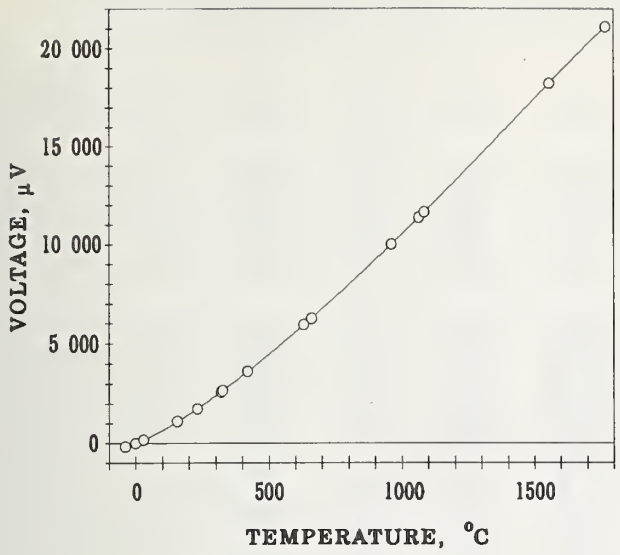

FIGURE 3.3.1. *Thermoelectric voltage for type R thermocouples. The circles indicate values at various thermometric fixed points.*

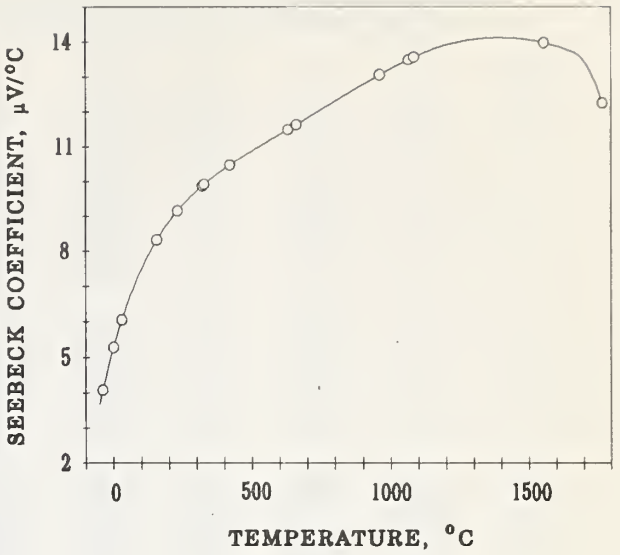

FIGURE 3.3.2. *Seebeck coefficient for type R thermocouples. The circles indicate values at various thermometric fixed points.*

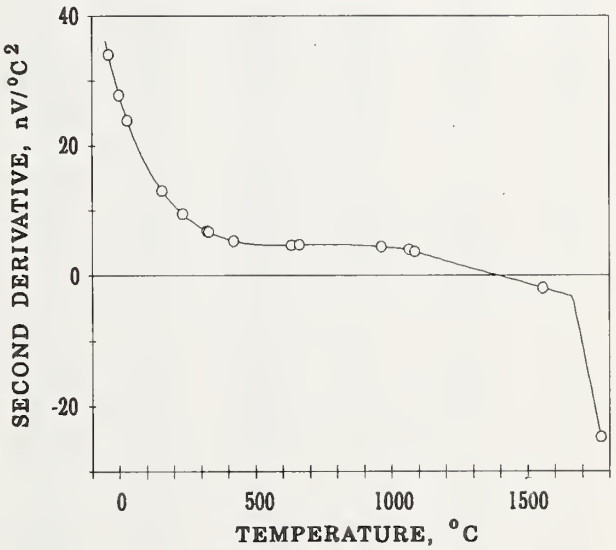

FIGURE 3.3.3. *Second derivative of thermoelectric voltage for type R thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
				−40	−187.69	4.052	34.31	−20	−100.03	4.703	30.88
				−39	−183.62	4.086	34.13	−19	−95.31	4.734	30.72
				−38	−179.52	4.120	33.95	−18	−90.56	4.765	30.56
				−37	−175.38	4.154	33.77	−17	−85.78	4.795	30.40
				−36	−171.21	4.188	33.59	−16	−80.97	4.825	30.24
				−35	−167.01	4.221	33.42	−15	−76.13	4.856	30.08
				−34	−162.77	4.255	33.24	−14	−71.26	4.886	29.93
				−33	−158.50	4.288	33.06	−13	−66.36	4.915	29.77
				−32	−154.20	4.321	32.89	−12	−61.43	4.945	29.62
				−31	−149.86	4.353	32.72	−11	−56.47	4.975	29.46
−50	−226.47	3.699	36.20	−30	−145.49	4.386	32.54	−10	−51.48	5.004	29.31
−49	−222.75	3.736	36.00	−29	−141.09	4.419	32.37	−9	−46.46	5.033	29.16
−48	−218.99	3.771	35.81	−28	−136.65	4.451	32.20	−8	−41.41	5.062	29.01
−47	−215.20	3.807	35.62	−27	−132.18	4.483	32.03	−7	−36.34	5.091	28.86
−46	−211.38	3.843	35.43	−26	−127.69	4.515	31.87	−6	−31.23	5.120	28.71
−45	−207.52	3.878	35.24	−25	−123.15	4.547	31.70	−5	−26.10	5.149	28.56
−44	−203.62	3.913	35.05	−24	−118.59	4.578	31.53	−4	−20.93	5.177	28.41
−43	−199.69	3.948	34.87	−23	−114.00	4.610	31.37	−3	−15.74	5.205	28.27
−42	−195.73	3.983	34.68	−22	−109.37	4.641	31.20	−2	−10.52	5.234	28.12
−41	−191.73	4.017	34.50	−21	−104.72	4.672	31.04	−1	−5.28	5.262	27.98
−40	−187.69	4.052	34.31	−20	−100.03	4.703	30.88	0	0.00	5.290	27.83

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
0	0.00	5.290	27.83	50	296.50	6.519	21.63	100	647.40	7.479	17.00
1	5.30	5.317	27.69	51	303.03	6.540	21.53	101	654.88	7.496	16.92
2	10.63	5.345	27.55	52	309.58	6.562	21.42	102	662.39	7.513	16.84
3	15.99	5.372	27.41	53	316.15	6.583	21.31	103	669.91	7.529	16.76
4	21.38	5.400	27.27	54	322.74	6.604	21.21	104	677.45	7.546	16.68
5	26.79	5.427	27.13	55	329.36	6.625	21.11	105	685.00	7.563	16.60
6	32.23	5.454	26.99	56	335.99	6.647	21.00	106	692.57	7.579	16.52
7	37.70	5.481	26.85	57	342.65	6.667	20.90	107	700.16	7.596	16.45
8	43.20	5.508	26.71	58	349.33	6.688	20.80	108	707.76	7.612	16.37
9	48.72	5.534	26.58	59	356.03	6.709	20.70	109	715.38	7.629	16.29
10	54.26	5.561	26.44	60	362.75	6.730	20.59	110	723.02	7.645	16.22
11	59.84	5.587	26.31	61	369.49	6.750	20.49	111	730.67	7.661	16.14
12	65.44	5.614	26.17	62	376.25	6.771	20.39	112	738.34	7.677	16.07
13	71.07	5.640	26.04	63	383.03	6.791	20.30	113	746.03	7.693	15.99
14	76.72	5.666	25.91	64	389.83	6.811	20.20	114	753.73	7.709	15.92
15	82.40	5.691	25.78	65	396.65	6.831	20.10	115	761.45	7.725	15.84
16	88.10	5.717	25.65	66	403.49	6.851	20.00	116	769.18	7.741	15.77
17	93.83	5.743	25.52	67	410.35	6.871	19.90	117	776.93	7.756	15.70
18	99.59	5.768	25.39	68	417.23	6.891	19.81	118	784.69	7.772	15.62
19	105.37	5.794	25.26	69	424.14	6.911	19.71	119	792.47	7.788	15.55
20	111.17	5.819	25.13	70	431.06	6.931	19.62	120	800.27	7.803	15.48
21	117.00	5.844	25.00	71	438.00	6.950	19.52	121	808.08	7.819	15.41
22	122.86	5.869	24.88	72	444.96	6.970	19.43	122	815.90	7.834	15.34
23	128.74	5.894	24.75	73	451.94	6.989	19.33	123	823.75	7.849	15.27
24	134.65	5.918	24.63	74	458.94	7.008	19.24	124	831.60	7.865	15.20
25	140.58	5.943	24.50	75	465.95	7.028	19.15	125	839.48	7.880	15.13
26	146.53	5.967	24.38	76	472.99	7.047	19.06	126	847.36	7.895	15.06
27	152.51	5.992	24.26	77	480.05	7.066	18.96	127	855.27	7.910	14.99
28	158.52	6.016	24.14	78	487.12	7.085	18.87	128	863.18	7.925	14.92
29	164.54	6.040	24.02	79	494.22	7.103	18.78	129	871.11	7.940	14.85
30	170.60	6.064	23.90	80	501.33	7.122	18.69	130	879.06	7.955	14.78
31	176.67	6.088	23.78	81	508.46	7.141	18.60	131	887.02	7.969	14.72
32	182.77	6.111	23.66	82	515.61	7.159	18.51	132	895.00	7.984	14.65
33	188.89	6.135	23.54	83	522.78	7.178	18.43	133	902.99	7.999	14.58
34	195.04	6.158	23.42	84	529.97	7.196	18.34	134	911.00	8.013	14.52
35	201.21	6.182	23.30	85	537.17	7.215	18.25	135	919.02	8.028	14.45
36	207.41	6.205	23.19	86	544.40	7.233	18.16	136	927.05	8.042	14.38
37	213.62	6.228	23.07	87	551.64	7.251	18.08	137	935.10	8.056	14.32
38	219.86	6.251	22.96	88	558.90	7.269	17.99	138	943.17	8.071	14.25
39	226.12	6.274	22.84	89	566.18	7.287	17.91	139	951.24	8.085	14.19
40	232.41	6.297	22.73	90	573.47	7.305	17.82	140	959.34	8.099	14.13
41	238.72	6.320	22.62	91	580.79	7.323	17.74	141	967.44	8.113	14.06
42	245.05	6.342	22.51	92	588.12	7.340	17.65	142	975.56	8.127	14.00
43	251.40	6.365	22.39	93	595.47	7.358	17.57	143	983.70	8.141	13.94
44	257.78	6.387	22.28	94	602.83	7.375	17.48	144	991.84	8.155	13.87
45	264.18	6.409	22.17	95	610.22	7.393	17.40	145	1 000.01	8.169	13.81
46	270.60	6.431	22.06	96	617.62	7.410	17.32	146	1 008.18	8.183	13.75
47	277.04	6.453	21.95	97	625.04	7.427	17.24	147	1 016.37	8.196	13.69
48	283.50	6.475	21.85	98	632.47	7.445	17.16	148	1 024.57	8.210	13.63
49	289.99	6.497	21.74	99	639.93	7.462	17.08	149	1 032.79	8.224	13.56
50	296.50	6.519	21.63	100	647.40	7.479	17.00	150	1 041.02	8.237	13.50

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	1 041.02	8.237	13.50	**200**	1 468.58	8.843	10.86	**250**	1 923.43	9.334	8.87
151	1 049.27	8.251	13.44	**201**	1 477.43	8.854	10.82	**251**	1 932.77	9.343	8.83
152	1 057.52	8.264	13.38	**202**	1 486.29	8.865	10.77	**252**	1 942.12	9.352	8.80
153	1 065.79	8.277	13.32	**203**	1 495.16	8.876	10.72	**253**	1 951.47	9.361	8.76
154	1 074.08	8.291	13.26	**204**	1 504.04	8.886	10.68	**254**	1 960.84	9.369	8.73
155	1 082.38	8.304	13.20	**205**	1 512.93	8.897	10.64	**255**	1 970.21	9.378	8.70
156	1 090.69	8.317	13.15	**206**	1 521.84	8.908	10.59	**256**	1 979.59	9.387	8.66
157	1 099.01	8.330	13.09	**207**	1 530.75	8.918	10.55	**257**	1 988.99	9.395	8.63
158	1 107.35	8.343	13.03	**208**	1 539.67	8.929	10.50	**258**	1 998.38	9.404	8.60
159	1 115.70	8.356	12.97	**209**	1 548.61	8.939	10.46	**259**	2 007.79	9.413	8.56
160	1 124.06	8.369	12.91	**210**	1 557.55	8.950	10.42	**260**	2 017.21	9.421	8.53
161	1 132.44	8.382	12.86	**211**	1 566.51	8.960	10.37	**261**	2 026.64	9.430	8.50
162	1 140.82	8.395	12.80	**212**	1 575.47	8.970	10.33	**262**	2 036.07	9.438	8.47
163	1 149.22	8.408	12.74	**213**	1 584.45	8.981	10.29	**263**	2 045.51	9.447	8.44
164	1 157.64	8.420	12.69	**214**	1 593.43	8.991	10.24	**264**	2 054.96	9.455	8.40
165	1 166.07	8.433	12.63	**215**	1 602.43	9.001	10.20	**265**	2 064.42	9.463	8.37
166	1 174.51	8.446	12.58	**216**	1 611.43	9.011	10.16	**266**	2 073.89	9.472	8.34
167	1 182.96	8.458	12.52	**217**	1 620.45	9.021	10.12	**267**	2 083.36	9.480	8.31
168	1 191.42	8.471	12.47	**218**	1 629.48	9.032	10.08	**268**	2 092.85	9.488	8.28
169	1 199.90	8.483	12.41	**219**	1 638.51	9.042	10.04	**269**	2 102.34	9.497	8.25
170	1 208.39	8.496	12.36	**220**	1 647.56	9.052	9.99	**270**	2 111.84	9.505	8.22
171	1 216.89	8.508	12.30	**221**	1 656.62	9.062	9.95	**271**	2 121.35	9.513	8.19
172	1 225.40	8.520	12.25	**222**	1 665.68	9.072	9.91	**272**	2 130.87	9.521	8.16
173	1 233.93	8.532	12.20	**223**	1 674.76	9.081	9.87	**273**	2 140.39	9.529	8.13
174	1 242.47	8.545	12.14	**224**	1 683.85	9.091	9.83	**274**	2 149.93	9.537	8.10
175	1 251.02	8.557	12.09	**225**	1 692.94	9.101	9.79	**275**	2 159.47	9.546	8.07
176	1 259.58	8.569	12.04	**226**	1 702.05	9.111	9.75	**276**	2 169.02	9.554	8.04
177	1 268.16	8.581	11.99	**227**	1 711.16	9.121	9.71	**277**	2 178.57	9.562	8.01
178	1 276.74	8.593	11.93	**228**	1 720.29	9.130	9.67	**278**	2 188.14	9.570	7.98
179	1 285.34	8.605	11.88	**229**	1 729.43	9.140	9.64	**279**	2 197.71	9.578	7.95
180	1 293.95	8.617	11.83	**230**	1 738.57	9.150	9.60	**280**	2 207.30	9.585	7.92
181	1 302.58	8.628	11.78	**231**	1 747.72	9.159	9.56	**281**	2 216.88	9.593	7.89
182	1 311.21	8.640	11.73	**232**	1 756.89	9.169	9.52	**282**	2 226.48	9.601	7.86
183	1 319.86	8.652	11.68	**233**	1 766.06	9.178	9.48	**283**	2 236.09	9.609	7.84
184	1 328.51	8.663	11.63	**234**	1 775.25	9.188	9.44	**284**	2 245.70	9.617	7.81
185	1 337.18	8.675	11.58	**235**	1 784.44	9.197	9.41	**285**	2 255.32	9.625	7.78
186	1 345.86	8.687	11.53	**236**	1 793.64	9.206	9.37	**286**	2 264.95	9.632	7.75
187	1 354.56	8.698	11.48	**237**	1 802.85	9.216	9.33	**287**	2 274.59	9.640	7.72
188	1 363.26	8.710	11.43	**238**	1 812.07	9.225	9.29	**288**	2 284.23	9.648	7.70
189	1 371.97	8.721	11.38	**239**	1 821.30	9.234	9.26	**289**	2 293.88	9.656	7.67
190	1 380.70	8.732	11.33	**240**	1 830.54	9.244	9.22	**290**	2 303.54	9.663	7.64
191	1 389.44	8.744	11.28	**241**	1 839.79	9.253	9.18	**291**	2 313.21	9.671	7.62
192	1 398.19	8.755	11.24	**242**	1 849.05	9.262	9.15	**292**	2 322.88	9.678	7.59
193	1 406.95	8.766	11.19	**243**	1 858.31	9.271	9.11	**293**	2 332.57	9.686	7.56
194	1 415.72	8.777	11.14	**244**	1 867.59	9.280	9.08	**294**	2 342.26	9.694	7.54
195	1 424.50	8.788	11.09	**245**	1 876.87	9.289	9.04	**295**	2 351.95	9.701	7.51
196	1 433.30	8.799	11.05	**246**	1 886.17	9.298	9.01	**296**	2 361.66	9.709	7.48
197	1 442.10	8.810	11.00	**247**	1 895.47	9.307	8.97	**297**	2 371.37	9.716	7.46
198	1 450.92	8.821	10.95	**248**	1 904.78	9.316	8.94	**298**	2 381.09	9.724	7.43
199	1 459.75	8.832	10.91	**249**	1 914.10	9.325	8.90	**299**	2 390.82	9.731	7.41
200	1 468.58	8.843	10.86	**250**	1 923.43	9.334	8.87	**300**	2 400.55	9.738	7.38

TABLE 3.3.3. ***Type R thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	2 400.55	9.738	7.38	**350**	2 896.21	10.079	6.30	**400**	3 407.69	10.374	5.55
301	2 410.29	9.746	7.35	**351**	2 906.29	10.085	6.28	**401**	3 418.06	10.380	5.54
302	2 420.04	9.753	7.33	**352**	2 916.38	10.091	6.27	**402**	3 428.44	10.385	5.53
303	2 429.80	9.760	7.30	**353**	2 926.47	10.098	6.25	**403**	3 438.83	10.391	5.52
304	2 439.56	9.768	7.28	**354**	2 936.57	10.104	6.23	**404**	3 449.23	10.396	5.51
305	2 449.34	9.775	7.26	**355**	2 946.68	10.110	6.21	**405**	3 459.62	10.402	5.50
306	2 459.11	9.782	7.23	**356**	2 956.79	10.116	6.20	**406**	3 470.03	10.407	5.48
307	2 468.90	9.789	7.21	**357**	2 966.91	10.123	6.18	**407**	3 480.44	10.413	5.47
308	2 478.69	9.797	7.18	**358**	2 977.04	10.129	6.16	**408**	3 490.85	10.418	5.46
309	2 488.49	9.804	7.16	**359**	2 987.17	10.135	6.14	**409**	3 501.27	10.424	5.45
310	2 498.30	9.811	7.13	**360**	2 997.31	10.141	6.13	**410**	3 511.70	10.429	5.44
311	2 508.11	9.818	7.11	**361**	3 007.45	10.147	6.11	**411**	3 522.13	10.434	5.43
312	2 517.94	9.825	7.09	**362**	3 017.60	10.153	6.09	**412**	3 532.57	10.440	5.42
313	2 527.77	9.832	7.06	**363**	3 027.76	10.159	6.08	**413**	3 543.01	10.445	5.41
314	2 537.60	9.839	7.04	**364**	3 037.92	10.165	6.06	**414**	3 553.46	10.451	5.40
315	2 547.44	9.846	7.02	**365**	3 048.09	10.171	6.05	**415**	3 563.91	10.456	5.39
316	2 557.29	9.853	6.99	**366**	3 058.26	10.177	6.03	**416**	3 574.37	10.461	5.38
317	2 567.15	9.860	6.97	**367**	3 068.44	10.183	6.01	**417**	3 584.84	10.467	5.36
318	2 577.01	9.867	6.95	**368**	3 078.63	10.190	6.00	**418**	3 595.31	10.472	5.35
319	2 586.88	9.874	6.93	**369**	3 088.82	10.195	5.98	**419**	3 605.78	10.478	5.34
320	2 596.76	9.881	6.90	**370**	3 099.02	10.201	5.97	**420**	3 616.26	10.483	5.33
321	2 606.65	9.888	6.88	**371**	3 109.23	10.207	5.95	**421**	3 626.75	10.488	5.32
322	2 616.54	9.895	6.86	**372**	3 119.44	10.213	5.94	**422**	3 637.24	10.493	5.31
323	2 626.44	9.902	6.84	**373**	3 129.65	10.219	5.92	**423**	3 647.73	10.499	5.30
324	2 636.34	9.909	6.82	**374**	3 139.88	10.225	5.91	**424**	3 658.24	10.504	5.30
325	2 646.25	9.915	6.79	**375**	3 150.10	10.231	5.89	**425**	3 668.74	10.509	5.29
326	2 656.17	9.922	6.77	**376**	3 160.34	10.237	5.88	**426**	3 679.25	10.515	5.28
327	2 666.10	9.929	6.75	**377**	3 170.58	10.243	5.86	**427**	3 689.77	10.520	5.27
328	2 676.03	9.936	6.73	**378**	3 180.82	10.249	5.85	**428**	3 700.29	10.525	5.26
329	2 685.97	9.942	6.71	**379**	3 191.07	10.255	5.83	**429**	3 710.82	10.530	5.25
330	2 695.92	9.949	6.69	**380**	3 201.33	10.260	5.82	**430**	3 721.35	10.536	5.24
331	2 705.87	9.956	6.67	**381**	3 211.60	10.266	5.80	**431**	3 731.89	10.541	5.23
332	2 715.83	9.962	6.65	**382**	3 221.86	10.272	5.79	**432**	3 742.44	10.546	5.22
333	2 725.79	9.969	6.63	**383**	3 232.14	10.278	5.78	**433**	3 752.99	10.551	5.21
334	2 735.76	9.976	6.61	**384**	3 242.42	10.284	5.76	**434**	3 763.54	10.557	5.20
335	2 745.74	9.982	6.59	**385**	3 252.71	10.289	5.75	**435**	3 774.10	10.562	5.20
336	2 755.73	9.989	6.57	**386**	3 263.00	10.295	5.73	**436**	3 784.66	10.567	5.19
337	2 765.72	9.995	6.55	**387**	3 273.30	10.301	5.72	**437**	3 795.23	10.572	5.18
338	2 775.72	10.002	6.53	**388**	3 283.60	10.306	5.71	**438**	3 805.81	10.577	5.17
339	2 785.73	10.008	6.51	**389**	3 293.91	10.312	5.69	**439**	3 816.39	10.583	5.16
340	2 795.74	10.015	6.49	**390**	3 304.22	10.318	5.68	**440**	3 826.97	10.588	5.15
341	2 805.75	10.021	6.47	**391**	3 314.55	10.324	5.67	**441**	3 837.56	10.593	5.15
342	2 815.78	10.028	6.45	**392**	3 324.87	10.329	5.65	**442**	3 848.16	10.598	5.14
343	2 825.81	10.034	6.43	**393**	3 335.20	10.335	5.64	**443**	3 858.76	10.603	5.13
344	2 835.85	10.041	6.41	**394**	3 345.54	10.340	5.63	**444**	3 869.36	10.608	5.12
345	2 845.89	10.047	6.39	**395**	3 355.88	10.346	5.62	**445**	3 879.97	10.613	5.11
346	2 855.94	10.054	6.37	**396**	3 366.23	10.352	5.60	**446**	3 890.59	10.618	5.11
347	2 866.00	10.060	6.36	**397**	3 376.59	10.357	5.59	**447**	3 901.21	10.624	5.10
348	2 876.06	10.066	6.34	**398**	3 386.95	10.363	5.58	**448**	3 911.84	10.629	5.09
349	2 886.13	10.073	6.32	**399**	3 397.31	10.368	5.57	**449**	3 922.47	10.634	5.08
350	2 896.21	10.079	6.30	**400**	3 407.69	10.374	5.55	**450**	3 933.11	10.639	5.08

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
450	3 933.11	10.639	5.08	**500**	4 471.26	10.885	4.81	**550**	5 021.47	11.122	4.70
451	3 943.75	10.644	5.07	**501**	4 482.15	10.890	4.81	**551**	5 032.60	11.127	4.70
452	3 954.39	10.649	5.06	**502**	4 493.04	10.895	4.80	**552**	5 043.73	11.132	4.70
453	3 965.04	10.654	5.06	**503**	4 503.94	10.900	4.80	**553**	5 054.86	11.136	4.70
454	3 975.70	10.659	5.05	**504**	4 514.84	10.904	4.80	**554**	5 066.00	11.141	4.69
455	3 986.36	10.664	5.04	**505**	4 525.75	10.909	4.79	**555**	5 077.14	11.146	4.69
456	3 997.03	10.669	5.03	**506**	4 536.66	10.914	4.79	**556**	5 088.29	11.151	4.69
457	4 007.70	10.674	5.03	**507**	4 547.57	10.919	4.79	**557**	5 099.44	11.155	4.69
458	4 018.38	10.679	5.02	**508**	4 558.50	10.924	4.78	**558**	5 110.60	11.160	4.69
459	4 029.06	10.684	5.01	**509**	4 569.42	10.928	4.78	**559**	5 121.76	11.165	4.69
460	4 039.75	10.689	5.01	**510**	4 580.35	10.933	4.78	**560**	5 132.93	11.169	4.69
461	4 050.44	10.694	5.00	**511**	4 591.29	10.938	4.77	**561**	5 144.10	11.174	4.69
462	4 061.13	10.699	5.00	**512**	4 602.23	10.943	4.77	**562**	5 155.28	11.179	4.69
463	4 071.84	10.704	4.99	**513**	4 613.17	10.947	4.77	**563**	5 166.46	11.183	4.69
464	4 082.54	10.709	4.98	**514**	4 624.12	10.952	4.76	**564**	5 177.64	11.188	4.69
465	4 093.25	10.714	4.98	**515**	4 635.08	10.957	4.76	**565**	5 188.84	11.193	4.69
466	4 103.97	10.719	4.97	**516**	4 646.04	10.962	4.76	**566**	5 200.03	11.197	4.69
467	4 114.69	10.724	4.96	**517**	4 657.00	10.966	4.76	**567**	5 211.23	11.202	4.69
468	4 125.42	10.729	4.96	**518**	4 667.97	10.971	4.75	**568**	5 222.43	11.207	4.69
469	4 136.15	10.734	4.95	**519**	4 678.94	10.976	4.75	**569**	5 233.64	11.211	4.69
470	4 146.89	10.739	4.95	**520**	4 689.92	10.981	4.75	**570**	5 244.86	11.216	4.69
471	4 157.63	10.744	4.94	**521**	4 700.90	10.985	4.75	**571**	5 256.08	11.221	4.69
472	4 168.38	10.749	4.94	**522**	4 711.89	10.990	4.74	**572**	5 267.30	11.226	4.69
473	4 179.13	10.754	4.93	**523**	4 722.89	10.995	4.74	**573**	5 278.53	11.230	4.69
474	4 189.88	10.759	4.93	**524**	4 733.88	11.000	4.74	**574**	5 289.76	11.235	4.68
475	4 200.64	10.764	4.92	**525**	4 744.88	11.004	4.74	**575**	5 301.00	11.240	4.68
476	4 211.41	10.769	4.91	**526**	4 755.89	11.009	4.74	**576**	5 312.24	11.244	4.68
477	4 222.18	10.773	4.91	**527**	4 766.90	11.014	4.73	**577**	5 323.49	11.249	4.68
478	4 232.96	10.778	4.90	**528**	4 777.92	11.019	4.73	**578**	5 334.74	11.254	4.68
479	4 243.74	10.783	4.90	**529**	4 788.94	11.023	4.73	**579**	5 345.99	11.258	4.68
480	4 254.52	10.788	4.89	**530**	4 799.97	11.028	4.73	**580**	5 357.25	11.263	4.68
481	4 265.31	10.793	4.89	**531**	4 811.00	11.033	4.73	**581**	5 368.52	11.268	4.68
482	4 276.11	10.798	4.88	**532**	4 822.03	11.038	4.72	**582**	5 379.79	11.272	4.68
483	4 286.91	10.803	4.88	**533**	4 833.07	11.042	4.72	**583**	5 391.06	11.277	4.68
484	4 297.72	10.808	4.88	**534**	4 844.12	11.047	4.72	**584**	5 402.34	11.282	4.68
485	4 308.53	10.813	4.87	**535**	4 855.17	11.052	4.72	**585**	5 413.63	11.286	4.69
486	4 319.34	10.817	4.87	**536**	4 866.22	11.056	4.72	**586**	5 424.92	11.291	4.69
487	4 330.16	10.822	4.86	**537**	4 877.28	11.061	4.72	**587**	5 436.21	11.296	4.69
488	4 340.99	10.827	4.86	**538**	4 888.34	11.066	4.71	**588**	5 447.51	11.300	4.69
489	4 351.82	10.832	4.85	**539**	4 899.41	11.071	4.71	**589**	5 458.81	11.305	4.69
490	4 362.65	10.837	4.85	**540**	4 910.48	11.075	4.71	**590**	5 470.12	11.310	4.69
491	4 373.49	10.842	4.84	**541**	4 921.56	11.080	4.71	**591**	5 481.43	11.315	4.69
492	4 384.33	10.847	4.84	**542**	4 932.64	11.085	4.71	**592**	5 492.75	11.319	4.69
493	4 395.18	10.851	4.84	**543**	4 943.73	11.089	4.71	**593**	5 504.07	11.324	4.69
494	4 406.04	10.856	4.83	**544**	4 954.82	11.094	4.71	**594**	5 515.39	11.329	4.69
495	4 416.89	10.861	4.83	**545**	4 965.92	11.099	4.70	**595**	5 526.73	11.333	4.69
496	4 427.76	10.866	4.82	**546**	4 977.02	11.104	4.70	**596**	5 538.06	11.338	4.69
497	4 438.63	10.871	4.82	**547**	4 988.13	11.108	4.70	**597**	5 549.40	11.343	4.69
498	4 449.50	10.876	4.82	**548**	4 999.24	11.113	4.70	**598**	5 560.75	11.347	4.69
499	4 460.38	10.880	4.81	**549**	5 010.35	11.118	4.70	**599**	5 572.10	11.352	4.69
500	4 471.26	10.885	4.81	**550**	5 021.47	11.122	4.70	**600**	5 583.45	11.357	4.69

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	5 583.45	11.357	4.69	650	6 157.17	11.592	4.74	700	6 742.72	11.831	4.79
601	5 594.81	11.361	4.69	651	6 168.76	11.597	4.74	701	6 754.56	11.835	4.79
602	5 606.17	11.366	4.69	652	6 180.36	11.602	4.74	702	6 766.40	11.840	4.79
603	5 617.54	11.371	4.69	653	6 191.97	11.606	4.74	703	6 778.24	11.845	4.79
604	5 628.92	11.376	4.69	654	6 203.57	11.611	4.74	704	6 790.09	11.850	4.80
605	5 640.29	11.380	4.69	655	6 215.19	11.616	4.74	705	6 801.94	11.854	4.80
606	5 651.68	11.385	4.69	656	6 226.81	11.621	4.74	706	6 813.79	11.859	4.80
607	5 663.06	11.390	4.69	657	6 238.43	11.625	4.74	707	6 825.66	11.864	4.80
608	5 674.46	11.394	4.70	658	6 250.06	11.630	4.75	708	6 837.52	11.869	4.80
609	5 685.85	11.399	4.70	659	6 261.69	11.635	4.75	709	6 849.39	11.874	4.80
610	5 697.25	11.404	4.70	660	6 273.33	11.640	4.75	710	6 861.27	11.878	4.80
611	5 708.66	11.408	4.70	661	6 284.97	11.644	4.75	711	6 873.15	11.883	4.80
612	5 720.07	11.413	4.70	662	6 296.62	11.649	4.75	712	6 885.04	11.888	4.80
613	5 731.49	11.418	4.70	663	6 308.27	11.654	4.75	713	6 896.93	11.893	4.80
614	5 742.91	11.422	4.70	664	6 319.92	11.659	4.75	714	6 908.82	11.898	4.80
615	5 754.33	11.427	4.70	665	6 331.58	11.663	4.75	715	6 920.72	11.902	4.81
616	5 765.76	11.432	4.70	666	6 343.25	11.668	4.75	716	6 932.63	11.907	4.81
617	5 777.19	11.437	4.70	667	6 354.92	11.673	4.76	717	6 944.54	11.912	4.81
618	5 788.63	11.441	4.70	668	6 366.60	11.678	4.76	718	6 956.45	11.917	4.81
619	5 800.08	11.446	4.70	669	6 378.28	11.682	4.76	719	6 968.37	11.922	4.81
620	5 811.52	11.451	4.70	670	6 389.96	11.687	4.76	720	6 980.29	11.927	4.81
621	5 822.98	11.455	4.71	671	6 401.65	11.692	4.76	721	6 992.22	11.931	4.81
622	5 834.44	11.460	4.71	672	6 413.35	11.697	4.76	722	7 004.16	11.936	4.81
623	5 845.90	11.465	4.71	673	6 425.04	11.702	4.76	723	7 016.10	11.941	4.81
624	5 857.37	11.470	4.71	674	6 436.75	11.706	4.76	724	7 028.04	11.946	4.81
625	5 868.84	11.474	4.71	675	6 448.46	11.711	4.76	725	7 039.99	11.951	4.81
626	5 880.31	11.479	4.71	676	6 460.17	11.716	4.77	726	7 051.94	11.955	4.81
627	5 891.80	11.484	4.71	677	6 471.89	11.721	4.77	727	7 063.90	11.960	4.81
628	5 903.28	11.488	4.71	678	6 483.61	11.725	4.77	728	7 075.86	11.965	4.81
629	5 914.77	11.493	4.71	679	6 495.34	11.730	4.77	729	7 087.83	11.970	4.81
630	5 926.27	11.498	4.71	680	6 507.07	11.735	4.77	730	7 099.80	11.975	4.82
631	5 937.77	11.502	4.72	681	6 518.81	11.740	4.77	731	7 111.78	11.979	4.82
632	5 949.27	11.507	4.72	682	6 530.55	11.744	4.77	732	7 123.76	11.984	4.82
633	5 960.78	11.512	4.72	683	6 542.30	11.749	4.77	733	7 135.75	11.989	4.82
634	5 972.30	11.517	4.72	684	6 554.05	11.754	4.77	734	7 147.74	11.994	4.82
635	5 983.81	11.521	4.72	685	6 565.81	11.759	4.78	735	7 159.73	11.999	4.82
636	5 995.34	11.526	4.72	686	6 577.57	11.764	4.78	736	7 171.73	12.004	4.82
637	6 006.87	11.531	4.72	687	6 589.33	11.768	4.78	737	7 183.74	12.008	4.82
638	6 018.40	11.536	4.72	688	6 601.10	11.773	4.78	738	7 195.75	12.013	4.82
639	6 029.94	11.540	4.72	689	6 612.88	11.778	4.78	739	7 207.77	12.018	4.82
640	6 041.48	11.545	4.72	690	6 624.66	11.783	4.78	740	7 219.79	12.023	4.82
641	6 053.03	11.550	4.73	691	6 636.44	11.787	4.78	741	7 231.81	12.028	4.82
642	6 064.58	11.554	4.73	692	6 648.23	11.792	4.78	742	7 243.84	12.032	4.82
643	6 076.14	11.559	4.73	693	6 660.03	11.797	4.78	743	7 255.88	12.037	4.82
644	6 087.70	11.564	4.73	694	6 671.83	11.802	4.79	744	7 267.92	12.042	4.82
645	6 099.26	11.569	4.73	695	6 683.63	11.807	4.79	745	7 279.96	12.047	4.82
646	6 110.84	11.573	4.73	696	6 695.44	11.811	4.79	746	7 292.01	12.052	4.82
647	6 122.41	11.578	4.73	697	6 707.25	11.816	4.79	747	7 304.07	12.057	4.82
648	6 133.99	11.583	4.73	698	6 719.07	11.821	4.79	748	7 316.12	12.061	4.82
649	6 145.58	11.588	4.73	699	6 730.90	11.826	4.79	749	7 328.19	12.066	4.82
650	6 157.17	11.592	4.74	700	6 742.72	11.831	4.79	750	7 340.26	12.071	4.82

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
750	7 340.26	12.071	4.82	**800**	7 949.84	12.312	4.81	**850**	8 571.43	12.551	4.74
751	7 352.33	12.076	4.82	**801**	7 962.15	12.317	4.81	**851**	8 583.98	12.556	4.74
752	7 364.41	12.081	4.82	**802**	7 974.47	12.322	4.81	**852**	8 596.54	12.561	4.74
753	7 376.49	12.086	4.82	**803**	7 986.80	12.327	4.81	**853**	8 609.11	12.565	4.73
754	7 388.58	12.090	4.82	**804**	7 999.12	12.331	4.81	**854**	8 621.67	12.570	4.73
755	7 400.67	12.095	4.82	**805**	8 011.46	12.336	4.81	**855**	8 634.25	12.575	4.73
756	7 412.77	12.100	4.82	**806**	8 023.80	12.341	4.80	**856**	8 646.82	12.579	4.73
757	7 424.87	12.105	4.82	**807**	8 036.14	12.346	4.80	**857**	8 659.40	12.584	4.73
758	7 436.98	12.110	4.82	**808**	8 048.49	12.351	4.80	**858**	8 671.99	12.589	4.72
759	7 449.09	12.114	4.82	**809**	8 060.84	12.355	4.80	**859**	8 684.58	12.594	4.72
760	7 461.21	12.119	4.82	**810**	8 073.20	12.360	4.80	**860**	8 697.18	12.598	4.72
761	7 473.33	12.124	4.83	**811**	8 085.56	12.365	4.80	**861**	8 709.78	12.603	4.72
762	7 485.46	12.129	4.83	**812**	8 097.93	12.370	4.80	**862**	8 722.38	12.608	4.72
763	7 497.59	12.134	4.83	**813**	8 110.30	12.375	4.80	**863**	8 734.99	12.613	4.71
764	7 509.72	12.139	4.82	**814**	8 122.68	12.379	4.80	**864**	8 747.61	12.617	4.71
765	7 521.86	12.143	4.82	**815**	8 135.06	12.384	4.79	**865**	8 760.23	12.622	4.71
766	7 534.01	12.148	4.82	**816**	8 147.45	12.389	4.79	**866**	8 772.85	12.627	4.71
767	7 546.16	12.153	4.82	**817**	8 159.84	12.394	4.79	**867**	8 785.48	12.631	4.70
768	7 558.32	12.158	4.82	**818**	8 172.23	12.399	4.79	**868**	8 798.12	12.636	4.70
769	7 570.48	12.163	4.82	**819**	8 184.63	12.403	4.79	**869**	8 810.75	12.641	4.70
770	7 582.64	12.168	4.82	**820**	8 197.04	12.408	4.79	**870**	8 823.40	12.645	4.70
771	7 594.81	12.172	4.82	**821**	8 209.45	12.413	4.79	**871**	8 836.05	12.650	4.70
772	7 606.99	12.177	4.82	**822**	8 221.87	12.418	4.79	**872**	8 848.70	12.655	4.69
773	7 619.17	12.182	4.82	**823**	8 234.29	12.422	4.78	**873**	8 861.36	12.660	4.69
774	7 631.35	12.187	4.82	**824**	8 246.71	12.427	4.78	**874**	8 874.02	12.664	4.69
775	7 643.54	12.192	4.82	**825**	8 259.14	12.432	4.78	**875**	8 886.68	12.669	4.69
776	7 655.73	12.196	4.82	**826**	8 271.57	12.437	4.78	**876**	8 899.36	12.674	4.68
777	7 667.93	12.201	4.82	**827**	8 284.01	12.442	4.78	**877**	8 912.03	12.678	4.68
778	7 680.14	12.206	4.82	**828**	8 296.46	12.446	4.78	**878**	8 924.71	12.683	4.68
779	7 692.35	12.211	4.82	**829**	8 308.91	12.451	4.78	**879**	8 937.40	12.688	4.68
780	7 704.56	12.216	4.82	**830**	8 321.36	12.456	4.77	**880**	8 950.09	12.692	4.67
781	7 716.78	12.221	4.82	**831**	8 333.82	12.461	4.77	**881**	8 962.78	12.697	4.67
782	7 729.00	12.225	4.82	**832**	8 346.28	12.465	4.77	**882**	8 975.48	12.702	4.67
783	7 741.23	12.230	4.82	**833**	8 358.75	12.470	4.77	**883**	8 988.18	12.706	4.67
784	7 753.46	12.235	4.82	**834**	8 371.22	12.475	4.77	**884**	9 000.89	12.711	4.66
785	7 765.70	12.240	4.82	**835**	8 383.70	12.480	4.77	**885**	9 013.61	12.716	4.66
786	7 777.94	12.245	4.82	**836**	8 396.18	12.485	4.77	**886**	9 026.32	12.720	4.66
787	7 790.19	12.250	4.82	**837**	8 408.67	12.489	4.76	**887**	9 039.05	12.725	4.66
788	7 802.44	12.254	4.82	**838**	8 421.16	12.494	4.76	**888**	9 051.77	12.730	4.65
789	7 814.70	12.259	4.82	**839**	8 433.66	12.499	4.76	**889**	9 064.51	12.734	4.65
790	7 826.96	12.264	4.82	**840**	8 446.16	12.504	4.76	**890**	9 077.24	12.739	4.65
791	7 839.22	12.269	4.82	**841**	8 458.66	12.508	4.76	**891**	9 089.98	12.744	4.64
792	7 851.49	12.274	4.82	**842**	8 471.17	12.513	4.76	**892**	9 102.73	12.748	4.64
793	7 863.77	12.278	4.81	**843**	8 483.69	12.518	4.75	**893**	9 115.48	12.753	4.64
794	7 876.05	12.283	4.81	**844**	8 496.21	12.523	4.75	**894**	9 128.24	12.757	4.64
795	7 888.34	12.288	4.81	**845**	8 508.73	12.527	4.75	**895**	9 141.00	12.762	4.63
796	7 900.63	12.293	4.81	**846**	8 521.26	12.532	4.75	**896**	9 153.76	12.767	4.63
797	7 912.92	12.298	4.81	**847**	8 533.80	12.537	4.75	**897**	9 166.53	12.771	4.63
798	7 925.22	12.302	4.81	**848**	8 546.34	12.542	4.74	**898**	9 179.30	12.776	4.63
799	7 937.53	12.307	4.81	**849**	8 558.88	12.546	4.74	**899**	9 192.08	12.781	4.62
800	7 949.84	12.312	4.81	**850**	8 571.43	12.551	4.74	**900**	9 204.86	12.785	4.62

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	9 204.86	12.785	4.62	**950**	9 849.84	13.012	4.46	**1000**	10 505.96	13.231	4.28
901	9 217.65	12.790	4.62	**951**	9 862.85	13.017	4.46	**1001**	10 519.19	13.235	4.27
902	9 230.44	12.794	4.61	**952**	9 875.87	13.021	4.45	**1002**	10 532.43	13.239	4.27
903	9 243.24	12.799	4.61	**953**	9 888.90	13.026	4.45	**1003**	10 545.67	13.244	4.26
904	9 256.04	12.804	4.61	**954**	9 901.92	13.030	4.45	**1004**	10 558.92	13.248	4.26
905	9 268.85	12.808	4.61	**955**	9 914.96	13.035	4.44	**1005**	10 572.17	13.252	4.26
906	9 281.66	12.813	4.60	**956**	9 927.99	13.039	4.44	**1006**	10 585.42	13.256	4.25
907	9 294.47	12.818	4.60	**957**	9 941.03	13.044	4.44	**1007**	10 598.68	13.261	4.25
908	9 307.29	12.822	4.60	**958**	9 954.08	13.048	4.43	**1008**	10 611.94	13.265	4.24
909	9 320.12	12.827	4.59	**959**	9 967.13	13.052	4.43	**1009**	10 625.21	13.269	4.24
910	9 332.95	12.831	4.59	**960**	9 980.19	13.057	4.42	**1010**	10 638.48	13.273	4.24
911	9 345.78	12.836	4.59	**961**	9 993.24	13.061	4.42	**1011**	10 651.76	13.278	4.23
912	9 358.62	12.840	4.58	**962**	10 006.31	13.066	4.42	**1012**	10 665.03	13.282	4.23
913	9 371.46	12.845	4.58	**963**	10 019.38	13.070	4.41	**1013**	10 678.32	13.286	4.23
914	9 384.31	12.850	4.58	**964**	10 032.45	13.074	4.41	**1014**	10 691.61	13.290	4.22
915	9 397.16	12.854	4.58	**965**	10 045.52	13.079	4.41	**1015**	10 704.90	13.295	4.22
916	9 410.02	12.859	4.57	**966**	10 058.61	13.083	4.40	**1016**	10 718.20	13.299	4.21
917	9 422.88	12.863	4.57	**967**	10 071.69	13.088	4.40	**1017**	10 731.50	13.303	4.21
918	9 435.74	12.868	4.57	**968**	10 084.78	13.092	4.40	**1018**	10 744.80	13.307	4.21
919	9 448.62	12.873	4.56	**969**	10 097.88	13.096	4.39	**1019**	10 758.11	13.311	4.20
920	9 461.49	12.877	4.56	**970**	10 110.97	13.101	4.39	**1020**	10 771.42	13.316	4.20
921	9 474.37	12.882	4.56	**971**	10 124.08	13.105	4.38	**1021**	10 784.74	13.320	4.19
922	9 487.25	12.886	4.55	**972**	10 137.18	13.110	4.38	**1022**	10 798.06	13.324	4.19
923	9 500.14	12.891	4.55	**973**	10 150.30	13.114	4.38	**1023**	10 811.39	13.328	4.19
924	9 513.03	12.895	4.55	**974**	10 163.41	13.118	4.37	**1024**	10 824.72	13.332	4.18
925	9 525.93	12.900	4.54	**975**	10 176.53	13.123	4.37	**1025**	10 838.06	13.337	4.18
926	9 538.83	12.904	4.54	**976**	10 189.66	13.127	4.37	**1026**	10 851.39	13.341	4.17
927	9 551.74	12.909	4.54	**977**	10 202.79	13.131	4.36	**1027**	10 864.74	13.345	4.17
928	9 564.65	12.913	4.53	**978**	10 215.92	13.136	4.36	**1028**	10 878.08	13.349	4.17
929	9 577.57	12.918	4.53	**979**	10 229.06	13.140	4.36	**1029**	10 891.43	13.353	4.16
930	9 590.49	12.922	4.53	**980**	10 242.20	13.145	4.35	**1030**	10 904.79	13.357	4.16
931	9 603.41	12.927	4.52	**981**	10 255.35	13.149	4.35	**1031**	10 918.15	13.362	4.15
932	9 616.34	12.932	4.52	**982**	10 268.50	13.153	4.34	**1032**	10 931.51	13.366	4.15
933	9 629.28	12.936	4.52	**983**	10 281.65	13.158	4.34	**1033**	10 944.88	13.370	4.14
934	9 642.21	12.941	4.51	**984**	10 294.81	13.162	4.34	**1034**	10 958.25	13.374	4.14
935	9 655.16	12.945	4.51	**985**	10 307.98	13.166	4.33	**1035**	10 971.63	13.378	4.14
936	9 668.10	12.950	4.51	**986**	10 321.15	13.171	4.33	**1036**	10 985.01	13.382	4.13
937	9 681.06	12.954	4.50	**987**	10 334.32	13.175	4.33	**1037**	10 998.39	13.386	4.13
938	9 694.01	12.959	4.50	**988**	10 347.50	13.179	4.32	**1038**	11 011.78	13.390	4.12
939	9 706.97	12.963	4.50	**989**	10 360.68	13.184	4.32	**1039**	11 025.17	13.395	4.12
940	9 719.94	12.968	4.49	**990**	10 373.86	13.188	4.31	**1040**	11 038.57	13.399	4.12
941	9 732.91	12.972	4.49	**991**	10 387.05	13.192	4.31	**1041**	11 051.97	13.403	4.11
942	9 745.88	12.977	4.49	**992**	10 400.25	13.197	4.31	**1042**	11 065.38	13.407	4.11
943	9 758.86	12.981	4.48	**993**	10 413.45	13.201	4.30	**1043**	11 078.79	13.411	4.10
944	9 771.85	12.986	4.48	**994**	10 426.65	13.205	4.30	**1044**	11 092.20	13.415	4.10
945	9 784.83	12.990	4.48	**995**	10 439.86	13.209	4.30	**1045**	11 105.62	13.419	4.09
946	9 797.83	12.995	4.47	**996**	10 453.07	13.214	4.29	**1046**	11 119.04	13.423	4.09
947	9 810.82	12.999	4.47	**997**	10 466.28	13.218	4.29	**1047**	11 132.46	13.427	4.09
948	9 823.82	13.003	4.47	**998**	10 479.50	13.222	4.28	**1048**	11 145.89	13.432	4.08
949	9 836.83	13.008	4.46	**999**	10 492.73	13.227	4.28	**1049**	11 159.33	13.436	4.08
950	9 849.84	13.012	4.46	**1000**	10 505.96	13.231	4.28	**1050**	11 172.76	13.440	4.07

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	11 172.76	13.440	4.07	**1100**	11 849.64	13.630	3.48	**1150**	12 535.24	13.788	2.85
1051	11 186.20	13.444	4.07	**1101**	11 863.27	13.634	3.47	**1151**	12 549.03	13.791	2.84
1052	11 199.65	13.448	4.06	**1102**	11 876.91	13.637	3.46	**1152**	12 562.82	13.794	2.82
1053	11 213.10	13.452	4.06	**1103**	11 890.55	13.641	3.45	**1153**	12 576.62	13.797	2.81
1054	11 226.55	13.456	4.06	**1104**	11 904.19	13.644	3.43	**1154**	12 590.42	13.800	2.80
1055	11 240.01	13.460	4.05	**1105**	11 917.84	13.647	3.42	**1155**	12 604.22	13.803	2.79
1056	11 253.47	13.464	4.05	**1106**	11 931.49	13.651	3.41	**1156**	12 618.02	13.805	2.78
1057	11 266.94	13.468	4.04	**1107**	11 945.14	13.654	3.39	**1157**	12 631.83	13.808	2.76
1058	11 280.41	13.472	4.04	**1108**	11 958.79	13.658	3.38	**1158**	12 645.64	13.811	2.75
1059	11 293.88	13.476	4.03	**1109**	11 972.45	13.661	3.37	**1159**	12 659.45	13.814	2.74
1060	11 307.36	13.480	4.03	**1110**	11 986.12	13.664	3.36	**1160**	12 673.26	13.816	2.73
1061	11 320.84	13.484	4.02	**1111**	11 999.78	13.668	3.34	**1161**	12 687.08	13.819	2.71
1062	11 334.33	13.488	4.02	**1112**	12 013.45	13.671	3.33	**1162**	12 700.90	13.822	2.70
1063	11 347.82	13.492	4.02	**1113**	12 027.12	13.674	3.32	**1163**	12 714.73	13.824	2.69
1064	11 361.32	13.496	4.01	**1114**	12 040.80	13.678	3.30	**1164**	12 728.55	13.827	2.68
1065	11 374.81	13.500	3.94	**1115**	12 054.48	13.681	3.29	**1165**	12 742.38	13.830	2.66
1066	11 388.32	13.504	3.93	**1116**	12 068.16	13.684	3.28	**1166**	12 756.21	13.832	2.65
1067	11 401.82	13.508	3.92	**1117**	12 081.85	13.688	3.27	**1167**	12 770.04	13.835	2.64
1068	11 415.33	13.512	3.90	**1118**	12 095.54	13.691	3.25	**1168**	12 783.88	13.838	2.63
1069	11 428.85	13.516	3.89	**1119**	12 109.23	13.694	3.24	**1169**	12 797.72	13.840	2.61
1070	11 442.36	13.520	3.88	**1120**	12 122.93	13.697	3.23	**1170**	12 811.56	13.843	2.60
1071	11 455.89	13.524	3.86	**1121**	12 136.62	13.701	3.21	**1171**	12 825.41	13.846	2.59
1072	11 469.41	13.527	3.85	**1122**	12 150.33	13.704	3.20	**1172**	12 839.25	13.848	2.58
1073	11 482.94	13.531	3.84	**1123**	12 164.03	13.707	3.19	**1173**	12 853.10	13.851	2.57
1074	11 496.47	13.535	3.82	**1124**	12 177.74	13.710	3.18	**1174**	12 866.95	13.853	2.55
1075	11 510.01	13.539	3.81	**1125**	12 191.45	13.713	3.16	**1175**	12 880.81	13.856	2.54
1076	11 523.55	13.543	3.80	**1126**	12 205.17	13.716	3.15	**1176**	12 894.67	13.858	2.53
1077	11 537.10	13.547	3.78	**1127**	12 218.88	13.720	3.14	**1177**	12 908.52	13.861	2.52
1078	11 550.64	13.550	3.77	**1128**	12 232.61	13.723	3.13	**1178**	12 922.39	13.863	2.50
1079	11 564.20	13.554	3.76	**1129**	12 246.33	13.726	3.11	**1179**	12 936.25	13.866	2.49
1080	11 577.75	13.558	3.75	**1130**	12 260.06	13.729	3.10	**1180**	12 950.12	13.868	2.48
1081	11 591.31	13.562	3.73	**1131**	12 273.79	13.732	3.09	**1181**	12 963.99	13.871	2.47
1082	11 604.88	13.565	3.72	**1132**	12 287.52	13.735	3.08	**1182**	12 977.86	13.873	2.46
1083	11 618.44	13.569	3.71	**1133**	12 301.26	13.738	3.06	**1183**	12 991.73	13.876	2.44
1084	11 632.01	13.573	3.69	**1134**	12 315.00	13.741	3.05	**1184**	13 005.61	13.878	2.43
1085	11 645.59	13.576	3.68	**1135**	12 328.74	13.744	3.04	**1185**	13 019.49	13.881	2.42
1086	11 659.17	13.580	3.67	**1136**	12 342.49	13.747	3.02	**1186**	13 033.37	13.883	2.41
1087	11 672.75	13.584	3.65	**1137**	12 356.24	13.750	3.01	**1187**	13 047.26	13.885	2.39
1088	11 686.33	13.587	3.64	**1138**	12 369.99	13.753	3.00	**1188**	13 061.14	13.888	2.38
1089	11 699.92	13.591	3.63	**1139**	12 383.74	13.756	2.99	**1189**	13 075.03	13.890	2.37
1090	11 713.52	13.595	3.61	**1140**	12 397.50	13.759	2.97	**1190**	13 088.92	13.893	2.36
1091	11 727.11	13.598	3.60	**1141**	12 411.26	13.762	2.96	**1191**	13 102.82	13.895	2.35
1092	11 740.71	13.602	3.59	**1142**	12 425.02	13.765	2.95	**1192**	13 116.71	13.897	2.33
1093	11 754.32	13.605	3.58	**1143**	12 438.79	13.768	2.94	**1193**	13 130.61	13.900	2.32
1094	11 767.92	13.609	3.56	**1144**	12 452.56	13.771	2.92	**1194**	13 144.51	13.902	2.31
1095	11 781.54	13.613	3.55	**1145**	12 466.33	13.774	2.91	**1195**	13 158.42	13.904	2.30
1096	11 795.15	13.616	3.54	**1146**	12 480.11	13.777	2.90	**1196**	13 172.32	13.906	2.29
1097	11 808.77	13.620	3.52	**1147**	12 493.89	13.780	2.89	**1197**	13 186.23	13.909	2.27
1098	11 822.39	13.623	3.51	**1148**	12 507.67	13.783	2.87	**1198**	13 200.14	13.911	2.26
1099	11 836.01	13.627	3.50	**1149**	12 521.45	13.786	2.86	**1199**	13 214.05	13.913	2.25
1100	11 849.64	13.630	3.48	**1150**	12 535.24	13.788	2.85	**1200**	13 227.97	13.916	2.24

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1200	13 227.97	13.916	2.24	**1250**	13 926.29	14.012	1.64	**1300**	14 628.72	14.080	1.06
1201	13 241.88	13.918	2.22	**1251**	13 940.30	14.014	1.63	**1301**	14 642.80	14.081	1.05
1202	13 255.80	13.920	2.21	**1252**	13 954.31	14.016	1.62	**1302**	14 656.88	14.082	1.04
1203	13 269.72	13.922	2.20	**1253**	13 968.33	14.017	1.61	**1303**	14 670.96	14.083	1.03
1204	13 283.64	13.924	2.19	**1254**	13 982.35	14.019	1.59	**1304**	14 685.04	14.084	1.01
1205	13 297.57	13.927	2.18	**1255**	13 996.37	14.020	1.58	**1305**	14 699.13	14.085	1.00
1206	13 311.50	13.929	2.16	**1256**	14 010.39	14.022	1.57	**1306**	14 713.21	14.086	0.99
1207	13 325.43	13.931	2.15	**1257**	14 024.41	14.024	1.56	**1307**	14 727.30	14.087	0.98
1208	13 339.36	13.933	2.14	**1258**	14 038.44	14.025	1.55	**1308**	14 741.39	14.088	0.97
1209	13 353.29	13.935	2.13	**1259**	14 052.46	14.027	1.54	**1309**	14 755.48	14.089	0.96
1210	13 367.23	13.937	2.12	**1260**	14 066.49	14.028	1.52	**1310**	14 769.57	14.090	0.94
1211	13 381.17	13.939	2.10	**1261**	14 080.52	14.030	1.51	**1311**	14 783.66	14.091	0.93
1212	13 395.11	13.941	2.09	**1262**	14 094.55	14.031	1.50	**1312**	14 797.75	14.092	0.92
1213	13 409.05	13.944	2.08	**1263**	14 108.58	14.033	1.49	**1313**	14 811.84	14.093	0.91
1214	13 423.00	13.946	2.07	**1264**	14 122.62	14.034	1.48	**1314**	14 825.93	14.094	0.90
1215	13 436.94	13.948	2.06	**1265**	14 136.65	14.036	1.47	**1315**	14 840.03	14.095	0.89
1216	13 450.89	13.950	2.04	**1266**	14 150.69	14.037	1.45	**1316**	14 854.12	14.095	0.88
1217	13 464.84	13.952	2.03	**1267**	14 164.73	14.039	1.44	**1317**	14 868.22	14.096	0.86
1218	13 478.79	13.954	2.02	**1268**	14 178.76	14.040	1.43	**1318**	14 882.31	14.097	0.85
1219	13 492.75	13.956	2.01	**1269**	14 192.81	14.041	1.42	**1319**	14 896.41	14.098	0.84
1220	13 506.71	13.958	2.00	**1270**	14 206.85	14.043	1.41	**1320**	14 910.51	14.099	0.83
1221	13 520.67	13.960	1.99	**1271**	14 220.89	14.044	1.40	**1321**	14 924.61	14.100	0.82
1222	13 534.63	13.962	1.97	**1272**	14 234.94	14.046	1.38	**1322**	14 938.71	14.100	0.81
1223	13 548.59	13.964	1.96	**1273**	14 248.98	14.047	1.37	**1323**	14 952.81	14.101	0.80
1224	13 562.55	13.966	1.95	**1274**	14 263.03	14.048	1.36	**1324**	14 966.91	14.102	0.78
1225	13 576.52	13.968	1.94	**1275**	14 277.08	14.050	1.35	**1325**	14 981.01	14.103	0.77
1226	13 590.49	13.970	1.93	**1276**	14 291.13	14.051	1.34	**1326**	14 995.12	14.104	0.76
1227	13 604.46	13.972	1.91	**1277**	14 305.18	14.052	1.33	**1327**	15 009.22	14.104	0.75
1228	13 618.43	13.973	1.90	**1278**	14 319.24	14.054	1.31	**1328**	15 023.33	14.105	0.74
1229	13 632.41	13.975	1.89	**1279**	14 333.29	14.055	1.30	**1329**	15 037.43	14.106	0.73
1230	13 646.38	13.977	1.88	**1280**	14 347.35	14.056	1.29	**1330**	15 051.54	14.107	0.72
1231	13 660.36	13.979	1.87	**1281**	14 361.40	14.058	1.28	**1331**	15 065.65	14.107	0.70
1232	13 674.34	13.981	1.85	**1282**	14 375.46	14.059	1.27	**1332**	15 079.75	14.108	0.69
1233	13 688.32	13.983	1.84	**1283**	14 389.52	14.060	1.26	**1333**	15 093.86	14.109	0.68
1234	13 702.31	13.985	1.83	**1284**	14 403.58	14.061	1.24	**1334**	15 107.97	14.109	0.67
1235	13 716.29	13.986	1.82	**1285**	14 417.64	14.063	1.23	**1335**	15 122.08	14.110	0.66
1236	13 730.28	13.988	1.81	**1286**	14 431.71	14.064	1.22	**1336**	15 136.19	14.111	0.65
1237	13 744.27	13.990	1.80	**1287**	14 445.77	14.065	1.21	**1337**	15 150.30	14.111	0.64
1238	13 758.26	13.992	1.78	**1288**	14 459.84	14.066	1.20	**1338**	15 164.41	14.112	0.62
1239	13 772.25	13.994	1.77	**1289**	14 473.90	14.068	1.19	**1339**	15 178.52	14.112	0.61
1240	13 786.25	13.995	1.76	**1290**	14 487.97	14.069	1.18	**1340**	15 192.64	14.113	0.60
1241	13 800.24	13.997	1.75	**1291**	14 502.04	14.070	1.16	**1341**	15 206.75	14.114	0.59
1242	13 814.24	13.999	1.74	**1292**	14 516.11	14.071	1.15	**1342**	15 220.86	14.114	0.58
1243	13 828.24	14.001	1.72	**1293**	14 530.18	14.072	1.14	**1343**	15 234.98	14.115	0.57
1244	13 842.24	14.002	1.71	**1294**	14 544.26	14.073	1.13	**1344**	15 249.09	14.115	0.56
1245	13 856.25	14.004	1.70	**1295**	14 558.33	14.074	1.12	**1345**	15 263.21	14.116	0.54
1246	13 870.25	14.006	1.69	**1296**	14 572.41	14.076	1.11	**1346**	15 277.33	14.117	0.53
1247	13 884.26	14.007	1.68	**1297**	14 586.48	14.077	1.09	**1347**	15 291.44	14.117	0.52
1248	13 898.27	14.009	1.67	**1298**	14 600.56	14.078	1.08	**1348**	15 305.56	14.118	0.51
1249	13 912.28	14.011	1.65	**1299**	14 614.64	14.079	1.07	**1349**	15 319.68	14.118	0.50
1250	13 926.29	14.012	1.64	**1300**	14 628.72	14.080	1.06	**1350**	15 333.80	14.119	0.49

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1350	15 333.80	14.119	0.49	1400	16 040.10	14.129	−0.08	1450	16 746.19	14.110	−0.65
1351	15 347.92	14.119	0.48	1401	16 054.22	14.129	−0.09	1451	16 760.30	14.110	−0.66
1352	15 362.03	14.119	0.46	1402	16 068.35	14.128	−0.10	1452	16 774.41	14.109	−0.67
1353	15 376.15	14.120	0.45	1403	16 082.48	14.128	−0.12	1453	16 788.52	14.108	−0.69
1354	15 390.27	14.120	0.44	1404	16 096.61	14.128	−0.13	1454	16 802.62	14.108	−0.70
1355	15 404.40	14.121	0.43	1405	16 110.74	14.128	−0.14	1455	16 816.73	14.107	−0.71
1356	15 418.52	14.121	0.42	1406	16 124.87	14.128	−0.15	1456	16 830.84	14.106	−0.72
1357	15 432.64	14.122	0.41	1407	16 138.99	14.128	−0.16	1457	16 844.94	14.105	−0.73
1358	15 446.76	14.122	0.40	1408	16 153.12	14.128	−0.17	1458	16 859.05	14.105	−0.74
1359	15 460.88	14.122	0.38	1409	16 167.25	14.127	−0.18	1459	16 873.15	14.104	−0.75
1360	15 475.00	14.123	0.37	1410	16 181.38	14.127	−0.20	1460	16 887.26	14.103	−0.77
1361	15 489.13	14.123	0.36	1411	16 195.50	14.127	−0.21	1461	16 901.36	14.102	−0.78
1362	15 503.25	14.124	0.35	1412	16 209.63	14.127	−0.22	1462	16 915.46	14.102	−0.79
1363	15 517.37	14.124	0.34	1413	16 223.76	14.127	−0.23	1463	16 929.56	14.101	−0.80
1364	15 531.50	14.124	0.33	1414	16 237.88	14.126	−0.24	1464	16 943.66	14.100	−0.81
1365	15 545.62	14.125	0.32	1415	16 252.01	14.126	−0.25	1465	16 957.76	14.099	−0.82
1366	15 559.75	14.125	0.30	1416	16 266.14	14.126	−0.26	1466	16 971.86	14.098	−0.83
1367	15 573.87	14.125	0.29	1417	16 280.26	14.126	−0.28	1467	16 985.96	14.098	−0.85
1368	15 588.00	14.125	0.28	1418	16 294.39	14.125	−0.29	1468	17 000.06	14.097	−0.86
1369	15 602.12	14.126	0.27	1419	16 308.51	14.125	−0.30	1469	17 014.15	14.096	−0.87
1370	15 616.25	14.126	0.26	1420	16 322.64	14.125	−0.31	1470	17 028.25	14.095	−0.88
1371	15 630.38	14.126	0.25	1421	16 336.76	14.124	−0.32	1471	17 042.34	14.094	−0.89
1372	15 644.50	14.126	0.24	1422	16 350.89	14.124	−0.33	1472	17 056.44	14.093	−0.90
1373	15 658.63	14.127	0.22	1423	16 365.01	14.124	−0.34	1473	17 070.53	14.092	−0.91
1374	15 672.76	14.127	0.21	1424	16 379.13	14.123	−0.35	1474	17 084.62	14.091	−0.93
1375	15 686.88	14.127	0.20	1425	16 393.26	14.123	−0.37	1475	17 098.71	14.090	−0.94
1376	15 701.01	14.127	0.19	1426	16 407.38	14.123	−0.38	1476	17 112.80	14.090	−0.95
1377	15 715.14	14.128	0.18	1427	16 421.50	14.122	−0.39	1477	17 126.89	14.089	−0.96
1378	15 729.27	14.128	0.17	1428	16 435.62	14.122	−0.40	1478	17 140.98	14.088	−0.97
1379	15 743.39	14.128	0.16	1429	16 449.75	14.121	−0.41	1479	17 155.07	14.087	−0.98
1380	15 757.52	14.128	0.15	1430	16 463.87	14.121	−0.42	1480	17 169.15	14.086	−0.99
1381	15 771.65	14.128	0.13	1431	16 477.99	14.121	−0.43	1481	17 183.24	14.085	−1.01
1382	15 785.78	14.128	0.12	1432	16 492.11	14.120	−0.45	1482	17 197.32	14.084	−1.02
1383	15 799.91	14.128	0.11	1433	16 506.23	14.120	−0.46	1483	17 211.41	14.083	−1.03
1384	15 814.03	14.129	0.10	1434	16 520.35	14.119	−0.47	1484	17 225.49	14.082	−1.04
1385	15 828.16	14.129	0.09	1435	16 534.47	14.119	−0.48	1485	17 239.57	14.081	−1.05
1386	15 842.29	14.129	0.08	1436	16 548.58	14.118	−0.49	1486	17 253.65	14.079	−1.06
1387	15 856.42	14.129	0.07	1437	16 562.70	14.118	−0.50	1487	17 267.73	14.078	−1.07
1388	15 870.55	14.129	0.05	1438	16 576.82	14.117	−0.51	1488	17 281.81	14.077	−1.09
1389	15 884.68	14.129	0.04	1439	16 590.94	14.117	−0.53	1489	17 295.88	14.076	−1.10
1390	15 898.81	14.129	0.03	1440	16 605.05	14.116	−0.54	1490	17 309.96	14.075	−1.11
1391	15 912.94	14.129	0.02	1441	16 619.17	14.116	−0.55	1491	17 324.03	14.074	−1.12
1392	15 927.06	14.129	0.01	1442	16 633.29	14.115	−0.56	1492	17 338.11	14.073	−1.13
1393	15 941.19	14.129	−0.00	1443	16 647.40	14.115	−0.57	1493	17 352.18	14.072	−1.14
1394	15 955.32	14.129	−0.01	1444	16 661.51	14.114	−0.58	1494	17 366.25	14.071	−1.16
1395	15 969.45	14.129	−0.03	1445	16 675.63	14.113	−0.59	1495	17 380.32	14.069	−1.17
1396	15 983.58	14.129	−0.04	1446	16 689.74	14.113	−0.61	1496	17 394.39	14.068	−1.18
1397	15 997.71	14.129	−0.05	1447	16 703.85	14.112	−0.62	1497	17 408.46	14.067	−1.19
1398	16 011.84	14.129	−0.06	1448	16 717.97	14.112	−0.63	1498	17 422.52	14.066	−1.20
1399	16 025.97	14.129	−0.07	1449	16 732.08	14.111	−0.64	1499	17 436.59	14.065	−1.21
1400	16 040.10	14.129	−0.08	1450	16 746.19	14.110	−0.65	1500	17 450.65	14.063	−1.22

TABLE 3.3.3. ***Type R thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1500	17 450.65	14.063	−1.22	1550	18 152.06	13.988	−1.81	1600	18 848.94	13.883	−2.40
1501	17 464.72	14.062	−1.24	1551	18 166.04	13.986	−1.82	1601	18 862.82	13.880	−2.41
1502	17 478.78	14.061	−1.25	1552	18 180.03	13.984	−1.83	1602	18 876.70	13.878	−2.43
1503	17 492.84	14.060	−1.26	1553	18 194.01	13.982	−1.84	1603	18 890.58	13.875	−2.44
1504	17 506.90	14.058	−1.27	1554	18 207.99	13.980	−1.85	1604	18 904.45	13.873	−2.45
1505	17 520.95	14.057	−1.28	1555	18 221.97	13.979	−1.87	1605	18 918.32	13.870	−2.46
1506	17 535.01	14.056	−1.29	1556	18 235.95	13.977	−1.88	1606	18 932.19	13.868	−2.47
1507	17 549.07	14.055	−1.31	1557	18 249.93	13.975	−1.89	1607	18 946.06	13.866	−2.49
1508	17 563.12	14.053	−1.32	1558	18 263.90	13.973	−1.90	1608	18 959.92	13.863	−2.50
1509	17 577.17	14.052	−1.33	1559	18 277.87	13.971	−1.91	1609	18 973.78	13.861	−2.51
1510	17 591.22	14.051	−1.34	1560	18 291.84	13.969	−1.92	1610	18 987.64	13.858	−2.52
1511	17 605.27	14.049	−1.35	1561	18 305.81	13.967	−1.94	1611	19 001.50	13.855	−2.53
1512	17 619.32	14.048	−1.36	1562	18 319.78	13.965	−1.95	1612	19 015.36	13.853	−2.55
1513	17 633.37	14.047	−1.37	1563	18 333.74	13.963	−1.96	1613	19 029.21	13.850	−2.56
1514	17 647.42	14.045	−1.39	1564	18 347.70	13.961	−1.97	1614	19 043.06	13.848	−2.57
1515	17 661.46	14.044	−1.40	1565	18 361.66	13.959	−1.98	1615	19 056.90	13.845	−2.58
1516	17 675.50	14.042	−1.41	1566	18 375.62	13.957	−2.00	1616	19 070.75	13.843	−2.60
1517	17 689.55	14.041	−1.42	1567	18 389.58	13.955	−2.01	1617	19 084.59	13.840	−2.61
1518	17 703.59	14.040	−1.43	1568	18 403.53	13.953	−2.02	1618	19 098.43	13.837	−2.62
1519	17 717.63	14.038	−1.44	1569	18 417.48	13.951	−2.03	1619	19 112.26	13.835	−2.63
1520	17 731.66	14.037	−1.46	1570	18 431.43	13.949	−2.04	1620	19 126.10	13.832	−2.64
1521	17 745.70	14.035	−1.47	1571	18 445.38	13.947	−2.05	1621	19 139.93	13.830	−2.66
1522	17 759.73	14.034	−1.48	1572	18 459.33	13.945	−2.07	1622	19 153.76	13.827	−2.67
1523	17 773.77	14.032	−1.49	1573	18 473.27	13.943	−2.08	1623	19 167.58	13.824	−2.68
1524	17 787.80	14.031	−1.50	1574	18 487.21	13.941	−2.09	1624	19 181.40	13.822	−2.69
1525	17 801.83	14.029	−1.51	1575	18 501.15	13.939	−2.10	1625	19 195.22	13.819	−2.71
1526	17 815.86	14.028	−1.53	1576	18 515.09	13.937	−2.11	1626	19 209.04	13.816	−2.72
1527	17 829.88	14.026	−1.54	1577	18 529.03	13.935	−2.13	1627	19 222.86	13.813	−2.73
1528	17 843.91	14.025	−1.55	1578	18 542.96	13.933	−2.14	1628	19 236.67	13.811	−2.74
1529	17 857.93	14.023	−1.56	1579	18 556.89	13.930	−2.15	1629	19 250.48	13.808	−2.75
1530	17 871.95	14.022	−1.57	1580	18 570.82	13.928	−2.16	1630	19 264.28	13.805	−2.77
1531	17 885.98	14.020	−1.58	1581	18 584.75	13.926	−2.17	1631	19 278.09	13.802	−2.78
1532	17 899.99	14.018	−1.60	1582	18 598.67	13.924	−2.19	1632	19 291.89	13.800	−2.79
1533	17 914.01	14.017	−1.61	1583	18 612.60	13.922	−2.20	1633	19 305.69	13.797	−2.80
1534	17 928.03	14.015	−1.62	1584	18 626.52	13.920	−2.21	1634	19 319.48	13.794	−2.82
1535	17 942.04	14.014	−1.63	1585	18 640.44	13.917	−2.22	1635	19 333.27	13.791	−2.83
1536	17 956.06	14.012	−1.64	1586	18 654.35	13.915	−2.23	1636	19 347.06	13.788	−2.84
1537	17 970.07	14.010	−1.65	1587	18 668.27	13.913	−2.25	1637	19 360.85	13.785	−2.85
1538	17 984.08	14.009	−1.67	1588	18 682.18	13.911	−2.26	1638	19 374.64	13.783	−2.87
1539	17 998.08	14.007	−1.68	1589	18 696.09	13.908	−2.27	1639	19 388.42	13.780	−2.88
1540	18 012.09	14.005	−1.69	1590	18 710.00	13.906	−2.28	1640	19 402.19	13.777	−2.89
1541	18 026.09	14.004	−1.70	1591	18 723.90	13.904	−2.29	1641	19 415.97	13.774	−2.90
1542	18 040.10	14.002	−1.71	1592	18 737.80	13.901	−2.31	1642	19 429.74	13.771	−2.92
1543	18 054.10	14.000	−1.72	1593	18 751.70	13.899	−2.32	1643	19 443.51	13.768	−2.93
1544	18 068.10	13.998	−1.74	1594	18 765.60	13.897	−2.33	1644	19 457.28	13.765	−2.94
1545	18 082.09	13.997	−1.75	1595	18 779.50	13.894	−2.34	1645	19 471.04	13.762	−2.95
1546	18 096.09	13.995	−1.76	1596	18 793.39	13.892	−2.35	1646	19 484.80	13.759	−2.96
1547	18 110.08	13.993	−1.77	1597	18 807.28	13.890	−2.37	1647	19 498.56	13.756	−2.98
1548	18 124.08	13.991	−1.78	1598	18 821.17	13.887	−2.38	1648	19 512.32	13.753	−2.99
1549	18 138.07	13.990	−1.79	1599	18 835.06	13.885	−2.39	1649	19 526.07	13.750	−3.00
1550	18 152.06	13.988	−1.81	1600	18 848.94	13.883	−2.40	1650	19 539.82	13.747	−3.01

TABLE 3.3.3. *Type R thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1650	19 539.82	13.747	−3.01	**1690**	20 086.62	13.553	−8.50	**1730**	20 619.74	13.047	−16.81
1651	19 553.56	13.744	−3.03	**1691**	20 100.17	13.545	−8.71	**1731**	20 632.77	13.030	−17.02
1652	19 567.30	13.741	−3.04	**1692**	20 113.71	13.536	−8.91	**1732**	20 645.80	13.013	−17.23
1653	19 581.04	13.738	−3.05	**1693**	20 127.24	13.527	−9.12	**1733**	20 658.80	12.996	−17.44
1654	19 594.78	13.735	−3.06	**1694**	20 140.77	13.518	−9.33	**1734**	20 671.79	12.978	−17.65
1655	19 608.51	13.732	−3.08	**1695**	20 154.28	13.508	−9.54	**1735**	20 684.76	12.960	−17.85
1656	19 622.25	13.729	−3.09	**1696**	20 167.78	13.498	−9.75	**1736**	20 697.71	12.942	−18.06
1657	19 635.97	13.726	−3.10	**1697**	20 181.28	13.489	−9.95	**1737**	20 710.64	12.924	−18.27
1658	19 649.70	13.723	−3.11	**1698**	20 194.76	13.479	−10.16	**1738**	20 723.55	12.906	−18.48
1659	19 663.42	13.720	−3.13	**1699**	20 208.23	13.468	−10.37	**1739**	20 736.45	12.887	−18.69
1660	19 677.14	13.717	−3.14	**1700**	20 221.70	13.458	−10.58	**1740**	20 749.33	12.868	−18.89
1661	19 690.85	13.713	−3.15	**1701**	20 235.15	13.447	−10.79	**1741**	20 762.19	12.849	−19.10
1662	19 704.56	13.710	−3.16	**1702**	20 248.59	13.436	−10.99	**1742**	20 775.03	12.830	−19.31
1663	19 718.27	13.707	−3.18	**1703**	20 262.02	13.425	−11.20	**1743**	20 787.85	12.811	−19.52
1664	19 731.98	13.704	−3.19	**1704**	20 275.44	13.414	−11.41	**1744**	20 800.65	12.791	−19.73
1665	19 745.68	13.701	−3.30	**1705**	20 288.85	13.402	−11.62	**1745**	20 813.43	12.771	−19.93
1666	19 759.38	13.697	−3.51	**1706**	20 302.25	13.391	−11.82	**1746**	20 826.19	12.751	−20.14
1667	19 773.07	13.694	−3.72	**1707**	20 315.63	13.379	−12.03	**1747**	20 838.93	12.731	−20.35
1668	19 786.77	13.690	−3.92	**1708**	20 329.00	13.367	−12.24	**1748**	20 851.65	12.711	−20.56
1669	19 800.45	13.686	−4.13	**1709**	20 342.36	13.354	−12.45	**1749**	20 864.35	12.690	−20.77
1670	19 814.14	13.682	−4.34	**1710**	20 355.71	13.342	−12.66	**1750**	20 877.03	12.669	−20.97
1671	19 827.82	13.677	−4.55	**1711**	20 369.05	13.329	−12.86	**1751**	20 889.69	12.648	−21.18
1672	19 841.49	13.672	−4.76	**1712**	20 382.37	13.316	−13.07	**1752**	20 902.33	12.627	−21.39
1673	19 855.16	13.668	−4.96	**1713**	20 395.68	13.303	−13.28	**1753**	20 914.95	12.605	−21.60
1674	19 868.83	13.663	−5.17	**1714**	20 408.97	13.289	−13.49	**1754**	20 927.54	12.583	−21.81
1675	19 882.49	13.657	−5.38	**1715**	20 422.26	13.276	−13.70	**1755**	20 940.11	12.562	−22.01
1676	19 896.14	13.652	−5.59	**1716**	20 435.53	13.262	−13.90	**1756**	20 952.66	12.539	−22.22
1677	19 909.79	13.646	−5.80	**1717**	20 448.78	13.248	−14.11	**1757**	20 965.19	12.517	−22.43
1678	19 923.43	13.640	−6.00	**1718**	20 462.02	13.234	−14.32	**1758**	20 977.70	12.495	−22.64
1679	19 937.07	13.634	−6.21	**1719**	20 475.25	13.219	−14.53	**1759**	20 990.18	12.472	−22.84
1680	19 950.70	13.628	−6.42	**1720**	20 488.46	13.205	−14.74	**1760**	21 002.64	12.449	−23.05
1681	19 964.33	13.621	−6.63	**1721**	20 501.66	13.190	−14.94	**1761**	21 015.08	12.426	−23.26
1682	19 977.94	13.615	−6.83	**1722**	20 514.84	13.175	−15.15	**1762**	21 027.49	12.402	−23.47
1683	19 991.56	13.608	−7.04	**1723**	20 528.01	13.160	−15.36	**1763**	21 039.88	12.379	−23.68
1684	20 005.16	13.600	−7.25	**1724**	20 541.16	13.144	−15.57	**1764**	21 052.25	12.355	−23.88
1685	20 018.76	13.593	−7.46	**1725**	20 554.29	13.128	−15.78	**1765**	21 064.59	12.331	−24.09
1686	20 032.35	13.586	−7.67	**1726**	20 567.42	13.113	−15.98	**1766**	21 076.91	12.307	−24.30
1687	20 045.93	13.578	−7.87	**1727**	20 580.52	13.096	−16.19	**1767**	21 089.21	12.282	−24.51
1688	20 059.50	13.570	−8.08	**1728**	20 593.61	13.080	−16.40	**1768**	21 101.48	12.258	−24.72
1689	20 073.07	13.562	−8.29	**1729**	20 606.68	13.064	−16.61				
1690	20 086.62	13.553	−8.50	**1730**	20 619.74	13.047	−16.81				

3.4. References

[1] ASTM, American Society for Testing and Materials, Standard E1159-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 388-389.

[2] Bedford, R. E.; Ma, C. K.; Barber, C. R.; Chandler, T. R.; Quinn, T. J.; Burns, G. W.; Scroger, M. New reference tables for platinum 10% rhodium/platinum and platinum 13% rhodium/platinum thermocouples. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4, Part 3, p. 1585; Plumb, H. H.., ed.; Pittsburgh: Instrument Society of America; 1972.

[3] Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; Chattle, M. New reference functions for platinum-13% rhodium versus platinum (type R) and platinum-30% rhodium versus platinum-6% rhodium (type B) thermocouples based on the ITS-90. in *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 559-564.

[4] Fairchild, C. O.; Schmitt, H. M. Life tests of platinum:platinum-rhodium thermocouples. *Chem. Metall. Eng.* **26**(4), 158-160; 1922.

[5] Foote, P. D.; Fairchild, C. O.; Harrison, T. R. Pyrometric practice. *Tech. Papers Natl. Bur. Stand. (U.S.)*, T170; 1921 February. p. 306, Table IV.

[6] Roeser, W. F.; Wensel, H. T. Reference tables for platinum to platinum–rhodium thermocouples. *J. Res. Natl. Bur. Stand. (U.S.)* **10**, 275-279; RP530; 1933.

[7] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 508*; 1951 May. 73 p.

[8] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J.; Lonberger, S. T. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 561*; 1955 April. 87 p.

[9] Barber, C. R. The E.M.F.–temperature calibration of platinum, 10% rhodium-platinum and platinum, 13% rhodium-platinum thermocouples over the temperature range 0°-1,760 °C., *Proc. Phys. Soc.* **63B**, 492-503; 1950.

[10] British Standards Institution, Reference tables for thermocouples, (platinum/rhodium v. platinum). *British Standard B.S. 1826:1952*; London: British Standards House; 1952. 42 p.

[11] Bedford, R. E. New reference tables for platinum 10% rhodium/platinum and platinum 13% rhodium/platinum thermocouples, an interim report. *Advances in Instrumentation*; Vol. 24, Part III, Paper No. 69-628; Pittsburgh:Instrument Society of America; 1969.

[12] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[13] International Electrotechnical Commission Standard, Thermocouples, Part 1: Reference tables. *IEC Publication 584-1*; Geneva, Switzerland: Bureau Central de la Commission Electrotechnique Internationale; 1977.

[14] Glawe, G. E.; Szaniszlo, A. J. Long-term drift of some noble- and refractory-metal thermocouples at 1600 K in air, argon, and vacuum. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4; Plumb, H. H.., ed.; Pittsburgh: Instrument Society of America; 1972. 1645-1662.

[15] Walker, B. E.; Ewing, C. T.; Miller, R.R. Thermoelectric instability of some noble metal thermocouples at high temperatures. *Rev. Sci. Instrum.* **33**, 1029-1040; 1962.

[16] Walker, B. E.; Ewing, C. T.; Miller, R.R. Study of the instability of noble metal thermocouples in vacuum. *Rev. Sci. Instrum.* **36**, 601-606; 1965.

[17] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[18] Strouse, G. F.; Mangum, B. W.; Pokhodun, A. I.; Moiseeva, N. P. Investigation of high-temperature platinum resistance thermometers at temperatures up to 962 °C, and, in some cases, 1064 °C. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 389-394.

[19] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[20] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

[21] Bedford, R. E.; Bonnier, G.; Maas, H.; Pavese, F. Recommended values of temperature for a selected set of secondary reference points. *Metrologia* **20**, 145-155; 1984.

4. TYPE S—Platinum-10% Rhodium Alloy Versus Platinum Thermocouples

4.1. Material Specifications and Precautions

This type is often referred to by the nominal chemical composition of its positive (SP) thermoelement: platinum-10% rhodium. The negative (SN) thermoelement is commercially-available platinum that has a nominal purity of 99.99% [1]. An industrial consensus standard (ASTM E1159-87) specifies that rhodium having a nominal purity of 99.98% shall be alloyed with platinum of 99.99% purity to produce the positive thermoelement, which typically contains 10.00 ± 0.05% rhodium by weight. The consensus standard [1] describes the purity of commercial type S materials that are used in many industrial thermometry applications and that meet the calibration tolerances described later in this section. It **does not** cover, however, the higher-purity, reference-grade materials that traditionally were used to construct thermocouples used as standard instruments of the IPTS-68, as transfer standards and reference thermometers in various laboratory applications, and to develop reference functions and tables [2,3]. The higher purity alloy material typically contains less than 500 atomic ppm of impurities and the platinum less than 100 atomic ppm of impurities [2]. Differences between such high purity commercial material and the platinum thermoelectric reference standard, Pt-67, are described in [2] and [3]. The effect of differences in rhodium content of the positive thermoelement is described later in this section.

The type S thermocouple was developed and tested by Le Chatelier [4] more than a century ago. Because of his pioneer work, this type of thermocouple has been referred to often as the Le Chatelier couple. His early research demonstrated that the main advantages of the thermocouple were its reproducibility, stability, and usefulness to moderately high temperatures in air. It was primarily for these reasons that the type S thermocouple was selected and served as a standard instrument of the International Temperature Scale from its inception in 1927 (ITS-27, see Ref. 5) until 1 January 1990 when the ITS-90 became the official scale.

The first reference table used in this country for type S thermocouples was published in 1910 by Sosman [6]. It was derived from measurements made by Day and Sosman [7] and by Sosman [6] with a gas thermometer and thermocouples. Several years later, Adams [8] revised Sosman's reference table to account for certain changes in the temperature scale below 650 °C. Adams's table, which was published in an NBS technical paper [9], was the most widely used type S table until a new reference function and table based on the ITS-27 were determined at NBS and published in 1933 by Roeser and Wensel [10]. They based their function and table on the calibrations of 20 thermocouples obtained from four manufacturers, and they derived the function and table in such a way that the value of the thermoelectric voltage at the freezing point of gold was the same as that given by Adams's table [8]. The tabular values of Roeser and Wensel [10], which covered the range t_{27} = 0 °C to 1773 °C (the recommended value, at that time, of the platinum freezing-point temperature on the ITS-27), were corrected in 1951 by Shenker and others at NBS to account for changes in the international temperature scale (from the ITS-27 to the ITS-48) and in the electrical units (from international to absolute). The revised tables were presented in NBS Circular 508 [11] and again, several years later, in NBS Circular 561 [12].

During the early 1960s, the reference tables from NBS Circular 561 were used to prepare the first ASTM (E230-63) and ISA (C96.1) standards giving tables for the letter-designated thermocouple types. At the time, a different reference table for type S thermocouples, based on research conducted at the National Physical Laboratory (NPL) by Barber [13] and published in 1952 by the British Standards Institution (BSI) as B.S. 1826:1952 [14], was used in the United Kingdom and promulgated widely in Europe. There were appreciable differences (equivalent to about 2 °C at 1000 °C and about 5 °C at 1600 °C) between the American and British reference tables because of small differences in rhodium content and different realizations of the temperature scales. Additionally, there were various deficiencies in both tables, as described by Bedford [15], that led to inaccuracy in values interpolated and extrapolated from calibration data.

An international cooperative program was initiated in 1968 to rectify the unsatisfactory agreement between the British and American standards and to establish a more accurate reference table. The program involved cooperation of the NBS, the NPL, the National Research Council (NRC, Canada), and six manufacturers in the United Kingdom and the United States. Each of four American and two British manufacturers provided 12 m of each thermoelement. The alloy thermoelements were manufactured to contain as closely as possible 10% rhodium, even though it was recognized that this would result in slightly higher emf values for given temperatures than those given by the existing American and British reference tables. Thermocouples were calibrated at NBS and NRC from −50 °C to the gold freezing-point temperature; eight selected thermocouples were then calibrated at

NPL from the gold freezing-point to the platinum freezing-point temperatures against a photoelectric optical pyrometer using blackbody comparators. The results of this program were published in 1972 by Bedford *et al.* [2]. Their reference function and table, which were based on the IPTS-68 and which covered the range $t_{68} = -50$ °C to 1767.6 °C (their measured value of the platinum freezing-point temperature on the IPTS-68), were published in NBS Monograph 125 [16]. In addition, their reference table was included in revised ASTM (E230-72), ISA (ANSI-MC96.1-1975) and BSI (BS 4937:Part 1:1973) standards, as well as in an International Electrotechnical Commission (IEC) standard (584-1) published in 1977 [17].

A reference function for the type S thermocouple, based on the ITS-90 and the SI volt, was determined recently from new data obtained in an international collaborative effort involving eight national laboratories. The results of this international collaboration were reported by Burns *et al.* [3]. The new function was used to compute the reference table given in section 4.3 of this monograph. The measurement methods, as well as the construction of the reference function and the differences between it and the IPTS-68 based reference function, are discussed in the next section.

The above mentioned research [2] demonstrated that type S thermocouples can be used from −50 °C to the platinum melting-point temperature. They may be used intermittently at temperatures up to the platinum melting point and continuously up to about 1300 °C with only small changes in their calibrations. The ultimate useful life of the thermocouple when used at such elevated temperatures is governed primarily by physical problems of impurity diffusion and grain growth which lead to mechanical failure. The thermocouple is most reliable when used in a clean oxidizing atmosphere (air) but may be used also in inert gaseous atmospheres or in a vacuum for short periods of time. However, type B thermocouples, as noted in section 2.1, are generally more suitable for such applications above 1200 °C. Type S thermocouples should not be used in reducing atmospheres, nor in those containing metallic vapor (such as lead or zinc), nonmetallic vapors (such as arsenic, phosphorus, or sulfur) or easily reduced oxides, unless they are suitably protected with nonmetallic protecting tubes. Also, they should never be inserted directly into a metallic protection tube for use at high temperatures. The stability of type S thermocouples at high temperatures (>1200 °C) depends primarily upon the quality of the materials used for protection and insulation, and has been studied by Walker *et al.* [18,19] and by Bentley [20]. High purity alumina, with low iron content, appears to be the most suitable material for insulating, protecting, and mechanically supporting the thermocouple wires.

Both thermoelements of type S thermocouples are sensitive to impurity contamination. In fact, type R thermocouples described in the previous section were developed essentially because of iron contamination effects in some British platinum-10% rhodium wires. The effects of various impurities on the thermoelectric voltages of platinum based thermocouple materials have been described by Rhys and Taimsalu [21], by Cochrane [22] and by Aliotta [23]. Impurity contamination usually causes negative changes [18-20] in the thermoelectric voltage of the thermocouple with time, the extent of which will depend on the type and amount of chemical contaminant. Such changes were shown to be due mainly to the platinum thermoelement [18-20]. Volatilization of rhodium from the positive thermoelement or the vapor transport of rhodium from the positive thermoelement to the pure platinum negative thermoelement also will cause negative drifts in the thermoelectric voltage. Bentley [20] demonstrated that the vapor transport of rhodium can be virtually eliminated at 1700 °C by using a single length of twin-bore tubing to insulate the thermoelements and that contamination of the thermocouple by impurities transferred from the alumina insulator can be reduced by heat treating the insulator prior to its use.

McLaren and Murdock [24-27] and Bentley and Jones [28] thoroughly studied the performance of type S thermocouples in the range 0 °C to 1100 °C. They described how thermally reversible effects, such as quenched-in point defects, mechanical stresses, and preferential oxidation of rhodium in the type SP thermoelement, cause chemical and physical inhomogeneities in the thermocouple and thereby limit its accuracy in this range. They emphasized the importance of annealing techniques.

The positive thermoelement is unstable in a thermal neutron flux because the rhodium converts to palladium. The negative thermoelement is relatively stable to neutron transmutation. Fast neutron bombardment, however, will cause physical damage, which will change the thermoelectric voltage unless it is annealed out.

At the gold freezing-point temperature, 1064.18 °C, the thermoelectric voltage of type S thermocouples increases by about 340 μV (about 3%) per weight percent increase in rhodium content; the Seebeck coefficient increases by about 4% per weight percent increase at the same temperature.

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [29] specifies that the initial calibration tolerances for type S commercial thermocouples be ± 1.5 °C or ± 0.25% (whichever is greater) between 0 °C and 1450 °C. Type S

thermocouples can be supplied to meet special tolerances of ± 0.6 °C or ± 0.1% (whichever is greater).

The suggested upper temperature limit, 1480 °C, given in the ASTM standard [29] for protected type S thermocouples applies to AWG 24 (0.51 mm) wire. This temperature limit applies to thermocouples used in conventional closed-end protecting tubes and it is intended only as a rough guide to the user. It does not apply to thermocouples having compacted mineral oxide insulation.

4.2. Construction of Reference Function

The reference function for type S thermocouples, based on the ITS-90 and the SI volt, is taken directly from the research published by Burns *et al.* [3]. The *emf*-t_{90} relationships of type S thermocouples were measured at eight national laboratories (NIST, IMGC, KRISS, NPL, NRLM, VNIIM, VSL, and SIPAI; see Ref. 30) using different thermocouples, different experimental procedures, and, of course, different apparatuses. Altogether, such measurements were obtained for 37 thermocouples acquired from several sources. At all of the laboratories, measurements of the *emf* of the thermocouples were made as a function of t_{90} over the range 630 °C to 962 °C, with t_{90} being determined with high temperature standard platinum resistance thermometers (HTSPRTs) calibrated according to the ITS-90. At NIST, measurements were extended up to 1070 °C, using an approximate interpolation method for HTSPRTs [31]. Similar measurements with standard platinum resistance thermometers (SPRTs) were conducted also at NIST and SIPAI within the range −50 °C to 550 °C. In addition, thermocouples were calibrated at various thermometric fixed points as realized either in metal freezing-point cells or by the melting-wire method.

The new reference function giving the *emf* as a function of t_{90} over the range from −50 °C to 1064.18 °C is based upon the experimental data for NIST thermocouple S5. The rationale for this choice and the analysis of the data are given by Guthrie *et al.* [32]. An 8th degree polynomial was fitted to the *emf*-t_{90} data for thermocouple S5 by the method of least squares. The residual standard deviation was 0.063 μV with 436 degrees of freedom. The 8th degree polynomial was used because lower degree polynomials did not adequately remove cyclic structure from the residuals. The 8th degree fit proved successful in removing cyclic structure from data obtained in different pieces of equipment, although retaining some structure in data obtained within a given apparatus. Polynomials of higher degree were not warranted because the structure in the residuals suggested that small changes occurred in the thermocouple with increasing temperature. Those changes are not reflected in the reference function.

The 8th degree polynomial was then modified [32] by making an adjustment of its quadratic coefficient to obtain the reference function. The magnitude of the adjustment at 1064.18 °C was 1.52 μV. As a consequence of this adjustment, the reference function gives the same value of *emf* at the freezing point of gold as the IPTS-68 based reference function [16], after the latter function was corrected to be consistent with the SI volt [33].

Above 1064.18 °C, the new reference function is based upon a mathematical conversion of the IPTS-68 based reference function [16]. The previous function consisted of two cubics which joined at t_{68}=1665 °C. The use of two functions was necessary to accommodate the rapid decrease of the Seebeck coefficient above 1700 °C. Direct substitution of $t_{68} = t_{90} - \Delta t$ in the cubics, where Δt is given by Eq. (42) in Ref. 34, produced two 6th degree polynomials that give the *emf* as a function of t_{90}. The coefficients of both polynomials were multiplied by 0.999990736 to correct the values of *emf* to the SI volt [33]. These polynomials were then modified by Burns *et al.* [3] to obtain the reference function according to the following discussion.

The 6th degree polynomial for the range 1064.18 °C to 1664.5 °C was truncated to a 4th degree polynomial. The coefficients of this 4th degree polynomial were then adjusted to obtain a polynomial that produces the same values of *emf* (E) and dE/dt_{90} at 1064.18 °C as the reference function for the −50 °C to 1064.18 °C range and the same values of E and dE/dt_{90} at 1664.5 °C as the 6th degree polynomial before it was truncated. The resulting bias in the adjusted 4th degree polynomial relative to the 6th degree polynomial was ≤0.047 μV. The 4th degree polynomial is the reference function in this range.

Burns *et al.* pointed out that the IPTS-68 based reference function in the range above 1664.5 °C was based on t_{68} = 1767.6 °C [2] for the freezing point of Pt. More recent determinations of the Pt freezing-point temperature, however, have resulted in a recommended value [35] of t_{68} = 1768.7 °C for that point. The corresponding value of t_{90}, according to Eq. (42) in Ref. 34, is 1768.117 °C. Hence, in order for the new and old reference functions to give the same values of E at the freezing point of Pt, a corrective function was added in this range. First, the 6th degree polynomial for this range was truncated to a 4th degree polynomial, thereby incurring a bias of ≤0.022 μV. This 4th degree polynomial was then corrected by adding a 3rd degree polynomial so that the resulting 4th degree polynomial produces the same values of E, dE/dt_{90},

and d^2E/dt_{90}^2 at 1664.5 °C as the reference function for the 1064.18 °C to 1664.5 °C range, and it also gives the same value of E at 1768.117 °C that the IPTS-68 based function gives at t_{68} = 1767.6 °C, after the latter function was corrected to be consistent with the SI volt [33].

The new ITS-90 reference function for type S thermocouples therefore consists of three polynomials that cover the range −50 °C to 1768.1 °C, with joins at 1064.18 °C and 1664.5 °C. The form of the polynomials and the coefficients for the three temperature ranges are given in the next section. Figure 4.2.1 shows the *emf* differences between the ITS-90 reference function and the reference function based on the IPTS-68. In this figure the IPTS-68 based reference function was adjusted to the ITS-90 and the SI volt.

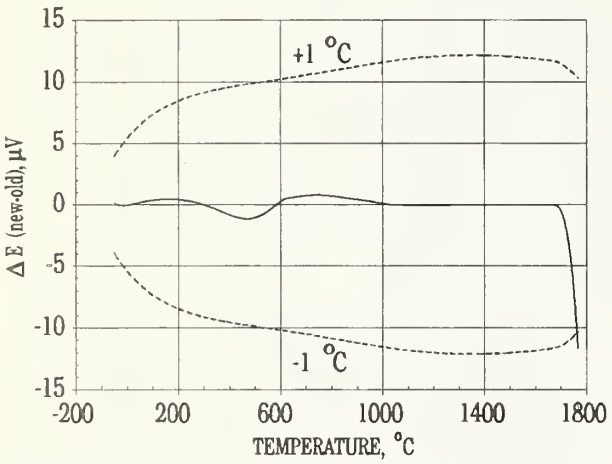

FIGURE 4.2.1. *Difference in thermoelectric voltages (ΔE) of old and new reference functions for type S thermocouples − comparison of values given in this Monograph to those given in NBS Monograph 125. Values from Monograph 125 are adjusted to the ITS-90 and the SI volt. The dashed lines indicate voltage differences equivalent to ± 1 °C.*

4.3. Reference Function and Table for Type S Thermocouples

The coefficients, c_i, for the eighth degree polynomial that gives the thermoelectric voltage, E, of type S thermocouples as a function of temperature, t_{90}, in the −50 °C to 1064.18 °C range are given in table 4.3.1. The coefficients for the fourth degree polynomials that give the thermoelectric voltage in the 1064.18 °C to 1664.5 °C and 1664.5 °C to 1768.1 °C ranges are also given in table 4.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type S thermocouples at selected fixed points are given in table 4.3.2. The reference values for type S thermocouples are given at 1 °C intervals from −50 °C to 1768 °C in table 4.3.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 4.3.1, 4.3.2, and 4.3.3, respectively.

TABLE 4.3.1. *Type S thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−50 °C to 1064.18 °C	1064.18 °C to 1664.5 °C	1664.5 °C to 1768.1 °C
c_0 =	0.000 000 000 00	$1.329\ 004\ 440\ 85 \times 10^{3}$	$1.466\ 282\ 326\ 36 \times 10^{5}$
c_1 =	5.403 133 086 31 . . .	3.345 093 113 44 . . .	$-2.584\ 305\ 167\ 52 \times 10^{2}$
c_2 =	$1.259\ 342\ 897\ 40 \times 10^{-2}$	$6.548\ 051\ 928\ 18 \times 10^{-3}$	$1.636\ 935\ 746\ 41 \times 10^{-1}$
c_3 =	$-2.324\ 779\ 686\ 89 \times 10^{-5}$	$-1.648\ 562\ 592\ 09 \times 10^{-6}$	$-3.304\ 390\ 469\ 87 \times 10^{-5}$
c_4 =	$3.220\ 288\ 230\ 36 \times 10^{-8}$	$1.299\ 896\ 051\ 74 \times 10^{-11}$	$-9.432\ 236\ 906\ 12 \times 10^{-12}$
c_5 =	$-3.314\ 651\ 963\ 89 \times 10^{-11}$		
c_6 =	$2.557\ 442\ 517\ 86 \times 10^{-14}$		
c_7 =	$-1.250\ 688\ 713\ 93 \times 10^{-17}$		
c_8 =	$2.714\ 431\ 761\ 45 \times 10^{-21}$		

TABLE 4.3.2. *Thermoelectric values at fixed points for type S thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dT nV/°C^2
Mercury TP	−38.8344	−189.40	4.312	31.23
Ice MP	0.000	0.00	5.403	25.19
Water TP	0.01	0.05	5.403	25.19
Gallium MP	29.7646	171.39	6.094	21.36
Indium FP	156.5985	1082.27	8.045	10.69
Tin FP	231.928	1715.00	8.711	7.24
Cadmium FP	321.069	2516.57	9.238	4.82
Lead FP	327.462	2575.73	9.268	4.70
Zinc FP	419.527	3446.89	9.638	3.50
Antimony FP	630.63	5552.80	10.303	3.16
Aluminum FP	660.323	5860.13	10.398	3.23
Silver FP	961.78	9148.38	11.418	3.22
Gold FP	1064.18	10334.20	11.743	3.27
Copper FP	1084.62	10574.80	11.798	2.55
Palladium FP	1554.8	16238.95	11.947	−1.91
Platinum FP	1768.1	18693.54	10.311	−23.52

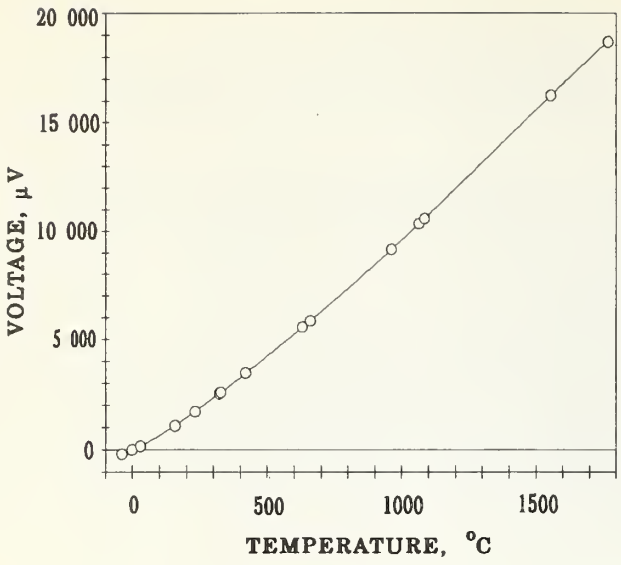

FIGURE 4.3.1. *Thermoelectric voltage for type S thermocouples. The circles indicate values at various thermometric fixed points.*

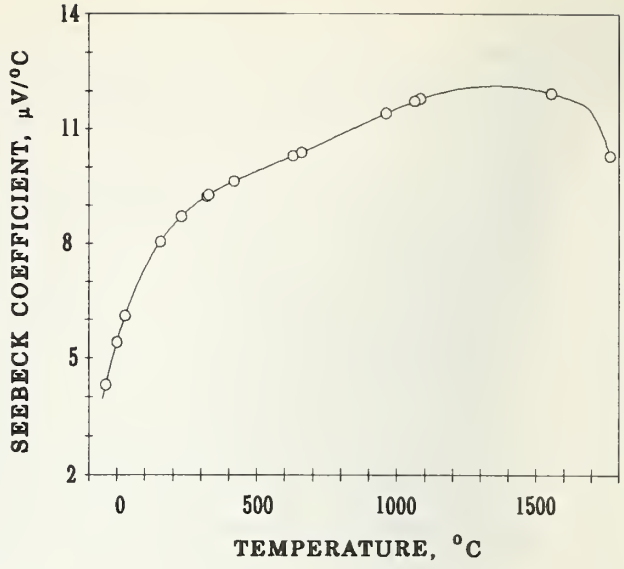

FIGURE 4.3.2. *Seebeck coefficient for type S thermocouples. The circles indicate values at various thermometric fixed points.*

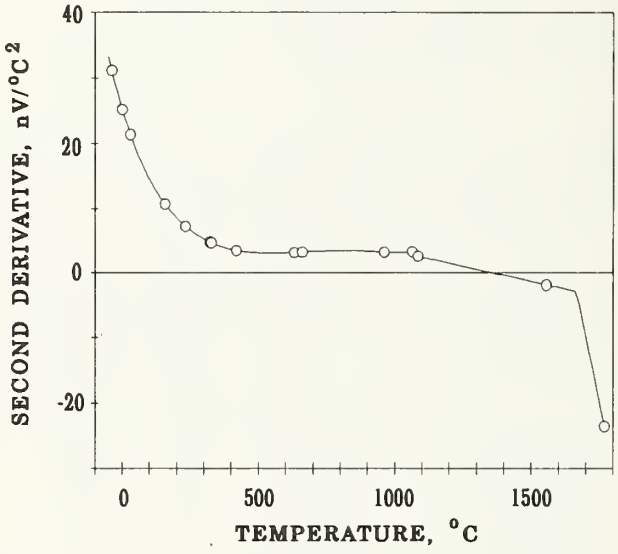

FIGURE 4.3.3. *Second derivative of thermoelectric voltage for type S thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
				−40	−194.40	4.275	31.43	−20	−102.83	4.870	28.14
				−39	−190.11	4.307	31.26	−19	−97.95	4.898	27.98
				−38	−185.79	4.338	31.08	−18	−93.04	4.926	27.83
				−37	−181.44	4.369	30.91	−17	−88.10	4.954	27.67
				−36	−177.05	4.400	30.74	−16	−83.13	4.982	27.52
				−35	−172.64	4.430	30.57	−15	−78.13	5.009	27.37
				−34	−168.19	4.461	30.40	−14	−73.11	5.036	27.22
				−33	−163.71	4.491	30.24	−13	−68.06	5.064	27.07
				−32	−159.21	4.521	30.07	−12	−62.98	5.091	26.92
				−31	−154.67	4.551	29.90	−11	−57.88	5.117	26.77
−50	−235.56	3.952	33.22	−30	−150.11	4.581	29.74	−10	−52.75	5.144	26.62
−49	−231.59	3.985	33.03	−29	−145.51	4.611	29.57	−9	−47.59	5.171	26.47
−48	−227.58	4.018	32.85	−28	−140.88	4.640	29.41	−8	−42.41	5.197	26.33
−47	−223.55	4.051	32.67	−27	−136.23	4.670	29.25	−7	−37.20	5.223	26.18
−46	−219.48	4.084	32.49	−26	−131.54	4.699	29.09	−6	−31.96	5.249	26.04
−45	−215.38	4.116	32.31	−25	−126.83	4.728	28.93	−5	−26.70	5.275	25.89
−44	−211.25	4.148	32.13	−24	−122.09	4.757	28.77	−4	−21.41	5.301	25.75
−43	−207.09	4.180	31.95	−23	−117.32	4.785	28.61	−3	−16.10	5.327	25.61
−42	−202.89	4.212	31.78	−22	−112.52	4.814	28.45	−2	−10.76	5.352	25.47
−41	−198.66	4.244	31.60	−21	−107.69	4.842	28.29	−1	−5.39	5.378	25.33
−40	−194.40	4.275	31.43	−20	−102.83	4.870	28.14	0	0.00	5.403	25.19

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
0	0.00	5.403	25.19	50	298.93	6.503	19.10	100	645.91	7.338	14.51
1	5.42	5.428	25.05	51	305.44	6.522	19.00	101	653.26	7.353	14.43
2	10.86	5.453	24.91	52	311.97	6.541	18.89	102	660.62	7.367	14.35
3	16.32	5.478	24.77	53	318.52	6.560	18.79	103	667.99	7.381	14.28
4	21.81	5.503	24.64	54	325.09	6.579	18.68	104	675.38	7.395	14.20
5	27.33	5.527	24.50	55	331.68	6.597	18.58	105	682.78	7.410	14.12
6	32.87	5.552	24.36	56	338.28	6.616	18.48	106	690.20	7.424	14.04
7	38.43	5.576	24.23	57	344.91	6.634	18.38	107	697.63	7.438	13.97
8	44.02	5.600	24.10	58	351.55	6.653	18.28	108	705.08	7.452	13.89
9	49.63	5.624	23.96	59	358.22	6.671	18.18	109	712.53	7.466	13.82
10	55.27	5.648	23.83	60	364.90	6.689	18.08	110	720.01	7.479	13.74
11	60.93	5.672	23.70	61	371.59	6.707	17.98	111	727.49	7.493	13.67
12	66.61	5.696	23.57	62	378.31	6.725	17.88	112	734.99	7.507	13.59
13	72.32	5.719	23.44	63	385.04	6.743	17.78	113	742.51	7.520	13.52
14	78.05	5.742	23.31	64	391.80	6.761	17.68	114	750.03	7.534	13.45
15	83.80	5.766	23.18	65	398.56	6.778	17.58	115	757.57	7.547	13.37
16	89.58	5.789	23.05	66	405.35	6.796	17.49	116	765.13	7.560	13.30
17	95.38	5.812	22.92	67	412.16	6.813	17.39	117	772.69	7.574	13.23
18	101.20	5.835	22.80	68	418.98	6.831	17.30	118	780.27	7.587	13.16
19	107.05	5.857	22.67	69	425.82	6.848	17.20	119	787.87	7.600	13.08
20	112.92	5.880	22.55	70	432.67	6.865	17.11	120	795.47	7.613	13.01
21	118.81	5.902	22.42	71	439.55	6.882	17.01	121	803.09	7.626	12.94
22	124.72	5.925	22.30	72	446.44	6.899	16.92	122	810.73	7.639	12.87
23	130.66	5.947	22.18	73	453.34	6.916	16.83	123	818.37	7.652	12.80
24	136.62	5.969	22.05	74	460.27	6.933	16.73	124	826.03	7.665	12.73
25	142.60	5.991	21.93	75	467.21	6.949	16.64	125	833.70	7.677	12.67
26	148.60	6.013	21.81	76	474.17	6.966	16.55	126	841.38	7.690	12.60
27	154.62	6.035	21.69	77	481.14	6.982	16.46	127	849.08	7.702	12.53
28	160.67	6.056	21.57	78	488.13	6.999	16.37	128	856.79	7.715	12.46
29	166.74	6.078	21.45	79	495.14	7.015	16.28	129	864.51	7.727	12.40
30	172.83	6.099	21.33	80	502.16	7.031	16.19	130	872.24	7.740	12.33
31	178.94	6.121	21.22	81	509.20	7.048	16.10	131	879.99	7.752	12.26
32	185.07	6.142	21.10	82	516.26	7.064	16.01	132	887.75	7.764	12.20
33	191.22	6.163	20.98	83	523.33	7.080	15.93	133	895.52	7.776	12.13
34	197.39	6.184	20.87	84	530.42	7.095	15.84	134	903.30	7.788	12.06
35	203.59	6.205	20.75	85	537.52	7.111	15.75	135	911.09	7.801	12.00
36	209.80	6.225	20.64	86	544.64	7.127	15.67	136	918.90	7.812	11.94
37	216.04	6.246	20.52	87	551.77	7.143	15.58	137	926.72	7.824	11.87
38	222.29	6.266	20.41	88	558.92	7.158	15.50	138	934.55	7.836	11.81
39	228.57	6.287	20.30	89	566.09	7.174	15.41	139	942.39	7.848	11.74
40	234.87	6.307	20.19	90	573.27	7.189	15.33	140	950.25	7.860	11.68
41	241.18	6.327	20.07	91	580.47	7.204	15.24	141	958.11	7.871	11.62
42	247.52	6.347	19.96	92	587.68	7.219	15.16	142	965.99	7.883	11.56
43	253.88	6.367	19.85	93	594.91	7.235	15.08	143	973.88	7.894	11.49
44	260.25	6.387	19.74	94	602.15	7.250	15.00	144	981.78	7.906	11.43
45	266.65	6.406	19.64	95	609.41	7.265	14.91	145	989.69	7.917	11.37
46	273.07	6.426	19.53	96	616.68	7.279	14.83	146	997.61	7.929	11.31
47	279.50	6.445	19.42	97	623.96	7.294	14.75	147	1 005.55	7.940	11.25
48	285.96	6.465	19.31	98	631.27	7.309	14.67	148	1 013.49	7.951	11.19
49	292.43	6.484	19.21	99	638.58	7.324	14.59	149	1 021.45	7.962	11.13
50	298.93	6.503	19.10	100	645.91	7.338	14.51	150	1 029.42	7.973	11.07

TABLE 4.3.3. ***Type S thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	1 029.42	7.973	11.07	**200**	1 440.78	8.460	8.51	**250**	1 873.57	8.836	6.63
151	1 037.40	7.985	11.01	**201**	1 449.25	8.468	8.47	**251**	1 882.41	8.843	6.60
152	1 045.39	7.995	10.95	**202**	1 457.72	8.477	8.43	**252**	1 891.26	8.849	6.57
153	1 053.39	8.006	10.90	**203**	1 466.20	8.485	8.38	**253**	1 900.11	8.856	6.54
154	1 061.40	8.017	10.84	**204**	1 474.69	8.494	8.34	**254**	1 908.97	8.862	6.50
155	1 069.42	8.028	10.78	**205**	1 483.19	8.502	8.30	**255**	1 917.83	8.869	6.47
156	1 077.46	8.039	10.72	**206**	1 491.69	8.510	8.25	**256**	1 926.70	8.875	6.44
157	1 085.50	8.050	10.67	**207**	1 500.21	8.518	8.21	**257**	1 935.58	8.882	6.41
158	1 093.55	8.060	10.61	**208**	1 508.73	8.527	8.17	**258**	1 944.47	8.888	6.38
159	1 101.62	8.071	10.55	**209**	1 517.26	8.535	8.13	**259**	1 953.36	8.894	6.35
160	1 109.70	8.081	10.50	**210**	1 525.80	8.543	8.09	**260**	1 962.26	8.901	6.32
161	1 117.78	8.092	10.44	**211**	1 534.35	8.551	8.05	**261**	1 971.16	8.907	6.29
162	1 125.88	8.102	10.39	**212**	1 542.90	8.559	8.01	**262**	1 980.07	8.913	6.26
163	1 133.99	8.113	10.33	**213**	1 551.46	8.567	7.97	**263**	1 988.99	8.920	6.23
164	1 142.10	8.123	10.28	**214**	1 560.04	8.575	7.92	**264**	1 997.91	8.926	6.20
165	1 150.23	8.133	10.22	**215**	1 568.61	8.583	7.88	**265**	2 006.84	8.932	6.17
166	1 158.37	8.143	10.17	**216**	1 577.20	8.591	7.84	**266**	2 015.77	8.938	6.14
167	1 166.52	8.153	10.11	**217**	1 585.80	8.598	7.81	**267**	2 024.71	8.944	6.12
168	1 174.68	8.163	10.06	**218**	1 594.40	8.606	7.77	**268**	2 033.66	8.950	6.09
169	1 182.85	8.174	10.01	**219**	1 603.01	8.614	7.73	**269**	2 042.62	8.956	6.06
170	1 191.02	8.184	9.95	**220**	1 611.63	8.622	7.69	**270**	2 051.57	8.962	6.03
171	1 199.21	8.193	9.90	**221**	1 620.25	8.629	7.65	**271**	2 060.54	8.968	6.00
172	1 207.41	8.203	9.85	**222**	1 628.88	8.637	7.61	**272**	2 069.51	8.974	5.97
173	1 215.62	8.213	9.80	**223**	1 637.53	8.645	7.57	**273**	2 078.49	8.980	5.95
174	1 223.84	8.223	9.75	**224**	1 646.17	8.652	7.54	**274**	2 087.47	8.986	5.92
175	1 232.06	8.233	9.70	**225**	1 654.83	8.660	7.50	**275**	2 096.46	8.992	5.89
176	1 240.30	8.242	9.65	**226**	1 663.49	8.667	7.46	**276**	2 105.46	8.998	5.87
177	1 248.55	8.252	9.59	**227**	1 672.16	8.675	7.42	**277**	2 114.46	9.004	5.84
178	1 256.81	8.261	9.54	**228**	1 680.84	8.682	7.39	**278**	2 123.46	9.010	5.81
179	1 265.07	8.271	9.49	**229**	1 689.53	8.689	7.35	**279**	2 132.48	9.016	5.79
180	1 273.35	8.280	9.44	**230**	1 698.22	8.697	7.31	**280**	2 141.50	9.021	5.76
181	1 281.63	8.290	9.40	**231**	1 706.92	8.704	7.28	**281**	2 150.52	9.027	5.73
182	1 289.93	8.299	9.35	**232**	1 715.63	8.711	7.24	**282**	2 159.55	9.033	5.71
183	1 298.23	8.309	9.30	**233**	1 724.34	8.718	7.20	**283**	2 168.59	9.039	5.68
184	1 306.55	8.318	9.25	**234**	1 733.07	8.726	7.17	**284**	2 177.63	9.044	5.66
185	1 314.87	8.327	9.20	**235**	1 741.80	8.733	7.13	**285**	2 186.67	9.050	5.63
186	1 323.20	8.336	9.15	**236**	1 750.53	8.740	7.10	**286**	2 195.73	9.055	5.61
187	1 331.54	8.345	9.11	**237**	1 759.27	8.747	7.06	**287**	2 204.79	9.061	5.58
188	1 339.89	8.354	9.06	**238**	1 768.03	8.754	7.03	**288**	2 213.85	9.067	5.56
189	1 348.25	8.364	9.01	**239**	1 776.78	8.761	6.99	**289**	2 222.92	9.072	5.53
190	1 356.62	8.373	8.96	**240**	1 785.55	8.768	6.96	**290**	2 231.99	9.078	5.51
191	1 364.99	8.381	8.92	**241**	1 794.32	8.775	6.93	**291**	2 241.07	9.083	5.48
192	1 373.38	8.390	8.87	**242**	1 803.10	8.782	6.89	**292**	2 250.16	9.089	5.46
193	1 381.77	8.399	8.83	**243**	1 811.88	8.789	6.86	**293**	2 259.25	9.094	5.43
194	1 390.18	8.408	8.78	**244**	1 820.68	8.796	6.83	**294**	2 268.35	9.100	5.41
195	1 398.59	8.417	8.74	**245**	1 829.47	8.802	6.79	**295**	2 277.45	9.105	5.39
196	1 407.01	8.425	8.69	**246**	1 838.28	8.809	6.76	**296**	2 286.56	9.110	5.36
197	1 415.44	8.434	8.65	**247**	1 847.09	8.816	6.73	**297**	2 295.67	9.116	5.34
198	1 423.88	8.443	8.60	**248**	1 855.91	8.823	6.69	**298**	2 304.79	9.121	5.32
199	1 432.33	8.451	8.56	**249**	1 864.74	8.829	6.66	**299**	2 313.91	9.126	5.29
200	1 440.78	8.460	8.51	**250**	1 873.57	8.836	6.63	**300**	2 323.04	9.132	5.27

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
300	2 323.04	9.132	5.27	350	2 785.77	9.370	4.32	400	3 259.36	9.568	3.68
301	2 332.18	9.137	5.25	351	2 795.14	9.374	4.30	401	3 268.93	9.572	3.67
302	2 341.32	9.142	5.22	352	2 804.52	9.378	4.28	402	3 278.50	9.576	3.66
303	2 350.46	9.147	5.20	353	2 813.90	9.383	4.27	403	3 288.08	9.579	3.65
304	2 359.61	9.152	5.18	354	2 823.29	9.387	4.25	404	3 297.66	9.583	3.64
305	2 368.77	9.158	5.16	355	2 832.67	9.391	4.24	405	3 307.24	9.587	3.63
306	2 377.93	9.163	5.14	356	2 842.07	9.395	4.22	406	3 316.83	9.590	3.62
307	2 387.09	9.168	5.11	357	2 851.46	9.400	4.21	407	3 326.43	9.594	3.61
308	2 396.26	9.173	5.09	358	2 860.87	9.404	4.19	408	3 336.02	9.598	3.60
309	2 405.44	9.178	5.07	359	2 870.27	9.408	4.18	409	3 345.62	9.601	3.59
310	2 414.62	9.183	5.05	360	2 879.68	9.412	4.17	410	3 355.22	9.605	3.58
311	2 423.80	9.188	5.03	361	2 889.10	9.416	4.15	411	3 364.83	9.608	3.57
312	2 432.99	9.193	5.01	362	2 898.51	9.420	4.14	412	3 374.44	9.612	3.57
313	2 442.19	9.198	4.99	363	2 907.94	9.425	4.12	413	3 384.05	9.615	3.56
314	2 451.39	9.203	4.97	364	2 917.36	9.429	4.11	414	3 393.67	9.619	3.55
315	2 460.60	9.208	4.95	365	2 926.79	9.433	4.09	415	3 403.29	9.623	3.54
316	2 469.81	9.213	4.92	366	2 936.23	9.437	4.08	416	3 412.92	9.626	3.53
317	2 479.02	9.218	4.90	367	2 945.67	9.441	4.07	417	3 422.54	9.630	3.52
318	2 488.24	9.223	4.88	368	2 955.11	9.445	4.05	418	3 432.17	9.633	3.51
319	2 497.47	9.228	4.86	369	2 964.56	9.449	4.04	419	3 441.81	9.637	3.51
320	2 506.70	9.233	4.84	370	2 974.01	9.453	4.03	420	3 451.45	9.640	3.50
321	2 515.93	9.237	4.83	371	2 983.46	9.457	4.01	421	3 461.09	9.644	3.49
322	2 525.17	9.242	4.81	372	2 992.92	9.461	4.00	422	3 470.73	9.647	3.48
323	2 534.42	9.247	4.79	373	3 002.39	9.465	3.99	423	3 480.38	9.651	3.47
324	2 543.67	9.252	4.77	374	3 011.85	9.469	3.97	424	3 490.04	9.654	3.47
325	2 552.92	9.257	4.75	375	3 021.32	9.473	3.96	425	3 499.69	9.657	3.46
326	2 562.18	9.261	4.73	376	3 030.80	9.477	3.95	426	3 509.35	9.661	3.45
327	2 571.44	9.266	4.71	377	3 040.28	9.481	3.94	427	3 519.01	9.664	3.44
328	2 580.71	9.271	4.69	378	3 049.76	9.485	3.92	428	3 528.68	9.668	3.44
329	2 589.99	9.275	4.67	379	3 059.25	9.489	3.91	429	3 538.35	9.671	3.43
330	2 599.26	9.280	4.65	380	3 068.74	9.493	3.90	430	3 548.02	9.675	3.42
331	2 608.55	9.285	4.64	381	3 078.23	9.497	3.89	431	3 557.70	9.678	3.41
332	2 617.83	9.289	4.62	382	3 087.73	9.500	3.88	432	3 567.38	9.682	3.41
333	2 627.12	9.294	4.60	383	3 097.23	9.504	3.86	433	3 577.06	9.685	3.40
334	2 636.42	9.299	4.58	384	3 106.74	9.508	3.85	434	3 586.75	9.688	3.39
335	2 645.72	9.303	4.56	385	3 116.25	9.512	3.84	435	3 596.44	9.692	3.39
336	2 655.03	9.308	4.55	386	3 125.76	9.516	3.83	436	3 606.13	9.695	3.38
337	2 664.34	9.312	4.53	387	3 135.28	9.520	3.82	437	3 615.83	9.698	3.37
338	2 673.65	9.317	4.51	388	3 144.80	9.523	3.81	438	3 625.53	9.702	3.37
339	2 682.97	9.321	4.50	389	3 154.33	9.527	3.80	439	3 635.23	9.705	3.36
340	2 692.29	9.326	4.48	390	3 163.86	9.531	3.78	440	3 644.94	9.709	3.35
341	2 701.62	9.330	4.46	391	3 173.39	9.535	3.77	441	3 654.65	9.712	3.35
342	2 710.95	9.335	4.44	392	3 182.93	9.539	3.76	442	3 664.36	9.715	3.34
343	2 720.29	9.339	4.43	393	3 192.47	9.542	3.75	443	3 674.08	9.719	3.33
344	2 729.63	9.344	4.41	394	3 202.01	9.546	3.74	444	3 683.80	9.722	3.33
345	2 738.98	9.348	4.40	395	3 211.56	9.550	3.73	445	3 693.52	9.725	3.32
346	2 748.33	9.352	4.38	396	3 221.11	9.554	3.72	446	3 703.25	9.729	3.31
347	2 757.68	9.357	4.36	397	3 230.67	9.557	3.71	447	3 712.98	9.732	3.31
348	2 767.04	9.361	4.35	398	3 240.23	9.561	3.70	448	3 722.71	9.735	3.30
349	2 776.40	9.365	4.33	399	3 249.79	9.565	3.69	449	3 732.45	9.738	3.30
350	2 785.77	9.370	4.32	400	3 259.36	9.568	3.68	450	3 742.19	9.742	3.29

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	3 742.19	9.742	3.29	**500**	4 233.29	9.901	3.10	**550**	4 732.17	10.054	3.05
451	3 751.93	9.745	3.29	**501**	4 243.20	9.904	3.10	**551**	4 742.23	10.057	3.05
452	3 761.68	9.748	3.28	**502**	4 253.10	9.907	3.09	**552**	4 752.29	10.060	3.05
453	3 771.43	9.752	3.28	**503**	4 263.01	9.910	3.09	**553**	4 762.35	10.063	3.05
454	3 781.18	9.755	3.27	**504**	4 272.92	9.913	3.09	**554**	4 772.41	10.066	3.05
455	3 790.94	9.758	3.26	**505**	4 282.84	9.916	3.09	**555**	4 782.48	10.069	3.05
456	3 800.70	9.761	3.26	**506**	4 292.75	9.919	3.09	**556**	4 792.55	10.072	3.05
457	3 810.46	9.765	3.25	**507**	4 302.68	9.922	3.08	**557**	4 802.62	10.075	3.05
458	3 820.23	9.768	3.25	**508**	4 312.60	9.925	3.08	**558**	4 812.70	10.078	3.05
459	3 830.00	9.771	3.24	**509**	4 322.53	9.929	3.08	**559**	4 822.78	10.081	3.05
460	3 839.77	9.774	3.24	**510**	4 332.46	9.932	3.08	**560**	4 832.86	10.084	3.05
461	3 849.55	9.778	3.23	**511**	4 342.39	9.935	3.08	**561**	4 842.95	10.087	3.05
462	3 859.33	9.781	3.23	**512**	4 352.33	9.938	3.07	**562**	4 853.04	10.091	3.05
463	3 869.11	9.784	3.22	**513**	4 362.27	9.941	3.07	**563**	4 863.13	10.094	3.05
464	3 878.90	9.787	3.22	**514**	4 372.21	9.944	3.07	**564**	4 873.23	10.097	3.05
465	3 888.68	9.791	3.22	**515**	4 382.15	9.947	3.07	**565**	4 883.32	10.100	3.05
466	3 898.48	9.794	3.21	**516**	4 392.10	9.950	3.07	**566**	4 893.42	10.103	3.05
467	3 908.27	9.797	3.21	**517**	4 402.05	9.953	3.07	**567**	4 903.53	10.106	3.06
468	3 918.07	9.800	3.20	**518**	4 412.01	9.956	3.07	**568**	4 913.64	10.109	3.06
469	3 927.87	9.803	3.20	**519**	4 421.97	9.959	3.06	**569**	4 923.75	10.112	3.06
470	3 937.68	9.807	3.19	**520**	4 431.93	9.962	3.06	**570**	4 933.86	10.115	3.06
471	3 947.49	9.810	3.19	**521**	4 441.89	9.965	3.06	**571**	4 943.98	10.118	3.06
472	3 957.30	9.813	3.19	**522**	4 451.86	9.968	3.06	**572**	4 954.10	10.121	3.06
473	3 967.11	9.816	3.18	**523**	4 461.83	9.972	3.06	**573**	4 964.22	10.124	3.06
474	3 976.93	9.819	3.18	**524**	4 471.80	9.975	3.06	**574**	4 974.34	10.127	3.06
475	3 986.75	9.822	3.17	**525**	4 481.78	9.978	3.06	**575**	4 984.47	10.130	3.06
476	3 996.57	9.826	3.17	**526**	4 491.76	9.981	3.06	**576**	4 994.61	10.133	3.06
477	4 006.40	9.829	3.17	**527**	4 501.74	9.984	3.06	**577**	5 004.74	10.136	3.06
478	4 016.23	9.832	3.16	**528**	4 511.72	9.987	3.05	**578**	5 014.88	10.139	3.07
479	4 026.06	9.835	3.16	**529**	4 521.71	9.990	3.05	**579**	5 025.02	10.143	3.07
480	4 035.90	9.838	3.16	**530**	4 531.70	9.993	3.05	**580**	5 035.16	10.146	3.07
481	4 045.74	9.841	3.15	**531**	4 541.70	9.996	3.05	**581**	5 045.31	10.149	3.07
482	4 055.58	9.845	3.15	**532**	4 551.70	9.999	3.05	**582**	5 055.46	10.152	3.07
483	4 065.43	9.848	3.15	**533**	4 561.70	10.002	3.05	**583**	5 065.61	10.155	3.07
484	4 075.28	9.851	3.14	**534**	4 571.70	10.005	3.05	**584**	5 075.77	10.158	3.07
485	4 085.13	9.854	3.14	**535**	4 581.71	10.008	3.05	**585**	5 085.93	10.161	3.07
486	4 094.99	9.857	3.14	**536**	4 591.72	10.011	3.05	**586**	5 096.09	10.164	3.08
487	4 104.85	9.860	3.13	**537**	4 601.73	10.014	3.05	**587**	5 106.26	10.167	3.08
488	4 114.71	9.863	3.13	**538**	4 611.74	10.017	3.05	**588**	5 116.43	10.170	3.08
489	4 124.57	9.867	3.13	**539**	4 621.76	10.020	3.05	**589**	5 126.60	10.173	3.08
490	4 134.44	9.870	3.12	**540**	4 631.79	10.023	3.05	**590**	5 136.77	10.176	3.08
491	4 144.31	9.873	3.12	**541**	4 641.81	10.026	3.05	**591**	5 146.95	10.179	3.08
492	4 154.19	9.876	3.12	**542**	4 651.84	10.030	3.05	**592**	5 157.13	10.182	3.08
493	4 164.06	9.879	3.12	**543**	4 661.87	10.033	3.05	**593**	5 167.32	10.186	3.09
494	4 173.95	9.882	3.11	**544**	4 671.90	10.036	3.05	**594**	5 177.50	10.189	3.09
495	4 183.83	9.885	3.11	**545**	4 681.94	10.039	3.05	**595**	5 187.69	10.192	3.09
496	4 193.72	9.888	3.11	**546**	4 691.98	10.042	3.05	**596**	5 197.89	10.195	3.09
497	4 203.61	9.891	3.10	**547**	4 702.02	10.045	3.05	**597**	5 208.08	10.198	3.09
498	4 213.50	9.895	3.10	**548**	4 712.07	10.048	3.05	**598**	5 218.28	10.201	3.09
499	4 223.39	9.898	3.10	**549**	4 722.12	10.051	3.05	**599**	5 228.48	10.204	3.10
500	4 233.29	9.901	3.10	**550**	4 732.17	10.054	3.05	**600**	5 238.69	10.207	3.10

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
600	5 238.69	10.207	3.10	**650**	5 752.96	10.365	3.20	**700**	6 275.25	10.528	3.32
601	5 248.90	10.210	3.10	**651**	5 763.33	10.368	3.21	**701**	6 285.78	10.531	3.33
602	5 259.11	10.213	3.10	**652**	5 773.70	10.371	3.21	**702**	6 296.31	10.534	3.33
603	5 269.33	10.217	3.10	**653**	5 784.07	10.374	3.21	**703**	6 306.85	10.538	3.33
604	5 279.54	10.220	3.10	**654**	5 794.45	10.377	3.21	**704**	6 317.38	10.541	3.33
605	5 289.76	10.223	3.11	**655**	5 804.83	10.381	3.22	**705**	6 327.93	10.544	3.34
606	5 299.99	10.226	3.11	**656**	5 815.21	10.384	3.22	**706**	6 338.47	10.548	3.34
607	5 310.22	10.229	3.11	**657**	5 825.59	10.387	3.22	**707**	6 349.02	10.551	3.34
608	5 320.45	10.232	3.11	**658**	5 835.98	10.390	3.22	**708**	6 359.58	10.554	3.34
609	5 330.68	10.235	3.11	**659**	5 846.37	10.394	3.22	**709**	6 370.13	10.558	3.35
610	5 340.92	10.238	3.12	**660**	5 856.77	10.397	3.23	**710**	6 380.69	10.561	3.35
611	5 351.16	10.241	3.12	**661**	5 867.17	10.400	3.23	**711**	6 391.25	10.565	3.35
612	5 361.40	10.245	3.12	**662**	5 877.57	10.403	3.23	**712**	6 401.82	10.568	3.35
613	5 371.65	10.248	3.12	**663**	5 887.97	10.406	3.23	**713**	6 412.39	10.571	3.35
614	5 381.90	10.251	3.12	**664**	5 898.38	10.410	3.24	**714**	6 422.96	10.575	3.36
615	5 392.15	10.254	3.12	**665**	5 908.79	10.413	3.24	**715**	6 433.54	10.578	3.36
616	5 402.40	10.257	3.13	**666**	5 919.21	10.416	3.24	**716**	6 444.12	10.581	3.36
617	5 412.66	10.260	3.13	**667**	5 929.63	10.419	3.24	**717**	6 454.70	10.585	3.36
618	5 422.92	10.263	3.13	**668**	5 940.05	10.423	3.25	**718**	6 465.29	10.588	3.37
619	5 433.19	10.266	3.13	**669**	5 950.47	10.426	3.25	**719**	6 475.88	10.591	3.37
620	5 443.46	10.270	3.14	**670**	5 960.90	10.429	3.25	**720**	6 486.47	10.595	3.37
621	5 453.73	10.273	3.14	**671**	5 971.33	10.432	3.25	**721**	6 497.07	10.598	3.37
622	5 464.00	10.276	3.14	**672**	5 981.76	10.436	3.26	**722**	6 507.67	10.601	3.37
623	5 474.28	10.279	3.14	**673**	5 992.20	10.439	3.26	**723**	6 518.27	10.605	3.38
624	5 484.56	10.282	3.14	**674**	6 002.64	10.442	3.26	**724**	6 528.88	10.608	3.38
625	5 494.84	10.285	3.15	**675**	6 013.08	10.445	3.26	**725**	6 539.49	10.612	3.38
626	5 505.13	10.288	3.15	**676**	6 023.53	10.449	3.27	**726**	6 550.10	10.615	3.38
627	5 515.42	10.292	3.15	**677**	6 033.98	10.452	3.27	**727**	6 560.72	10.618	3.38
628	5 525.71	10.295	3.15	**678**	6 044.44	10.455	3.27	**728**	6 571.34	10.622	3.39
629	5 536.01	10.298	3.15	**679**	6 054.89	10.458	3.27	**729**	6 581.96	10.625	3.39
630	5 546.31	10.301	3.16	**680**	6 065.35	10.462	3.28	**730**	6 592.59	10.629	3.39
631	5 556.61	10.304	3.16	**681**	6 075.82	10.465	3.28	**731**	6 603.22	10.632	3.39
632	5 566.92	10.307	3.16	**682**	6 086.28	10.468	3.28	**732**	6 613.85	10.635	3.39
633	5 577.23	10.310	3.16	**683**	6 096.75	10.472	3.28	**733**	6 624.49	10.639	3.40
634	5 587.54	10.314	3.17	**684**	6 107.23	10.475	3.29	**734**	6 635.13	10.642	3.40
635	5 597.85	10.317	3.17	**685**	6 117.70	10.478	3.29	**735**	6 645.77	10.646	3.40
636	5 608.17	10.320	3.17	**686**	6 128.18	10.481	3.29	**736**	6 656.42	10.649	3.40
637	5 618.49	10.323	3.17	**687**	6 138.67	10.485	3.29	**737**	6 667.07	10.652	3.40
638	5 628.82	10.326	3.17	**688**	6 149.15	10.488	3.30	**738**	6 677.72	10.656	3.40
639	5 639.15	10.329	3.18	**689**	6 159.64	10.491	3.30	**739**	6 688.38	10.659	3.41
640	5 649.48	10.333	3.18	**690**	6 170.13	10.495	3.30	**740**	6 699.04	10.663	3.41
641	5 659.81	10.336	3.18	**691**	6 180.63	10.498	3.30	**741**	6 709.71	10.666	3.41
642	5 670.15	10.339	3.18	**692**	6 191.13	10.501	3.31	**742**	6 720.37	10.669	3.41
643	5 680.49	10.342	3.19	**693**	6 201.63	10.505	3.31	**743**	6 731.04	10.673	3.41
644	5 690.83	10.345	3.19	**694**	6 212.14	10.508	3.31	**744**	6 741.72	10.676	3.42
645	5 701.18	10.349	3.19	**695**	6 222.65	10.511	3.31	**745**	6 752.40	10.680	3.42
646	5 711.53	10.352	3.19	**696**	6 233.16	10.515	3.32	**746**	6 763.08	10.683	3.42
647	5 721.88	10.355	3.20	**697**	6 243.68	10.518	3.32	**747**	6 773.76	10.686	3.42
648	5 732.24	10.358	3.20	**698**	6 254.20	10.521	3.32	**748**	6 784.45	10.690	3.42
649	5 742.60	10.361	3.20	**699**	6 264.72	10.524	3.32	**749**	6 795.14	10.693	3.42
650	5 752.96	10.365	3.20	**700**	6 275.25	10.528	3.32	**750**	6 805.84	10.697	3.43

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	6 805.84	10.697	3.43	800	7 344.98	10.869	3.47	850	7 892.80	11.043	3.46
751	6 816.54	10.700	3.43	801	7 355.85	10.873	3.48	851	7 903.84	11.047	3.46
752	6 827.24	10.704	3.43	802	7 366.73	10.876	3.48	852	7 914.89	11.050	3.45
753	6 837.94	10.707	3.43	803	7 377.61	10.880	3.48	853	7 925.94	11.053	3.45
754	6 848.65	10.710	3.43	804	7 388.49	10.883	3.48	854	7 937.00	11.057	3.45
755	6 859.36	10.714	3.43	805	7 399.37	10.887	3.48	855	7 948.06	11.060	3.45
756	6 870.08	10.717	3.43	806	7 410.26	10.890	3.48	856	7 959.12	11.064	3.45
757	6 880.80	10.721	3.44	807	7 421.15	10.894	3.48	857	7 970.18	11.067	3.45
758	6 891.52	10.724	3.44	808	7 432.05	10.897	3.48	858	7 981.25	11.071	3.45
759	6 902.25	10.728	3.44	809	7 442.95	10.901	3.48	859	7 992.33	11.074	3.45
760	6 912.98	10.731	3.44	810	7 453.85	10.904	3.48	860	8 003.40	11.078	3.44
761	6 923.71	10.734	3.44	811	7 464.76	10.908	3.48	861	8 014.48	11.081	3.44
762	6 934.45	10.738	3.44	812	7 475.67	10.911	3.48	862	8 025.56	11.084	3.44
763	6 945.19	10.741	3.44	813	7 486.58	10.915	3.48	863	8 036.65	11.088	3.44
764	6 955.93	10.745	3.45	814	7 497.50	10.918	3.48	864	8 047.74	11.091	3.44
765	6 966.67	10.748	3.45	815	7 508.42	10.922	3.48	865	8 058.83	11.095	3.44
766	6 977.42	10.752	3.45	816	7 519.34	10.925	3.48	866	8 069.93	11.098	3.44
767	6 988.18	10.755	3.45	817	7 530.27	10.929	3.48	867	8 081.03	11.102	3.43
768	6 998.94	10.759	3.45	818	7 541.20	10.932	3.48	868	8 092.13	11.105	3.43
769	7 009.70	10.762	3.45	819	7 552.13	10.936	3.48	869	8 103.24	11.108	3.43
770	7 020.46	10.765	3.45	820	7 563.07	10.939	3.48	870	8 114.35	11.112	3.43
771	7 031.23	10.769	3.45	821	7 574.01	10.942	3.48	871	8 125.46	11.115	3.43
772	7 042.00	10.772	3.45	822	7 584.95	10.946	3.48	872	8 136.58	11.119	3.43
773	7 052.77	10.776	3.46	823	7 595.90	10.949	3.48	873	8 147.70	11.122	3.42
774	7 063.55	10.779	3.46	824	7 606.85	10.953	3.48	874	8 158.82	11.126	3.42
775	7 074.33	10.783	3.46	825	7 617.80	10.956	3.47	875	8 169.95	11.129	3.42
776	7 085.11	10.786	3.46	826	7 628.76	10.960	3.47	876	8 181.08	11.132	3.42
777	7 095.90	10.790	3.46	827	7 639.72	10.963	3.47	877	8 192.22	11.136	3.42
778	7 106.69	10.793	3.46	828	7 650.69	10.967	3.47	878	8 203.35	11.139	3.42
779	7 117.49	10.797	3.46	829	7 661.66	10.970	3.47	879	8 214.50	11.143	3.41
780	7 128.29	10.800	3.46	830	7 672.63	10.974	3.47	880	8 225.64	11.146	3.41
781	7 139.09	10.804	3.46	831	7 683.61	10.977	3.47	881	8 236.79	11.150	3.41
782	7 149.89	10.807	3.46	832	7 694.58	10.981	3.47	882	8 247.94	11.153	3.41
783	7 160.70	10.810	3.47	833	7 705.57	10.984	3.47	883	8 259.09	11.156	3.41
784	7 171.51	10.814	3.47	834	7 716.55	10.988	3.47	884	8 270.25	11.160	3.40
785	7 182.33	10.817	3.47	835	7 727.54	10.991	3.47	885	8 281.41	11.163	3.40
786	7 193.15	10.821	3.47	836	7 738.54	10.995	3.47	886	8 292.58	11.167	3.40
787	7 203.97	10.824	3.47	837	7 749.53	10.998	3.47	887	8 303.75	11.170	3.40
788	7 214.80	10.828	3.47	838	7 760.53	11.002	3.47	888	8 314.92	11.173	3.40
789	7 225.63	10.831	3.47	839	7 771.53	11.005	3.47	889	8 326.09	11.177	3.39
790	7 236.46	10.835	3.47	840	7 782.54	11.008	3.47	890	8 337.27	11.180	3.39
791	7 247.30	10.838	3.47	841	7 793.55	11.012	3.47	891	8 348.45	11.184	3.39
792	7 258.14	10.842	3.47	842	7 804.57	11.015	3.46	892	8 359.64	11.187	3.39
793	7 268.98	10.845	3.47	843	7 815.58	11.019	3.46	893	8 370.83	11.190	3.39
794	7 279.83	10.849	3.47	844	7 826.60	11.022	3.46	894	8 382.02	11.194	3.38
795	7 290.68	10.852	3.47	845	7 837.63	11.026	3.46	895	8 393.21	11.197	3.38
796	7 301.53	10.856	3.47	846	7 848.65	11.029	3.46	896	8 404.41	11.200	3.38
797	7 312.39	10.859	3.47	847	7 859.69	11.033	3.46	897	8 415.62	11.204	3.38
798	7 323.25	10.863	3.47	848	7 870.72	11.036	3.46	898	8 426.82	11.207	3.38
799	7 334.11	10.866	3.47	849	7 881.76	11.040	3.46	899	8 438.03	11.211	3.37
800	7 344.98	10.869	3.47	850	7 892.80	11.043	3.46	900	8 449.24	11.214	3.37

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	8 449.24	11.214	3.37	**950**	9 014.11	11.380	3.25	**1000**	9 587.10	11.539	3.16
901	8 460.46	11.217	3.37	**951**	9 025.49	11.383	3.25	**1001**	9 598.64	11.542	3.16
902	8 471.68	11.221	3.37	**952**	9 036.87	11.386	3.24	**1002**	9 610.18	11.546	3.15
903	8 482.90	11.224	3.36	**953**	9 048.26	11.389	3.24	**1003**	9 621.73	11.549	3.15
904	8 494.13	11.227	3.36	**954**	9 059.65	11.393	3.24	**1004**	9 633.28	11.552	3.15
905	8 505.35	11.231	3.36	**955**	9 071.04	11.396	3.24	**1005**	9 644.83	11.555	3.15
906	8 516.59	11.234	3.36	**956**	9 082.44	11.399	3.23	**1006**	9 656.39	11.558	3.15
907	8 527.82	11.238	3.36	**957**	9 093.84	11.402	3.23	**1007**	9 667.95	11.561	3.15
908	8 539.06	11.241	3.35	**958**	9 105.25	11.405	3.23	**1008**	9 679.51	11.565	3.15
909	8 550.30	11.244	3.35	**959**	9 116.65	11.409	3.23	**1009**	9 691.08	11.568	3.15
910	8 561.55	11.248	3.35	**960**	9 128.06	11.412	3.22	**1010**	9 702.65	11.571	3.15
911	8 572.80	11.251	3.35	**961**	9 139.48	11.415	3.22	**1011**	9 714.22	11.574	3.15
912	8 584.05	11.254	3.34	**962**	9 150.89	11.418	3.22	**1012**	9 725.80	11.577	3.15
913	8 595.31	11.258	3.34	**963**	9 162.31	11.422	3.22	**1013**	9 737.38	11.580	3.15
914	8 606.57	11.261	3.34	**964**	9 173.74	11.425	3.22	**1014**	9 748.96	11.583	3.15
915	8 617.83	11.264	3.34	**965**	9 185.16	11.428	3.21	**1015**	9 760.54	11.587	3.15
916	8 629.10	11.268	3.33	**966**	9 196.59	11.431	3.21	**1016**	9 772.13	11.590	3.15
917	8 640.37	11.271	3.33	**967**	9 208.03	11.434	3.21	**1017**	9 783.72	11.593	3.15
918	8 651.64	11.274	3.33	**968**	9 219.46	11.438	3.21	**1018**	9 795.32	11.596	3.15
919	8 662.91	11.278	3.33	**969**	9 230.90	11.441	3.20	**1019**	9 806.91	11.599	3.15
920	8 674.19	11.281	3.32	**970**	9 242.34	11.444	3.20	**1020**	9 818.51	11.602	3.15
921	8 685.48	11.284	3.32	**971**	9 253.79	11.447	3.20	**1021**	9 830.12	11.606	3.15
922	8 696.76	11.288	3.32	**972**	9 265.24	11.450	3.20	**1022**	9 841.73	11.609	3.15
923	8 708.05	11.291	3.32	**973**	9 276.69	11.454	3.20	**1023**	9 853.34	11.612	3.15
924	8 719.34	11.294	3.31	**974**	9 288.15	11.457	3.19	**1024**	9 864.95	11.615	3.15
925	8 730.64	11.298	3.31	**975**	9 299.60	11.460	3.19	**1025**	9 876.57	11.618	3.15
926	8 741.94	11.301	3.31	**976**	9 311.07	11.463	3.19	**1026**	9 888.19	11.621	3.16
927	8 753.24	11.304	3.31	**977**	9 322.53	11.466	3.19	**1027**	9 899.81	11.624	3.16
928	8 764.55	11.307	3.30	**978**	9 334.00	11.470	3.19	**1028**	9 911.43	11.628	3.16
929	8 775.86	11.311	3.30	**979**	9 345.47	11.473	3.19	**1029**	9 923.06	11.631	3.16
930	8 787.17	11.314	3.30	**980**	9 356.94	11.476	3.18	**1030**	9 934.70	11.634	3.16
931	8 798.48	11.317	3.30	**981**	9 368.42	11.479	3.18	**1031**	9 946.33	11.637	3.16
932	8 809.80	11.321	3.29	**982**	9 379.90	11.482	3.18	**1032**	9 957.97	11.640	3.16
933	8 821.13	11.324	3.29	**983**	9 391.39	11.486	3.18	**1033**	9 969.61	11.643	3.17
934	8 832.45	11.327	3.29	**984**	9 402.87	11.489	3.18	**1034**	9 981.26	11.647	3.17
935	8 843.78	11.331	3.29	**985**	9 414.36	11.492	3.17	**1035**	9 992.90	11.650	3.17
936	8 855.11	11.334	3.28	**986**	9 425.86	11.495	3.17	**1036**	10 004.56	11.653	3.17
937	8 866.45	11.337	3.28	**987**	9 437.35	11.498	3.17	**1037**	10 016.21	11.656	3.17
938	8 877.79	11.340	3.28	**988**	9 448.85	11.501	3.17	**1038**	10 027.87	11.659	3.18
939	8 889.13	11.344	3.28	**989**	9 460.36	11.505	3.17	**1039**	10 039.53	11.662	3.18
940	8 900.47	11.347	3.27	**990**	9 471.86	11.508	3.17	**1040**	10 051.19	11.666	3.18
941	8 911.82	11.350	3.27	**991**	9 483.37	11.511	3.17	**1041**	10 062.86	11.669	3.18
942	8 923.17	11.353	3.27	**992**	9 494.88	11.514	3.16	**1042**	10 074.53	11.672	3.18
943	8 934.53	11.357	3.27	**993**	9 506.40	11.517	3.16	**1043**	10 086.20	11.675	3.19
944	8 945.89	11.360	3.26	**994**	9 517.92	11.520	3.16	**1044**	10 097.88	11.678	3.19
945	8 957.25	11.363	3.26	**995**	9 529.44	11.524	3.16	**1045**	10 109.56	11.682	3.19
946	8 968.61	11.367	3.26	**996**	9 540.97	11.527	3.16	**1046**	10 121.24	11.685	3.20
947	8 979.98	11.370	3.26	**997**	9 552.49	11.530	3.16	**1047**	10 132.93	11.688	3.20
948	8 991.35	11.373	3.25	**998**	9 564.03	11.533	3.16	**1048**	10 144.62	11.691	3.20
949	9 002.73	11.376	3.25	**999**	9 575.56	11.536	3.16	**1049**	10 156.31	11.694	3.21
950	9 014.11	11.380	3.25	**1000**	9 587.10	11.539	3.16	**1050**	10 168.01	11.698	3.21

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	10 168.01	11.698	3.21	**1100**	10 756.54	11.836	2.40	**1150**	11 351.14	11.944	1.93
1051	10 179.71	11.701	3.21	**1101**	10 768.38	11.838	2.39	**1151**	11 363.08	11.946	1.92
1052	10 191.41	11.704	3.22	**1102**	10 780.22	11.841	2.39	**1152**	11 375.03	11.948	1.91
1053	10 203.12	11.707	3.22	**1103**	10 792.06	11.843	2.38	**1153**	11 386.98	11.950	1.90
1054	10 214.82	11.710	3.23	**1104**	10 803.91	11.845	2.37	**1154**	11 398.93	11.952	1.89
1055	10 226.54	11.714	3.23	**1105**	10 815.75	11.848	2.36	**1155**	11 410.88	11.954	1.88
1056	10 238.25	11.717	3.23	**1106**	10 827.60	11.850	2.35	**1156**	11 422.84	11.955	1.87
1057	10 249.97	11.720	3.24	**1107**	10 839.45	11.852	2.34	**1157**	11 434.79	11.957	1.86
1058	10 261.69	11.723	3.24	**1108**	10 851.31	11.855	2.33	**1158**	11 446.75	11.959	1.85
1059	10 273.42	11.727	3.25	**1109**	10 863.16	11.857	2.32	**1159**	11 458.71	11.961	1.84
1060	10 285.15	11.730	3.25	**1110**	10 875.02	11.859	2.31	**1160**	11 470.67	11.963	1.83
1061	10 296.88	11.733	3.26	**1111**	10 886.88	11.862	2.30	**1161**	11 482.64	11.965	1.82
1062	10 308.61	11.736	3.26	**1112**	10 898.74	11.864	2.29	**1162**	11 494.60	11.966	1.81
1063	10 320.35	11.740	3.27	**1113**	10 910.61	11.866	2.28	**1163**	11 506.57	11.968	1.80
1064	10 332.09	11.743	3.27	**1114**	10 922.48	11.868	2.27	**1164**	11 518.54	11.970	1.79
1065	10 343.83	11.746	2.74	**1115**	10 934.35	11.871	2.26	**1165**	11 530.51	11.972	1.78
1066	10 355.58	11.748	2.73	**1116**	10 946.22	11.873	2.25	**1166**	11 542.48	11.974	1.77
1067	10 367.33	11.751	2.72	**1117**	10 958.09	11.875	2.24	**1167**	11 554.46	11.975	1.77
1068	10 379.08	11.754	2.71	**1118**	10 969.97	11.877	2.23	**1168**	11 566.43	11.977	1.76
1069	10 390.84	11.757	2.70	**1119**	10 981.85	11.880	2.22	**1169**	11 578.41	11.979	1.75
1070	10 402.60	11.759	2.69	**1120**	10 993.73	11.882	2.21	**1170**	11 590.39	11.981	1.74
1071	10 414.36	11.762	2.68	**1121**	11 005.61	11.884	2.20	**1171**	11 602.37	11.982	1.73
1072	10 426.12	11.765	2.67	**1122**	11 017.50	11.886	2.19	**1172**	11 614.36	11.984	1.72
1073	10 437.89	11.767	2.66	**1123**	11 029.38	11.889	2.18	**1173**	11 626.34	11.986	1.71
1074	10 449.66	11.770	2.65	**1124**	11 041.27	11.891	2.18	**1174**	11 638.33	11.988	1.70
1075	10 461.43	11.773	2.64	**1125**	11 053.16	11.893	2.17	**1175**	11 650.32	11.989	1.69
1076	10 473.20	11.775	2.63	**1126**	11 065.06	11.895	2.16	**1176**	11 662.31	11.991	1.68
1077	10 484.98	11.778	2.62	**1127**	11 076.95	11.897	2.15	**1177**	11 674.30	11.993	1.67
1078	10 496.76	11.781	2.61	**1128**	11 088.85	11.899	2.14	**1178**	11 686.29	11.994	1.66
1079	10 508.54	11.783	2.60	**1129**	11 100.75	11.901	2.13	**1179**	11 698.29	11.996	1.65
1080	10 520.32	11.786	2.60	**1130**	11 112.66	11.904	2.12	**1180**	11 710.28	11.998	1.64
1081	10 532.11	11.788	2.59	**1131**	11 124.56	11.906	2.11	**1181**	11 722.28	11.999	1.63
1082	10 543.90	11.791	2.58	**1132**	11 136.47	11.908	2.10	**1182**	11 734.28	12.001	1.62
1083	10 555.69	11.793	2.57	**1133**	11 148.38	11.910	2.09	**1183**	11 746.28	12.002	1.61
1084	10 567.49	11.796	2.56	**1134**	11 160.29	11.912	2.08	**1184**	11 758.29	12.004	1.60
1085	10 579.28	11.799	2.55	**1135**	11 172.20	11.914	2.07	**1185**	11 770.29	12.006	1.59
1086	10 591.08	11.801	2.54	**1136**	11 184.11	11.916	2.06	**1186**	11 782.30	12.007	1.58
1087	10 602.89	11.804	2.53	**1137**	11 196.03	11.918	2.05	**1187**	11 794.31	12.009	1.57
1088	10 614.69	11.806	2.52	**1138**	11 207.95	11.920	2.04	**1188**	11 806.31	12.010	1.57
1089	10 626.50	11.809	2.51	**1139**	11 219.87	11.922	2.03	**1189**	11 818.33	12.012	1.56
1090	10 638.31	11.811	2.50	**1140**	11 231.80	11.924	2.02	**1190**	11 830.34	12.013	1.55
1091	10 650.12	11.814	2.49	**1141**	11 243.72	11.926	2.01	**1191**	11 842.35	12.015	1.54
1092	10 661.94	11.816	2.48	**1142**	11 255.65	11.928	2.00	**1192**	11 854.37	12.017	1.53
1093	10 673.75	11.819	2.47	**1143**	11 267.58	11.930	1.99	**1193**	11 866.39	12.018	1.52
1094	10 685.57	11.821	2.46	**1144**	11 279.51	11.932	1.98	**1194**	11 878.41	12.020	1.51
1095	10 697.40	11.824	2.45	**1145**	11 291.44	11.934	1.97	**1195**	11 890.43	12.021	1.50
1096	10 709.22	11.826	2.44	**1146**	11 303.38	11.936	1.97	**1196**	11 902.45	12.023	1.49
1097	10 721.05	11.828	2.43	**1147**	11 315.31	11.938	1.96	**1197**	11 914.47	12.024	1.48
1098	10 732.88	11.831	2.42	**1148**	11 327.25	11.940	1.95	**1198**	11 926.50	12.026	1.47
1099	10 744.71	11.833	2.41	**1149**	11 339.19	11.942	1.94	**1199**	11 938.52	12.027	1.46
1100	10 756.54	11.836	2.40	**1150**	11 351.14	11.944	1.93	**1200**	11 950.55	12.028	1.45

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1200	11 950.55	12.028	1.45	1250	12 553.59	12.089	0.98	1300	13 159.07	12.126	0.50
1201	11 962.58	12.030	1.44	1251	12 565.68	12.090	0.97	1301	13 171.19	12.127	0.49
1202	11 974.61	12.031	1.43	1252	12 577.77	12.091	0.96	1302	13 183.32	12.127	0.48
1203	11 986.64	12.033	1.42	1253	12 589.86	12.092	0.95	1303	13 195.45	12.128	0.47
1204	11 998.67	12.034	1.41	1254	12 601.95	12.093	0.94	1304	13 207.58	12.128	0.46
1205	12 010.71	12.036	1.40	1255	12 614.05	12.094	0.93	1305	13 219.70	12.128	0.45
1206	12 022.75	12.037	1.39	1256	12 626.14	12.095	0.92	1306	13 231.83	12.129	0.44
1207	12 034.78	12.038	1.38	1257	12 638.24	12.096	0.91	1307	13 243.96	12.129	0.43
1208	12 046.82	12.040	1.37	1258	12 650.33	12.097	0.90	1308	13 256.09	12.130	0.43
1209	12 058.86	12.041	1.37	1259	12 662.43	12.098	0.89	1309	13 268.22	12.130	0.42
1210	12 070.91	12.043	1.36	1260	12 674.53	12.098	0.88	1310	13 280.35	12.131	0.41
1211	12 082.95	12.044	1.35	1261	12 686.63	12.099	0.87	1311	13 292.48	12.131	0.40
1212	12 094.99	12.045	1.34	1262	12 698.73	12.100	0.86	1312	13 304.61	12.131	0.39
1213	12 107.04	12.047	1.33	1263	12 710.83	12.101	0.85	1313	13 316.75	12.132	0.38
1214	12 119.09	12.048	1.32	1264	12 722.93	12.102	0.84	1314	13 328.88	12.132	0.37
1215	12 131.13	12.049	1.31	1265	12 735.03	12.103	0.83	1315	13 341.01	12.132	0.36
1216	12 143.18	12.050	1.30	1266	12 747.13	12.104	0.82	1316	13 353.14	12.133	0.35
1217	12 155.24	12.052	1.29	1267	12 759.24	12.104	0.81	1317	13 365.28	12.133	0.34
1218	12 167.29	12.053	1.28	1268	12 771.34	12.105	0.80	1318	13 377.41	12.134	0.33
1219	12 179.34	12.054	1.27	1269	12 783.45	12.106	0.80	1319	13 389.54	12.134	0.32
1220	12 191.40	12.056	1.26	1270	12 795.55	12.107	0.79	1320	13 401.68	12.134	0.31
1221	12 203.45	12.057	1.25	1271	12 807.66	12.108	0.78	1321	13 413.81	12.134	0.30
1222	12 215.51	12.058	1.24	1272	12 819.77	12.108	0.77	1322	13 425.95	12.135	0.29
1223	12 227.57	12.059	1.23	1273	12 831.88	12.109	0.76	1323	13 438.08	12.135	0.28
1224	12 239.63	12.061	1.22	1274	12 843.99	12.110	0.75	1324	13 450.22	12.135	0.27
1225	12 251.69	12.062	1.21	1275	12 856.10	12.111	0.74	1325	13 462.35	12.136	0.26
1226	12 263.75	12.063	1.20	1276	12 868.21	12.111	0.73	1326	13 474.49	12.136	0.25
1227	12 275.82	12.064	1.19	1277	12 880.32	12.112	0.72	1327	13 486.62	12.136	0.24
1228	12 287.88	12.065	1.18	1278	12 892.43	12.113	0.71	1328	13 498.76	12.136	0.24
1229	12 299.95	12.067	1.18	1279	12 904.55	12.113	0.70	1329	13 510.90	12.137	0.23
1230	12 312.01	12.068	1.17	1280	12 916.66	12.114	0.69	1330	13 523.03	12.137	0.22
1231	12 324.08	12.069	1.16	1281	12 928.77	12.115	0.68	1331	13 535.17	12.137	0.21
1232	12 336.15	12.070	1.15	1282	12 940.89	12.115	0.67	1332	13 547.31	12.137	0.20
1233	12 348.22	12.071	1.14	1283	12 953.00	12.116	0.66	1333	13 559.44	12.137	0.19
1234	12 360.29	12.072	1.13	1284	12 965.12	12.117	0.65	1334	13 571.58	12.138	0.18
1235	12 372.37	12.073	1.12	1285	12 977.24	12.117	0.64	1335	13 583.72	12.138	0.17
1236	12 384.44	12.075	1.11	1286	12 989.36	12.118	0.63	1336	13 595.86	12.138	0.16
1237	12 396.52	12.076	1.10	1287	13 001.47	12.119	0.62	1337	13 607.99	12.138	0.15
1238	12 408.59	12.077	1.09	1288	13 013.59	12.119	0.61	1338	13 620.13	12.138	0.14
1239	12 420.67	12.078	1.08	1289	13 025.71	12.120	0.61	1339	13 632.27	12.138	0.13
1240	12 432.75	12.079	1.07	1290	13 037.83	12.121	0.60	1340	13 644.41	12.139	0.12
1241	12 444.83	12.080	1.06	1291	13 049.95	12.121	0.59	1341	13 656.55	12.139	0.11
1242	12 456.91	12.081	1.05	1292	13 062.08	12.122	0.58	1342	13 668.69	12.139	0.10
1243	12 468.99	12.082	1.04	1293	13 074.20	12.122	0.57	1343	13 680.83	12.139	0.09
1244	12 481.07	12.083	1.03	1294	13 086.32	12.123	0.56	1344	13 692.96	12.139	0.08
1245	12 493.16	12.084	1.02	1295	13 098.44	12.123	0.55	1345	13 705.10	12.139	0.07
1246	12 505.24	12.085	1.01	1296	13 110.57	12.124	0.54	1346	13 717.24	12.139	0.06
1247	12 517.33	12.086	1.00	1297	13 122.69	12.125	0.53	1347	13 729.38	12.139	0.06
1248	12 529.41	12.087	0.99	1298	13 134.82	12.125	0.52	1348	13 741.52	12.139	0.05
1249	12 541.50	12.088	0.99	1299	13 146.94	12.126	0.51	1349	13 753.66	12.139	0.04
1250	12 553.59	12.089	0.98	1300	13 159.07	12.126	0.50	1350	13 765.80	12.139	0.03

TABLE 4.3.3. ***Type S thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1350	13 765.80	12.139	0.03	**1400**	14 372.60	12.129	−0.45	**1450**	14 978.28	12.095	−0.92
1351	13 777.94	12.139	0.02	**1401**	14 384.73	12.128	−0.46	**1451**	14 990.38	12.094	−0.93
1352	13 790.08	12.139	0.01	**1402**	14 396.85	12.128	−0.46	**1452**	15 002.47	12.093	−0.94
1353	13 802.22	12.139	−0.00	**1403**	14 408.98	12.127	−0.47	**1453**	15 014.56	12.092	−0.95
1354	13 814.36	12.139	−0.01	**1404**	14 421.11	12.127	−0.48	**1454**	15 026.65	12.091	−0.96
1355	13 826.50	12.139	−0.02	**1405**	14 433.24	12.126	−0.49	**1455**	15 038.74	12.090	−0.97
1356	13 838.63	12.139	−0.03	**1406**	14 445.36	12.126	−0.50	**1456**	15 050.83	12.089	−0.98
1357	13 850.77	12.139	−0.04	**1407**	14 457.49	12.125	−0.51	**1457**	15 062.92	12.088	−0.98
1358	13 862.91	12.139	−0.05	**1408**	14 469.61	12.125	−0.52	**1458**	15 075.01	12.087	−0.99
1359	13 875.05	12.139	−0.06	**1409**	14 481.74	12.124	−0.53	**1459**	15 087.10	12.086	−1.00
1360	13 887.19	12.139	−0.07	**1410**	14 493.86	12.124	−0.54	**1460**	15 099.18	12.085	−1.01
1361	13 899.33	12.139	−0.08	**1411**	14 505.98	12.123	−0.55	**1461**	15 111.26	12.084	−1.02
1362	13 911.47	12.139	−0.09	**1412**	14 518.11	12.123	−0.56	**1462**	15 123.35	12.083	−1.03
1363	13 923.61	12.139	−0.10	**1413**	14 530.23	12.122	−0.57	**1463**	15 135.43	12.082	−1.04
1364	13 935.75	12.139	−0.11	**1414**	14 542.35	12.122	−0.58	**1464**	15 147.51	12.081	−1.05
1365	13 947.89	12.139	−0.11	**1415**	14 554.47	12.121	−0.59	**1465**	15 159.59	12.080	−1.06
1366	13 960.02	12.138	−0.12	**1416**	14 566.59	12.120	−0.60	**1466**	15 171.67	12.079	−1.07
1367	13 972.16	12.138	−0.13	**1417**	14 578.71	12.120	−0.61	**1467**	15 183.75	12.078	−1.08
1368	13 984.30	12.138	−0.14	**1418**	14 590.83	12.119	−0.62	**1468**	15 195.83	12.077	−1.09
1369	13 996.44	12.138	−0.15	**1419**	14 602.95	12.119	−0.63	**1469**	15 207.90	12.075	−1.10
1370	14 008.58	12.138	−0.16	**1420**	14 615.07	12.118	−0.64	**1470**	15 219.98	12.074	−1.11
1371	14 020.71	12.138	−0.17	**1421**	14 627.19	12.117	−0.64	**1471**	15 232.05	12.073	−1.12
1372	14 032.85	12.138	−0.18	**1422**	14 639.31	12.117	−0.65	**1472**	15 244.12	12.072	−1.13
1373	14 044.99	12.137	−0.19	**1423**	14 651.42	12.116	−0.66	**1473**	15 256.20	12.071	−1.14
1374	14 057.13	12.137	−0.20	**1424**	14 663.54	12.115	−0.67	**1474**	15 268.27	12.070	−1.14
1375	14 069.26	12.137	−0.21	**1425**	14 675.65	12.115	−0.68	**1475**	15 280.34	12.069	−1.15
1376	14 081.40	12.137	−0.22	**1426**	14 687.77	12.114	−0.69	**1476**	15 292.40	12.068	−1.16
1377	14 093.54	12.137	−0.23	**1427**	14 699.88	12.113	−0.70	**1477**	15 304.47	12.066	−1.17
1378	14 105.67	12.136	−0.24	**1428**	14 711.99	12.113	−0.71	**1478**	15 316.54	12.065	−1.18
1379	14 117.81	12.136	−0.25	**1429**	14 724.11	12.112	−0.72	**1479**	15 328.60	12.064	−1.19
1380	14 129.95	12.136	−0.26	**1430**	14 736.22	12.111	−0.73	**1480**	15 340.67	12.063	−1.20
1381	14 142.08	12.136	−0.27	**1431**	14 748.33	12.110	−0.74	**1481**	15 352.73	12.062	−1.21
1382	14 154.22	12.135	−0.28	**1432**	14 760.44	12.110	−0.75	**1482**	15 364.79	12.060	−1.22
1383	14 166.35	12.135	−0.29	**1433**	14 772.55	12.109	−0.76	**1483**	15 376.85	12.059	−1.23
1384	14 178.49	12.135	−0.29	**1434**	14 784.66	12.108	−0.77	**1484**	15 388.91	12.058	−1.24
1385	14 190.62	12.134	−0.30	**1435**	14 796.76	12.107	−0.78	**1485**	15 400.96	12.057	−1.25
1386	14 202.76	12.134	−0.31	**1436**	14 808.87	12.107	−0.79	**1486**	15 413.02	12.055	−1.26
1387	14 214.89	12.134	−0.32	**1437**	14 820.98	12.106	−0.80	**1487**	15 425.08	12.054	−1.27
1388	14 227.02	12.133	−0.33	**1438**	14 833.08	12.105	−0.81	**1488**	15 437.13	12.053	−1.28
1389	14 239.16	12.133	−0.34	**1439**	14 845.19	12.104	−0.81	**1489**	15 449.18	12.052	−1.29
1390	14 251.29	12.133	−0.35	**1440**	14 857.29	12.103	−0.82	**1490**	15 461.23	12.050	−1.30
1391	14 263.42	12.132	−0.36	**1441**	14 869.39	12.103	−0.83	**1491**	15 473.28	12.049	−1.31
1392	14 275.55	12.132	−0.37	**1442**	14 881.50	12.102	−0.84	**1492**	15 485.33	12.048	−1.31
1393	14 287.69	12.132	−0.38	**1443**	14 893.60	12.101	−0.85	**1493**	15 497.38	12.046	−1.32
1394	14 299.82	12.131	−0.39	**1444**	14 905.70	12.100	−0.86	**1494**	15 509.42	12.045	−1.33
1395	14 311.95	12.131	−0.40	**1445**	14 917.80	12.099	−0.87	**1495**	15 521.47	12.044	−1.34
1396	14 324.08	12.130	−0.41	**1446**	14 929.90	12.098	−0.88	**1496**	15 533.51	12.042	−1.35
1397	14 336.21	12.130	−0.42	**1447**	14 941.99	12.097	−0.89	**1497**	15 545.55	12.041	−1.36
1398	14 348.34	12.130	−0.43	**1448**	14 954.09	12.096	−0.90	**1498**	15 557.59	12.040	−1.37
1399	14 360.47	12.129	−0.44	**1449**	14 966.19	12.096	−0.91	**1499**	15 569.63	12.038	−1.38
1400	14 372.60	12.129	−0.45	**1450**	14 978.28	12.095	−0.92	**1500**	15 581.67	12.037	−1.39

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1500	15 581.67	12.037	−1.39	**1550**	16 181.58	11.956	−1.86	**1600**	16 776.84	11.851	−2.33
1501	15 593.71	12.036	−1.40	**1551**	16 193.54	11.954	−1.87	**1601**	16 788.69	11.849	−2.34
1502	15 605.74	12.034	−1.41	**1552**	16 205.49	11.952	−1.88	**1602**	16 800.54	11.846	−2.35
1503	15 617.77	12.033	−1.42	**1553**	16 217.44	11.950	−1.89	**1603**	16 812.39	11.844	−2.36
1504	15 629.81	12.031	−1.43	**1554**	16 229.39	11.948	−1.90	**1604**	16 824.23	11.841	−2.37
1505	15 641.84	12.030	−1.44	**1555**	16 241.34	11.946	−1.91	**1605**	16 836.07	11.839	−2.38
1506	15 653.87	12.028	−1.45	**1556**	16 253.28	11.944	−1.92	**1606**	16 847.91	11.837	−2.39
1507	15 665.89	12.027	−1.46	**1557**	16 265.23	11.942	−1.93	**1607**	16 859.74	11.834	−2.40
1508	15 677.92	12.026	−1.47	**1558**	16 277.17	11.940	−1.94	**1608**	16 871.58	11.832	−2.41
1509	15 689.94	12.024	−1.47	**1559**	16 289.11	11.939	−1.95	**1609**	16 883.41	11.830	−2.42
1510	15 701.97	12.023	−1.48	**1560**	16 301.04	11.937	−1.95	**1610**	16 895.23	11.827	−2.42
1511	15 713.99	12.021	−1.49	**1561**	16 312.98	11.935	−1.96	**1611**	16 907.06	11.825	−2.43
1512	15 726.01	12.020	−1.50	**1562**	16 324.91	11.933	−1.97	**1612**	16 918.88	11.822	−2.44
1513	15 738.03	12.018	−1.51	**1563**	16 336.85	11.931	−1.98	**1613**	16 930.70	11.820	−2.45
1514	15 750.05	12.017	−1.52	**1564**	16 348.78	11.929	−1.99	**1614**	16 942.52	11.817	−2.46
1515	15 762.06	12.015	−1.53	**1565**	16 360.70	11.927	−2.00	**1615**	16 954.34	11.815	−2.47
1516	15 774.08	12.013	−1.54	**1566**	16 372.63	11.925	−2.01	**1616**	16 966.15	11.812	−2.48
1517	15 786.09	12.012	−1.55	**1567**	16 384.55	11.923	−2.02	**1617**	16 977.96	11.810	−2.49
1518	15 798.10	12.010	−1.56	**1568**	16 396.47	11.921	−2.03	**1618**	16 989.77	11.807	−2.50
1519	15 810.11	12.009	−1.57	**1569**	16 408.39	11.919	−2.04	**1619**	17 001.58	11.805	−2.51
1520	15 822.12	12.007	−1.58	**1570**	16 420.31	11.917	−2.05	**1620**	17 013.38	11.802	−2.52
1521	15 834.12	12.006	−1.59	**1571**	16 432.23	11.915	−2.06	**1621**	17 025.18	11.800	−2.53
1522	15 846.13	12.004	−1.60	**1572**	16 444.14	11.912	−2.07	**1622**	17 036.98	11.797	−2.54
1523	15 858.13	12.002	−1.61	**1573**	16 456.05	11.910	−2.08	**1623**	17 048.78	11.795	−2.55
1524	15 870.13	12.001	−1.62	**1574**	16 467.96	11.908	−2.09	**1624**	17 060.57	11.792	−2.56
1525	15 882.13	11.999	−1.63	**1575**	16 479.87	11.906	−2.10	**1625**	17 072.36	11.790	−2.57
1526	15 894.13	11.998	−1.63	**1576**	16 491.77	11.904	−2.11	**1626**	17 084.15	11.787	−2.57
1527	15 906.13	11.996	−1.64	**1577**	16 503.68	11.902	−2.11	**1627**	17 095.94	11.785	−2.58
1528	15 918.12	11.994	−1.65	**1578**	16 515.58	11.900	−2.12	**1628**	17 107.72	11.782	−2.59
1529	15 930.12	11.993	−1.66	**1579**	16 527.48	11.898	−2.13	**1629**	17 119.50	11.779	−2.60
1530	15 942.11	11.991	−1.67	**1580**	16 539.37	11.896	−2.14	**1630**	17 131.28	11.777	−2.61
1531	15 954.10	11.989	−1.68	**1581**	16 551.27	11.893	−2.15	**1631**	17 143.05	11.774	−2.62
1532	15 966.09	11.988	−1.69	**1582**	16 563.16	11.891	−2.16	**1632**	17 154.83	11.771	−2.63
1533	15 978.08	11.986	−1.70	**1583**	16 575.05	11.889	−2.17	**1633**	17 166.60	11.769	−2.64
1534	15 990.06	11.984	−1.71	**1584**	16 586.94	11.887	−2.18	**1634**	17 178.36	11.766	−2.65
1535	16 002.04	11.983	−1.72	**1585**	16 598.82	11.885	−2.19	**1635**	17 190.13	11.764	−2.66
1536	16 014.03	11.981	−1.73	**1586**	16 610.71	11.883	−2.20	**1636**	17 201.89	11.761	−2.67
1537	16 026.01	11.979	−1.74	**1587**	16 622.59	11.880	−2.21	**1637**	17 213.65	11.758	−2.68
1538	16 037.98	11.977	−1.75	**1588**	16 634.47	11.878	−2.22	**1638**	17 225.41	11.756	−2.69
1539	16 049.96	11.976	−1.76	**1589**	16 646.35	11.876	−2.23	**1639**	17 237.16	11.753	−2.70
1540	16 061.93	11.974	−1.77	**1590**	16 658.22	11.874	−2.24	**1640**	17 248.91	11.750	−2.71
1541	16 073.91	11.972	−1.78	**1591**	16 670.09	11.871	−2.25	**1641**	17 260.66	11.747	−2.72
1542	16 085.88	11.970	−1.79	**1592**	16 681.96	11.869	−2.26	**1642**	17 272.41	11.745	−2.72
1543	16 097.85	11.968	−1.79	**1593**	16 693.83	11.867	−2.27	**1643**	17 284.15	11.742	−2.73
1544	16 109.82	11.967	−1.80	**1594**	16 705.70	11.865	−2.27	**1644**	17 295.89	11.739	−2.74
1545	16 121.78	11.965	−1.81	**1595**	16 717.56	11.862	−2.28	**1645**	17 307.63	11.736	−2.75
1546	16 133.75	11.963	−1.82	**1596**	16 729.42	11.860	−2.29	**1646**	17 319.37	11.734	−2.76
1547	16 145.71	11.961	−1.83	**1597**	16 741.28	11.858	−2.30	**1647**	17 331.10	11.731	−2.77
1548	16 157.67	11.959	−1.84	**1598**	16 753.14	11.856	−2.31	**1648**	17 342.83	11.728	−2.78
1549	16 169.63	11.958	−1.85	**1599**	16 764.99	11.853	−2.32	**1649**	17 354.55	11.725	−2.79
1550	16 181.58	11.956	−1.86	**1600**	16 776.84	11.851	−2.33	**1650**	17 366.28	11.723	−2.80

TABLE 4.3.3. *Type S thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1650	17 366.28	11.723	−2.80	**1690**	17 832.32	11.542	−8.00	**1730**	18 285.46	11.063	−15.95
1651	17 378.00	11.720	−2.81	**1691**	17 843.86	11.533	−8.20	**1731**	18 296.52	11.047	−16.15
1652	17 389.72	11.717	−2.82	**1692**	17 855.39	11.525	−8.40	**1732**	18 307.56	11.030	−16.34
1653	17 401.43	11.714	−2.83	**1693**	17 866.91	11.517	−8.60	**1733**	18 318.58	11.014	−16.54
1654	17 413.15	11.711	−2.84	**1694**	17 878.42	11.508	−8.80	**1734**	18 329.58	10.997	−16.74
1655	17 424.86	11.708	−2.85	**1695**	17 889.92	11.499	−8.99	**1735**	18 340.57	10.980	−16.94
1656	17 436.56	11.706	−2.86	**1696**	17 901.42	11.490	−9.19	**1736**	18 351.54	10.963	−17.14
1657	17 448.27	11.703	−2.87	**1697**	17 912.90	11.481	−9.39	**1737**	18 362.50	10.946	−17.34
1658	17 459.97	11.700	−2.87	**1698**	17 924.38	11.471	−9.59	**1738**	18 373.44	10.929	−17.54
1659	17 471.67	11.697	−2.88	**1699**	17 935.85	11.462	−9.79	**1739**	18 384.36	10.911	−17.74
1660	17 483.36	11.694	−2.89	**1700**	17 947.30	11.452	−9.99	**1740**	18 395.26	10.893	−17.93
1661	17 495.06	11.691	−2.90	**1701**	17 958.75	11.442	−10.19	**1741**	18 406.14	10.875	−18.13
1662	17 506.75	11.688	−2.91	**1702**	17 970.19	11.431	−10.39	**1742**	18 417.01	10.857	−18.33
1663	17 518.43	11.685	−2.92	**1703**	17 981.61	11.421	−10.58	**1743**	18 427.86	10.838	−18.53
1664	17 530.12	11.682	−2.93	**1704**	17 993.03	11.410	−10.78	**1744**	18 438.68	10.820	−18.73
1665	17 541.80	11.680	−3.04	**1705**	18 004.43	11.399	−10.98	**1745**	18 449.50	10.801	−18.93
1666	17 553.48	11.676	−3.23	**1706**	18 015.82	11.388	−11.18	**1746**	18 460.29	10.782	−19.13
1667	17 565.15	11.673	−3.43	**1707**	18 027.21	11.377	−11.38	**1747**	18 471.06	10.763	−19.32
1668	17 576.82	11.670	−3.63	**1708**	18 038.58	11.365	−11.58	**1748**	18 481.81	10.743	−19.52
1669	17 588.49	11.666	−3.83	**1709**	18 049.94	11.354	−11.78	**1749**	18 492.55	10.724	−19.72
1670	17 600.15	11.662	−4.03	**1710**	18 061.29	11.342	−11.97	**1750**	18 503.26	10.704	−19.92
1671	17 611.81	11.658	−4.23	**1711**	18 072.62	11.330	−12.17	**1751**	18 513.95	10.684	−20.12
1672	17 623.47	11.653	−4.43	**1712**	18 083.95	11.317	−12.37	**1752**	18 524.63	10.664	−20.32
1673	17 635.12	11.649	−4.62	**1713**	18 095.26	11.305	−12.57	**1753**	18 535.28	10.643	−20.52
1674	17 646.77	11.644	−4.82	**1714**	18 106.56	11.292	−12.77	**1754**	18 545.91	10.623	−20.72
1675	17 658.41	11.639	−5.02	**1715**	18 117.84	11.279	−12.97	**1755**	18 556.53	10.602	−20.91
1676	17 670.04	11.634	−5.22	**1716**	18 129.11	11.266	−13.17	**1756**	18 567.12	10.581	−21.11
1677	17 681.68	11.629	−5.42	**1717**	18 140.37	11.253	−13.36	**1757**	18 577.69	10.560	−21.31
1678	17 693.30	11.623	−5.62	**1718**	18 151.62	11.240	−13.56	**1758**	18 588.24	10.538	−21.51
1679	17 704.92	11.618	−5.82	**1719**	18 162.85	11.226	−13.76	**1759**	18 598.76	10.517	−21.71
1680	17 716.54	11.612	−6.01	**1720**	18 174.07	11.212	−13.96	**1760**	18 609.27	10.495	−21.91
1681	17 728.15	11.606	−6.21	**1721**	18 185.28	11.198	−14.16	**1761**	18 619.75	10.473	−22.11
1682	17 739.75	11.599	−6.41	**1722**	18 196.47	11.184	−14.36	**1762**	18 630.22	10.451	−22.30
1683	17 751.34	11.593	−6.61	**1723**	18 207.64	11.169	−14.56	**1763**	18 640.65	10.428	−22.50
1684	17 762.93	11.586	−6.81	**1724**	18 218.81	11.155	−14.76	**1764**	18 651.07	10.406	−22.70
1685	17 774.52	11.579	−7.01	**1725**	18 229.95	11.140	−14.95	**1765**	18 661.47	10.383	−22.90
1686	17 786.09	11.572	−7.21	**1726**	18 241.09	11.125	−15.15	**1766**	18 671.84	10.360	−23.10
1687	17 797.66	11.565	−7.41	**1727**	18 252.20	11.110	−15.35	**1767**	18 682.19	10.337	−23.30
1688	17 809.22	11.557	−7.60	**1728**	18 263.31	11.094	−15.55	**1768**	18 692.51	10.313	−23.50
1689	17 820.77	11.549	−7.80	**1729**	18 274.39	11.078	−15.75				
1690	17 832.32	11.542	−8.00	**1730**	18 285.46	11.063	−15.95				

4.4. References

[1] ASTM, American Society for Testing and Materials, Standard E1159-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 388-389.

[2] Bedford, R. E.; Ma, C. K.; Barber, C. R.; Chandler, T. R.; Quinn, T. J.; Burns, G. W.; Scroger, M. New reference tables for platinum 10% rhodium/platinum and platinum 13% rhodium/platinum thermocouples. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4; Plumb, H. H.., ed.; Pittsburgh: Instrument Society of America; 1972. 1585-1603.

[3] Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. New reference function for platinum-10% rhodium versus platinum (type S) thermocouples based on the ITS-90, Part I and Part II. in *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 537-546.

[4] Le Chatelier, H., *C. R. Acad. Sci.* **102**, 819; 1886. Additional papers were published in *Journal de Physique and Annallen der Physik* during 1887.

[5] Burgess, G. K. The International Temperature Scale. *J. Res. Natl. Bur. Stand. (U.S.)* **11**, 635-640; RP22; 1928.

[6] Sosman, R. B. The platinum-rhodium thermoelement from 0° to 1755°. *Am. J. Sci.* (4), **30**, 1-15; 1910.

[7] Day, A. L.; Sosman, R. B. The nitrogen thermometer from zinc to palladium. *Am. J. Sci.* (4), **29**, 93-161; 1910.

[8] Adams, L. H. Calibration tables for copper-constantan and platinum-platinrhodium thermoelements. *J. Am. Chem. Soc.* **36**, 65-72; 1914.

[9] Foote, P. D.; Fairchild, C. O.; Harrison, T. R. Pyrometric practice. *Tech. Papers Natl. Bur. Stand. (U.S.)*, T170; 1921 February. 326 p.

[10] Roeser, W. F.; Wensel, H. T. Reference tables for platinum to platinum–rhodium thermocouples. *J. Res. Natl. Bur. Stand. (U.S.)* **10**, 275-279; RP530; 1933.

[11] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 508*; 1951 May. 73 p.

[12] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J.; Lonberger, S. T. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 561*; 1955 April. 87 p.

[13] Barber, C. R. The E.M.F.–temperature calibration of platinum, 10% rhodium-platinum and platinum, 13% rhodium-platinum thermocouples over the temperature range 0°-1,760 °C., *Proc. Phys. Soc.* **63B**, 492-503; 1950.

[14] British Standards Institution, Reference tables for thermocouples, (platinum/rhodium v. platinum). *British Standard B.S. 1826:1952*; London: British Standards House; 1952. 42 p.

[15] Bedford, R. E. New reference tables for platinum 10% rhodium/platinum and platinum 13% rhodium/platinum thermocouples, an interim report. *Advances in Instrumentation*; Vol. 24, Part III, Paper No. 69-628; Pittsburgh:Instrument Society of America; 1969.

[16] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[17] International Electrotechnical Commission Standard, Thermocouples, Part 1: Reference tables. *IEC Publication 584-1*; Geneva, Switzerland: Bureau Central de la Commission Electrotechnique Internationale; 1977.

[18] Walker, B. E.; Ewing, C. T.; Miller, R.R. Thermoelectric instability of some noble metal thermocouples at high temperatures. *Rev. Sci. Instrum.* **33**, 1029-1040; 1962.

[19] Walker, B. E.; Ewing, C. T.; Miller, R.R. Study of the instability of noble metal thermocouples in vacuum. *Rev. Sci. Instrum.* **36**, 601-606; 1965.

[20] Bentley, R. E. Changes in Seebeck coefficient of Pt and Pt 10% Rh after use to 1700 °C in high-purity polycrystalline alumina. *Int. J. Thermophys.* **6**(1), 83-99; 1985.

[21] Rhys, D. W.; Taimsalu, P. Effect of alloying additions on the thermoelectric properties of platinum. *Engelhard Tech. Bull.* **10**, 41-47; 1969.

[22] Cochrane, J. Relationship of chemical composition to the electrical properties of platinum. *Engelhard Tech. Bull.* **11**, 58-71; 1969. Also in *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4; Plumb, H. H., ed.; Pittsburgh: Instrument Society of America; 1972. 1619-1632.

[23] Aliotta, J. Effects of impurities on the thermoelectric properties of platinum. *Inst. and Control Systems*, 106-107; March 1972.

[24] McLaren, E. H.; Murdock, E. G. New considerations on the preparation, properties and limitations of the standard thermocouple for thermometry. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4; Plumb, H. H.., ed.; Pittsburgh: Instrument Society of America; 1972. 1543-1560.

[25] McLaren, E. H.; Murdock, E. G. The properties of Pt/PtRh thermocouples for thermometry in the range 0-1100 °C: I. Basic measurements with standard thermocouples. *National Research Council of Canada Publication APH 2212/NRCC 17407*; 1979.

[26] McLaren, E. H.; Murdock, E. G. The properties of Pt/PtRh thermocouples for thermometry in the range 0-1100 °C: II. Effect of heat treatment on standard thermocouples. *National Research Council of Canada Publication APH 2213/NRCC 17408*; 1979.

[27] McLaren, E. H.; Murdock, E. G. Properties of some noble and base metal thermocouples at fixed points in the range 0-1100 °C. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5; Schooley, J. F., ed.; New York: American Institute of Physics; 1982. 953-975.

[28] Bentley, R. E.; Jones, T. P. Inhomogeneities in type S thermocouples when used to 1064 °C. *High Temperatures-High Pressures* **12**, 33-45; 1980.

[29] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[30] National Institute of Standards and Technology (NIST), Gaithersburg, MD; Istituto di Metrologia "G. Colonnetti" (IMGC), Torino, Italy; Korea Research Institute of Standards and Science (KRISS), Taejon, Republic of Korea; National Physical Laboratory (NPL), Teddington, United Kingdom; National Research Laboratory of Metrology (NRLM), Ibaraki, Japan; D. I. Mendeleyev Institute for Metrology (VNIIM), St. Petersburg, Russia; Van Swinden Laboratorium (VSL), Delft, The Netherlands;

Shanghai Institute of Process Automation Instrumentation (SIPAI), Shanghai, PRC.

[31] Strouse, G. F.; Mangum, B. W.; Pokhodun, A. I.; Moiseeva, N. P. Investigation of high-temperature platinum resistance thermometers at temperatures up to 962 °C, and, in some cases, 1064 °C. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 389-394.

[32] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 547-552.

[33] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[34] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

[35] Bedford, R. E.; Bonnier, G.; Maas, H.; Pavese, F. Recommended values of temperature for a selected set of secondary reference points. *Metrologia* **20**, 145-155; 1984.

5. TYPE E—Nickel-Chromium Alloy Versus Copper-Nickel Alloy Thermocouples

5.1. Material Specifications and Precautions

This type, and the other base-metal types, do not have specific chemical compositions given in standards; rather, any material whose emf-temperature relationship agrees with that of the specified reference table within certain tolerances (see the end of this section) can be considered to be a type E thermocouple. The positive thermoelement, EP, is the same material as KP. The negative thermoelement, EN, is the same material as TN. Their nominal chemical compositions are given in chapters 7 and 9, respectively.

The type E thermocouple does not have a well-documented history. The first officially recognized reference tables were those calculated by Shenker and others at NBS and presented in 1951 in NBS Circular 508 [1] and again, several years later, in NBS Circular 561 [2]. The tables covered the range −200 °C to 1000 °C and were based upon a combination of data for KP versus platinum and platinum versus TN, where the data were taken from earlier NBS Research Papers [3,4].

Extensive research on the low-temperature properties of the commonly used thermocouple types was conducted during the 1960s and early 1970s by Sparks, Powell and others of the NBS Cryogenics Division in Boulder. Their research led to the establishment of a type E thermocouple reference function and table covering the range from 7 °C down to −270 °C to satisfy a need for thermocouple reference data in the cryogenic temperature range. The reference function and table, which were based on the NBS 2-20 temperature scale [5] at temperatures below 20 K and on the IPTS-68 above 20 K, were presented in NBS Monograph 124 [6]. Powell and others at NBS then combined this low-temperature reference function with a high-temperature function that they obtained by fitting selected tabular values taken from NBS Circular 561 at temperatures above 0 °C, after correcting the latter values to account for the change in the international temperature scale from the IPTS-48 to the IPTS-68. Their IPTS-68 based reference function and table, which covered the range −270 °C to 1000 °C, were published in 1974 in NBS Monograph 125 [7].

The low-temperature research [6] by members of the NBS Cryogenics Division showed that type E thermocouples are very useful down to liquid hydrogen temperatures (n.b.p. about 20.3 K) where their Seebeck coefficient is about 8 μV/°C. They may even be used down to liquid helium temperatures (4.2 K) although their Seebeck coefficient becomes quite low, only about 2 μV/°C at 4 K. Both thermoelements of type E thermocouples have a relatively low thermal conductivity, good resistance to corrosion in moist atmospheres, and reasonably good homogeneity. For these three reasons and their relatively high Seebeck coefficients, type E thermocouples have been recommended [6] as the most useful of the letter-designated thermocouple types for low-temperature measurements.

For measurements below 20 K, the non-letter-designated thermocouple, KP versus gold-0.07 at.% iron, is recommended. The properties of this thermocouple have been described by Sparks and Powell [8].

Type E thermocouples also have the largest Seebeck coefficient above 0 °C of any of the letter-designated thermocouples. For that reason they are being used more often whenever environmental conditions permit.

Type E thermocouples are recommended by the ASTM [9] for use in the temperature range from −200 °C to 900 °C in oxidizing or inert atmospheres. If used for extended times in air above 500 °C, heavy gage wires are recommended because the oxidation rate is rapid at elevated temperatures. About 50 years ago, Dahl [10] studied the thermoelectric stability of EP and EN type alloys when heated in air at elevated temperatures and his work should be consulted for details. More recent stability data on these alloys in air were reported by Burley *et al.* [11]. Type E thermocouples should not be used at high temperatures in sulfurous, reducing, or alternately reducing and oxidizing atmospheres unless suitably protected with protecting tubes. They also should not be used in vacuum (at high temperatures) for extended times because the chromium in the positive thermoelement, a nickel-chromium alloy, vaporizes out of solution and alters the calibration. In addition, their use in atmospheres that promote "green-rot" corrosion of the positive thermoelement should be avoided. Such corrosion results from the preferential oxidation of chromium in atmospheres with low, but not negligible, oxygen content and can lead to a large decrease in the thermoelectric voltage of the thermocouple with time. The effect is most serious at temperatures between 800 °C and 1050 °C.

The negative thermoelement, a copper-nickel alloy, is subject to composition changes under thermal neutron irradiation since the copper is converted to nickel and zinc.

Neither thermoelement of type E thermocouples is very sensitive to minor changes in composition or impurity level because both are already heavily alloyed. Similarly, they are also not extremely sensitive to minor differences in heat treatment (provided that the treatment does not violate any of the restrictions mentioned above). For most general

applications, they may be used with the heat treatment given by the wire manufacturers. However, when the highest accuracy is sought, additional preparatory heat treatments may be desirable in order to enhance their performance. Details on this and other phases of the use and behavior of type KP thermoelements (EP is the same as KP) are given in publications by Potts and McElroy [12], by Burley and Ackland [13], by Burley [14], by Wang and Starr [15,16], by Bentley [17] and by Kollie *et al.* [18].

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [19] specifies that the initial calibration tolerances for type E commercial thermocouples be ± 1.7 °C or ± 0.5% (whichever is greater) between 0 °C and 900 °C, and ± 1.7 °C or ±1% (whichever is greater) between −200 °C and 0 °C. Type E thermocouples can also be supplied to meet special tolerances which are equal to ± 1 °C or ± 0.4% (whichever is greater) between 0 °C and 900 °C, and ± 1 °C or ± 0.5% (whichever is greater) between −200 °C and 0 °C. Type E thermocouple materials are normally supplied to meet the tolerances specified for temperatures above 0 °C. The same materials, however, may not satisfy the tolerances specified for the −200 °C to 0 °C range. If materials are required to meet the tolerances below 0 °C, this should be specified when they are purchased.

The suggested upper temperature limit, 870 °C, given in the ASTM standard [19] for protected type E thermocouples applies to AWG 8 (3.25 mm) wire. It decreases to 650 °C for AWG 14 (1.63 mm), 540 °C for AWG 20 (0.81 mm), 430 °C for AWG 24 or 28 (0.51 mm or 0.33 mm), and 370 °C for AWG 30 (0.25 mm). These temperature limits apply to thermocouples used in conventional closed-end protecting tubes and they are intended only as a rough guide to the user. They do not apply to thermocouples having compacted mineral oxide insulation.

5.2. Construction of Reference Function

The reference function for type E thermocouples is based on the polynomial representations in NBS Monograph 125 [7] and the difference in values of temperature expressed on the IPTS-68 and the ITS-90 [20] as given by

$$\Delta t = t_{90} - t_{68},$$

where t_{90} and t_{68} indicate temperature (°C) on the ITS-90 and the IPTS-68, respectively.

Monograph 125 gives polynomial representations of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the temperature range −270 °C to 1000 °C. In terms of t_{90}, these are replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i \quad for\ j = 1, 2.$$

Thermoelectric voltages, Y_t, where

$$Y_t = 0.999990736\ g(t_{90} - \Delta t),$$

were fitted by the method of least-squares to corresponding values of t_{90} to obtain the coefficients, c_i, of $f_j(t_{90})$ in terms of the ITS-90 and the SI volt [21]. The data for this analysis come from three sources. To generate Y_t values for the range 20 K to 630 °C, Δt values at 10 °C intervals were taken from the table of Preston-Thomas [20]. Between 630 °C and 1000 °C, Δt values were obtained at 10 °C intervals from the fifth degree polynomial in t_{90} given by Guthrie *et al.* [22]. Below 20 K, the function $g(t)$ in Monograph 125 is expressed on the acoustic temperature scale, NBS 2-20 [5]. Given the table of temperature differences between NBS 2-20 and EPT-76 published by the BIPM [23], thermoelectric voltages given by

$$Y_t = 0.999990736\ g(T_{NBS2\text{-}20} - 273.15),$$

and corresponding temperatures, T_{76}, were computed at roughly 1 °C intervals. These in turn are related to temperatures, t_{90}, by the equations [24]:

$$T_{90} - T_{76} = -5.6 \text{ X } 10^{-6} (T_{76})^2,$$

where $T_{90}/\text{K} = t_{90}/°\text{C} + 273.15$.

A single polynomial was not satisfactory to cover the temperature range from −270 °C to 1000 °C, and, as in Monograph 125, the range was broken at 0 °C into two segments. A separate polynomial is defined for each segment.

The appropriate degree for each polynomial is at issue, and the least-squares criteria for testing the appropriateness of a model do not strictly apply because the Δt data, derived by smoothing of experimental data, are not contaminated by random error. The approach used was to choose the lowest degree polynomial for which the largest absolute difference between a fitted value, $f_j(t_{90})$, and a corresponding datum point, Y_t, was less than 0.08 μV for temperatures below 0 °C and less than $0.02 f_j'(t_{90})$ μV for temperatures above 0 °C (except in the range 600 °C to 660 °C). In the 600 to 660 °C

temperature range the residuals are greater than $0.02 f_j'(t_{90})$ μV because the model chosen to fit the corresponding values of Y_t and t_{90} does not account for the discontinuity at 630.615 °C that is induced by the discontinuity [22] in the first derivative of the Δt data at that temperature. For temperatures in the range −270 °C to 0 °C, a thirteenth degree polynomial, $f_1(t_{90})$, satisfies the criterion and for the range 0 °C to 1000 °C a tenth degree polynomial, $f_2(t_{90})$, is adequate. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 5.3 to 11 significant digits. The reader is cautioned that further rounding or truncation of the coefficients could adversely affect computations which depend on the reference function.

Equality at the break-point (0 °C) was achieved by constraining the polynomials to give 0 μV at 0 °C. Also, the polynomial for the range below 0 °C was constrained to have the same first derivative at 0 °C as that of the polynomial for the range above 0 °C. The second derivatives of the polynomials were not constrained.

The uncertainty in the ITS-90 reference function is given as its bias relative to the IPTS-68 reference function. The uncertainty for each temperature range is estimated by computing the maximum absolute difference between $f_j(t_{90})$ and Y_t over that range. This difference is computed for three subranges of the 0 °C to 1000 °C range. These biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below.

Temperature range °C			Bias μV
−270	to	0	0.068
0	to	600	0.736
600	to	660	1.915
660	to	1000	0.887

These biases describe the disagreement between the voltage produced by the new reference function for a particular value of t_{90} and the voltage that would be obtained by substituting $t_{90} - \Delta t$ into the IPTS-68 reference function. They do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function. These latter uncertainties, which are not known, would be needed to make a statement about the absolute uncertainty of voltages or temperatures derived using this reference function.

The reference functions for the positive thermoelement, type EP (same as KP), and for the negative thermoelement, type EN (same as TN), versus platinum, Pt-67, are discussed in sections 7.2.2 and 9.2.3, respectively. The coefficients, c_i, of polynomials that give the thermoelectric voltage as a function of t_{90} for type EP thermoelements versus Pt-67 and for Pt-67 versus type EN thermoelements are presented in sections 7.4 and 9.5, respectively.

5.3. Reference Function and Table for Type E Thermocouples

The coefficients, c_i, for the thirteenth degree polynomial that gives the thermoelectric voltage, E, of type E thermocouples as a function of temperature, t_{90}, in the −270 °C to 0 °C range are given in table 5.3.1. The coefficients for the tenth degree polynomial that gives the thermoelectric voltage in the 0 °C to 1000 °C range are also given in table 5.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type E thermocouples at selected fixed points are given in table 5.3.2. The reference values for type E thermocouples are given at 1 °C intervals from −270 °C to 1000 °C in table 5.3.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 5.3.1, 5.3.2, and 5.3.3, respectively. The irregular behavior of the second derivative near 0 °C is a result of the fitting techniques at the junction of two regions; it is not the result of a real physical phenomenon.

It should be stressed that **type E thermocouple materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type E thermocouples are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 5.3.1. *Type E thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−270 °C to 0 °C	0 °C to 1000 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	$5.866\ 550\ 870\ 8 \times 10^{1}$	$5.866\ 550\ 871\ 0 \times 10^{1}$
c_2 =	$4.541\ 097\ 712\ 4 \times 10^{-2}$	$4.503\ 227\ 558\ 2 \times 10^{-2}$
c_3 =	$-7.799\ 804\ 868\ 6 \times 10^{-4}$	$2.890\ 840\ 721\ 2 \times 10^{-5}$
c_4 =	$-2.580\ 016\ 084\ 3 \times 10^{-5}$	$-3.305\ 689\ 665\ 2 \times 10^{-7}$
c_5 =	$-5.945\ 258\ 305\ 7 \times 10^{-7}$	$6.502\ 440\ 327\ 0 \times 10^{-10}$
c_6 =	$-9.321\ 405\ 866\ 7 \times 10^{-9}$	$-1.919\ 749\ 550\ 4 \times 10^{-13}$
c_7 =	$-1.028\ 760\ 553\ 4 \times 10^{-10}$	$-1.253\ 660\ 049\ 7 \times 10^{-15}$
c_8 =	$-8.037\ 012\ 362\ 1 \times 10^{-13}$	$2.148\ 921\ 756\ 9 \times 10^{-18}$
c_9 =	$-4.397\ 949\ 739\ 1 \times 10^{-15}$	$-1.438\ 804\ 178\ 2 \times 10^{-21}$
c_{10} =	$-1.641\ 477\ 635\ 5 \times 10^{-17}$	$3.596\ 089\ 948\ 1 \times 10^{-25}$
c_{11} =	$-3.967\ 361\ 951\ 6 \times 10^{-20}$	
c_{12} =	$-5.582\ 732\ 872\ 1 \times 10^{-23}$	
c_{13} =	$-3.465\ 784\ 201\ 3 \times 10^{-26}$	

TABLE 5.3.2. *Thermoelectric values at fixed points for type E thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
e-Hydrogen TP	−259.3467	−9792.62	6.178	388.07
Neon TP	−248.5939	−9704.46	10.171	359.84
Oxygen TP	−218.7916	−9249.84	20.006	294.14
Argon TP	−189.3442	−8542.78	27.737	237.22
Mercury TP	−38.8344	−2191.90	54.044	128.63
Ice MP	0.000	0.00	58.666	90.06
Water TP	0.01	0.6	58.666	90.07
Gallium MP	29.7646	1786.6	61.391	92.05
Indium FP	156.5985	10259.7	71.571	63.02
Tin FP	231.928	15809.2	75.510	42.42
Cadmium FP	321.069	22683.8	78.479	25.46
Lead FP	327.462	23186.1	78.639	24.50
Zinc FP	419.527	30511.9	80.322	12.44
Antimony FP	630.63	47560.2	80.400	−9.44
Aluminum FP	660.323	49943.1	80.099	−10.77
Silver FP	961.78	73494.3	75.581	−17.97

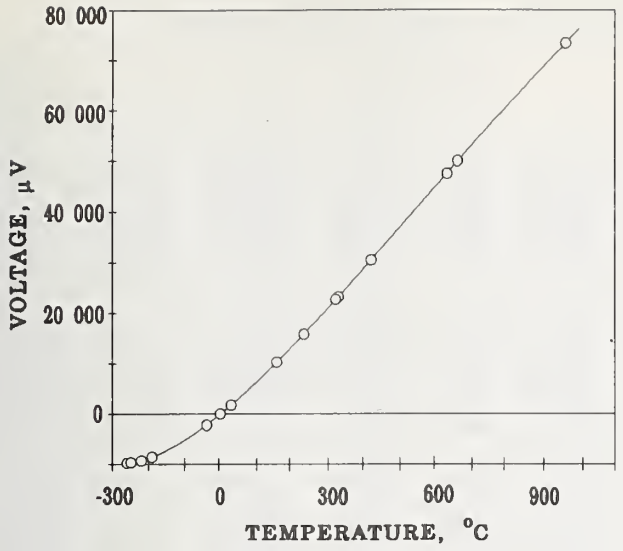

FIGURE 5.3.1. *Thermoelectric voltage for type E thermocouples. The circles indicate values at various thermometric fixed points.*

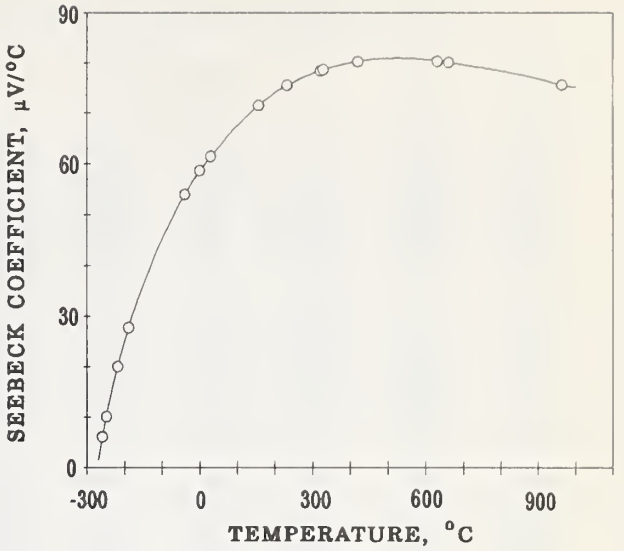

FIGURE 5.3.2. *Seebeck coefficient for type E thermocouples. The circles indicate values at various thermometric fixed points.*

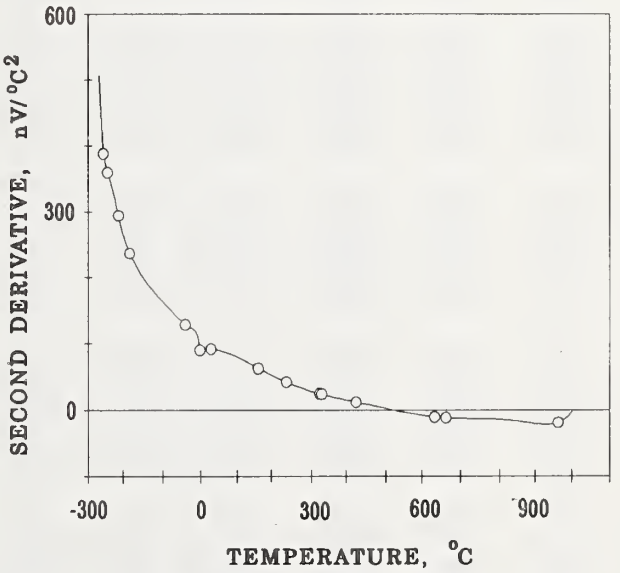

FIGURE 5.3.3. *Second derivative of thermoelectric voltage for type E thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−270	−9 834.95	1.565	506.01	**−230**	−9 455.00	16.548	322.91	**−190**	−8 560.92	27.581	238.10
−269	−9 833.14	2.061	486.44	**−229**	−9 438.29	16.869	320.40	**−189**	−8 533.22	27.818	236.77
−268	−9 830.83	2.539	469.25	**−228**	−9 421.26	17.189	317.87	**−188**	−8 505.28	28.054	235.47
−267	−9 828.06	3.000	454.20	**−227**	−9 403.92	17.505	315.31	**−187**	−8 477.11	28.289	234.20
−266	−9 824.84	3.448	441.04	**−226**	−9 386.25	17.819	312.74	**−186**	−8 448.70	28.523	232.95
−265	−9 821.17	3.883	429.57	**−225**	−9 368.28	18.131	310.15	**−185**	−8 420.07	28.755	231.73
−264	−9 817.08	4.307	419.60	**−224**	−9 349.99	18.440	307.56	**−184**	−8 391.20	28.986	230.54
−263	−9 812.56	4.723	410.94	**−223**	−9 331.40	18.746	304.96	**−183**	−8 362.09	29.216	229.37
−262	−9 807.63	5.130	403.44	**−222**	−9 312.50	19.049	302.37	**−182**	−8 332.76	29.445	228.21
−261	−9 802.30	5.530	396.95	**−221**	−9 293.30	19.351	299.79	**−181**	−8 303.20	29.672	227.08
−260	−9 796.58	5.924	391.33	**−220**	−9 273.80	19.649	297.22	**−180**	−8 273.42	29.899	225.97
−259	−9 790.46	6.313	386.47	**−219**	−9 254.01	19.945	294.67	**−179**	−8 243.41	30.124	224.87
−258	−9 783.95	6.697	382.26	**−218**	−9 233.91	20.238	292.14	**−178**	−8 213.17	30.349	223.79
−257	−9 777.07	7.077	378.59	**−217**	−9 213.53	20.529	289.64	**−177**	−8 182.71	30.572	222.72
−256	−9 769.80	7.454	375.40	**−216**	−9 192.86	20.818	287.17	**−176**	−8 152.03	30.794	221.67
−255	−9 762.16	7.828	372.59	**−215**	−9 171.89	21.104	284.73	**−175**	−8 121.12	31.015	220.63
−254	−9 754.14	8.200	370.10	**−214**	−9 150.65	21.387	282.33	**−174**	−8 090.00	31.235	219.60
−253	−9 745.76	8.569	367.86	**−213**	−9 129.12	21.668	279.97	**−173**	−8 058.65	31.455	218.58
−252	−9 737.01	8.935	365.83	**−212**	−9 107.31	21.947	277.65	**−172**	−8 027.09	31.673	217.58
−251	−9 727.89	9.300	363.95	**−211**	−9 085.23	22.224	275.37	**−171**	−7 995.31	31.890	216.58
−250	−9 718.41	9.663	362.19	**−210**	−9 062.87	22.498	273.13	**−170**	−7 963.31	32.106	215.59
−249	−9 708.56	10.025	360.51	**−209**	−9 040.23	22.770	270.95	**−169**	−7 931.09	32.321	214.61
−248	−9 698.36	10.384	358.87	**−208**	−9 017.33	23.040	268.80	**−168**	−7 898.67	32.535	213.64
−247	−9 687.79	10.742	357.26	**−207**	−8 994.15	23.307	266.71	**−167**	−7 866.03	32.748	212.67
−246	−9 676.87	11.099	355.65	**−206**	−8 970.71	23.573	264.66	**−166**	−7 833.17	32.960	211.71
−245	−9 665.60	11.454	354.02	**−205**	−8 947.01	23.837	262.66	**−165**	−7 800.10	33.172	210.76
−244	−9 653.97	11.807	352.36	**−204**	−8 923.04	24.099	260.72	**−164**	−7 766.83	33.382	209.82
−243	−9 641.98	12.158	350.65	**−203**	−8 898.81	24.358	258.81	**−163**	−7 733.34	33.591	208.88
−242	−9 629.65	12.508	348.90	**−202**	−8 874.32	24.616	256.96	**−162**	−7 699.65	33.800	207.94
−241	−9 616.97	12.856	347.08	**−201**	−8 849.58	24.872	255.15	**−161**	−7 665.74	34.007	207.02
−240	−9 603.94	13.202	345.20	**−200**	−8 824.58	25.126	253.39	**−160**	−7 631.63	34.214	206.10
−239	−9 590.56	13.547	343.25	**−199**	−8 799.33	25.379	251.68	**−159**	−7 597.32	34.419	205.18
−238	−9 576.85	13.889	341.23	**−198**	−8 773.82	25.630	250.01	**−158**	−7 562.79	34.624	204.27
−237	−9 562.79	14.229	339.15	**−197**	−8 748.07	25.879	248.38	**−157**	−7 528.07	34.828	203.37
−236	−9 548.39	14.567	337.00	**−196**	−8 722.07	26.127	246.80	**−156**	−7 493.14	35.031	202.47
−235	−9 533.65	14.903	334.79	**−195**	−8 695.82	26.373	245.26	**−155**	−7 458.01	35.233	201.58
−234	−9 518.58	15.237	332.52	**−194**	−8 669.32	26.617	243.75	**−154**	−7 422.67	35.434	200.69
−233	−9 503.18	15.568	330.19	**−193**	−8 642.58	26.860	242.28	**−153**	−7 387.14	35.634	199.81
−232	−9 487.45	15.897	327.80	**−192**	−8 615.60	27.102	240.85	**−152**	−7 351.40	35.834	198.94
−231	−9 471.39	16.224	325.38	**−191**	−8 588.38	27.342	239.46	**−151**	−7 315.47	36.032	198.07
−230	−9 455.00	16.548	322.91	**−190**	−8 560.92	27.581	238.10	**−150**	−7 279.34	36.230	197.21

TABLE 5.3.3. ***Type E thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−7 279.34	36.230	197.21	−100	−5 237.18	45.175	162.95	−50	−2 787.21	52.579	133.88
−149	−7 243.01	36.427	196.36	−99	−5 191.93	45.337	162.35	−49	−2 734.57	52.713	133.37
−148	−7 206.49	36.622	195.52	−98	−5 146.51	45.499	161.76	−48	−2 681.79	52.846	132.87
−147	−7 169.77	36.818	194.68	−97	−5 100.93	45.661	161.16	−47	−2 628.88	52.979	132.38
−146	−7 132.85	37.012	193.85	−96	−5 055.19	45.822	160.57	−46	−2 575.83	53.111	131.89
−145	−7 095.74	37.205	193.03	−95	−5 009.29	45.982	159.97	−45	−2 522.65	53.243	131.41
−144	−7 058.44	37.398	192.21	−94	−4 963.23	46.142	159.37	−44	−2 469.35	53.374	130.94
−143	−7 020.95	37.590	191.41	−93	−4 917.00	46.301	158.77	−43	−2 415.91	53.504	130.47
−142	−6 983.26	37.781	190.61	−92	−4 870.62	46.459	158.17	−42	−2 362.34	53.635	130.02
−141	−6 945.39	37.971	189.82	−91	−4 824.09	46.617	157.57	−41	−2 308.64	53.764	129.57
−140	−6 907.32	38.160	189.03	−90	−4 777.39	46.774	156.97	−40	−2 254.81	53.894	129.13
−139	−6 869.07	38.349	188.26	−89	−4 730.54	46.931	156.37	−39	−2 200.85	54.023	128.70
−138	−6 830.62	38.537	187.49	−88	−4 683.53	47.087	155.77	−38	−2 146.76	54.151	128.28
−137	−6 791.99	38.724	186.74	−87	−4 636.36	47.242	155.17	−37	−2 092.55	54.279	127.88
−136	−6 753.18	38.910	185.99	−86	−4 589.04	47.397	154.56	−36	−2 038.21	54.407	127.48
−135	−6 714.17	39.096	185.25	−85	−4 541.57	47.552	153.96	−35	−1 983.73	54.534	127.09
−134	−6 674.99	39.281	184.51	−84	−4 493.94	47.705	153.36	−34	−1 929.14	54.661	126.72
−133	−6 635.61	39.465	183.79	−83	−4 446.16	47.858	152.75	−33	−1 874.41	54.788	126.36
−132	−6 596.06	39.648	183.07	−82	−4 398.22	48.011	152.15	−32	−1 819.56	54.914	126.01
−131	−6 556.32	39.831	182.36	−81	−4 350.14	48.163	151.55	−31	−1 764.58	55.040	125.66
−130	−6 516.39	40.013	181.66	−80	−4 301.90	48.314	150.95	−30	−1 709.48	55.165	125.33
−129	−6 476.29	40.194	180.97	−79	−4 253.51	48.465	150.34	−29	−1 654.25	55.290	125.01
−128	−6 436.01	40.375	180.28	−78	−4 204.97	48.615	149.74	−28	−1 598.90	55.415	124.70
−127	−6 395.54	40.555	179.60	−77	−4 156.28	48.764	149.14	−27	−1 543.42	55.540	124.40
−126	−6 354.90	40.734	178.93	−76	−4 107.44	48.913	148.54	−26	−1 487.82	55.664	124.10
−125	−6 314.07	40.913	178.27	−75	−4 058.46	49.061	147.94	−25	−1 432.10	55.788	123.80
−124	−6 273.07	41.091	177.61	−74	−4 009.32	49.209	147.35	−24	−1 376.25	55.912	123.51
−123	−6 231.89	41.268	176.96	−73	−3 960.04	49.356	146.75	−23	−1 320.27	56.035	123.21
−122	−6 190.53	41.445	176.31	−72	−3 910.61	49.502	146.16	−22	−1 264.18	56.158	122.91
−121	−6 149.00	41.621	175.67	−71	−3 861.03	49.648	145.57	−21	−1 207.96	56.281	122.60
−120	−6 107.29	41.796	175.03	−70	−3 811.31	49.793	144.98	−20	−1 151.61	56.403	122.28
−119	−6 065.41	41.971	174.40	−69	−3 761.45	49.938	144.39	−19	−1 095.15	56.525	121.93
−118	−6 023.35	42.145	173.78	−68	−3 711.44	50.082	143.81	−18	−1 038.56	56.647	121.55
−117	−5 981.12	42.318	173.15	−67	−3 661.28	50.226	143.23	−17	−981.86	56.768	121.14
−116	−5 938.71	42.491	172.54	−66	−3 610.99	50.369	142.65	−16	−925.03	56.889	120.67
−115	−5 896.14	42.663	171.92	−65	−3 560.55	50.511	142.07	−15	−868.08	57.010	120.15
−114	−5 853.39	42.835	171.31	−64	−3 509.96	50.653	141.50	−14	−811.01	57.130	119.56
−113	−5 810.47	43.006	170.71	−63	−3 459.24	50.794	140.93	−13	−753.82	57.249	118.88
−112	−5 767.38	43.176	170.10	−62	−3 408.38	50.935	140.36	−12	−696.51	57.367	118.10
−111	−5 724.12	43.346	169.50	−61	−3 357.37	51.075	139.80	−11	−639.08	57.485	117.19
−110	−5 680.68	43.515	168.90	−60	−3 306.23	51.214	139.24	−10	−581.54	57.602	116.14
−109	−5 637.08	43.684	168.30	−59	−3 254.94	51.353	138.68	−9	−523.88	57.717	114.93
−108	−5 593.32	43.852	167.70	−58	−3 203.52	51.492	138.13	−8	−466.11	57.831	113.52
−107	−5 549.38	44.019	167.11	−57	−3 151.96	51.629	137.58	−7	−408.22	57.944	111.89
−106	−5 505.28	44.186	166.51	−56	−3 100.26	51.767	137.04	−6	−350.22	58.055	109.99
−105	−5 461.01	44.352	165.92	−55	−3 048.43	51.904	136.50	−5	−292.11	58.164	107.81
−104	−5 416.57	44.518	165.32	−54	−2 996.46	52.040	135.96	−4	−233.89	58.271	105.28
−103	−5 371.97	44.683	164.73	−53	−2 944.35	52.175	135.44	−3	−175.57	58.375	102.37
−102	−5 327.21	44.848	164.13	−52	−2 892.10	52.311	134.91	−2	−117.14	58.475	99.03
−101	−5 282.28	45.011	163.54	−51	−2 839.73	52.445	134.39	−1	−58.62	58.572	95.20
−100	−5 237.18	45.175	162.95	−50	−2 787.21	52.579	133.88	0	0.00	58.666	90.82

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	58.666	90.06	50	3 047.6	63.240	90.39	100	6 318.9	67.523	79.75
1	58.7	58.756	90.23	51	3 110.9	63.330	90.26	101	6 386.5	67.603	79.48
2	117.5	58.846	90.40	52	3 174.3	63.421	90.13	102	6 454.1	67.682	79.21
3	176.4	58.936	90.55	53	3 237.7	63.511	89.99	103	6 521.9	67.761	78.93
4	235.4	59.027	90.70	54	3 301.3	63.601	89.84	104	6 589.7	67.840	78.65
5	294.5	59.118	90.83	55	3 364.9	63.690	89.69	105	6 657.5	67.919	78.37
6	353.6	59.209	90.97	56	3 428.7	63.780	89.54	106	6 725.5	67.997	78.09
7	412.9	59.300	91.09	57	3 492.5	63.869	89.38	107	6 793.5	68.075	77.81
8	472.2	59.391	91.20	58	3 556.4	63.959	89.22	108	6 861.6	68.153	77.53
9	531.7	59.482	91.31	59	3 620.4	64.048	89.06	109	6 929.8	68.230	77.24
10	591.2	59.574	91.42	60	3 684.5	64.137	88.89	110	6 998.1	68.307	76.96
11	650.8	59.665	91.51	61	3 748.7	64.226	88.72	111	7 066.5	68.384	76.67
12	710.5	59.757	91.60	62	3 813.0	64.314	88.54	112	7 134.9	68.460	76.38
13	770.3	59.848	91.68	63	3 877.3	64.403	88.36	113	7 203.4	68.537	76.09
14	830.2	59.940	91.75	64	3 941.8	64.491	88.18	114	7 271.9	68.613	75.80
15	890.2	60.032	91.82	65	4 006.3	64.579	88.00	115	7 340.6	68.688	75.51
16	950.3	60.124	91.88	66	4 070.9	64.667	87.81	116	7 409.3	68.764	75.22
17	1 010.4	60.215	91.93	67	4 135.6	64.755	87.61	117	7 478.1	68.839	74.93
18	1 070.7	60.307	91.98	68	4 200.4	64.842	87.42	118	7 547.0	68.913	74.64
19	1 131.1	60.399	92.02	69	4 265.3	64.930	87.22	119	7 616.0	68.988	74.34
20	1 191.5	60.491	92.05	70	4 330.3	65.017	87.02	120	7 685.0	69.062	74.05
21	1 252.0	60.583	92.08	71	4 395.3	65.104	86.81	121	7 754.1	69.136	73.75
22	1 312.7	60.676	92.10	72	4 460.5	65.190	86.60	122	7 823.2	69.210	73.46
23	1 373.4	60.768	92.11	73	4 525.7	65.277	86.39	123	7 892.5	69.283	73.16
24	1 434.2	60.860	92.12	74	4 591.0	65.363	86.18	124	7 961.8	69.356	72.86
25	1 495.1	60.952	92.12	75	4 656.5	65.449	85.96	125	8 031.2	69.429	72.56
26	1 556.1	61.044	92.12	76	4 721.9	65.535	85.74	126	8 100.7	69.501	72.26
27	1 617.2	61.136	92.11	77	4 787.5	65.621	85.52	127	8 170.2	69.573	71.96
28	1 678.4	61.228	92.09	78	4 853.2	65.706	85.29	128	8 239.8	69.645	71.67
29	1 739.7	61.320	92.07	79	4 918.9	65.791	85.06	129	8 309.5	69.717	71.36
30	1 801.0	61.412	92.04	80	4 984.8	65.876	84.83	130	8 379.2	69.788	71.06
31	1 862.5	61.504	92.01	81	5 050.7	65.961	84.60	131	8 449.1	69.859	70.76
32	1 924.0	61.596	91.97	82	5 116.7	66.045	84.36	132	8 519.0	69.929	70.46
33	1 985.7	61.688	91.93	83	5 182.8	66.130	84.13	133	8 588.9	70.000	70.16
34	2 047.4	61.780	91.88	84	5 248.9	66.214	83.88	134	8 659.0	70.070	69.86
35	2 109.2	61.872	91.82	85	5 315.2	66.297	83.64	135	8 729.1	70.139	69.56
36	2 171.2	61.964	91.76	86	5 381.5	66.381	83.40	136	8 799.2	70.209	69.25
37	2 233.2	62.056	91.70	87	5 448.0	66.464	83.15	137	8 869.5	70.278	68.95
38	2 295.3	62.147	91.63	88	5 514.5	66.547	82.90	138	8 939.8	70.347	68.65
39	2 357.5	62.239	91.55	89	5 581.1	66.630	82.65	139	9 010.2	70.415	68.34
40	2 419.7	62.330	91.47	90	5 647.7	66.712	82.39	140	9 080.6	70.483	68.04
41	2 482.1	62.422	91.38	91	5 714.5	66.795	82.14	141	9 151.1	70.551	67.74
42	2 544.6	62.513	91.29	92	5 781.3	66.877	81.88	142	9 221.7	70.619	67.43
43	2 607.1	62.604	91.20	93	5 848.2	66.958	81.62	143	9 292.4	70.686	67.13
44	2 669.8	62.696	91.09	94	5 915.2	67.040	81.36	144	9 363.1	70.753	66.83
45	2 732.5	62.787	90.99	95	5 982.3	67.121	81.10	145	9 433.9	70.820	66.52
46	2 795.4	62.878	90.88	96	6 049.5	67.202	80.83	146	9 504.7	70.886	66.22
47	2 858.3	62.968	90.77	97	6 116.7	67.283	80.56	147	9 575.7	70.952	65.92
48	2 921.3	63.059	90.65	98	6 184.0	67.363	80.30	148	9 646.6	71.018	65.61
49	2 984.4	63.150	90.52	99	6 251.4	67.443	80.03	149	9 717.7	71.083	65.31
50	3 047.6	63.240	90.39	100	6 318.9	67.523	79.75	150	9 788.8	71.149	65.01

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	9 788.8	71.149	65.01	**200**	13 421.3	74.030	50.52	**250**	17 180.6	76.240	38.34
151	9 860.0	71.213	64.71	**201**	13 495.4	74.080	50.25	**251**	17 256.8	76.278	38.12
152	9 931.2	71.278	64.40	**202**	13 569.5	74.130	49.98	**252**	17 333.1	76.316	37.91
153	10 002.6	71.342	64.10	**203**	13 643.6	74.180	49.71	**253**	17 409.5	76.354	37.69
154	10 073.9	71.406	63.80	**204**	13 717.8	74.230	49.44	**254**	17 485.8	76.391	37.48
155	10 145.4	71.470	63.50	**205**	13 792.1	74.279	49.18	**255**	17 562.2	76.429	37.27
156	10 216.9	71.533	63.20	**206**	13 866.4	74.328	48.91	**256**	17 638.7	76.466	37.06
157	10 288.4	71.596	62.89	**207**	13 940.7	74.377	48.65	**257**	17 715.2	76.503	36.85
158	10 360.1	71.659	62.59	**208**	14 015.1	74.425	48.39	**258**	17 791.7	76.539	36.64
159	10 431.7	71.721	62.29	**209**	14 089.6	74.473	48.12	**259**	17 868.2	76.576	36.44
160	10 503.5	71.784	61.99	**210**	14 164.1	74.521	47.86	**260**	17 944.8	76.612	36.23
161	10 575.3	71.845	61.69	**211**	14 238.6	74.569	47.60	**261**	18 021.5	76.648	36.03
162	10 647.2	71.907	61.39	**212**	14 313.2	74.617	47.34	**262**	18 098.1	76.684	35.82
163	10 719.1	71.968	61.10	**213**	14 387.9	74.664	47.09	**263**	18 174.8	76.720	35.62
164	10 791.1	72.029	60.80	**214**	14 462.5	74.711	46.83	**264**	18 251.6	76.756	35.42
165	10 863.2	72.090	60.50	**215**	14 537.3	74.758	46.58	**265**	18 328.4	76.791	35.22
166	10 935.3	72.150	60.20	**216**	14 612.1	74.804	46.32	**266**	18 405.2	76.826	35.02
167	11 007.5	72.210	59.91	**217**	14 686.9	74.850	46.07	**267**	18 482.0	76.861	34.82
168	11 079.7	72.270	59.61	**218**	14 761.8	74.896	45.82	**268**	18 558.9	76.896	34.62
169	11 152.0	72.329	59.31	**219**	14 836.7	74.942	45.57	**269**	18 635.8	76.930	34.43
170	11 224.4	72.389	59.02	**220**	14 911.6	74.987	45.32	**270**	18 712.7	76.965	34.23
171	11 296.8	72.447	58.72	**221**	14 986.6	75.032	45.07	**271**	18 789.7	76.999	34.04
172	11 369.3	72.506	58.43	**222**	15 061.7	75.077	44.82	**272**	18 866.7	77.033	33.84
173	11 441.8	72.564	58.14	**223**	15 136.8	75.122	44.57	**273**	18 943.8	77.066	33.65
174	11 514.4	72.622	57.84	**224**	15 211.9	75.167	44.33	**274**	19 020.9	77.100	33.46
175	11 587.1	72.680	57.55	**225**	15 287.1	75.211	44.08	**275**	19 098.0	77.133	33.27
176	11 659.8	72.737	57.26	**226**	15 362.4	75.255	43.84	**276**	19 175.1	77.166	33.08
177	11 732.5	72.794	56.97	**227**	15 437.6	75.298	43.60	**277**	19 252.3	77.199	32.89
178	11 805.4	72.851	56.68	**228**	15 513.0	75.342	43.36	**278**	19 329.5	77.232	32.70
179	11 878.2	72.908	56.39	**229**	15 588.3	75.385	43.12	**279**	19 406.8	77.265	32.52
180	11 951.2	72.964	56.10	**230**	15 663.7	75.428	42.88	**280**	19 484.1	77.297	32.33
181	12 024.2	73.020	55.82	**231**	15 739.2	75.471	42.64	**281**	19 561.4	77.329	32.15
182	12 097.2	73.076	55.53	**232**	15 814.7	75.513	42.40	**282**	19 638.7	77.362	31.96
183	12 170.3	73.131	55.24	**233**	15 890.2	75.556	42.17	**283**	19 716.1	77.393	31.78
184	12 243.5	73.186	54.96	**234**	15 965.8	75.598	41.93	**284**	19 793.5	77.425	31.60
185	12 316.7	73.241	54.67	**235**	16 041.4	75.640	41.70	**285**	19 871.0	77.457	31.42
186	12 390.0	73.296	54.39	**236**	16 117.1	75.681	41.47	**286**	19 948.4	77.488	31.24
187	12 463.3	73.350	54.11	**237**	16 192.8	75.723	41.24	**287**	20 025.9	77.519	31.06
188	12 536.7	73.404	53.83	**238**	16 268.5	75.764	41.01	**288**	20 103.5	77.550	30.88
189	12 610.1	73.457	53.55	**239**	16 344.3	75.805	40.78	**289**	20 181.0	77.581	30.70
190	12 683.6	73.511	53.27	**240**	16 420.1	75.845	40.55	**290**	20 258.6	77.611	30.53
191	12 757.1	73.564	52.99	**241**	16 496.0	75.886	40.32	**291**	20 336.3	77.642	30.35
192	12 830.7	73.617	52.71	**242**	16 571.9	75.926	40.10	**292**	20 413.9	77.672	30.18
193	12 904.3	73.669	52.43	**243**	16 647.8	75.966	39.87	**293**	20 491.6	77.702	30.00
194	12 978.0	73.722	52.15	**244**	16 723.8	76.006	39.65	**294**	20 569.3	77.732	29.83
195	13 051.8	73.774	51.88	**245**	16 799.9	76.045	39.43	**295**	20 647.1	77.762	29.66
196	13 125.6	73.825	51.60	**246**	16 875.9	76.084	39.21	**296**	20 724.8	77.791	29.49
197	13 199.4	73.877	51.33	**247**	16 952.0	76.124	38.99	**297**	20 802.6	77.821	29.32
198	13 273.3	73.928	51.06	**248**	17 028.2	76.162	38.77	**298**	20 880.5	77.850	29.15
199	13 347.3	73.979	50.79	**249**	17 104.3	76.201	38.55	**299**	20 958.3	77.879	28.98
200	13 421.3	74.030	50.52	**250**	17 180.6	76.240	38.34	**300**	21 036.2	77.908	28.81

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	21 036.2	77.908	28.81	**350**	24 964.4	79.155	21.30	**400**	28 946.0	80.056	14.85
301	21 114.2	77.937	28.65	**351**	25 043.5	79.176	21.16	**401**	29 026.0	80.070	14.72
302	21 192.1	77.965	28.48	**352**	25 122.7	79.197	21.03	**402**	29 106.1	80.085	14.60
303	21 270.1	77.994	28.32	**353**	25 201.9	79.218	20.89	**403**	29 186.2	80.100	14.48
304	21 348.1	78.022	28.15	**354**	25 281.2	79.239	20.76	**404**	29 266.3	80.114	14.35
305	21 426.1	78.050	27.99	**355**	25 360.4	79.259	20.62	**405**	29 346.4	80.128	14.23
306	21 504.2	78.078	27.82	**356**	25 439.7	79.280	20.49	**406**	29 426.6	80.143	14.10
307	21 582.3	78.106	27.66	**357**	25 519.0	79.300	20.35	**407**	29 506.7	80.157	13.98
308	21 660.4	78.133	27.50	**358**	25 598.3	79.321	20.22	**408**	29 586.9	80.171	13.86
309	21 738.6	78.161	27.34	**359**	25 677.6	79.341	20.09	**409**	29 667.1	80.184	13.73
310	21 816.7	78.188	27.18	**360**	25 757.0	79.361	19.95	**410**	29 747.2	80.198	13.61
311	21 894.9	78.215	27.02	**361**	25 836.3	79.381	19.82	**411**	29 827.4	80.212	13.49
312	21 973.2	78.242	26.86	**362**	25 915.7	79.400	19.69	**412**	29 907.7	80.225	13.37
313	22 051.4	78.269	26.70	**363**	25 995.1	79.420	19.56	**413**	29 987.9	80.238	13.24
314	22 129.7	78.295	26.55	**364**	26 074.6	79.440	19.43	**414**	30 068.1	80.251	13.12
315	22 208.0	78.322	26.39	**365**	26 154.0	79.459	19.29	**415**	30 148.4	80.264	13.00
316	22 286.3	78.348	26.24	**366**	26 233.5	79.478	19.16	**416**	30 228.7	80.277	12.87
317	22 364.7	78.374	26.08	**367**	26 313.0	79.497	19.03	**417**	30 309.0	80.290	12.75
318	22 443.1	78.400	25.93	**368**	26 392.5	79.516	18.90	**418**	30 389.3	80.303	12.63
319	22 521.5	78.426	25.77	**369**	26 472.0	79.535	18.77	**419**	30 469.6	80.316	12.51
320	22 599.9	78.452	25.62	**370**	26 551.5	79.554	18.64	**420**	30 549.9	80.328	12.38
321	22 678.4	78.477	25.47	**371**	26 631.1	79.572	18.51	**421**	30 630.2	80.340	12.26
322	22 756.9	78.503	25.32	**372**	26 710.7	79.591	18.38	**422**	30 710.6	80.352	12.14
323	22 835.4	78.528	25.17	**373**	26 790.3	79.609	18.25	**423**	30 790.9	80.365	12.02
324	22 914.0	78.553	25.02	**374**	26 869.9	79.627	18.13	**424**	30 871.3	80.377	11.89
325	22 992.5	78.578	24.87	**375**	26 949.5	79.645	18.00	**425**	30 951.7	80.388	11.77
326	23 071.1	78.603	24.72	**376**	27 029.2	79.663	17.87	**426**	31 032.1	80.400	11.65
327	23 149.7	78.628	24.57	**377**	27 108.9	79.681	17.74	**427**	31 112.5	80.412	11.53
328	23 228.4	78.652	24.42	**378**	27 188.6	79.699	17.61	**428**	31 192.9	80.423	11.41
329	23 307.0	78.676	24.27	**379**	27 268.3	79.716	17.49	**429**	31 273.3	80.434	11.28
330	23 385.7	78.701	24.13	**380**	27 348.0	79.734	17.36	**430**	31 353.8	80.446	11.16
331	23 464.4	78.725	23.98	**381**	27 427.7	79.751	17.23	**431**	31 434.2	80.457	11.04
332	23 543.2	78.749	23.83	**382**	27 507.5	79.768	17.10	**432**	31 514.7	80.468	10.92
333	23 621.9	78.772	23.69	**383**	27 587.3	79.785	16.98	**433**	31 595.1	80.479	10.79
334	23 700.7	78.796	23.54	**384**	27 667.1	79.802	16.85	**434**	31 675.6	80.489	10.67
335	23 779.5	78.819	23.40	**385**	27 746.9	79.819	16.72	**435**	31 756.1	80.500	10.55
336	23 858.4	78.843	23.26	**386**	27 826.7	79.836	16.60	**436**	31 836.6	80.510	10.43
337	23 937.2	78.866	23.11	**387**	27 906.5	79.852	16.47	**437**	31 917.1	80.521	10.31
338	24 016.1	78.889	22.97	**388**	27 986.4	79.869	16.35	**438**	31 997.7	80.531	10.19
339	24 095.0	78.912	22.83	**389**	28 066.3	79.885	16.22	**439**	32 078.2	80.541	10.06
340	24 173.9	78.935	22.69	**390**	28 146.2	79.901	16.09	**440**	32 158.8	80.551	9.94
341	24 252.9	78.957	22.55	**391**	28 226.1	79.917	15.97	**441**	32 239.3	80.561	9.82
342	24 331.8	78.980	22.41	**392**	28 306.0	79.933	15.84	**442**	32 319.9	80.571	9.70
343	24 410.8	79.002	22.27	**393**	28 385.9	79.949	15.72	**443**	32 400.5	80.580	9.58
344	24 489.8	79.024	22.13	**394**	28 465.9	79.964	15.59	**444**	32 481.0	80.590	9.45
345	24 568.9	79.046	21.99	**395**	28 545.9	79.980	15.47	**445**	32 561.6	80.599	9.33
346	24 647.9	79.068	21.85	**396**	28 625.9	79.995	15.34	**446**	32 642.2	80.609	9.21
347	24 727.0	79.090	21.71	**397**	28 705.9	80.011	15.22	**447**	32 722.9	80.618	9.09
348	24 806.1	79.112	21.57	**398**	28 785.9	80.026	15.10	**448**	32 803.5	80.627	8.97
349	24 885.2	79.133	21.44	**399**	28 865.9	80.041	14.97	**449**	32 884.1	80.636	8.85
350	24 964.4	79.155	21.30	**400**	28 946.0	80.056	14.85	**450**	32 964.7	80.645	8.73

TABLE 5.3.3. ***Type E thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
450	32 964.7	80.645	8.73	500	37 005.4	80.930	2.72	550	41 052.8	80.923	−2.87
451	33 045.4	80.653	8.60	501	37 086.3	80.932	2.60	551	41 133.8	80.920	−2.98
452	33 126.1	80.662	8.48	502	37 167.2	80.935	2.48	552	41 214.7	80.917	−3.08
453	33 206.7	80.670	8.36	503	37 248.2	80.937	2.36	553	41 295.6	80.914	−3.18
454	33 287.4	80.678	8.24	504	37 329.1	80.940	2.25	554	41 376.5	80.911	−3.28
455	33 368.1	80.687	8.12	505	37 410.0	80.942	2.13	555	41 457.4	80.907	−3.38
456	33 448.8	80.695	8.00	506	37 491.0	80.944	2.01	556	41 538.3	80.904	−3.49
457	33 529.5	80.703	7.87	507	37 571.9	80.946	1.90	557	41 619.2	80.900	−3.59
458	33 610.2	80.710	7.75	508	37 652.9	80.948	1.78	558	41 700.1	80.897	−3.69
459	33 690.9	80.718	7.63	509	37 733.8	80.949	1.66	559	41 781.0	80.893	−3.79
460	33 771.6	80.726	7.51	510	37 814.8	80.951	1.55	560	41 861.9	80.889	−3.89
461	33 852.3	80.733	7.39	511	37 895.7	80.953	1.43	561	41 942.8	80.885	−3.98
462	33 933.1	80.740	7.27	512	37 976.7	80.954	1.32	562	42 023.7	80.881	−4.08
463	34 013.8	80.748	7.15	513	38 057.6	80.955	1.20	563	42 104.6	80.877	−4.18
464	34 094.6	80.755	7.03	514	38 138.6	80.956	1.08	564	42 185.4	80.873	−4.28
465	34 175.3	80.762	6.91	515	38 219.5	80.957	0.97	565	42 266.3	80.868	−4.38
466	34 256.1	80.769	6.78	516	38 300.5	80.958	0.85	566	42 347.2	80.864	−4.47
467	34 336.9	80.775	6.66	517	38 381.5	80.959	0.74	567	42 428.0	80.859	−4.57
468	34 417.6	80.782	6.54	518	38 462.4	80.960	0.63	568	42 508.9	80.855	−4.66
469	34 498.4	80.788	6.42	519	38 543.4	80.960	0.51	569	42 589.7	80.850	−4.76
470	34 579.2	80.795	6.30	520	38 624.3	80.961	0.40	570	42 670.6	80.845	−4.85
471	34 660.0	80.801	6.18	521	38 705.3	80.961	0.28	571	42 751.4	80.840	−4.95
472	34 740.8	80.807	6.06	522	38 786.3	80.961	0.17	572	42 832.3	80.835	−5.04
473	34 821.6	80.813	5.94	523	38 867.2	80.961	0.06	573	42 913.1	80.830	−5.13
474	34 902.4	80.819	5.82	524	38 948.2	80.961	−0.05	574	42 993.9	80.825	−5.22
475	34 983.3	80.825	5.70	525	39 029.1	80.961	−0.17	575	43 074.7	80.820	−5.32
476	35 064.1	80.830	5.58	526	39 110.1	80.961	−0.28	576	43 155.6	80.815	−5.41
477	35 144.9	80.836	5.46	527	39 191.1	80.961	−0.39	577	43 236.4	80.809	−5.50
478	35 225.8	80.841	5.34	528	39 272.0	80.960	−0.50	578	43 317.2	80.804	−5.59
479	35 306.6	80.847	5.22	529	39 353.0	80.960	−0.61	579	43 398.0	80.798	−5.68
480	35 387.5	80.852	5.10	530	39 433.9	80.959	−0.72	580	43 478.8	80.792	−5.77
481	35 468.3	80.857	4.98	531	39 514.9	80.958	−0.84	581	43 559.6	80.786	−5.85
482	35 549.2	80.862	4.86	532	39 595.9	80.957	−0.95	582	43 640.4	80.781	−5.94
483	35 630.0	80.866	4.74	533	39 676.8	80.956	−1.06	583	43 721.1	80.775	−6.03
484	35 710.9	80.871	4.62	534	39 757.8	80.955	−1.17	584	43 801.9	80.768	−6.12
485	35 791.8	80.876	4.50	535	39 838.7	80.954	−1.27	585	43 882.7	80.762	−6.20
486	35 872.7	80.880	4.38	536	39 919.7	80.953	−1.38	586	43 963.4	80.756	−6.29
487	35 953.5	80.884	4.26	537	40 000.6	80.951	−1.49	587	44 044.2	80.750	−6.37
488	36 034.4	80.889	4.14	538	40 081.6	80.950	−1.60	588	44 124.9	80.743	−6.46
489	36 115.3	80.893	4.02	539	40 162.5	80.948	−1.71	589	44 205.7	80.737	−6.54
490	36 196.2	80.897	3.90	540	40 243.5	80.946	−1.82	590	44 286.4	80.730	−6.62
491	36 277.1	80.901	3.78	541	40 324.4	80.945	−1.92	591	44 367.1	80.724	−6.70
492	36 358.0	80.904	3.66	542	40 405.4	80.943	−2.03	592	44 447.8	80.717	−6.79
493	36 438.9	80.908	3.54	543	40 486.3	80.940	−2.14	593	44 528.6	80.710	−6.87
494	36 519.8	80.911	3.42	544	40 567.3	80.938	−2.24	594	44 609.3	80.703	−6.95
495	36 600.7	80.915	3.31	545	40 648.2	80.936	−2.35	595	44 690.0	80.696	−7.03
496	36 681.7	80.918	3.19	546	40 729.1	80.934	−2.45	596	44 770.7	80.689	−7.11
497	36 762.6	80.921	3.07	547	40 810.1	80.931	−2.56	597	44 851.3	80.682	−7.19
498	36 843.5	80.924	2.95	548	40 891.0	80.928	−2.66	598	44 932.0	80.675	−7.26
499	36 924.4	80.927	2.83	549	40 971.9	80.926	−2.77	599	45 012.7	80.667	−7.34
500	37 005.4	80.930	2.72	550	41 052.8	80.923	−2.87	600	45 093.4	80.660	−7.42

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
600	45 093.4	80.660	−7.42	**650**	49 115.7	80.208	−10.38	**700**	53 112.4	79.650	−11.70
601	45 174.0	80.653	−7.49	**651**	49 195.9	80.197	−10.42	**701**	53 192.0	79.638	−11.71
602	45 254.7	80.645	−7.57	**652**	49 276.1	80.187	−10.46	**702**	53 271.7	79.627	−11.73
603	45 335.3	80.637	−7.64	**653**	49 356.2	80.177	−10.50	**703**	53 351.3	79.615	−11.74
604	45 415.9	80.630	−7.72	**654**	49 436.4	80.166	−10.54	**704**	53 430.9	79.603	−11.75
605	45 496.6	80.622	−7.79	**655**	49 516.6	80.155	−10.58	**705**	53 510.5	79.591	−11.76
606	45 577.2	80.614	−7.86	**656**	49 596.7	80.145	−10.62	**706**	53 590.1	79.580	−11.77
607	45 657.8	80.606	−7.94	**657**	49 676.9	80.134	−10.65	**707**	53 669.7	79.568	−11.78
608	45 738.4	80.598	−8.01	**658**	49 757.0	80.124	−10.69	**708**	53 749.2	79.556	−11.80
609	45 819.0	80.590	−8.08	**659**	49 837.1	80.113	−10.73	**709**	53 828.8	79.544	−11.81
610	45 899.6	80.582	−8.15	**660**	49 917.2	80.102	−10.76	**710**	53 908.3	79.532	−11.82
611	45 980.2	80.574	−8.22	**661**	49 997.3	80.091	−10.80	**711**	53 987.8	79.521	−11.83
612	46 060.7	80.566	−8.29	**662**	50 077.4	80.081	−10.83	**712**	54 067.3	79.509	−11.84
613	46 141.3	80.557	−8.35	**663**	50 157.5	80.070	−10.86	**713**	54 146.8	79.497	−11.85
614	46 221.8	80.549	−8.42	**664**	50 237.5	80.059	−10.90	**714**	54 226.3	79.485	−11.85
615	46 302.4	80.540	−8.49	**665**	50 317.6	80.048	−10.93	**715**	54 305.8	79.473	−11.86
616	46 382.9	80.532	−8.55	**666**	50 397.6	80.037	−10.96	**716**	54 385.3	79.461	−11.87
617	46 463.4	80.523	−8.62	**667**	50 477.7	80.026	−10.99	**717**	54 464.7	79.450	−11.88
618	46 544.0	80.515	−8.68	**668**	50 557.7	80.015	−11.02	**718**	54 544.2	79.438	−11.89
619	46 624.5	80.506	−8.75	**669**	50 637.7	80.004	−11.05	**719**	54 623.6	79.426	−11.90
620	46 705.0	80.497	−8.81	**670**	50 717.7	79.993	−11.08	**720**	54 703.0	79.414	−11.90
621	46 785.5	80.488	−8.87	**671**	50 797.7	79.982	−11.11	**721**	54 782.4	79.402	−11.91
622	46 866.0	80.480	−8.93	**672**	50 877.7	79.971	−11.14	**722**	54 861.8	79.390	−11.92
623	46 946.4	80.471	−8.99	**673**	50 957.6	79.960	−11.16	**723**	54 941.2	79.378	−11.93
624	47 026.9	80.462	−9.05	**674**	51 037.6	79.948	−11.19	**724**	55 020.6	79.366	−11.93
625	47 107.4	80.452	−9.11	**675**	51 117.5	79.937	−11.22	**725**	55 100.0	79.354	−11.94
626	47 187.8	80.443	−9.17	**676**	51 197.5	79.926	−11.24	**726**	55 179.3	79.342	−11.95
627	47 268.2	80.434	−9.23	**677**	51 277.4	79.915	−11.27	**727**	55 258.6	79.330	−11.95
628	47 348.7	80.425	−9.29	**678**	51 357.3	79.903	−11.29	**728**	55 338.0	79.318	−11.96
629	47 429.1	80.416	−9.35	**679**	51 437.2	79.892	−11.32	**729**	55 417.3	79.306	−11.97
630	47 509.5	80.406	−9.40	**680**	51 517.1	79.881	−11.34	**730**	55 496.6	79.294	−11.97
631	47 589.9	80.397	−9.46	**681**	51 596.9	79.869	−11.36	**731**	55 575.9	79.282	−11.98
632	47 670.3	80.387	−9.51	**682**	51 676.8	79.858	−11.38	**732**	55 655.1	79.270	−11.99
633	47 750.7	80.378	−9.57	**683**	51 756.7	79.847	−11.41	**733**	55 734.4	79.258	−11.99
634	47 831.0	80.368	−9.62	**684**	51 836.5	79.835	−11.43	**734**	55 813.7	79.246	−12.00
635	47 911.4	80.358	−9.67	**685**	51 916.3	79.824	−11.45	**735**	55 892.9	79.234	−12.01
636	47 991.8	80.349	−9.72	**686**	51 996.2	79.812	−11.47	**736**	55 972.1	79.222	−12.01
637	48 072.1	80.339	−9.77	**687**	52 076.0	79.801	−11.49	**737**	56 051.3	79.210	−12.02
638	48 152.4	80.329	−9.83	**688**	52 155.8	79.789	−11.51	**738**	56 130.6	79.198	−12.02
639	48 232.8	80.319	−9.88	**689**	52 235.5	79.778	−11.52	**739**	56 209.7	79.186	−12.03
640	48 313.1	80.309	−9.92	**690**	52 315.3	79.766	−11.54	**740**	56 288.9	79.174	−12.04
641	48 393.4	80.299	−9.97	**691**	52 395.1	79.755	−11.56	**741**	56 368.1	79.162	−12.04
642	48 473.7	80.289	−10.02	**692**	52 474.8	79.743	−11.58	**742**	56 447.2	79.150	−12.05
643	48 554.0	80.279	−10.07	**693**	52 554.6	79.732	−11.59	**743**	56 526.4	79.138	−12.06
644	48 634.2	80.269	−10.11	**694**	52 634.3	79.720	−11.61	**744**	56 605.5	79.126	−12.06
645	48 714.5	80.259	−10.16	**695**	52 714.0	79.708	−11.63	**745**	56 684.6	79.114	−12.07
646	48 794.8	80.249	−10.20	**696**	52 793.7	79.697	−11.64	**746**	56 763.8	79.102	−12.08
647	48 875.0	80.239	−10.25	**697**	52 873.4	79.685	−11.66	**747**	56 842.8	79.090	−12.08
648	48 955.2	80.229	−10.29	**698**	52 953.1	79.673	−11.67	**748**	56 921.9	79.078	−12.09
649	49 035.5	80.218	−10.33	**699**	53 032.7	79.662	−11.69	**749**	57 001.0	79.066	−12.10
650	49 115.7	80.208	−10.38	**700**	53 112.4	79.650	−11.70	**750**	57 080.1	79.054	−12.11

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	57 080.1	79.054	−12.11	**800**	61 017.4	78.431	−13.00	**850**	64 921.8	77.723	−15.71
751	57 159.1	79.042	−12.11	**801**	61 095.8	78.418	−13.03	**851**	64 999.5	77.707	−15.79
752	57 238.1	79.029	−12.12	**802**	61 174.2	78.405	−13.07	**852**	65 077.2	77.691	−15.86
753	57 317.2	79.017	−12.13	**803**	61 252.6	78.392	−13.10	**853**	65 154.9	77.675	−15.94
754	57 396.2	79.005	−12.14	**804**	61 331.0	78.379	−13.14	**854**	65 232.6	77.659	−16.02
755	57 475.2	78.993	−12.15	**805**	61 409.4	78.366	−13.17	**855**	65 310.2	77.643	−16.09
756	57 554.2	78.981	−12.16	**806**	61 487.7	78.353	−13.21	**856**	65 387.8	77.627	−16.17
757	57 633.1	78.969	−12.17	**807**	61 566.1	78.340	−13.25	**857**	65 465.5	77.611	−16.25
758	57 712.1	78.957	−12.17	**808**	61 644.4	78.326	−13.29	**858**	65 543.1	77.594	−16.33
759	57 791.1	78.944	−12.18	**809**	61 722.7	78.313	−13.33	**859**	65 620.6	77.578	−16.41
760	57 870.0	78.932	−12.19	**810**	61 801.0	78.300	−13.37	**860**	65 698.2	77.562	−16.49
761	57 948.9	78.920	−12.20	**811**	61 879.3	78.286	−13.41	**861**	65 775.8	77.545	−16.57
762	58 027.8	78.908	−12.22	**812**	61 957.6	78.273	−13.45	**862**	65 853.3	77.528	−16.66
763	58 106.7	78.896	−12.23	**813**	62 035.9	78.259	−13.50	**863**	65 930.8	77.512	−16.74
764	58 185.6	78.883	−12.24	**814**	62 114.1	78.246	−13.54	**864**	66 008.3	77.495	−16.82
765	58 264.5	78.871	−12.25	**815**	62 192.4	78.232	−13.59	**865**	66 085.8	77.478	−16.90
766	58 343.4	78.859	−12.26	**816**	62 270.6	78.219	−13.63	**866**	66 163.3	77.461	−16.99
767	58 422.2	78.847	−12.27	**817**	62 348.8	78.205	−13.68	**867**	66 240.7	77.444	−17.07
768	58 501.1	78.834	−12.29	**818**	62 427.0	78.191	−13.73	**868**	66 318.2	77.427	−17.16
769	58 579.9	78.822	−12.30	**819**	62 505.2	78.178	−13.78	**869**	66 395.6	77.410	−17.24
770	58 658.7	78.810	−12.32	**820**	62 583.4	78.164	−13.82	**870**	66 473.0	77.393	−17.32
771	58 737.5	78.797	−12.33	**821**	62 661.5	78.150	−13.88	**871**	66 550.4	77.375	−17.41
772	58 816.3	78.785	−12.34	**822**	62 739.7	78.136	−13.93	**872**	66 627.7	77.358	−17.49
773	58 895.1	78.773	−12.36	**823**	62 817.8	78.122	−13.98	**873**	66 705.1	77.340	−17.58
774	58 973.8	78.760	−12.38	**824**	62 895.9	78.108	−14.03	**874**	66 782.4	77.323	−17.67
775	59 052.6	78.748	−12.39	**825**	62 974.0	78.094	−14.09	**875**	66 859.7	77.305	−17.75
776	59 131.3	78.736	−12.41	**826**	63 052.1	78.080	−14.14	**876**	66 937.0	77.287	−17.84
777	59 210.1	78.723	−12.43	**827**	63 130.2	78.066	−14.20	**877**	67 014.3	77.269	−17.92
778	59 288.8	78.711	−12.44	**828**	63 208.2	78.051	−14.25	**878**	67 091.6	77.251	−18.01
779	59 367.5	78.698	−12.46	**829**	63 286.3	78.037	−14.31	**879**	67 168.8	77.233	−18.09
780	59 446.2	78.686	−12.48	**830**	63 364.3	78.023	−14.37	**880**	67 246.0	77.215	−18.18
781	59 524.9	78.673	−12.50	**831**	63 442.3	78.008	−14.43	**881**	67 323.2	77.197	−18.26
782	59 603.5	78.661	−12.52	**832**	63 520.3	77.994	−14.49	**882**	67 400.4	77.179	−18.35
783	59 682.2	78.648	−12.54	**833**	63 598.3	77.979	−14.55	**883**	67 477.6	77.160	−18.43
784	59 760.8	78.636	−12.56	**834**	63 676.3	77.965	−14.61	**884**	67 554.8	77.142	−18.52
785	59 839.5	78.623	−12.59	**835**	63 754.2	77.950	−14.67	**885**	67 631.9	77.123	−18.60
786	59 918.1	78.610	−12.61	**836**	63 832.2	77.936	−14.74	**886**	67 709.0	77.104	−18.69
787	59 996.7	78.598	−12.63	**837**	63 910.1	77.921	−14.80	**887**	67 786.1	77.086	−18.77
788	60 075.3	78.585	−12.66	**838**	63 988.0	77.906	−14.87	**888**	67 863.2	77.067	−18.85
789	60 153.8	78.573	−12.68	**839**	64 065.9	77.891	−14.93	**889**	67 940.2	77.048	−18.93
790	60 232.4	78.560	−12.71	**840**	64 143.8	77.876	−15.00	**890**	68 017.3	77.029	−19.02
791	60 311.0	78.547	−12.73	**841**	64 221.7	77.861	−15.07	**891**	68 094.3	77.010	−19.10
792	60 389.5	78.534	−12.76	**842**	64 299.5	77.846	−15.14	**892**	68 171.3	76.991	−19.18
793	60 468.0	78.522	−12.79	**843**	64 377.3	77.831	−15.20	**893**	68 248.3	76.972	−19.26
794	60 546.6	78.509	−12.81	**844**	64 455.2	77.816	−15.27	**894**	68 325.2	76.952	−19.34
795	60 625.1	78.496	−12.84	**845**	64 533.0	77.800	−15.35	**895**	68 402.2	76.933	−19.41
796	60 703.5	78.483	−12.87	**846**	64 610.8	77.785	−15.42	**896**	68 479.1	76.913	−19.49
797	60 782.0	78.470	−12.90	**847**	64 688.5	77.769	−15.49	**897**	68 556.0	76.894	−19.57
798	60 860.5	78.457	−12.93	**848**	64 766.3	77.754	−15.56	**898**	68 632.9	76.874	−19.64
799	60 938.9	78.444	−12.97	**849**	64 844.1	77.738	−15.64	**899**	68 709.7	76.855	−19.71
800	61 017.4	78.431	−13.00	**850**	64 921.8	77.723	−15.71	**900**	68 786.6	76.835	−19.79

TABLE 5.3.3. *Type E thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
900	68 786.6	76.835	−19.79	**935**	71 463.3	76.113	−20.92	**970**	74 115.0	75.441	−15.89
901	68 863.4	76.815	−19.86	**936**	71 539.4	76.092	−20.89	**971**	74 190.4	75.425	−15.59
902	68 940.2	76.795	−19.93	**937**	71 615.5	76.071	−20.85	**972**	74 265.8	75.410	−15.28
903	69 017.0	76.775	−20.00	**938**	71 691.5	76.050	−20.81	**973**	74 341.2	75.395	−14.96
904	69 093.8	76.755	−20.06	**939**	71 767.6	76.029	−20.77	**974**	74 416.6	75.380	−14.62
905	69 170.5	76.735	−20.13	**940**	71 843.6	76.008	−20.72	**975**	74 492.0	75.366	−14.27
906	69 247.2	76.715	−20.19	**941**	71 919.6	75.988	−20.66	**976**	74 567.4	75.352	−13.91
907	69 323.9	76.695	−20.25	**942**	71 995.6	75.967	−20.60	**977**	74 642.7	75.338	−13.54
908	69 400.6	76.674	−20.31	**943**	72 071.5	75.947	−20.53	**978**	74 718.0	75.325	−13.15
909	69 477.3	76.654	−20.37	**944**	72 147.5	75.926	−20.46	**979**	74 793.4	75.312	−12.75
910	69 553.9	76.634	−20.43	**945**	72 223.4	75.906	−20.38	**980**	74 868.7	75.299	−12.34
911	69 630.6	76.613	−20.48	**946**	72 299.3	75.885	−20.29	**981**	74 944.0	75.287	−11.92
912	69 707.2	76.593	−20.54	**947**	72 375.2	75.865	−20.20	**982**	75 019.2	75.275	−11.48
913	69 783.7	76.572	−20.59	**948**	72 451.0	75.845	−20.10	**983**	75 094.5	75.264	−11.02
914	69 860.3	76.552	−20.63	**949**	72 526.8	75.825	−19.99	**984**	75 169.8	75.253	−10.55
915	69 936.9	76.531	−20.68	**950**	72 602.7	75.805	−19.88	**985**	75 245.0	75.243	−10.07
916	70 013.4	76.510	−20.72	**951**	72 678.5	75.785	−19.76	**986**	75 320.2	75.233	−9.57
917	70 089.9	76.489	−20.76	**952**	72 754.2	75.765	−19.63	**987**	75 395.5	75.224	−9.06
918	70 166.4	76.469	−20.80	**953**	72 830.0	75.746	−19.50	**988**	75 470.7	75.215	−8.53
919	70 242.8	76.448	−20.83	**954**	72 905.7	75.726	−19.36	**989**	75 545.9	75.207	−7.99
920	70 319.2	76.427	−20.86	**955**	72 981.4	75.707	−19.21	**990**	75 621.1	75.199	−7.43
921	70 395.7	76.406	−20.89	**956**	73 057.1	75.688	−19.05	**991**	75 696.3	75.192	−6.85
922	70 472.1	76.385	−20.92	**957**	73 132.8	75.669	−18.88	**992**	75 771.5	75.185	−6.26
923	70 548.4	76.364	−20.94	**958**	73 208.5	75.650	−18.71	**993**	75 846.7	75.179	−5.65
924	70 624.8	76.343	−20.96	**959**	73 284.1	75.632	−18.53	**994**	75 921.8	75.174	−5.02
925	70 701.1	76.322	−20.98	**960**	73 359.7	75.613	−18.34	**995**	75 997.0	75.169	−4.38
926	70 777.4	76.301	−20.99	**961**	73 435.3	75.595	−18.14	**996**	76 072.2	75.165	−3.71
927	70 853.7	76.280	−21.00	**962**	73 510.9	75.577	−17.93	**997**	76 147.4	75.162	−3.03
928	70 930.0	76.259	−21.00	**963**	73 586.5	75.559	−17.71	**998**	76 222.5	75.159	−2.33
929	71 006.2	76.238	−21.00	**964**	73 662.0	75.542	−17.48	**999**	76 297.7	75.157	−1.61
930	71 082.5	76.217	−21.00	**965**	73 737.6	75.524	−17.24	**1000**	76 372.8	75.156	−0.88
931	71 158.7	76.196	−20.99	**966**	73 813.1	75.507	−16.99				
932	71 234.9	76.175	−20.98	**967**	73 888.6	75.490	−16.73				
933	71 311.0	76.154	−20.96	**968**	73 964.1	75.474	−16.46				
934	71 387.2	76.134	−20.94	**969**	74 039.5	75.457	−16.18				
935	71 463.3	76.113	−20.92	**970**	74 115.0	75.441	−15.89				

5.4. References

[1] Shenker, H.; Lauritzen, J. I. Jr.; Corruccini, R. J. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 508*; 1951 May. 73 p.

[2] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J.; Lonberger, S. T. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 561*; 1955 April. 87 p.

[3] Roeser, W. F.; Dahl, A. I.; Gowens, G. J. Standard tables for Chromel-Alumel thermocuples. *J. Res. Natl. Bur. Stand. (U.S.)* **14**, 239-246; RP767; 1935 June.

[4] Roeser, W. F.; Dahl, A. I. Reference tables for iron-constantan and copper-constantan thermocouples. *J. Res. Natl. Bur. Stand. (U.S.)* **20**, 337-355; RP1080; 1938 March.

[5] Plumb, H. H.; Cataland, G. Acoustical thermometer and the National Bureau of Standards Provisional Temperature Scale 2-20 (1965). *Metrologia* **2**, 127-139; 1966.

[6] Sparks, L. L.; Powell, R. L.; Hall, W. J. Reference tables for low-temperature thermocouples. *Natl. Bur. Stand. (U.S.) Monogr. 124*; 1972 June. 61 p.

[7] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[8] Sparks, L. L.; Powell, R. L. Low temperatures thermocouples: KP, "normal" silver, and copper versus Au-0.02 at% Fe and Au-0.07 at% Fe. *J. Res. Natl. Bur. Stand. (U.S.)* **76A**(3), 263-283; 1972 May-June.

[9] ASTM, American Society for Testing and Materials. Manual on the use of thermocouples in temperature measurement. *Special Tech. Publ. 470B*; edited by Benedict, R. P.; Philadelphia: ASTM; 1981. 258 p.

[10] Dahl, A. I. Stability of base-metal thermocouples in air from 800 to 2200 °F. *J. Res. Natl. Bur. Stand. (U.S.)* **24**, 205-224; RP1278; 1940 February.

[11] Burley, N. A.; Hess, R. M.; Howie, C. F.; Coleman, J. A. The nicrosil versus nisil thermocouple: A critical comparison with the ANSI standard letter-designated base-metal thermocouples. Schooley, J. F., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5, Part 2; New York: American Institute of Physics; 1982. 1159-1166.

[12] Potts, J. F. Jr.; McElroy, D. L. The effects of cold working, heat treatment, and oxidation on the thermal emf of nickel-base thermoelements. Herzfeld, C. M.; Brickwedde, F. G.; Dahl, A. I.; Hardy, J. D., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 3, Part 2; New York: Reinhold Publishing Corp.; 1962. 243-264.

[13] Burley, N. A.; Ackland, R. G. The stability of the thermo-emf/temperature characterisitics of nickel-base thermocouples. *Jour. of Australian Inst. of Metals* **12**(1), 23-31; 1967.

[14] Burley, N. A. Nicrosil and nisil: Highly stable nickel-base alloys for thermocouples. Plumb, H. H., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4, Part 3; Pittsburg: Instrument Society of America; 1972. 1677-1695.

[15] Wang, T. P.; Starr, C. D. Electromotive force stability of nicrosil-nisil. *Journal of Testing and Evaluation* 8(4), 192-198; 1980.

[16] Starr, C. D.; Wang, T. P. Effect of oxidation on stability of thermocouples, *Proceedings of the American Society for Testing and Materials* Vol. **63**, 1185-1194; 1963.

[17] Bentley, R. E. Short-term instabilities in thermocouples containing nickel-based alloys. *High Temperatures-High Pressures* **15**, 599-611; 1983.

[18] Kollie, T. G.; Horton, J. L.; Carr, K. R.; Herskovitz, M. B.; Mossman, C. A. Temperature measurement errors with type K (Chromel vs Alumel) thermocouples due to short-ranged ordering in Chromel. *Rev. Sci. Instrum.* **46**, 1447-1461; 1975.

[19] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[20] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10 (1990); *ibid.* p. 107.

[21] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[22] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. Schooley, J. F., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; New York: American Institute of Physics; 1992. 547-552.

[23] Bureau International de Poids et Mesures. The 1976 Provisional 0.5 to 30 K Temperature Scale. *Metrologia* **15**, 65-68; 1979.

[24] Bureau International des Poids et Mesures, Supplementary information for the International Temperature Scale of 1990. Pavillion de Breteuil, F-92310 Sevres; 1990 December. 177 p.

6. TYPE J—Iron Versus Copper-Nickel Alloy (SAMA) Thermocouples

6.1. Material Specifications and Precautions

This is one of the most common types of industrial thermocouples, because of its relatively high Seebeck coefficient and low cost. It has been reported that more than 200 tons of type J materials are supplied annually to industry in this country. However, this type is least suitable for accurate thermometry because there are significant nonlinear deviations in the thermoelectric output of thermocouples obtained from different manufacturers. These irregular deviations lead to difficulties in obtaining accurate calibrations based on a limited number of calibration points. The positive thermoelement is commercially pure (99.5% Fe) iron, usually containing significant impurity levels of carbon, chromium, copper, manganese, nickel, phosphorus, silicon, and sulfur. Thermocouple wire represents such a small fraction of the total production of commercial iron wire that the producers do not control the chemical composition to maintain constant thermoelectric properties. Instead, instrument companies and thermocouple fabricators select material most suitable for their thermocouple usage. The total and specific types of impurities that occur in commercial iron change with time, location of primary ores, and methods of smelting. Many unusual lots have been selected in the past, for example spools of industrial iron wire and even scrapped rails from an elevated train line. At present, iron wire that most closely fits these tables has about 0.25 percent manganese and 0.12 percent copper, plus other minor impurities.

The negative thermoelement for type J thermocouples is a copper-nickel alloy known ambiguously as constantan. The word constantan has commonly referred to copper-nickel alloys containing anywhere from 45 to 60 percent copper, plus minor impurities of carbon, cobalt, iron, and manganese. Constantan for type J thermocouples usually contains about 55 percent copper, 45 percent nickel, and a small but thermoelectrically significant amount of cobalt, iron, and manganese, about 0.1 percent or more. **It should be emphasized that type JN thermoelements are NOT generally interchangeable with type TN (or EN) thermoelements, although they are all referred to as "constantan".** In order to provide some differentiation in nomenclature, type JN is often referred to as SAMA constantan.

Suppliers of type J thermocouples usually select batches of iron and well-matched batches of constantan so that the total output of the combination closely fits the type J table up to 760 °C. In fact, with care in selection, type J thermocouples can be produced that will fit reference tables as accurately as the more expensive type K and type N thermocouples. While the overall thermocouple will conform to the initial calibration tolerances published in ASTM and ISA standards (or may even have closer tolerances), it should be emphasized that type JP and JN thermoelements as supplied by different companies are **not** generally interchangeable.

The grandfather of the type J thermocouple tables presented in this Monograph was the commercial table printed by Leeds and Northrup in 1913 and incorporated in a later (1920) NBS Technical Paper [1] and in the NAS-NRC International Critical Tables [2] in 1926. The usefulness of an iron versus copper-nickel alloy thermocouple had been shown as early as 1892 by Lindeck [3]. By the 1930s a number of different tables had been published for iron versus constantan thermocouples because of a lack of standardization and differences in the irons used by various thermocouple manufacturers. Although other tables for iron versus constantan thermocouples came into existence, the 1913 table was the most commonly used for instrument calibrations. Until the late 1930s, however, thermocouples did not conform accurately to this table. Therefore, Roeser and Dahl at NBS obtained a representative selection of both materials, carefully measured their thermoelectric voltages at temperatures between −200 °C and 1000 °C, and published [4] new tabular values for the thermocouple in 1938. Their results were representative of material used by the military at that time, but deviated significantly from the 1913 table. Because their table values differed by up to 2 % from those of the previous tables, they were not generally accepted as a replacement for the earlier iron versus constantan tables. To somewhat ease the confusion, the tables generated by Roeser and Dahl [4] were referred to as type Y or RP 1080 iron versus constantan. Their tables were used by several military groups but were not generally used in civilian applications.

In an effort to promote uniformity, a section of the Scientific Apparatus Makers of America (SAMA) initiated a new program in 1948. A research project was established at the National Bureau of Standards to obtain experimental data on the characteristics of iron versus constantan thermocouples that reproduced the 1913 table. The results of this project were published in 1953 by Corruccini and Shenker [5]. Their tables covered the temperature range from −195 °C to 871 °C and were very close to the 1913 ones. Several years later they were included in NBS Circular 561 [6] and became generally accepted as the type J, iron versus constantan, thermocouple standards. Upon introduction of the IPTS-68, Powell and others at NBS revised the type J tables to account for the scale change. They used the

research results of Corruccini and Shenker [5], plus some experimental data reported by Sine [7] at temperatures above 760 °C, for generating their IPTS-68 based function and table for the thermocouple. The revised table, which covered the range from −210 °C to 1200 °C, was published in 1974 in NBS Monograph 125 [8].

Type J thermocouples are recommended by the ASTM [9] for use in the temperature range from 0 °C to 760 °C in vacuum, oxidizing, reducing, or inert atmospheres. If used for extended times in air above 500 °C, heavy gage wires are recommended because the oxidation rate is rapid at elevated temperatures. Oxidation normally causes a gradual decrease in the thermoelectric voltage of the thermocouple with time. About 50 years ago, Dahl [10] studied the thermoelectric stability of type J thermocouples when heated in air at elevated temperatures and his work should be consulted for details. Because iron rusts in moist atmospheres and may become brittle, type J thermocouples are not recommended for use below 0 °C. In addition, they should not be used unprotected in sulfurous atmospheres above 500 °C.

The positive thermoelement, iron, is relatively insensitive to composition changes under thermal neutron irradiation, but does exhibit a slight increase in manganese content. The negative thermoelement, a copper-nickel alloy, is subject to substantial composition changes under thermal neutron irradiation since copper is converted to nickel and zinc.

Both thermoelements of type J thermocouples are variable in thermoelectric output because of compositional variations in the iron and in the copper-nickel alloy. Corruccini and Shenker [5] found an order of magnitude variation in both the manganese (0.03 to 0.38%) and copper (0.02 to 0.15%) impurities in the iron thermoelements, even though the materials were presumably specially selected lots of material. Not only were the thermoelectric voltages of different iron thermoelements different by as much as 2%, the output curves were sometimes different in shape. The negative thermoelements also differed by as much as 2%, but their deviations tended to be much more linear. At present the manufacturers are controlling the compositions and the matching of thermoelements more carefully and therefore deviations from the standards should be considerably less than those observed by Corruccini and Shenker [5].

Finch [11] has shown that the Seebeck coefficient of iron at 500 °C is increased by additions of Cr, Mn, or S but decreased by additions of Ni, Si, Sn, P, and Cu (for impurity level above 0.1 percent). Manufacturers select the negative thermoelement to match a given lot of positive material. The composition of the copper-nickel alloy therefore also varies significantly. Its average composition is around 55% copper.

Iron undergoes a magnetic transformation near 769 °C and an α-γ crystal transformation near 910 °C [12]. Both of these transformations, especially the latter, seriously affect the thermoelectric properties of iron, and therefore of type J thermocouples. This behavior and the rapid oxidation rate of iron are the main reasons why iron versus constantan thermocouples are not recommended as a standardized type above 760 °C. If type J thermocouples are taken to high temperatures, especially above 900 °C, they will lose the accuracy of their calibration when they are recycled to lower temperatures. If type J thermocouples are used in air at temperatures above 760 °C, only the largest wire, AWG 8 (3.3 mm) should be used and they should be held at the measured temperature for 10 to 20 min before readings are taken. The thermoelectric voltage of the type J thermocouples may change by as much as 40 μV (or 0.6 °C equivalent) per minute when first brought up to temperatures near 900 °C.

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [13] specifies that the initial calibration tolerances for type J commercial thermocouples be ± 2.2 °C or ± 0.75 % (whichever is greater) between 0 °C and 750 °C. Type J thermocouples can also be supplied to meet special tolerances, which are equal to approximately one-half the standard tolerances given above. Tolerances are not specified for type J thermocouples below 0 °C or above 750 °C.

The suggested upper temperature limit of 760 °C given in the above ASTM standard [13] for protected type J thermocouples applies to AWG 8 (3.25 mm) wire. For smaller diameter wires the suggested upper temperature limit decreases to 590 °C for AWG 14 (1.63 mm), 480 °C for AWG 20 (0.81 mm), 370 °C for AWG 24 or 28 (0.51 mm or 0.33 mm), and 320 °C for AWG 30 (0.25 mm). These temperature limits apply to thermocouples used in conventional closed-end protecting tubes and they are intended only as a rough guide to the user. They do not apply to sheathed thermocouples having compacted mineral oxide insulation.

6.2. Construction of Reference Functions

6.2.1. Type J thermocouples

The reference function for type J thermocouples is based on the polynomial representations in NBS Monograph 125 [8] and the difference in values of

temperature expressed on the IPTS-68 and the ITS-90 [14] as given by

$$\Delta t = t_{90} - t_{68},$$

where t_{90} and t_{68} indicate temperature (°C) on the ITS-90 and the IPTS-68, respectively.

Monograph 125 gives polynomial representationsof the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the temperature range −210 °C to 1200 °C. In terms of t_{90}, these are replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i \quad for\ j = 1, 2.$$

Thermoelectric voltages, Y_t, where

$$Y_t = 0.999990736\ g(t_{90} - \Delta t),$$

were generated at 10 °C intervals and fitted by the method of least-squares to corresponding values of t_{90} to obtain the coefficients, c_i, of $f_j(t_{90})$ in terms of the ITS-90 and the SI volt [15]. The Δt data for this analysis came from three sources. For the range −210 °C to 630 °C, Δt values were taken from the table of Preston-Thomas [14]. Between 630 °C and 1064 °C, Δt values were obtained from the fifth degree polynomial in t_{90} given by Guthrie *et al.* [16]. Above 1064 °C, Δt values were generated from the relationship given by Mangum and Furukawa [17], namely,

$$(t_{90} - t_{68})/°C = -0.25[(t_{90}/°C + 273.15)/1337.33]^2.$$

A single polynomial is not satisfactory to cover the temperature range −210 °C to 1200 °C. The range is broken at 760 °C, as in NBS Monograph 125, and a separate polynomial is defined for each segment. As noted in Monograph 125, the IPTS-68 function and values above 760 °C were given with reduced precision due to large uncertainties in the experimental data. Therefore, as in Monograph 125, the function and values above this temperature are given only as a guide and rough approximation.

The appropriate degree for each polynomial is at issue, and the least-squares criteria for testing the aptness of a model do not strictly apply because the Δt values, derived by smoothing of experimental data, are not contaminated by random error. The approach used instead was to choose the lowest degree polynomial for which the largest absolute difference between a fitted value, $f_j(t_{90})$, and a corresponding data point, Y_t, was less than $0.02 f_j'(t_{90})$ μV. Using a criterion based on the Seebeck coefficient, $f_j'(t_{90})$, guarantees that for any value of t_{90} in the data set, the difference between $f_j(t_{90})$ and Y_t will be a voltage difference equivalent to not more than 0.02 °C. For temperatures in the range −210 °C to 760 °C an eighth degree polynomial, $f_1(t_{90})$, satisfies the criterion and for the range 760 °C to 1200 °C a fifth degree polynomial, $f_2(t_{90})$, is adequate.

The polynomials, $f_1(t_{90})$ and $f_2(t_{90})$, were constructed so that the conditions $f_1(760) = f_2(760)$ and $f_1'(760) = f_2'(760)$ are satisfied. This was accomplished by fitting the two polynomials simultaneously as a spline model. The spline model was then expanded for each temperature range to obtain the polynomials. The second derivatives of these polynomials were not constrained because higher degree polynomials would be needed to simultaneously meet the condition $f_1''(760) = f_2''(760)$ and the fitting criterion discussed above.

The coefficients for the polynomials, $f_1(t_{90})$ and $f_2(t_{90})$, are given in section 6.3. Since the coefficients have been rounded to a fixed number of significant digits, the equality of the polynomials at the break-point (760 °C) will not be *exact* due to slight round off errors. The reader is cautioned also that further rounding or truncation of the coefficients could adversely affect computations which depend on this reference function.

The uncertainty in the ITS-90 reference function is given as its bias relative to the IPTS-68 reference function. The uncertainty for each temperature range is estimated by computing the maximum absolute difference between $f_j(t_{90})$ and Y_t over that range. These biases are tabulated below.

Temperature range °C			Bias μV
−210	to	760	1.23
760	to	1200	0.47

The biases given above describe the disagreement between the voltage produced by the new reference function for a particular value of t_{90} and the voltage that would be obtained by substituting $t_{90} - \Delta t$ into the IPTS-68 reference function. They do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function. These latter uncertainties, which are not known, would be needed to make a statement about the absolute uncertainty of voltages or temperatures derived using this reference function.

6.2.2. Positive thermoelement, type JP, versus platinum, Pt-67

The construction of the reference function for the positive thermoelement, type JP, versus Pt-67 parallels the conversion outlined for the type J thermocouple. For the positive thermoelement, NBS Monograph 125 gives a single polynomial representation of thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the temperature range −210 °C to 760 °C. In terms of t_{90}, this is replaced by a single polynomial of the form:

$$f(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i.$$

The criterion in section 6.2.1 for determining the lowest degree polynomial which fits the data results in a reference function that is an eighth degree polynomial. The coefficients of the polynomial are given in section 6.4 to 11 significant digits.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum absolute difference between $f(t_{90})$ and Y_t in the range −210 °C to 760 °C is computed as in section 6.2.1. The maximum bias for the conversion of the reference function from the IPTS-68 to the ITS-90 is 0.29 μV. As in section 6.2.1, this computed bias does not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

6.2.3. Platinum, Pt-67, versus negative thermoelement, type JN

The reference function for Pt-67 versus the negative thermoelement, type JN, is based on the reference function for the total thermocouple, type J, and the reference function for its positive thermoelement, type JP. More specifically, the type JN function is the algebraic difference between the reference function for the type J thermocouple (see sec. 6.2.1) and the reference function for the type JP thermoelement versus Pt-67 (see sec. 6.2.2). This results in a reference function that is an eighth degree polynomial of the form:

$$f(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i ,$$

this function covers the temperature range −210 °C to 760 °C. The coefficients of the polynomial are given in section 6.5 to 11 significant digits.

The uncertainty in the ITS-90 reference function is given as its bias relative to the IPTS-68 reference function. The maximum absolute difference between $f(t_{90})$ and Y_t in the range −210 °C to 760 °C is computed as in sections 6.2.1 and 6.2.2. The maximum bias for the conversion of the reference function from the IPTS-68 to the ITS-90 is 0.94 μV. As in sections 6.2.1 and 6.2.2, this computed bias does not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

6.3. Reference Function and Table for Type J Thermocouples

The coefficients, c_i, for the eighth degree polynomial and for the fifth degree polynomial that give the thermoelectric voltage, E, of type J thermocouples as a function of temperature, t_{90}, in the −210 °C to 760 °C and 760 °C to 1200 °C ranges, respectively, are given in table 6.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type J thermocouples at selected fixed points are given in table 6.3.2. The reference values for type J thermocouples are given at 1 °C intervals from −210 °C to 1200 °C in table 6.3.3. Graphs of the thermoelectric voltage, its first derivative, and second derivative are given in figures 6.3.1, 6.3.2, and 6.3.3, respectively. The discontinuity in the second derivative at 760 °C is apparent in figure 6.3.3. It results from equations for the two temperature regions being joined without constraints on their second derivatives.

Values above 760 °C are given as a guide only: the thermoelectric properties of type J thermocouples are not stable above 760 °C. The function and values above 760 °C are not suitable for precise temperature measurements; hence, values are given with reduced precision above this temperature. The thermocouple is NOT a standardized type above 760 °C.

TABLE 6.3.1. *Type J thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−210 °C to 760 °C	760 °C to 1200 °C
c_0 =	0.000 000 000 0 . . .	2.964 562 568 1 X 10^{5}
c_1 =	5.038 118 781 5 X 10^{1}	−1.497 612 778 6 X 10^{3}
c_2 =	3.047 583 693 0 X 10^{-2}	3.178 710 392 4 . . .
c_3 =	−8.568 106 572 0 X 10^{-5}	−3.184 768 670 1 X 10^{-3}
c_4 =	1.322 819 529 5 X 10^{-7}	1.572 081 900 4 X 10^{-6}
c_5 =	−1.705 295 833 7 X 10^{-10}	−3.069 136 905 6 X 10^{-10}
c_6 =	2.094 809 069 7 X 10^{-13}	
c_7 =	−1.253 839 533 6 X 10^{-16}	
c_8 =	1.563 172 569 7 X 10^{-20}	

TABLE 6.3.2. *Thermoelectric values at fixed points for type J thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
Argon TP	−189.3442	−7 642.87	24.590	247.75
Mercury TP	−38.8344	−1 905.23	47.593	83.52
Ice MP	0.000	0.00	50.381	60.95
Water TP	0.01	0.5	50.382	60.95
Gallium MP	29.7646	1 524.4	51.981	46.97
Indium FP	156.5985	8 374.2	55.248	9.57
Tin FP	231.928	12 551.7	55.537	−0.66
Cadmium FP	321.069	17 492.6	55.276	−3.58
Lead FP	327.462	17 846.0	55.254	−3.42
Zinc FP	419.527	22 925.4	55.204	3.84
Antimony FP	630.63	34 910.1	59.560	36.44
Aluminum FP	660.323	36 695.0	60.669	37.90
Silver FP	961.78	55 669	60.34	−31.4
Gold FP	1064.18	61 716	58.13	−11.0
Copper FP	1084.62	62 902	57.94	−7.5

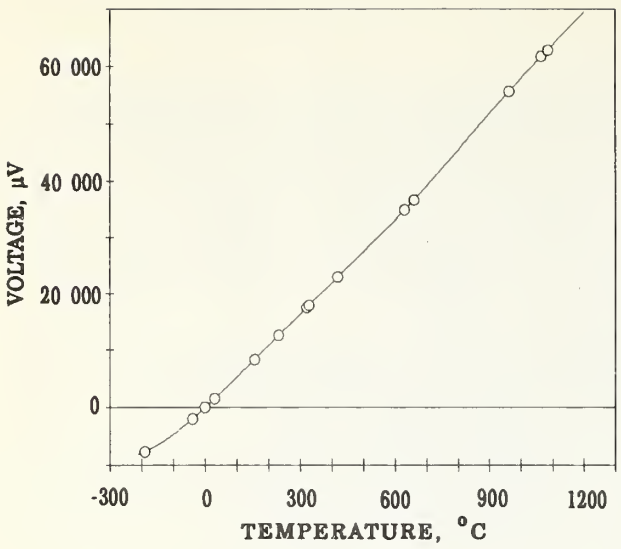

FIGURE 6.3.1. *Thermoelectric voltage for type J thermocouples. The circles indicate values at various thermometric fixed points.*

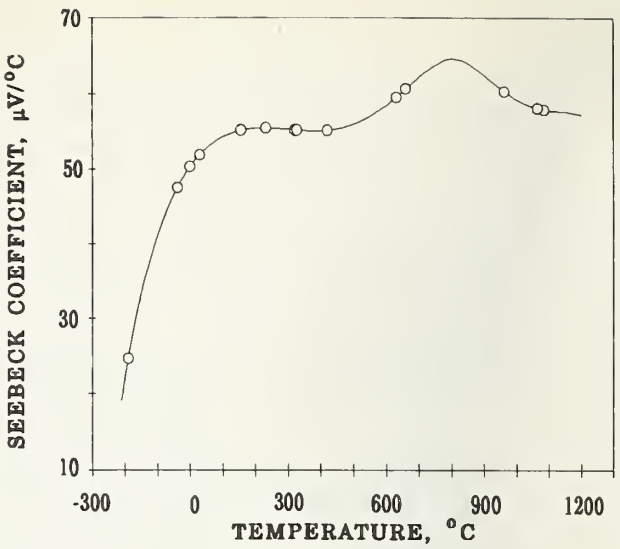

FIGURE 6.3.2. *Seebeck coefficient for type J thermocouples. The circles indicate values at various thermometric fixed points.*

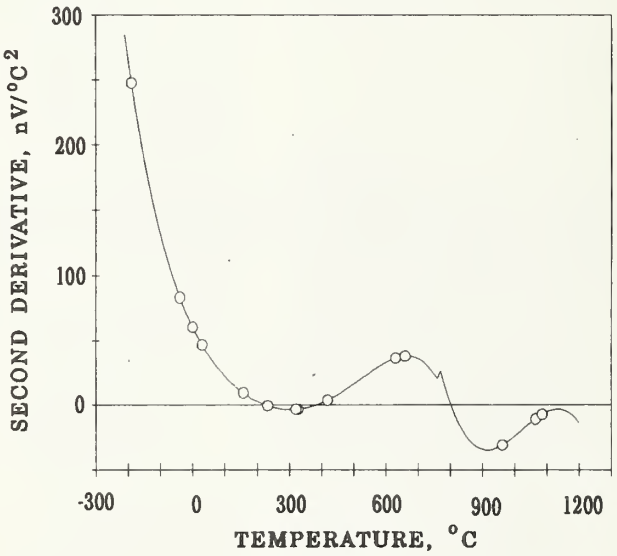

FIGURE 6.3.3. *Second derivative of thermoelectric voltage for type J thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
−210	−8 095.38	19.096	284.95	−190	−7 658.94	24.427	248.86	−170	−7 122.82	29.079	217.00
−209	−8 076.14	19.380	283.03	−189	−7 634.39	24.675	247.17	−169	−7 093.63	29.295	215.50
−208	−8 056.62	19.662	281.13	−188	−7 609.59	24.921	245.49	−168	−7 064.23	29.510	214.02
−207	−8 036.82	19.943	279.25	−187	−7 584.55	25.166	243.82	−167	−7 034.61	29.723	212.55
−206	−8 016.73	20.221	277.37	−186	−7 559.26	25.409	242.17	−166	−7 004.79	29.935	211.09
−205	−7 996.38	20.497	275.50	−185	−7 533.73	25.650	240.52	−165	−6 974.75	30.145	209.63
−204	−7 975.74	20.772	273.65	−184	−7 507.96	25.890	238.88	−164	−6 944.50	30.354	208.19
−203	−7 954.83	21.045	271.81	−183	−7 481.95	26.128	237.25	−163	−6 914.04	30.562	206.75
−202	−7 933.65	21.316	269.97	−182	−7 455.71	26.365	235.64	−162	−6 883.37	30.768	205.32
−201	−7 912.20	21.585	268.15	−181	−7 429.22	26.599	234.03	−161	−6 852.50	30.972	203.91
−200	−7 890.48	21.852	266.35	−180	−7 402.51	26.833	232.43	−160	−6 821.43	31.176	202.50
−199	−7 868.50	22.117	264.55	−179	−7 375.56	27.064	230.84	−159	−6 790.15	31.377	201.10
−198	−7 846.25	22.381	262.76	−178	−7 348.38	27.294	229.27	−158	−6 758.67	31.578	199.71
−197	−7 823.74	22.643	260.99	−177	−7 320.97	27.523	227.70	−157	−6 727.00	31.777	198.32
−196	−7 800.96	22.903	259.22	−176	−7 293.33	27.750	226.14	−156	−6 695.12	31.975	196.95
−195	−7 777.93	23.161	257.47	−175	−7 265.47	27.975	224.59	−155	−6 663.05	32.171	195.58
−194	−7 754.64	23.418	255.72	−174	−7 237.39	28.199	223.05	−154	−6 630.78	32.366	194.23
−193	−7 731.10	23.673	253.99	−173	−7 209.08	28.421	221.53	−153	−6 598.32	32.559	192.88
−192	−7 707.30	23.926	252.27	−172	−7 180.54	28.642	220.01	−152	−6 565.66	32.751	191.54
−191	−7 683.25	24.177	250.56	−171	−7 151.79	28.861	218.50	−151	−6 532.81	32.942	190.21
−190	−7 658.94	24.427	248.86	−170	−7 122.82	29.079	217.00	−150	−6 499.78	33.132	188.88

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−6 499.78	33.132	188.88	−100	−4 632.52	41.088	132.33	−50	−2 431.28	46.619	91.09
−149	−6 466.55	33.320	187.57	−99	−4 591.37	41.220	131.37	−49	−2 384.61	46.710	90.39
−148	−6 433.14	33.507	186.26	−98	−4 550.08	41.350	130.42	−48	−2 337.86	46.800	89.70
−147	−6 399.54	33.693	184.96	−97	−4 508.67	41.480	129.47	−47	−2 291.01	46.889	89.01
−146	−6 365.75	33.877	183.67	−96	−4 467.12	41.609	128.53	−46	−2 244.08	46.978	88.32
−145	−6 331.78	34.060	182.39	−95	−4 425.45	41.737	127.59	−45	−2 197.06	47.066	87.64
−144	−6 297.63	34.242	181.12	−94	−4 383.65	41.865	126.66	−44	−2 149.95	47.153	86.96
−143	−6 263.30	34.422	179.85	−93	−4 341.72	41.991	125.74	−43	−2 102.75	47.240	86.29
−142	−6 228.79	34.601	178.59	−92	−4 299.67	42.116	124.82	−42	−2 055.47	47.326	85.62
−141	−6 194.10	34.779	177.34	−91	−4 257.49	42.240	123.91	−41	−2 008.10	47.411	84.95
−140	−6 159.23	34.956	176.10	−90	−4 215.19	42.364	123.01	−40	−1 960.65	47.496	84.29
−139	−6 124.19	35.132	174.86	−89	−4 172.76	42.486	122.11	−39	−1 913.11	47.580	83.63
−138	−6 088.97	35.306	173.64	−88	−4 130.22	42.608	121.21	−38	−1 865.49	47.663	82.98
−137	−6 053.58	35.479	172.42	−87	−4 087.55	42.729	120.32	−37	−1 817.78	47.746	82.33
−136	−6 018.01	35.651	171.21	−86	−4 044.76	42.849	119.44	−36	−1 770.00	47.828	81.69
−135	−5 982.27	35.821	170.00	−85	−4 001.85	42.968	118.56	−35	−1 722.13	47.909	81.05
−134	−5 946.37	35.991	168.81	−84	−3 958.82	43.086	117.69	−34	−1 674.18	47.990	80.41
−133	−5 910.29	36.159	167.62	−83	−3 915.68	43.203	116.83	−33	−1 626.15	48.070	79.78
−132	−5 874.05	36.326	166.44	−82	−3 872.42	43.320	115.96	−32	−1 578.04	48.149	79.15
−131	−5 837.64	36.492	165.26	−81	−3 829.04	43.435	115.11	−31	−1 529.85	48.228	78.52
−130	−5 801.07	36.656	164.10	−80	−3 785.55	43.550	114.26	−30	−1 481.58	48.306	77.90
−129	−5 764.33	36.820	162.94	−79	−3 741.94	43.664	113.41	−29	−1 433.24	48.384	77.28
−128	−5 727.43	36.982	161.79	−78	−3 698.22	43.777	112.57	−28	−1 384.81	48.461	76.67
−127	−5 690.37	37.144	160.64	−77	−3 654.39	43.889	111.74	−27	−1 336.32	48.537	76.06
−126	−5 653.14	37.304	159.51	−76	−3 610.44	44.000	110.91	−26	−1 287.74	48.613	75.45
−125	−5 615.76	37.463	158.37	−75	−3 566.39	44.111	110.09	−25	−1 239.09	48.688	74.85
−124	−5 578.22	37.620	157.25	−74	−3 522.22	44.220	109.27	−24	−1 190.36	48.763	74.25
−123	−5 540.52	37.777	156.14	−73	−3 477.95	44.329	108.46	−23	−1 141.56	48.837	73.66
−122	−5 502.66	37.933	155.03	−72	−3 433.56	44.437	107.65	−22	−1 092.69	48.910	73.07
−121	−5 464.65	38.087	153.93	−71	−3 389.07	44.544	106.84	−21	−1 043.75	48.983	72.48
−120	−5 426.49	38.240	152.83	−70	−3 344.47	44.651	106.05	−20	−994.73	49.055	71.90
−119	−5 388.17	38.393	151.74	−69	−3 299.77	44.757	105.25	−19	−945.64	49.127	71.32
−118	−5 349.70	38.544	150.66	−68	−3 254.96	44.861	104.46	−18	−896.47	49.198	70.74
−117	−5 311.08	38.694	149.59	−67	−3 210.05	44.965	103.68	−17	−847.24	49.268	70.17
−116	−5 272.32	38.843	148.52	−66	−3 165.03	45.069	102.90	−16	−797.94	49.338	69.60
−115	−5 233.40	38.991	147.46	−65	−3 119.91	45.171	102.13	−15	−748.56	49.407	69.03
−114	−5 194.33	39.138	146.40	−64	−3 074.69	45.273	101.36	−14	−699.12	49.476	68.47
−113	−5 155.12	39.284	145.36	−63	−3 029.37	45.374	100.60	−13	−649.61	49.544	67.91
−112	−5 115.77	39.429	144.32	−62	−2 983.94	45.474	99.84	−12	−600.03	49.612	67.36
−111	−5 076.27	39.573	143.28	−61	−2 938.42	45.574	99.08	−11	−550.39	49.679	66.80
−110	−5 036.62	39.715	142.25	−60	−2 892.79	45.672	98.33	−10	−500.68	49.745	66.25
−109	−4 996.84	39.857	141.23	−59	−2 847.07	45.770	97.59	−9	−450.90	49.811	65.71
−108	−4 956.91	39.998	140.22	−58	−2 801.25	45.868	96.85	−8	−401.05	49.877	65.17
−107	−4 916.84	40.138	139.21	−57	−2 755.34	45.964	96.11	−7	−351.15	49.942	64.63
−106	−4 876.63	40.276	138.21	−56	−2 709.33	46.060	95.38	−6	−301.17	50.006	64.09
−105	−4 836.29	40.414	137.21	−55	−2 663.22	46.155	94.66	−5	−251.13	50.070	63.56
−104	−4 795.81	40.551	136.22	−54	−2 617.02	46.249	93.93	−4	−201.03	50.133	63.03
−103	−4 755.19	40.686	135.24	−53	−2 570.72	46.343	93.22	−3	−150.87	50.196	62.51
−102	−4 714.43	40.821	134.26	−52	−2 524.33	46.436	92.50	−2	−100.64	50.258	61.99
−101	−4 673.55	40.955	133.29	−51	−2 477.85	46.528	91.80	−1	−50.35	50.320	61.47
−100	−4 632.52	41.088	132.33	−50	−2 431.28	46.619	91.09	0	0.00	50.381	60.95

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	50.381	60.95	50	2 585.3	52.847	38.83	100	5 268.9	54.361	22.58
1	50.4	50.442	60.44	51	2 638.2	52.886	38.45	101	5 323.3	54.384	22.31
2	100.9	50.502	59.93	52	2 691.1	52.924	38.08	102	5 377.7	54.406	22.03
3	151.4	50.562	59.42	53	2 744.0	52.962	37.70	103	5 432.1	54.428	21.76
4	202.0	50.621	58.92	54	2 797.0	53.000	37.33	104	5 486.5	54.450	21.49
5	252.7	50.680	58.42	55	2 850.0	53.037	36.97	105	5 541.0	54.471	21.22
6	303.4	50.738	57.92	56	2 903.1	53.074	36.60	106	5 595.5	54.492	20.96
7	354.1	50.795	57.43	57	2 956.2	53.110	36.24	107	5 650.0	54.513	20.69
8	405.0	50.853	56.94	58	3 009.3	53.146	35.88	108	5 704.5	54.533	20.43
9	455.8	50.909	56.45	59	3 062.5	53.182	35.52	109	5 759.1	54.554	20.17
10	506.8	50.966	55.97	60	3 115.7	53.217	35.16	110	5 813.6	54.574	19.91
11	557.8	51.021	55.48	61	3 168.9	53.252	34.81	111	5 868.2	54.594	19.65
12	608.8	51.076	55.01	62	3 222.2	53.287	34.46	112	5 922.8	54.613	19.39
13	659.9	51.131	54.53	63	3 275.5	53.321	34.11	113	5 977.4	54.632	19.14
14	711.1	51.186	54.06	64	3 328.8	53.355	33.76	114	6 032.1	54.651	18.88
15	762.3	51.239	53.59	65	3 382.2	53.389	33.41	115	6 086.7	54.670	18.63
16	813.6	51.293	53.12	66	3 435.6	53.422	33.07	116	6 141.4	54.689	18.38
17	864.9	51.346	52.65	67	3 489.0	53.455	32.73	117	6 196.1	54.707	18.14
18	916.2	51.398	52.19	68	3 542.5	53.487	32.39	118	6 250.8	54.725	17.89
19	967.7	51.450	51.73	69	3 596.0	53.519	32.05	119	6 305.6	54.743	17.64
20	1019.1	51.502	51.28	70	3 649.5	53.551	31.72	120	6 360.3	54.760	17.40
21	1070.7	51.553	50.83	71	3 703.1	53.583	31.38	121	6 415.1	54.777	17.16
22	1122.3	51.603	50.38	72	3 756.7	53.614	31.05	122	6 469.9	54.795	16.92
23	1173.9	51.653	49.93	73	3 810.3	53.645	30.72	123	6 524.7	54.811	16.68
24	1225.6	51.703	49.48	74	3 864.0	53.676	30.40	124	6 579.5	54.828	16.44
25	1277.3	51.752	49.04	75	3 917.7	53.706	30.07	125	6 634.3	54.844	16.21
26	1329.1	51.801	48.60	76	3 971.4	53.736	29.75	126	6 689.2	54.860	15.98
27	1380.9	51.849	48.16	77	4 025.2	53.765	29.43	127	6 744.0	54.876	15.74
28	1432.8	51.897	47.73	78	4 078.9	53.795	29.11	128	6 798.9	54.892	15.51
29	1484.7	51.945	47.30	79	4 132.7	53.823	28.79	129	6 853.8	54.907	15.28
30	1536.7	51.992	46.87	80	4 186.6	53.852	28.48	130	6 908.7	54.922	15.06
31	1588.7	52.039	46.44	81	4 240.4	53.880	28.17	131	6 963.7	54.937	14.83
32	1640.7	52.085	46.02	82	4 294.3	53.908	27.85	132	7 018.6	54.952	14.61
33	1692.8	52.131	45.60	83	4 348.3	53.936	27.55	133	7 073.6	54.967	14.39
34	1745.0	52.176	45.18	84	4 402.2	53.964	27.24	134	7 128.5	54.981	14.16
35	1797.2	52.221	44.77	85	4 456.2	53.991	26.93	135	7 183.5	54.995	13.95
36	1849.4	52.266	44.35	86	4 510.2	54.017	26.63	136	7 238.5	55.009	13.73
37	1901.7	52.310	43.94	87	4 564.2	54.044	26.33	137	7 293.6	55.022	13.51
38	1954.1	52.354	43.53	88	4 618.3	54.070	26.03	138	7 348.6	55.036	13.30
39	2006.4	52.397	43.13	89	4 672.4	54.096	25.73	139	7 403.6	55.049	13.08
40	2058.8	52.440	42.73	90	4 726.5	54.122	25.44	140	7 458.7	55.062	12.87
41	2111.3	52.482	42.32	91	4 780.6	54.147	25.14	141	7 513.7	55.075	12.66
42	2163.8	52.524	41.93	92	4 834.8	54.172	24.85	142	7 568.8	55.087	12.45
43	2216.4	52.566	41.53	93	4 889.0	54.197	24.56	143	7 623.9	55.100	12.24
44	2268.9	52.608	41.14	94	4 943.2	54.221	24.27	144	7 679.0	55.112	12.04
45	2321.6	52.648	40.75	95	4 997.4	54.245	23.99	145	7 734.1	55.124	11.83
46	2374.2	52.689	40.36	96	5 051.7	54.269	23.70	146	7 789.3	55.135	11.63
47	2426.9	52.729	39.97	97	5 105.9	54.292	23.42	147	7 844.4	55.147	11.43
48	2479.7	52.769	39.59	98	5 160.2	54.316	23.14	148	7 899.6	55.158	11.23
49	2532.5	52.808	39.21	99	5 214.6	54.339	22.86	149	7 954.7	55.169	11.03
50	2585.3	52.847	38.83	100	5 268.9	54.361	22.58	150	8 009.9	55.180	10.84

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	8 009.9	55.180	10.84	200	10 778.7	55.506	2.77	250	13 555.2	55.512	−2.03
151	8 065.1	55.191	10.64	201	10 834.3	55.509	2.64	251	13 610.7	55.510	−2.09
152	8 120.3	55.202	10.45	202	10 889.8	55.512	2.52	252	13 666.2	55.507	−2.16
153	8 175.5	55.212	10.25	203	10 945.3	55.514	2.39	253	13 721.7	55.505	−2.22
154	8 230.7	55.222	10.06	204	11 000.8	55.516	2.27	254	13 777.2	55.503	−2.28
155	8 285.9	55.232	9.87	205	11 056.3	55.518	2.15	255	13 832.7	55.501	−2.34
156	8 341.2	55.242	9.68	206	11 111.8	55.521	2.03	256	13 888.2	55.498	−2.40
157	8 396.4	55.251	9.50	207	11 167.4	55.523	1.91	257	13 943.7	55.496	−2.45
158	8 451.7	55.261	9.31	208	11 222.9	55.524	1.79	258	13 999.2	55.493	−2.51
159	8 506.9	55.270	9.13	209	11 278.4	55.526	1.67	259	14 054.7	55.491	−2.56
160	8 562.2	55.279	8.95	210	11 333.9	55.528	1.56	260	14 110.2	55.488	−2.62
161	8 617.5	55.288	8.77	211	11 389.5	55.529	1.44	261	14 165.7	55.486	−2.67
162	8 672.8	55.297	8.59	212	11 445.0	55.531	1.33	262	14 221.2	55.483	−2.72
163	8 728.1	55.305	8.41	213	11 500.5	55.532	1.22	263	14 276.6	55.480	−2.77
164	8 783.4	55.313	8.23	214	11 556.0	55.533	1.11	264	14 332.1	55.477	−2.82
165	8 838.7	55.322	8.05	215	11 611.6	55.534	1.00	265	14 387.6	55.475	−2.86
166	8 894.0	55.330	7.88	216	11 667.1	55.535	0.89	266	14 443.1	55.472	−2.91
167	8 949.4	55.337	7.71	217	11 722.7	55.536	0.79	267	14 498.5	55.469	−2.95
168	9 004.7	55.345	7.54	218	11 778.2	55.537	0.68	268	14 554.0	55.466	−3.00
169	9 060.1	55.352	7.37	219	11 833.7	55.537	0.58	269	14 609.5	55.463	−3.04
170	9 115.4	55.360	7.20	220	11 889.3	55.538	0.47	270	14 664.9	55.460	−3.08
171	9 170.8	55.367	7.03	221	11 944.8	55.538	0.37	271	14 720.4	55.457	−3.12
172	9 226.2	55.374	6.87	222	12 000.3	55.539	0.27	272	14 775.9	55.453	−3.16
173	9 281.5	55.381	6.70	223	12 055.9	55.539	0.17	273	14 831.3	55.450	−3.20
174	9 336.9	55.387	6.54	224	12 111.4	55.539	0.07	274	14 886.8	55.447	−3.23
175	9 392.3	55.394	6.38	225	12 167.0	55.539	−0.02	275	14 942.2	55.444	−3.27
176	9 447.7	55.400	6.22	226	12 222.5	55.539	−0.12	276	14 997.6	55.441	−3.30
177	9 503.1	55.406	6.06	227	12 278.0	55.539	−0.21	277	15 053.1	55.437	−3.33
178	9 558.5	55.412	5.90	228	12 333.6	55.538	−0.30	278	15 108.5	55.434	−3.37
179	9 613.9	55.418	5.74	229	12 389.1	55.538	−0.40	279	15 163.9	55.431	−3.40
180	9 669.4	55.423	5.59	230	12 444.6	55.538	−0.49	280	15 219.4	55.427	−3.42
181	9 724.8	55.429	5.44	231	12 500.2	55.537	−0.57	281	15 274.8	55.424	−3.45
182	9 780.2	55.434	5.28	232	12 555.7	55.536	−0.66	282	15 330.2	55.420	−3.48
183	9 835.6	55.440	5.13	233	12 611.3	55.536	−0.75	283	15 385.6	55.417	−3.50
184	9 891.1	55.445	4.98	234	12 666.8	55.535	−0.83	284	15 441.1	55.413	−3.53
185	9 946.5	55.450	4.83	235	12 722.3	55.534	−0.92	285	15 496.5	55.410	−3.55
186	10 002.0	55.454	4.69	236	12 777.9	55.533	−1.00	286	15 551.9	55.406	−3.57
187	10 057.4	55.459	4.54	237	12 833.4	55.532	−1.08	287	15 607.3	55.403	−3.59
188	10 112.9	55.463	4.40	238	12 888.9	55.531	−1.16	288	15 662.7	55.399	−3.61
189	10 168.4	55.468	4.26	239	12 944.5	55.530	−1.24	289	15 718.1	55.395	−3.63
190	10 223.8	55.472	4.11	240	13 000.0	55.529	−1.32	290	15 773.5	55.392	−3.65
191	10 279.3	55.476	3.97	241	13 055.5	55.527	−1.40	291	15 828.9	55.388	−3.66
192	10 334.8	55.480	3.83	242	13 111.0	55.526	−1.47	292	15 884.2	55.384	−3.68
193	10 390.3	55.484	3.70	243	13 166.6	55.524	−1.55	293	15 939.6	55.381	−3.69
194	10 445.8	55.487	3.56	244	13 222.1	55.523	−1.62	294	15 995.0	55.377	−3.70
195	10 501.3	55.491	3.43	245	13 277.6	55.521	−1.69	295	16 050.4	55.373	−3.71
196	10 556.7	55.494	3.29	246	13 333.1	55.519	−1.76	296	16 105.8	55.370	−3.72
197	10 612.2	55.497	3.16	247	13 388.6	55.517	−1.83	297	16 161.1	55.366	−3.73
198	10 667.7	55.500	3.03	248	13 444.2	55.516	−1.90	298	16 216.5	55.362	−3.74
199	10 723.2	55.503	2.90	249	13 499.7	55.514	−1.96	299	16 271.8	55.358	−3.75
200	10 778.7	55.506	2.77	250	13 555.2	55.512	−2.03	300	16 327.2	55.355	−3.75

TABLE 6.3.3. ***Type J thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
300	16 327.2	55.355	−3.75	**350**	19 090.5	55.186	−2.50	**400**	21 848.1	55.152	1.56
301	16 382.6	55.351	−3.75	**351**	19 145.6	55.184	−2.44	**401**	21 903.2	55.153	1.67
302	16 437.9	55.347	−3.76	**352**	19 200.8	55.181	−2.39	**402**	21 958.4	55.155	1.78
303	16 493.3	55.343	−3.76	**353**	19 256.0	55.179	−2.33	**403**	22 013.5	55.157	1.89
304	16 548.6	55.340	−3.76	**354**	19 311.2	55.177	−2.27	**404**	22 068.7	55.159	2.00
305	16 603.9	55.336	−3.76	**355**	19 366.4	55.174	−2.21	**405**	22 123.8	55.161	2.11
306	16 659.3	55.332	−3.75	**356**	19 421.5	55.172	−2.15	**406**	22 179.0	55.163	2.22
307	16 714.6	55.328	−3.75	**357**	19 476.7	55.170	−2.09	**407**	22 234.2	55.165	2.34
308	16 769.9	55.325	−3.75	**358**	19 531.9	55.168	−2.03	**408**	22 289.3	55.168	2.45
309	16 825.2	55.321	−3.74	**359**	19 587.0	55.166	−1.97	**409**	22 344.5	55.170	2.57
310	16 880.6	55.317	−3.73	**360**	19 642.2	55.164	−1.90	**410**	22 399.7	55.173	2.68
311	16 935.9	55.313	−3.73	**361**	19 697.4	55.162	−1.84	**411**	22 454.9	55.176	2.80
312	16 991.2	55.310	−3.72	**362**	19 752.5	55.160	−1.77	**412**	22 510.0	55.178	2.92
313	17 046.5	55.306	−3.71	**363**	19 807.7	55.159	−1.70	**413**	22 565.2	55.181	3.04
314	17 101.8	55.302	−3.69	**364**	19 862.9	55.157	−1.63	**414**	22 620.4	55.185	3.16
315	17 157.1	55.298	−3.68	**365**	19 918.0	55.155	−1.56	**415**	22 675.6	55.188	3.28
316	17 212.4	55.295	−3.67	**366**	19 973.2	55.154	−1.49	**416**	22 730.8	55.191	3.40
317	17 267.7	55.291	−3.65	**367**	20 028.3	55.152	−1.42	**417**	22 786.0	55.195	3.53
318	17 323.0	55.288	−3.64	**368**	20 083.5	55.151	−1.35	**418**	22 841.2	55.198	3.65
319	17 378.3	55.284	−3.62	**369**	20 138.6	55.150	−1.27	**419**	22 896.4	55.202	3.77
320	17 433.5	55.280	−3.60	**370**	20 193.8	55.149	−1.20	**420**	22 951.6	55.206	3.90
321	17 488.8	55.277	−3.58	**371**	20 248.9	55.147	−1.12	**421**	23 006.8	55.210	4.03
322	17 544.1	55.273	−3.56	**372**	20 304.1	55.146	−1.04	**422**	23 062.0	55.214	4.15
323	17 599.4	55.270	−3.54	**373**	20 359.2	55.145	−0.96	**423**	23 117.2	55.218	4.28
324	17 654.6	55.266	−3.51	**374**	20 414.4	55.144	−0.88	**424**	23 172.4	55.222	4.41
325	17 709.9	55.263	−3.49	**375**	20 469.5	55.144	−0.80	**425**	23 227.6	55.227	4.54
326	17 765.2	55.259	−3.46	**376**	20 524.6	55.143	−0.72	**426**	23 282.9	55.231	4.67
327	17 820.4	55.256	−3.44	**377**	20 579.8	55.142	−0.64	**427**	23 338.1	55.236	4.80
328	17 875.7	55.252	−3.41	**378**	20 634.9	55.142	−0.55	**428**	23 393.3	55.241	4.94
329	17 930.9	55.249	−3.38	**379**	20 690.1	55.141	−0.47	**429**	23 448.6	55.246	5.07
330	17 986.2	55.245	−3.35	**380**	20 745.2	55.141	−0.38	**430**	23 503.8	55.251	5.20
331	18 041.4	55.242	−3.32	**381**	20 800.3	55.140	−0.29	**431**	23 559.1	55.256	5.34
332	18 096.7	55.239	−3.28	**382**	20 855.5	55.140	−0.20	**432**	23 614.3	55.262	5.48
333	18 151.9	55.236	−3.25	**383**	20 910.6	55.140	−0.12	**433**	23 669.6	55.267	5.61
334	18 207.1	55.232	−3.21	**384**	20 965.8	55.140	−0.03	**434**	23 724.9	55.273	5.75
335	18 262.4	55.229	−3.18	**385**	21 020.9	55.140	0.07	**435**	23 780.2	55.279	5.89
336	18 317.6	55.226	−3.14	**386**	21 076.0	55.140	0.16	**436**	23 835.4	55.285	6.03
337	18 372.8	55.223	−3.10	**387**	21 131.2	55.140	0.25	**437**	23 890.7	55.291	6.17
338	18 428.0	55.220	−3.06	**388**	21 186.3	55.140	0.35	**438**	23 946.0	55.297	6.31
339	18 483.3	55.217	−3.02	**389**	21 241.5	55.141	0.44	**439**	24 001.3	55.304	6.45
340	18 538.5	55.214	−2.98	**390**	21 296.6	55.141	0.54	**440**	24 056.6	55.310	6.59
341	18 593.7	55.211	−2.94	**391**	21 351.8	55.142	0.64	**441**	24 111.9	55.317	6.74
342	18 648.9	55.208	−2.89	**392**	21 406.9	55.143	0.74	**442**	24 167.3	55.324	6.88
343	18 704.1	55.205	−2.85	**393**	21 462.0	55.143	0.84	**443**	24 222.6	55.331	7.03
344	18 759.3	55.202	−2.80	**394**	21 517.2	55.144	0.94	**444**	24 277.9	55.338	7.17
345	18 814.5	55.199	−2.75	**395**	21 572.3	55.145	1.04	**445**	24 333.3	55.345	7.32
346	18 869.7	55.197	−2.70	**396**	21 627.5	55.146	1.14	**446**	24 388.6	55.352	7.47
347	18 924.9	55.194	−2.65	**397**	21 682.6	55.148	1.25	**447**	24 444.0	55.360	7.61
348	18 980.1	55.191	−2.60	**398**	21 737.8	55.149	1.35	**448**	24 499.3	55.367	7.76
349	19 035.3	55.189	−2.55	**399**	21 792.9	55.150	1.46	**449**	24 554.7	55.375	7.91
350	19 090.5	55.186	−2.50	**400**	21 848.1	55.152	1.56	**450**	24 610.1	55.383	8.06

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
450	24 610.1	55.383	8.06	500	27 392.6	55.987	16.32	550	30 216.1	57.026	25.21
451	24 665.5	55.391	8.21	501	27 448.6	56.004	16.49	551	30 273.2	57.051	25.38
452	24 720.9	55.400	8.37	502	27 504.6	56.020	16.67	552	30 330.2	57.077	25.56
453	24 776.3	55.408	8.52	503	27 560.7	56.037	16.85	553	30 387.3	57.102	25.73
454	24 831.7	55.417	8.67	504	27 616.7	56.054	17.02	554	30 444.4	57.128	25.90
455	24 887.1	55.426	8.82	505	27 672.8	56.071	17.20	555	30 501.6	57.154	26.08
456	24 942.5	55.434	8.98	506	27 728.9	56.089	17.38	556	30 558.7	57.180	26.25
457	24 998.0	55.443	9.13	507	27 785.0	56.106	17.56	557	30 615.9	57.207	26.42
458	25 053.4	55.453	9.29	508	27 841.1	56.124	17.73	558	30 673.1	57.233	26.59
459	25 108.9	55.462	9.45	509	27 897.2	56.142	17.91	559	30 730.4	57.260	26.76
460	25 164.3	55.472	9.60	510	27 953.4	56.160	18.09	560	30 787.7	57.287	26.93
461	25 219.8	55.481	9.76	511	28 009.5	56.178	18.27	561	30 845.0	57.314	27.10
462	25 275.3	55.491	9.92	512	28 065.7	56.196	18.45	562	30 902.3	57.341	27.27
463	25 330.8	55.501	10.08	513	28 121.9	56.215	18.63	563	30 959.6	57.368	27.44
464	25 386.3	55.511	10.24	514	28 178.1	56.233	18.80	564	31 017.0	57.396	27.60
465	25 441.8	55.522	10.40	515	28 234.4	56.252	18.98	565	31 074.4	57.424	27.77
466	25 497.4	55.532	10.56	516	28 290.6	56.271	19.16	566	31 131.9	57.451	27.94
467	25 552.9	55.543	10.72	517	28 346.9	56.291	19.34	567	31 189.3	57.479	28.10
468	25 608.4	55.553	10.88	518	28 403.2	56.310	19.52	568	31 246.8	57.508	28.27
469	25 664.0	55.564	11.04	519	28 459.5	56.330	19.70	569	31 304.4	57.536	28.43
470	25 719.6	55.576	11.21	520	28 515.9	56.349	19.88	570	31 361.9	57.564	28.59
471	25 775.1	55.587	11.37	521	28 572.2	56.369	20.06	571	31 419.5	57.593	28.76
472	25 830.7	55.598	11.53	522	28 628.6	56.389	20.24	572	31 477.1	57.622	28.92
473	25 886.3	55.610	11.70	523	28 685.0	56.410	20.42	573	31 534.7	57.651	29.08
474	25 942.0	55.622	11.86	524	28 741.4	56.430	20.60	574	31 592.4	57.680	29.24
475	25 997.6	55.634	12.03	525	28 797.9	56.451	20.77	575	31 650.1	57.709	29.40
476	26 053.2	55.646	12.20	526	28 854.3	56.472	20.95	576	31 707.8	57.739	29.56
477	26 108.9	55.658	12.36	527	28 910.8	56.493	21.13	577	31 765.6	57.769	29.72
478	26 164.5	55.670	12.53	528	28 967.3	56.514	21.31	578	31 823.3	57.798	29.87
479	26 220.2	55.683	12.70	529	29 023.9	56.536	21.49	579	31 881.2	57.828	30.03
480	26 275.9	55.696	12.87	530	29 080.4	56.557	21.67	580	31 939.0	57.858	30.19
481	26 331.6	55.709	13.03	531	29 137.0	56.579	21.85	581	31 996.9	57.889	30.34
482	26 387.3	55.722	13.20	532	29 193.6	56.601	22.03	582	32 054.8	57.919	30.49
483	26 443.1	55.735	13.37	533	29 250.2	56.623	22.21	583	32 112.7	57.950	30.65
484	26 498.8	55.749	13.54	534	29 306.8	56.645	22.38	584	32 170.7	57.980	30.80
485	26 554.6	55.762	13.71	535	29 363.5	56.668	22.56	585	32 228.7	58.011	30.95
486	26 610.3	55.776	13.89	536	29 420.1	56.690	22.74	586	32 286.7	58.042	31.10
487	26 666.1	55.790	14.06	537	29 476.8	56.713	22.92	587	32 344.8	58.073	31.25
488	26 721.9	55.804	14.23	538	29 533.6	56.736	23.10	588	32 402.9	58.105	31.40
489	26 777.7	55.819	14.40	539	29 590.3	56.759	23.27	589	32 461.0	58.136	31.54
490	26 833.5	55.833	14.57	540	29 647.1	56.783	23.45	590	32 519.1	58.168	31.69
491	26 889.4	55.848	14.75	541	29 703.9	56.806	23.63	591	32 577.3	58.200	31.83
492	26 945.2	55.863	14.92	542	29 760.7	56.830	23.81	592	32 635.5	58.232	31.98
493	27 001.1	55.878	15.09	543	29 817.5	56.854	23.98	593	32 693.8	58.264	32.12
494	27 057.0	55.893	15.27	544	29 874.4	56.878	24.16	594	32 752.1	58.296	32.26
495	27 112.9	55.908	15.44	545	29 931.3	56.902	24.33	595	32 810.4	58.328	32.40
496	27 168.8	55.924	15.62	546	29 988.2	56.927	24.51	596	32 868.7	58.361	32.54
497	27 224.7	55.939	15.79	547	30 045.1	56.951	24.69	597	32 927.1	58.393	32.67
498	27 280.7	55.955	15.97	548	30 102.1	56.976	24.86	598	32 985.5	58.426	32.81
499	27 336.7	55.971	16.14	549	30 159.1	57.001	25.04	599	33 043.9	58.459	32.95
500	27 392.6	55.987	16.32	550	30 216.1	57.026	25.21	600	33 102.4	58.492	33.08

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	33 102.4	58.492	33.08	**650**	36 070.7	60.279	37.64	**700**	39 131.8	62.151	35.88
601	33 160.9	58.525	33.21	**651**	36 131.0	60.317	37.68	**701**	39 194.0	62.186	35.75
602	33 219.5	58.558	33.34	**652**	36 191.4	60.355	37.71	**702**	39 256.2	62.222	35.62
603	33 278.0	58.592	33.47	**653**	36 251.7	60.392	37.74	**703**	39 318.4	62.258	35.49
604	33 336.6	58.625	33.60	**654**	36 312.1	60.430	37.77	**704**	39 380.7	62.293	35.35
605	33 395.3	58.659	33.73	**655**	36 372.6	60.468	37.80	**705**	39 443.0	62.328	35.21
606	33 454.0	58.693	33.85	**656**	36 433.1	60.506	37.83	**706**	39 505.4	62.364	35.07
607	33 512.7	58.727	33.98	**657**	36 493.6	60.543	37.85	**707**	39 567.8	62.399	34.92
608	33 571.4	58.761	34.10	**658**	36 554.2	60.581	37.87	**708**	39 630.2	62.433	34.77
609	33 630.2	58.795	34.22	**659**	36 614.8	60.619	37.89	**709**	39 692.6	62.468	34.61
610	33 689.0	58.829	34.34	**660**	36 675.4	60.657	37.90	**710**	39 755.1	62.503	34.45
611	33 747.9	58.863	34.46	**661**	36 736.1	60.695	37.91	**711**	39 817.6	62.537	34.28
612	33 806.7	58.898	34.58	**662**	36 796.8	60.733	37.92	**712**	39 880.2	62.571	34.11
613	33 865.6	58.933	34.69	**663**	36 857.5	60.771	37.93	**713**	39 942.8	62.605	33.93
614	33 924.6	58.967	34.80	**664**	36 918.3	60.809	37.93	**714**	40 005.4	62.639	33.75
615	33 983.6	59.002	34.92	**665**	36 979.2	60.847	37.93	**715**	40 068.0	62.673	33.57
616	34 042.6	59.037	35.03	**666**	37 040.0	60.885	37.93	**716**	40 130.7	62.706	33.38
617	34 101.7	59.072	35.14	**667**	37 100.9	60.923	37.92	**717**	40 193.5	62.739	33.19
618	34 160.7	59.107	35.24	**668**	37 161.9	60.960	37.91	**718**	40 256.2	62.773	32.99
619	34 219.9	59.143	35.35	**669**	37 222.9	60.998	37.90	**719**	40 319.0	62.805	32.79
620	34 279.0	59.178	35.45	**670**	37 283.9	61.036	37.89	**720**	40 381.8	62.838	32.58
621	34 338.2	59.214	35.55	**671**	37 344.9	61.074	37.87	**721**	40 444.7	62.871	32.37
622	34 397.5	59.249	35.65	**672**	37 406.0	61.112	37.85	**722**	40 507.6	62.903	32.15
623	34 456.7	59.285	35.75	**673**	37 467.2	61.150	37.82	**723**	40 570.5	62.935	31.93
624	34 516.0	59.321	35.85	**674**	37 528.3	61.188	37.79	**724**	40 633.4	62.967	31.70
625	34 575.4	59.357	35.94	**675**	37 589.5	61.225	37.76	**725**	40 696.4	62.998	31.47
626	34 634.7	59.393	36.04	**676**	37 650.8	61.263	37.73	**726**	40 759.4	63.030	31.24
627	34 694.2	59.429	36.13	**677**	37 712.1	61.301	37.69	**727**	40 822.5	63.061	31.00
628	34 753.6	59.465	36.21	**678**	37 773.4	61.339	37.65	**728**	40 885.6	63.092	30.75
629	34 813.1	59.501	36.30	**679**	37 834.7	61.376	37.61	**729**	40 948.7	63.122	30.50
630	34 872.6	59.537	36.39	**680**	37 896.1	61.414	37.56	**730**	41 011.8	63.153	30.24
631	34 932.2	59.574	36.47	**681**	37 957.6	61.451	37.51	**731**	41 075.0	63.183	29.98
632	34 991.7	59.610	36.55	**682**	38 019.0	61.489	37.46	**732**	41 138.2	63.213	29.72
633	35 051.4	59.647	36.63	**683**	38 080.5	61.526	37.40	**733**	41 201.4	63.242	29.44
634	35 111.0	59.684	36.71	**684**	38 142.1	61.564	37.34	**734**	41 264.6	63.271	29.17
635	35 170.7	59.720	36.78	**685**	38 203.7	61.601	37.28	**735**	41 327.9	63.301	28.89
636	35 230.5	59.757	36.85	**686**	38 265.3	61.638	37.21	**736**	41 391.2	63.329	28.60
637	35 290.3	59.794	36.93	**687**	38 326.9	61.675	37.14	**737**	41 454.6	63.358	28.31
638	35 350.1	59.831	36.99	**688**	38 388.6	61.712	37.06	**738**	41 518.0	63.386	28.01
639	35 409.9	59.868	37.06	**689**	38 450.4	61.749	36.99	**739**	41 581.4	63.414	27.70
640	35 469.8	59.905	37.12	**690**	38 512.1	61.786	36.90	**740**	41 644.8	63.441	27.40
641	35 529.7	59.942	37.19	**691**	38 573.9	61.823	36.82	**741**	41 708.2	63.469	27.08
642	35 589.7	59.980	37.25	**692**	38 635.8	61.860	36.73	**742**	41 771.7	63.495	26.76
643	35 649.7	60.017	37.30	**693**	38 697.7	61.897	36.64	**743**	41 835.2	63.522	26.44
644	35 709.7	60.054	37.36	**694**	38 759.6	61.933	36.54	**744**	41 898.8	63.548	26.11
645	35 769.8	60.092	37.41	**695**	38 821.5	61.970	36.44	**745**	41 962.3	63.574	25.77
646	35 829.9	60.129	37.46	**696**	38 883.5	62.006	36.33	**746**	42 025.9	63.600	25.43
647	35 890.1	60.166	37.51	**697**	38 945.5	62.042	36.23	**747**	42 089.5	63.625	25.08
648	35 950.2	60.204	37.55	**698**	39 007.6	62.079	36.11	**748**	42 153.2	63.650	24.73
649	36 010.5	60.242	37.60	**699**	39 069.7	62.115	36.00	**749**	42 216.8	63.675	24.37
650	36 070.7	60.279	37.64	**700**	39 131.8	62.151	35.88	**750**	42 280.5	63.699	24.00

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	42 280.5	63.699	24.00	**800**	45 494	64.63	1.3	**850**	48 715	63.97	−24.6
751	42 344.2	63.723	23.63	**801**	45 559	64.63	0.6	**851**	48 779	63.95	−25.0
752	42 408.0	63.746	23.25	**802**	45 624	64.63	−0.1	**852**	48 843	63.92	−25.3
753	42 471.7	63.769	22.87	**803**	45 688	64.63	−0.8	**853**	48 907	63.90	−25.6
754	42 535.5	63.792	22.48	**804**	45 753	64.63	−1.5	**854**	48 971	63.87	−25.9
755	42 599.3	63.814	22.09	**805**	45 818	64.63	−2.1	**855**	49 034	63.85	−26.3
756	42 663.1	63.836	21.68	**806**	45 882	64.63	−2.8	**856**	49 098	63.82	−26.6
757	42 727.0	63.857	21.28	**807**	45 947	64.62	−3.4	**857**	49 162	63.79	−26.9
758	42 790.8	63.878	20.86	**808**	46 011	64.62	−4.1	**858**	49 226	63.77	−27.2
759	42 854.7	63.899	20.44	**809**	46 076	64.62	−4.7	**859**	49 290	63.74	−27.4
760	42 918.6	63.919	20.02	**810**	46 141	64.61	−5.4	**860**	49 353	63.71	−27.7
761	42 983	63.96	35.7	**811**	46 205	64.61	−6.0	**861**	49 417	63.68	−28.0
762	43 047	63.99	34.6	**812**	46 270	64.60	−6.6	**862**	49 481	63.66	−28.3
763	43 111	64.02	33.6	**813**	46 334	64.59	−7.2	**863**	49 544	63.63	−28.5
764	43 175	64.06	32.5	**814**	46 399	64.59	−7.8	**864**	49 608	63.60	−28.8
765	43 239	64.09	31.5	**815**	46 464	64.58	−8.4	**865**	49 672	63.57	−29.1
766	43 303	64.12	30.5	**816**	46 528	64.57	−9.0	**866**	49 735	63.54	−29.3
767	43 367	64.15	29.5	**817**	46 593	64.56	−9.6	**867**	49 799	63.51	−29.5
768	43 431	64.18	28.5	**818**	46 657	64.55	−10.2	**868**	49 862	63.48	−29.8
769	43 495	64.21	27.5	**819**	46 722	64.54	−10.7	**869**	49 926	63.45	−30.0
770	43 559	64.23	26.5	**820**	46 786	64.53	−11.3	**870**	49 989	63.42	−30.2
771	43 624	64.26	25.5	**821**	46 851	64.52	−11.8	**871**	50 052	63.39	−30.5
772	43 688	64.29	24.6	**822**	46 915	64.50	−12.4	**872**	50 116	63.36	−30.7
773	43 752	64.31	23.6	**823**	46 980	64.49	−12.9	**873**	50 179	63.33	−30.9
774	43 817	64.33	22.7	**824**	47 044	64.48	−13.4	**874**	50 243	63.30	−31.1
775	43 881	64.36	21.8	**825**	47 109	64.46	−13.9	**875**	50 306	63.27	−31.3
776	43 945	64.38	20.8	**826**	47 173	64.45	−14.5	**876**	50 369	63.24	−31.5
777	44 010	64.40	19.9	**827**	47 238	64.44	−15.0	**877**	50 432	63.20	−31.7
778	44 074	64.42	19.0	**828**	47 302	64.42	−15.5	**878**	50 495	63.17	−31.8
779	44 139	64.44	18.1	**829**	47 367	64.40	−15.9	**879**	50 559	63.14	−32.0
780	44 203	64.45	17.2	**830**	47 431	64.39	−16.4	**880**	50 622	63.11	−32.2
781	44 267	64.47	16.4	**831**	47 495	64.37	−16.9	**881**	50 685	63.08	−32.3
782	44 332	64.49	15.5	**832**	47 560	64.35	−17.4	**882**	50 748	63.04	−32.5
783	44 396	64.50	14.6	**833**	47 624	64.34	−17.8	**883**	50 811	63.01	−32.7
784	44 461	64.51	13.8	**834**	47 688	64.32	−18.3	**884**	50 874	62.98	−32.8
785	44 525	64.53	12.9	**835**	47 753	64.30	−18.7	**885**	50 937	62.95	−32.9
786	44 590	64.54	12.1	**836**	47 817	64.28	−19.2	**886**	51 000	62.91	−33.1
787	44 655	64.55	11.3	**837**	47 881	64.26	−19.6	**887**	51 063	62.88	−33.2
788	44 719	64.56	10.5	**838**	47 946	64.24	−20.0	**888**	51 126	62.85	−33.3
789	44 784	64.57	9.6	**839**	48 010	64.22	−20.4	**889**	51 188	62.81	−33.5
790	44 848	64.58	8.8	**840**	48 074	64.20	−20.9	**890**	51 251	62.78	−33.6
791	44 913	64.59	8.1	**841**	48 138	64.18	−21.3	**891**	51 314	62.75	−33.7
792	44 977	64.60	7.3	**842**	48 202	64.16	−21.7	**892**	51 377	62.71	−33.8
793	45 042	64.61	6.5	**843**	48 267	64.14	−22.1	**893**	51 439	62.68	−33.9
794	45 107	64.61	5.7	**844**	48 331	64.11	−22.4	**894**	51 502	62.64	−34.0
795	45 171	64.62	5.0	**845**	48 395	64.09	−22.8	**895**	51 565	62.61	−34.1
796	45 236	64.62	4.2	**846**	48 459	64.07	−23.2	**896**	51 627	62.58	−34.2
797	45 301	64.63	3.5	**847**	48 523	64.05	−23.6	**897**	51 690	62.54	−34.3
798	45 365	64.63	2.8	**848**	48 587	64.02	−23.9	**898**	51 752	62.51	−34.4
799	45 430	64.63	2.0	**849**	48 651	64.00	−24.3	**899**	51 815	62.47	−34.4
800	45 494	64.63	1.3	**850**	48 715	63.97	−24.6	**900**	51 877	62.44	−34.5

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	51 877	62.44	−34.5	**950**	54 956	60.72	−32.9	**1000**	57 953	59.26	−24.5
901	51 940	62.40	−34.6	**951**	55 016	60.68	−32.8	**1001**	58 013	59.24	−24.3
902	52 002	62.37	−34.6	**952**	55 077	60.65	−32.7	**1002**	58 072	59.21	−24.1
903	52 064	62.33	−34.7	**953**	55 138	60.62	−32.6	**1003**	58 131	59.19	−23.9
904	52 127	62.30	−34.7	**954**	55 198	60.58	−32.4	**1004**	58 190	59.16	−23.6
905	52 189	62.27	−34.8	**955**	55 259	60.55	−32.3	**1005**	58 249	59.14	−23.4
906	52 251	62.23	−34.8	**956**	55 319	60.52	−32.2	**1006**	58 309	59.12	−23.2
907	52 314	62.20	−34.9	**957**	55 380	60.49	−32.0	**1007**	58 368	59.09	−23.0
908	52 376	62.16	−34.9	**958**	55 440	60.46	−31.9	**1008**	58 427	59.07	−22.8
909	52 438	62.13	−34.9	**959**	55 501	60.42	−31.8	**1009**	58 486	59.05	−22.6
910	52 500	62.09	−34.9	**960**	55 561	60.39	−31.6	**1010**	58 545	59.03	−22.4
911	52 562	62.06	−35.0	**961**	55 622	60.36	−31.5	**1011**	58 604	59.00	−22.2
912	52 624	62.02	−35.0	**962**	55 682	60.33	−31.3	**1012**	58 663	58.98	−21.9
913	52 686	61.99	−35.0	**963**	55 742	60.30	−31.2	**1013**	58 722	58.96	−21.7
914	52 748	61.95	−35.0	**964**	55 803	60.27	−31.0	**1014**	58 781	58.94	−21.5
915	52 810	61.92	−35.0	**965**	55 863	60.24	−30.9	**1015**	58 840	58.92	−21.3
916	52 872	61.88	−35.0	**966**	55 923	60.20	−30.7	**1016**	58 899	58.90	−21.1
917	52 934	61.85	−35.0	**967**	55 983	60.17	−30.6	**1017**	58 957	58.88	−20.9
918	52 996	61.81	−35.0	**968**	56 043	60.14	−30.4	**1018**	59 016	58.85	−20.7
919	53 057	61.78	−35.0	**969**	56 104	60.11	−30.3	**1019**	59 075	58.83	−20.4
920	53 119	61.74	−35.0	**970**	56 164	60.08	−30.1	**1020**	59 134	58.81	−20.2
921	53 181	61.71	−35.0	**971**	56 224	60.05	−29.9	**1021**	59 193	58.79	−20.0
922	53 243	61.67	−34.9	**972**	56 284	60.02	−29.8	**1022**	59 252	58.77	−19.8
923	53 304	61.64	−34.9	**973**	56 344	59.99	−29.6	**1023**	59 310	58.75	−19.6
924	53 366	61.60	−34.9	**974**	56 404	59.96	−29.4	**1024**	59 369	58.73	−19.4
925	53 427	61.57	−34.9	**975**	56 464	59.93	−29.3	**1025**	59 428	58.72	−19.1
926	53 489	61.53	−34.8	**976**	56 524	59.91	−29.1	**1026**	59 487	58.70	−18.9
927	53 550	61.50	−34.8	**977**	56 584	59.88	−28.9	**1027**	59 545	58.68	−18.7
928	53 612	61.46	−34.7	**978**	56 643	59.85	−28.7	**1028**	59 604	58.66	−18.5
929	53 673	61.43	−34.7	**979**	56 703	59.82	−28.6	**1029**	59 663	58.64	−18.3
930	53 735	61.39	−34.6	**980**	56 763	59.79	−28.4	**1030**	59 721	58.62	−18.0
931	53 796	61.36	−34.6	**981**	56 823	59.76	−28.2	**1031**	59 780	58.60	−17.8
932	53 857	61.32	−34.5	**982**	56 883	59.73	−28.0	**1032**	59 838	58.59	−17.6
933	53 919	61.29	−34.5	**983**	56 942	59.71	−27.8	**1033**	59 897	58.57	−17.4
934	53 980	61.25	−34.4	**984**	57 002	59.68	−27.6	**1034**	59 956	58.55	−17.2
935	54 041	61.22	−34.3	**985**	57 062	59.65	−27.5	**1035**	60 014	58.53	−17.0
936	54 102	61.19	−34.2	**986**	57 121	59.62	−27.3	**1036**	60 073	58.52	−16.8
937	54 164	61.15	−34.2	**987**	57 181	59.60	−27.1	**1037**	60 131	58.50	−16.5
938	54 225	61.12	−34.1	**988**	57 240	59.57	−26.9	**1038**	60 190	58.48	−16.3
939	54 286	61.08	−34.0	**989**	57 300	59.54	−26.7	**1039**	60 248	58.47	−16.1
940	54 347	61.05	−33.9	**990**	57 360	59.52	−26.5	**1040**	60 307	58.45	−15.9
941	54 408	61.02	−33.8	**991**	57 419	59.49	−26.3	**1041**	60 365	58.44	−15.7
942	54 469	60.98	−33.7	**992**	57 479	59.46	−26.1	**1042**	60 423	58.42	−15.5
943	54 530	60.95	−33.7	**993**	57 538	59.44	−25.9	**1043**	60 482	58.41	−15.3
944	54 591	60.91	−33.6	**994**	57 597	59.41	−25.7	**1044**	60 540	58.39	−15.0
945	54 652	60.88	−33.5	**995**	57 657	59.39	−25.5	**1045**	60 599	58.38	−14.8
946	54 713	60.85	−33.4	**996**	57 716	59.36	−25.3	**1046**	60 657	58.36	−14.6
947	54 773	60.81	−33.3	**997**	57 776	59.34	−25.1	**1047**	60 715	58.35	−14.4
948	54 834	60.78	−33.1	**998**	57 835	59.31	−24.9	**1048**	60 774	58.33	−14.2
949	54 895	60.75	−33.0	**999**	57 894	59.29	−24.7	**1049**	60 832	58.32	−14.0
950	54 956	60.72	−32.9	**1000**	57 953	59.26	−24.5	**1050**	60 890	58.30	−13.8

TABLE 6.3.3. *Type J thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	60 890	58.30	−13.8	1100	63 792	57.84	−5.5	1150	66 679	57.64	−4.1
1051	60 949	58.29	−13.6	1101	63 850	57.84	−5.4	1151	66 737	57.64	−4.2
1052	61 007	58.28	−13.4	1102	63 908	57.83	−5.2	1152	66 794	57.63	−4.2
1053	61 065	58.26	−13.2	1103	63 966	57.83	−5.1	1153	66 852	57.63	−4.3
1054	61 123	58.25	−13.0	1104	64 024	57.82	−5.0	1154	66 910	57.62	−4.4
1055	61 182	58.24	−12.8	1105	64 081	57.82	−4.9	1155	66 967	57.62	−4.5
1056	61 240	58.23	−12.6	1106	64 139	57.81	−4.8	1156	67 025	57.62	−4.6
1057	61 298	58.21	−12.4	1107	64 197	57.81	−4.7	1157	67 082	57.61	−4.7
1058	61 356	58.20	−12.2	1108	64 255	57.80	−4.7	1158	67 140	57.61	−4.8
1059	61 415	58.19	−12.0	1109	64 313	57.80	−4.6	1159	67 198	57.60	−4.9
1060	61 473	58.18	−11.8	1110	64 370	57.79	−4.5	1160	67 255	57.60	−5.1
1061	61 531	58.16	−11.6	1111	64 428	57.79	−4.4	1161	67 313	57.59	−5.2
1062	61 589	58.15	−11.4	1112	64 486	57.78	−4.3	1162	67 370	57.59	−5.3
1063	61 647	58.14	−11.2	1113	64 544	57.78	−4.3	1163	67 428	57.58	−5.4
1064	61 705	58.13	−11.0	1114	64 602	57.78	−4.2	1164	67 486	57.58	−5.6
1065	61 763	58.12	−10.8	1115	64 659	57.77	−4.1	1165	67 543	57.57	−5.7
1066	61 822	58.11	−10.7	1116	64 717	57.77	−4.0	1166	67 601	57.56	−5.9
1067	61 880	58.10	−10.5	1117	64 775	57.76	−4.0	1167	67 658	57.56	−6.0
1068	61 938	58.09	−10.3	1118	64 833	57.76	−3.9	1168	67 716	57.55	−6.2
1069	61 996	58.08	−10.1	1119	64 890	57.76	−3.9	1169	67 773	57.55	−6.3
1070	62 054	58.07	−9.9	1120	64 948	57.75	−3.8	1170	67 831	57.54	−6.5
1071	62 112	58.06	−9.7	1121	65 006	57.75	−3.8	1171	67 888	57.53	−6.7
1072	62 170	58.05	−9.6	1122	65 064	57.74	−3.7	1172	67 946	57.53	−6.9
1073	62 228	58.04	−9.4	1123	65 121	57.74	−3.7	1173	68 003	57.52	−7.1
1074	62 286	58.03	−9.2	1124	65 179	57.74	−3.7	1174	68 061	57.51	−7.3
1075	62 344	58.02	−9.0	1125	65 237	57.73	−3.6	1175	68 119	57.50	−7.5
1076	62 402	58.01	−8.9	1126	65 295	57.73	−3.6	1176	68 176	57.50	−7.7
1077	62 460	58.00	−8.7	1127	65 352	57.73	−3.6	1177	68 234	57.49	−7.9
1078	62 518	57.99	−8.5	1128	65 410	57.72	−3.5	1178	68 291	57.48	−8.1
1079	62 576	57.99	−8.4	1129	65 468	57.72	−3.5	1179	68 348	57.47	−8.3
1080	62 634	57.98	−8.2	1130	65 525	57.72	−3.5	1180	68 406	57.46	−8.5
1081	62 692	57.97	−8.1	1131	65 583	57.71	−3.5	1181	68 463	57.46	−8.8
1082	62 750	57.96	−7.9	1132	65 641	57.71	−3.5	1182	68 521	57.45	−9.0
1083	62 808	57.95	−7.7	1133	65 699	57.70	−3.5	1183	68 578	57.44	−9.2
1084	62 866	57.95	−7.6	1134	65 756	57.70	−3.5	1184	68 636	57.43	−9.5
1085	62 924	57.94	−7.4	1135	65 814	57.70	−3.5	1185	68 693	57.42	−9.7
1086	62 982	57.93	−7.3	1136	65 872	57.69	−3.5	1186	68 751	57.41	−10.0
1087	63 040	57.92	−7.1	1137	65 929	57.69	−3.5	1187	68 808	57.40	−10.3
1088	63 098	57.92	−7.0	1138	65 987	57.69	−3.5	1188	68 865	57.39	−10.5
1089	63 156	57.91	−6.9	1139	66 045	57.68	−3.6	1189	68 923	57.38	−10.8
1090	63 214	57.90	−6.7	1140	66 102	57.68	−3.6	1190	68 980	57.37	−11.1
1091	63 271	57.90	−6.6	1141	66 160	57.68	−3.6	1191	69 037	57.36	−11.4
1092	63 329	57.89	−6.5	1142	66 218	57.67	−3.7	1192	69 095	57.34	−11.7
1093	63 387	57.88	−6.3	1143	66 275	57.67	−3.7	1193	69 152	57.33	−12.0
1094	63 445	57.88	−6.2	1144	66 333	57.67	−3.7	1194	69 209	57.32	−12.3
1095	63 503	57.87	−6.1	1145	66 391	57.66	−3.8	1195	69 267	57.31	−12.6
1096	63 561	57.86	−5.9	1146	66 448	57.66	−3.8	1196	69 324	57.29	−12.9
1097	63 619	57.86	−5.8	1147	66 506	57.65	−3.9	1197	69 381	57.28	−13.3
1098	63 677	57.85	−5.7	1148	66 564	57.65	−4.0	1198	69 439	57.27	−13.6
1099	63 734	57.85	−5.6	1149	66 621	57.65	−4.0	1199	69 496	57.25	−13.9
1100	63 792	57.84	−5.5	1150	66 679	57.64	−4.1	1200	69 553	57.24	−14.3

6.4. Reference Function and Table for the Positive Thermoelement, Type JP, Iron Versus Platinum, Pt-67

The coefficients, c_i, for the eighth degree polynomial that gives the thermoelectric voltage, E, of type JP thermoelements versus Pt-67 as a function of temperature, t_{90}, in the −210 °C to 760 °C range are given in table 6.4.1. The polynomial is of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type JP thermoelements versus Pt-67 at selected fixed points are given in table 6.4.2. The reference values for type JP thermoelements versus Pt-67 are given at 1 °C intervals from −210 °C to 760 °C in table 6.4.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 6.4.1, 6.4.2, and 6.4.3, respectively.

Because of the lack of stability of type J thermocouples above 760 °C, no reference function is given for type JP thermoelements above 760 °C.

The tables in this section merely give average values for industrial materials which have a wide variability. Neither the ASTM nor the ISA recognize type JP or type JN thermoelements as standardized materials.

TABLE 6.4.1. *Type JP thermoelements versus platinum, Pt-67 --- coefficients, c_i, of reference equation giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature range. The equation is of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−210 °C to 760 °C
c_0 =	0.000 000 000 0 . . .
c_1 =	1.791 354 855 9 X 10^{1}
c_2 =	4.677 466 335 8 X 10^{-3}
c_3 =	−7.122 599 299 1 X 10^{-5}
c_4 =	1.335 212 501 6 X 10^{-7}
c_5 =	−1.500 896 263 9 X 10^{-10}
c_6 =	1.551 431 962 5 X 10^{-13}
c_7 =	−7.950 357 212 5 X 10^{-17}
c_8 =	2.429 790 391 0 X 10^{-21}

TABLE 6.4.2. *Thermoelectric values at fixed points for type JP thermoelements versus platinum, Pt-67*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
Argon TP	−189.3442	−2524.65	3.639	174.89
Mercury TP	−38.8344	−684.12	17.195	28.55
Ice MP	0.000	0.00	17.914	9.35
Water TP	0.01	0.2	17.914	9.35
Gallium MP	29.7646	535.6	18.016	−2.02
Indium FP	156.5985	2714.7	15.818	−27.32
Tin FP	231.928	3824.6	13.620	−29.78
Cadmium FP	321.069	4925.3	11.165	−23.82
Lead FP	327.462	4996.2	11.015	−23.07
Zinc FP	419.527	5931.2	9.527	−8.05
Antimony FP	630.63	8107.0	12.701	35.85
Aluminum FP	660.323	8500.4	13.810	38.47

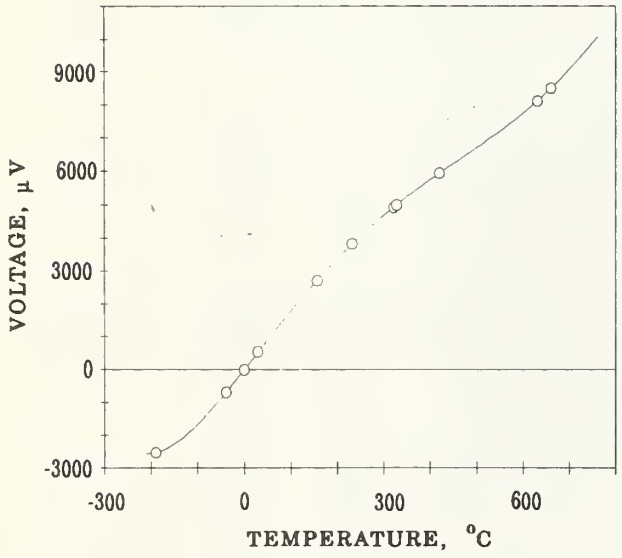

FIGURE 6.4.1. *Thermoelectric voltage for type JP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

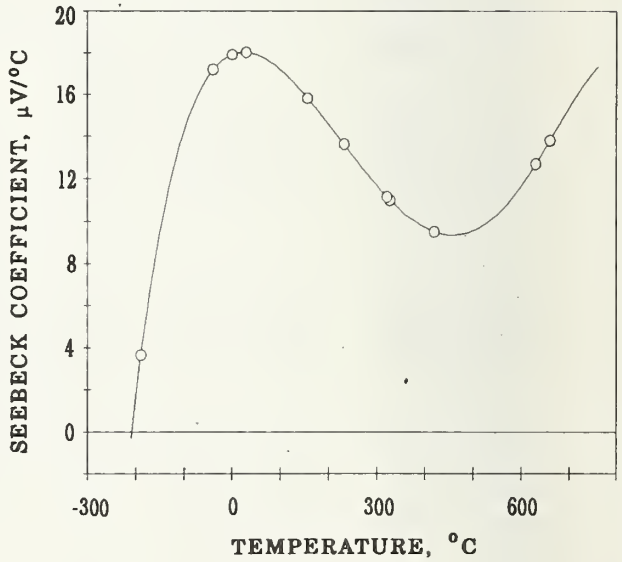

FIGURE 6.4.2. *Seebeck coefficient for type JP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

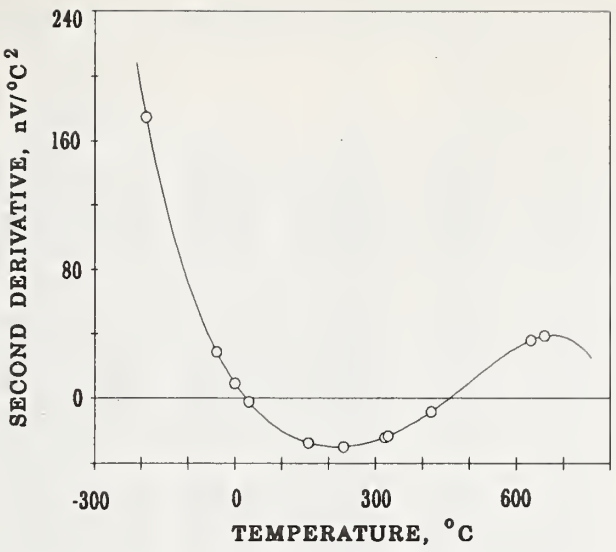

FIGURE 6.4.3. *Second derivative of thermoelectric voltage for type JP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

TABLE 6.4.3. ***Type JP thermoelements versus platinum, Pt-67*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−210	−2 560.23	−0.308	207.99	−190	−2 527.00	3.524	175.88	−170	−2 423.29	6.751	147.42
−209	−2 560.43	−0.101	206.29	−189	−2 523.38	3.699	174.38	−169	−2 416.46	6.898	146.09
−208	−2 560.43	0.105	204.60	−188	−2 519.60	3.873	172.88	−168	−2 409.49	7.044	144.76
−207	−2 560.22	0.308	202.92	−187	−2 515.64	4.045	171.39	−167	−2 402.38	7.188	143.45
−206	−2 559.81	0.510	201.26	−186	−2 511.51	4.216	169.91	−166	−2 395.12	7.331	142.14
−205	−2 559.20	0.711	199.60	−185	−2 507.21	4.385	168.44	−165	−2 387.72	7.472	140.84
−204	−2 558.39	0.910	197.95	−184	−2 502.74	4.553	166.98	−164	−2 380.17	7.612	139.54
−203	−2 557.38	1.107	196.31	−183	−2 498.10	4.719	165.53	−163	−2 372.49	7.751	138.26
−202	−2 556.18	1.302	194.68	−182	−2 493.30	4.884	164.08	−162	−2 364.67	7.889	136.98
−201	−2 554.78	1.496	193.06	−181	−2 488.34	5.047	162.65	−161	−2 356.72	8.025	135.71
−200	−2 553.19	1.688	191.45	−180	−2 483.21	5.209	161.22	−160	−2 348.62	8.160	134.45
−199	−2 551.40	1.879	189.86	−179	−2 477.92	5.369	159.80	−159	−2 340.40	8.294	133.19
−198	−2 549.43	2.068	188.27	−178	−2 472.47	5.529	158.39	−158	−2 332.04	8.427	131.95
−197	−2 547.27	2.255	186.68	−177	−2 466.86	5.686	156.99	−157	−2 323.54	8.558	130.71
−196	−2 544.92	2.441	185.11	−176	−2 461.10	5.843	155.60	−156	−2 314.92	8.688	129.48
−195	−2 542.39	2.626	183.55	−175	−2 455.18	5.997	154.22	−155	−2 306.17	8.817	128.25
−194	−2 539.67	2.808	182.00	−174	−2 449.10	6.151	152.84	−154	−2 297.29	8.945	127.04
−193	−2 536.77	2.990	180.46	−173	−2 442.87	6.303	151.47	−153	−2 288.28	9.071	125.83
−192	−2 533.69	3.169	178.92	−172	−2 436.50	6.454	150.12	−152	−2 279.15	9.196	124.63
−191	−2 530.43	3.348	177.40	−171	−2 429.97	6.603	148.77	−151	−2 269.89	9.320	123.44
−190	−2 527.00	3.524	175.88	−170	−2 423.29	6.751	147.42	−150	−2 260.51	9.443	122.25

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
−150	−2 260.51	9.443	122.25	−100	−1 658.34	14.222	71.61	−50	−874.20	16.840	35.13
−149	−2 251.00	9.565	121.07	−99	−1 644.08	14.293	70.76	−49	−857.34	16.875	34.52
−148	−2 241.38	9.685	119.90	−98	−1 629.75	14.364	69.91	−48	−840.45	16.909	33.92
−147	−2 231.63	9.805	118.74	−97	−1 615.35	14.433	69.06	−47	−823.52	16.943	33.32
−146	−2 221.77	9.923	117.58	−96	−1 600.89	14.502	68.23	−46	−806.56	16.976	32.72
−145	−2 211.79	10.040	116.43	−95	−1 586.35	14.570	67.39	−45	−789.57	17.008	32.12
−144	−2 201.69	10.156	115.29	−94	−1 571.75	14.637	66.57	−44	−772.55	17.040	31.53
−143	−2 191.48	10.270	114.16	−93	−1 557.08	14.703	65.74	−43	−755.49	17.071	30.95
−142	−2 181.15	10.384	113.03	−92	−1 542.34	14.768	64.93	−42	−738.41	17.102	30.37
−141	−2 170.71	10.496	111.91	−91	−1 527.54	14.833	64.11	−41	−721.29	17.132	29.79
−140	−2 160.16	10.608	110.79	−90	−1 512.68	14.896	63.31	−40	−704.14	17.161	29.22
−139	−2 149.49	10.718	109.69	−89	−1 497.75	14.959	62.51	−39	−686.97	17.190	28.65
−138	−2 138.72	10.827	108.59	−88	−1 482.76	15.021	61.71	−38	−669.76	17.219	28.08
−137	−2 127.84	10.935	107.50	−87	−1 467.70	15.083	60.92	−37	−652.53	17.246	27.52
−136	−2 116.85	11.042	106.41	−86	−1 452.59	15.143	60.14	−36	−635.27	17.274	26.96
−135	−2 105.76	11.148	105.33	−85	−1 437.42	15.203	59.36	−35	−617.98	17.300	26.41
−134	−2 094.56	11.253	104.26	−84	−1 422.19	15.262	58.58	−34	−600.67	17.326	25.86
−133	−2 083.25	11.356	103.19	−83	−1 406.89	15.320	57.81	−33	−583.33	17.352	25.32
−132	−2 071.84	11.459	102.14	−82	−1 391.55	15.378	57.05	−32	−565.96	17.377	24.77
−131	−2 060.33	11.561	101.08	−81	−1 376.14	15.434	56.29	−31	−548.58	17.402	24.24
−130	−2 048.72	11.661	100.04	−80	−1 360.68	15.490	55.54	−30	−531.16	17.426	23.70
−129	−2 037.01	11.761	99.00	−79	−1 345.16	15.545	54.79	−29	−513.72	17.449	23.17
−128	−2 025.20	11.859	97.97	−78	−1 329.59	15.600	54.04	−28	−496.26	17.472	22.65
−127	−2 013.29	11.957	96.94	−77	−1 313.96	15.653	53.30	−27	−478.78	17.494	22.12
−126	−2 001.29	12.053	95.92	−76	−1 298.28	15.706	52.57	−26	−461.28	17.516	21.60
−125	−1 989.19	12.149	94.91	−75	−1 282.55	15.759	51.84	−25	−443.75	17.537	21.09
−124	−1 976.99	12.243	93.91	−74	−1 266.76	15.810	51.12	−24	−426.20	17.558	20.58
−123	−1 964.70	12.336	92.91	−73	−1 250.93	15.861	50.40	−23	−408.63	17.579	20.07
−122	−1 952.32	12.429	91.91	−72	−1 235.04	15.911	49.68	−22	−391.04	17.598	19.57
−121	−1 939.84	12.520	90.93	−71	−1 219.11	15.960	48.97	−21	−373.44	17.618	19.06
−120	−1 927.28	12.611	89.95	−70	−1 203.12	16.009	48.27	−20	−355.81	17.637	18.57
−119	−1 914.62	12.700	88.97	−69	−1 187.09	16.057	47.57	−19	−338.16	17.655	18.07
−118	−1 901.88	12.789	88.00	−68	−1 171.01	16.104	46.87	−18	−320.50	17.673	17.58
−117	−1 889.05	12.876	87.04	−67	−1 154.88	16.151	46.18	−17	−302.82	17.690	17.10
−116	−1 876.13	12.963	86.09	−66	−1 138.71	16.196	45.50	−16	−285.12	17.707	16.62
−115	−1 863.12	13.048	85.14	−65	−1 122.49	16.241	44.81	−15	−267.40	17.723	16.14
−114	−1 850.03	13.133	84.19	−64	−1 106.22	16.286	44.14	−14	−249.67	17.739	15.66
−113	−1 836.86	13.217	83.26	−63	−1 089.92	16.330	43.46	−13	−231.93	17.755	15.19
−112	−1 823.60	13.299	82.33	−62	−1 073.57	16.373	42.80	−12	−214.16	17.770	14.72
−111	−1 810.26	13.381	81.40	−61	−1 057.17	16.415	42.13	−11	−196.39	17.784	14.25
−110	−1 796.83	13.462	80.48	−60	−1 040.73	16.457	41.48	−10	−178.60	17.798	13.79
−109	−1 783.33	13.542	79.57	−59	−1 024.26	16.498	40.82	−9	−160.79	17.812	13.33
−108	−1 769.75	13.621	78.66	−58	−1 007.74	16.539	40.17	−8	−142.97	17.825	12.88
−107	−1 756.09	13.700	77.76	−57	−991.18	16.579	39.53	−7	−125.14	17.837	12.43
−106	−1 742.35	13.777	76.87	−56	−974.58	16.618	38.89	−6	−107.30	17.850	11.98
−105	−1 728.54	13.853	75.98	−55	−957.94	16.656	38.25	−5	−89.44	17.861	11.53
−104	−1 714.65	13.929	75.09	−54	−941.27	16.694	37.62	−4	−71.57	17.873	11.09
−103	−1 700.68	14.004	74.21	−53	−924.56	16.732	36.99	−3	−53.70	17.884	10.65
−102	−1 686.64	14.077	73.34	−52	−907.81	16.768	36.37	−2	−35.81	17.894	10.22
−101	−1 672.52	14.150	72.47	−51	−891.02	16.804	35.75	−1	−17.91	17.904	9.78
−100	−1 658.34	14.222	71.61	−50	−874.20	16.840	35.13	0	0.00	17.914	9.35

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	17.914	9.35	50	899.3	17.909	−8.35	100	1 778.9	17.180	−19.93
1	17.9	17.923	8.93	51	917.2	17.901	−8.64	101	1 796.1	17.160	−20.11
2	35.8	17.931	8.51	52	935.1	17.892	−8.92	102	1 813.2	17.140	−20.28
3	53.8	17.940	8.09	53	952.9	17.883	−9.21	103	1 830.4	17.119	−20.46
4	71.7	17.948	7.67	54	970.8	17.874	−9.48	104	1 847.5	17.099	−20.63
5	89.7	17.955	7.26	55	988.7	17.864	−9.76	105	1 864.5	17.078	−20.80
6	107.6	17.962	6.85	56	1 006.6	17.854	−10.04	106	1 881.6	17.057	−20.97
7	125.6	17.969	6.44	57	1 024.4	17.844	−10.31	107	1 898.7	17.036	−21.14
8	143.6	17.975	6.04	58	1 042.2	17.834	−10.58	108	1 915.7	17.015	−21.31
9	161.5	17.981	5.64	59	1 060.1	17.823	−10.84	109	1 932.7	16.994	−21.47
10	179.5	17.986	5.24	60	1 077.9	17.812	−11.11	110	1 949.7	16.972	−21.63
11	197.5	17.991	4.84	61	1 095.7	17.801	−11.37	111	1 966.6	16.950	−21.79
12	215.5	17.996	4.45	62	1 113.5	17.789	−11.63	112	1 983.6	16.929	−21.95
13	233.5	18.000	4.06	63	1 131.3	17.777	−11.89	113	2 000.5	16.906	−22.11
14	251.5	18.004	3.68	64	1 149.0	17.765	−12.15	114	2 017.4	16.884	−22.27
15	269.5	18.008	3.30	65	1 166.8	17.753	−12.40	115	2 034.3	16.862	−22.42
16	287.5	18.011	2.92	66	1 184.6	17.741	−12.65	116	2 051.1	16.839	−22.57
17	305.5	18.013	2.54	67	1 202.3	17.728	−12.90	117	2 067.9	16.817	−22.72
18	323.6	18.016	2.16	68	1 220.0	17.715	−13.15	118	2 084.7	16.794	−22.87
19	341.6	18.018	1.79	69	1 237.7	17.702	−13.39	119	2 101.5	16.771	−23.02
20	359.6	18.019	1.43	70	1 255.4	17.688	−13.63	120	2 118.3	16.748	−23.16
21	377.6	18.021	1.06	71	1 273.1	17.674	−13.87	121	2 135.0	16.725	−23.30
22	395.6	18.021	0.70	72	1 290.8	17.660	−14.11	122	2 151.7	16.701	−23.44
23	413.7	18.022	0.34	73	1 308.4	17.646	−14.35	123	2 168.4	16.678	−23.58
24	431.7	18.022	−0.02	74	1 326.0	17.632	−14.58	124	2 185.1	16.654	−23.72
25	449.7	18.022	−0.37	75	1 343.7	17.617	−14.81	125	2 201.7	16.630	−23.86
26	467.7	18.021	−0.72	76	1 361.3	17.602	−15.04	126	2 218.4	16.606	−23.99
27	485.7	18.020	−1.07	77	1 378.9	17.587	−15.27	127	2 235.0	16.582	−24.12
28	503.8	18.019	−1.42	78	1 396.5	17.571	−15.49	128	2 251.5	16.558	−24.26
29	521.8	18.018	−1.76	79	1 414.0	17.556	−15.72	129	2 268.1	16.534	−24.38
30	539.8	18.016	−2.10	80	1 431.6	17.540	−15.94	130	2 284.6	16.509	−24.51
31	557.8	18.013	−2.44	81	1 449.1	17.524	−16.16	131	2 301.1	16.485	−24.64
32	575.8	18.011	−2.77	82	1 466.6	17.508	−16.37	132	2 317.6	16.460	−24.76
33	593.8	18.008	−3.11	83	1 484.1	17.491	−16.59	133	2 334.0	16.435	−24.89
34	611.8	18.005	−3.43	84	1 501.6	17.475	−16.80	134	2 350.4	16.410	−25.01
35	629.8	18.001	−3.76	85	1 519.1	17.458	−17.01	135	2 366.8	16.385	−25.13
36	647.8	17.997	−4.09	86	1 536.5	17.441	−17.22	136	2 383.2	16.360	−25.24
37	665.8	17.993	−4.41	87	1 553.9	17.423	−17.42	137	2 399.5	16.335	−25.36
38	683.8	17.988	−4.73	88	1 571.4	17.406	−17.63	138	2 415.9	16.309	−25.47
39	701.8	17.983	−5.04	89	1 588.8	17.388	−17.83	139	2 432.2	16.284	−25.59
40	719.8	17.978	−5.36	90	1 606.1	17.370	−18.03	140	2 448.4	16.258	−25.70
41	737.8	17.973	−5.67	91	1 623.5	17.352	−18.23	141	2 464.7	16.233	−25.81
42	755.7	17.967	−5.98	92	1 640.8	17.334	−18.43	142	2 480.9	16.207	−25.92
43	773.7	17.961	−6.28	93	1 658.2	17.315	−18.62	143	2 497.1	16.181	−26.02
44	791.7	17.954	−6.59	94	1 675.5	17.296	−18.81	144	2 513.3	16.155	−26.13
45	809.6	17.948	−6.89	95	1 692.8	17.277	−19.00	145	2 529.4	16.128	−26.23
46	827.6	17.941	−7.19	96	1 710.0	17.258	−19.19	146	2 545.5	16.102	−26.33
47	845.5	17.933	−7.48	97	1 727.3	17.239	−19.38	147	2 561.6	16.076	−26.43
48	863.4	17.926	−7.77	98	1 744.5	17.220	−19.56	148	2 577.7	16.049	−26.53
49	881.3	17.918	−8.07	99	1 761.7	17.200	−19.75	149	2 593.7	16.023	−26.63
50	899.3	17.909	−8.35	100	1 778.9	17.180	−19.93	150	2 609.7	15.996	−26.72

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	2 609.7	15.996	−26.72	**200**	3 374.5	14.572	−29.65	**250**	4 065.9	13.085	−29.29
151	2 625.7	15.969	−26.82	**201**	3 389.1	14.542	−29.68	**251**	4 079.0	13.056	−29.25
152	2 641.7	15.942	−26.91	**202**	3 403.6	14.513	−29.70	**252**	4 092.0	13.027	−29.22
153	2 657.6	15.915	−27.00	**203**	3 418.1	14.483	−29.72	**253**	4 105.0	12.998	−29.18
154	2 673.5	15.888	−27.09	**204**	3 432.6	14.453	−29.74	**254**	4 118.0	12.969	−29.13
155	2 689.4	15.861	−27.18	**205**	3 447.0	14.423	−29.76	**255**	4 130.9	12.939	−29.09
156	2 705.2	15.834	−27.27	**206**	3 461.4	14.394	−29.78	**256**	4 143.9	12.910	−29.05
157	2 721.0	15.807	−27.35	**207**	3 475.8	14.364	−29.79	**257**	4 156.8	12.881	−29.00
158	2 736.8	15.779	−27.43	**208**	3 490.1	14.334	−29.81	**258**	4 169.6	12.852	−28.96
159	2 752.6	15.752	−27.52	**209**	3 504.5	14.304	−29.82	**259**	4 182.5	12.823	−28.91
160	2 768.3	15.724	−27.60	**210**	3 518.8	14.274	−29.83	**260**	4 195.3	12.795	−28.86
161	2 784.0	15.697	−27.68	**211**	3 533.0	14.245	−29.84	**261**	4 208.1	12.766	−28.81
162	2 799.7	15.669	−27.75	**212**	3 547.2	14.215	−29.85	**262**	4 220.8	12.737	−28.76
163	2 815.4	15.641	−27.83	**213**	3 561.4	14.185	−29.86	**263**	4 233.5	12.708	−28.71
164	2 831.0	15.613	−27.90	**214**	3 575.6	14.155	−29.87	**264**	4 246.2	12.680	−28.66
165	2 846.6	15.585	−27.98	**215**	3 589.8	14.125	−29.87	**265**	4 258.9	12.651	−28.60
166	2 862.2	15.557	−28.05	**216**	3 603.9	14.095	−29.88	**266**	4 271.5	12.622	−28.55
167	2 877.7	15.529	−28.12	**217**	3 617.9	14.065	−29.88	**267**	4 284.1	12.594	−28.49
168	2 893.2	15.501	−28.19	**218**	3 632.0	14.035	−29.88	**268**	4 296.7	12.565	−28.43
169	2 908.7	15.473	−28.26	**219**	3 646.0	14.006	−29.88	**269**	4 309.3	12.537	−28.37
170	2 924.2	15.445	−28.32	**220**	3 660.0	13.976	−29.88	**270**	4 321.8	12.509	−28.31
171	2 939.6	15.416	−28.39	**221**	3 674.0	13.946	−29.88	**271**	4 334.3	12.480	−28.25
172	2 955.0	15.388	−28.45	**222**	3 687.9	13.916	−29.87	**272**	4 346.7	12.452	−28.19
173	2 970.4	15.359	−28.51	**223**	3 701.8	13.886	−29.87	**273**	4 359.2	12.424	−28.13
174	2 985.7	15.331	−28.57	**224**	3 715.7	13.856	−29.86	**274**	4 371.6	12.396	−28.06
175	3 001.0	15.302	−28.63	**225**	3 729.5	13.826	−29.86	**275**	4 384.0	12.368	−28.00
176	3 016.3	15.274	−28.69	**226**	3 743.3	13.796	−29.85	**276**	4 396.3	12.340	−27.93
177	3 031.6	15.245	−28.74	**227**	3 757.1	13.767	−29.84	**277**	4 408.7	12.312	−27.87
178	3 046.8	15.216	−28.80	**228**	3 770.9	13.737	−29.83	**278**	4 421.0	12.284	−27.80
179	3 062.0	15.187	−28.85	**229**	3 784.6	13.707	−29.82	**279**	4 433.2	12.256	−27.73
180	3 077.2	15.158	−28.90	**230**	3 798.3	13.677	−29.80	**280**	4 445.5	12.229	−27.66
181	3 092.3	15.129	−28.95	**231**	3 811.9	13.647	−29.79	**281**	4 457.7	12.201	−27.58
182	3 107.5	15.100	−29.00	**232**	3 825.6	13.618	−29.78	**282**	4 469.9	12.173	−27.51
183	3 122.5	15.071	−29.05	**233**	3 839.2	13.588	−29.76	**283**	4 482.0	12.146	−27.44
184	3 137.6	15.042	−29.10	**234**	3 852.7	13.558	−29.74	**284**	4 494.2	12.119	−27.36
185	3 152.6	15.013	−29.14	**235**	3 866.3	13.528	−29.72	**285**	4 506.3	12.091	−27.29
186	3 167.6	14.984	−29.18	**236**	3 879.8	13.499	−29.70	**286**	4 518.3	12.064	−27.21
187	3 182.6	14.955	−29.23	**237**	3 893.3	13.469	−29.68	**287**	4 530.4	12.037	−27.13
188	3 197.5	14.926	−29.27	**238**	3 906.7	13.439	−29.66	**288**	4 542.4	12.010	−27.05
189	3 212.4	14.896	−29.31	**239**	3 920.2	13.410	−29.63	**289**	4 554.4	11.983	−26.97
190	3 227.3	14.867	−29.35	**240**	3 933.6	13.380	−29.61	**290**	4 566.4	11.956	−26.89
191	3 242.2	14.838	−29.38	**241**	3 946.9	13.350	−29.58	**291**	4 578.3	11.929	−26.81
192	3 257.0	14.808	−29.42	**242**	3 960.3	13.321	−29.55	**292**	4 590.2	11.902	−26.72
193	3 271.8	14.779	−29.45	**243**	3 973.6	13.291	−29.53	**293**	4 602.1	11.876	−26.64
194	3 286.6	14.749	−29.48	**244**	3 986.8	13.262	−29.50	**294**	4 614.0	11.849	−26.55
195	3 301.3	14.720	−29.52	**245**	4 000.1	13.232	−29.47	**295**	4 625.8	11.822	−26.46
196	3 316.0	14.690	−29.55	**246**	4 013.3	13.203	−29.43	**296**	4 637.6	11.796	−26.38
197	3 330.7	14.661	−29.57	**247**	4 026.5	13.173	−29.40	**297**	4 649.4	11.770	−26.29
198	3 345.3	14.631	−29.60	**248**	4 039.6	13.144	−29.37	**298**	4 661.2	11.743	−26.20
199	3 359.9	14.602	−29.63	**249**	4 052.8	13.115	−29.33	**299**	4 672.9	11.717	−26.10
200	3 374.5	14.572	−29.65	**250**	4 065.9	13.085	−29.29	**300**	4 684.6	11.691	−26.01

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	4 684.6	11.691	−26.01	**350**	5 238.9	10.528	−20.09	**400**	5 743.4	9.721	−11.83
301	4 696.3	11.665	−25.92	**351**	5 249.4	10.508	−19.95	**401**	5 753.1	9.710	−11.64
302	4 707.9	11.639	−25.82	**352**	5 259.9	10.488	−19.80	**402**	5 762.8	9.698	−11.45
303	4 719.6	11.614	−25.73	**353**	5 270.4	10.469	−19.66	**403**	5 772.5	9.687	−11.27
304	4 731.2	11.588	−25.63	**354**	5 280.8	10.449	−19.51	**404**	5 782.2	9.676	−11.08
305	4 742.7	11.562	−25.53	**355**	5 291.3	10.430	−19.36	**405**	5 791.8	9.665	−10.89
306	4 754.3	11.537	−25.44	**356**	5 301.7	10.410	−19.21	**406**	5 801.5	9.654	−10.70
307	4 765.8	11.511	−25.34	**357**	5 312.1	10.391	−19.07	**407**	5 811.1	9.643	−10.51
308	4 777.3	11.486	−25.24	**358**	5 322.5	10.372	−18.92	**408**	5 820.8	9.633	−10.31
309	4 788.8	11.461	−25.13	**359**	5 332.8	10.353	−18.76	**409**	5 830.4	9.623	−10.12
310	4 800.2	11.436	−25.03	**360**	5 343.2	10.335	−18.61	**410**	5 840.0	9.612	−9.93
311	4 811.7	11.411	−24.93	**361**	5 353.5	10.316	−18.46	**411**	5 849.6	9.603	−9.74
312	4 823.1	11.386	−24.82	**362**	5 363.8	10.298	−18.31	**412**	5 859.2	9.593	−9.54
313	4 834.4	11.361	−24.72	**363**	5 374.1	10.279	−18.15	**413**	5 868.8	9.584	−9.35
314	4 845.8	11.337	−24.61	**364**	5 384.4	10.261	−18.00	**414**	5 878.4	9.574	−9.15
315	4 857.1	11.312	−24.50	**365**	5 394.6	10.243	−17.84	**415**	5 888.0	9.565	−8.95
316	4 868.4	11.288	−24.39	**366**	5 404.8	10.226	−17.68	**416**	5 897.5	9.556	−8.76
317	4 879.7	11.263	−24.28	**367**	5 415.1	10.208	−17.52	**417**	5 907.1	9.548	−8.56
318	4 890.9	11.239	−24.17	**368**	5 425.3	10.191	−17.37	**418**	5 916.6	9.539	−8.36
319	4 902.2	11.215	−24.06	**369**	5 435.4	10.173	−17.21	**419**	5 926.2	9.531	−8.16
320	4 913.4	11.191	−23.95	**370**	5 445.6	10.156	−17.04	**420**	5 935.7	9.523	−7.96
321	4 924.5	11.167	−23.83	**371**	5 455.8	10.139	−16.88	**421**	5 945.2	9.515	−7.76
322	4 935.7	11.143	−23.72	**372**	5 465.9	10.123	−16.72	**422**	5 954.7	9.507	−7.56
323	4 946.8	11.120	−23.60	**373**	5 476.0	10.106	−16.56	**423**	5 964.2	9.500	−7.35
324	4 957.9	11.096	−23.48	**374**	5 486.1	10.089	−16.39	**424**	5 973.7	9.493	−7.15
325	4 969.0	11.073	−23.36	**375**	5 496.2	10.073	−16.23	**425**	5 983.2	9.486	−6.95
326	4 980.1	11.049	−23.25	**376**	5 506.2	10.057	−16.06	**426**	5 992.7	9.479	−6.74
327	4 991.1	11.026	−23.12	**377**	5 516.3	10.041	−15.89	**427**	6 002.2	9.472	−6.54
328	5 002.1	11.003	−23.00	**378**	5 526.3	10.025	−15.73	**428**	6 011.6	9.466	−6.33
329	5 013.1	10.980	−22.88	**379**	5 536.3	10.010	−15.56	**429**	6 021.1	9.460	−6.13
330	5 024.1	10.957	−22.76	**380**	5 546.3	9.994	−15.39	**430**	6 030.6	9.454	−5.92
331	5 035.0	10.935	−22.63	**381**	5 556.3	9.979	−15.22	**431**	6 040.0	9.448	−5.71
332	5 046.0	10.912	−22.51	**382**	5 566.3	9.964	−15.05	**432**	6 049.5	9.442	−5.51
333	5 056.9	10.890	−22.38	**383**	5 576.3	9.949	−14.88	**433**	6 058.9	9.437	−5.30
334	5 067.7	10.867	−22.26	**384**	5 586.2	9.934	−14.70	**434**	6 068.3	9.432	−5.09
335	5 078.6	10.845	−22.13	**385**	5 596.1	9.919	−14.53	**435**	6 077.8	9.427	−4.88
336	5 089.4	10.823	−22.00	**386**	5 606.0	9.905	−14.35	**436**	6 087.2	9.422	−4.67
337	5 100.2	10.801	−21.87	**387**	5 615.9	9.891	−14.18	**437**	6 096.6	9.417	−4.46
338	5 111.0	10.779	−21.74	**388**	5 625.8	9.876	−14.00	**438**	6 106.0	9.413	−4.25
339	5 121.8	10.758	−21.61	**389**	5 635.7	9.863	−13.83	**439**	6 115.4	9.409	−4.04
340	5 132.6	10.736	−21.47	**390**	5 645.5	9.849	−13.65	**440**	6 124.8	9.405	−3.82
341	5 143.3	10.715	−21.34	**391**	5 655.4	9.835	−13.47	**441**	6 134.2	9.401	−3.61
342	5 154.0	10.693	−21.20	**392**	5 665.2	9.822	−13.29	**442**	6 143.6	9.398	−3.40
343	5 164.7	10.672	−21.07	**393**	5 675.0	9.809	−13.11	**443**	6 153.0	9.394	−3.18
344	5 175.3	10.651	−20.93	**394**	5 684.8	9.796	−12.93	**444**	6 162.4	9.391	−2.97
345	5 186.0	10.630	−20.79	**395**	5 694.6	9.783	−12.75	**445**	6 171.8	9.388	−2.75
346	5 196.6	10.610	−20.65	**396**	5 704.4	9.770	−12.56	**446**	6 181.2	9.386	−2.54
347	5 207.2	10.589	−20.51	**397**	5 714.2	9.758	−12.38	**447**	6 190.6	9.383	−2.32
348	5 217.8	10.569	−20.37	**398**	5 723.9	9.745	−12.20	**448**	6 200.0	9.381	−2.10
349	5 228.3	10.548	−20.23	**399**	5 733.6	9.733	−12.01	**449**	6 209.3	9.379	−1.89
350	5 238.9	10.528	−20.09	**400**	5 743.4	9.721	−11.83	**450**	6 218.7	9.377	−1.67

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
450	6 218.7	9.377	−1.67	**500**	6 690.2	9.575	9.69	**550**	7 185.8	10.349	21.18
451	6 228.1	9.376	−1.45	**501**	6 699.7	9.584	9.92	**551**	7 196.2	10.370	21.40
452	6 237.5	9.374	−1.23	**502**	6 709.3	9.594	10.15	**552**	7 206.6	10.391	21.62
453	6 246.8	9.373	−1.01	**503**	6 718.9	9.605	10.39	**553**	7 217.0	10.413	21.84
454	6 256.2	9.372	−0.79	**504**	6 728.5	9.615	10.62	**554**	7 227.4	10.435	22.06
455	6 265.6	9.372	−0.57	**505**	6 738.2	9.626	10.85	**555**	7 237.8	10.457	22.28
456	6 275.0	9.371	−0.35	**506**	6 747.8	9.637	11.09	**556**	7 248.3	10.480	22.50
457	6 284.3	9.371	−0.13	**507**	6 757.4	9.648	11.32	**557**	7 258.8	10.502	22.72
458	6 293.7	9.371	0.09	**508**	6 767.1	9.660	11.55	**558**	7 269.3	10.525	22.93
459	6 303.1	9.371	0.31	**509**	6 776.7	9.671	11.78	**559**	7 279.9	10.548	23.15
460	6 312.4	9.372	0.53	**510**	6 786.4	9.683	12.02	**560**	7 290.4	10.571	23.37
461	6 321.8	9.372	0.76	**511**	6 796.1	9.695	12.25	**561**	7 301.0	10.595	23.58
462	6 331.2	9.373	0.98	**512**	6 805.8	9.708	12.48	**562**	7 311.6	10.618	23.80
463	6 340.6	9.374	1.20	**513**	6 815.5	9.720	12.72	**563**	7 322.2	10.642	24.01
464	6 349.9	9.375	1.43	**514**	6 825.3	9.733	12.95	**564**	7 332.9	10.666	24.22
465	6 359.3	9.377	1.65	**515**	6 835.0	9.746	13.18	**565**	7 343.6	10.691	24.43
466	6 368.7	9.379	1.88	**516**	6 844.7	9.759	13.41	**566**	7 354.3	10.715	24.65
467	6 378.1	9.381	2.10	**517**	6 854.5	9.773	13.65	**567**	7 365.0	10.740	24.86
468	6 387.5	9.383	2.33	**518**	6 864.3	9.787	13.88	**568**	7 375.7	10.765	25.07
469	6 396.8	9.385	2.55	**519**	6 874.1	9.801	14.11	**569**	7 386.5	10.790	25.28
470	6 406.2	9.388	2.78	**520**	6 883.9	9.815	14.34	**570**	7 397.3	10.816	25.48
471	6 415.6	9.391	3.01	**521**	6 893.7	9.829	14.57	**571**	7 408.2	10.841	25.69
472	6 425.0	9.394	3.23	**522**	6 903.6	9.844	14.81	**572**	7 419.0	10.867	25.90
473	6 434.4	9.397	3.46	**523**	6 913.4	9.859	15.04	**573**	7 429.9	10.893	26.10
474	6 443.8	9.401	3.69	**524**	6 923.3	9.874	15.27	**574**	7 440.8	10.919	26.31
475	6 453.2	9.405	3.92	**525**	6 933.2	9.890	15.50	**575**	7 451.7	10.946	26.51
476	6 462.6	9.409	4.14	**526**	6 943.0	9.905	15.73	**576**	7 462.7	10.972	26.72
477	6 472.0	9.413	4.37	**527**	6 953.0	9.921	15.96	**577**	7 473.7	10.999	26.92
478	6 481.4	9.418	4.60	**528**	6 962.9	9.937	16.19	**578**	7 484.7	11.026	27.12
479	6 490.9	9.422	4.83	**529**	6 972.8	9.953	16.42	**579**	7 495.7	11.053	27.32
480	6 500.3	9.427	5.06	**530**	6 982.8	9.970	16.65	**580**	7 506.8	11.081	27.52
481	6 509.7	9.432	5.29	**531**	6 992.8	9.987	16.88	**581**	7 517.9	11.108	27.72
482	6 519.2	9.438	5.52	**532**	7 002.8	10.004	17.11	**582**	7 529.0	11.136	27.91
483	6 528.6	9.443	5.75	**533**	7 012.8	10.021	17.34	**583**	7 540.2	11.164	28.11
484	6 538.0	9.449	5.98	**534**	7 022.8	10.038	17.57	**584**	7 551.3	11.192	28.30
485	6 547.5	9.455	6.21	**535**	7 032.9	10.056	17.80	**585**	7 562.5	11.221	28.50
486	6 556.9	9.462	6.44	**536**	7 042.9	10.074	18.03	**586**	7 573.8	11.249	28.69
487	6 566.4	9.468	6.67	**537**	7 053.0	10.092	18.25	**587**	7 585.0	11.278	28.88
488	6 575.9	9.475	6.90	**538**	7 063.1	10.111	18.48	**588**	7 596.3	11.307	29.07
489	6 585.4	9.482	7.13	**539**	7 073.2	10.129	18.71	**589**	7 607.7	11.336	29.26
490	6 594.9	9.489	7.37	**540**	7 083.4	10.148	18.94	**590**	7 619.0	11.366	29.45
491	6 604.3	9.497	7.60	**541**	7 093.5	10.167	19.16	**591**	7 630.4	11.395	29.63
492	6 613.8	9.505	7.83	**542**	7 103.7	10.186	19.39	**592**	7 641.8	11.425	29.82
493	6 623.4	9.513	8.06	**543**	7 113.9	10.206	19.61	**593**	7 653.2	11.455	30.00
494	6 632.9	9.521	8.29	**544**	7 124.1	10.225	19.84	**594**	7 664.7	11.485	30.19
495	6 642.4	9.529	8.53	**545**	7 134.3	10.245	20.06	**595**	7 676.2	11.515	30.37
496	6 651.9	9.538	8.76	**546**	7 144.6	10.266	20.29	**596**	7 687.7	11.546	30.55
497	6 661.5	9.547	8.99	**547**	7 154.9	10.286	20.51	**597**	7 699.3	11.576	30.73
498	6 671.0	9.556	9.22	**548**	7 165.2	10.307	20.73	**598**	7 710.9	11.607	30.91
499	6 680.6	9.565	9.46	**549**	7 175.5	10.327	20.96	**599**	7 722.5	11.638	31.08
500	6 690.2	9.575	9.69	**550**	7 185.8	10.349	21.18	**600**	7 734.2	11.669	31.26

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
600	7 734.2	11.669	31.26	**650**	8 359.9	13.416	37.80	**700**	9 078.9	15.344	37.99
601	7 745.9	11.701	31.43	**651**	8 373.4	13.454	37.88	**701**	9 094.2	15.382	37.91
602	7 757.6	11.732	31.60	**652**	8 386.8	13.492	37.95	**702**	9 109.6	15.420	37.82
603	7 769.3	11.764	31.78	**653**	8 400.3	13.530	38.03	**703**	9 125.1	15.458	37.72
604	7 781.1	11.796	31.95	**654**	8 413.9	13.568	38.10	**704**	9 140.5	15.495	37.63
605	7 792.9	11.828	32.11	**655**	8 427.5	13.606	38.16	**705**	9 156.1	15.533	37.53
606	7 804.8	11.860	32.28	**656**	8 441.1	13.644	38.23	**706**	9 171.6	15.570	37.42
607	7 816.6	11.892	32.44	**657**	8 454.8	13.682	38.29	**707**	9 187.2	15.608	37.31
608	7 828.5	11.925	32.61	**658**	8 468.5	13.721	38.34	**708**	9 202.8	15.645	37.20
609	7 840.5	11.957	32.77	**659**	8 482.2	13.759	38.40	**709**	9 218.5	15.682	37.08
610	7 852.5	11.990	32.93	**660**	8 496.0	13.797	38.45	**710**	9 234.2	15.719	36.96
611	7 864.5	12.023	33.09	**661**	8 509.8	13.836	38.50	**711**	9 249.9	15.756	36.83
612	7 876.5	12.056	33.25	**662**	8 523.7	13.874	38.55	**712**	9 265.7	15.793	36.70
613	7 888.6	12.090	33.40	**663**	8 537.5	13.913	38.60	**713**	9 281.5	15.829	36.57
614	7 900.7	12.123	33.56	**664**	8 551.5	13.952	38.64	**714**	9 297.4	15.866	36.43
615	7 912.8	12.157	33.71	**665**	8 565.5	13.990	38.68	**715**	9 313.2	15.902	36.29
616	7 925.0	12.191	33.86	**666**	8 579.5	14.029	38.71	**716**	9 329.2	15.939	36.14
617	7 937.2	12.225	34.01	**667**	8 593.5	14.068	38.74	**717**	9 345.1	15.975	35.99
618	7 949.4	12.259	34.15	**668**	8 607.6	14.106	38.77	**718**	9 361.1	16.011	35.83
619	7 961.7	12.293	34.30	**669**	8 621.7	14.145	38.80	**719**	9 377.1	16.046	35.67
620	7 974.0	12.327	34.44	**670**	8 635.9	14.184	38.82	**720**	9 393.2	16.082	35.50
621	7 986.4	12.362	34.58	**671**	8 650.1	14.223	38.85	**721**	9 409.3	16.117	35.33
622	7 998.8	12.396	34.72	**672**	8 664.3	14.262	38.86	**722**	9 425.4	16.153	35.16
623	8 011.2	12.431	34.86	**673**	8 678.6	14.301	38.88	**723**	9 441.6	16.188	34.98
624	8 023.6	12.466	35.00	**674**	8 692.9	14.339	38.89	**724**	9 457.8	16.222	34.79
625	8 036.1	12.501	35.13	**675**	8 707.3	14.378	38.90	**725**	9 474.1	16.257	34.60
626	8 048.6	12.536	35.26	**676**	8 721.7	14.417	38.90	**726**	9 490.3	16.292	34.41
627	8 061.2	12.572	35.39	**677**	8 736.1	14.456	38.90	**727**	9 506.6	16.326	34.21
628	8 073.8	12.607	35.52	**678**	8 750.6	14.495	38.90	**728**	9 523.0	16.360	34.00
629	8 086.4	12.643	35.65	**679**	8 765.1	14.534	38.90	**729**	9 539.4	16.394	33.79
630	8 099.0	12.679	35.77	**680**	8 779.7	14.573	38.89	**730**	9 555.8	16.428	33.58
631	8 111.7	12.714	35.90	**681**	8 794.3	14.612	38.88	**731**	9 572.2	16.461	33.36
632	8 124.5	12.750	36.02	**682**	8 808.9	14.651	38.87	**732**	9 588.7	16.494	33.14
633	8 137.2	12.786	36.13	**683**	8 823.6	14.689	38.85	**733**	9 605.2	16.527	32.91
634	8 150.0	12.823	36.25	**684**	8 838.3	14.728	38.83	**734**	9 621.8	16.560	32.67
635	8 162.9	12.859	36.36	**685**	8 853.0	14.767	38.80	**735**	9 638.3	16.593	32.43
636	8 175.8	12.895	36.48	**686**	8 867.8	14.806	38.77	**736**	9 654.9	16.625	32.19
637	8 188.7	12.932	36.59	**687**	8 882.6	14.845	38.74	**737**	9 671.6	16.657	31.94
638	8 201.6	12.969	36.69	**688**	8 897.5	14.883	38.70	**738**	9 688.3	16.689	31.68
639	8 214.6	13.005	36.80	**689**	8 912.4	14.922	38.67	**739**	9 705.0	16.720	31.42
640	8 227.6	13.042	36.90	**690**	8 927.3	14.961	38.62	**740**	9 721.7	16.752	31.16
641	8 240.7	13.079	37.00	**691**	8 942.3	14.999	38.58	**741**	9 738.5	16.783	30.88
642	8 253.8	13.116	37.10	**692**	8 957.3	15.038	38.53	**742**	9 755.3	16.814	30.61
643	8 266.9	13.153	37.20	**693**	8 972.4	15.076	38.47	**743**	9 772.1	16.844	30.33
644	8 280.1	13.191	37.29	**694**	8 987.5	15.115	38.41	**744**	9 788.9	16.874	30.04
645	8 293.3	13.228	37.38	**695**	9 002.6	15.153	38.35	**745**	9 805.8	16.904	29.74
646	8 306.6	13.265	37.47	**696**	9 017.8	15.191	38.29	**746**	9 822.8	16.934	29.45
647	8 319.8	13.303	37.56	**697**	9 033.0	15.230	38.22	**747**	9 839.7	16.963	29.14
648	8 333.2	13.340	37.64	**698**	9 048.3	15.268	38.15	**748**	9 856.7	16.992	28.83
649	8 346.5	13.378	37.72	**699**	9 063.5	15.306	38.07	**749**	9 873.7	17.021	28.52
650	8 359.9	13.416	37.80	**700**	9 078.9	15.344	37.99	**750**	9 890.7	17.049	28.19

TABLE 6.4.3. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}, reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
750	9 890.7	17.049	28.19	**755**	9 976.3	17.186	26.50	**760**	10 062.6	17.314	24.66
751	9 907.8	17.077	27.87	**756**	9 993.5	17.212	26.14				
752	9 924.9	17.105	27.53	**757**	10 010.7	17.238	25.78				
753	9 942.0	17.132	27.20	**758**	10 028.0	17.264	25.41				
754	9 959.1	17.159	26.85	**759**	10 045.3	17.289	25.04				

6.5. Reference Function and Table for Platinum, Pt-67, Versus the Negative Thermoelement, Type JN, a Copper-Nickel Alloy

The coefficients, c_i, for the eighth degree polynomial that gives the thermoelectric voltage, E, of Pt-67 versus type JN thermoelements as a function of temperature, t_{90}, in the −210 °C to 760 °C range are given in table 6.5.1. The polynomial is of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for Pt-67 versus type JN thermoelements at selected fixed points are given in table 6.5.2. The reference values for Pt-67 versus type JN thermoelements are given at 1 °C intervals from −210 °C to 760 °C in table 6.5.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 6.5.1, 6.5.2, and 6.5.3, respectively.

Because of the lack of stability type J thermocouples above 760 °C, no reference function is given for type JN thermoelements above 760 °C.

The tables in this section merely give average values for industrial materials which have a wide variability. Neither the ASTM nor the ISA recognize type JP or type JN thermoelements as standardized materials.

TABLE 6.5.1. *Platinum, Pt-67, versus type JN thermoelements --- coefficients, c_i, of reference equation giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature range. The equation is of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−210 °C to 760 °C
c_0 =	0.000 000 000 0 . . .
c_1 =	$3.246\,763\,925\,6 \times 10^{1}$
c_2 =	$2.579\,837\,059\,4 \times 10^{-2}$
c_3 =	$-1.445\,507\,273\,0 \times 10^{-5}$
c_4 =	$-1.239\,297\,209\,3 \times 10^{-9}$
c_5 =	$-2.043\,995\,698\,0 \times 10^{-11}$
c_6 =	$5.433\,771\,071\,8 \times 10^{-14}$
c_7 =	$-4.588\,038\,123\,5 \times 10^{-17}$
c_8 =	$1.320\,193\,530\,6 \times 10^{-20}$

TABLE 6.5.2. *Thermoelectric values at fixed points for platinum, Pt-67, versus type JN thermoelements*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
Argon TP	−189.3442	−5 118.22	20.951	72.86
Mercury TP	−38.8344	−1 221.11	30.399	54.97
Ice MP	0.000	0.00	32.468	51.60
Water TP	0.01	0.3	32.468	51.60
Gallium MP	29.7646	988.9	33.965	48.99
Indium FP	156.5985	5 659.6	39.430	36.89
Tin FP	231.928	8 727.1	41.917	29.12
Cadmium FP	321.069	12 567.3	44.111	20.25
Lead FP	327.462	12 849.7	44.239	19.65
Zinc FP	419.527	16 994.3	45.677	11.89
Antimony FP	630.63	26 803.1	46.859	0.59
Aluminum FP	660.323	28 194.6	46.860	−0.57

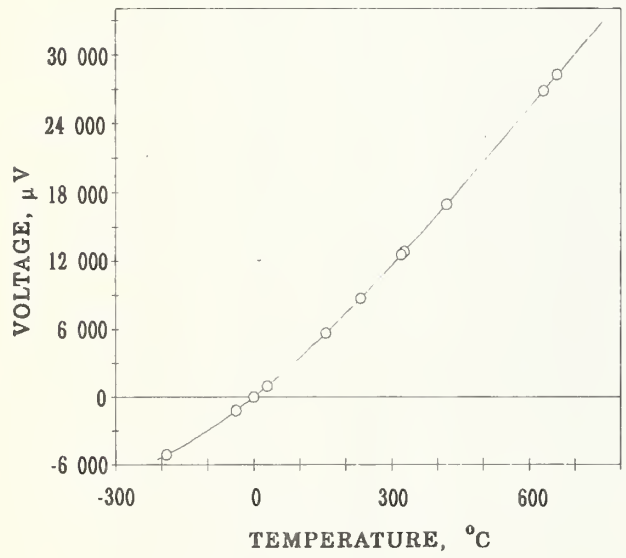

FIGURE 6.5.1. *Thermoelectric voltage for platinum, Pt-67, versus type JN thermoelements. The circles indicate values at various thermometric fixed points.*

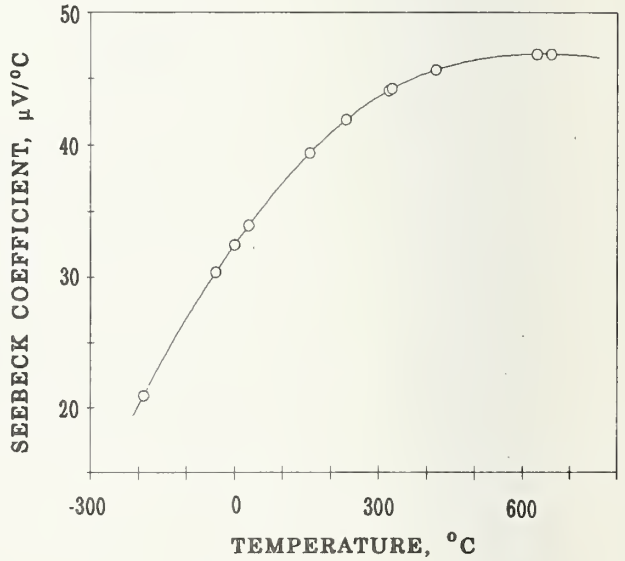

FIGURE 6.5.2. *Seebeck coefficient for platinum, Pt-67, versus type JN thermoelements. The circles indicate values at various thermometric fixed points.*

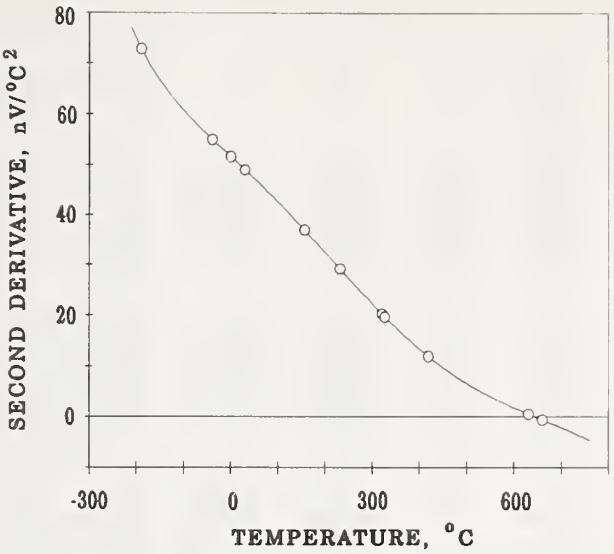

FIGURE 6.5.3. *Second derivative of thermoelectric voltage for platinum Pt-67, versus type JN thermoelements. The circles indicate values at various thermometric fixed points.*

TABLE 6.5.3. ***Platinum, Pt-67, versus type JN thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
−210	−5 535.15	19.404	76.96	**−190**	−5 131.95	20.903	72.98	**−170**	−4 699.53	22.327	69.57
−209	−5 515.71	19.481	76.75	**−189**	−5 111.01	20.976	72.80	**−169**	−4 677.17	22.397	69.42
−208	−5 496.19	19.558	76.53	**−188**	−5 090.00	21.048	72.61	**−168**	−4 654.74	22.466	69.26
−207	−5 476.59	19.634	76.32	**−187**	−5 068.91	21.121	72.43	**−167**	−4 632.24	22.535	69.10
−206	−5 456.92	19.711	76.11	**−186**	−5 047.75	21.193	72.26	**−166**	−4 609.67	22.604	68.95
−205	−5 437.17	19.787	75.90	**−185**	−5 026.53	21.265	72.08	**−165**	−4 587.03	22.673	68.80
−204	−5 417.35	19.862	75.70	**−184**	−5 005.22	21.337	71.90	**−164**	−4 564.32	22.742	68.65
−203	−5 397.45	19.938	75.49	**−183**	−4 983.85	21.409	71.73	**−163**	−4 541.54	22.811	68.50
−202	−5 377.47	20.013	75.29	**−182**	−4 962.41	21.481	71.55	**−162**	−4 518.70	22.879	68.35
−201	−5 357.42	20.089	75.09	**−181**	−4 940.89	21.552	71.38	**−161**	−4 495.79	22.947	68.20
−200	−5 337.30	20.164	74.89	**−180**	−4 919.30	21.624	71.21	**−160**	−4 472.80	23.015	68.05
−199	−5 317.09	20.238	74.69	**−179**	−4 897.64	21.695	71.04	**−159**	−4 449.75	23.083	67.90
−198	−5 296.82	20.313	74.50	**−178**	−4 875.91	21.766	70.87	**−158**	−4 426.64	23.151	67.76
−197	−5 276.47	20.387	74.30	**−177**	−4 854.11	21.837	70.71	**−157**	−4 403.45	23.219	67.61
−196	−5 256.04	20.462	74.11	**−176**	−4 832.24	21.907	70.54	**−156**	−4 380.20	23.287	67.47
−195	−5 235.55	20.536	73.92	**−175**	−4 810.30	21.978	70.38	**−155**	−4 356.88	23.354	67.33
−194	−5 214.97	20.609	73.73	**−174**	−4 788.28	22.048	70.21	**−154**	−4 333.49	23.421	67.19
−193	−5 194.33	20.683	73.54	**−173**	−4 766.20	22.118	70.05	**−153**	−4 310.04	23.488	67.05
−192	−5 173.61	20.756	73.35	**−172**	−4 744.05	22.188	69.89	**−152**	−4 286.52	23.555	66.91
−191	−5 152.81	20.830	73.16	**−171**	−4 721.82	22.258	69.73	**−151**	−4 262.93	23.622	66.77
−190	−5 131.95	20.903	72.98	**−170**	−4 699.53	22.327	69.57	**−150**	−4 239.27	23.689	66.63

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
−150	−4 239.27	23.689	66.63	−100	−2 974.19	26.865	60.71	−50	−1 557.08	29.779	55.96
−149	−4 215.55	23.755	66.49	−99	−2 947.29	26.926	60.61	−49	−1 527.27	29.835	55.87
−148	−4 191.76	23.822	66.36	−98	−2 920.33	26.987	60.51	−48	−1 497.41	29.891	55.78
−147	−4 167.91	23.888	66.22	−97	−2 893.32	27.047	60.40	−47	−1 467.49	29.947	55.69
−146	−4 143.98	23.954	66.09	−96	−2 866.24	27.107	60.30	−46	−1 437.52	30.002	55.60
−145	−4 120.00	24.020	65.96	−95	−2 839.10	27.168	60.20	−45	−1 407.49	30.058	55.51
−144	−4 095.94	24.086	65.83	−94	−2 811.90	27.228	60.10	−44	−1 377.40	30.113	55.43
−143	−4 071.82	24.152	65.69	−93	−2 784.65	27.288	60.00	−43	−1 347.26	30.169	55.34
−142	−4 047.64	24.218	65.56	−92	−2 757.33	27.348	59.90	−42	−1 317.06	30.224	55.25
−141	−4 023.39	24.283	65.43	−91	−2 729.95	27.408	59.80	−41	−1 286.81	30.279	55.16
−140	−3 999.07	24.348	65.30	−90	−2 702.51	27.467	59.70	−40	−1 256.50	30.334	55.07
−139	−3 974.69	24.414	65.18	−89	−2 675.02	27.527	59.60	−39	−1 226.14	30.389	54.98
−138	−3 950.25	24.479	65.05	−88	−2 647.46	27.587	59.50	−38	−1 195.73	30.444	54.90
−137	−3 925.74	24.544	64.92	−87	−2 619.84	27.646	59.40	−37	−1 165.25	30.499	54.81
−136	−3 901.16	24.609	64.80	−86	−2 592.17	27.705	59.30	−36	−1 134.73	30.554	54.72
−135	−3 876.52	24.673	64.67	−85	−2 564.43	27.765	59.21	−35	−1 104.15	30.609	54.63
−134	−3 851.81	24.738	64.55	−84	−2 536.64	27.824	59.11	−34	−1 073.51	30.663	54.55
−133	−3 827.04	24.802	64.42	−83	−2 508.78	27.883	59.01	−33	−1 042.82	30.718	54.46
−132	−3 802.21	24.867	64.30	−82	−2 480.87	27.942	58.92	−32	−1 012.07	30.772	54.37
−131	−3 777.31	24.931	64.18	−81	−2 452.90	28.001	58.82	−31	−981.27	30.827	54.28
−130	−3 752.35	24.995	64.06	−80	−2 424.87	28.060	58.72	−30	−950.42	30.881	54.20
−129	−3 727.32	25.059	63.94	−79	−2 396.78	28.118	58.63	−29	−919.51	30.935	54.11
−128	−3 702.23	25.123	63.82	−78	−2 368.63	28.177	58.53	−28	−888.55	30.989	54.02
−127	−3 677.07	25.187	63.70	−77	−2 340.43	28.235	58.44	−27	−857.54	31.043	53.94
−126	−3 651.85	25.250	63.58	−76	−2 312.16	28.294	58.34	−26	−826.47	31.097	53.85
−125	−3 626.57	25.314	63.46	−75	−2 283.84	28.352	58.25	−25	−795.34	31.151	53.76
−124	−3 601.23	25.377	63.35	−74	−2 255.46	28.410	58.15	−24	−764.16	31.204	53.68
−123	−3 575.82	25.441	63.23	−73	−2 227.02	28.468	58.06	−23	−732.93	31.258	53.59
−122	−3 550.34	25.504	63.11	−72	−2 198.52	28.526	57.96	−22	−701.65	31.312	53.50
−121	−3 524.81	25.567	63.00	−71	−2 169.97	28.584	57.87	−21	−670.31	31.365	53.42
−120	−3 499.21	25.630	62.88	−70	−2 141.35	28.642	57.78	−20	−638.92	31.418	53.33
−119	−3 473.55	25.693	62.77	−69	−2 112.68	28.700	57.68	−19	−607.47	31.472	53.24
−118	−3 447.83	25.755	62.66	−68	−2 083.95	28.757	57.59	−18	−575.97	31.525	53.16
−117	−3 422.04	25.818	62.54	−67	−2 055.17	28.815	57.50	−17	−544.42	31.578	53.07
−116	−3 396.19	25.880	62.43	−66	−2 026.32	28.872	57.41	−16	−512.82	31.631	52.98
−115	−3 370.28	25.943	62.32	−65	−1 997.42	28.930	57.32	−15	−481.16	31.684	52.90
−114	−3 344.30	26.005	62.21	−64	−1 968.46	28.987	57.22	−14	−449.45	31.737	52.81
−113	−3 318.27	26.067	62.10	−63	−1 939.45	29.044	57.13	−13	−417.69	31.790	52.72
−112	−3 292.17	26.129	61.99	−62	−1 910.38	29.101	57.04	−12	−385.87	31.842	52.64
−111	−3 266.01	26.191	61.88	−61	−1 881.25	29.158	56.95	−11	−354.00	31.895	52.55
−110	−3 239.79	26.253	61.77	−60	−1 852.06	29.215	56.86	−10	−322.08	31.947	52.46
−109	−3 213.50	26.315	61.66	−59	−1 822.82	29.272	56.77	−9	−290.11	32.000	52.38
−108	−3 187.16	26.376	61.56	−58	−1 793.52	29.329	56.68	−8	−258.08	32.052	52.29
−107	−3 160.75	26.438	61.45	−57	−1 764.16	29.385	56.59	−7	−226.00	32.104	52.20
−106	−3 134.28	26.499	61.34	−56	−1 734.74	29.442	56.50	−6	−193.87	32.156	52.12
−105	−3 107.75	26.561	61.24	−55	−1 705.27	29.498	56.41	−5	−161.69	32.209	52.03
−104	−3 081.16	26.622	61.13	−54	−1 675.75	29.555	56.32	−4	−129.46	32.261	51.94
−103	−3 054.51	26.683	61.03	−53	−1 646.17	29.611	56.23	−3	−97.17	32.312	51.86
−102	−3 027.79	26.744	60.92	−52	−1 616.53	29.667	56.14	−2	−64.83	32.364	51.77
−101	−3 001.02	26.805	60.82	−51	−1 586.83	29.723	56.05	−1	−32.44	32.416	51.68
−100	−2 974.19	26.865	60.71	−50	−1 557.08	29.779	55.96	0	0.00	32.468	51.60

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	32.468	51.60	50	1 686.1	34.938	47.18	100	3 490.0	37.181	42.51
1	32.5	32.519	51.51	51	1 721.0	34.985	47.09	101	3 527.2	37.224	42.41
2	65.0	32.571	51.42	52	1 756.0	35.032	47.00	102	3 564.5	37.266	42.32
3	97.6	32.622	51.34	53	1 791.1	35.079	46.91	103	3 601.7	37.309	42.22
4	130.3	32.673	51.25	54	1 826.2	35.126	46.82	104	3 639.1	37.351	42.12
5	163.0	32.725	51.16	55	1 861.3	35.173	46.73	105	3 676.5	37.393	42.03
6	195.7	32.776	51.08	56	1 896.5	35.219	46.64	106	3 713.9	37.435	41.93
7	228.5	32.827	50.99	57	1 931.8	35.266	46.55	107	3 751.3	37.477	41.83
8	261.4	32.878	50.90	58	1 967.1	35.312	46.45	108	3 788.8	37.518	41.74
9	294.3	32.928	50.81	59	2 002.4	35.359	46.36	109	3 826.4	37.560	41.64
10	327.2	32.979	50.73	60	2 037.8	35.405	46.27	110	3 863.9	37.602	41.54
11	360.2	33.030	50.64	61	2 073.2	35.451	46.18	111	3 901.6	37.643	41.44
12	393.3	33.081	50.55	62	2 108.7	35.498	46.09	112	3 939.2	37.685	41.35
13	426.4	33.131	50.47	63	2 144.2	35.544	46.00	113	3 976.9	37.726	41.25
14	459.6	33.181	50.38	64	2 179.8	35.590	45.90	114	4 014.7	37.767	41.15
15	492.8	33.232	50.29	65	2 215.4	35.635	45.81	115	4 052.5	37.808	41.05
16	526.0	33.282	50.20	66	2 251.0	35.681	45.72	116	4 090.3	37.849	40.95
17	559.3	33.332	50.12	67	2 286.7	35.727	45.63	117	4 128.2	37.890	40.86
18	592.7	33.382	50.03	68	2 322.5	35.772	45.53	118	4 166.1	37.931	40.76
19	626.1	33.432	49.94	69	2 358.3	35.818	45.44	119	4 204.0	37.972	40.66
20	659.6	33.482	49.85	70	2 394.1	35.863	45.35	120	4 242.0	38.012	40.56
21	693.1	33.532	49.77	71	2 430.0	35.909	45.26	121	4 280.0	38.053	40.46
22	726.6	33.582	49.68	72	2 465.9	35.954	45.16	122	4 318.1	38.093	40.36
23	760.2	33.631	49.59	73	2 501.9	35.999	45.07	123	4 356.2	38.133	40.26
24	793.9	33.681	49.50	74	2 537.9	36.044	44.98	124	4 394.4	38.174	40.17
25	827.6	33.730	49.41	75	2 574.0	36.089	44.88	125	4 432.6	38.214	40.07
26	861.3	33.780	49.33	76	2 610.1	36.134	44.79	126	4 470.8	38.254	39.97
27	895.1	33.829	49.24	77	2 646.3	36.178	44.70	127	4 509.1	38.294	39.87
28	929.0	33.878	49.15	78	2 682.5	36.223	44.60	128	4 547.4	38.334	39.77
29	962.9	33.927	49.06	79	2 718.7	36.268	44.51	129	4 585.8	38.373	39.67
30	996.9	33.976	48.97	80	2 755.0	36.312	44.41	130	4 624.1	38.413	39.57
31	1 030.9	34.025	48.88	81	2 791.3	36.356	44.32	131	4 662.6	38.452	39.47
32	1 064.9	34.074	48.79	82	2 827.7	36.401	44.23	132	4 701.1	38.492	39.37
33	1 099.0	34.123	48.71	83	2 864.2	36.445	44.13	133	4 739.6	38.531	39.27
34	1 133.2	34.171	48.62	84	2 900.6	36.489	44.04	134	4 778.1	38.570	39.17
35	1 167.3	34.220	48.53	85	2 937.1	36.533	43.94	135	4 816.7	38.609	39.07
36	1 201.6	34.269	48.44	86	2 973.7	36.577	43.85	136	4 855.3	38.649	38.97
37	1 235.9	34.317	48.35	87	3 010.3	36.621	43.75	137	4 894.0	38.687	38.87
38	1 270.2	34.365	48.26	88	3 046.9	36.664	43.66	138	4 932.7	38.726	38.77
39	1 304.6	34.413	48.17	89	3 083.6	36.708	43.56	139	4 971.5	38.765	38.67
40	1 339.1	34.462	48.08	90	3 120.3	36.752	43.47	140	5 010.2	38.804	38.57
41	1 373.5	34.510	47.99	91	3 157.1	36.795	43.37	141	5 049.1	38.842	38.47
42	1 408.1	34.558	47.90	92	3 193.9	36.838	43.28	142	5 087.9	38.881	38.37
43	1 442.7	34.605	47.81	93	3 230.8	36.882	43.18	143	5 126.8	38.919	38.27
44	1 477.3	34.653	47.72	94	3 267.7	36.925	43.09	144	5 165.8	38.957	38.17
45	1 512.0	34.701	47.63	95	3 304.6	36.968	42.99	145	5 204.7	38.995	38.07
46	1 546.7	34.748	47.54	96	3 341.6	37.011	42.90	146	5 243.8	39.033	37.96
47	1 581.5	34.796	47.45	97	3 378.7	37.053	42.80	147	5 282.8	39.071	37.86
48	1 616.3	34.843	47.36	98	3 415.7	37.096	42.70	148	5 321.9	39.109	37.76
49	1 651.1	34.891	47.27	99	3 452.9	37.139	42.61	149	5 361.0	39.147	37.66
50	1 686.1	34.938	47.18	100	3 490.0	37.181	42.51	150	5 400.2	39.184	37.56

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	5 400.2	39.184	37.56	200	7 404.2	40.934	32.42	250	9 489.3	42.426	27.26
151	5 439.4	39.222	37.46	201	7 445.2	40.967	32.32	251	9 531.8	42.453	27.16
152	5 478.6	39.259	37.36	202	7 486.2	40.999	32.22	252	9 574.2	42.481	27.06
153	5 517.9	39.296	37.26	203	7 527.2	41.031	32.11	253	9 616.7	42.508	26.96
154	5 557.2	39.334	37.15	204	7 568.2	41.063	32.01	254	9 659.2	42.534	26.86
155	5 596.6	39.371	37.05	205	7 609.3	41.095	31.91	255	9 701.8	42.561	26.75
156	5 636.0	39.408	36.95	206	7 650.4	41.127	31.80	256	9 744.4	42.588	26.65
157	5 675.4	39.445	36.85	207	7 691.6	41.159	31.70	257	9 787.0	42.615	26.55
158	5 714.9	39.481	36.75	208	7 732.7	41.190	31.60	258	9 829.6	42.641	26.45
159	5 754.4	39.518	36.65	209	7 773.9	41.222	31.49	259	9 872.2	42.667	26.35
160	5 793.9	39.555	36.54	210	7 815.2	41.253	31.39	260	9 914.9	42.694	26.24
161	5 833.5	39.591	36.44	211	7 856.4	41.285	31.28	261	9 957.6	42.720	26.14
162	5 873.1	39.628	36.34	212	7 897.7	41.316	31.18	262	10 000.4	42.746	26.04
163	5 912.7	39.664	36.24	213	7 939.1	41.347	31.08	263	10 043.1	42.772	25.94
164	5 952.4	39.700	36.13	214	7 980.4	41.378	30.97	264	10 085.9	42.798	25.84
165	5 992.1	39.736	36.03	215	8 021.8	41.409	30.87	265	10 128.7	42.824	25.74
166	6 031.9	39.772	35.93	216	8 063.3	41.440	30.77	266	10 171.6	42.849	25.64
167	6 071.7	39.808	35.83	217	8 104.7	41.471	30.66	267	10 214.4	42.875	25.54
168	6 111.5	39.844	35.73	218	8 146.2	41.501	30.56	268	10 257.3	42.900	25.44
169	6 151.4	39.880	35.62	219	8 187.7	41.532	30.46	269	10 300.2	42.926	25.33
170	6 191.2	39.915	35.52	220	8 229.3	41.562	30.35	270	10 343.2	42.951	25.23
171	6 231.2	39.951	35.42	221	8 270.8	41.592	30.25	271	10 386.1	42.976	25.13
172	6 271.2	39.986	35.31	222	8 312.4	41.623	30.15	272	10 429.1	43.001	25.03
173	6 311.2	40.021	35.21	223	8 354.1	41.653	30.04	273	10 472.1	43.026	24.93
174	6 351.2	40.056	35.11	224	8 395.7	41.683	29.94	274	10 515.2	43.051	24.83
175	6 391.3	40.091	35.01	225	8 437.4	41.713	29.84	275	10 558.2	43.076	24.73
176	6 431.4	40.126	34.90	226	8 479.2	41.742	29.73	276	10 601.3	43.101	24.63
177	6 471.5	40.161	34.80	227	8 520.9	41.772	29.63	277	10 644.4	43.125	24.53
178	6 511.7	40.196	34.70	228	8 562.7	41.802	29.53	278	10 687.6	43.150	24.43
179	6 551.9	40.231	34.59	229	8 604.5	41.831	29.42	279	10 730.7	43.174	24.33
180	6 592.2	40.265	34.49	230	8 646.4	41.860	29.32	280	10 773.9	43.198	24.23
181	6 632.4	40.300	34.39	231	8 688.3	41.890	29.22	281	10 817.1	43.223	24.13
182	6 672.8	40.334	34.29	232	8 730.2	41.919	29.11	282	10 860.4	43.247	24.03
183	6 713.1	40.368	34.18	233	8 772.1	41.948	29.01	283	10 903.6	43.271	23.93
184	6 753.5	40.402	34.08	234	8 814.1	41.977	28.91	284	10 946.9	43.295	23.83
185	6 793.9	40.436	33.98	235	8 856.0	42.006	28.80	285	10 990.2	43.318	23.73
186	6 834.4	40.470	33.87	236	8 898.1	42.035	28.70	286	11 033.5	43.342	23.64
187	6 874.9	40.504	33.77	237	8 940.1	42.063	28.60	287	11 076.9	43.366	23.54
188	6 915.4	40.538	33.67	238	8 982.2	42.092	28.49	288	11 120.3	43.389	23.44
189	6 955.9	40.571	33.56	239	9 024.3	42.120	28.39	289	11 163.7	43.413	23.34
190	6 996.5	40.605	33.46	240	9 066.4	42.148	28.29	290	11 207.1	43.436	23.24
191	7 037.1	40.638	33.36	241	9 108.6	42.177	28.19	291	11 250.5	43.459	23.14
192	7 077.8	40.672	33.25	242	9 150.8	42.205	28.08	292	11 294.0	43.482	23.04
193	7 118.5	40.705	33.15	243	9 193.0	42.233	27.98	293	11 337.5	43.505	22.95
194	7 159.2	40.738	33.05	244	9 235.2	42.261	27.88	294	11 381.0	43.528	22.85
195	7 200.0	40.771	32.94	245	9 277.5	42.289	27.78	295	11 424.6	43.551	22.75
196	7 240.7	40.804	32.84	246	9 319.8	42.316	27.67	296	11 468.1	43.574	22.65
197	7 281.6	40.837	32.73	247	9 362.2	42.344	27.57	297	11 511.7	43.596	22.55
198	7 322.4	40.869	32.63	248	9 404.5	42.372	27.47	298	11 555.3	43.619	22.46
199	7 363.3	40.902	32.53	249	9 446.9	42.399	27.37	299	11 598.9	43.641	22.36
200	7 404.2	40.934	32.42	250	9 489.3	42.426	27.26	300	11 642.6	43.663	22.26

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	11 642.6	43.663	22.26	350	13 851.6	44.658	17.59	400	16 104.7	45.430	13.39
301	11 686.3	43.686	22.16	351	13 896.3	44.676	17.50	401	16 150.1	45.444	13.31
302	11 730.0	43.708	22.07	352	13 941.0	44.693	17.41	402	16 195.6	45.457	13.23
303	11 773.7	43.730	21.97	353	13 985.7	44.710	17.33	403	16 241.0	45.470	13.15
304	11 817.4	43.752	21.87	354	14 030.4	44.728	17.24	404	16 286.5	45.483	13.08
305	11 861.2	43.773	21.78	355	14 075.1	44.745	17.15	405	16 332.0	45.496	13.00
306	11 905.0	43.795	21.68	356	14 119.9	44.762	17.06	406	16 377.5	45.509	12.92
307	11 948.8	43.817	21.58	357	14 164.6	44.779	16.97	407	16 423.0	45.522	12.84
308	11 992.6	43.838	21.49	358	14 209.4	44.796	16.89	408	16 468.6	45.535	12.77
309	12 036.5	43.860	21.39	359	14 254.2	44.813	16.80	409	16 514.1	45.548	12.69
310	12 080.3	43.881	21.30	360	14 299.0	44.830	16.71	410	16 559.6	45.560	12.61
311	12 124.2	43.902	21.20	361	14 343.9	44.846	16.62	411	16 605.2	45.573	12.54
312	12 168.1	43.924	21.11	362	14 388.7	44.863	16.54	412	16 650.8	45.585	12.46
313	12 212.1	43.945	21.01	363	14 433.6	44.879	16.45	413	16 696.4	45.598	12.38
314	12 256.0	43.966	20.91	364	14 478.5	44.896	16.36	414	16 742.0	45.610	12.31
315	12 300.0	43.986	20.82	365	14 523.4	44.912	16.28	415	16 787.6	45.622	12.23
316	12 344.0	44.007	20.72	366	14 568.3	44.928	16.19	416	16 833.2	45.635	12.16
317	12 388.0	44.028	20.63	367	14 613.3	44.944	16.11	417	16 878.9	45.647	12.08
318	12 432.0	44.048	20.53	368	14 658.2	44.960	16.02	418	16 924.5	45.659	12.01
319	12 476.1	44.069	20.44	369	14 703.2	44.976	15.93	419	16 970.2	45.671	11.93
320	12 520.2	44.089	20.35	370	14 748.2	44.992	15.85	420	17 015.9	45.683	11.86
321	12 564.3	44.110	20.25	371	14 793.2	45.008	15.76	421	17 061.6	45.695	11.78
322	12 608.4	44.130	20.16	372	14 838.2	45.024	15.68	422	17 107.3	45.706	11.71
323	12 652.5	44.150	20.06	373	14 883.2	45.039	15.59	423	17 153.0	45.718	11.64
324	12 696.7	44.170	19.97	374	14 928.3	45.055	15.51	424	17 198.7	45.730	11.56
325	12 740.9	44.190	19.88	375	14 973.3	45.070	15.43	425	17 244.4	45.741	11.49
326	12 785.1	44.210	19.78	376	15 018.4	45.086	15.34	426	17 290.2	45.753	11.42
327	12 829.3	44.229	19.69	377	15 063.5	45.101	15.26	427	17 335.9	45.764	11.34
328	12 873.5	44.249	19.60	378	15 108.6	45.116	15.17	428	17 381.7	45.775	11.27
329	12 917.8	44.269	19.50	379	15 153.7	45.132	15.09	429	17 427.5	45.786	11.20
330	12 962.1	44.288	19.41	380	15 198.9	45.147	15.01	430	17 473.3	45.798	11.13
331	13 006.4	44.307	19.32	381	15 244.0	45.162	14.93	431	17 519.1	45.809	11.05
332	13 050.7	44.327	19.23	382	15 289.2	45.176	14.84	432	17 564.9	45.820	10.98
333	13 095.0	44.346	19.13	383	15 334.4	45.191	14.76	433	17 610.7	45.831	10.91
334	13 139.4	44.365	19.04	384	15 379.6	45.206	14.68	434	17 656.6	45.842	10.84
335	13 183.8	44.384	18.95	385	15 424.8	45.221	14.60	435	17 702.4	45.852	10.77
336	13 228.2	44.403	18.86	386	15 470.0	45.235	14.51	436	17 748.3	45.863	10.70
337	13 272.6	44.422	18.77	387	15 515.3	45.250	14.43	437	17 794.1	45.874	10.63
338	13 317.0	44.440	18.67	388	15 560.5	45.264	14.35	438	17 840.0	45.884	10.56
339	13 361.4	44.459	18.58	389	15 605.8	45.278	14.27	439	17 885.9	45.895	10.49
340	13 405.9	44.478	18.49	390	15 651.1	45.293	14.19	440	17 931.8	45.905	10.42
341	13 450.4	44.496	18.40	391	15 696.4	45.307	14.11	441	17 977.7	45.916	10.35
342	13 494.9	44.514	18.31	392	15 741.7	45.321	14.03	442	18 023.6	45.926	10.28
343	13 539.4	44.533	18.22	393	15 787.0	45.335	13.95	443	18 069.6	45.936	10.21
344	13 584.0	44.551	18.13	394	15 832.3	45.349	13.87	444	18 115.5	45.946	10.14
345	13 628.5	44.569	18.04	395	15 877.7	45.362	13.79	445	18 161.5	45.957	10.07
346	13 673.1	44.587	17.95	396	15 923.1	45.376	13.71	446	18 207.4	45.967	10.00
347	13 717.7	44.605	17.86	397	15 968.5	45.390	13.63	447	18 253.4	45.977	9.93
348	13 762.3	44.623	17.77	398	16 013.9	45.403	13.55	448	18 299.4	45.986	9.87
349	13 807.0	44.640	17.68	399	16 059.3	45.417	13.47	449	18 345.4	45.996	9.80
350	13 851.6	44.658	17.59	400	16 104.7	45.430	13.39	450	18 391.4	46.006	9.73

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	18 391.4	46.006	9.73	**500**	20 702.5	46.413	6.63	**550**	23 030.3	46.678	4.03
451	18 437.4	46.016	9.66	**501**	20 748.9	46.419	6.57	**551**	23 077.0	46.682	3.98
452	18 483.4	46.025	9.60	**502**	20 795.3	46.426	6.52	**552**	23 123.6	46.685	3.94
453	18 529.4	46.035	9.53	**503**	20 841.7	46.432	6.46	**553**	23 170.3	46.689	3.89
454	18 575.5	46.044	9.46	**504**	20 888.2	46.439	6.41	**554**	23 217.0	46.693	3.84
455	18 621.5	46.054	9.40	**505**	20 934.6	46.445	6.35	**555**	23 263.7	46.697	3.80
456	18 667.6	46.063	9.33	**506**	20 981.1	46.452	6.29	**556**	23 310.4	46.701	3.75
457	18 713.6	46.073	9.26	**507**	21 027.5	46.458	6.24	**557**	23 357.1	46.705	3.70
458	18 759.7	46.082	9.20	**508**	21 074.0	46.464	6.18	**558**	23 403.8	46.708	3.66
459	18 805.8	46.091	9.13	**509**	21 120.5	46.470	6.13	**559**	23 450.5	46.712	3.61
460	18 851.9	46.100	9.07	**510**	21 166.9	46.476	6.07	**560**	23 497.2	46.715	3.56
461	18 898.0	46.109	9.00	**511**	21 213.4	46.482	6.02	**561**	23 544.0	46.719	3.52
462	18 944.1	46.118	8.94	**512**	21 259.9	46.488	5.96	**562**	23 590.7	46.723	3.47
463	18 990.2	46.127	8.87	**513**	21 306.4	46.494	5.91	**563**	23 637.4	46.726	3.43
464	19 036.4	46.136	8.81	**514**	21 352.9	46.500	5.86	**564**	23 684.1	46.729	3.38
465	19 082.5	46.145	8.74	**515**	21 399.4	46.506	5.80	**565**	23 730.9	46.733	3.33
466	19 128.7	46.153	8.68	**516**	21 445.9	46.512	5.75	**566**	23 777.6	46.736	3.29
467	19 174.8	46.162	8.62	**517**	21 492.4	46.518	5.70	**567**	23 824.3	46.739	3.24
468	19 221.0	46.170	8.55	**518**	21 538.9	46.523	5.64	**568**	23 871.1	46.743	3.20
469	19 267.2	46.179	8.49	**519**	21 585.5	46.529	5.59	**569**	23 917.8	46.746	3.15
470	19 313.3	46.187	8.43	**520**	21 632.0	46.534	5.54	**570**	23 964.6	46.749	3.11
471	19 359.5	46.196	8.36	**521**	21 678.5	46.540	5.48	**571**	24 011.3	46.752	3.06
472	19 405.7	46.204	8.30	**522**	21 725.1	46.545	5.43	**572**	24 058.1	46.755	3.02
473	19 451.9	46.212	8.24	**523**	21 771.6	46.551	5.38	**573**	24 104.8	46.758	2.98
474	19 498.2	46.221	8.18	**524**	21 818.2	46.556	5.33	**574**	24 151.6	46.761	2.93
475	19 544.4	46.229	8.11	**525**	21 864.7	46.561	5.27	**575**	24 198.4	46.764	2.89
476	19 590.6	46.237	8.05	**526**	21 911.3	46.567	5.22	**576**	24 245.1	46.767	2.84
477	19 636.9	46.245	7.99	**527**	21 957.9	46.572	5.17	**577**	24 291.9	46.770	2.80
478	19 683.1	46.253	7.93	**528**	22 004.4	46.577	5.12	**578**	24 338.7	46.772	2.76
479	19 729.4	46.261	7.87	**529**	22 051.0	46.582	5.07	**579**	24 385.4	46.775	2.71
480	19 775.6	46.269	7.81	**530**	22 097.6	46.587	5.02	**580**	24 432.2	46.778	2.67
481	19 821.9	46.276	7.75	**531**	22 144.2	46.592	4.97	**581**	24 479.0	46.780	2.63
482	19 868.2	46.284	7.68	**532**	22 190.8	46.597	4.92	**582**	24 525.8	46.783	2.58
483	19 914.5	46.292	7.62	**533**	22 237.4	46.602	4.87	**583**	24 572.6	46.786	2.54
484	19 960.8	46.299	7.56	**534**	22 284.0	46.607	4.82	**584**	24 619.3	46.788	2.50
485	20 007.1	46.307	7.50	**535**	22 330.6	46.612	4.76	**585**	24 666.1	46.791	2.45
486	20 053.4	46.314	7.44	**536**	22 377.2	46.616	4.71	**586**	24 712.9	46.793	2.41
487	20 099.7	46.322	7.39	**537**	22 423.8	46.621	4.67	**587**	24 759.7	46.795	2.37
488	20 146.0	46.329	7.33	**538**	22 470.5	46.626	4.62	**588**	24 806.5	46.798	2.32
489	20 192.4	46.336	7.27	**539**	22 517.1	46.630	4.57	**589**	24 853.3	46.800	2.28
490	20 238.7	46.344	7.21	**540**	22 563.7	46.635	4.52	**590**	24 900.1	46.802	2.24
491	20 285.0	46.351	7.15	**541**	22 610.4	46.639	4.47	**591**	24 946.9	46.804	2.20
492	20 331.4	46.358	7.09	**542**	22 657.0	46.644	4.42	**592**	24 993.7	46.807	2.15
493	20 377.8	46.365	7.03	**543**	22 703.6	46.648	4.37	**593**	25 040.5	46.809	2.11
494	20 424.1	46.372	6.97	**544**	22 750.3	46.652	4.32	**594**	25 087.3	46.811	2.07
495	20 470.5	46.379	6.92	**545**	22 796.9	46.657	4.27	**595**	25 134.2	46.813	2.03
496	20 516.9	46.386	6.86	**546**	22 843.6	46.661	4.22	**596**	25 181.0	46.815	1.99
497	20 563.3	46.393	6.80	**547**	22 890.3	46.665	4.18	**597**	25 227.8	46.817	1.95
498	20 609.7	46.399	6.74	**548**	22 936.9	46.669	4.13	**598**	25 274.6	46.819	1.90
499	20 656.1	46.406	6.69	**549**	22 983.6	46.673	4.08	**599**	25 321.4	46.821	1.86
500	20 702.5	46.413	6.63	**550**	23 030.3	46.678	4.03	**600**	25 368.2	46.823	1.82

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	25 368.2	46.823	1.82	**650**	27 710.8	46.863	−0.17	**700**	30 053.0	46.807	−2.11
601	25 415.1	46.824	1.78	**651**	27 757.7	46.863	−0.21	**701**	30 099.8	46.804	−2.15
602	25 461.9	46.826	1.74	**652**	27 804.5	46.863	−0.24	**702**	30 146.6	46.802	−2.19
603	25 508.7	46.828	1.70	**653**	27 851.4	46.863	−0.28	**703**	30 193.4	46.800	−2.23
604	25 555.5	46.830	1.66	**654**	27 898.3	46.862	−0.32	**704**	30 240.2	46.798	−2.27
605	25 602.4	46.831	1.61	**655**	27 945.1	46.862	−0.36	**705**	30 287.0	46.796	−2.31
606	25 649.2	46.833	1.57	**656**	27 992.0	46.862	−0.40	**706**	30 333.8	46.793	−2.35
607	25 696.0	46.834	1.53	**657**	28 038.8	46.861	−0.44	**707**	30 380.5	46.791	−2.39
608	25 742.9	46.836	1.49	**658**	28 085.7	46.861	−0.48	**708**	30 427.3	46.788	−2.43
609	25 789.7	46.837	1.45	**659**	28 132.6	46.860	−0.51	**709**	30 474.1	46.786	−2.47
610	25 836.6	46.839	1.41	**660**	28 179.4	46.860	−0.55	**710**	30 520.9	46.783	−2.51
611	25 883.4	46.840	1.37	**661**	28 226.3	46.859	−0.59	**711**	30 567.7	46.781	−2.55
612	25 930.2	46.841	1.33	**662**	28 273.1	46.859	−0.63	**712**	30 614.5	46.778	−2.59
613	25 977.1	46.843	1.29	**663**	28 320.0	46.858	−0.67	**713**	30 661.2	46.776	−2.64
614	26 023.9	46.844	1.25	**664**	28 366.9	46.857	−0.71	**714**	30 708.0	46.773	−2.68
615	26 070.8	46.845	1.21	**665**	28 413.7	46.857	−0.75	**715**	30 754.8	46.770	−2.72
616	26 117.6	46.846	1.17	**666**	28 460.6	46.856	−0.78	**716**	30 801.6	46.768	−2.76
617	26 164.5	46.848	1.13	**667**	28 507.4	46.855	−0.82	**717**	30 848.3	46.765	−2.80
618	26 211.3	46.849	1.09	**668**	28 554.3	46.854	−0.86	**718**	30 895.1	46.762	−2.84
619	26 258.2	46.850	1.05	**669**	28 601.1	46.853	−0.90	**719**	30 941.9	46.759	−2.88
620	26 305.0	46.851	1.01	**670**	28 648.0	46.852	−0.94	**720**	30 988.6	46.756	−2.92
621	26 351.9	46.852	0.97	**671**	28 694.8	46.851	−0.98	**721**	31 035.4	46.753	−2.96
622	26 398.7	46.853	0.93	**672**	28 741.7	46.850	−1.02	**722**	31 082.1	46.750	−3.00
623	26 445.6	46.854	0.89	**673**	28 788.5	46.849	−1.06	**723**	31 128.9	46.747	−3.04
624	26 492.4	46.855	0.85	**674**	28 835.4	46.848	−1.09	**724**	31 175.6	46.744	−3.09
625	26 539.3	46.855	0.81	**675**	28 882.2	46.847	−1.13	**725**	31 222.4	46.741	−3.13
626	26 586.1	46.856	0.77	**676**	28 929.1	46.846	−1.17	**726**	31 269.1	46.738	−3.17
627	26 633.0	46.857	0.73	**677**	28 975.9	46.845	−1.21	**727**	31 315.8	46.735	−3.21
628	26 679.8	46.858	0.69	**678**	29 022.8	46.844	−1.25	**728**	31 362.6	46.732	−3.25
629	26 726.7	46.858	0.65	**679**	29 069.6	46.842	−1.29	**729**	31 409.3	46.728	−3.29
630	26 773.6	46.859	0.61	**680**	29 116.5	46.841	−1.33	**730**	31 456.0	46.725	−3.34
631	26 820.4	46.859	0.57	**681**	29 163.3	46.840	−1.37	**731**	31 502.7	46.722	−3.38
632	26 867.3	46.860	0.53	**682**	29 210.1	46.838	−1.41	**732**	31 549.5	46.718	−3.42
633	26 914.1	46.861	0.50	**683**	29 257.0	46.837	−1.44	**733**	31 596.2	46.715	−3.46
634	26 961.0	46.861	0.46	**684**	29 303.8	46.835	−1.48	**734**	31 642.9	46.711	−3.50
635	27 007.9	46.861	0.42	**685**	29 350.6	46.834	−1.52	**735**	31 689.6	46.708	−3.55
636	27 054.7	46.862	0.38	**686**	29 397.5	46.832	−1.56	**736**	31 736.3	46.704	−3.59
637	27 101.6	46.862	0.34	**687**	29 444.3	46.831	−1.60	**737**	31 783.0	46.701	−3.63
638	27 148.4	46.863	0.30	**688**	29 491.1	46.829	−1.64	**738**	31 829.7	46.697	−3.67
639	27 195.3	46.863	0.26	**689**	29 538.0	46.827	−1.68	**739**	31 876.4	46.693	−3.72
640	27 242.2	46.863	0.22	**690**	29 584.8	46.826	−1.72	**740**	31 923.1	46.690	−3.76
641	27 289.0	46.863	0.18	**691**	29 631.6	46.824	−1.76	**741**	31 969.8	46.686	−3.80
642	27 335.9	46.863	0.14	**692**	29 678.4	46.822	−1.80	**742**	32 016.5	46.682	−3.85
643	27 382.8	46.864	0.10	**693**	29 725.3	46.820	−1.84	**743**	32 063.1	46.678	−3.89
644	27 429.6	46.864	0.07	**694**	29 772.1	46.819	−1.88	**744**	32 109.8	46.674	−3.93
645	27 476.5	46.864	0.03	**695**	29 818.9	46.817	−1.92	**745**	32 156.5	46.670	−3.98
646	27 523.3	46.864	−0.01	**696**	29 865.7	46.815	−1.95	**746**	32 203.2	46.666	−4.02
647	27 570.2	46.864	−0.05	**697**	29 912.5	46.813	−1.99	**747**	32 249.8	46.662	−4.06
648	27 617.1	46.864	−0.09	**698**	29 959.3	46.811	−2.03	**748**	32 296.5	46.658	−4.11
649	27 663.9	46.863	−0.13	**699**	30 006.1	46.809	−2.07	**749**	32 343.1	46.654	−4.15
650	27 710.8	46.863	−0.17	**700**	30 053.0	46.807	−2.11	**750**	32 389.8	46.650	−4.19

TABLE 6.5.3. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	32 389.8	46.650	−4.19	755	32 623.0	46.628	−4.42	760	32 856.1	46.606	−4.64
751	32 436.4	46.646	−4.24	756	32 669.6	46.624	−4.46				
752	32 483.1	46.641	−4.28	757	32 716.2	46.619	−4.50				
753	32 529.7	46.637	−4.33	758	32 762.9	46.615	−4.55				
754	32 576.4	46.633	−4.37	759	32 809.5	46.610	−4.59				

6.6. References

[1] Foote, P. D.; Fairchild, C. O.; Harrison, T. R. Pyrometric practice. *Tech. Papers Natl. Bur. Stand. (U.S.)*, T170; 1921 February. 326 p.

[2] Nat. Acad. of Sciences and Nat. Res. Council. International critical tables. Vol. 1, 59; New York: McGraw-Hill Book Co.; 1926.

[3] Lindeck, S. Report Brit. Assoc. for Advance. of Science, 134; 1892.

[4] Roeser, W. F.; Dahl, A. I. Reference tables for iron-constantan and copper-constantan thermocouples. *J. Res. Natl. Bur. Stand. (U.S.)* 20, 337-355; RP1080; 1938 March.

[5] Corruccini, R. J.; Shenker, H. Modified 1913 reference tables for iron-constantan thermocouples. *J. Res. Natl. Bur. Stand. (U.S.)* 50(5), 229-248; RP2415; 1953 May.

[6] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J.; Lonberger, S. T. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 561*; 1955 April. 87 p.

[7] Sine, J. D. Data sheet shown at ASTM Advisory Committee meeting [June 4, 1971] at ASTM headquarters, based on Honeywell, Inc. in-house calibrations.

[8] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[9] ASTM, American Society for Testing and Materials. Manual on the use of thermocouples in temperature measurement. *Special Tech. Publ. 470B*; edited by Benedict, R. P.; Philadelphia: ASTM; 1981. 258 p.

[10] Dahl, A. I. Stability of base-metal thermocouples in air from 800 to 2200 AF. *J. Res. Natl. Bur. Stand. (U.S.)* 24, 205-224; RP1278; 1940 February.

[11] Finch, D. I., U. S. Patent No. 2,325,759; August 3, 1943.

[12] Hansen, M.; Anderko, K. Constitution of binary alloys. New York: McGraw-Hill Book Co.; 1958.

[13] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. 14.03; Philadelphia: ASTM; 1992. 102-230.

[14] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10 (1990); ibid. p. 107.

[15] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[16] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. Schooley, J. F., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; New York:American Institute of Physics; 1992. 547-552.

[17] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

7. TYPE K—Nickel-Chromium Alloy Versus Nickel-Aluminum Alloy Thermocouples

7.1. Material Specifications and Precautions

This type is more resistant to oxidation at elevated temperatures than types E, J, or T thermocouples and, consequently, it finds wide application at temperatures above 500 °C. The positive thermoelement, KP, which is the same as EP, is an alloy that typically contains about 89 to 90% nickel, 9 to about 9.5% chromium, both silicon and iron in amounts up to about 0.5%, plus smaller amounts of other constituents such as carbon, manganese, cobalt and niobium. The negative thermoelement, KN, is typically composed of about 95 to 96% nickel, 1 to 1.5% silicon, 1 to 2.3% aluminum, 1.6 to 3.2% manganese, up to about 0.5% cobalt and smaller amounts of other constituents such as iron, copper and lead. Also, type KN thermoelements with modified compositions are available for use in special applications. These include alloys in which the manganese and aluminum contents are reduced or eliminated, while the silicon and cobalt contents are increased.

Type K thermocouples were developed in 1906 and were known originally as Chromel [1] versus Alumel [1] thermocouples. The Hoskins Manufacturing Company was the sole manufacturer of these thermocouples in this country until the mid-1940s. After that time, other type K thermocouples such as Topel [2] versus Nial [2], T1 [3] versus T2 [3], and ThermoKanthal KP [4] versus ThermoKanthal KN [4] were introduced commercially.

The first reference tables for type K thermocouples to gain general industry-wide acceptance were the ones prepared by Roeser and others at NBS and published [5] in 1935. They based their tables upon the calibrations of 30 samples of No. 8 AWG type KP and type KN thermoelements, except that below 0 °C they used only two samples of each of the KP and KN thermoelements. The thermoelements, selected by the manufacturer from 100 production tests, were furnished by the Hoskins Manufacturing Co. (the only manufacturer at the time). The tabular values of Roeser *et al.* [5], which covered the range −200 °C to 1371 °C, were corrected in 1951 by Shenker and others at NBS [6] to account for changes in the international temperature scale (from the ITS-27 to the ITS-48) and in the electrical units (from international to absolute). The revised tables were presented in NBS Circular 508 [6] and again, several years later, in NBS Circular 561 [7].

Extensive research on the low-temperature properties of the commonly used thermocouple types was conducted during the 1960s and early 1970s by Sparks, Powell and others of the NBS Cryogenics Division in Boulder. Their research led to the establishment of a type K thermocouple reference function and table covering the range from 7 °C down to −273 °C to satisfy a need for thermocouple reference data in the cryogenic temperature range. Their reference function and table, which were based on the NBS 2-20 temperature scale [8] at temperatures below 20 K and on the IPTS-68 above 20 K, were presented in NBS Monograph 124 [9]. Powell and others [10] at NBS then combined this low-temperature reference function with a high-temperature function that they derived by fitting selected tabular values taken from NBS Circular 561 at temperatures above 0 °C, after correcting the latter values to account for the change in the international temperature scale from the IPTS-48 to the IPTS-68. Their IPTS-68 based reference function and table, which covered the range −270 °C to 1372 °C, were published in 1974 in NBS Monograph 125 [10].

The low-temperature research [9] by members of the NBS Cryogenics Division showed that the type K thermocouple may be used down to liquid helium temperatures (about 4 K) but that its Seebeck coefficient becomes quite small below 20 K. Its Seebeck coefficient at 20 K is only about 4 μV/K, being roughly one-half that of the type E thermocouple which is, for the reasons given in section 5.1, the most suitable of the letter-designated thermocouple types for measurements down to 20 K. Type KP and type KN thermoelements do have a relatively low thermal conductivity and good resistance to corrosion in moist atmospheres at low temperatures. The thermoelectric homogeneity of type KN thermoelements, however, was found [9] to be not quite as good as that of type EN thermoelements.

Type K thermocouples are recommended by the ASTM [11] for use at temperatures within the range −250 °C to 1260 °C in oxidizing or inert atmospheres. Both the KP and the KN thermoelements are subject to deterioration by oxidation when used in air above about 750 °C, but even so, type K thermocouples may be used at temperatures up to about 1350 °C for short periods with only small changes in calibration. When oxidation occurs it normally leads to a gradual increase in the thermoelectric voltage with time. The magnitude of the change in the thermoelectric voltage and the physical life of the thermocouple will depend upon such factors as the temperature, the time at temperature, the diameter of the thermoelements and the conditions of use. The thermoelectric instability of type K thermocouples in air at elevated temperatures has been carefully studied by Dahl [12], by Potts and McElroy [13], by Burley and Ackland [14], by Starr and Wang [15],

and by Wang *et al.* [16] and their work should be consulted for details.

The ASTM Manual [11] indicates that type K thermocouples should not be used at high temperatures in sulfurous, reducing, or alternately oxidizing and reducing atmospheres unless suitably protected with protecting tubes. They also should not be used in vacuum (at high temperatures) for extended times because the chromium in the positive thermoelement, a nickel-chromium alloy, vaporizes out of solution and alters the calibration. In addition, their use in atmospheres that promote "green-rot" corrosion [15] of the positive thermoelement should be avoided. Such corrosion results from the preferential oxidation of chromium in atmospheres with low, but not negligible, oxygen content and can lead to a large decrease in the thermoelectric voltage of the thermocouple with time. The effect is most serious at temperatures between 800 °C and 1050 °C.

Both thermoelements of type K thermocouples are reasonably stable, thermoelectrically, under neutron irradiation since the resulting changes in their chemical compositions due to transmutation are small. The KN thermoelements are somewhat less stable than the KP thermoelements in that they experience a small increase in the iron content accompanied by a slight decrease in the manganese and cobalt contents.

Neither thermoelement of a type K thermocouple is very sensitive to minor changes in composition or impurity level because both are already heavily alloyed. Similarly, they are not extremely sensitive to minor differences in heat treatment (provided that the treatment does not violate any of the restrictions mentioned above). For most general applications, they may be used with the heat treatment routinely given by the wire manufacturer. However, when the highest accuracy is sought, additional preparatory heat treatments may be desirable in order to enhance their performance. Details on this and other phases of the use, limitations and behavior of type K thermocouples are given in articles by Potts and McElroy [13], by Burley [17], by Wang and Starr [18], by Bentley [19], and by Kollie *et al.* [20].

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [21] specifies that the initial calibration tolerances for type K commercial thermocouples be ± 2.2 °C or ± 0.75% (whichever is greater) between 0 °C and 1250 °C, and ± 2.2 °C or ± 2% (whichever is greater) between −200 °C and 0 °C. In the 0 °C to 1250 °C range, type K thermocouples can be supplied to meet special tolerances that are equal to approximately one-half the standard tolerances given above. Type K thermocouple materials are normally supplied to meet the tolerances specified for temperatures above 0 °C. However, the same materials may not satisfy the tolerances specified for the −200 °C to 0 °C range. If materials are required to meet the tolerances below 0 °C, this should be specified when they are purchased

Although initial calibration tolerances for single-leg thermoelements versus platinum are not given in ASTM Standard E230-87, type KP and type KN thermoelements are supplied, by common practice, to a voltage tolerance equivalent to one half the tolerance specified for the type K thermocouple.

The suggested upper temperature limit of 1260 °C given in the ASTM standard [21] for protected type K thermocouples applies to AWG 8 (3.25 mm) wire. It decreases to 1090 °C for AWG 14 (1.63 mm), 980 °C for AWG 20 (0.81 mm), 870 °C for AWG 24 or 28 (0.51 mm or 0.33 mm), and 760 °C for AWG 30 (0.25 mm). These temperature limits apply to thermocouples used in conventional closed-end protecting tubes and they are intended only as a rough guide to the user. They do not apply to thermocouples having compacted mineral oxide insulation.

7.2. Construction of Reference Functions

7.2.1. Type K thermocouples

The reference function for type K thermocouples is based on the functional representations in NBS Monograph 125 [10] and the difference in values of temperature expressed on the IPTS-68 and the ITS-90 [22] as given by

$$\Delta t = t_{90} - t_{68},$$

where t_{90} and t_{68} indicate temperature (°C) on the ITS-90 and the IPTS-68, respectively.

Monograph 125 gives representations of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i + \beta_0 e^{(t_{68}-\beta_2)^2/\beta_1},$$

for the temperature ranges −270 °C to 0 °C and 0 °C to 1372 °C. In terms of t_{90}, these are replaced by two functions of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i + \alpha_0 e^{\alpha_1 (t_{90}-\alpha_2)^2} \quad \text{for } j=1, 2.$$

The coefficients β_0 and α_0 of the above functions are zero in the −270 °C to 0 °C range; hence, both functions reduce to polynomials in that range.

Thermoelectric voltages, Y_t, where

$$Y_t = 0.999990736\ g(t_{90} - \Delta t),$$

are fitted by least-squares to corresponding values of t_{90} to obtain the coefficients, c_i and α_0, of $f_j(t_{90})$ in terms of the ITS-90 and the SI volt [23]. The coefficient, α_1, is not changed in the scale conversion; it is simply the reciprocal of β_1. α_2 is obtained in terms of the ITS-90 by converting β_2 (which is 127 °C in terms of the IPTS-68) by:

$$\alpha_2 = \beta_2 + \Delta t(127).$$

The data for these analyses come from four sources. To generate Y_t values for the range 20 K to 630 °C, Δt values at 10 °C intervals are taken from the table of Preston-Thomas [22]. Between 630 °C and 1064 °C, Δt values are obtained at 10 °C intervals from the fifth degree polynomial in t_{90} given by Guthrie *et al.* [24]. Above 1064 °C, Δt values are generated at 10 °C intervals from the relationship given by Mangum and Furukawa [25], namely,

$$(t_{90} - t_{68})/°C = -0.25[(t_{90}/°C + 273.15)/1337.33]^2.$$

Below 20 K, the function $g(t)$ in Monograph 125 is expressed on the acoustic temperature scale, NBS 2-20 [8]. Given the table of temperature differences between NBS 2-20 and EPT-76 published by the BIPM [26], thermoelectric voltages given by

$$Y_t = 0.999990736\ g(T_{NBS2\text{-}20} - 273.15),$$

and corresponding temperatures, T_{76}, were computed at roughly 1 °C intervals. These in turn are related to temperatures, t_{90}, by the equations [27]:

$$T_{90} - T_{76} = -5.6 \times 10^{-6}(T_{76})^2,$$

where $T_{90}/K = t_{90}/°C + 273.15$.

A single function is not satisfactory to cover the temperature range −270 °C to 1372 °C. As in Monograph 125, the range is broken at 0 °C into two segments, and a separate function is defined for each segment.

The appropriate degree for the polynomial portion of each function is at issue, and the least-squares criteria for testing the appropriateness of a model do not strictly apply because the Δt values, derived by smoothing of experimental data, are not contaminated by random error. The approach used was to choose the lowest degree polynomial for which the largest absolute difference between a fitted value, $f_j(t_{90})$, and a corresponding datum point, Y_t, was not more than 0.08 μV for temperatures below 0 °C and not more than $0.025 f_j(t_{90})$ μV for temperatures above 0 °C (except in the range 600 °C to 660 °C). In the 600 °C to 660 °C temperature range the residuals are greater than $0.025 f_j(t_{90})$ μV because the model chosen to fit the corresponding values of Y_t and t_{90} does not account for the discontinuity at 630.615 °C that is induced by the discontinuity in the first derivative of the Δt values at that temperature [24]. For temperatures in the range −270 °C to 0 °C, a tenth degree polynomial, $f_1(t_{90})$, satisfies the criterion and for the range 0 °C to 1372 °C a function, $f_2(t_{90})$, consisting of a ninth degree polynomial plus an exponential expression is adequate. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 8.3. The reader is cautioned that further rounding or truncation of the coefficients could adversely affect computations which depend on this reference function.

Equality at the break-point (0 °C) was achieved by constraining the functions $f_1(t_{90})$ and $f_2(t_{90})$ to give 0 μV at 0 °C. Also, the function for the range below 0 °C was constrained to have the same first derivative at 0 °C as that of the function for the range above 0 °C. The second derivatives of the functions were not constrained.

The uncertainty in the ITS-90 reference function is given as its bias relative to the IPTS-68 reference function. The uncertainty for each temperature range is estimated by computing the maximum difference between $f_j(t_{90})$ and Y_t over that range. This difference is computed for three subranges of the 0 °C to 1372 °C range. These biases are tabulated below.

Temperature range °C			Bias μV
−270	to	0	0.071
0	to	600	0.939
600	to	660	1.981
660	to	1372	1.258

These biases describe the disagreement between the voltage produced by the new reference function for a particular value of t_{90} and the voltage that would be obtained by substituting $t_{90} - \Delta t$ into the IPTS-68 reference function. They do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function. These latter uncertainties, which are not known, would be needed to make a statement about the absolute uncertainty of voltages or temperatures derived using this reference function.

7.2.2. Positive thermoelement, type KP, versus platinum, Pt-67

The construction of the reference function for the positive thermoelement, type KP, versus Pt-67 parallels the conversion outlined for the total thermocouple, type K. For the positive thermoelement, NBS Monograph 125 gives a polynomial representation of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i(t_{68})^i,$$

to cover the temperature range −270 °C to 0 °C and another polynomial of the same form to cover the range 0 °C to 1372 °C. In terms of t_{90}, these have been replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i \quad for\ j = 1, 2.$$

The criteria in section 7.2.1 for determining the lowest degree polynomials which fit the corresponding values of Y_t and t_{90} result in a thirteenth degree polynomial, $f_1(t_{90})$, for the range −270 °C to 0 °C and a tenth degree polynomial, $f_2(t_{90})$, for the range 0 °C to 1372 °C. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 8.4 to eleven significant digits.

Equality at the break-point (0 °C) was achieved by constraining the polynomials to give 0 μV at 0 °C. Also, the polynomial for the range below 0 °C was constrained to have the same first derivative at 0 °C as that of the polynomial for the range above 0 °C. The second derivatives of the polynomials were not constrained.

The uncertainty in the ITS-90 reference function is given as its bias relative to the IPTS-68 reference function. The maximum absolute difference between $f_j(t_{90})$ and Y_t for each temperature range is computed as in section 7.2.1. This difference is computed for three subranges of the 0 °C to 1372 °C range. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in section 7.2.1, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
−270	to	0	0.040
0	to	600	0.802
600	to	660	1.647
660	to	1372	0.979

7.2.3. Platinum, Pt-67, versus the negative thermoelement, type KN

The construction of the reference function for Pt-67 versus the negative thermoelement, type KN, is based on the reference function for the type K thermocouple and the reference function for its positive thermoelement, type KP. Two functions of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i + \alpha_0 e^{\alpha_1(t_{90}-\alpha_2)^2} \quad for\ j=1, 2,$$

are defined to cover the temperature range −270 °C to 1372 °C. Each function is the algebraic difference of the reference function for the type K thermocouple (see sec. 7.2.1) and the reference function for the type KP thermoelement versus Pt-67 (see sec. 7.2.2) in the appropriate range. This results in a thirteenth degree polynomial, $f_1(t_{90})$, for the range −270 °C to 0 °C and a tenth degree polynomial $f_2(t_{90})$ plus an exponential expression for the range 0 °C to 1372 °C. Coefficients of the functions $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 7.5.

The uncertainty in the ITS-90 reference function is given as its bias relative to the IPTS-68 reference function. The maximum difference between $f_j(t_{90})$ and Y_t for each temperature range is computed as in sections 7.2.1 and 7.2.2. This difference is computed for three subranges of the 0 °C to 1372 °C range. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in sections 7.2.1 and 7.2.2, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
−270	to	0	0.056
0	to	600	0.658
600	to	660	0.334
660	to	1372	0.281

7.3. Reference Function and Table for Type K Thermocouples

The coefficients, α_0, α_1, and c_i, for the ninth degree polynomial plus the exponential expression that give the thermoelectric voltage, E, of type K thermocouples as a function of temperature, t_{90}, in the 0 °C to 1372 °C range are given in table 7.3.1. The reference equation in this range is of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i + \alpha_0 e^{\alpha_1 (t_{90} - 126.9686)^2},$$

where e is the natural logarithm constant, E is in microvolts, and t_{90} is in degrees Celsius (ITS-90). The coefficients for the tenth degree polynomial that gives the thermoelectric voltage in the −270 °C to 0 °C range are given also in table 7.3.1.

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type K thermocouples at selected fixed points are given in table 7.3.2. The reference values for type K thermocouples are given at 1 °C intervals from −270 °C to 1372 °C in table 7.3.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 7.3.1, 7.3.2, and 7.3.3, respectively.

It should be stressed that **type K thermocouple materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type K thermocouples are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 7.3.1. *Type K thermocouples --- coefficients, α_0, α_1 and c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equation below 0 °C is of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$; the equation above 0 °C is of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i + \alpha_0 e^{\alpha_1 (t_{90} - 126.9686)^2}$, where e is the natural logarithm constant, E is in microvolts, and t_{90} is in degrees Celsius.*

Temperature Range	Coefficients
−270 °C to 0 °C	$c_0 = 0.000\ 000\ 000\ 0\ldots$ $c_1 = 3.945\ 012\ 802\ 5 \times 10^{1}$ $c_2 = 2.362\ 237\ 359\ 8 \times 10^{-2}$ $c_3 = -3.285\ 890\ 678\ 4 \times 10^{-4}$ $c_4 = -4.990\ 482\ 877\ 7 \times 10^{-6}$ $c_5 = -6.750\ 905\ 917\ 3 \times 10^{-8}$ $c_6 = -5.741\ 032\ 742\ 8 \times 10^{-10}$ $c_7 = -3.108\ 887\ 289\ 4 \times 10^{-12}$ $c_8 = -1.045\ 160\ 936\ 5 \times 10^{-14}$ $c_9 = -1.988\ 926\ 687\ 8 \times 10^{-17}$ $c_{10} = -1.632\ 269\ 748\ 6 \times 10^{-20}$
0 °C to 1372 °C	$c_0 = -1.760\ 041\ 368\ 6 \times 10^{1}$ $c_1 = 3.892\ 120\ 497\ 5 \times 10^{1}$ $c_2 = 1.855\ 877\ 003\ 2 \times 10^{-2}$ $c_3 = -9.945\ 759\ 287\ 4 \times 10^{-5}$ $c_4 = 3.184\ 094\ 571\ 9 \times 10^{-7}$ $c_5 = -5.607\ 284\ 488\ 9 \times 10^{-10}$ $c_6 = 5.607\ 505\ 905\ 9 \times 10^{-13}$ $c_7 = -3.202\ 072\ 000\ 3 \times 10^{-16}$ $c_8 = 9.715\ 114\ 715\ 2 \times 10^{-20}$ $c_9 = -1.210\ 472\ 127\ 5 \times 10^{-23}$ $\alpha_0 = 1.185\ 976 \times 10^{2}$ $\alpha_1 = -1.183\ 432 \times 10^{-4}$

TABLE 7.3.2. *Thermoelectric values at fixed points for type K thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
e-Hydrogen TP	−259.3467	−6 439.31	2.802	212.26
Neon TP	−248.5939	−6 396.56	5.171	224.63
Oxygen TP	−218.7916	−6 144.53	11.625	202.73
Argon TP	−189.3442	−5 718.49	17.181	176.33
Mercury TP	−38.8344	−1 484.15	36.770	83.11
Ice MP	0.000	0.0	39.450	48.85
Water TP	0.01	0.4	39.451	48.84
Gallium MP	29.7646	1 193.7	40.685	33.80
Indium FP	156.5985	6 403.7	40.158	−16.81
Tin FP	231.928	9 420.5	40.393	17.05
Cadmium FP	321.069	13 084.2	41.664	9.33
Lead FP	327.462	13 350.7	41.722	8.84
Zinc FP	419.527	17 223.1	42.349	5.22
Antimony FP	630.63	26 205.3	42.363	−5.34
Aluminum FP	660.323	27 460.7	42.186	−6.57
Silver FP	961.78	39 778.1	39.378	−10.25
Gold FP	1064.18	43 755.2	38.277	−11.49
Copper FP	1084.62	44 535.1	38.038	−11.92

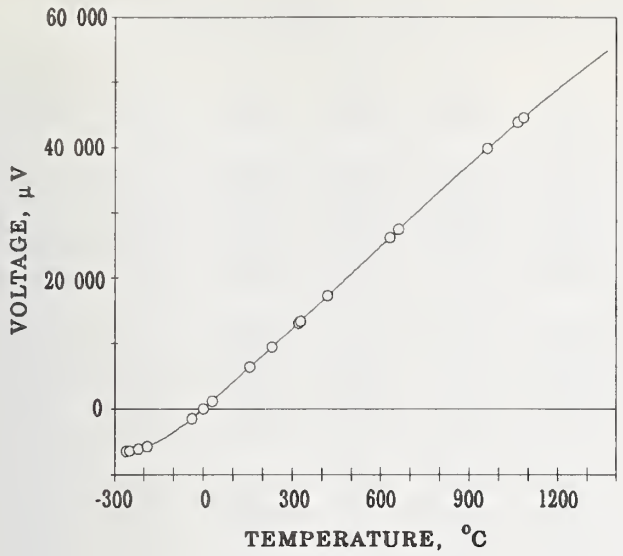

FIGURE 7.3.1. *Thermoelectric voltage for type K thermocouples. The circles indicate values at various thermometric fixed points.*

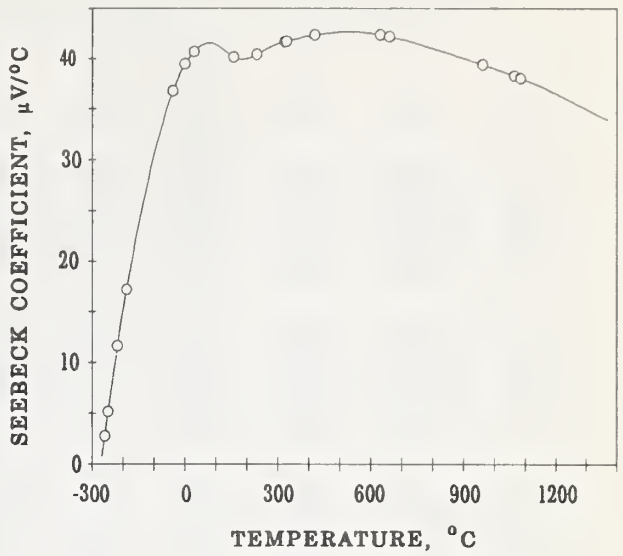

FIGURE 7.3.2. *Seebeck coefficient for type K thermocouples. The circles indicate values at various thermometric fixed points.*

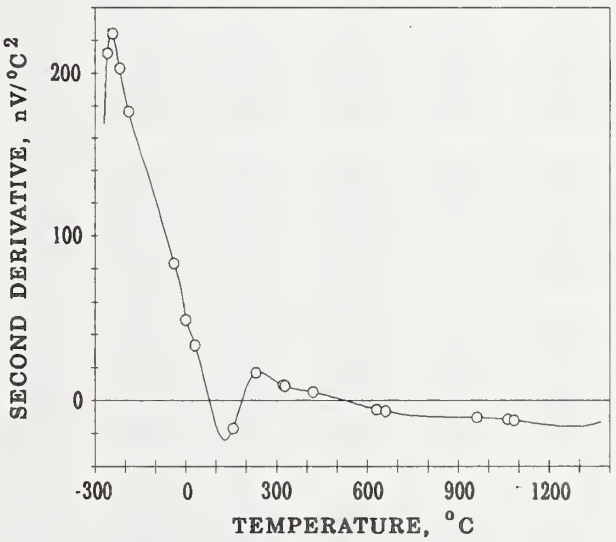

FIGURE 7.3.3. *Second derivative of thermoelectric voltage for type K thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−270	−6 457.74	0.735	168.87	**−230**	−6 261.84	9.286	214.40	**−190**	−5 729.72	17.065	176.81
−269	−6 456.92	0.907	174.85	**−229**	−6 252.44	9.500	213.40	**−189**	−5 712.57	17.242	176.08
−268	−6 455.92	1.084	180.37	**−228**	−6 242.84	9.713	212.39	**−188**	−5 695.24	17.417	175.36
−267	−6 454.75	1.267	185.46	**−227**	−6 233.02	9.925	211.36	**−187**	−5 677.73	17.592	174.66
−266	−6 453.39	1.455	190.13	**−226**	−6 222.99	10.136	210.32	**−186**	−5 660.05	17.767	173.96
−265	−6 451.83	1.648	194.42	**−225**	−6 212.75	10.346	209.28	**−185**	−5 642.20	17.940	173.26
−264	−6 450.09	1.844	198.34	**−224**	−6 202.30	10.554	208.23	**−184**	−5 624.17	18.113	172.58
−263	−6 448.15	2.044	201.90	**−223**	−6 191.64	10.762	207.17	**−183**	−5 605.97	18.285	171.91
−262	−6 446.00	2.248	205.14	**−222**	−6 180.77	10.969	206.11	**−182**	−5 587.60	18.457	171.24
−261	−6 443.65	2.454	208.07	**−221**	−6 169.70	11.174	205.06	**−181**	−5 569.06	18.628	170.58
−260	−6 441.09	2.664	210.70	**−220**	−6 158.42	11.379	204.00	**−180**	−5 550.35	18.798	169.92
−259	−6 438.32	2.876	213.05	**−219**	−6 146.94	11.582	202.95	**−179**	−5 531.46	18.968	169.28
−258	−6 435.34	3.090	215.14	**−218**	−6 135.26	11.785	201.90	**−178**	−5 512.41	19.137	168.64
−257	−6 432.14	3.306	216.99	**−217**	−6 123.37	11.986	200.86	**−177**	−5 493.19	19.305	168.00
−256	−6 428.73	3.524	218.60	**−216**	−6 111.29	12.187	199.82	**−176**	−5 473.80	19.473	167.37
−255	−6 425.09	3.743	220.00	**−215**	−6 099.00	12.386	198.79	**−175**	−5 454.25	19.640	166.75
−254	−6 421.24	3.964	221.19	**−214**	−6 086.52	12.584	197.77	**−174**	−5 434.52	19.806	166.13
−253	−6 417.17	4.185	222.19	**−213**	−6 073.83	12.781	196.76	**−173**	−5 414.63	19.972	165.51
−252	−6 412.87	4.408	223.01	**−212**	−6 060.95	12.978	195.76	**−172**	−5 394.58	20.137	164.90
−251	−6 408.35	4.631	223.67	**−211**	−6 047.88	13.173	194.77	**−171**	−5 374.36	20.302	164.29
−250	−6 403.61	4.855	224.17	**−210**	−6 034.61	13.367	193.79	**−170**	−5 353.98	20.466	163.69
−249	−6 398.64	5.080	224.52	**−209**	−6 021.14	13.561	192.83	**−169**	−5 333.43	20.629	163.09
−248	−6 393.45	5.304	224.74	**−208**	−6 007.49	13.753	191.87	**−168**	−5 312.72	20.792	162.49
−247	−6 388.03	5.529	224.83	**−207**	−5 993.64	13.944	190.93	**−167**	−5 291.84	20.954	161.90
−246	−6 382.39	5.754	224.81	**−206**	−5 979.60	14.135	190.00	**−166**	−5 270.81	21.116	161.31
−245	−6 376.52	5.979	224.68	**−205**	−5 965.37	14.324	189.08	**−165**	−5 249.61	21.277	160.72
−244	−6 370.43	6.203	224.45	**−204**	−5 950.95	14.513	188.18	**−164**	−5 228.26	21.437	160.13
−243	−6 364.12	6.427	224.12	**−203**	−5 936.34	14.701	187.29	**−163**	−5 206.74	21.597	159.55
−242	−6 357.58	6.651	223.72	**−202**	−5 921.55	14.887	186.41	**−162**	−5 185.06	21.756	158.97
−241	−6 350.81	6.875	223.23	**−201**	−5 906.57	15.073	185.54	**−161**	−5 163.23	21.915	158.39
−240	−6 343.83	7.098	222.67	**−200**	−5 891.40	15.259	184.69	**−160**	−5 141.23	22.073	157.81
−239	−6 336.62	7.320	222.05	**−199**	−5 876.05	15.443	183.85	**−159**	−5 119.08	22.231	157.23
−238	−6 329.19	7.542	221.37	**−198**	−5 860.52	15.626	183.02	**−158**	−5 096.77	22.388	156.65
−237	−6 321.54	7.763	220.63	**−197**	−5 844.80	15.809	182.20	**−157**	−5 074.31	22.544	156.07
−236	−6 313.66	7.983	219.85	**−196**	−5 828.90	15.991	181.40	**−156**	−5 051.68	22.700	155.50
−235	−6 305.57	8.203	219.03	**−195**	−5 812.82	16.172	180.61	**−155**	−5 028.91	22.855	154.92
−234	−6 297.26	8.421	218.16	**−194**	−5 796.56	16.352	179.82	**−154**	−5 005.97	23.009	154.35
−233	−6 288.73	8.639	217.26	**−193**	−5 780.12	16.531	179.06	**−153**	−4 982.89	23.164	153.77
−232	−6 279.98	8.856	216.33	**−192**	−5 763.50	16.710	178.30	**−152**	−4 959.65	23.317	153.20
−231	−6 271.02	9.072	215.38	**−191**	−5 746.70	16.888	177.55	**−151**	−4 936.25	23.470	152.63
−230	−6 261.84	9.286	214.40	**−190**	−5 729.72	17.065	176.81	**−150**	−4 912.71	23.622	152.05

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−4 912.71	23.622	152.05	−100	−3 553.63	30.494	122.37	−50	−1 889.38	35.804	89.96
−149	−4 889.01	23.774	151.48	−99	−3 523.08	30.616	121.74	−49	−1 853.53	35.894	89.33
−148	−4 865.16	23.925	150.91	−98	−3 492.40	30.737	121.11	−48	−1 817.60	35.983	88.70
−147	−4 841.16	24.076	150.33	−97	−3 461.60	30.858	120.48	−47	−1 781.57	36.071	88.08
−146	−4 817.01	24.226	149.76	−96	−3 430.68	30.978	119.85	−46	−1 745.45	36.159	87.47
−145	−4 792.71	24.375	149.18	−95	−3 399.65	31.098	119.22	−45	−1 709.25	36.246	86.85
−144	−4 768.26	24.524	148.61	−94	−3 368.49	31.217	118.58	−44	−1 672.96	36.333	86.24
−143	−4 743.66	24.673	148.03	−93	−3 337.21	31.335	117.95	−43	−1 636.59	36.419	85.63
−142	−4 718.91	24.820	147.45	−92	−3 305.82	31.453	117.31	−42	−1 600.12	36.504	85.02
−141	−4 694.02	24.968	146.88	−91	−3 274.31	31.570	116.67	−41	−1 563.58	36.589	84.41
−140	−4 668.98	25.114	146.30	−90	−3 242.68	31.686	116.03	−40	−1 526.95	36.673	83.81
−139	−4 643.79	25.260	145.72	−89	−3 210.94	31.802	115.38	−39	−1 490.23	36.756	83.21
−138	−4 618.46	25.406	145.14	−88	−3 179.08	31.917	114.74	−38	−1 453.44	36.839	82.60
−137	−4 592.98	25.550	144.56	−87	−3 147.10	32.031	114.09	−37	−1 416.56	36.921	82.00
−136	−4 567.36	25.695	143.98	−86	−3 115.01	32.145	113.45	−36	−1 379.59	37.003	81.40
−135	−4 541.59	25.838	143.40	−85	−3 082.81	32.258	112.80	−35	−1 342.55	37.084	80.80
−134	−4 515.68	25.981	142.82	−84	−3 050.50	32.371	112.15	−34	−1 305.42	37.165	80.20
−133	−4 489.63	26.124	142.24	−83	−3 018.07	32.482	111.49	−33	−1 268.22	37.245	79.60
−132	−4 463.43	26.266	141.66	−82	−2 985.53	32.593	110.84	−32	−1 230.94	37.324	78.99
−131	−4 437.10	26.407	141.07	−81	−2 952.89	32.704	110.19	−31	−1 193.57	37.403	78.39
−130	−4 410.62	26.548	140.49	−80	−2 920.13	32.814	109.53	−30	−1 156.13	37.481	77.77
−129	−4 384.00	26.688	139.90	−79	−2 887.26	32.923	108.88	−29	−1 118.61	37.558	77.16
−128	−4 357.24	26.828	139.31	−78	−2 854.28	33.032	108.22	−28	−1 081.01	37.635	76.53
−127	−4 330.34	26.967	138.72	−77	−2 821.19	33.140	107.56	−27	−1 043.34	37.711	75.90
−126	−4 303.31	27.105	138.13	−76	−2 788.00	33.247	106.90	−26	−1 005.59	37.787	75.26
−125	−4 276.13	27.243	137.54	−75	−2 754.70	33.353	106.24	−25	−967.77	37.862	74.61
−124	−4 248.82	27.380	136.95	−74	−2 721.30	33.459	105.58	−24	−929.87	37.936	73.95
−123	−4 221.37	27.517	136.36	−73	−2 687.78	33.564	104.92	−23	−891.90	38.010	73.28
−122	−4 193.79	27.653	135.76	−72	−2 654.17	33.669	104.26	−22	−853.85	38.083	72.59
−121	−4 166.07	27.789	135.17	−71	−2 620.45	33.773	103.60	−21	−815.73	38.155	71.88
−120	−4 138.21	27.923	134.57	−70	−2 586.62	33.876	102.94	−20	−777.54	38.226	71.15
−119	−4 110.22	28.058	133.98	−69	−2 552.69	33.979	102.28	−19	−739.28	38.297	70.40
−118	−4 082.10	28.191	133.38	−68	−2 518.66	34.081	101.62	−18	−700.95	38.367	69.62
−117	−4 053.84	28.325	132.78	−67	−2 484.53	34.182	100.96	−17	−662.54	38.436	68.82
−116	−4 025.45	28.457	132.18	−66	−2 450.30	34.283	100.30	−16	−624.07	38.505	67.99
−115	−3 996.92	28.589	131.57	−65	−2 415.97	34.383	99.64	−15	−585.54	38.572	67.12
−114	−3 968.27	28.720	130.97	−64	−2 381.53	34.482	98.98	−14	−546.93	38.639	66.22
−113	−3 939.48	28.851	130.37	−63	−2 347.00	34.581	98.33	−13	−508.26	38.705	65.27
−112	−3 910.57	28.981	129.76	−62	−2 312.37	34.679	97.67	−12	−469.52	38.770	64.29
−111	−3 881.52	29.110	129.15	−61	−2 277.65	34.776	97.02	−11	−430.72	38.833	63.25
−110	−3 852.35	29.239	128.54	−60	−2 242.82	34.873	96.36	−10	−391.85	38.896	62.16
−109	−3 823.04	29.367	127.93	−59	−2 207.90	34.969	95.71	−9	−352.93	38.958	61.02
−108	−3 793.61	29.495	127.32	−58	−2 172.88	35.064	95.06	−8	−313.94	39.018	59.81
−107	−3 764.05	29.622	126.71	−57	−2 137.77	35.159	94.42	−7	−274.89	39.077	58.53
−106	−3 734.37	29.748	126.09	−56	−2 102.57	35.253	93.77	−6	−235.79	39.135	57.19
−105	−3 704.56	29.874	125.47	−55	−2 067.27	35.346	93.13	−5	−196.62	39.192	55.76
−104	−3 674.62	29.999	124.86	−54	−2 031.87	35.439	92.49	−4	−157.40	39.247	54.25
−103	−3 644.56	30.124	124.24	−53	−1 996.39	35.531	91.85	−3	−118.13	39.300	52.66
−102	−3 614.37	30.248	123.61	−52	−1 960.81	35.623	91.22	−2	−78.80	39.352	50.96
−101	−3 584.06	30.371	122.99	−51	−1 925.14	35.714	90.59	−1	−39.43	39.402	49.16
−100	−3 553.63	30.494	122.37	−50	−1 889.38	35.804	89.96	0	0.00	39.450	47.24

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	39.450	48.85	50	2 023.1	41.246	21.13	100	4 096.2	41.369	−15.33
1	39.5	39.499	48.35	51	2 064.3	41.266	20.43	101	4 137.6	41.353	−15.90
2	79.0	39.547	47.86	52	2 105.6	41.286	19.73	102	4 178.9	41.337	−16.45
3	118.6	39.594	47.37	53	2 146.9	41.306	19.01	103	4 220.3	41.320	−16.98
4	158.2	39.642	46.88	54	2 188.2	41.324	18.30	104	4 261.6	41.303	−17.50
5	197.9	39.688	46.40	55	2 229.6	41.342	17.57	105	4 302.9	41.285	−18.00
6	237.6	39.734	45.91	56	2 270.9	41.360	16.84	106	4 344.1	41.267	−18.49
7	277.3	39.780	45.42	57	2 312.3	41.376	16.11	107	4 385.4	41.248	−18.95
8	317.1	39.825	44.94	58	2 353.7	41.392	15.37	108	4 426.6	41.229	−19.40
9	357.0	39.870	44.45	59	2 395.1	41.407	14.62	109	4 467.9	41.209	−19.83
10	396.9	39.914	43.97	60	2 436.5	41.421	13.87	110	4 509.1	41.189	−20.24
11	436.8	39.958	43.48	61	2 477.9	41.435	13.11	111	4 550.2	41.169	−20.64
12	476.8	40.001	42.99	62	2 519.3	41.447	12.35	112	4 591.4	41.148	−21.01
13	516.8	40.044	42.50	63	2 560.8	41.459	11.59	113	4 632.5	41.127	−21.36
14	556.9	40.086	42.01	64	2 602.3	41.470	10.82	114	4 673.7	41.105	−21.70
15	597.0	40.128	41.51	65	2 643.7	41.481	10.05	115	4 714.7	41.083	−22.01
16	637.1	40.169	41.02	66	2 685.2	41.491	9.28	116	4 755.8	41.061	−22.30
17	677.3	40.210	40.52	67	2 726.7	41.499	8.51	117	4 796.9	41.039	−22.58
18	717.5	40.250	40.02	68	2 768.2	41.508	7.73	118	4 837.9	41.016	−22.83
19	757.8	40.290	39.51	69	2 809.7	41.515	6.95	119	4 878.9	40.993	−23.06
20	798.1	40.329	39.00	70	2 851.2	41.521	6.17	120	4 919.9	40.970	−23.27
21	838.5	40.368	38.49	71	2 892.8	41.527	5.39	121	4 960.8	40.947	−23.46
22	878.9	40.406	37.98	72	2 934.3	41.532	4.61	122	5 001.8	40.923	−23.62
23	919.3	40.444	37.45	73	2 975.8	41.536	3.83	123	5 042.7	40.899	−23.77
24	959.7	40.481	36.93	74	3 017.4	41.540	3.05	124	5 083.6	40.876	−23.89
25	1 000.2	40.518	36.40	75	3 058.9	41.543	2.27	125	5 124.4	40.852	−23.99
26	1 040.8	40.554	35.86	76	3 100.5	41.544	1.49	126	5 165.3	40.828	−24.07
27	1 081.3	40.589	35.32	77	3 142.0	41.546	0.71	127	5 206.1	40.804	−24.13
28	1 122.0	40.625	34.78	78	3 183.6	41.546	−0.06	128	5 246.9	40.779	−24.17
29	1 162.6	40.659	34.23	79	3 225.1	41.545	−0.83	129	5 287.7	40.755	−24.18
30	1 203.3	40.693	33.67	80	3 266.6	41.544	−1.60	130	5 328.4	40.731	−24.17
31	1 244.0	40.726	33.11	81	3 308.2	41.542	−2.36	131	5 369.1	40.707	−24.14
32	1 284.7	40.759	32.54	82	3 349.7	41.540	−3.12	132	5 409.8	40.683	−24.09
33	1 325.5	40.791	31.96	83	3 391.3	41.536	−3.87	133	5 450.5	40.659	−24.02
34	1 366.3	40.823	31.38	84	3 432.8	41.532	−4.61	134	5 491.1	40.635	−23.93
35	1 407.1	40.854	30.79	85	3 474.3	41.527	−5.35	135	5 531.7	40.611	−23.81
36	1 448.0	40.885	30.20	86	3 515.9	41.521	−6.09	136	5 572.3	40.587	−23.68
37	1 488.9	40.915	29.60	87	3 557.4	41.515	−6.81	137	5 612.9	40.563	−23.52
38	1 529.8	40.944	28.99	88	3 598.9	41.507	−7.53	138	5 653.5	40.540	−23.35
39	1 570.8	40.973	28.37	89	3 640.4	41.500	−8.24	139	5 694.0	40.517	−23.15
40	1 611.8	41.001	27.75	90	3 681.9	41.491	−8.94	140	5 734.5	40.494	−22.94
41	1 652.8	41.028	27.12	91	3 723.4	41.482	−9.63	141	5 775.0	40.471	−22.70
42	1 693.8	41.055	26.48	92	3 764.8	41.472	−10.31	142	5 815.4	40.448	−22.45
43	1 734.9	41.081	25.84	93	3 806.3	41.461	−10.98	143	5 855.9	40.426	−22.17
44	1 776.0	41.107	25.19	94	3 847.8	41.450	−11.64	144	5 896.3	40.404	−21.88
45	1 817.1	41.131	24.53	95	3 889.2	41.438	−12.29	145	5 936.7	40.382	−21.57
46	1 858.3	41.156	23.86	96	3 930.6	41.425	−12.93	146	5 977.1	40.361	−21.25
47	1 899.4	41.179	23.19	97	3 972.1	41.412	−13.55	147	6 017.4	40.340	−20.90
48	1 940.6	41.202	22.51	98	4 013.5	41.398	−14.16	148	6 057.7	40.319	−20.54
49	1 981.8	41.224	21.82	99	4 054.9	41.384	−14.75	149	6 098.1	40.299	−20.16
50	2 023.1	41.246	21.13	100	4 096.2	41.369	−15.33	150	6 138.3	40.279	−19.77

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	6 138.3	40.279	−19.77	**200**	8 138.5	39.965	7.76	**250**	10 153.4	40.710	17.45
151	6 178.6	40.259	−19.36	**201**	8 178.4	39.973	8.23	**251**	10 194.1	40.727	17.40
152	6 218.9	40.240	−18.94	**202**	8 218.4	39.982	8.69	**252**	10 234.8	40.744	17.34
153	6 259.1	40.221	−18.50	**203**	8 258.4	39.991	9.13	**253**	10 275.6	40.762	17.28
154	6 299.3	40.203	−18.05	**204**	8 298.4	40.000	9.57	**254**	10 316.3	40.779	17.21
155	6 339.5	40.185	−17.58	**205**	8 338.4	40.010	10.00	**255**	10 357.1	40.796	17.13
156	6 379.7	40.168	−17.10	**206**	8 378.4	40.020	10.42	**256**	10 397.9	40.813	17.05
157	6 419.8	40.151	−16.61	**207**	8 418.4	40.031	10.82	**257**	10 438.8	40.830	16.96
158	6 460.0	40.135	−16.11	**208**	8 458.5	40.042	11.21	**258**	10 479.6	40.847	16.87
159	6 500.1	40.119	−15.60	**209**	8 498.5	40.053	11.59	**259**	10 520.5	40.864	16.78
160	6 540.2	40.103	−15.08	**210**	8 538.6	40.065	11.96	**260**	10 561.3	40.881	16.68
161	6 580.3	40.089	−14.54	**211**	8 578.7	40.077	12.32	**261**	10 602.2	40.897	16.58
162	6 620.4	40.074	−14.00	**212**	8 618.7	40.090	12.67	**262**	10 643.1	40.914	16.47
163	6 660.5	40.061	−13.45	**213**	8 658.8	40.102	13.00	**263**	10 684.0	40.930	16.36
164	6 700.5	40.047	−12.89	**214**	8 698.9	40.116	13.32	**264**	10 725.0	40.946	16.25
165	6 740.6	40.035	−12.32	**215**	8 739.1	40.129	13.63	**265**	10 765.9	40.963	16.13
166	6 780.6	40.023	−11.75	**216**	8 779.2	40.143	13.93	**266**	10 806.9	40.979	16.01
167	6 820.6	40.011	−11.17	**217**	8 819.4	40.157	14.21	**267**	10 847.9	40.995	15.89
168	6 860.6	40.000	−10.58	**218**	8 859.5	40.171	14.48	**268**	10 888.9	41.011	15.76
169	6 900.6	39.990	−9.99	**219**	8 899.7	40.186	14.74	**269**	10 929.9	41.026	15.63
170	6 940.6	39.980	−9.40	**220**	8 939.9	40.201	14.99	**270**	10 970.9	41.042	15.51
171	6 980.6	39.971	−8.80	**221**	8 980.1	40.216	15.23	**271**	11 012.0	41.057	15.37
172	7 020.5	39.963	−8.20	**222**	9 020.3	40.231	15.45	**272**	11 053.1	41.073	15.24
173	7 060.5	39.955	−7.59	**223**	9 060.6	40.247	15.67	**273**	11 094.1	41.088	15.11
174	7 100.4	39.948	−6.99	**224**	9 100.8	40.263	15.87	**274**	11 135.2	41.103	14.97
175	7 140.4	39.941	−6.38	**225**	9 141.1	40.278	16.06	**275**	11 176.3	41.118	14.84
176	7 180.3	39.935	−5.77	**226**	9 181.4	40.295	16.23	**276**	11 217.5	41.132	14.70
177	7 220.3	39.929	−5.16	**227**	9 221.7	40.311	16.40	**277**	11 258.6	41.147	14.56
178	7 260.2	39.925	−4.55	**228**	9 262.0	40.327	16.55	**278**	11 299.8	41.162	14.42
179	7 300.1	39.920	−3.94	**229**	9 302.3	40.344	16.70	**279**	11 340.9	41.176	14.28
180	7 340.0	39.917	−3.33	**230**	9 342.7	40.361	16.83	**280**	11 382.1	41.190	14.14
181	7 379.9	39.914	−2.73	**231**	9 383.1	40.378	16.95	**281**	11 423.3	41.204	14.00
182	7 419.9	39.911	−2.13	**232**	9 423.4	40.395	17.06	**282**	11 464.5	41.218	13.87
183	7 459.8	39.909	−1.53	**233**	9 463.8	40.412	17.16	**283**	11 505.8	41.232	13.73
184	7 499.7	39.908	−0.93	**234**	9 504.3	40.429	17.25	**284**	11 547.0	41.246	13.59
185	7 539.6	39.908	−0.34	**235**	9 544.7	40.446	17.33	**285**	11 588.2	41.259	13.45
186	7 579.5	39.908	0.25	**236**	9 585.2	40.464	17.40	**286**	11 629.5	41.272	13.31
187	7 619.4	39.908	0.83	**237**	9 625.6	40.481	17.46	**287**	11 670.8	41.286	13.17
188	7 659.3	39.909	1.41	**238**	9 666.1	40.499	17.51	**288**	11 712.1	41.299	13.04
189	7 699.2	39.911	1.98	**239**	9 706.6	40.516	17.55	**289**	11 753.4	41.312	12.90
190	7 739.1	39.913	2.55	**240**	9 747.2	40.534	17.58	**290**	11 794.7	41.325	12.76
191	7 779.0	39.916	3.10	**241**	9 787.7	40.551	17.61	**291**	11 836.0	41.337	12.63
192	7 819.0	39.919	3.65	**242**	9 828.3	40.569	17.62	**292**	11 877.4	41.350	12.50
193	7 858.9	39.923	4.20	**243**	9 868.8	40.587	17.63	**293**	11 918.7	41.362	12.37
194	7 898.8	39.928	4.73	**244**	9 909.4	40.604	17.62	**294**	11 960.1	41.375	12.24
195	7 938.7	39.933	5.26	**245**	9 950.0	40.622	17.61	**295**	12 001.5	41.387	12.11
196	7 978.7	39.938	5.78	**246**	9 990.7	40.639	17.60	**296**	12 042.9	41.399	11.98
197	8 018.6	39.944	6.29	**247**	10 031.3	40.657	17.57	**297**	12 084.3	41.411	11.85
198	8 058.6	39.951	6.79	**248**	10 072.0	40.675	17.54	**298**	12 125.7	41.423	11.73
199	8 098.5	39.958	7.28	**249**	10 112.7	40.692	17.50	**299**	12 167.1	41.434	11.60
200	8 138.5	39.965	7.76	**250**	10 153.4	40.710	17.45	**300**	12 208.6	41.446	11.48

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	12 208.6	41.446	11.48	**350**	14 293.1	41.906	7.58	**400**	16 397.1	42.241	5.90
301	12 250.0	41.457	11.36	**351**	14 335.1	41.913	7.54	**401**	16 439.4	42.246	5.87
302	12 291.5	41.468	11.24	**352**	14 377.0	41.921	7.50	**402**	16 481.6	42.252	5.83
303	12 333.0	41.480	11.13	**353**	14 418.9	41.928	7.46	**403**	16 523.9	42.258	5.80
304	12 374.4	41.491	11.01	**354**	14 460.8	41.935	7.41	**404**	16 566.2	42.264	5.77
305	12 415.9	41.502	10.90	**355**	14 502.8	41.943	7.37	**405**	16 608.4	42.270	5.73
306	12 457.4	41.512	10.79	**356**	14 544.7	41.950	7.34	**406**	16 650.7	42.275	5.70
307	12 499.0	41.523	10.68	**357**	14 586.7	41.958	7.30	**407**	16 693.0	42.281	5.67
308	12 540.5	41.534	10.57	**358**	14 628.6	41.965	7.26	**408**	16 735.3	42.287	5.63
309	12 582.0	41.544	10.46	**359**	14 670.6	41.972	7.22	**409**	16 777.5	42.292	5.60
310	12 623.6	41.555	10.36	**360**	14 712.6	41.979	7.19	**410**	16 819.8	42.298	5.56
311	12 665.1	41.565	10.26	**361**	14 754.6	41.986	7.15	**411**	16 862.1	42.303	5.53
312	12 706.7	41.575	10.16	**362**	14 796.5	41.994	7.11	**412**	16 904.4	42.309	5.49
313	12 748.3	41.585	10.06	**363**	14 838.5	42.001	7.08	**413**	16 946.8	42.314	5.46
314	12 789.9	41.595	9.96	**364**	14 880.6	42.008	7.04	**414**	16 989.1	42.320	5.42
315	12 831.5	41.605	9.87	**365**	14 922.6	42.015	7.01	**415**	17 031.4	42.325	5.39
316	12 873.1	41.615	9.78	**366**	14 964.6	42.022	6.98	**416**	17 073.7	42.331	5.35
317	12 914.7	41.625	9.68	**367**	15 006.6	42.029	6.94	**417**	17 116.1	42.336	5.32
318	12 956.3	41.635	9.60	**368**	15 048.6	42.036	6.91	**418**	17 158.4	42.341	5.28
319	12 998.0	41.644	9.51	**369**	15 090.7	42.043	6.88	**419**	17 200.7	42.347	5.24
320	13 039.6	41.654	9.42	**370**	15 132.7	42.049	6.84	**420**	17 243.1	42.352	5.21
321	13 081.3	41.663	9.34	**371**	15 174.8	42.056	6.81	**421**	17 285.4	42.357	5.17
322	13 123.0	41.672	9.26	**372**	15 216.8	42.063	6.78	**422**	17 327.8	42.362	5.13
323	13 164.6	41.681	9.18	**373**	15 258.9	42.070	6.75	**423**	17 370.2	42.367	5.09
324	13 206.3	41.691	9.10	**374**	15 301.0	42.077	6.71	**424**	17 412.5	42.372	5.06
325	13 248.0	41.700	9.02	**375**	15 343.1	42.083	6.68	**425**	17 454.9	42.377	5.02
326	13 289.7	41.709	8.95	**376**	15 385.1	42.090	6.65	**426**	17 497.3	42.382	4.98
327	13 331.4	41.718	8.88	**377**	15 427.2	42.097	6.62	**427**	17 539.7	42.387	4.94
328	13 373.1	41.726	8.80	**378**	15 469.3	42.103	6.59	**428**	17 582.1	42.392	4.90
329	13 414.9	41.735	8.73	**379**	15 511.4	42.110	6.56	**429**	17 624.5	42.397	4.86
330	13 456.6	41.744	8.67	**380**	15 553.6	42.116	6.53	**430**	17 666.9	42.402	4.82
331	13 498.4	41.752	8.60	**381**	15 595.7	42.123	6.50	**431**	17 709.3	42.407	4.78
332	13 540.1	41.761	8.53	**382**	15 637.8	42.129	6.47	**432**	17 751.7	42.411	4.74
333	13 581.9	41.770	8.47	**383**	15 679.9	42.136	6.43	**433**	17 794.1	42.416	4.70
334	13 623.7	41.778	8.41	**384**	15 722.1	42.142	6.40	**434**	17 836.5	42.421	4.66
335	13 665.4	41.786	8.35	**385**	15 764.2	42.148	6.37	**435**	17 878.9	42.426	4.62
336	13 707.2	41.795	8.29	**386**	15 806.4	42.155	6.34	**436**	17 921.4	42.430	4.58
337	13 749.0	41.803	8.23	**387**	15 848.5	42.161	6.31	**437**	17 963.8	42.435	4.54
338	13 790.8	41.811	8.17	**388**	15 890.7	42.167	6.28	**438**	18 006.2	42.439	4.49
339	13 832.7	41.819	8.12	**389**	15 932.9	42.174	6.25	**439**	18 048.7	42.444	4.45
340	13 874.5	41.827	8.06	**390**	15 975.0	42.180	6.22	**440**	18 091.1	42.448	4.41
341	13 916.3	41.835	8.01	**391**	16 017.2	42.186	6.19	**441**	18 133.6	42.452	4.37
342	13 958.2	41.843	7.96	**392**	16 059.4	42.192	6.15	**442**	18 176.0	42.457	4.33
343	14 000.0	41.851	7.91	**393**	16 101.6	42.198	6.12	**443**	18 218.5	42.461	4.28
344	14 041.9	41.859	7.86	**394**	16 143.8	42.205	6.09	**444**	18 260.9	42.465	4.24
345	14 083.7	41.867	7.81	**395**	16 186.0	42.211	6.06	**445**	18 303.4	42.470	4.20
346	14 125.6	41.875	7.76	**396**	16 228.2	42.217	6.03	**446**	18 345.9	42.474	4.15
347	14 167.5	41.883	7.72	**397**	16 270.4	42.223	6.00	**447**	18 388.4	42.478	4.11
348	14 209.4	41.890	7.67	**398**	16 312.7	42.229	5.96	**448**	18 430.8	42.482	4.06
349	14 251.2	41.898	7.63	**399**	16 354.9	42.235	5.93	**449**	18 473.3	42.486	4.02
350	14 293.1	41.906	7.58	**400**	16 397.1	42.241	5.90	**450**	18 515.8	42.490	3.97

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	18 515.8	42.490	3.97	500	20 644.3	42.628	1.49	550	22 776.4	42.635	−1.25
451	18 558.3	42.494	3.93	501	20 686.9	42.630	1.43	551	22 819.1	42.633	−1.30
452	18 600.8	42.498	3.88	502	20 729.5	42.631	1.38	552	22 861.7	42.632	−1.36
453	18 643.3	42.502	3.84	503	20 772.2	42.633	1.33	553	22 904.3	42.631	−1.41
454	18 685.8	42.506	3.79	504	20 814.8	42.634	1.27	554	22 947.0	42.629	−1.47
455	18 728.3	42.509	3.75	505	20 857.4	42.635	1.22	555	22 989.6	42.628	−1.52
456	18 770.8	42.513	3.70	506	20 900.1	42.636	1.16	556	23 032.2	42.626	−1.58
457	18 813.3	42.517	3.65	507	20 942.7	42.637	1.11	557	23 074.8	42.624	−1.63
458	18 855.9	42.520	3.61	508	20 985.4	42.638	1.06	558	23 117.5	42.623	−1.69
459	18 898.4	42.524	3.56	509	21 028.0	42.640	1.00	559	23 160.1	42.621	−1.74
460	18 940.9	42.527	3.51	510	21 070.6	42.641	0.95	560	23 202.7	42.619	−1.80
461	18 983.4	42.531	3.47	511	21 113.3	42.641	0.89	561	23 245.3	42.617	−1.85
462	19 026.0	42.534	3.42	512	21 155.9	42.642	0.84	562	23 287.9	42.616	−1.90
463	19 068.5	42.538	3.37	513	21 198.6	42.643	0.78	563	23 330.6	42.614	−1.96
464	19 111.0	42.541	3.32	514	21 241.2	42.644	0.73	564	23 373.2	42.612	−2.01
465	19 153.6	42.544	3.28	515	21 283.8	42.645	0.67	565	23 415.8	42.610	−2.07
466	19 196.1	42.548	3.23	516	21 326.5	42.645	0.62	566	23 458.4	42.608	−2.12
467	19 238.7	42.551	3.18	517	21 369.1	42.646	0.57	567	23 501.0	42.605	−2.17
468	19 281.2	42.554	3.13	518	21 411.8	42.646	0.51	568	23 543.6	42.603	−2.23
469	19 323.8	42.557	3.08	519	21 454.4	42.647	0.46	569	23 586.2	42.601	−2.28
470	19 366.3	42.560	3.03	520	21 497.1	42.647	0.40	570	23 628.8	42.599	−2.33
471	19 408.9	42.563	2.98	521	21 539.7	42.648	0.35	571	23 671.4	42.596	−2.39
472	19 451.5	42.566	2.93	522	21 582.4	42.648	0.29	572	23 714.0	42.594	−2.44
473	19 494.0	42.569	2.88	523	21 625.0	42.648	0.24	573	23 756.6	42.591	−2.49
474	19 536.6	42.572	2.83	524	21 667.7	42.648	0.18	574	23 799.2	42.589	−2.55
475	19 579.2	42.575	2.78	525	21 710.3	42.649	0.13	575	23 841.8	42.586	−2.60
476	19 621.8	42.578	2.73	526	21 753.0	42.649	0.07	576	23 884.3	42.584	−2.65
477	19 664.3	42.580	2.68	527	21 795.6	42.649	0.02	577	23 926.9	42.581	−2.71
478	19 706.9	42.583	2.63	528	21 838.3	42.649	−0.04	578	23 969.5	42.578	−2.76
479	19 749.5	42.586	2.58	529	21 880.9	42.649	−0.09	579	24 012.1	42.575	−2.81
480	19 792.1	42.588	2.53	530	21 923.6	42.649	−0.15	580	24 054.7	42.573	−2.86
481	19 834.7	42.591	2.48	531	21 966.2	42.648	−0.20	581	24 097.2	42.570	−2.92
482	19 877.3	42.593	2.43	532	22 008.9	42.648	−0.26	582	24 139.8	42.567	−2.97
483	19 919.9	42.595	2.38	533	22 051.5	42.648	−0.31	583	24 182.4	42.564	−3.02
484	19 962.5	42.598	2.33	534	22 094.2	42.647	−0.37	584	24 224.9	42.561	−3.07
485	20 005.1	42.600	2.27	535	22 136.8	42.647	−0.42	585	24 267.5	42.558	−3.12
486	20 047.7	42.602	2.22	536	22 179.4	42.647	−0.48	586	24 310.0	42.554	−3.18
487	20 090.3	42.605	2.17	537	22 222.1	42.646	−0.53	587	24 352.6	42.551	−3.23
488	20 132.9	42.607	2.12	538	22 264.7	42.646	−0.59	588	24 395.1	42.548	−3.28
489	20 175.5	42.609	2.07	539	22 307.4	42.645	−0.65	589	24 437.7	42.545	−3.33
490	20 218.1	42.611	2.02	540	22 350.0	42.644	−0.70	590	24 480.2	42.541	−3.38
491	20 260.7	42.613	1.96	541	22 392.7	42.644	−0.76	591	24 522.8	42.538	−3.43
492	20 303.3	42.615	1.91	542	22 435.3	42.643	−0.81	592	24 565.3	42.535	−3.48
493	20 345.9	42.617	1.86	543	22 478.0	42.642	−0.87	593	24 607.8	42.531	−3.54
494	20 388.5	42.618	1.80	544	22 520.6	42.641	−0.92	594	24 650.4	42.527	−3.59
495	20 431.2	42.620	1.75	545	22 563.2	42.640	−0.98	595	24 692.9	42.524	−3.64
496	20 473.8	42.622	1.70	546	22 605.9	42.639	−1.03	596	24 735.4	42.520	−3.69
497	20 516.4	42.624	1.65	547	22 648.5	42.638	−1.09	597	24 777.9	42.516	−3.74
498	20 559.0	42.625	1.59	548	22 691.2	42.637	−1.14	598	24 820.4	42.513	−3.79
499	20 601.7	42.627	1.54	549	22 733.8	42.636	−1.20	599	24 863.0	42.509	−3.84
500	20 644.3	42.628	1.49	550	22 776.4	42.635	−1.25	600	24 905.5	42.505	−3.89

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
600	24 905.5	42.505	−3.89	**650**	27 024.9	42.252	−6.16	**700**	29 129.0	41.898	−7.90
601	24 948.0	42.501	−3.94	**651**	27 067.1	42.246	−6.20	**701**	29 170.9	41.890	−7.93
602	24 990.5	42.497	−3.99	**652**	27 109.4	42.239	−6.24	**702**	29 212.8	41.882	−7.96
603	25 033.0	42.493	−4.04	**653**	27 151.6	42.233	−6.28	**703**	29 254.6	41.874	−7.99
604	25 075.5	42.489	−4.09	**654**	27 193.8	42.227	−6.32	**704**	29 296.5	41.866	−8.01
605	25 117.9	42.485	−4.14	**655**	27 236.0	42.221	−6.36	**705**	29 338.4	41.858	−8.04
606	25 160.4	42.481	−4.18	**656**	27 278.3	42.214	−6.40	**706**	29 380.2	41.850	−8.07
607	25 202.9	42.477	−4.23	**657**	27 320.5	42.208	−6.44	**707**	29 422.1	41.842	−8.10
608	25 245.4	42.472	−4.28	**658**	27 362.7	42.201	−6.48	**708**	29 463.9	41.834	−8.13
609	25 287.8	42.468	−4.33	**659**	27 404.9	42.195	−6.51	**709**	29 505.7	41.826	−8.15
610	25 330.3	42.464	−4.38	**660**	27 447.1	42.188	−6.55	**710**	29 547.6	41.818	−8.18
611	25 372.8	42.459	−4.43	**661**	27 489.3	42.182	−6.59	**711**	29 589.4	41.809	−8.21
612	25 415.2	42.455	−4.47	**662**	27 531.4	42.175	−6.63	**712**	29 631.2	41.801	−8.23
613	25 457.7	42.450	−4.52	**663**	27 573.6	42.168	−6.67	**713**	29 673.0	41.793	−8.26
614	25 500.1	42.446	−4.57	**664**	27 615.8	42.162	−6.70	**714**	29 714.8	41.785	−8.28
615	25 542.6	42.441	−4.62	**665**	27 657.9	42.155	−6.74	**715**	29 756.5	41.776	−8.31
616	25 585.0	42.437	−4.66	**666**	27 700.1	42.148	−6.78	**716**	29 798.3	41.768	−8.34
617	25 627.5	42.432	−4.71	**667**	27 742.2	42.142	−6.82	**717**	29 840.1	41.760	−8.36
618	25 669.9	42.427	−4.76	**668**	27 784.4	42.135	−6.85	**718**	29 881.8	41.751	−8.39
619	25 712.3	42.422	−4.81	**669**	27 826.5	42.128	−6.89	**719**	29 923.6	41.743	−8.41
620	25 754.7	42.418	−4.85	**670**	27 868.6	42.121	−6.92	**720**	29 965.3	41.734	−8.43
621	25 797.1	42.413	−4.90	**671**	27 910.7	42.114	−6.96	**721**	30 007.0	41.726	−8.46
622	25 839.5	42.408	−4.94	**672**	27 952.8	42.107	−7.00	**722**	30 048.8	41.718	−8.48
623	25 882.0	42.403	−4.99	**673**	27 994.9	42.100	−7.03	**723**	30 090.5	41.709	−8.51
624	25 924.4	42.398	−5.04	**674**	28 037.0	42.093	−7.07	**724**	30 132.2	41.701	−8.53
625	25 966.8	42.393	−5.08	**675**	28 079.1	42.086	−7.10	**725**	30 173.9	41.692	−8.55
626	26 009.1	42.388	−5.13	**676**	28 121.2	42.079	−7.14	**726**	30 215.6	41.683	−8.58
627	26 051.5	42.382	−5.17	**677**	28 163.3	42.072	−7.17	**727**	30 257.3	41.675	−8.60
628	26 093.9	42.377	−5.22	**678**	28 205.4	42.064	−7.21	**728**	30 298.9	41.666	−8.62
629	26 136.3	42.372	−5.26	**679**	28 247.4	42.057	−7.24	**729**	30 340.6	41.658	−8.64
630	26 178.6	42.367	−5.31	**680**	28 289.5	42.050	−7.27	**730**	30 382.2	41.649	−8.67
631	26 221.0	42.361	−5.35	**681**	28 331.5	42.043	−7.31	**731**	30 423.9	41.640	−8.69
632	26 263.4	42.356	−5.40	**682**	28 373.6	42.035	−7.34	**732**	30 465.5	41.632	−8.71
633	26 305.7	42.351	−5.44	**683**	28 415.6	42.028	−7.37	**733**	30 507.1	41.623	−8.73
634	26 348.1	42.345	−5.48	**684**	28 457.6	42.021	−7.41	**734**	30 548.8	41.614	−8.75
635	26 390.4	42.340	−5.53	**685**	28 499.6	42.013	−7.44	**735**	30 590.4	41.605	−8.77
636	26 432.8	42.334	−5.57	**686**	28 541.6	42.006	−7.47	**736**	30 632.0	41.597	−8.80
637	26 475.1	42.328	−5.61	**687**	28 583.6	41.998	−7.50	**737**	30 673.6	41.588	−8.82
638	26 517.4	42.323	−5.66	**688**	28 625.6	41.991	−7.54	**738**	30 715.1	41.579	−8.84
639	26 559.7	42.317	−5.70	**689**	28 667.6	41.983	−7.57	**739**	30 756.7	41.570	−8.86
640	26 602.0	42.311	−5.74	**690**	28 709.6	41.976	−7.60	**740**	30 798.3	41.561	−8.88
641	26 644.4	42.306	−5.79	**691**	28 751.6	41.968	−7.63	**741**	30 839.8	41.552	−8.90
642	26 686.7	42.300	−5.83	**692**	28 793.5	41.960	−7.66	**742**	30 881.4	41.543	−8.92
643	26 729.0	42.294	−5.87	**693**	28 835.5	41.953	−7.69	**743**	30 922.9	41.535	−8.94
644	26 771.2	42.288	−5.91	**694**	28 877.4	41.945	−7.72	**744**	30 964.5	41.526	−8.95
645	26 813.5	42.282	−5.95	**695**	28 919.4	41.937	−7.75	**745**	31 006.0	41.517	−8.97
646	26 855.8	42.276	−6.00	**696**	28 961.3	41.929	−7.78	**746**	31 047.5	41.508	−8.99
647	26 898.1	42.270	−6.04	**697**	29 003.2	41.922	−7.81	**747**	31 089.0	41.499	−9.01
648	26 940.3	42.264	−6.08	**698**	29 045.2	41.914	−7.84	**748**	31 130.5	41.490	−9.03
649	26 982.6	42.258	−6.12	**699**	29 087.1	41.906	−7.87	**749**	31 172.0	41.481	−9.05
650	27 024.9	42.252	−6.16	**700**	29 129.0	41.898	−7.90	**750**	31 213.5	41.472	−9.07

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
750	31 213.5	41.472	−9.07	**800**	33 275.4	41.000	−9.71	**850**	35 313.1	40.507	−9.98
751	31 254.9	41.462	−9.08	**801**	33 316.4	40.990	−9.72	**851**	35 353.6	40.497	−9.98
752	31 296.4	41.453	−9.10	**802**	33 357.4	40.981	−9.73	**852**	35 394.1	40.487	−9.99
753	31 337.8	41.444	−9.12	**803**	33 398.3	40.971	−9.74	**853**	35 434.6	40.477	−9.99
754	31 379.3	41.435	−9.13	**804**	33 439.3	40.961	−9.74	**854**	35 475.1	40.467	−9.99
755	31 420.7	41.426	−9.15	**805**	33 480.3	40.952	−9.75	**855**	35 515.5	40.457	−10.00
756	31 462.1	41.417	−9.17	**806**	33 521.2	40.942	−9.76	**856**	35 556.0	40.447	−10.00
757	31 503.5	41.408	−9.18	**807**	33 562.1	40.932	−9.77	**857**	35 596.4	40.437	−10.00
758	31 544.9	41.398	−9.20	**808**	33 603.1	40.922	−9.78	**858**	35 636.8	40.427	−10.00
759	31 586.3	41.389	−9.22	**809**	33 644.0	40.912	−9.78	**859**	35 677.3	40.417	−10.01
760	31 627.7	41.380	−9.23	**810**	33 684.9	40.903	−9.79	**860**	35 717.7	40.407	−10.01
761	31 669.1	41.371	−9.25	**811**	33 725.8	40.893	−9.80	**861**	35 758.1	40.397	−10.01
762	31 710.5	41.361	−9.26	**812**	33 766.7	40.883	−9.80	**862**	35 798.5	40.387	−10.01
763	31 751.8	41.352	−9.28	**813**	33 807.6	40.873	−9.81	**863**	35 838.8	40.377	−10.01
764	31 793.2	41.343	−9.29	**814**	33 848.4	40.863	−9.82	**864**	35 879.2	40.367	−10.02
765	31 834.5	41.334	−9.31	**815**	33 889.3	40.854	−9.82	**865**	35 919.6	40.357	−10.02
766	31 875.8	41.324	−9.32	**816**	33 930.1	40.844	−9.83	**866**	35 959.9	40.347	−10.02
767	31 917.1	41.315	−9.34	**817**	33 971.0	40.834	−9.84	**867**	36 000.3	40.337	−10.02
768	31 958.5	41.306	−9.35	**818**	34 011.8	40.824	−9.84	**868**	36 040.6	40.327	−10.02
769	31 999.8	41.296	−9.37	**819**	34 052.6	40.814	−9.85	**869**	36 080.9	40.317	−10.03
770	32 041.0	41.287	−9.38	**820**	34 093.4	40.804	−9.85	**870**	36 121.2	40.307	−10.03
771	32 082.3	41.278	−9.39	**821**	34 134.2	40.795	−9.86	**871**	36 161.5	40.296	−10.03
772	32 123.6	41.268	−9.41	**822**	34 175.0	40.785	−9.87	**872**	36 201.8	40.286	−10.03
773	32 164.9	41.259	−9.42	**823**	34 215.8	40.775	−9.87	**873**	36 242.1	40.276	−10.03
774	32 206.1	41.249	−9.43	**824**	34 256.6	40.765	−9.88	**874**	36 282.4	40.266	−10.04
775	32 247.4	41.240	−9.45	**825**	34 297.3	40.755	−9.88	**875**	36 322.6	40.256	−10.04
776	32 288.6	41.230	−9.46	**826**	34 338.1	40.745	−9.89	**876**	36 362.9	40.246	−10.04
777	32 329.8	41.221	−9.47	**827**	34 378.8	40.735	−9.89	**877**	36 403.1	40.236	−10.04
778	32 371.0	41.211	−9.48	**828**	34 419.6	40.725	−9.90	**878**	36 443.4	40.226	−10.04
779	32 412.2	41.202	−9.50	**829**	34 460.3	40.716	−9.90	**879**	36 483.6	40.216	−10.04
780	32 453.4	41.192	−9.51	**830**	34 501.0	40.706	−9.91	**880**	36 523.8	40.206	−10.04
781	32 494.6	41.183	−9.52	**831**	34 541.7	40.696	−9.91	**881**	36 564.0	40.196	−10.05
782	32 535.8	41.173	−9.53	**832**	34 582.4	40.686	−9.92	**882**	36 604.2	40.186	−10.05
783	32 577.0	41.164	−9.54	**833**	34 623.1	40.676	−9.92	**883**	36 644.4	40.176	−10.05
784	32 618.1	41.154	−9.55	**834**	34 663.7	40.666	−9.92	**884**	36 684.5	40.166	−10.05
785	32 659.3	41.145	−9.56	**835**	34 704.4	40.656	−9.93	**885**	36 724.7	40.156	−10.05
786	32 700.4	41.135	−9.58	**836**	34 745.0	40.646	−9.93	**886**	36 764.9	40.146	−10.05
787	32 741.6	41.126	−9.59	**837**	34 785.7	40.636	−9.94	**887**	36 805.0	40.136	−10.06
788	32 782.7	41.116	−9.60	**838**	34 826.3	40.626	−9.94	**888**	36 845.1	40.126	−10.06
789	32 823.8	41.106	−9.61	**839**	34 866.9	40.616	−9.95	**889**	36 885.3	40.116	−10.06
790	32 864.9	41.097	−9.62	**840**	34 907.5	40.606	−9.95	**890**	36 925.4	40.106	−10.06
791	32 906.0	41.087	−9.63	**841**	34 948.1	40.596	−9.95	**891**	36 965.5	40.096	−10.06
792	32 947.1	41.078	−9.64	**842**	34 988.7	40.586	−9.96	**892**	37 005.6	40.086	−10.06
793	32 988.1	41.068	−9.65	**843**	35 029.3	40.576	−9.96	**893**	37 045.6	40.075	−10.06
794	33 029.2	41.058	−9.66	**844**	35 069.9	40.566	−9.96	**894**	37 085.7	40.065	−10.07
795	33 070.3	41.049	−9.67	**845**	35 110.4	40.557	−9.97	**895**	37 125.8	40.055	−10.07
796	33 111.3	41.039	−9.68	**846**	35 151.0	40.547	−9.97	**896**	37 165.8	40.045	−10.07
797	33 152.3	41.029	−9.68	**847**	35 191.5	40.537	−9.97	**897**	37 205.9	40.035	−10.07
798	33 193.4	41.020	−9.69	**848**	35 232.1	40.527	−9.98	**898**	37 245.9	40.025	−10.07
799	33 234.4	41.010	−9.70	**849**	35 272.6	40.517	−9.98	**899**	37 285.9	40.015	−10.07
800	33 275.4	41.000	−9.71	**850**	35 313.1	40.507	−9.98	**900**	37 325.9	40.005	−10.07

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	37 325.9	40.005	−10.07	950	39 313.5	39.499	−10.20	1000	41 275.6	38.981	−10.54
901	37 365.9	39.995	−10.08	951	39 353.0	39.489	−10.20	1001	41 314.6	38.971	−10.55
902	37 405.9	39.985	−10.08	952	39 392.5	39.478	−10.21	1002	41 353.5	38.960	−10.56
903	37 445.9	39.975	−10.08	953	39 432.0	39.468	−10.21	1003	41 392.5	38.950	−10.57
904	37 485.9	39.965	−10.08	954	39 471.4	39.458	−10.22	1004	41 431.4	38.939	−10.59
905	37 525.8	39.955	−10.08	955	39 510.9	39.448	−10.22	1005	41 470.4	38.929	−10.60
906	37 565.8	39.944	−10.08	956	39 550.3	39.437	−10.23	1006	41 509.3	38.918	−10.61
907	37 605.7	39.934	−10.08	957	39 589.8	39.427	−10.23	1007	41 548.2	38.907	−10.62
908	37 645.6	39.924	−10.09	958	39 629.2	39.417	−10.24	1008	41 587.1	38.897	−10.63
909	37 685.6	39.914	−10.09	959	39 668.6	39.407	−10.24	1009	41 626.0	38.886	−10.64
910	37 725.5	39.904	−10.09	960	39 708.0	39.397	−10.25	1010	41 664.9	38.875	−10.65
911	37 765.4	39.894	−10.09	961	39 747.4	39.386	−10.25	1011	41 703.8	38.865	−10.66
912	37 805.2	39.884	−10.09	962	39 786.8	39.376	−10.26	1012	41 742.6	38.854	−10.67
913	37 845.1	39.874	−10.09	963	39 826.2	39.366	−10.26	1013	41 781.5	38.843	−10.69
914	37 885.0	39.864	−10.10	964	39 865.5	39.355	−10.27	1014	41 820.3	38.833	−10.70
915	37 924.9	39.854	−10.10	965	39 904.9	39.345	−10.27	1015	41 859.1	38.822	−10.71
916	37 964.7	39.844	−10.10	966	39 944.2	39.335	−10.28	1016	41 898.0	38.811	−10.72
917	38 004.5	39.833	−10.10	967	39 983.5	39.325	−10.28	1017	41 936.8	38.801	−10.74
918	38 044.4	39.823	−10.10	968	40 022.9	39.314	−10.29	1018	41 975.6	38.790	−10.75
919	38 084.2	39.813	−10.11	969	40 062.2	39.304	−10.30	1019	42 014.3	38.779	−10.76
920	38 124.0	39.803	−10.11	970	40 101.5	39.294	−10.30	1020	42 053.1	38.768	−10.77
921	38 163.8	39.793	−10.11	971	40 140.7	39.283	−10.31	1021	42 091.9	38.758	−10.79
922	38 203.6	39.783	−10.11	972	40 180.0	39.273	−10.31	1022	42 130.6	38.747	−10.80
923	38 243.4	39.773	−10.11	973	40 219.3	39.263	−10.32	1023	42 169.4	38.736	−10.81
924	38 283.1	39.763	−10.12	974	40 258.6	39.253	−10.33	1024	42 208.1	38.725	−10.83
925	38 322.9	39.753	−10.12	975	40 297.8	39.242	−10.33	1025	42 246.8	38.714	−10.84
926	38 362.6	39.742	−10.12	976	40 337.0	39.232	−10.34	1026	42 285.5	38.703	−10.85
927	38 402.4	39.732	−10.12	977	40 376.3	39.222	−10.35	1027	42 324.2	38.693	−10.87
928	38 442.1	39.722	−10.13	978	40 415.5	39.211	−10.36	1028	42 362.9	38.682	−10.88
929	38 481.8	39.712	−10.13	979	40 454.7	39.201	−10.36	1029	42 401.6	38.671	−10.90
930	38 521.5	39.702	−10.13	980	40 493.9	39.190	−10.37	1030	42 440.3	38.660	−10.91
931	38 561.2	39.692	−10.13	981	40 533.1	39.180	−10.38	1031	42 478.9	38.649	−10.93
932	38 600.9	39.682	−10.14	982	40 572.2	39.170	−10.38	1032	42 517.6	38.638	−10.94
933	38 640.6	39.672	−10.14	983	40 611.4	39.159	−10.39	1033	42 556.2	38.627	−10.96
934	38 680.3	39.661	−10.14	984	40 650.6	39.149	−10.40	1034	42 594.8	38.616	−10.97
935	38 719.9	39.651	−10.15	985	40 689.7	39.138	−10.41	1035	42 633.4	38.605	−10.99
936	38 759.6	39.641	−10.15	986	40 728.8	39.128	−10.42	1036	42 672.0	38.594	−11.00
937	38 799.2	39.631	−10.15	987	40 768.0	39.118	−10.42	1037	42 710.6	38.583	−11.02
938	38 838.8	39.621	−10.16	988	40 807.1	39.107	−10.43	1038	42 749.2	38.572	−11.03
939	38 878.4	39.611	−10.16	989	40 846.2	39.097	−10.44	1039	42 787.7	38.561	−11.05
940	38 918.0	39.601	−10.16	990	40 885.3	39.086	−10.45	1040	42 826.3	38.550	−11.06
941	38 957.6	39.590	−10.16	991	40 924.3	39.076	−10.46	1041	42 864.8	38.539	−11.08
942	38 997.2	39.580	−10.17	992	40 963.4	39.065	−10.47	1042	42 903.4	38.528	−11.10
943	39 036.8	39.570	−10.17	993	41 002.5	39.055	−10.48	1043	42 941.9	38.517	−11.11
944	39 076.4	39.560	−10.18	994	41 041.5	39.044	−10.49	1044	42 980.4	38.506	−11.13
945	39 115.9	39.550	−10.18	995	41 080.6	39.034	−10.50	1045	43 018.9	38.495	−11.15
946	39 155.5	39.539	−10.18	996	41 119.6	39.023	−10.50	1046	43 057.4	38.483	−11.16
947	39 195.0	39.529	−10.19	997	41 158.6	39.013	−10.51	1047	43 095.9	38.472	−11.18
948	39 234.5	39.519	−10.19	998	41 197.6	39.002	−10.52	1048	43 134.3	38.461	−11.20
949	39 274.0	39.509	−10.19	999	41 236.6	38.992	−10.53	1049	43 172.8	38.450	−11.21
950	39 313.5	39.499	−10.20	1000	41 275.6	38.981	−10.54	1050	43 211.2	38.439	−11.23

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	43 211.2	38.439	−11.23	1100	45 118.7	37.852	−12.28	1150	46 995.5	37.206	−13.58
1051	43 249.7	38.427	−11.25	1101	45 156.6	37.840	−12.30	1151	47 032.7	37.193	−13.61
1052	43 288.1	38.416	−11.27	1102	45 194.4	37.828	−12.33	1152	47 069.9	37.179	−13.64
1053	43 326.5	38.405	−11.28	1103	45 232.2	37.815	−12.35	1153	47 107.0	37.165	−13.67
1054	43 364.9	38.394	−11.30	1104	45 270.0	37.803	−12.38	1154	47 144.2	37.152	−13.69
1055	43 403.3	38.382	−11.32	1105	45 307.8	37.790	−12.40	1155	47 181.3	37.138	−13.72
1056	43 441.7	38.371	−11.34	1106	45 345.6	37.778	−12.43	1156	47 218.5	37.124	−13.75
1057	43 480.0	38.360	−11.36	1107	45 383.4	37.766	−12.45	1157	47 255.6	37.110	−13.77
1058	43 518.4	38.348	−11.38	1108	45 421.2	37.753	−12.48	1158	47 292.7	37.097	−13.80
1059	43 556.7	38.337	−11.39	1109	45 458.9	37.741	−12.50	1159	47 329.8	37.083	−13.83
1060	43 595.1	38.325	−11.41	1110	45 496.6	37.728	−12.53	1160	47 366.8	37.069	−13.86
1061	43 633.4	38.314	−11.43	1111	45 534.4	37.716	−12.55	1161	47 403.9	37.055	−13.88
1062	43 671.7	38.302	−11.45	1112	45 572.1	37.703	−12.58	1162	47 441.0	37.041	−13.91
1063	43 710.0	38.291	−11.47	1113	45 609.8	37.690	−12.60	1163	47 478.0	37.027	−13.94
1064	43 748.3	38.280	−11.49	1114	45 647.5	37.678	−12.63	1164	47 515.0	37.013	−13.96
1065	43 786.6	38.268	−11.51	1115	45 685.1	37.665	−12.65	1165	47 552.0	36.999	−13.99
1066	43 824.8	38.257	−11.53	1116	45 722.8	37.653	−12.68	1166	47 589.0	36.985	−14.02
1067	43 863.1	38.245	−11.55	1117	45 760.4	37.640	−12.70	1167	47 626.0	36.971	−14.04
1068	43 901.3	38.233	−11.57	1118	45 798.1	37.627	−12.73	1168	47 663.0	36.957	−14.07
1069	43 939.5	38.222	−11.59	1119	45 835.7	37.614	−12.76	1169	47 699.9	36.943	−14.10
1070	43 977.7	38.210	−11.61	1120	45 873.3	37.602	−12.78	1170	47 736.8	36.929	−14.12
1071	44 016.0	38.199	−11.63	1121	45 910.9	37.589	−12.81	1171	47 773.8	36.915	−14.15
1072	44 054.1	38.187	−11.65	1122	45 948.5	37.576	−12.83	1172	47 810.7	36.901	−14.18
1073	44 092.3	38.175	−11.67	1123	45 986.0	37.563	−12.86	1173	47 847.6	36.887	−14.20
1074	44 130.5	38.164	−11.69	1124	46 023.6	37.550	−12.89	1174	47 884.4	36.872	−14.23
1075	44 168.7	38.152	−11.71	1125	46 061.1	37.537	−12.91	1175	47 921.3	36.858	−14.26
1076	44 206.8	38.140	−11.74	1126	46 098.7	37.524	−12.94	1176	47 958.2	36.844	−14.28
1077	44 244.9	38.128	−11.76	1127	46 136.2	37.511	−12.97	1177	47 995.0	36.830	−14.31
1078	44 283.1	38.117	−11.78	1128	46 173.7	37.499	−12.99	1178	48 031.8	36.815	−14.34
1079	44 321.2	38.105	−11.80	1129	46 211.2	37.486	−13.02	1179	48 068.6	36.801	−14.36
1080	44 359.3	38.093	−11.82	1130	46 248.7	37.472	−13.05	1180	48 105.4	36.787	−14.39
1081	44 397.4	38.081	−11.84	1131	46 286.1	37.459	−13.07	1181	48 142.2	36.772	−14.41
1082	44 435.4	38.069	−11.86	1132	46 323.6	37.446	−13.10	1182	48 179.0	36.758	−14.44
1083	44 473.5	38.058	−11.89	1133	46 361.0	37.433	−13.13	1183	48 215.7	36.743	−14.47
1084	44 511.5	38.046	−11.91	1134	46 398.4	37.420	−13.15	1184	48 252.4	36.729	−14.49
1085	44 549.6	38.034	−11.93	1135	46 435.9	37.407	−13.18	1185	48 289.2	36.714	−14.52
1086	44 587.6	38.022	−11.95	1136	46 473.3	37.394	−13.21	1186	48 325.9	36.700	−14.54
1087	44 625.6	38.010	−11.98	1137	46 510.6	37.381	−13.23	1187	48 362.6	36.685	−14.57
1088	44 663.6	37.998	−12.00	1138	46 548.0	37.367	−13.26	1188	48 399.2	36.671	−14.59
1089	44 701.6	37.986	−12.02	1139	46 585.4	37.354	−13.29	1189	48 435.9	36.656	−14.62
1090	44 739.6	37.974	−12.04	1140	46 622.7	37.341	−13.31	1190	48 472.6	36.641	−14.64
1091	44 777.6	37.962	−12.07	1141	46 660.1	37.327	−13.34	1191	48 509.2	36.627	−14.67
1092	44 815.5	37.950	−12.09	1142	46 697.4	37.314	−13.37	1192	48 545.8	36.612	−14.69
1093	44 853.5	37.938	−12.11	1143	46 734.7	37.301	−13.39	1193	48 582.4	36.597	−14.72
1094	44 891.4	37.925	−12.14	1144	46 772.0	37.287	−13.42	1194	48 619.0	36.583	−14.74
1095	44 929.3	37.913	−12.16	1145	46 809.3	37.274	−13.45	1195	48 655.6	36.568	−14.77
1096	44 967.2	37.901	−12.18	1146	46 846.5	37.260	−13.48	1196	48 692.1	36.553	−14.79
1097	45 005.1	37.889	−12.21	1147	46 883.8	37.247	−13.50	1197	48 728.7	36.538	−14.81
1098	45 043.0	37.877	−12.23	1148	46 921.0	37.233	−13.53	1198	48 765.2	36.523	−14.84
1099	45 080.9	37.864	−12.26	1149	46 958.3	37.220	−13.56	1199	48 801.7	36.509	−14.86
1100	45 118.7	37.852	−12.28	1150	46 995.5	37.206	−13.58	1200	48 838.2	36.494	−14.89

TABLE 7.3.3. *Type K thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1200	48 838.2	36.494	−14.89	1250	50 643.9	35.724	−15.78	1300	52 410.3	34.932	−15.72
1201	48 874.7	36.479	−14.91	1251	50 679.6	35.709	−15.79	1301	52 445.2	34.916	−15.70
1202	48 911.2	36.464	−14.93	1252	50 715.3	35.693	−15.80	1302	52 480.1	34.900	−15.68
1203	48 947.7	36.449	−14.96	1253	50 751.0	35.677	−15.81	1303	52 515.0	34.885	−15.67
1204	48 984.1	36.434	−14.98	1254	50 786.7	35.661	−15.82	1304	52 549.9	34.869	−15.65
1205	49 020.5	36.419	−15.00	1255	50 822.3	35.645	−15.82	1305	52 584.7	34.853	−15.63
1206	49 056.9	36.404	−15.02	1256	50 857.9	35.630	−15.83	1306	52 619.6	34.838	−15.61
1207	49 093.3	36.389	−15.05	1257	50 893.6	35.614	−15.84	1307	52 654.4	34.822	−15.60
1208	49 129.7	36.374	−15.07	1258	50 929.2	35.598	−15.85	1308	52 689.2	34.807	−15.58
1209	49 166.1	36.359	−15.09	1259	50 964.8	35.582	−15.85	1309	52 724.0	34.791	−15.55
1210	49 202.4	36.344	−15.11	1260	51 000.3	35.566	−15.86	1310	52 758.8	34.776	−15.53
1211	49 238.8	36.329	−15.13	1261	51 035.9	35.550	−15.87	1311	52 793.6	34.760	−15.51
1212	49 275.1	36.313	−15.16	1262	51 071.4	35.534	−15.87	1312	52 828.3	34.745	−15.49
1213	49 311.4	36.298	−15.18	1263	51 107.0	35.519	−15.88	1313	52 863.1	34.729	−15.47
1214	49 347.7	36.283	−15.20	1264	51 142.5	35.503	−15.88	1314	52 897.8	34.714	−15.44
1215	49 384.0	36.268	−15.22	1265	51 178.0	35.487	−15.89	1315	52 932.5	34.698	−15.42
1216	49 420.2	36.253	−15.24	1266	51 213.4	35.471	−15.89	1316	52 967.2	34.683	−15.39
1217	49 456.5	36.237	−15.26	1267	51 248.9	35.455	−15.89	1317	53 001.9	34.667	−15.37
1218	49 492.7	36.222	−15.28	1268	51 284.4	35.439	−15.90	1318	53 036.5	34.652	−15.34
1219	49 528.9	36.207	−15.30	1269	51 319.8	35.423	−15.90	1319	53 071.2	34.637	−15.31
1220	49 565.1	36.192	−15.32	1270	51 355.2	35.407	−15.90	1320	53 105.8	34.621	−15.28
1221	49 601.3	36.176	−15.34	1271	51 390.6	35.391	−15.90	1321	53 140.4	34.606	−15.25
1222	49 637.5	36.161	−15.36	1272	51 426.0	35.376	−15.90	1322	53 175.0	34.591	−15.22
1223	49 673.6	36.145	−15.38	1273	51 461.4	35.360	−15.90	1323	53 209.6	34.576	−15.19
1224	49 709.7	36.130	−15.39	1274	51 496.7	35.344	−15.90	1324	53 244.2	34.561	−15.16
1225	49 745.9	36.115	−15.41	1275	51 532.0	35.328	−15.90	1325	53 278.7	34.545	−15.13
1226	49 782.0	36.099	−15.43	1276	51 567.4	35.312	−15.90	1326	53 313.2	34.530	−15.10
1227	49 818.1	36.084	−15.45	1277	51 602.7	35.296	−15.90	1327	53 347.8	34.515	−15.06
1228	49 854.1	36.068	−15.47	1278	51 638.0	35.280	−15.90	1328	53 382.3	34.500	−15.03
1229	49 890.2	36.053	−15.48	1279	51 673.2	35.264	−15.90	1329	53 416.8	34.485	−14.99
1230	49 926.3	36.037	−15.50	1280	51 708.5	35.248	−15.89	1330	53 451.2	34.470	−14.96
1231	49 962.3	36.022	−15.52	1281	51 743.7	35.232	−15.89	1331	53 485.7	34.455	−14.92
1232	49 998.3	36.006	−15.53	1282	51 778.9	35.217	−15.89	1332	53 520.2	34.440	−14.88
1233	50 034.3	35.991	−15.55	1283	51 814.2	35.201	−15.88	1333	53 554.6	34.425	−14.84
1234	50 070.3	35.975	−15.57	1284	51 849.3	35.185	−15.88	1334	53 589.0	34.411	−14.80
1235	50 106.2	35.960	−15.58	1285	51 884.5	35.169	−15.87	1335	53 623.4	34.396	−14.76
1236	50 142.2	35.944	−15.60	1286	51 919.7	35.153	−15.86	1336	53 657.8	34.381	−14.72
1237	50 178.1	35.929	−15.61	1287	51 954.8	35.137	−15.86	1337	53 692.2	34.366	−14.68
1238	50 214.1	35.913	−15.63	1288	51 990.0	35.121	−15.85	1338	53 726.5	34.352	−14.64
1239	50 250.0	35.897	−15.64	1289	52 025.1	35.105	−15.84	1339	53 760.9	34.337	−14.59
1240	50 285.8	35.882	−15.66	1290	52 060.2	35.090	−15.83	1340	53 795.2	34.323	−14.55
1241	50 321.7	35.866	−15.67	1291	52 095.3	35.074	−15.83	1341	53 829.5	34.308	−14.50
1242	50 357.6	35.850	−15.68	1292	52 130.3	35.058	−15.82	1342	53 863.8	34.294	−14.46
1243	50 393.4	35.835	−15.70	1293	52 165.4	35.042	−15.80	1343	53 898.1	34.279	−14.41
1244	50 429.2	35.819	−15.71	1294	52 200.4	35.026	−15.79	1344	53 932.4	34.265	−14.36
1245	50 465.1	35.803	−15.72	1295	52 235.4	35.011	−15.78	1345	53 966.6	34.250	−14.31
1246	50 500.9	35.787	−15.73	1296	52 270.4	34.995	−15.77	1346	54 000.9	34.236	−14.26
1247	50 536.6	35.772	−15.74	1297	52 305.4	34.979	−15.76	1347	54 035.1	34.222	−14.21
1248	50 572.4	35.756	−15.76	1298	52 340.4	34.963	−15.74	1348	54 069.3	34.208	−14.16
1249	50 608.1	35.740	−15.77	1299	52 375.3	34.948	−15.73	1349	54 103.5	34.194	−14.11
1250	50 643.9	35.724	−15.78	1300	52 410.3	34.932	−15.72	1350	54 137.7	34.179	−14.06

TABLE 7.3.3. ***Type K thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1350	54 137.7	34.179	−14.06	**1360**	54 478.8	34.042	−13.47	**1370**	54 818.6	33.910	−12.79
1351	54 171.9	34.165	−14.00	**1361**	54 512.8	34.028	−13.41	**1371**	54 852.5	33.898	−12.72
1352	54 206.0	34.151	−13.95	**1362**	54 546.9	34.015	−13.34	**1372**	54 886.4	33.885	−12.64
1353	54 240.2	34.138	−13.89	**1363**	54 580.9	34.002	−13.28				
1354	54 274.3	34.124	−13.83	**1364**	54 614.9	33.988	−13.21				
1355	54 308.4	34.110	−13.78	**1365**	54 648.9	33.975	−13.14				
1356	54 342.5	34.096	−13.72	**1366**	54 682.8	33.962	−13.08				
1357	54 376.6	34.082	−13.66	**1367**	54 716.8	33.949	−13.01				
1358	54 410.7	34.069	−13.60	**1368**	54 750.7	33.936	−12.94				
1359	54 444.8	34.055	−13.54	**1369**	54 784.7	33.923	−12.86				

7.4. Reference Function and Table for the Positive Thermoelement, Type KP, a Nickel-Chromium Alloy Versus Platinum, Pt-67

The coefficients, c_i, for the thirteenth degree polynomial and for the tenth degree polynomial that give the thermoelectric voltage, E, of type KP (or EP) thermoelements versus Pt-67 as a function of temperature, t_{90}, in the −270 °C to 0 °C and 0 °C to 1372 °C ranges, respectively, are given in table 7.4.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type KP (or EP) thermoelements versus Pt-67 at selected fixed points are given in table 7.4.2. The reference values for type KP (or EP) thermoelements versus Pt-67 are given at 1 °C intervals from −270 °C to 1372 °C in table 7.4.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 7.4.1, 7.4.2, and 7.4.3, respectively.

It should be stressed that **type KP (or EP) thermoelement materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type KP (or EP) thermoelements are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 7.4.1. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−270 °C to 0 °C	0 °C to 1372 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	2.581 195 057 4 X 10^{1}	2.581 195 057 3 X 10^{1}
c_2 =	2.299 008 894 3 X 10^{-2}	2.683 139 535 5 X 10^{-2}
c_3 =	−6.157 475 446 0 X 10^{-4}	−3.867 519 441 2 X 10^{-5}
c_4 =	−2.327 184 376 5 X 10^{-5}	3.030 555 323 4 X 10^{-8}
c_5 =	−5.457 033 359 6 X 10^{-7}	−1.028 040 353 3 X 10^{-11}
c_6 =	−7.845 394 226 4 X 10^{-9}	−3.448 171 733 0 X 10^{-14}
c_7 =	−7.251 284 060 8 X 10^{-11}	8.251 289 448 0 X 10^{-17}
c_8 =	−4.356 917 479 1 X 10^{-13}	−7.889 338 217 7 X 10^{-20}
c_9 =	−1.664 752 760 6 X 10^{-15}	3.569 925 312 6 X 10^{-23}
c_{10} =	−3.737 720 750 1 X 10^{-18}	−6.331 536 065 9 X 10^{-27}
c_{11} =	−3.774 144 269 5 X 10^{-21}	
c_{12} =	1.002 535 559 0 X 10^{-24}	
c_{13} =	3.893 531 072 5 X 10^{-27}	

TABLE 7.4.2. *Thermoelectric values at fixed points for type KP (or EP) thermoelements versus platinum, Pt-67*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
e-Hydrogen TP	−259.3467	−3 548.47	0.915	11.00
Neon TP	−248.5939	−3 537.89	1.065	18.59
Oxygen TP	−218.7916	−3 487.82	2.719	100.00
Argon TP	−189.3442	−3 354.95	6.528	145.74
Mercury TP	−38.8344	−955.59	23.297	71.81
Ice MP	0.000	0.00	25.812	53.66
Water TP	0.01	0.3	25.812	53.66
Gallium MP	29.7646	791.1	27.310	47.07
Indium FP	156.5985	4 568.5	31.792	25.10
Tin FP	231.928	7 025.1	33.311	15.57
Cadmium FP	321.069	10 043.8	34.286	6.67
Lead FP	327.462	10 263.1	34.327	6.12
Zinc FP	419.527	13 439.0	34.562	−0.63
Antimony FP	630.63	20 647.4	33.481	−7.76
Aluminum FP	660.323	21 638.1	33.247	−7.94
Silver FP	961.78	31 316.7	31.055	−6.61
Gold FP	1064.18	34 461.3	30.349	−7.37
Copper FP	1084.62	35 080.1	30.196	−7.66

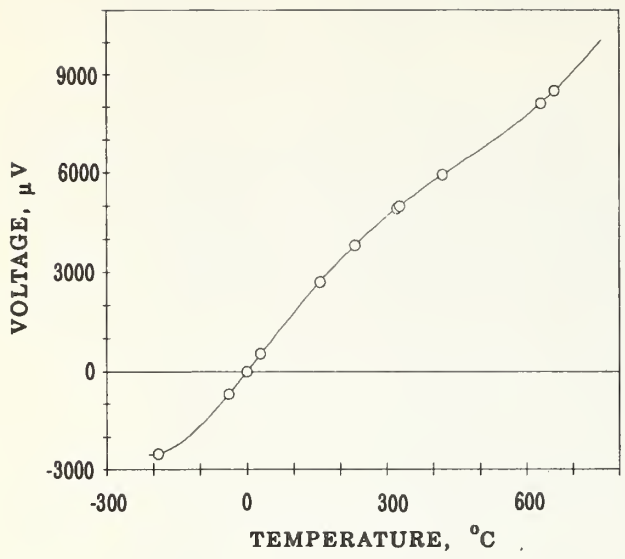

FIGURE 7.4.1. *Thermoelectric voltage for type KP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

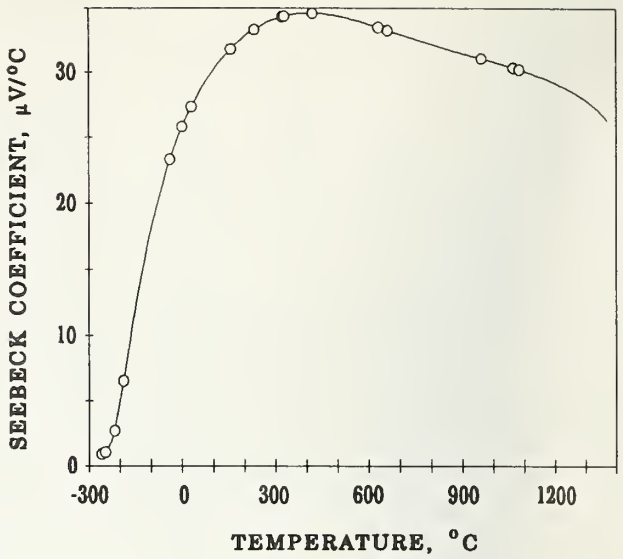

FIGURE 7.4.2. *Seebeck coefficient for type KP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

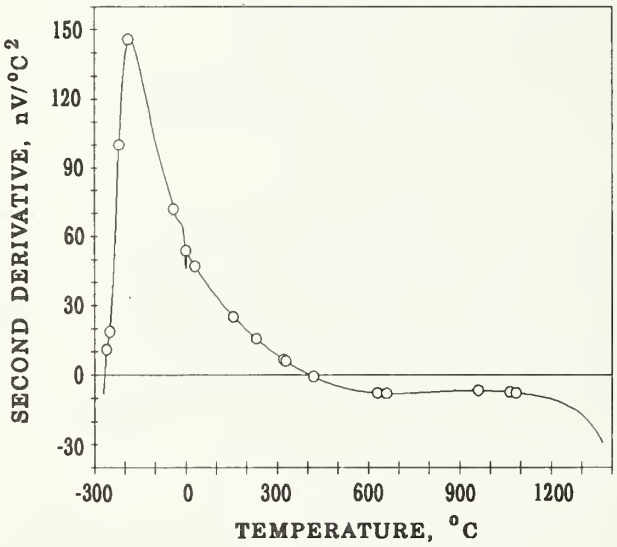

FIGURE 7.4.3. *Second derivative of thermoelectric voltage for type KP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
−270	−3 557.76	0.860	−7.92	−230	−3 512.73	1.789	65.26	−190	−3 359.20	6.433	145.52
−269	−3 556.90	0.854	−3.68	−229	−3 510.90	1.856	68.46	−189	−3 352.70	6.579	145.84
−268	−3 556.05	0.853	−0.22	−228	−3 509.01	1.926	71.67	−188	−3 346.05	6.725	146.11
−267	−3 555.20	0.854	2.55	−227	−3 507.05	2.000	74.87	−187	−3 339.25	6.871	146.31
−266	−3 554.34	0.857	4.75	−226	−3 505.01	2.076	78.07	−186	−3 332.30	7.017	146.46
−265	−3 553.48	0.863	6.48	−225	−3 502.90	2.156	81.24	−185	−3 325.21	7.164	146.55
−264	−3 552.62	0.870	7.82	−224	−3 500.70	2.239	84.38	−184	−3 317.98	7.310	146.59
−263	−3 551.74	0.879	8.84	−223	−3 498.42	2.325	87.48	−183	−3 310.59	7.457	146.58
−262	−3 550.86	0.888	9.63	−222	−3 496.05	2.414	90.54	−182	−3 303.06	7.603	146.52
−261	−3 549.97	0.898	10.24	−221	−3 493.59	2.506	93.55	−181	−3 295.39	7.750	146.42
−260	−3 549.06	0.908	10.72	−220	−3 491.04	2.601	96.51	−180	−3 287.56	7.896	146.28
−259	−3 548.15	0.919	11.13	−219	−3 488.39	2.699	99.40	−179	−3 279.59	8.042	146.10
−258	−3 547.22	0.931	11.51	−218	−3 485.64	2.799	102.23	−178	−3 271.48	8.188	145.89
−257	−3 546.29	0.942	11.89	−217	−3 482.79	2.903	104.98	−177	−3 263.22	8.334	145.64
−256	−3 545.34	0.954	12.31	−216	−3 479.83	3.009	107.66	−176	−3 254.81	8.480	145.36
−255	−3 544.38	0.967	12.80	−215	−3 476.77	3.118	110.25	−175	−3 246.26	8.625	145.06
−254	−3 543.40	0.980	13.37	−214	−3 473.60	3.230	112.76	−174	−3 237.56	8.770	144.72
−253	−3 542.42	0.994	14.04	−213	−3 470.31	3.344	115.19	−173	−3 228.72	8.914	144.36
−252	−3 541.42	1.008	14.84	−212	−3 466.91	3.460	117.52	−172	−3 219.73	9.059	143.98
−251	−3 540.40	1.023	15.77	−211	−3 463.39	3.579	119.77	−171	−3 210.60	9.202	143.58
−250	−3 539.37	1.040	16.84	−210	−3 459.75	3.700	121.92	−170	−3 201.33	9.346	143.16
−249	−3 538.32	1.057	18.06	−209	−3 455.99	3.823	123.97	−169	−3 191.91	9.489	142.72
−248	−3 537.26	1.076	19.43	−208	−3 452.10	3.948	125.93	−168	−3 182.35	9.631	142.27
−247	−3 536.17	1.096	20.95	−207	−3 448.09	4.074	127.79	−167	−3 172.65	9.773	141.81
−246	−3 535.06	1.118	22.62	−206	−3 443.95	4.203	129.56	−166	−3 162.80	9.915	141.33
−245	−3 533.93	1.141	24.45	−205	−3 439.69	4.334	131.23	−165	−3 152.82	10.056	140.84
−244	−3 532.78	1.167	26.42	−204	−3 435.29	4.466	132.80	−164	−3 142.69	10.196	140.34
−243	−3 531.60	1.194	28.53	−203	−3 430.75	4.599	134.28	−163	−3 132.43	10.337	139.83
−242	−3 530.39	1.224	30.78	−202	−3 426.09	4.734	135.66	−162	−3 122.02	10.476	139.32
−241	−3 529.15	1.256	33.16	−201	−3 421.28	4.870	136.95	−161	−3 111.47	10.615	138.79
−240	−3 527.88	1.290	35.66	−200	−3 416.35	5.008	138.15	−160	−3 100.79	10.754	138.27
−239	−3 526.57	1.327	38.27	−199	−3 411.27	5.147	139.26	−159	−3 089.97	10.892	137.73
−238	−3 525.22	1.367	40.98	−198	−3 406.05	5.286	140.28	−158	−3 079.01	11.029	137.19
−237	−3 523.83	1.409	43.79	−197	−3 400.70	5.427	141.21	−157	−3 067.91	11.166	136.65
−236	−3 522.40	1.454	46.69	−196	−3 395.20	5.569	142.06	−156	−3 056.67	11.302	136.10
−235	−3 520.92	1.503	49.66	−195	−3 389.56	5.711	142.83	−155	−3 045.30	11.438	135.55
−234	−3 519.40	1.554	52.69	−194	−3 383.77	5.854	143.51	−154	−3 033.80	11.574	135.00
−233	−3 517.82	1.608	55.77	−193	−3 377.85	5.998	144.12	−153	−3 022.16	11.708	134.45
−232	−3 516.18	1.665	58.91	−192	−3 371.78	6.143	144.66	−152	−3 010.38	11.842	133.89
−231	−3 514.48	1.726	62.07	−191	−3 365.56	6.288	145.12	−151	−2 998.47	11.976	133.33
−230	−3 512.73	1.789	65.26	−190	−3 359.20	6.433	145.52	−150	−2 986.43	12.109	132.77

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−2 986.43	12.109	132.77	−100	−2 227.39	17.993	101.93	−50	−1 211.12	22.463	77.62
−149	−2 974.25	12.242	132.20	−99	−2 209.35	18.094	101.34	−49	−1 188.62	22.541	77.09
−148	−2 961.95	12.374	131.64	−98	−2 191.20	18.195	100.74	−48	−1 166.04	22.617	76.57
−147	−2 949.51	12.505	131.07	−97	−2 172.96	18.296	100.16	−47	−1 143.38	22.694	76.04
−146	−2 936.94	12.636	130.50	−96	−2 154.61	18.396	99.58	−46	−1 120.65	22.770	75.51
−145	−2 924.24	12.766	129.93	−95	−2 136.17	18.495	99.02	−45	−1 097.84	22.845	74.98
−144	−2 911.40	12.896	129.36	−94	−2 117.62	18.594	98.46	−44	−1 074.96	22.919	74.45
−143	−2 898.44	13.025	128.78	−93	−2 098.98	18.692	97.90	−43	−1 052.00	22.994	73.92
−142	−2 885.36	13.153	128.20	−92	−2 080.24	18.789	97.36	−42	−1 028.97	23.067	73.40
−141	−2 872.14	13.281	127.62	−91	−2 061.40	18.887	96.82	−41	−1 005.87	23.140	72.89
−140	−2 858.79	13.408	127.04	−90	−2 042.46	18.983	96.29	−40	−982.69	23.213	72.38
−139	−2 845.32	13.535	126.45	−89	−2 023.43	19.079	95.77	−39	−959.44	23.285	71.89
−138	−2 831.72	13.661	125.86	−88	−2 004.31	19.175	95.26	−38	−936.12	23.357	71.40
−137	−2 818.00	13.787	125.27	−87	−1 985.08	19.270	94.75	−37	−912.73	23.428	70.93
−136	−2 804.15	13.912	124.67	−86	−1 965.77	19.364	94.26	−36	−889.27	23.499	70.47
−135	−2 790.18	14.036	124.08	−85	−1 946.36	19.458	93.77	−35	−865.73	23.569	70.04
−134	−2 776.08	14.160	123.47	−84	−1 926.85	19.552	93.28	−34	−842.13	23.639	69.61
−133	−2 761.86	14.283	122.87	−83	−1 907.25	19.645	92.81	−33	−818.46	23.708	69.21
−132	−2 747.51	14.406	122.26	−82	−1 887.56	19.737	92.34	−32	−794.71	23.777	68.83
−131	−2 733.05	14.528	121.65	−81	−1 867.78	19.829	91.88	−31	−770.90	23.846	68.48
−130	−2 718.46	14.649	121.03	−80	−1 847.90	19.921	91.42	−30	−747.02	23.914	68.14
−129	−2 703.75	14.770	120.41	−79	−1 827.94	20.012	90.97	−29	−723.07	23.982	67.84
−128	−2 688.92	14.890	119.79	−78	−1 807.88	20.103	90.52	−28	−699.06	24.050	67.56
−127	−2 673.97	15.009	119.16	−77	−1 787.73	20.193	90.08	−27	−674.97	24.117	67.30
−126	−2 658.90	15.128	118.53	−76	−1 767.49	20.283	89.64	−26	−650.82	24.185	67.07
−125	−2 643.71	15.246	117.90	−75	−1 747.16	20.373	89.20	−25	−626.60	24.251	66.86
−124	−2 628.41	15.364	117.27	−74	−1 726.75	20.462	88.77	−24	−602.32	24.318	66.68
−123	−2 612.99	15.481	116.63	−73	−1 706.24	20.550	88.34	−23	−577.97	24.385	66.52
−122	−2 597.45	15.597	115.99	−72	−1 685.65	20.638	87.91	−22	−553.55	24.451	66.38
−121	−2 581.79	15.713	115.34	−71	−1 664.97	20.726	87.48	−21	−529.06	24.518	66.26
−120	−2 566.02	15.828	114.70	−70	−1 644.20	20.813	87.05	−20	−504.51	24.584	66.15
−119	−2 550.14	15.942	114.05	−69	−1 623.34	20.900	86.62	−19	−479.90	24.650	66.04
−118	−2 534.14	16.056	113.40	−68	−1 602.40	20.986	86.18	−18	−455.21	24.716	65.94
−117	−2 518.02	16.169	112.75	−67	−1 581.37	21.072	85.75	−17	−430.47	24.782	65.83
−116	−2 501.80	16.281	112.10	−66	−1 560.25	21.158	85.31	−16	−405.65	24.848	65.70
−115	−2 485.46	16.393	111.45	−65	−1 539.05	21.243	84.87	−15	−380.77	24.913	65.54
−114	−2 469.01	16.504	110.80	−64	−1 517.77	21.328	84.42	−14	−355.82	24.979	65.34
−113	−2 452.45	16.615	110.15	−63	−1 496.40	21.412	83.97	−13	−330.81	25.044	65.09
−112	−2 435.78	16.725	109.50	−62	−1 474.94	21.496	83.52	−12	−305.74	25.109	64.77
−111	−2 419.00	16.834	108.85	−61	−1 453.40	21.579	83.06	−11	−280.60	25.173	64.36
−110	−2 402.12	16.942	108.20	−60	−1 431.78	21.662	82.60	−10	−255.39	25.237	63.84
−109	−2 385.12	17.050	107.56	−59	−1 410.08	21.744	82.13	−9	−230.12	25.301	63.19
−108	−2 368.02	17.157	106.92	−58	−1 388.30	21.826	81.65	−8	−204.79	25.364	62.38
−107	−2 350.81	17.264	106.28	−57	−1 366.43	21.907	81.17	−7	−179.39	25.426	61.38
−106	−2 333.49	17.370	105.64	−56	−1 344.48	21.988	80.68	−6	−153.94	25.486	60.17
−105	−2 316.07	17.475	105.01	−55	−1 322.45	22.069	80.18	−5	−128.42	25.546	58.70
−104	−2 298.54	17.580	104.38	−54	−1 300.34	22.149	79.68	−4	−102.85	25.604	56.93
−103	−2 280.91	17.684	103.76	−53	−1 278.16	22.228	79.17	−3	−77.21	25.660	54.83
−102	−2 263.17	17.788	103.15	−52	−1 255.89	22.307	78.66	−2	−51.53	25.713	52.34
−101	−2 245.33	17.890	102.54	−51	−1 233.54	22.385	78.14	−1	−25.79	25.764	49.41
−100	−2 227.39	17.993	101.93	−50	−1 211.12	22.463	77.62	0	0.00	25.812	45.98

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
0	0.0	25.812	53.66	50	1 353.0	28.220	42.94	100	2 813.7	30.133	33.82
1	25.8	25.865	53.43	51	1 381.3	28.263	42.74	101	2 843.9	30.166	33.65
2	51.7	25.919	53.20	52	1 409.6	28.305	42.54	102	2 874.1	30.200	33.48
3	77.7	25.972	52.97	53	1 437.9	28.348	42.35	103	2 904.3	30.233	33.31
4	103.7	26.025	52.74	54	1 466.2	28.390	42.15	104	2 934.5	30.266	33.15
5	129.7	26.077	52.51	55	1 494.7	28.432	41.96	105	2 964.8	30.299	32.98
6	155.8	26.130	52.28	56	1 523.1	28.474	41.76	106	2 995.1	30.332	32.82
7	182.0	26.182	52.06	57	1 551.6	28.516	41.57	107	3 025.5	30.365	32.65
8	208.2	26.234	51.83	58	1 580.1	28.557	41.38	108	3 055.9	30.398	32.49
9	234.5	26.286	51.60	59	1 608.7	28.598	41.19	109	3 086.3	30.430	32.32
10	260.8	26.337	51.38	60	1 637.3	28.639	40.99	110	3 116.7	30.462	32.16
11	287.1	26.388	51.15	61	1 666.0	28.680	40.80	111	3 147.2	30.494	32.00
12	313.5	26.439	50.93	62	1 694.7	28.721	40.61	112	3 177.7	30.526	31.84
13	340.0	26.490	50.71	63	1 723.4	28.762	40.42	113	3 208.3	30.558	31.67
14	366.5	26.541	50.48	64	1 752.2	28.802	40.23	114	3 238.8	30.590	31.51
15	393.1	26.591	50.26	65	1 781.0	28.842	40.04	115	3 269.4	30.621	31.35
16	419.7	26.641	50.04	66	1 809.9	28.882	39.86	116	3 300.1	30.652	31.19
17	446.4	26.691	49.82	67	1 838.8	28.922	39.67	117	3 330.7	30.684	31.03
18	473.1	26.741	49.60	68	1 867.8	28.961	39.48	118	3 361.4	30.714	30.87
19	499.9	26.790	49.38	69	1 896.7	29.001	39.30	119	3 392.2	30.745	30.72
20	526.7	26.840	49.17	70	1 925.8	29.040	39.11	120	3 422.9	30.776	30.56
21	553.5	26.889	48.95	71	1 954.8	29.079	38.93	121	3 453.7	30.806	30.40
22	580.4	26.938	48.73	72	1 983.9	29.118	38.74	122	3 484.5	30.837	30.24
23	607.4	26.986	48.52	73	2 013.0	29.156	38.56	123	3 515.4	30.867	30.09
24	634.4	27.035	48.30	74	2 042.2	29.195	38.38	124	3 546.3	30.897	29.93
25	661.5	27.083	48.09	75	2 071.4	29.233	38.19	125	3 577.2	30.927	29.77
26	688.6	27.131	47.87	76	2 100.7	29.271	38.01	126	3 608.1	30.956	29.62
27	715.7	27.179	47.66	77	2 130.0	29.309	37.83	127	3 639.1	30.986	29.46
28	742.9	27.226	47.45	78	2 159.3	29.347	37.65	128	3 670.1	31.015	29.31
29	770.2	27.274	47.23	79	2 188.7	29.384	37.47	129	3 701.1	31.045	29.16
30	797.5	27.321	47.02	80	2 218.1	29.422	37.29	130	3 732.2	31.074	29.00
31	824.8	27.368	46.81	81	2 247.5	29.459	37.11	131	3 763.3	31.103	28.85
32	852.2	27.414	46.60	82	2 277.0	29.496	36.93	132	3 794.4	31.131	28.70
33	879.7	27.461	46.39	83	2 306.5	29.533	36.75	133	3 825.5	31.160	28.55
34	907.1	27.507	46.18	84	2 336.1	29.570	36.58	134	3 856.7	31.188	28.40
35	934.7	27.553	45.98	85	2 365.6	29.606	36.40	135	3 887.9	31.217	28.24
36	962.2	27.599	45.77	86	2 395.3	29.642	36.22	136	3 919.1	31.245	28.09
37	989.9	27.645	45.56	87	2 424.9	29.678	36.05	137	3 950.4	31.273	27.94
38	1 017.5	27.690	45.36	88	2 454.6	29.714	35.87	138	3 981.7	31.301	27.80
39	1 045.3	27.735	45.15	89	2 484.4	29.750	35.70	139	4 013.0	31.329	27.65
40	1 073.0	27.780	44.95	90	2 514.1	29.786	35.52	140	4 044.3	31.356	27.50
41	1 100.8	27.825	44.74	91	2 543.9	29.821	35.35	141	4 075.7	31.384	27.35
42	1 128.7	27.870	44.54	92	2 573.8	29.857	35.18	142	4 107.1	31.411	27.20
43	1 156.6	27.914	44.34	93	2 603.6	29.892	35.01	143	4 138.5	31.438	27.05
44	1 184.5	27.959	44.14	94	2 633.6	29.927	34.83	144	4 170.0	31.465	26.91
45	1 212.5	28.003	43.93	95	2 663.5	29.961	34.66	145	4 201.5	31.492	26.76
46	1 240.5	28.046	43.73	96	2 693.5	29.996	34.49	146	4 233.0	31.518	26.62
47	1 268.6	28.090	43.53	97	2 723.5	30.030	34.32	147	4 264.5	31.545	26.47
48	1 296.7	28.134	43.33	98	2 753.5	30.065	34.15	148	4 296.1	31.571	26.33
49	1 324.8	28.177	43.14	99	2 783.6	30.099	33.98	149	4 327.7	31.598	26.18
50	1 353.0	28.220	42.94	100	2 813.7	30.133	33.82	150	4 359.3	31.624	26.04

TABLE 7.4.3. *Type KP (or EP) thermoelementsversus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	4 359.3	31.624	26.04	200	5 970.1	32.754	19.36	250	7 629.5	33.574	13.58
151	4 390.9	31.650	25.89	201	6 002.9	32.774	19.23	251	7 663.1	33.588	13.47
152	4 422.6	31.676	25.75	202	6 035.7	32.793	19.11	252	7 696.7	33.601	13.37
153	4 454.2	31.701	25.61	203	6 068.5	32.812	18.99	253	7 730.3	33.615	13.26
154	4 486.0	31.727	25.47	204	6 101.3	32.831	18.86	254	7 763.9	33.628	13.15
155	4 517.7	31.752	25.32	205	6 134.1	32.850	18.74	255	7 797.6	33.641	13.05
156	4 549.5	31.777	25.18	206	6 167.0	32.868	18.62	256	7 831.2	33.654	12.94
157	4 581.3	31.803	25.04	207	6 199.9	32.887	18.50	257	7 864.9	33.667	12.83
158	4 613.1	31.827	24.90	208	6 232.8	32.905	18.38	258	7 898.6	33.680	12.73
159	4 644.9	31.852	24.76	209	6 265.7	32.924	18.26	259	7 932.2	33.692	12.62
160	4 676.8	31.877	24.62	210	6 298.6	32.942	18.13	260	7 965.9	33.705	12.52
161	4 708.7	31.902	24.48	211	6 331.6	32.960	18.01	261	7 999.7	33.717	12.42
162	4 740.6	31.926	24.34	212	6 364.5	32.978	17.89	262	8 033.4	33.730	12.31
163	4 772.5	31.950	24.20	213	6 397.5	32.996	17.77	263	8 067.1	33.742	12.21
164	4 804.5	31.974	24.07	214	6 430.5	33.013	17.66	264	8 100.9	33.754	12.10
165	4 836.5	31.998	23.93	215	6 463.5	33.031	17.54	265	8 134.6	33.766	12.00
166	4 868.5	32.022	23.79	216	6 496.6	33.049	17.42	266	8 168.4	33.778	11.90
167	4 900.5	32.046	23.65	217	6 529.6	33.066	17.30	267	8 202.2	33.790	11.80
168	4 932.6	32.070	23.52	218	6 562.7	33.083	17.18	268	8 236.0	33.802	11.69
169	4 964.7	32.093	23.38	219	6 595.8	33.100	17.06	269	8 269.8	33.813	11.59
170	4 996.8	32.116	23.25	220	6 628.9	33.117	16.95	270	8 303.6	33.825	11.49
171	5 028.9	32.139	23.11	221	6 662.0	33.134	16.83	271	8 337.4	33.836	11.39
172	5 061.0	32.163	22.98	222	6 695.2	33.151	16.71	272	8 371.3	33.848	11.29
173	5 093.2	32.185	22.84	223	6 728.3	33.168	16.60	273	8 405.1	33.859	11.19
174	5 125.4	32.208	22.71	224	6 761.5	33.184	16.48	274	8 439.0	33.870	11.09
175	5 157.6	32.231	22.57	225	6 794.7	33.201	16.37	275	8 472.9	33.881	10.99
176	5 189.9	32.253	22.44	226	6 827.9	33.217	16.25	276	8 506.8	33.892	10.89
177	5 222.1	32.276	22.31	227	6 861.1	33.233	16.13	277	8 540.7	33.903	10.79
178	5 254.4	32.298	22.17	228	6 894.4	33.249	16.02	278	8 574.6	33.914	10.69
179	5 286.7	32.320	22.04	229	6 927.6	33.265	15.91	279	8 608.5	33.924	10.59
180	5 319.1	32.342	21.91	230	6 960.9	33.281	15.79	280	8 642.4	33.935	10.49
181	5 351.4	32.364	21.78	231	6 994.2	33.297	15.68	281	8 676.3	33.945	10.39
182	5 383.8	32.386	21.65	232	7 027.5	33.312	15.57	282	8 710.3	33.956	10.29
183	5 416.2	32.407	21.52	233	7 060.8	33.328	15.45	283	8 744.3	33.966	10.19
184	5 448.6	32.429	21.39	234	7 094.2	33.343	15.34	284	8 778.2	33.976	10.10
185	5 481.0	32.450	21.26	235	7 127.5	33.359	15.23	285	8 812.2	33.986	10.00
186	5 513.5	32.471	21.13	236	7 160.9	33.374	15.12	286	8 846.2	33.996	9.90
187	5 546.0	32.492	21.00	237	7 194.3	33.389	15.00	287	8 880.2	34.006	9.81
188	5 578.5	32.513	20.87	238	7 227.7	33.404	14.89	288	8 914.2	34.016	9.71
189	5 611.0	32.534	20.74	239	7 261.1	33.419	14.78	289	8 948.2	34.025	9.61
190	5 643.6	32.555	20.62	240	7 294.5	33.433	14.67	290	8 982.3	34.035	9.52
191	5 676.1	32.575	20.49	241	7 327.9	33.448	14.56	291	9 016.3	34.044	9.42
192	5 708.7	32.596	20.36	242	7 361.4	33.462	14.45	292	9 050.4	34.054	9.33
193	5 741.3	32.616	20.23	243	7 394.9	33.477	14.34	293	9 084.4	34.063	9.23
194	5 773.9	32.636	20.11	244	7 428.3	33.491	14.23	294	9 118.5	34.072	9.14
195	5 806.6	32.656	19.98	245	7 461.8	33.505	14.12	295	9 152.6	34.081	9.04
196	5 839.2	32.676	19.86	246	7 495.3	33.519	14.01	296	9 186.6	34.090	8.95
197	5 871.9	32.696	19.73	247	7 528.9	33.533	13.90	297	9 220.7	34.099	8.85
198	5 904.6	32.716	19.61	248	7 562.4	33.547	13.80	298	9 254.8	34.108	8.76
199	5 937.4	32.735	19.48	249	7 596.0	33.561	13.69	299	9 289.0	34.117	8.67
200	5 970.1	32.754	19.36	250	7 629.5	33.574	13.58	300	9 323.1	34.125	8.57

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
300	9 323.1	34.125	8.57	**350**	11 038.2	34.443	4.26	**400**	12 764.1	34.562	0.62
301	9 357.2	34.134	8.48	**351**	11 072.6	34.447	4.18	**401**	12 798.6	34.563	0.55
302	9 391.3	34.142	8.39	**352**	11 107.1	34.452	4.10	**402**	12 833.2	34.564	0.48
303	9 425.5	34.151	8.29	**353**	11 141.5	34.456	4.02	**403**	12 867.8	34.564	0.42
304	9 459.6	34.159	8.20	**354**	11 176.0	34.460	3.95	**404**	12 902.3	34.564	0.35
305	9 493.8	34.167	8.11	**355**	11 210.5	34.464	3.87	**405**	12 936.9	34.565	0.29
306	9 528.0	34.175	8.02	**356**	11 244.9	34.467	3.79	**406**	12 971.5	34.565	0.22
307	9 562.2	34.183	7.93	**357**	11 279.4	34.471	3.71	**407**	13 006.0	34.565	0.16
308	9 596.3	34.191	7.84	**358**	11 313.9	34.475	3.63	**408**	13 040.6	34.565	0.10
309	9 630.5	34.199	7.75	**359**	11 348.3	34.478	3.56	**409**	13 075.2	34.565	0.03
310	9 664.7	34.206	7.66	**360**	11 382.8	34.482	3.48	**410**	13 109.7	34.565	−0.03
311	9 698.9	34.214	7.57	**361**	11 417.3	34.485	3.40	**411**	13 144.3	34.565	−0.10
312	9 733.2	34.221	7.48	**362**	11 451.8	34.489	3.33	**412**	13 178.9	34.565	−0.16
313	9 767.4	34.229	7.39	**363**	11 486.3	34.492	3.25	**413**	13 213.4	34.565	−0.22
314	9 801.6	34.236	7.30	**364**	11 520.8	34.495	3.17	**414**	13 248.0	34.565	−0.28
315	9 835.9	34.244	7.21	**365**	11 555.3	34.498	3.10	**415**	13 282.6	34.564	−0.35
316	9 870.1	34.251	7.12	**366**	11 589.8	34.501	3.02	**416**	13 317.1	34.564	−0.41
317	9 904.4	34.258	7.03	**367**	11 624.3	34.504	2.95	**417**	13 351.7	34.564	−0.47
318	9 938.6	34.265	6.94	**368**	11 658.8	34.507	2.87	**418**	13 386.2	34.563	−0.53
319	9 972.9	34.272	6.85	**369**	11 693.3	34.510	2.80	**419**	13 420.8	34.563	−0.59
320	10 007.2	34.278	6.77	**370**	11 727.8	34.513	2.72	**420**	13 455.4	34.562	−0.66
321	10 041.5	34.285	6.68	**371**	11 762.3	34.516	2.65	**421**	13 489.9	34.561	−0.72
322	10 075.7	34.292	6.59	**372**	11 796.8	34.518	2.58	**422**	13 524.5	34.560	−0.78
323	10 110.0	34.298	6.51	**373**	11 831.3	34.521	2.50	**423**	13 559.1	34.560	−0.84
324	10 144.3	34.305	6.42	**374**	11 865.9	34.523	2.43	**424**	13 593.6	34.559	−0.90
325	10 178.6	34.311	6.33	**375**	11 900.4	34.526	2.36	**425**	13 628.2	34.558	−0.96
326	10 213.0	34.317	6.25	**376**	11 934.9	34.528	2.28	**426**	13 662.7	34.557	−1.02
327	10 247.3	34.324	6.16	**377**	11 969.4	34.530	2.21	**427**	13 697.3	34.556	−1.08
328	10 281.6	34.330	6.07	**378**	12 004.0	34.532	2.14	**428**	13 731.8	34.555	−1.13
329	10 315.9	34.336	5.99	**379**	12 038.5	34.534	2.07	**429**	13 766.4	34.554	−1.19
330	10 350.3	34.342	5.90	**380**	12 073.0	34.537	1.99	**430**	13 800.9	34.552	−1.25
331	10 384.6	34.348	5.82	**381**	12 107.6	34.538	1.92	**431**	13 835.5	34.551	−1.31
332	10 419.0	34.353	5.74	**382**	12 142.1	34.540	1.85	**432**	13 870.0	34.550	−1.37
333	10 453.3	34.359	5.65	**383**	12 176.7	34.542	1.78	**433**	13 904.6	34.548	−1.42
334	10 487.7	34.365	5.57	**384**	12 211.2	34.544	1.71	**434**	13 939.1	34.547	−1.48
335	10 522.1	34.370	5.48	**385**	12 245.8	34.546	1.64	**435**	13 973.7	34.545	−1.54
336	10 556.4	34.376	5.40	**386**	12 280.3	34.547	1.57	**436**	14 008.2	34.544	−1.60
337	10 590.8	34.381	5.32	**387**	12 314.8	34.549	1.50	**437**	14 042.8	34.542	−1.65
338	10 625.2	34.386	5.23	**388**	12 349.4	34.550	1.43	**438**	14 077.3	34.540	−1.71
339	10 659.6	34.392	5.15	**389**	12 383.9	34.552	1.36	**439**	14 111.9	34.539	−1.77
340	10 694.0	34.397	5.07	**390**	12 418.5	34.553	1.29	**440**	14 146.4	34.537	−1.82
341	10 728.4	34.402	4.99	**391**	12 453.1	34.554	1.22	**441**	14 180.9	34.535	−1.88
342	10 762.8	34.407	4.91	**392**	12 487.6	34.555	1.16	**442**	14 215.5	34.533	−1.93
343	10 797.2	34.411	4.82	**393**	12 522.2	34.556	1.09	**443**	14 250.0	34.531	−1.99
344	10 831.6	34.416	4.74	**394**	12 556.7	34.558	1.02	**444**	14 284.5	34.529	−2.04
345	10 866.0	34.421	4.66	**395**	12 591.3	34.559	0.95	**445**	14 319.1	34.527	−2.10
346	10 900.4	34.426	4.58	**396**	12 625.8	34.559	0.88	**446**	14 353.6	34.525	−2.15
347	10 934.9	34.430	4.50	**397**	12 660.4	34.560	0.82	**447**	14 388.1	34.523	−2.20
348	10 969.3	34.435	4.42	**398**	12 695.0	34.561	0.75	**448**	14 422.6	34.521	−2.26
349	11 003.7	34.439	4.34	**399**	12 729.5	34.562	0.68	**449**	14 457.1	34.518	−2.31
350	11 038.2	34.443	4.26	**400**	12 764.1	34.562	0.62	**450**	14 491.7	34.516	−2.36

TABLE 7.4.3. ***Type KP (or EP) thermoelements versus platinum, Pt-67 ---*** *thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	14 491.7	34.516	−2.36	500	16 213.5	34.337	−4.68	550	17 923.7	34.059	−6.34
451	14 526.2	34.514	−2.42	501	16 247.8	34.332	−4.72	551	17 957.8	34.053	−6.37
452	14 560.7	34.511	−2.47	502	16 282.1	34.328	−4.76	552	17 991.8	34.046	−6.39
453	14 595.2	34.509	−2.52	503	16 316.5	34.323	−4.80	553	18 025.9	34.040	−6.42
454	14 629.7	34.506	−2.57	504	16 350.8	34.318	−4.84	554	18 059.9	34.033	−6.45
455	14 664.2	34.504	−2.63	505	16 385.1	34.313	−4.87	555	18 093.9	34.027	−6.47
456	14 698.7	34.501	−2.68	506	16 419.4	34.308	−4.91	556	18 128.0	34.020	−6.50
457	14 733.2	34.498	−2.73	507	16 453.7	34.303	−4.95	557	18 162.0	34.014	−6.52
458	14 767.7	34.495	−2.78	508	16 488.0	34.298	−4.99	558	18 196.0	34.007	−6.55
459	14 802.2	34.493	−2.83	509	16 522.3	34.293	−5.03	559	18 230.0	34.001	−6.57
460	14 836.7	34.490	−2.88	510	16 556.6	34.288	−5.06	560	18 264.0	33.994	−6.60
461	14 871.2	34.487	−2.93	511	16 590.9	34.283	−5.10	561	18 298.0	33.988	−6.62
462	14 905.7	34.484	−2.98	512	16 625.2	34.278	−5.14	562	18 332.0	33.981	−6.65
463	14 940.2	34.481	−3.03	513	16 659.5	34.273	−5.17	563	18 366.0	33.974	−6.67
464	14 974.6	34.478	−3.08	514	16 693.7	34.268	−5.21	564	18 399.9	33.968	−6.69
465	15 009.1	34.475	−3.13	515	16 728.0	34.263	−5.25	565	18 433.9	33.961	−6.72
466	15 043.6	34.472	−3.18	516	16 762.2	34.257	−5.28	566	18 467.8	33.954	−6.74
467	15 078.1	34.468	−3.23	517	16 796.5	34.252	−5.32	567	18 501.8	33.948	−6.76
468	15 112.5	34.465	−3.27	518	16 830.8	34.247	−5.35	568	18 535.7	33.941	−6.79
469	15 147.0	34.462	−3.32	519	16 865.0	34.241	−5.39	569	18 569.7	33.934	−6.81
470	15 181.4	34.458	−3.37	520	16 899.2	34.236	−5.42	570	18 603.6	33.927	−6.83
471	15 215.9	34.455	−3.42	521	16 933.5	34.231	−5.46	571	18 637.5	33.920	−6.85
472	15 250.4	34.452	−3.46	522	16 967.7	34.225	−5.49	572	18 671.4	33.913	−6.87
473	15 284.8	34.448	−3.51	523	17 001.9	34.220	−5.52	573	18 705.4	33.907	−6.90
474	15 319.3	34.445	−3.56	524	17 036.1	34.214	−5.56	574	18 739.3	33.900	−6.92
475	15 353.7	34.441	−3.60	525	17 070.3	34.208	−5.59	575	18 773.2	33.893	−6.94
476	15 388.1	34.437	−3.65	526	17 104.6	34.203	−5.62	576	18 807.0	33.886	−6.96
477	15 422.6	34.434	−3.70	527	17 138.8	34.197	−5.66	577	18 840.9	33.879	−6.98
478	15 457.0	34.430	−3.74	528	17 172.9	34.192	−5.69	578	18 874.8	33.872	−7.00
479	15 491.4	34.426	−3.79	529	17 207.1	34.186	−5.72	579	18 908.7	33.865	−7.02
480	15 525.9	34.422	−3.83	530	17 241.3	34.180	−5.75	580	18 942.5	33.858	−7.04
481	15 560.3	34.419	−3.88	531	17 275.5	34.174	−5.78	581	18 976.4	33.851	−7.06
482	15 594.7	34.415	−3.92	532	17 309.7	34.169	−5.82	582	19 010.2	33.844	−7.08
483	15 629.1	34.411	−3.97	533	17 343.8	34.163	−5.85	583	19 044.1	33.837	−7.10
484	15 663.5	34.407	−4.01	534	17 378.0	34.157	−5.88	584	19 077.9	33.829	−7.12
485	15 697.9	34.403	−4.05	535	17 412.1	34.151	−5.91	585	19 111.7	33.822	−7.14
486	15 732.3	34.399	−4.10	536	17 446.3	34.145	−5.94	586	19 145.6	33.815	−7.15
487	15 766.7	34.395	−4.14	537	17 480.4	34.139	−5.97	587	19 179.4	33.808	−7.17
488	15 801.1	34.390	−4.18	538	17 514.6	34.133	−6.00	588	19 213.2	33.801	−7.19
489	15 835.5	34.386	−4.23	539	17 548.7	34.127	−6.03	589	19 247.0	33.794	−7.21
490	15 869.9	34.382	−4.27	540	17 582.8	34.121	−6.06	590	19 280.8	33.786	−7.23
491	15 904.3	34.378	−4.31	541	17 616.9	34.115	−6.09	591	19 314.5	33.779	−7.24
492	15 938.6	34.373	−4.35	542	17 651.1	34.109	−6.12	592	19 348.3	33.772	−7.26
493	15 973.0	34.369	−4.39	543	17 685.2	34.103	−6.15	593	19 382.1	33.765	−7.28
494	16 007.4	34.365	−4.44	544	17 719.3	34.097	−6.18	594	19 415.8	33.757	−7.29
495	16 041.7	34.360	−4.48	545	17 753.4	34.090	−6.20	595	19 449.6	33.750	−7.31
496	16 076.1	34.356	−4.52	546	17 787.4	34.084	−6.23	596	19 483.3	33.743	−7.33
497	16 110.4	34.351	−4.56	547	17 821.5	34.078	−6.26	597	19 517.1	33.735	−7.34
498	16 144.8	34.346	−4.60	548	17 855.6	34.072	−6.29	598	19 550.8	33.728	−7.36
499	16 179.1	34.342	−4.64	549	17 889.7	34.065	−6.31	599	19 584.5	33.721	−7.37
500	16 213.5	34.337	−4.68	550	17 923.7	34.059	−6.34	600	19 618.3	33.713	−7.39

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	19 618.3	33.713	−7.39	**650**	21 294.4	33.329	−7.90	**700**	22 950.9	32.931	−7.97
601	19 652.0	33.706	−7.40	**651**	21 327.7	33.321	−7.90	**701**	22 983.9	32.923	−7.96
602	19 685.7	33.699	−7.42	**652**	21 361.1	33.313	−7.91	**702**	23 016.8	32.915	−7.96
603	19 719.4	33.691	−7.43	**653**	21 394.4	33.305	−7.91	**703**	23 049.7	32.907	−7.96
604	19 753.1	33.684	−7.45	**654**	21 427.7	33.298	−7.92	**704**	23 082.6	32.899	−7.96
605	19 786.7	33.676	−7.46	**655**	21 461.0	33.290	−7.92	**705**	23 115.5	32.891	−7.95
606	19 820.4	33.669	−7.48	**656**	21 494.3	33.282	−7.92	**706**	23 148.4	32.883	−7.95
607	19 854.1	33.661	−7.49	**657**	21 527.5	33.274	−7.93	**707**	23 181.3	32.875	−7.95
608	19 887.7	33.654	−7.50	**658**	21 560.8	33.266	−7.93	**708**	23 214.1	32.867	−7.95
609	19 921.4	33.646	−7.52	**659**	21 594.1	33.258	−7.94	**709**	23 247.0	32.859	−7.94
610	19 955.0	33.639	−7.53	**660**	21 627.3	33.250	−7.94	**710**	23 279.9	32.852	−7.94
611	19 988.7	33.631	−7.54	**661**	21 660.6	33.242	−7.94	**711**	23 312.7	32.844	−7.94
612	20 022.3	33.624	−7.56	**662**	21 693.8	33.234	−7.95	**712**	23 345.5	32.836	−7.93
613	20 055.9	33.616	−7.57	**663**	21 727.0	33.226	−7.95	**713**	23 378.4	32.828	−7.93
614	20 089.5	33.608	−7.58	**664**	21 760.3	33.218	−7.95	**714**	23 411.2	32.820	−7.93
615	20 123.1	33.601	−7.59	**665**	21 793.5	33.210	−7.96	**715**	23 444.0	32.812	−7.92
616	20 156.7	33.593	−7.61	**666**	21 826.7	33.202	−7.96	**716**	23 476.8	32.804	−7.92
617	20 190.3	33.586	−7.62	**667**	21 859.9	33.194	−7.96	**717**	23 509.6	32.796	−7.91
618	20 223.9	33.578	−7.63	**668**	21 893.1	33.186	−7.96	**718**	23 542.4	32.788	−7.91
619	20 257.5	33.570	−7.64	**669**	21 926.2	33.178	−7.97	**719**	23 575.2	32.780	−7.91
620	20 291.0	33.563	−7.65	**670**	21 959.4	33.170	−7.97	**720**	23 608.0	32.772	−7.90
621	20 324.6	33.555	−7.66	**671**	21 992.6	33.162	−7.97	**721**	23 640.7	32.764	−7.90
622	20 358.1	33.547	−7.67	**672**	22 025.7	33.154	−7.97	**722**	23 673.5	32.757	−7.89
623	20 391.7	33.540	−7.68	**673**	22 058.9	33.146	−7.97	**723**	23 706.3	32.749	−7.89
624	20 425.2	33.532	−7.69	**674**	22 092.0	33.139	−7.98	**724**	23 739.0	32.741	−7.88
625	20 458.7	33.524	−7.70	**675**	22 125.2	33.131	−7.98	**725**	23 771.7	32.733	−7.88
626	20 492.3	33.517	−7.71	**676**	22 158.3	33.123	−7.98	**726**	23 804.5	32.725	−7.87
627	20 525.8	33.509	−7.72	**677**	22 191.4	33.115	−7.98	**727**	23 837.2	32.717	−7.87
628	20 559.3	33.501	−7.73	**678**	22 224.5	33.107	−7.98	**728**	23 869.9	32.709	−7.86
629	20 592.8	33.493	−7.74	**679**	22 257.6	33.099	−7.98	**729**	23 902.6	32.701	−7.86
630	20 626.3	33.486	−7.75	**680**	22 290.7	33.091	−7.98	**730**	23 935.3	32.694	−7.85
631	20 659.8	33.478	−7.76	**681**	22 323.8	33.083	−7.98	**731**	23 968.0	32.686	−7.85
632	20 693.2	33.470	−7.77	**682**	22 356.9	33.075	−7.98	**732**	24 000.7	32.678	−7.84
633	20 726.7	33.462	−7.78	**683**	22 390.0	33.067	−7.98	**733**	24 033.3	32.670	−7.84
634	20 760.1	33.455	−7.79	**684**	22 423.0	33.059	−7.98	**734**	24 066.0	32.662	−7.83
635	20 793.6	33.447	−7.79	**685**	22 456.1	33.051	−7.98	**735**	24 098.7	32.654	−7.83
636	20 827.0	33.439	−7.80	**686**	22 489.1	33.043	−7.98	**736**	24 131.3	32.647	−7.82
637	20 860.5	33.431	−7.81	**687**	22 522.2	33.035	−7.98	**737**	24 164.0	32.639	−7.82
638	20 893.9	33.423	−7.82	**688**	22 555.2	33.027	−7.98	**738**	24 196.6	32.631	−7.81
639	20 927.3	33.416	−7.83	**689**	22 588.2	33.019	−7.98	**739**	24 229.2	32.623	−7.80
640	20 960.7	33.408	−7.83	**690**	22 621.2	33.011	−7.98	**740**	24 261.8	32.615	−7.80
641	20 994.1	33.400	−7.84	**691**	22 654.2	33.003	−7.98	**741**	24 294.5	32.607	−7.79
642	21 027.5	33.392	−7.85	**692**	22 687.2	32.995	−7.98	**742**	24 327.1	32.600	−7.79
643	21 060.9	33.384	−7.85	**693**	22 720.2	32.987	−7.98	**743**	24 359.7	32.592	−7.78
644	21 094.3	33.376	−7.86	**694**	22 753.2	32.979	−7.98	**744**	24 392.2	32.584	−7.77
645	21 127.7	33.369	−7.87	**695**	22 786.2	32.971	−7.97	**745**	24 424.8	32.576	−7.77
646	21 161.0	33.361	−7.87	**696**	22 819.2	32.963	−7.97	**746**	24 457.4	32.569	−7.76
647	21 194.4	33.353	−7.88	**697**	22 852.1	32.955	−7.97	**747**	24 490.0	32.561	−7.75
648	21 227.7	33.345	−7.88	**698**	22 885.1	32.947	−7.97	**748**	24 522.5	32.553	−7.75
649	21 261.1	33.337	−7.89	**699**	22 918.0	32.939	−7.97	**749**	24 555.1	32.545	−7.74
650	21 294.4	33.329	−7.90	**700**	22 950.9	32.931	−7.97	**750**	24 587.6	32.538	−7.73

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	24 587.6	32.538	−7.73	**800**	26 205.0	32.160	−7.35	**850**	27 804.0	31.803	−6.95
751	24 620.1	32.530	−7.73	**801**	26 237.1	32.153	−7.34	**851**	27 835.8	31.796	−6.94
752	24 652.7	32.522	−7.72	**802**	26 269.3	32.146	−7.33	**852**	27 867.6	31.789	−6.94
753	24 685.2	32.514	−7.71	**803**	26 301.4	32.138	−7.32	**853**	27 899.3	31.782	−6.93
754	24 717.7	32.507	−7.71	**804**	26 333.6	32.131	−7.31	**854**	27 931.1	31.775	−6.92
755	24 750.2	32.499	−7.70	**805**	26 365.7	32.124	−7.31	**855**	27 962.9	31.768	−6.92
756	24 782.7	32.491	−7.69	**806**	26 397.8	32.116	−7.30	**856**	27 994.7	31.761	−6.91
757	24 815.2	32.484	−7.69	**807**	26 429.9	32.109	−7.29	**857**	28 026.4	31.755	−6.90
758	24 847.7	32.476	−7.68	**808**	26 462.0	32.102	−7.28	**858**	28 058.2	31.748	−6.89
759	24 880.1	32.468	−7.67	**809**	26 494.1	32.094	−7.27	**859**	28 089.9	31.741	−6.89
760	24 912.6	32.461	−7.66	**810**	26 526.2	32.087	−7.26	**860**	28 121.7	31.734	−6.88
761	24 945.1	32.453	−7.66	**811**	26 558.3	32.080	−7.26	**861**	28 153.4	31.727	−6.87
762	24 977.5	32.445	−7.65	**812**	26 590.4	32.073	−7.25	**862**	28 185.1	31.720	−6.87
763	25 009.9	32.438	−7.64	**813**	26 622.4	32.065	−7.24	**863**	28 216.8	31.713	−6.86
764	25 042.4	32.430	−7.64	**814**	26 654.5	32.058	−7.23	**864**	28 248.5	31.706	−6.86
765	25 074.8	32.422	−7.63	**815**	26 686.6	32.051	−7.22	**865**	28 280.2	31.700	−6.85
766	25 107.2	32.415	−7.62	**816**	26 718.6	32.044	−7.22	**866**	28 311.9	31.693	−6.84
767	25 139.6	32.407	−7.61	**817**	26 750.6	32.037	−7.21	**867**	28 343.6	31.686	−6.84
768	25 172.0	32.400	−7.61	**818**	26 782.7	32.029	−7.20	**868**	28 375.3	31.679	−6.83
769	25 204.4	32.392	−7.60	**819**	26 814.7	32.022	−7.19	**869**	28 407.0	31.672	−6.82
770	25 236.8	32.384	−7.59	**820**	26 846.7	32.015	−7.18	**870**	28 438.7	31.665	−6.82
771	25 269.2	32.377	−7.58	**821**	26 878.7	32.008	−7.17	**871**	28 470.3	31.659	−6.81
772	25 301.6	32.369	−7.57	**822**	26 910.7	32.001	−7.17	**872**	28 502.0	31.652	−6.81
773	25 333.9	32.362	−7.57	**823**	26 942.7	31.993	−7.16	**873**	28 533.6	31.645	−6.80
774	25 366.3	32.354	−7.56	**824**	26 974.7	31.986	−7.15	**874**	28 565.3	31.638	−6.79
775	25 398.7	32.346	−7.55	**825**	27 006.7	31.979	−7.14	**875**	28 596.9	31.631	−6.79
776	25 431.0	32.339	−7.54	**826**	27 038.7	31.972	−7.13	**876**	28 628.5	31.625	−6.78
777	25 463.3	32.331	−7.54	**827**	27 070.6	31.965	−7.13	**877**	28 660.1	31.618	−6.78
778	25 495.7	32.324	−7.53	**828**	27 102.6	31.958	−7.12	**878**	28 691.8	31.611	−6.77
779	25 528.0	32.316	−7.52	**829**	27 134.6	31.951	−7.11	**879**	28 723.4	31.604	−6.77
780	25 560.3	32.309	−7.51	**830**	27 166.5	31.943	−7.10	**880**	28 755.0	31.597	−6.76
781	25 592.6	32.301	−7.50	**831**	27 198.5	31.936	−7.09	**881**	28 786.6	31.591	−6.76
782	25 624.9	32.294	−7.50	**832**	27 230.4	31.929	−7.09	**882**	28 818.1	31.584	−6.75
783	25 657.2	32.286	−7.49	**833**	27 262.3	31.922	−7.08	**883**	28 849.7	31.577	−6.74
784	25 689.5	32.279	−7.48	**834**	27 294.2	31.915	−7.07	**884**	28 881.3	31.570	−6.74
785	25 721.7	32.271	−7.47	**835**	27 326.1	31.908	−7.06	**885**	28 912.9	31.564	−6.73
786	25 754.0	32.264	−7.46	**836**	27 358.0	31.901	−7.06	**886**	28 944.4	31.557	−6.73
787	25 786.3	32.256	−7.45	**837**	27 389.9	31.894	−7.05	**887**	28 976.0	31.550	−6.72
788	25 818.5	32.249	−7.45	**838**	27 421.8	31.887	−7.04	**888**	29 007.5	31.544	−6.72
789	25 850.8	32.242	−7.44	**839**	27 453.7	31.880	−7.03	**889**	29 039.1	31.537	−6.71
790	25 883.0	32.234	−7.43	**840**	27 485.6	31.873	−7.02	**890**	29 070.6	31.530	−6.71
791	25 915.2	32.227	−7.42	**841**	27 517.5	31.866	−7.02	**891**	29 102.1	31.523	−6.71
792	25 947.5	32.219	−7.41	**842**	27 549.3	31.859	−7.01	**892**	29 133.6	31.517	−6.70
793	25 979.7	32.212	−7.41	**843**	27 581.2	31.852	−7.00	**893**	29 165.2	31.510	−6.70
794	26 011.9	32.204	−7.40	**844**	27 613.0	31.845	−6.99	**894**	29 196.7	31.503	−6.69
795	26 044.1	32.197	−7.39	**845**	27 644.9	31.838	−6.99	**895**	29 228.2	31.497	−6.69
796	26 076.3	32.190	−7.38	**846**	27 676.7	31.831	−6.98	**896**	29 259.7	31.490	−6.68
797	26 108.5	32.182	−7.37	**847**	27 708.5	31.824	−6.97	**897**	29 291.1	31.483	−6.68
798	26 140.6	32.175	−7.36	**848**	27 740.4	31.817	−6.97	**898**	29 322.6	31.477	−6.68
799	26 172.8	32.168	−7.36	**849**	27 772.2	31.810	−6.96	**899**	29 354.1	31.470	−6.67
800	26 205.0	32.160	−7.35	**850**	27 804.0	31.803	−6.95	**900**	29 385.6	31.463	−6.67

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	29 385.6	31.463	−6.67	**950**	30 950.5	31.133	−6.59	**1000**	32 498.8	30.800	−6.76
901	29 417.0	31.457	−6.66	**951**	30 981.6	31.126	−6.59	**1001**	32 529.6	30.793	−6.77
902	29 448.5	31.450	−6.66	**952**	31 012.7	31.120	−6.59	**1002**	32 560.4	30.787	−6.77
903	29 479.9	31.443	−6.66	**953**	31 043.8	31.113	−6.59	**1003**	32 591.2	30.780	−6.78
904	29 511.4	31.437	−6.65	**954**	31 074.9	31.106	−6.59	**1004**	32 622.0	30.773	−6.79
905	29 542.8	31.430	−6.65	**955**	31 106.0	31.100	−6.59	**1005**	32 652.7	30.766	−6.79
906	29 574.2	31.423	−6.65	**956**	31 137.1	31.093	−6.60	**1006**	32 683.5	30.759	−6.80
907	29 605.6	31.417	−6.64	**957**	31 168.2	31.087	−6.60	**1007**	32 714.2	30.753	−6.81
908	29 637.1	31.410	−6.64	**958**	31 199.3	31.080	−6.60	**1008**	32 745.0	30.746	−6.81
909	29 668.5	31.403	−6.64	**959**	31 230.4	31.073	−6.60	**1009**	32 775.7	30.739	−6.82
910	29 699.9	31.397	−6.63	**960**	31 261.5	31.067	−6.60	**1010**	32 806.5	30.732	−6.83
911	29 731.3	31.390	−6.63	**961**	31 292.5	31.060	−6.60	**1011**	32 837.2	30.725	−6.83
912	29 762.6	31.383	−6.63	**962**	31 323.6	31.054	−6.61	**1012**	32 867.9	30.719	−6.84
913	29 794.0	31.377	−6.62	**963**	31 354.6	31.047	−6.61	**1013**	32 898.6	30.712	−6.85
914	29 825.4	31.370	−6.62	**964**	31 385.7	31.040	−6.61	**1014**	32 929.4	30.705	−6.86
915	29 856.8	31.364	−6.62	**965**	31 416.7	31.034	−6.61	**1015**	32 960.1	30.698	−6.86
916	29 888.1	31.357	−6.62	**966**	31 447.7	31.027	−6.62	**1016**	32 990.7	30.691	−6.87
917	29 919.5	31.350	−6.61	**967**	31 478.8	31.021	−6.62	**1017**	33 021.4	30.684	−6.88
918	29 950.8	31.344	−6.61	**968**	31 509.8	31.014	−6.62	**1018**	33 052.1	30.677	−6.89
919	29 982.2	31.337	−6.61	**969**	31 540.8	31.007	−6.62	**1019**	33 082.8	30.670	−6.90
920	30 013.5	31.331	−6.61	**970**	31 571.8	31.001	−6.63	**1020**	33 113.5	30.664	−6.90
921	30 044.8	31.324	−6.61	**971**	31 602.8	30.994	−6.63	**1021**	33 144.1	30.657	−6.91
922	30 076.2	31.317	−6.60	**972**	31 633.8	30.987	−6.63	**1022**	33 174.8	30.650	−6.92
923	30 107.5	31.311	−6.60	**973**	31 664.8	30.981	−6.64	**1023**	33 205.4	30.643	−6.93
924	30 138.8	31.304	−6.60	**974**	31 695.7	30.974	−6.64	**1024**	33 236.1	30.636	−6.94
925	30 170.1	31.298	−6.60	**975**	31 726.7	30.968	−6.64	**1025**	33 266.7	30.629	−6.95
926	30 201.4	31.291	−6.60	**976**	31 757.7	30.961	−6.65	**1026**	33 297.3	30.622	−6.96
927	30 232.7	31.284	−6.60	**977**	31 788.6	30.954	−6.65	**1027**	33 327.9	30.615	−6.96
928	30 263.9	31.278	−6.59	**978**	31 819.6	30.948	−6.65	**1028**	33 358.5	30.608	−6.97
929	30 295.2	31.271	−6.59	**979**	31 850.5	30.941	−6.66	**1029**	33 389.1	30.601	−6.98
930	30 326.5	31.265	−6.59	**980**	31 881.5	30.934	−6.66	**1030**	33 419.7	30.594	−6.99
931	30 357.7	31.258	−6.59	**981**	31 912.4	30.928	−6.66	**1031**	33 450.3	30.587	−7.00
932	30 389.0	31.251	−6.59	**982**	31 943.3	30.921	−6.67	**1032**	33 480.9	30.580	−7.01
933	30 420.2	31.245	−6.59	**983**	31 974.2	30.914	−6.67	**1033**	33 511.5	30.573	−7.02
934	30 451.5	31.238	−6.59	**984**	32 005.1	30.908	−6.68	**1034**	33 542.1	30.566	−7.03
935	30 482.7	31.232	−6.59	**985**	32 036.1	30.901	−6.68	**1035**	33 572.6	30.559	−7.04
936	30 513.9	31.225	−6.59	**986**	32 067.0	30.894	−6.69	**1036**	33 603.2	30.552	−7.05
937	30 545.2	31.218	−6.59	**987**	32 097.8	30.888	−6.69	**1037**	33 633.7	30.545	−7.06
938	30 576.4	31.212	−6.59	**988**	32 128.7	30.881	−6.70	**1038**	33 664.3	30.538	−7.07
939	30 607.6	31.205	−6.59	**989**	32 159.6	30.874	−6.70	**1039**	33 694.8	30.531	−7.08
940	30 638.8	31.199	−6.59	**990**	32 190.5	30.867	−6.71	**1040**	33 725.3	30.524	−7.09
941	30 670.0	31.192	−6.58	**991**	32 221.3	30.861	−6.71	**1041**	33 755.9	30.517	−7.10
942	30 701.2	31.186	−6.58	**992**	32 252.2	30.854	−6.72	**1042**	33 786.4	30.510	−7.11
943	30 732.4	31.179	−6.58	**993**	32 283.0	30.847	−6.72	**1043**	33 816.9	30.502	−7.12
944	30 763.5	31.172	−6.59	**994**	32 313.9	30.841	−6.73	**1044**	33 847.4	30.495	−7.13
945	30 794.7	31.166	−6.59	**995**	32 344.7	30.834	−6.73	**1045**	33 877.9	30.488	−7.14
946	30 825.9	31.159	−6.59	**996**	32 375.6	30.827	−6.74	**1046**	33 908.3	30.481	−7.15
947	30 857.0	31.153	−6.59	**997**	32 406.4	30.820	−6.74	**1047**	33 938.8	30.474	−7.16
948	30 888.2	31.146	−6.59	**998**	32 437.2	30.814	−6.75	**1048**	33 969.3	30.467	−7.18
949	30 919.3	31.139	−6.59	**999**	32 468.0	30.807	−6.76	**1049**	33 999.8	30.459	−7.19
950	30 950.5	31.133	−6.59	**1000**	32 498.8	30.800	−6.76	**1050**	34 030.2	30.452	−7.20

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	34 030.2	30.452	−7.20	**1100**	35 543.6	30.076	−7.90	**1150**	37 037.1	29.657	−8.92
1051	34 060.7	30.445	−7.21	**1101**	35 573.6	30.068	−7.92	**1151**	37 066.8	29.648	−8.94
1052	34 091.1	30.438	−7.22	**1102**	35 603.7	30.060	−7.94	**1152**	37 096.4	29.639	−8.97
1053	34 121.5	30.431	−7.23	**1103**	35 633.8	30.052	−7.95	**1153**	37 126.0	29.630	−8.99
1054	34 152.0	30.423	−7.24	**1104**	35 663.8	30.044	−7.97	**1154**	37 155.7	29.621	−9.02
1055	34 182.4	30.416	−7.26	**1105**	35 693.8	30.036	−7.99	**1155**	37 185.3	29.612	−9.04
1056	34 212.8	30.409	−7.27	**1106**	35 723.9	30.028	−8.01	**1156**	37 214.9	29.603	−9.07
1057	34 243.2	30.402	−7.28	**1107**	35 753.9	30.020	−8.02	**1157**	37 244.5	29.594	−9.09
1058	34 273.6	30.394	−7.29	**1108**	35 783.9	30.012	−8.04	**1158**	37 274.1	29.585	−9.12
1059	34 304.0	30.387	−7.30	**1109**	35 813.9	30.004	−8.06	**1159**	37 303.6	29.576	−9.14
1060	34 334.4	30.380	−7.32	**1110**	35 843.9	29.996	−8.08	**1160**	37 333.2	29.567	−9.17
1061	34 364.8	30.372	−7.33	**1111**	35 873.9	29.988	−8.10	**1161**	37 362.8	29.557	−9.20
1062	34 395.1	30.365	−7.34	**1112**	35 903.9	29.980	−8.11	**1162**	37 392.3	29.548	−9.22
1063	34 425.5	30.358	−7.36	**1113**	35 933.9	29.972	−8.13	**1163**	37 421.9	29.539	−9.25
1064	34 455.8	30.350	−7.37	**1114**	35 963.8	29.964	−8.15	**1164**	37 451.4	29.530	−9.28
1065	34 486.2	30.343	−7.38	**1115**	35 993.8	29.955	−8.17	**1165**	37 480.9	29.520	−9.30
1066	34 516.5	30.336	−7.39	**1116**	36 023.8	29.947	−8.19	**1166**	37 510.5	29.511	−9.33
1067	34 546.9	30.328	−7.41	**1117**	36 053.7	29.939	−8.21	**1167**	37 540.0	29.502	−9.36
1068	34 577.2	30.321	−7.42	**1118**	36 083.6	29.931	−8.23	**1168**	37 569.5	29.492	−9.39
1069	34 607.5	30.313	−7.43	**1119**	36 113.6	29.923	−8.25	**1169**	37 598.9	29.483	−9.42
1070	34 637.8	30.306	−7.45	**1120**	36 143.5	29.914	−8.27	**1170**	37 628.4	29.473	−9.44
1071	34 668.1	30.298	−7.46	**1121**	36 173.4	29.906	−8.28	**1171**	37 657.9	29.464	−9.47
1072	34 698.4	30.291	−7.47	**1122**	36 203.3	29.898	−8.30	**1172**	37 687.3	29.455	−9.50
1073	34 728.7	30.283	−7.49	**1123**	36 233.2	29.889	−8.32	**1173**	37 716.8	29.445	−9.53
1074	34 759.0	30.276	−7.50	**1124**	36 263.1	29.881	−8.34	**1174**	37 746.2	29.435	−9.56
1075	34 789.2	30.268	−7.52	**1125**	36 292.9	29.873	−8.36	**1175**	37 775.7	29.426	−9.59
1076	34 819.5	30.261	−7.53	**1126**	36 322.8	29.864	−8.38	**1176**	37 805.1	29.416	−9.62
1077	34 849.8	30.253	−7.54	**1127**	36 352.7	29.856	−8.41	**1177**	37 834.5	29.407	−9.65
1078	34 880.0	30.246	−7.56	**1128**	36 382.5	29.848	−8.43	**1178**	37 863.9	29.397	−9.68
1079	34 910.3	30.238	−7.57	**1129**	36 412.4	29.839	−8.45	**1179**	37 893.3	29.387	−9.71
1080	34 940.5	30.231	−7.59	**1130**	36 442.2	29.831	−8.47	**1180**	37 922.7	29.378	−9.74
1081	34 970.7	30.223	−7.60	**1131**	36 472.0	29.822	−8.49	**1181**	37 952.1	29.368	−9.77
1082	35 000.9	30.216	−7.62	**1132**	36 501.9	29.814	−8.51	**1182**	37 981.4	29.358	−9.80
1083	35 031.1	30.208	−7.63	**1133**	36 531.7	29.805	−8.53	**1183**	38 010.8	29.348	−9.84
1084	35 061.4	30.200	−7.65	**1134**	36 561.5	29.797	−8.55	**1184**	38 040.1	29.338	−9.87
1085	35 091.5	30.193	−7.66	**1135**	36 591.3	29.788	−8.57	**1185**	38 069.4	29.328	−9.90
1086	35 121.7	30.185	−7.68	**1136**	36 621.0	29.779	−8.60	**1186**	38 098.8	29.319	−9.93
1087	35 151.9	30.177	−7.69	**1137**	36 650.8	29.771	−8.62	**1187**	38 128.1	29.309	−9.97
1088	35 182.1	30.170	−7.71	**1138**	36 680.6	29.762	−8.64	**1188**	38 157.4	29.299	−10.00
1089	35 212.3	30.162	−7.72	**1139**	36 710.3	29.754	−8.66	**1189**	38 186.7	29.289	−10.03
1090	35 242.4	30.154	−7.74	**1140**	36 740.1	29.745	−8.68	**1190**	38 216.0	29.279	−10.07
1091	35 272.6	30.146	−7.75	**1141**	36 769.8	29.736	−8.71	**1191**	38 245.2	29.268	−10.10
1092	35 302.7	30.139	−7.77	**1142**	36 799.6	29.728	−8.73	**1192**	38 274.5	29.258	−10.13
1093	35 332.8	30.131	−7.79	**1143**	36 829.3	29.719	−8.75	**1193**	38 303.8	29.248	−10.17
1094	35 363.0	30.123	−7.80	**1144**	36 859.0	29.710	−8.78	**1194**	38 333.0	29.238	−10.20
1095	35 393.1	30.115	−7.82	**1145**	36 888.7	29.701	−8.80	**1195**	38 362.2	29.228	−10.24
1096	35 423.2	30.107	−7.84	**1146**	36 918.4	29.692	−8.82	**1196**	38 391.5	29.218	−10.28
1097	35 453.3	30.100	−7.85	**1147**	36 948.1	29.684	−8.85	**1197**	38 420.7	29.207	−10.31
1098	35 483.4	30.092	−7.87	**1148**	36 977.8	29.675	−8.87	**1198**	38 449.9	29.197	−10.35
1099	35 513.5	30.084	−7.89	**1149**	37 007.4	29.666	−8.89	**1199**	38 479.1	29.187	−10.38
1100	35 543.6	30.076	−7.90	**1150**	37 037.1	29.657	−8.92	**1200**	38 508.2	29.176	−10.42

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1200	38 508.2	29.176	−10.42	**1250**	39 953.1	28.600	−12.85	**1300**	41 365.5	27.861	−17.10
1201	38 537.4	29.166	−10.46	**1251**	39 981.7	28.587	−12.92	**1301**	41 393.4	27.844	−17.21
1202	38 566.6	29.155	−10.50	**1252**	40 010.3	28.574	−12.98	**1302**	41 421.2	27.827	−17.33
1203	38 595.7	29.145	−10.54	**1253**	40 038.9	28.561	−13.04	**1303**	41 449.0	27.809	−17.44
1204	38 624.9	29.134	−10.57	**1254**	40 067.4	28.548	−13.11	**1304**	41 476.8	27.792	−17.56
1205	38 654.0	29.124	−10.61	**1255**	40 096.0	28.534	−13.18	**1305**	41 504.6	27.774	−17.68
1206	38 683.1	29.113	−10.65	**1256**	40 124.5	28.521	−13.24	**1306**	41 532.4	27.756	−17.80
1207	38 712.2	29.102	−10.69	**1257**	40 153.0	28.508	−13.31	**1307**	41 560.1	27.738	−17.92
1208	38 741.3	29.092	−10.73	**1258**	40 181.5	28.495	−13.38	**1308**	41 587.9	27.720	−18.04
1209	38 770.4	29.081	−10.77	**1259**	40 210.0	28.481	−13.45	**1309**	41 615.6	27.702	−18.17
1210	38 799.5	29.070	−10.81	**1260**	40 238.5	28.468	−13.52	**1310**	41 643.3	27.684	−18.29
1211	38 828.5	29.059	−10.85	**1261**	40 266.9	28.454	−13.59	**1311**	41 670.9	27.666	−18.42
1212	38 857.6	29.048	−10.90	**1262**	40 295.4	28.441	−13.66	**1312**	41 698.6	27.647	−18.55
1213	38 886.6	29.037	−10.94	**1263**	40 323.8	28.427	−13.73	**1313**	41 726.2	27.629	−18.68
1214	38 915.7	29.026	−10.98	**1264**	40 352.2	28.413	−13.81	**1314**	41 753.9	27.610	−18.81
1215	38 944.7	29.015	−11.02	**1265**	40 380.6	28.399	−13.88	**1315**	41 781.5	27.591	−18.94
1216	38 973.7	29.004	−11.07	**1266**	40 409.0	28.385	−13.95	**1316**	41 809.0	27.572	−19.08
1217	39 002.7	28.993	−11.11	**1267**	40 437.4	28.371	−14.03	**1317**	41 836.6	27.553	−19.21
1218	39 031.7	28.982	−11.16	**1268**	40 465.8	28.357	−14.11	**1318**	41 864.1	27.534	−19.35
1219	39 060.7	28.971	−11.20	**1269**	40 494.1	28.343	−14.18	**1319**	41 891.7	27.514	−19.49
1220	39 089.6	28.960	−11.25	**1270**	40 522.5	28.329	−14.26	**1320**	41 919.2	27.495	−19.63
1221	39 118.6	28.948	−11.29	**1271**	40 550.8	28.315	−14.34	**1321**	41 946.7	27.475	−19.78
1222	39 147.5	28.937	−11.34	**1272**	40 579.1	28.300	−14.42	**1322**	41 974.1	27.455	−19.92
1223	39 176.5	28.926	−11.38	**1273**	40 607.4	28.286	−14.50	**1323**	42 001.6	27.435	−20.07
1224	39 205.4	28.914	−11.43	**1274**	40 635.7	28.271	−14.59	**1324**	42 029.0	27.415	−20.22
1225	39 234.3	28.903	−11.48	**1275**	40 663.9	28.257	−14.67	**1325**	42 056.4	27.395	−20.37
1226	39 263.2	28.891	−11.53	**1276**	40 692.2	28.242	−14.75	**1326**	42 083.8	27.374	−20.52
1227	39 292.1	28.880	−11.58	**1277**	40 720.4	28.227	−14.84	**1327**	42 111.1	27.354	−20.67
1228	39 320.9	28.868	−11.62	**1278**	40 748.6	28.212	−14.93	**1328**	42 138.5	27.333	−20.83
1229	39 349.8	28.857	−11.67	**1279**	40 776.8	28.197	−15.01	**1329**	42 165.8	27.312	−20.99
1230	39 378.7	28.845	−11.72	**1280**	40 805.0	28.182	−15.10	**1330**	42 193.1	27.291	−21.14
1231	39 407.5	28.833	−11.78	**1281**	40 833.2	28.167	−15.19	**1331**	42 220.4	27.270	−21.31
1232	39 436.3	28.821	−11.83	**1282**	40 861.4	28.152	−15.28	**1332**	42 247.6	27.248	−21.47
1233	39 465.1	28.810	−11.88	**1283**	40 889.5	28.136	−15.37	**1333**	42 274.9	27.227	−21.63
1234	39 493.9	28.798	−11.93	**1284**	40 917.6	28.121	−15.46	**1334**	42 302.1	27.205	−21.80
1235	39 522.7	28.786	−11.98	**1285**	40 945.7	28.106	−15.56	**1335**	42 329.3	27.183	−21.97
1236	39 551.5	28.774	−12.04	**1286**	40 973.8	28.090	−15.65	**1336**	42 356.5	27.161	−22.14
1237	39 580.3	28.762	−12.09	**1287**	41 001.9	28.074	−15.75	**1337**	42 383.6	27.139	−22.31
1238	39 609.0	28.749	−12.15	**1288**	41 030.0	28.058	−15.84	**1338**	42 410.7	27.116	−22.49
1239	39 637.8	28.737	−12.20	**1289**	41 058.0	28.043	−15.94	**1339**	42 437.8	27.094	−22.67
1240	39 666.5	28.725	−12.26	**1290**	41 086.1	28.027	−16.04	**1340**	42 464.9	27.071	−22.84
1241	39 695.2	28.713	−12.31	**1291**	41 114.1	28.010	−16.14	**1341**	42 492.0	27.048	−23.03
1242	39 723.9	28.700	−12.37	**1292**	41 142.1	27.994	−16.24	**1342**	42 519.0	27.025	−23.21
1243	39 752.6	28.688	−12.43	**1293**	41 170.1	27.978	−16.35	**1343**	42 546.0	27.002	−23.39
1244	39 781.3	28.676	−12.49	**1294**	41 198.1	27.962	−16.45	**1344**	42 573.0	26.978	−23.58
1245	39 810.0	28.663	−12.55	**1295**	41 226.0	27.945	−16.56	**1345**	42 600.0	26.955	−23.77
1246	39 838.6	28.650	−12.61	**1296**	41 253.9	27.928	−16.66	**1346**	42 626.9	26.931	−23.96
1247	39 867.3	28.638	−12.67	**1297**	41 281.9	27.912	−16.77	**1347**	42 653.9	26.907	−24.16
1248	39 895.9	28.625	−12.73	**1298**	41 309.8	27.895	−16.88	**1348**	42 680.8	26.882	−24.36
1249	39 924.5	28.612	−12.79	**1299**	41 337.7	27.878	−16.99	**1349**	42 707.6	26.858	−24.56
1250	39 953.1	28.600	−12.85	**1300**	41 365.5	27.861	−17.10	**1350**	42 734.5	26.833	−24.76

TABLE 7.4.3. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1350	42 734.5	26.833	−24.76	**1360**	43 001.5	26.575	−26.91	**1370**	43 265.9	26.294	−29.32
1351	42 761.3	26.808	−24.96	**1361**	43 028.1	26.548	−27.13	**1371**	43 292.2	26.265	−29.57
1352	42 788.1	26.783	−25.17	**1362**	43 054.6	26.521	−27.37	**1372**	43 318.4	26.235	−29.83
1353	42 814.9	26.758	−25.38	**1363**	43 081.1	26.493	−27.60				
1354	42 841.6	26.733	−25.59	**1364**	43 107.6	26.466	−27.84				
1355	42 868.3	26.707	−25.80	**1365**	43 134.1	26.438	−28.08				
1356	42 895.0	26.681	−26.02	**1366**	43 160.5	26.410	−28.32				
1357	42 921.7	26.655	−26.23	**1367**	43 186.9	26.381	−28.56				
1358	42 948.3	26.629	−26.46	**1368**	43 213.3	26.352	−28.81				
1359	42 974.9	26.602	−26.68	**1369**	43 239.6	26.324	−29.06				
1360	43 001.5	26.575	−26.91	**1370**	43 265.9	26.294	−29.32				

7.5. Reference Function and Table for Platinum, Pt-67, Versus the Negative Thermoelement, Type KN, a Nickel-Aluminum Alloy

The coefficients, α_0, α_1, and c_i, for the tenth degree polynomial plus the exponential expression that give the thermoelectric voltage, E, of Pt-67 versus type KN thermoelements as a function of temperature, t_{90}, in the 0 °C to 1372 °C range are given in table 7.5.1. The reference equation in this range is of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i + \alpha_0 e^{\alpha_1 (t_{90} - 126.9686)^2},$$

where e is the natural logarithm constant, E is in microvolts, and t_{90} is in degrees Celsius (ITS-90). The coefficients for the thirteenth degree polynomial that gives the thermoelectric voltage in the −270 °C to 0 °C range are also given in table 7.5.1.

TABLE 7.5.1. *Platinum, Pt-67, versus type KN thermoelements --- coefficients, α_0, α_1 and c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equation below 0 °C is of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$; the equation above 0 °C is of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i + \alpha_0 e^{\alpha_1 (t_{90} - 126.9686)^2}$, where e is the natural logarithm constant, E is in microvolts, and t_{90} is in degrees Celsius.*

Temperature Range	Coefficients
−270 °C to 0 °C	$c_0 = 0.000\ 000\ 000\ 0\ldots$ $c_1 = 1.363\ 817\ 745\ 2 \times 10^{1}$ $c_2 = 6.322\ 846\ 542\ 6 \times 10^{-4}$ $c_3 = 2.871\ 584\ 767\ 6 \times 10^{-4}$ $c_4 = 1.828\ 136\ 088\ 7 \times 10^{-5}$ $c_5 = 4.781\ 942\ 767\ 9 \times 10^{-7}$ $c_6 = 7.271\ 290\ 952\ 1 \times 10^{-9}$ $c_7 = 6.940\ 395\ 331\ 9 \times 10^{-11}$ $c_8 = 4.252\ 401\ 385\ 5 \times 10^{-13}$ $c_9 = 1.644\ 863\ 493\ 8 \times 10^{-15}$ $c_{10} = 3.721\ 398\ 052\ 6 \times 10^{-18}$ $c_{11} = 3.774\ 144\ 269\ 5 \times 10^{-21}$ $c_{12} = -1.002\ 535\ 559\ 0 \times 10^{-24}$ $c_{13} = -3.893\ 531\ 072\ 5 \times 10^{-27}$
0 °C to 1372 °C	$c_0 = -1.760\ 041\ 368\ 6 \times 10^{1}$ $c_1 = 1.310\ 925\ 440\ 3 \times 10^{1}$ $c_2 = -8.272\ 625\ 323\ 0 \times 10^{-3}$ $c_3 = -6.078\ 239\ 846\ 2 \times 10^{-5}$ $c_4 = 2.881\ 039\ 039\ 6 \times 10^{-7}$ $c_5 = -5.504\ 480\ 453\ 6 \times 10^{-10}$ $c_6 = 5.952\ 323\ 079\ 2 \times 10^{-13}$ $c_7 = -4.027\ 200\ 945\ 1 \times 10^{-16}$ $c_8 = 1.760\ 445\ 293\ 3 \times 10^{-19}$ $c_9 = -4.780\ 397\ 440\ 1 \times 10^{-23}$ $c_{10} = 6.331\ 536\ 065\ 9 \times 10^{-27}$ $\alpha_0 = 1.185\ 976 \times 10^{2}$ $\alpha_1 = -1.183\ 432 \times 10^{-4}$

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for Pt-67 versus type KN thermoelements at selected fixed points are given in table 7.5.2. The reference values for Pt-67 versus type KN thermoelements are given at 1 °C intervals from −270 °C to 1372 °C in table 7.5.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 7.5.1, 7.5.2, and 7.5.3, respectively.

It should be stressed that **type KN thermoelement materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type KN thermoelements are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 7.5.2. *Thermoelectric values at fixed points for platinum, Pt-67, versus type KN thermoelements*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
e-Hydrogen TP	−259.3467	−2890.84	1.886	201.27
Neon TP	−248.5939	−2858.67	4.106	206.03
Oxygen TP	−218.7916	−2656.70	8.905	102.73
Argon TP	−189.3442	−2363.54	10.652	30.59
Mercury TP	−38.8344	−528.56	13.473	11.30
Ice MP	0.000	0.00	13.638	−4.82
Water TP	0.01	0.1	13.638	−4.82
Gallium MP	29.7646	402.6	13.375	−13.27
Indium FP	156.5985	1835.2	8.365	−41.91
Tin FP	231.928	2395.4	7.082	1.48
Cadmium FP	321.069	3040.3	7.378	2.66
Lead FP	327.462	3087.6	7.395	2.72
Zinc FP	419.527	3784.0	7.787	5.85
Antimony FP	630.63	5558.0	8.882	2.42
Aluminum FP	660.323	5822.6	8.939	1.38
Silver FP	961.78	8461.4	8.323	−3.65
Gold FP	1064.18	9293.9	7.928	−4.12
Copper FP	1084.62	9455.1	7.843	−4.27

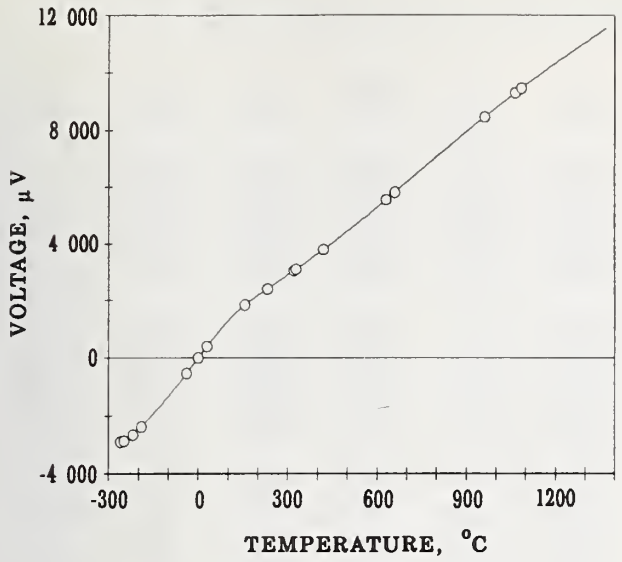

FIGURE 7.5.1. *Thermoelectric voltage for platinum, Pt-67, versus type KN thermoelements. The circles indicate values at various thermometric fixed points.*

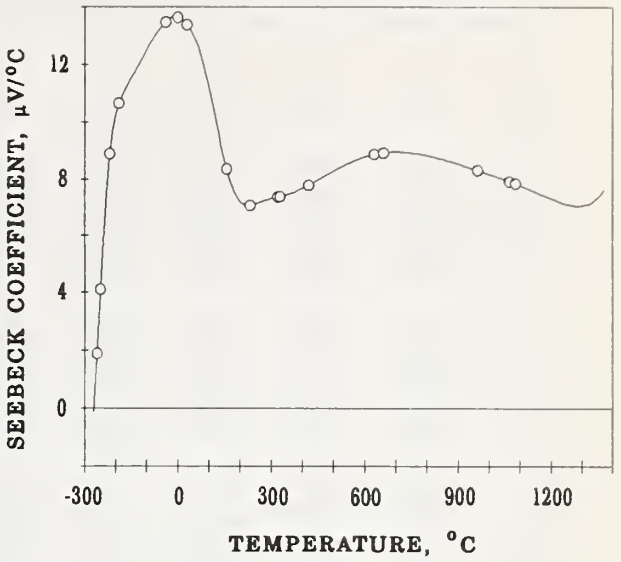

FIGURE 7.5.2. *Seebeck coefficient for platinum, Pt-67, versus type KN thermoelements. The circles indicate values at various thermometric fixed points.*

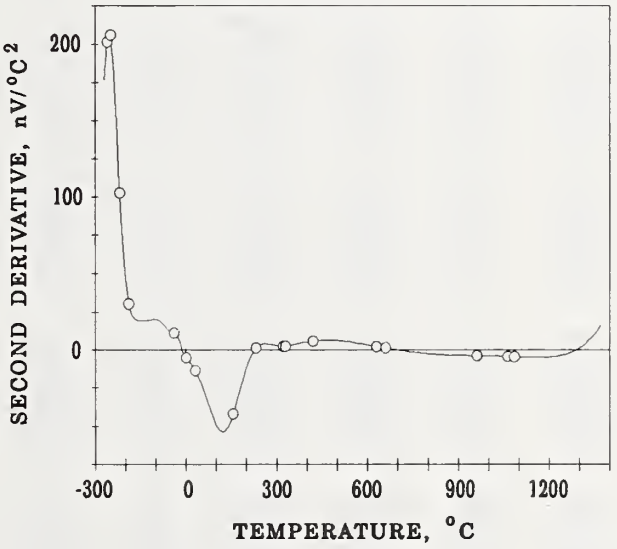

FIGURE 7.5.3. *Second derivative of thermoelectric voltage for platinum, Pt-67, versus type KN thermoelements. The circles indicate values at various thermometric fixed points.*

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−270	−2 899.98	−0.125	176.79	−230	−2 749.11	7.497	149.14	−190	−2 370.52	10.632	31.29
−269	−2 900.01	0.052	178.53	−229	−2 741.54	7.644	144.94	−189	−2 359.87	10.663	30.24
−268	−2 899.87	0.232	180.60	−228	−2 733.82	7.787	140.72	−188	−2 349.19	10.693	29.26
−267	−2 899.55	0.414	182.91	−227	−2 725.97	7.925	136.49	−187	−2 338.48	10.721	28.34
−266	−2 899.04	0.598	185.38	−226	−2 717.97	8.060	132.26	−186	−2 327.75	10.749	27.50
−265	−2 898.35	0.784	187.94	−225	−2 709.85	8.190	128.04	−185	−2 316.99	10.776	26.71
−264	−2 897.47	0.974	190.52	−224	−2 701.60	8.316	123.85	−184	−2 306.20	10.803	25.99
−263	−2 896.40	1.166	193.06	−223	−2 693.22	8.438	119.69	−183	−2 295.38	10.828	25.33
−262	−2 895.14	1.360	195.51	−222	−2 684.72	8.555	115.57	−182	−2 284.54	10.853	24.71
−261	−2 893.68	1.556	197.83	−221	−2 676.11	8.669	111.50	−181	−2 273.67	10.878	24.15
−260	−2 892.03	1.755	199.97	−220	−2 667.39	8.778	107.49	−180	−2 262.78	10.902	23.64
−259	−2 890.17	1.956	201.92	−219	−2 658.55	8.884	103.54	−179	−2 251.87	10.925	23.17
−258	−2 888.12	2.159	203.63	−218	−2 649.62	8.985	99.67	−178	−2 240.93	10.948	22.75
−257	−2 885.85	2.364	205.09	−217	−2 640.59	9.083	95.88	−177	−2 229.97	10.971	22.36
−256	−2 883.39	2.569	206.29	−216	−2 631.45	9.177	92.16	−176	−2 218.99	10.993	22.01
−255	−2 880.72	2.776	207.20	−215	−2 622.23	9.268	88.54	−175	−2 207.99	11.015	21.69
−254	−2 877.84	2.984	207.82	−214	−2 612.92	9.354	85.01	−174	−2 196.96	11.036	21.41
−253	−2 874.75	3.192	208.15	−213	−2 603.52	9.438	81.57	−173	−2 185.92	11.058	21.15
−252	−2 871.45	3.400	208.17	−212	−2 594.05	9.517	78.24	−172	−2 174.85	11.079	20.92
−251	−2 867.95	3.608	207.90	−211	−2 584.49	9.594	75.01	−171	−2 163.76	11.099	20.71
−250	−2 864.24	3.815	207.33	−210	−2 574.86	9.668	71.88	−170	−2 152.65	11.120	20.53
−249	−2 860.32	4.022	206.47	−209	−2 565.16	9.738	68.86	−169	−2 141.52	11.140	20.37
−248	−2 856.19	4.228	205.32	−208	−2 555.38	9.805	65.94	−168	−2 130.37	11.161	20.22
−247	−2 851.86	4.433	203.89	−207	−2 545.55	9.870	63.14	−167	−2 119.20	11.181	20.09
−246	−2 847.33	4.636	202.19	−206	−2 535.65	9.932	60.44	−166	−2 108.01	11.201	19.98
−245	−2 842.59	4.837	200.23	−205	−2 525.68	9.991	57.85	−165	−2 096.80	11.221	19.88
−244	−2 837.65	5.036	198.03	−204	−2 515.67	10.047	55.38	−164	−2 085.56	11.241	19.79
−243	−2 832.52	5.233	195.59	−203	−2 505.59	10.102	53.01	−163	−2 074.31	11.260	19.72
−242	−2 827.19	5.427	192.94	−202	−2 495.46	10.153	50.74	−162	−2 063.04	11.280	19.65
−241	−2 821.66	5.619	190.07	−201	−2 485.28	10.203	48.59	−161	−2 051.75	11.300	19.59
−240	−2 815.95	5.808	187.01	−200	−2 475.06	10.251	46.54	−160	−2 040.44	11.319	19.54
−239	−2 810.05	5.993	183.78	−199	−2 464.78	10.296	44.59	−159	−2 029.12	11.339	19.50
−238	−2 803.97	6.175	180.38	−198	−2 454.47	10.340	42.74	−158	−2 017.77	11.358	19.46
−237	−2 797.70	6.354	176.84	−197	−2 444.11	10.382	40.99	−157	−2 006.40	11.378	19.42
−236	−2 791.26	6.529	173.16	−196	−2 433.70	10.422	39.34	−156	−1 995.01	11.397	19.39
−235	−2 784.65	6.700	169.37	−195	−2 423.26	10.460	37.78	−155	−1 983.60	11.417	19.37
−234	−2 777.86	6.867	165.47	−194	−2 412.78	10.497	36.31	−154	−1 972.18	11.436	19.35
−233	−2 770.91	7.031	161.49	−193	−2 402.27	10.533	34.93	−153	−1 960.73	11.455	19.33
−232	−2 763.80	7.190	157.43	−192	−2 391.72	10.567	33.64	−152	−1 949.27	11.475	19.31
−231	−2 756.53	7.346	153.31	−191	−2 381.13	10.600	32.43	−151	−1 937.78	11.494	19.30
−230	−2 749.11	7.497	149.14	−190	−2 370.52	10.632	31.29	−150	−1 926.28	11.513	19.28

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−1 926.28	11.513	19.28	−100	−1 326.24	12.501	20.43	−50	−678.26	13.341	12.34
−149	−1 914.76	11.532	19.27	−99	−1 313.73	12.522	20.40	−49	−664.92	13.353	12.23
−148	−1 903.21	11.552	19.27	−98	−1 301.20	12.542	20.37	−48	−651.56	13.365	12.14
−147	−1 891.65	11.571	19.26	−97	−1 288.65	12.562	20.32	−47	−638.19	13.377	12.05
−146	−1 880.07	11.590	19.25	−96	−1 276.07	12.583	20.27	−46	−624.80	13.389	11.96
−145	−1 868.47	11.610	19.25	−95	−1 263.48	12.603	20.20	−45	−611.41	13.401	11.87
−144	−1 856.85	11.629	19.25	−94	−1 250.87	12.623	20.13	−44	−598.00	13.413	11.79
−143	−1 845.21	11.648	19.25	−93	−1 238.23	12.643	20.04	−43	−584.58	13.425	11.70
−142	−1 833.56	11.667	19.25	−92	−1 225.58	12.663	19.95	−42	−571.15	13.437	11.61
−141	−1 821.88	11.687	19.26	−91	−1 212.91	12.683	19.85	−41	−557.71	13.448	11.52
−140	−1 810.18	11.706	19.26	−90	−1 200.21	12.703	19.74	−40	−544.26	13.460	11.42
−139	−1 798.47	11.725	19.27	−89	−1 187.50	12.723	19.61	−39	−530.79	13.471	11.32
−138	−1 786.73	11.744	19.28	−88	−1 174.77	12.742	19.48	−38	−517.31	13.482	11.20
−137	−1 774.98	11.764	19.29	−87	−1 162.02	12.762	19.34	−37	−503.83	13.493	11.07
−136	−1 763.21	11.783	19.31	−86	−1 149.25	12.781	19.19	−36	−490.33	13.504	10.93
−135	−1 751.41	11.802	19.33	−85	−1 136.46	12.800	19.03	−35	−476.82	13.515	10.77
−134	−1 739.60	11.822	19.35	−84	−1 123.65	12.819	18.86	−34	−463.30	13.526	10.59
−133	−1 727.77	11.841	19.37	−83	−1 110.82	12.838	18.69	−33	−449.77	13.536	10.39
−132	−1 715.92	11.860	19.40	−82	−1 097.97	12.856	18.50	−32	−436.22	13.547	10.16
−131	−1 704.05	11.880	19.42	−81	−1 085.11	12.875	18.31	−31	−422.67	13.557	9.91
−130	−1 692.16	11.899	19.45	−80	−1 072.22	12.893	18.11	−30	−409.11	13.566	9.63
−129	−1 680.25	11.919	19.49	−79	−1 059.32	12.911	17.91	−29	−395.54	13.576	9.32
−128	−1 668.32	11.938	19.52	−78	−1 046.40	12.929	17.70	−28	−381.96	13.585	8.98
−127	−1 656.38	11.958	19.56	−77	−1 033.46	12.946	17.48	−27	−368.37	13.594	8.60
−126	−1 644.41	11.977	19.60	−76	−1 020.51	12.964	17.26	−26	−354.77	13.602	8.19
−125	−1 632.42	11.997	19.64	−75	−1 007.54	12.981	17.04	−25	−341.16	13.610	7.75
−124	−1 620.41	12.017	19.69	−74	−994.55	12.998	16.81	−24	−327.55	13.618	7.27
−123	−1 608.39	12.036	19.73	−73	−981.54	13.014	16.58	−23	−313.93	13.625	6.75
−122	−1 596.34	12.056	19.78	−72	−968.52	13.031	16.35	−22	−300.30	13.631	6.20
−121	−1 584.28	12.076	19.83	−71	−955.48	13.047	16.12	−21	−286.67	13.637	5.62
−120	−1 572.19	12.096	19.88	−70	−942.42	13.063	15.89	−20	−273.03	13.643	5.00
−119	−1 560.08	12.116	19.93	−69	−929.35	13.079	15.66	−19	−259.38	13.647	4.35
−118	−1 547.96	12.136	19.98	−68	−916.27	13.094	15.44	−18	−245.73	13.651	3.69
−117	−1 535.81	12.156	20.03	−67	−903.16	13.110	15.21	−17	−232.08	13.655	3.00
−116	−1 523.65	12.176	20.08	−66	−890.05	13.125	14.99	−16	−218.42	13.657	2.29
−115	−1 511.46	12.196	20.13	−65	−876.92	13.140	14.77	−15	−204.77	13.659	1.58
−114	−1 499.26	12.216	20.17	−64	−863.77	13.154	14.56	−14	−191.11	13.660	0.88
−113	−1 487.03	12.236	20.22	−63	−850.61	13.169	14.35	−13	−177.44	13.661	0.18
−112	−1 474.78	12.256	20.26	−62	−837.43	13.183	14.15	−12	−163.78	13.661	−0.48
−111	−1 462.52	12.277	20.30	−61	−824.24	13.197	13.96	−11	−150.12	13.660	−1.11
−110	−1 450.23	12.297	20.34	−60	−811.04	13.211	13.77	−10	−136.46	13.659	−1.68
−109	−1 437.92	12.317	20.37	−59	−797.82	13.225	13.59	−9	−122.81	13.657	−2.17
−108	−1 425.60	12.338	20.40	−58	−784.59	13.238	13.42	−8	−109.15	13.654	−2.57
−107	−1 413.25	12.358	20.43	−57	−771.34	13.252	13.25	−7	−95.50	13.652	−2.85
−106	−1 400.88	12.378	20.45	−56	−758.08	13.265	13.10	−6	−81.85	13.649	−2.98
−105	−1 388.49	12.399	20.46	−55	−744.81	13.278	12.95	−5	−68.20	13.646	−2.93
−104	−1 376.08	12.419	20.47	−54	−731.53	13.291	12.81	−4	−54.56	13.643	−2.68
−103	−1 363.65	12.440	20.47	−53	−718.23	13.303	12.68	−3	−40.92	13.640	−2.17
−102	−1 351.20	12.460	20.47	−52	−704.92	13.316	12.56	−2	−27.28	13.639	−1.38
−101	−1 338.73	12.481	20.45	−51	−691.60	13.328	12.44	−1	−13.64	13.638	−0.25
−100	−1 326.24	12.501	20.43	−50	−678.26	13.341	12.34	0	0.00	13.638	1.26

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	13.638	−4.82	50	670.1	13.026	−21.81	100	1 282.5	11.236	−49.15
1	13.6	13.633	−5.08	51	683.1	13.004	−22.31	101	1 293.7	11.187	−49.54
2	27.3	13.628	−5.34	52	696.1	12.981	−22.82	102	1 304.9	11.137	−49.93
3	40.9	13.623	−5.60	53	709.0	12.958	−23.33	103	1 316.0	11.087	−50.29
4	54.5	13.617	−5.86	54	722.0	12.934	−23.86	104	1 327.0	11.036	−50.65
5	68.1	13.611	−6.11	55	734.9	12.910	−24.39	105	1 338.1	10.986	−50.98
6	81.7	13.605	−6.37	56	747.8	12.886	−24.92	106	1 349.0	10.934	−51.30
7	95.3	13.598	−6.63	57	760.7	12.861	−25.46	107	1 359.9	10.883	−51.60
8	108.9	13.591	−6.89	58	773.5	12.835	−26.01	108	1 370.8	10.831	−51.89
9	122.5	13.584	−7.15	59	786.3	12.808	−26.57	109	1 381.6	10.779	−52.16
10	136.1	13.577	−7.41	60	799.1	12.782	−27.12	110	1 392.3	10.727	−52.40
11	149.7	13.569	−7.68	61	811.9	12.754	−27.69	111	1 403.0	10.674	−52.63
12	163.2	13.562	−7.94	62	824.6	12.726	−28.26	112	1 413.7	10.622	−52.85
13	176.8	13.554	−8.21	63	837.4	12.698	−28.83	113	1 424.3	10.569	−53.04
14	190.3	13.545	−8.48	64	850.0	12.669	−29.41	114	1 434.8	10.516	−53.21
15	203.9	13.537	−8.75	65	862.7	12.639	−29.99	115	1 445.3	10.462	−53.36
16	217.4	13.528	−9.02	66	875.3	12.609	−30.58	116	1 455.7	10.409	−53.50
17	230.9	13.519	−9.30	67	887.9	12.578	−31.16	117	1 466.1	10.355	−53.61
18	244.5	13.509	−9.59	68	900.5	12.546	−31.75	118	1 476.5	10.302	−53.70
19	258.0	13.499	−9.87	69	913.0	12.514	−32.35	119	1 486.7	10.248	−53.78
20	271.5	13.489	−10.16	70	925.5	12.482	−32.94	120	1 497.0	10.194	−53.83
21	284.9	13.479	−10.46	71	938.0	12.448	−33.54	121	1 507.1	10.140	−53.86
22	298.4	13.468	−10.76	72	950.4	12.415	−34.13	122	1 517.2	10.086	−53.87
23	311.9	13.458	−11.06	73	962.8	12.380	−34.73	123	1 527.3	10.033	−53.85
24	325.3	13.446	−11.37	74	975.2	12.345	−35.33	124	1 537.3	9.979	−53.82
25	338.8	13.435	−11.69	75	987.5	12.309	−35.92	125	1 547.3	9.925	−53.77
26	352.2	13.423	−12.01	76	999.8	12.273	−36.52	126	1 557.2	9.871	−53.69
27	365.6	13.411	−12.33	77	1 012.0	12.236	−37.11	127	1 567.0	9.818	−53.59
28	379.0	13.398	−12.67	78	1 024.2	12.199	−37.71	128	1 576.8	9.764	−53.48
29	392.4	13.385	−13.01	79	1 036.4	12.161	−38.30	129	1 586.5	9.711	−53.34
30	405.8	13.372	−13.35	80	1 048.6	12.122	−38.88	130	1 596.2	9.657	−53.18
31	419.2	13.359	−13.70	81	1 060.7	12.083	−39.47	131	1 605.8	9.604	−52.99
32	432.5	13.345	−14.06	82	1 072.7	12.043	−40.05	132	1 615.4	9.551	−52.79
33	445.8	13.331	−14.43	83	1 084.8	12.003	−40.62	133	1 624.9	9.499	−52.57
34	459.2	13.316	−14.80	84	1 096.7	11.962	−41.19	134	1 634.4	9.446	−52.32
35	472.5	13.301	−15.18	85	1 108.7	11.921	−41.75	135	1 643.8	9.394	−52.06
36	485.8	13.286	−15.57	86	1 120.6	11.879	−42.31	136	1 653.2	9.342	−51.77
37	499.0	13.270	−15.97	87	1 132.4	11.836	−42.86	137	1 662.5	9.290	−51.47
38	512.3	13.254	−16.37	88	1 144.3	11.793	−43.41	138	1 671.8	9.239	−51.14
39	525.6	13.237	−16.78	89	1 156.0	11.749	−43.94	139	1 681.0	9.188	−50.80
40	538.8	13.220	−17.20	90	1 167.8	11.705	−44.47	140	1 690.2	9.138	−50.43
41	552.0	13.203	−17.63	91	1 179.4	11.660	−44.98	141	1 699.3	9.087	−50.05
42	565.2	13.185	−18.06	92	1 191.1	11.615	−45.49	142	1 708.3	9.038	−49.65
43	578.4	13.167	−18.50	93	1 202.7	11.569	−45.99	143	1 717.3	8.988	−49.23
44	591.5	13.148	−18.95	94	1 214.2	11.523	−46.48	144	1 726.3	8.939	−48.79
45	604.7	13.129	−19.41	95	1 225.7	11.476	−46.95	145	1 735.2	8.890	−48.34
46	617.8	13.109	−19.87	96	1 237.2	11.429	−47.42	146	1 744.1	8.842	−47.86
47	630.9	13.089	−20.34	97	1 248.6	11.382	−47.87	147	1 752.9	8.795	−47.37
48	644.0	13.068	−20.82	98	1 259.9	11.334	−48.31	148	1 761.7	8.748	−46.87
49	657.0	13.047	−21.31	99	1 271.2	11.285	−48.73	149	1 770.4	8.701	−46.34
50	670.1	13.026	−21.81	100	1 282.5	11.236	−49.15	150	1 779.1	8.655	−45.81

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
150	1 779.1	8.655	−45.81	**200**	2 168.4	7.211	−11.60	**250**	2 523.8	7.135	3.87
151	1 787.7	8.609	−45.25	**201**	2 175.6	7.200	−11.01	**251**	2 531.0	7.139	3.93
152	1 796.3	8.564	−44.69	**202**	2 182.8	7.189	−10.42	**252**	2 538.1	7.143	3.98
153	1 804.8	8.520	−44.11	**203**	2 189.9	7.179	−9.85	**253**	2 545.3	7.147	4.02
154	1 813.3	8.476	−43.51	**204**	2 197.1	7.169	−9.29	**254**	2 552.4	7.151	4.05
155	1 821.8	8.433	−42.91	**205**	2 204.3	7.160	−8.74	**255**	2 559.6	7.155	4.09
156	1 830.2	8.390	−42.29	**206**	2 211.4	7.152	−8.20	**256**	2 566.7	7.159	4.11
157	1 838.6	8.348	−41.66	**207**	2 218.6	7.144	−7.68	**257**	2 573.9	7.163	4.13
158	1 846.9	8.307	−41.01	**208**	2 225.7	7.136	−7.16	**258**	2 581.0	7.167	4.14
159	1 855.2	8.266	−40.36	**209**	2 232.9	7.129	−6.66	**259**	2 588.2	7.172	4.15
160	1 863.4	8.226	−39.70	**210**	2 240.0	7.123	−6.17	**260**	2 595.4	7.176	4.16
161	1 871.6	8.187	−39.02	**211**	2 247.1	7.117	−5.69	**261**	2 602.6	7.180	4.16
162	1 879.8	8.148	−38.34	**212**	2 254.2	7.112	−5.23	**262**	2 609.7	7.184	4.16
163	1 887.9	8.110	−37.65	**213**	2 261.3	7.107	−4.78	**263**	2 616.9	7.188	4.15
164	1 896.0	8.073	−36.96	**214**	2 268.4	7.102	−4.33	**264**	2 624.1	7.192	4.14
165	1 904.1	8.036	−36.25	**215**	2 275.5	7.098	−3.91	**265**	2 631.3	7.196	4.13
166	1 912.1	8.001	−35.54	**216**	2 282.6	7.094	−3.49	**266**	2 638.5	7.201	4.11
167	1 920.1	7.965	−34.82	**217**	2 289.7	7.091	−3.09	**267**	2 645.7	7.205	4.09
168	1 928.0	7.931	−34.10	**218**	2 296.8	7.088	−2.70	**268**	2 652.9	7.209	4.07
169	1 936.0	7.897	−33.37	**219**	2 303.9	7.086	−2.32	**269**	2 660.1	7.213	4.04
170	1 943.8	7.864	−32.64	**220**	2 311.0	7.083	−1.95	**270**	2 667.3	7.217	4.02
171	1 951.7	7.832	−31.91	**221**	2 318.1	7.082	−1.60	**271**	2 674.6	7.221	3.99
172	1 959.5	7.800	−31.17	**222**	2 325.1	7.080	−1.26	**272**	2 681.8	7.225	3.95
173	1 967.3	7.770	−30.43	**223**	2 332.2	7.079	−0.93	**273**	2 689.0	7.229	3.92
174	1 975.0	7.739	−29.69	**224**	2 339.3	7.078	−0.61	**274**	2 696.2	7.233	3.89
175	1 982.8	7.710	−28.95	**225**	2 346.4	7.078	−0.31	**275**	2 703.5	7.236	3.85
176	1 990.5	7.682	−28.21	**226**	2 353.5	7.078	−0.02	**276**	2 710.7	7.240	3.81
177	1 998.1	7.654	−27.46	**227**	2 360.5	7.078	0.26	**277**	2 718.0	7.244	3.78
178	2 005.8	7.627	−26.72	**228**	2 367.6	7.078	0.53	**278**	2 725.2	7.248	3.74
179	2 013.4	7.600	−25.98	**229**	2 374.7	7.079	0.79	**279**	2 732.5	7.252	3.70
180	2 021.0	7.575	−25.24	**230**	2 381.8	7.080	1.04	**280**	2 739.7	7.255	3.66
181	2 028.5	7.550	−24.51	**231**	2 388.9	7.081	1.27	**281**	2 747.0	7.259	3.61
182	2 036.1	7.526	−23.77	**232**	2 395.9	7.082	1.50	**282**	2 754.2	7.262	3.57
183	2 043.6	7.502	−23.04	**233**	2 403.0	7.084	1.71	**283**	2 761.5	7.266	3.53
184	2 051.1	7.480	−22.32	**234**	2 410.1	7.086	1.91	**284**	2 768.8	7.270	3.49
185	2 058.5	7.458	−21.60	**235**	2 417.2	7.088	2.10	**285**	2 776.0	7.273	3.45
186	2 066.0	7.436	−20.88	**236**	2 424.3	7.090	2.28	**286**	2 783.3	7.276	3.41
187	2 073.4	7.416	−20.17	**237**	2 431.4	7.092	2.46	**287**	2 790.6	7.280	3.37
188	2 080.8	7.396	−19.46	**238**	2 438.5	7.095	2.62	**288**	2 797.9	7.283	3.33
189	2 088.2	7.377	−18.76	**239**	2 445.6	7.098	2.77	**289**	2 805.2	7.287	3.29
190	2 095.6	7.359	−18.07	**240**	2 452.7	7.100	2.91	**290**	2 812.4	7.290	3.25
191	2 102.9	7.341	−17.38	**241**	2 459.8	7.103	3.05	**291**	2 819.7	7.293	3.21
192	2 110.3	7.324	−16.71	**242**	2 466.9	7.107	3.17	**292**	2 827.0	7.296	3.17
193	2 117.6	7.307	−16.04	**243**	2 474.0	7.110	3.29	**293**	2 834.3	7.299	3.14
194	2 124.9	7.292	−15.38	**244**	2 481.1	7.113	3.39	**294**	2 841.6	7.302	3.10
195	2 132.2	7.277	−14.72	**245**	2 488.2	7.117	3.49	**295**	2 848.9	7.306	3.06
196	2 139.4	7.262	−14.08	**246**	2 495.3	7.120	3.58	**296**	2 856.2	7.309	3.03
197	2 146.7	7.248	−13.44	**247**	2 502.4	7.124	3.67	**297**	2 863.5	7.312	3.00
198	2 153.9	7.235	−12.82	**248**	2 509.6	7.127	3.74	**298**	2 870.9	7.315	2.97
199	2 161.1	7.223	−12.21	**249**	2 516.7	7.131	3.81	**299**	2 878.2	7.318	2.94
200	2 168.4	7.211	−11.60	**250**	2 523.8	7.135	3.87	**300**	2 885.5	7.320	2.91

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	2 885.5	7.320	2.91	350	3 255.0	7.462	3.32	400	3 633.1	7.678	5.28
301	2 892.8	7.323	2.88	351	3 262.4	7.466	3.36	401	3 640.7	7.683	5.32
302	2 900.1	7.326	2.86	352	3 269.9	7.469	3.39	402	3 648.4	7.689	5.35
303	2 907.5	7.329	2.83	353	3 277.4	7.472	3.43	403	3 656.1	7.694	5.38
304	2 914.8	7.332	2.81	354	3 284.8	7.476	3.47	404	3 663.8	7.699	5.41
305	2 922.1	7.335	2.79	355	3 292.3	7.479	3.51	405	3 671.5	7.705	5.45
306	2 929.5	7.337	2.77	356	3 299.8	7.483	3.55	406	3 679.2	7.710	5.48
307	2 936.8	7.340	2.75	357	3 307.3	7.486	3.59	407	3 686.9	7.716	5.51
308	2 944.1	7.343	2.73	358	3 314.8	7.490	3.63	408	3 694.7	7.721	5.54
309	2 951.5	7.346	2.72	359	3 322.3	7.494	3.67	409	3 702.4	7.727	5.57
310	2 958.8	7.348	2.70	360	3 329.8	7.497	3.71	410	3 710.1	7.733	5.60
311	2 966.2	7.351	2.69	361	3 337.3	7.501	3.75	411	3 717.8	7.738	5.63
312	2 973.5	7.354	2.68	362	3 344.8	7.505	3.79	412	3 725.6	7.744	5.65
313	2 980.9	7.356	2.67	363	3 352.3	7.509	3.83	413	3 733.3	7.749	5.68
314	2 988.3	7.359	2.67	364	3 359.8	7.512	3.87	414	3 741.1	7.755	5.71
315	2 995.6	7.362	2.66	365	3 367.3	7.516	3.91	415	3 748.8	7.761	5.74
316	3 003.0	7.364	2.66	366	3 374.8	7.520	3.95	416	3 756.6	7.767	5.76
317	3 010.3	7.367	2.65	367	3 382.3	7.524	3.99	417	3 764.4	7.772	5.79
318	3 017.7	7.370	2.65	368	3 389.9	7.528	4.04	418	3 772.1	7.778	5.81
319	3 025.1	7.372	2.65	369	3 397.4	7.532	4.08	419	3 779.9	7.784	5.84
320	3 032.5	7.375	2.66	370	3 404.9	7.536	4.12	420	3 787.7	7.790	5.86
321	3 039.8	7.378	2.66	371	3 412.5	7.541	4.16	421	3 795.5	7.796	5.88
322	3 047.2	7.380	2.67	372	3 420.0	7.545	4.20	422	3 803.3	7.802	5.91
323	3 054.6	7.383	2.67	373	3 427.6	7.549	4.24	423	3 811.1	7.808	5.93
324	3 062.0	7.386	2.68	374	3 435.1	7.553	4.29	424	3 818.9	7.813	5.95
325	3 069.4	7.388	2.69	375	3 442.7	7.558	4.33	425	3 826.7	7.819	5.97
326	3 076.8	7.391	2.70	376	3 450.2	7.562	4.37	426	3 834.6	7.825	5.99
327	3 084.1	7.394	2.72	377	3 457.8	7.566	4.41	427	3 842.4	7.831	6.01
328	3 091.5	7.397	2.73	378	3 465.4	7.571	4.45	428	3 850.2	7.837	6.03
329	3 098.9	7.399	2.74	379	3 472.9	7.575	4.49	429	3 858.1	7.844	6.05
330	3 106.3	7.402	2.76	380	3 480.5	7.580	4.53	430	3 865.9	7.850	6.07
331	3 113.7	7.405	2.78	381	3 488.1	7.584	4.57	431	3 873.8	7.856	6.09
332	3 121.2	7.408	2.80	382	3 495.7	7.589	4.61	432	3 881.6	7.862	6.11
333	3 128.6	7.410	2.82	383	3 503.3	7.593	4.65	433	3 889.5	7.868	6.13
334	3 136.0	7.413	2.84	384	3 510.9	7.598	4.69	434	3 897.4	7.874	6.14
335	3 143.4	7.416	2.86	385	3 518.5	7.603	4.73	435	3 905.2	7.880	6.16
336	3 150.8	7.419	2.89	386	3 526.1	7.608	4.77	436	3 913.1	7.886	6.17
337	3 158.2	7.422	2.91	387	3 533.7	7.612	4.81	437	3 921.0	7.893	6.19
338	3 165.6	7.425	2.94	388	3 541.3	7.617	4.85	438	3 928.9	7.899	6.20
339	3 173.1	7.428	2.97	389	3 548.9	7.622	4.89	439	3 936.8	7.905	6.22
340	3 180.5	7.431	2.99	390	3 556.5	7.627	4.92	440	3 944.7	7.911	6.23
341	3 187.9	7.434	3.02	391	3 564.2	7.632	4.96	441	3 952.6	7.917	6.24
342	3 195.4	7.437	3.05	392	3 571.8	7.637	5.00	442	3 960.6	7.924	6.26
343	3 202.8	7.440	3.08	393	3 579.4	7.642	5.04	443	3 968.5	7.930	6.27
344	3 210.3	7.443	3.12	394	3 587.1	7.647	5.07	444	3 976.4	7.936	6.28
345	3 217.7	7.446	3.15	395	3 594.7	7.652	5.11	445	3 984.3	7.942	6.29
346	3 225.1	7.449	3.18	396	3 602.4	7.657	5.14	446	3 992.3	7.949	6.30
347	3 232.6	7.452	3.21	397	3 610.0	7.662	5.18	447	4 000.2	7.955	6.31
348	3 240.0	7.456	3.25	398	3 617.7	7.668	5.21	448	4 008.2	7.961	6.32
349	3 247.5	7.459	3.28	399	3 625.4	7.673	5.25	449	4 016.2	7.968	6.33
350	3 255.0	7.462	3.32	400	3 633.1	7.678	5.28	450	4 024.1	7.974	6.34

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	4 024.1	7.974	6.34	**500**	4 430.8	8.291	6.16	**550**	4 852.7	8.575	5.09
451	4 032.1	7.980	6.35	**501**	4 439.1	8.297	6.15	**551**	4 861.3	8.581	5.06
452	4 040.1	7.987	6.35	**502**	4 447.4	8.303	6.14	**552**	4 869.9	8.586	5.04
453	4 048.1	7.993	6.36	**503**	4 455.7	8.310	6.12	**553**	4 878.4	8.591	5.01
454	4 056.1	7.999	6.37	**504**	4 464.0	8.316	6.11	**554**	4 887.0	8.596	4.98
455	4 064.1	8.006	6.37	**505**	4 472.3	8.322	6.09	**555**	4 895.6	8.601	4.95
456	4 072.1	8.012	6.38	**506**	4 480.7	8.328	6.08	**556**	4 904.2	8.606	4.92
457	4 080.1	8.019	6.38	**507**	4 489.0	8.334	6.06	**557**	4 912.9	8.610	4.89
458	4 088.1	8.025	6.39	**508**	4 497.3	8.340	6.04	**558**	4 921.5	8.615	4.86
459	4 096.2	8.031	6.39	**509**	4 505.7	8.346	6.03	**559**	4 930.1	8.620	4.83
460	4 104.2	8.038	6.39	**510**	4 514.0	8.352	6.01	**560**	4 938.7	8.625	4.80
461	4 112.2	8.044	6.40	**511**	4 522.4	8.358	5.99	**561**	4 947.3	8.630	4.77
462	4 120.3	8.051	6.40	**512**	4 530.7	8.364	5.97	**562**	4 956.0	8.635	4.74
463	4 128.3	8.057	6.40	**513**	4 539.1	8.370	5.96	**563**	4 964.6	8.639	4.71
464	4 136.4	8.063	6.40	**514**	4 547.5	8.376	5.94	**564**	4 973.2	8.644	4.68
465	4 144.5	8.070	6.40	**515**	4 555.9	8.382	5.92	**565**	4 981.9	8.649	4.65
466	4 152.5	8.076	6.40	**516**	4 564.2	8.388	5.90	**566**	4 990.5	8.653	4.62
467	4 160.6	8.083	6.40	**517**	4 572.6	8.394	5.88	**567**	4 999.2	8.658	4.59
468	4 168.7	8.089	6.40	**518**	4 581.0	8.400	5.86	**568**	5 007.9	8.662	4.56
469	4 176.8	8.095	6.40	**519**	4 589.4	8.405	5.84	**569**	5 016.5	8.667	4.53
470	4 184.9	8.102	6.40	**520**	4 597.8	8.411	5.82	**570**	5 025.2	8.671	4.50
471	4 193.0	8.108	6.40	**521**	4 606.3	8.417	5.80	**571**	5 033.9	8.676	4.47
472	4 201.1	8.115	6.40	**522**	4 614.7	8.423	5.78	**572**	5 042.5	8.680	4.43
473	4 209.2	8.121	6.39	**523**	4 623.1	8.429	5.76	**573**	5 051.2	8.685	4.40
474	4 217.4	8.127	6.39	**524**	4 631.5	8.434	5.74	**574**	5 059.9	8.689	4.37
475	4 225.5	8.134	6.39	**525**	4 640.0	8.440	5.72	**575**	5 068.6	8.694	4.34
476	4 233.6	8.140	6.38	**526**	4 648.4	8.446	5.69	**576**	5 077.3	8.698	4.31
477	4 241.8	8.146	6.38	**527**	4 656.9	8.451	5.67	**577**	5 086.0	8.702	4.27
478	4 249.9	8.153	6.37	**528**	4 665.3	8.457	5.65	**578**	5 094.7	8.706	4.24
479	4 258.1	8.159	6.37	**529**	4 673.8	8.463	5.63	**579**	5 103.4	8.711	4.21
480	4 266.2	8.166	6.36	**530**	4 682.2	8.468	5.60	**580**	5 112.1	8.715	4.18
481	4 274.4	8.172	6.36	**531**	4 690.7	8.474	5.58	**581**	5 120.8	8.719	4.14
482	4 282.6	8.178	6.35	**532**	4 699.2	8.480	5.56	**582**	5 129.6	8.723	4.11
483	4 290.8	8.185	6.34	**533**	4 707.7	8.485	5.53	**583**	5 138.3	8.727	4.08
484	4 298.9	8.191	6.34	**534**	4 716.2	8.491	5.51	**584**	5 147.0	8.731	4.04
485	4 307.1	8.197	6.33	**535**	4 724.7	8.496	5.48	**585**	5 155.7	8.735	4.01
486	4 315.3	8.204	6.32	**536**	4 733.2	8.502	5.46	**586**	5 164.5	8.739	3.98
487	4 323.5	8.210	6.31	**537**	4 741.7	8.507	5.44	**587**	5 173.2	8.743	3.94
488	4 331.8	8.216	6.30	**538**	4 750.2	8.512	5.41	**588**	5 182.0	8.747	3.91
489	4 340.0	8.223	6.29	**539**	4 758.7	8.518	5.38	**589**	5 190.7	8.751	3.88
490	4 348.2	8.229	6.28	**540**	4 767.2	8.523	5.36	**590**	5 199.5	8.755	3.84
491	4 356.4	8.235	6.27	**541**	4 775.7	8.529	5.33	**591**	5 208.2	8.759	3.81
492	4 364.7	8.241	6.26	**542**	4 784.3	8.534	5.31	**592**	5 217.0	8.763	3.78
493	4 372.9	8.248	6.25	**543**	4 792.8	8.539	5.28	**593**	5 225.8	8.766	3.74
494	4 381.2	8.254	6.24	**544**	4 801.3	8.544	5.25	**594**	5 234.5	8.770	3.71
495	4 389.4	8.260	6.23	**545**	4 809.9	8.550	5.23	**595**	5 243.3	8.774	3.67
496	4 397.7	8.266	6.22	**546**	4 818.4	8.555	5.20	**596**	5 252.1	8.777	3.64
497	4 406.0	8.273	6.20	**547**	4 827.0	8.560	5.17	**597**	5 260.9	8.781	3.60
498	4 414.2	8.279	6.19	**548**	4 835.6	8.565	5.15	**598**	5 269.6	8.785	3.57
499	4 422.5	8.285	6.18	**549**	4 844.1	8.570	5.12	**599**	5 278.4	8.788	3.54
500	4 430.8	8.291	6.16	**550**	4 852.7	8.575	5.09	**600**	5 287.2	8.792	3.50

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	5 287.2	8.792	3.50	**650**	5 730.4	8.923	1.74	**700**	6 178.0	8.967	0.07
601	5 296.0	8.795	3.47	**651**	5 739.4	8.924	1.70	**701**	6 187.0	8.967	0.03
602	5 304.8	8.799	3.43	**652**	5 748.3	8.926	1.67	**702**	6 196.0	8.967	0.00
603	5 313.6	8.802	3.40	**653**	5 757.2	8.928	1.63	**703**	6 204.9	8.967	−0.03
604	5 322.4	8.805	3.36	**654**	5 766.1	8.929	1.60	**704**	6 213.9	8.967	−0.06
605	5 331.2	8.809	3.33	**655**	5 775.1	8.931	1.56	**705**	6 222.9	8.967	−0.09
606	5 340.0	8.812	3.29	**656**	5 784.0	8.933	1.53	**706**	6 231.8	8.967	−0.12
607	5 348.8	8.815	3.26	**657**	5 792.9	8.934	1.49	**707**	6 240.8	8.967	−0.15
608	5 357.7	8.819	3.22	**658**	5 801.9	8.936	1.46	**708**	6 249.8	8.966	−0.18
609	5 366.5	8.822	3.19	**659**	5 810.8	8.937	1.42	**709**	6 258.7	8.966	−0.21
610	5 375.3	8.825	3.15	**660**	5 819.7	8.938	1.39	**710**	6 267.7	8.966	−0.24
611	5 384.1	8.828	3.12	**661**	5 828.7	8.940	1.35	**711**	6 276.7	8.966	−0.27
612	5 393.0	8.831	3.08	**662**	5 837.6	8.941	1.32	**712**	6 285.6	8.966	−0.30
613	5 401.8	8.834	3.05	**663**	5 846.6	8.942	1.28	**713**	6 294.6	8.965	−0.33
614	5 410.6	8.837	3.01	**664**	5 855.5	8.944	1.25	**714**	6 303.6	8.965	−0.36
615	5 419.5	8.840	2.98	**665**	5 864.5	8.945	1.22	**715**	6 312.5	8.964	−0.39
616	5 428.3	8.843	2.94	**666**	5 873.4	8.946	1.18	**716**	6 321.5	8.964	−0.42
617	5 437.1	8.846	2.91	**667**	5 882.3	8.947	1.15	**717**	6 330.5	8.964	−0.45
618	5 446.0	8.849	2.87	**668**	5 891.3	8.948	1.11	**718**	6 339.4	8.963	−0.48
619	5 454.8	8.852	2.83	**669**	5 900.2	8.949	1.08	**719**	6 348.4	8.963	−0.50
620	5 463.7	8.855	2.80	**670**	5 909.2	8.951	1.04	**720**	6 357.3	8.962	−0.53
621	5 472.6	8.858	2.76	**671**	5 918.1	8.952	1.01	**721**	6 366.3	8.962	−0.56
622	5 481.4	8.860	2.73	**672**	5 927.1	8.953	0.98	**722**	6 375.3	8.961	−0.59
623	5 490.3	8.863	2.69	**673**	5 936.1	8.953	0.94	**723**	6 384.2	8.960	−0.62
624	5 499.1	8.866	2.66	**674**	5 945.0	8.954	0.91	**724**	6 393.2	8.960	−0.65
625	5 508.0	8.868	2.62	**675**	5 954.0	8.955	0.88	**725**	6 402.1	8.959	−0.67
626	5 516.9	8.871	2.59	**676**	5 962.9	8.956	0.84	**726**	6 411.1	8.958	−0.70
627	5 525.7	8.873	2.55	**677**	5 971.9	8.957	0.81	**727**	6 420.1	8.958	−0.73
628	5 534.6	8.876	2.52	**678**	5 980.8	8.958	0.78	**728**	6 429.0	8.957	−0.76
629	5 543.5	8.878	2.48	**679**	5 989.8	8.959	0.74	**729**	6 438.0	8.956	−0.79
630	5 552.4	8.881	2.44	**680**	5 998.7	8.959	0.71	**730**	6 446.9	8.955	−0.81
631	5 561.3	8.883	2.41	**681**	6 007.7	8.960	0.68	**731**	6 455.9	8.955	−0.84
632	5 570.1	8.886	2.37	**682**	6 016.7	8.961	0.64	**732**	6 464.8	8.954	−0.87
633	5 579.0	8.888	2.34	**683**	6 025.6	8.961	0.61	**733**	6 473.8	8.953	−0.89
634	5 587.9	8.890	2.30	**684**	6 034.6	8.962	0.58	**734**	6 482.7	8.952	−0.92
635	5 596.8	8.893	2.27	**685**	6 043.6	8.962	0.54	**735**	6 491.7	8.951	−0.95
636	5 605.7	8.895	2.23	**686**	6 052.5	8.963	0.51	**736**	6 500.6	8.950	−0.97
637	5 614.6	8.897	2.20	**687**	6 061.5	8.963	0.48	**737**	6 509.6	8.949	−1.00
638	5 623.5	8.899	2.16	**688**	6 070.4	8.964	0.45	**738**	6 518.5	8.948	−1.03
639	5 632.4	8.902	2.12	**689**	6 079.4	8.964	0.41	**739**	6 527.5	8.947	−1.05
640	5 641.3	8.904	2.09	**690**	6 088.4	8.965	0.38	**740**	6 536.4	8.946	−1.08
641	5 650.2	8.906	2.05	**691**	6 097.3	8.965	0.35	**741**	6 545.4	8.945	−1.11
642	5 659.1	8.908	2.02	**692**	6 106.3	8.965	0.32	**742**	6 554.3	8.944	−1.13
643	5 668.0	8.910	1.98	**693**	6 115.3	8.966	0.29	**743**	6 563.3	8.943	−1.16
644	5 676.9	8.912	1.95	**694**	6 124.2	8.966	0.25	**744**	6 572.2	8.941	−1.18
645	5 685.8	8.914	1.91	**695**	6 133.2	8.966	0.22	**745**	6 581.2	8.940	−1.21
646	5 694.8	8.916	1.88	**696**	6 142.2	8.966	0.19	**746**	6 590.1	8.939	−1.23
647	5 703.7	8.917	1.84	**697**	6 151.1	8.967	0.16	**747**	6 599.0	8.938	−1.26
648	5 712.6	8.919	1.81	**698**	6 160.1	8.967	0.13	**748**	6 608.0	8.937	−1.28
649	5 721.5	8.921	1.77	**699**	6 169.1	8.967	0.10	**749**	6 616.9	8.935	−1.31
650	5 730.4	8.923	1.74	**700**	6 178.0	8.967	0.07	**750**	6 625.8	8.934	−1.33

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	6 625.8	8.934	−1.33	800	7 070.4	8.840	−2.36	850	7 509.1	8.704	−3.03
751	6 634.8	8.933	−1.36	801	7 079.2	8.838	−2.38	851	7 517.8	8.701	−3.04
752	6 643.7	8.931	−1.38	802	7 088.1	8.835	−2.40	852	7 526.5	8.698	−3.05
753	6 652.6	8.930	−1.40	803	7 096.9	8.833	−2.41	853	7 535.2	8.695	−3.06
754	6 661.6	8.928	−1.43	804	7 105.7	8.830	−2.43	854	7 543.9	8.691	−3.07
755	6 670.5	8.927	−1.45	805	7 114.6	8.828	−2.45	855	7 552.6	8.688	−3.08
756	6 679.4	8.925	−1.47	806	7 123.4	8.825	−2.46	856	7 561.3	8.685	−3.09
757	6 688.3	8.924	−1.50	807	7 132.2	8.823	−2.48	857	7 570.0	8.682	−3.10
758	6 697.3	8.922	−1.52	808	7 141.0	8.821	−2.49	858	7 578.7	8.679	−3.11
759	6 706.2	8.921	−1.54	809	7 149.9	8.818	−2.51	859	7 587.3	8.676	−3.12
760	6 715.1	8.919	−1.57	810	7 158.7	8.816	−2.52	860	7 596.0	8.673	−3.13
761	6 724.0	8.918	−1.59	811	7 167.5	8.813	−2.54	861	7 604.7	8.670	−3.14
762	6 732.9	8.916	−1.61	812	7 176.3	8.810	−2.56	862	7 613.4	8.667	−3.14
763	6 741.9	8.915	−1.64	813	7 185.1	8.808	−2.57	863	7 622.0	8.663	−3.15
764	6 750.8	8.913	−1.66	814	7 193.9	8.805	−2.59	864	7 630.7	8.660	−3.16
765	6 759.7	8.911	−1.68	815	7 202.7	8.803	−2.60	865	7 639.3	8.657	−3.17
766	6 768.6	8.910	−1.70	816	7 211.5	8.800	−2.61	866	7 648.0	8.654	−3.18
767	6 777.5	8.908	−1.72	817	7 220.3	8.797	−2.63	867	7 656.7	8.651	−3.19
768	6 786.4	8.906	−1.75	818	7 229.1	8.795	−2.64	868	7 665.3	8.648	−3.19
769	6 795.3	8.904	−1.77	819	7 237.9	8.792	−2.66	869	7 673.9	8.644	−3.20
770	6 804.2	8.903	−1.79	820	7 246.7	8.790	−2.67	870	7 682.6	8.641	−3.21
771	6 813.1	8.901	−1.81	821	7 255.5	8.787	−2.69	871	7 691.2	8.638	−3.22
772	6 822.0	8.899	−1.83	822	7 264.3	8.784	−2.70	872	7 699.9	8.635	−3.23
773	6 830.9	8.897	−1.85	823	7 273.1	8.781	−2.71	873	7 708.5	8.632	−3.23
774	6 839.8	8.895	−1.87	824	7 281.8	8.779	−2.73	874	7 717.1	8.628	−3.24
775	6 848.7	8.893	−1.89	825	7 290.6	8.776	−2.74	875	7 725.8	8.625	−3.25
776	6 857.6	8.891	−1.92	826	7 299.4	8.773	−2.75	876	7 734.4	8.622	−3.26
777	6 866.5	8.890	−1.94	827	7 308.2	8.770	−2.77	877	7 743.0	8.619	−3.26
778	6 875.4	8.888	−1.96	828	7 316.9	8.768	−2.78	878	7 751.6	8.615	−3.27
779	6 884.3	8.886	−1.98	829	7 325.7	8.765	−2.79	879	7 760.2	8.612	−3.28
780	6 893.2	8.884	−2.00	830	7 334.5	8.762	−2.80	880	7 768.8	8.609	−3.28
781	6 902.0	8.882	−2.02	831	7 343.2	8.759	−2.82	881	7 777.4	8.605	−3.29
782	6 910.9	8.880	−2.04	832	7 352.0	8.756	−2.83	882	7 786.0	8.602	−3.30
783	6 919.8	8.878	−2.05	833	7 360.7	8.754	−2.84	883	7 794.7	8.599	−3.30
784	6 928.7	8.876	−2.07	834	7 369.5	8.751	−2.85	884	7 803.2	8.596	−3.31
785	6 937.5	8.873	−2.09	835	7 378.2	8.748	−2.87	885	7 811.8	8.592	−3.32
786	6 946.4	8.871	−2.11	836	7 387.0	8.745	−2.88	886	7 820.4	8.589	−3.32
787	6 955.3	8.869	−2.13	837	7 395.7	8.742	−2.89	887	7 829.0	8.586	−3.33
788	6 964.2	8.867	−2.15	838	7 404.5	8.739	−2.90	888	7 837.6	8.582	−3.34
789	6 973.0	8.865	−2.17	839	7 413.2	8.736	−2.91	889	7 846.2	8.579	−3.34
790	6 981.9	8.863	−2.19	840	7 421.9	8.733	−2.92	890	7 854.8	8.576	−3.35
791	6 990.8	8.861	−2.21	841	7 430.7	8.731	−2.94	891	7 863.3	8.572	−3.36
792	6 999.6	8.858	−2.22	842	7 439.4	8.728	−2.95	892	7 871.9	8.569	−3.36
793	7 008.5	8.856	−2.24	843	7 448.1	8.725	−2.96	893	7 880.5	8.565	−3.37
794	7 017.3	8.854	−2.26	844	7 456.9	8.722	−2.97	894	7 889.0	8.562	−3.37
795	7 026.2	8.852	−2.28	845	7 465.6	8.719	−2.98	895	7 897.6	8.559	−3.38
796	7 035.0	8.849	−2.29	846	7 474.3	8.716	−2.99	896	7 906.2	8.555	−3.38
797	7 043.9	8.847	−2.31	847	7 483.0	8.713	−3.00	897	7 914.7	8.552	−3.39
798	7 052.7	8.845	−2.33	848	7 491.7	8.710	−3.01	898	7 923.3	8.549	−3.40
799	7 061.6	8.842	−2.35	849	7 500.4	8.707	−3.02	899	7 931.8	8.545	−3.40
800	7 070.4	8.840	−2.36	850	7 509.1	8.704	−3.03	900	7 940.3	8.542	−3.41

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	7 940.3	8.542	−3.41	950	8363.1	8.366	−3.61	1000	8 776.8	8.181	−3.78
901	7 948.9	8.538	−3.41	951	8371.4	8.362	−3.61	1001	8 785.0	8.177	−3.79
902	7 957.4	8.535	−3.42	952	8379.8	8.359	−3.62	1002	8 793.1	8.174	−3.79
903	7 966.0	8.531	−3.42	953	8388.2	8.355	−3.62	1003	8 801.3	8.170	−3.79
904	7 974.5	8.528	−3.43	954	8396.5	8.351	−3.62	1004	8 809.5	8.166	−3.80
905	7 983.0	8.525	−3.43	955	8404.9	8.348	−3.63	1005	8 817.7	8.162	−3.80
906	7 991.5	8.521	−3.44	956	8413.2	8.344	−3.63	1006	8 825.8	8.158	−3.81
907	8 000.1	8.518	−3.44	957	8421.6	8.341	−3.63	1007	8 834.0	8.155	−3.81
908	8 008.6	8.514	−3.45	958	8429.9	8.337	−3.64	1008	8 842.1	8.151	−3.82
909	8 017.1	8.511	−3.45	959	8438.2	8.333	−3.64	1009	8 850.3	8.147	−3.82
910	8 025.6	8.507	−3.46	960	8446.6	8.330	−3.64	1010	8 858.4	8.143	−3.82
911	8 034.1	8.504	−3.46	961	8454.9	8.326	−3.65	1011	8 866.6	8.139	−3.83
912	8 042.6	8.500	−3.47	962	8463.2	8.322	−3.65	1012	8 874.7	8.136	−3.83
913	8 051.1	8.497	−3.47	963	8471.5	8.319	−3.65	1013	8 882.8	8.132	−3.84
914	8 059.6	8.494	−3.47	964	8479.8	8.315	−3.66	1014	8 891.0	8.128	−3.84
915	8 068.1	8.490	−3.48	965	8488.2	8.311	−3.66	1015	8 899.1	8.124	−3.85
916	8 076.6	8.487	−3.48	966	8496.5	8.308	−3.66	1016	8 907.2	8.120	−3.85
917	8 085.1	8.483	−3.49	967	8504.8	8.304	−3.67	1017	8 915.3	8.116	−3.86
918	8 093.5	8.480	−3.49	968	8513.1	8.300	−3.67	1018	8 923.4	8.112	−3.86
919	8 102.0	8.476	−3.50	969	8521.4	8.297	−3.67	1019	8 931.5	8.109	−3.86
920	8 110.5	8.473	−3.50	970	8529.7	8.293	−3.68	1020	8 939.7	8.105	−3.87
921	8 119.0	8.469	−3.50	971	8538.0	8.289	−3.68	1021	8 947.8	8.101	−3.87
922	8 127.4	8.466	−3.51	972	8546.3	8.286	−3.68	1022	8 955.9	8.097	−3.88
923	8 135.9	8.462	−3.51	973	8554.5	8.282	−3.69	1023	8 964.0	8.093	−3.88
924	8 144.4	8.459	−3.52	974	8562.8	8.278	−3.69	1024	8 972.0	8.089	−3.89
925	8 152.8	8.455	−3.52	975	8571.1	8.275	−3.69	1025	8 980.1	8.085	−3.89
926	8 161.3	8.452	−3.52	976	8579.4	8.271	−3.70	1026	8 988.2	8.081	−3.90
927	8 169.7	8.448	−3.53	977	8587.6	8.267	−3.70	1027	8 996.3	8.078	−3.90
928	8 178.2	8.444	−3.53	978	8595.9	8.264	−3.70	1028	9 004.4	8.074	−3.91
929	8 186.6	8.441	−3.54	979	8604.2	8.260	−3.71	1029	9 012.4	8.070	−3.91
930	8 195.0	8.437	−3.54	980	8612.4	8.256	−3.71	1030	9 020.5	8.066	−3.92
931	8 203.5	8.434	−3.54	981	8620.7	8.252	−3.71	1031	9 028.6	8.062	−3.92
932	8 211.9	8.430	−3.55	982	8628.9	8.249	−3.72	1032	9 036.6	8.058	−3.93
933	8 220.3	8.427	−3.55	983	8637.2	8.245	−3.72	1033	9 044.7	8.054	−3.94
934	8 228.8	8.423	−3.56	984	8645.4	8.241	−3.72	1034	9 052.7	8.050	−3.94
935	8 237.2	8.420	−3.56	985	8653.7	8.238	−3.73	1035	9 060.8	8.046	−3.95
936	8 245.6	8.416	−3.56	986	8661.9	8.234	−3.73	1036	9 068.8	8.042	−3.95
937	8 254.0	8.413	−3.57	987	8670.1	8.230	−3.73	1037	9 076.9	8.038	−3.96
938	8 262.4	8.409	−3.57	988	8678.3	8.226	−3.74	1038	9 084.9	8.034	−3.96
939	8 270.8	8.405	−3.57	989	8686.6	8.223	−3.74	1039	9 092.9	8.030	−3.97
940	8 279.2	8.402	−3.58	990	8694.8	8.219	−3.74	1040	9 101.0	8.026	−3.97
941	8 287.6	8.398	−3.58	991	8703.0	8.215	−3.75	1041	9 109.0	8.022	−3.98
942	8 296.0	8.395	−3.58	992	8711.2	8.211	−3.75	1042	9 117.0	8.018	−3.99
943	8 304.4	8.391	−3.59	993	8719.4	8.208	−3.76	1043	9 125.0	8.014	−3.99
944	8 312.8	8.388	−3.59	994	8727.6	8.204	−3.76	1044	9 133.0	8.010	−4.00
945	8 321.2	8.384	−3.59	995	8735.8	8.200	−3.76	1045	9 141.1	8.006	−4.00
946	8 329.6	8.380	−3.60	996	8744.0	8.196	−3.77	1046	9 149.1	8.002	−4.01
947	8 338.0	8.377	−3.60	997	8752.2	8.193	−3.77	1047	9 157.1	7.998	−4.01
948	8 346.3	8.373	−3.60	998	8760.4	8.189	−3.77	1048	9 165.1	7.994	−4.02
949	8 354.7	8.370	−3.61	999	8768.6	8.185	−3.78	1049	9 173.0	7.990	−4.03
950	8 363.1	8.366	−3.61	1000	8776.8	8.181	−3.78	1050	9 181.0	7.986	−4.03

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1050	9 181.0	7.986	−4.03	**1100**	9 575.2	7.776	−4.38	**1150**	9 958.4	7.549	−4.67
1051	9 189.0	7.982	−4.04	**1101**	9 582.9	7.772	−4.39	**1151**	9 965.9	7.545	−4.67
1052	9 197.0	7.978	−4.04	**1102**	9 590.7	7.767	−4.39	**1152**	9 973.5	7.540	−4.67
1053	9 205.0	7.974	−4.05	**1103**	9 598.5	7.763	−4.40	**1153**	9 981.0	7.535	−4.67
1054	9 212.9	7.970	−4.06	**1104**	9 606.2	7.759	−4.41	**1154**	9 988.5	7.531	−4.68
1055	9 220.9	7.966	−4.06	**1105**	9 614.0	7.754	−4.41	**1155**	9 996.1	7.526	−4.68
1056	9 228.9	7.962	−4.07	**1106**	9 621.7	7.750	−4.42	**1156**	10 003.6	7.521	−4.68
1057	9 236.8	7.958	−4.08	**1107**	9 629.5	7.745	−4.43	**1157**	10 011.1	7.517	−4.68
1058	9 244.8	7.954	−4.08	**1108**	9 637.2	7.741	−4.44	**1158**	10 018.6	7.512	−4.68
1059	9 252.7	7.950	−4.09	**1109**	9 645.0	7.737	−4.44	**1159**	10 026.1	7.507	−4.68
1060	9 260.7	7.946	−4.10	**1110**	9 652.7	7.732	−4.45	**1160**	10 033.6	7.502	−4.69
1061	9 268.6	7.942	−4.10	**1111**	9 660.4	7.728	−4.46	**1161**	10 041.1	7.498	−4.69
1062	9 276.6	7.937	−4.11	**1112**	9 668.2	7.723	−4.46	**1162**	10 048.6	7.493	−4.69
1063	9 284.5	7.933	−4.12	**1113**	9 675.9	7.719	−4.47	**1163**	10 056.1	7.488	−4.69
1064	9 292.4	7.929	−4.12	**1114**	9 683.6	7.714	−4.48	**1164**	10 063.6	7.484	−4.69
1065	9 300.4	7.925	−4.13	**1115**	9 691.3	7.710	−4.48	**1165**	10 071.1	7.479	−4.69
1066	9 308.3	7.921	−4.14	**1116**	9 699.0	7.705	−4.49	**1166**	10 078.6	7.474	−4.69
1067	9 316.2	7.917	−4.14	**1117**	9 706.7	7.701	−4.50	**1167**	10 086.0	7.470	−4.68
1068	9 324.1	7.913	−4.15	**1118**	9 714.4	7.696	−4.50	**1168**	10 093.5	7.465	−4.68
1069	9 332.0	7.909	−4.16	**1119**	9 722.1	7.692	−4.51	**1169**	10 101.0	7.460	−4.68
1070	9 339.9	7.904	−4.16	**1120**	9 729.8	7.687	−4.52	**1170**	10 108.4	7.456	−4.68
1071	9 347.8	7.900	−4.17	**1121**	9 737.5	7.683	−4.52	**1171**	10 115.9	7.451	−4.68
1072	9 355.7	7.896	−4.18	**1122**	9 745.2	7.678	−4.53	**1172**	10 123.3	7.446	−4.68
1073	9 363.6	7.892	−4.18	**1123**	9 752.9	7.674	−4.54	**1173**	10 130.8	7.442	−4.67
1074	9 371.5	7.888	−4.19	**1124**	9 760.5	7.669	−4.54	**1174**	10 138.2	7.437	−4.67
1075	9 379.4	7.883	−4.20	**1125**	9 768.2	7.665	−4.55	**1175**	10 145.6	7.432	−4.67
1076	9 387.3	7.879	−4.21	**1126**	9 775.9	7.660	−4.55	**1176**	10 153.1	7.428	−4.66
1077	9 395.2	7.875	−4.21	**1127**	9 783.5	7.656	−4.56	**1177**	10 160.5	7.423	−4.66
1078	9 403.0	7.871	−4.22	**1128**	9 791.2	7.651	−4.57	**1178**	10 167.9	7.418	−4.66
1079	9 410.9	7.867	−4.23	**1129**	9 798.8	7.646	−4.57	**1179**	10 175.3	7.414	−4.65
1080	9 418.8	7.862	−4.23	**1130**	9 806.5	7.642	−4.58	**1180**	10 182.7	7.409	−4.65
1081	9 426.6	7.858	−4.24	**1131**	9 814.1	7.637	−4.58	**1181**	10 190.1	7.404	−4.64
1082	9 434.5	7.854	−4.25	**1132**	9 821.7	7.633	−4.59	**1182**	10 197.5	7.400	−4.64
1083	9 442.3	7.850	−4.25	**1133**	9 829.4	7.628	−4.59	**1183**	10 204.9	7.395	−4.63
1084	9 450.2	7.845	−4.26	**1134**	9 837.0	7.623	−4.60	**1184**	10 212.3	7.390	−4.62
1085	9 458.0	7.841	−4.27	**1135**	9 844.6	7.619	−4.60	**1185**	10 219.7	7.386	−4.62
1086	9 465.9	7.837	−4.28	**1136**	9 852.2	7.614	−4.61	**1186**	10 227.1	7.381	−4.61
1087	9 473.7	7.833	−4.28	**1137**	9 859.8	7.610	−4.61	**1187**	10 234.5	7.377	−4.60
1088	9 481.5	7.828	−4.29	**1138**	9 867.4	7.605	−4.62	**1188**	10 241.9	7.372	−4.59
1089	9 489.4	7.824	−4.30	**1139**	9 875.0	7.600	−4.62	**1189**	10 249.2	7.367	−4.59
1090	9 497.2	7.820	−4.31	**1140**	9 882.6	7.596	−4.63	**1190**	10 256.6	7.363	−4.58
1091	9 505.0	7.815	−4.31	**1141**	9 890.2	7.591	−4.63	**1191**	10 264.0	7.358	−4.57
1092	9 512.8	7.811	−4.32	**1142**	9 897.8	7.586	−4.64	**1192**	10 271.3	7.354	−4.56
1093	9 520.6	7.807	−4.33	**1143**	9 905.4	7.582	−4.64	**1193**	10 278.7	7.349	−4.55
1094	9 528.4	7.802	−4.33	**1144**	9 913.0	7.577	−4.65	**1194**	10 286.0	7.345	−4.54
1095	9 536.2	7.798	−4.34	**1145**	9 920.6	7.573	−4.65	**1195**	10 293.4	7.340	−4.53
1096	9 544.0	7.794	−4.35	**1146**	9 928.1	7.568	−4.65	**1196**	10 300.7	7.336	−4.51
1097	9 551.8	7.789	−4.36	**1147**	9 935.7	7.563	−4.66	**1197**	10 308.0	7.331	−4.50
1098	9 559.6	7.785	−4.36	**1148**	9 943.3	7.559	−4.66	**1198**	10 315.4	7.327	−4.49
1099	9 567.4	7.781	−4.37	**1149**	9 950.8	7.554	−4.66	**1199**	10 322.7	7.322	−4.48
1100	9 575.2	7.776	−4.38	**1150**	9 958.4	7.549	−4.67	**1200**	10 330.0	7.318	−4.46

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1200	10 330.0	7.318	−4.46	1250	10 690.7	7.125	−2.92	1300	11 044.7	7.071	1.38
1201	10 337.3	7.313	−4.45	1251	10 697.9	7.122	−2.87	1301	11 051.8	7.072	1.51
1202	10 344.6	7.309	−4.44	1252	10 705.0	7.119	−2.82	1302	11 058.9	7.074	1.64
1203	10 351.9	7.304	−4.42	1253	10 712.1	7.116	−2.76	1303	11 066.0	7.076	1.77
1204	10 359.2	7.300	−4.40	1254	10 719.2	7.114	−2.71	1304	11 073.0	7.077	1.91
1205	10 366.5	7.295	−4.39	1255	10 726.3	7.111	−2.65	1305	11 080.1	7.079	2.05
1206	10 373.8	7.291	−4.37	1256	10 733.4	7.108	−2.59	1306	11 087.2	7.082	2.18
1207	10 381.1	7.287	−4.35	1257	10 740.6	7.106	−2.53	1307	11 094.3	7.084	2.32
1208	10 388.4	7.282	−4.34	1258	10 747.7	7.103	−2.47	1308	11 101.4	7.086	2.47
1209	10 395.7	7.278	−4.32	1259	10 754.8	7.101	−2.41	1309	11 108.5	7.089	2.61
1210	10 403.0	7.274	−4.30	1260	10 761.9	7.098	−2.34	1310	11 115.5	7.091	2.76
1211	10 410.2	7.269	−4.28	1261	10 769.0	7.096	−2.28	1311	11 122.6	7.094	2.91
1212	10 417.5	7.265	−4.26	1262	10 776.0	7.094	−2.21	1312	11 129.7	7.097	3.06
1213	10 424.8	7.261	−4.24	1263	10 783.1	7.092	−2.14	1313	11 136.8	7.100	3.21
1214	10 432.0	7.257	−4.22	1264	10 790.2	7.090	−2.08	1314	11 143.9	7.104	3.37
1215	10 439.3	7.252	−4.19	1265	10 797.3	7.088	−2.01	1315	11 151.0	7.107	3.53
1216	10 446.5	7.248	−4.17	1266	10 804.4	7.086	−1.94	1316	11 158.2	7.111	3.69
1217	10 453.8	7.244	−4.15	1267	10 811.5	7.084	−1.86	1317	11 165.3	7.114	3.85
1218	10 461.0	7.240	−4.12	1268	10 818.6	7.082	−1.79	1318	11 172.4	7.118	4.01
1219	10 468.2	7.236	−4.10	1269	10 825.7	7.080	−1.71	1319	11 179.5	7.122	4.18
1220	10 475.5	7.232	−4.07	1270	10 832.7	7.078	−1.64	1320	11 186.6	7.127	4.35
1221	10 482.7	7.228	−4.05	1271	10 839.8	7.077	−1.56	1321	11 193.8	7.131	4.52
1222	10 489.9	7.224	−4.02	1272	10 846.9	7.075	−1.48	1322	11 200.9	7.136	4.70
1223	10 497.2	7.220	−3.99	1273	10 854.0	7.074	−1.40	1323	11 208.0	7.141	4.88
1224	10 504.4	7.216	−3.96	1274	10 861.0	7.072	−1.32	1324	11 215.2	7.146	5.06
1225	10 511.6	7.212	−3.93	1275	10 868.1	7.071	−1.23	1325	11 222.3	7.151	5.24
1226	10 518.8	7.208	−3.90	1276	10 875.2	7.070	−1.15	1326	11 229.5	7.156	5.42
1227	10 526.0	7.204	−3.87	1277	10 882.2	7.069	−1.06	1327	11 236.6	7.162	5.61
1228	10 533.2	7.200	−3.84	1278	10 889.3	7.068	−0.97	1328	11 243.8	7.167	5.80
1229	10 540.4	7.196	−3.81	1279	10 896.4	7.067	−0.88	1329	11 251.0	7.173	5.99
1230	10 547.6	7.192	−3.78	1280	10 903.5	7.066	−0.79	1330	11 258.1	7.179	6.19
1231	10 554.8	7.189	−3.74	1281	10 910.5	7.065	−0.70	1331	11 265.3	7.186	6.39
1232	10 562.0	7.185	−3.71	1282	10 917.6	7.065	−0.61	1332	11 272.5	7.192	6.59
1233	10 569.2	7.181	−3.67	1283	10 924.6	7.064	−0.51	1333	11 279.7	7.199	6.79
1234	10 576.3	7.178	−3.64	1284	10 931.7	7.064	−0.41	1334	11 286.9	7.206	7.00
1235	10 583.5	7.174	−3.60	1285	10 938.8	7.063	−0.31	1335	11 294.1	7.213	7.21
1236	10 590.7	7.170	−3.56	1286	10 945.8	7.063	−0.21	1336	11 301.3	7.220	7.42
1237	10 597.9	7.167	−3.52	1287	10 952.9	7.063	−0.11	1337	11 308.6	7.228	7.63
1238	10 605.0	7.163	−3.48	1288	10 960.0	7.063	−0.01	1338	11 315.8	7.235	7.85
1239	10 612.2	7.160	−3.44	1289	10 967.0	7.063	0.10	1339	11 323.0	7.243	8.07
1240	10 619.3	7.157	−3.40	1290	10 974.1	7.063	0.21	1340	11 330.3	7.251	8.30
1241	10 626.5	7.153	−3.36	1291	10 981.2	7.063	0.32	1341	11 337.5	7.260	8.52
1242	10 633.6	7.150	−3.31	1292	10 988.2	7.064	0.43	1342	11 344.8	7.268	8.75
1243	10 640.8	7.147	−3.27	1293	10 995.3	7.064	0.54	1343	11 352.1	7.277	8.98
1244	10 647.9	7.143	−3.22	1294	11 002.3	7.065	0.66	1344	11 359.3	7.286	9.22
1245	10 655.1	7.140	−3.17	1295	11 009.4	7.065	0.77	1345	11 366.6	7.296	9.46
1246	10 662.2	7.137	−3.13	1296	11 016.5	7.066	0.89	1346	11 373.9	7.305	9.70
1247	10 669.4	7.134	−3.08	1297	11 023.5	7.067	1.01	1347	11 381.3	7.315	9.95
1248	10 676.5	7.131	−3.03	1298	11 030.6	7.068	1.13	1348	11 388.6	7.325	10.19
1249	10 683.6	7.128	−2.98	1299	11 037.7	7.070	1.26	1349	11 395.9	7.336	10.45
1250	10 690.7	7.125	−2.92	1300	11 044.7	7.071	1.38	1350	11 403.2	7.346	10.70

TABLE 7.5.3. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C-Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1350	11 403.2	7.346	10.70	**1360**	11 477.3	7.467	13.43	**1370**	11 552.7	7.616	16.53
1351	11 410.6	7.357	10.96	**1361**	11 484.8	7.480	13.73	**1371**	11 560.3	7.633	16.86
1352	11 418.0	7.368	11.22	**1362**	11 492.2	7.494	14.02	**1372**	11 567.9	7.650	17.19
1353	11 425.3	7.379	11.48	**1363**	11 499.7	7.508	14.32				
1354	11 432.7	7.391	11.75	**1364**	11 507.3	7.523	14.62				
1355	11 440.1	7.403	12.02	**1365**	11 514.8	7.537	14.93				
1356	11 447.5	7.415	12.30	**1366**	11 522.3	7.552	15.24				
1357	11 454.9	7.428	12.58	**1367**	11 529.9	7.568	15.56				
1358	11 462.4	7.440	12.86	**1368**	11 537.5	7.584	15.88				
1359	11 469.8	7.453	13.14	**1369**	11 545.1	7.600	16.20				

7.6. References

[1] Trademark--Hoskins Manufacturing Company.

[2] Trademark--Carpenter Technology Corporation.

[3] Trademark--Driver Harris Company.

[4] Trademark--Kanthal Corporation.

[5] Roeser, W. F.; Dahl, A. I.; Gowens, G. J. Standard tables for Chromel-Alumel thermocuples. *J. Res. Natl. Bur. Stand. (U.S.)* **14**, 239-246; RP767; 1935 June.

[6] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 508*; 1951 May. 73 p.

[7] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J.; Lonberger, S. T. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.)* Circular 561; 1955 April. 87 p.

[8] Plumb, H. H.; Cataland, G. Acoustical thermometer and the National Bureau of Standards Provisional Temperature Scale 2-20 (1965). *Metrologia* **2**, 127-139; 1966.

[9] Sparks, L. L.; Powell, R. L.; Hall, W. J. Reference tables for low-temperature thermocouples. *Natl. Bur. Stand. (U.S.) Monogr. 124*; 1972 June. 61 p.

[10] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[11] ASTM, American Society for Testing and Materials. Manual on the use of thermocouples in temperature measurement. *Special Tech. Publ. 470B*; edited by Benedict, R. P.; Philadelphia: ASTM; 1981. 258 p.

[12] Dahl, A. I. Stability of base-metal thermocouples in air from 800 to 2200 °F. *J. Res. Natl. Bur. Stand. (U.S.)* **24**, 205-224; RP1278; 1940 February.

[13] Potts, J. F. Jr.; McElroy, D. L. The effects of cold working, heat treatment, and oxidation on the thermal emf of nickel-base thermoelements. Herzfeld, C. M., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 3, Part 2; New York: Reinhold Publishing Corp.; 1962. 243-264.

[14] Burley, N. A.; Ackland, R. G. The stability of the thermo-emf/temperature characterisitics of nickel-base thermocouples. *Jour. of Australian Inst. of Metals* **12**(1), 23-31; 1967.

[15] Starr, C. D.; Wang, T. P. Effect of oxidation on stability of thermocouples, *Proceedings of the American Society for Testing and Materials* Vol. **63**, 1185-1194; 1963.

[16] Wang, T. P.; Gottlieb, A. J.; Starr, C. D. The emf stability of type K thermocouple alloys. Paper no. 690426, National Air Transportation Meeting, Soc. Auto. Engr., New York, NY; 21-24 April 1969.

[17] Burley, N. A. Nicrosil and nisil: Highly stable nickel-base alloys for thermocouples. Plumb, H. H., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4, Part 3; Pittsburg: Instrument Society of America; 1972. 1677-1695.

[18] Wang, T. P.; Starr, C. D. Electromotive force stability of nicrosil-nisil. *Journal of Testing and Evaluation* **8**(4), 192-198; 1980.

[19] Bentley, R. E. Short-term instabilities in thermocouples containing nickel-based alloys. *High Temperatures-High Pressures* **15**, 599-611; 1983.

[20] Kollie, T. G.; Horton, J. L.; Carr, K. R.; Herskovitz, M. B.; Mossman, C. A. Temperature measurement errors with type K (Chromel vs Alumel) thermocouples due to short-ranged ordering in Chromel. *Rev. Sci. Instrum.* **46**, 1447-1461; 1975.

[21] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[22] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10; 1990. *ibid.* p. 107.

[23] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[24] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. Schooley, J. F., ed. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; New York: American Institute of Physics; 1992. 547-552.

[25] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

[26] Bureau International de Poids et Mesures. The 1976 Provisional 0.5 to 30 K Temperature Scale. *Metrologia* **15**, 65-68; 1979.

[27] Bureau International des Poids et Mesures, Supplementary information for the International Temperature Scale of 1990. Pavillion de Breteuil, F-92310 Sevres; 1990 December. 177 p.

8. TYPE N—Nickel-Chromium-Silicon Alloy Versus Nickel-Silicon-Magnesium Alloy Thermocouples

8.1. Material Specifications and Precautions

This type is the newest of the letter-designated thermocouples. It offers higher thermoelectric stability in air above 1000 °C and better air-oxidation resistance than types E, J, and K thermocouples. The positive thermoelement, NP, is an alloy that typically contains about 84% nickel, 14 to 14.4% chromium, 1.3 to 1.6% silicon, plus small amounts (usually not exceeding about 0.1%) of other elements such as magnesium, iron, carbon, and cobalt. The negative thermoelement, NN, is an alloy that typically contains about 95% nickel, 4.2 to 4.6% silicon, 0.5 to 1.5% magnesium, plus minor impurities of iron, cobalt, manganese and carbon totaling about 0.1 to 0.3%.

The type N thermocouple alloys were developed during the late 1960s and early 1970s, with the alloy compositions given above evolving from several stages of alloy development [1-4]. The type NP and NN alloys were known originally [1] as nicrosil and nisil, respectively. During their development it was shown that improved environmental stability could be obtained in nickel-based thermocouple alloys by increasing the amounts of silicon and chromium to cause a transition from internal to external modes of oxidation. Oxidation then takes place primarily at the surface where adherent, protective oxide layers form to minimize further oxidation. In the type NN alloy, a small amount of a highly reactive element was needed to retard the preferential loss of silicon by oxidation. Magnesium was found to be a suitable element for this purpose. It was shown also that reversible thermoelectric effects, observed [1,5-8] in type KP (or EP) thermoelements on heating in the 250 °C to 550 °C range, could be reduced substantially in nickel-chromium-silicon alloys by properly adjusting the chromium and silicon contents.

A collaborative research program by the Materials Research Laboratories of the Australian Government Department of Defence and the NBS was carried out during the mid-1970s to study the thermoelectric and other properties of these new nickel-based thermocouple alloys. The thermocouple alloys used in the program were fabricated to close compositional tolerances; samples were acquired in several wire sizes from five major manufacturers of base-metal thermocouple wire, three in the United States, one in the United Kingdom, and one in Sweden. The experimental work was conducted in thermometry laboratories of the NBS located in Boulder, Colorado and Gaithersburg, Maryland. This program produced reference functions and tables for the nicrosil versus nisil thermocouple for the range −270 °C to 1300 °C, and for its thermoelements versus platinum (Pt-67) for the range −200 °C to 1300 °C. These reference functions and tables, which were based on the NBS 2-20 Temperature Scale [9] at temperatures below 20 K and on the IPTS-68 above 20 K, were presented by Burley, Powell, and others in 1978 in NBS Monograph 161 [4]. The effects of solute variation, wire diameter, and plastic deformation on the temperature-emf relationships of the types NP and NN alloys versus platinum, Pt-67, were reported in NBS Monograph 161 as well.

The research reported in NBS Monograph 161 showed that the type N thermocouple may be used down to liquid helium temperatures (about 4 K) but that its Seebeck coefficient becomes very small below 20 K. Its Seebeck coefficient at 20 K is about 2.5 μV/K, roughly one-third that of type E thermocouples which are, for the reasons given in section 5.1, the most suitable of the letter-designated thermocouple types for measurements down to 20 K. Nevertheless, types NP and NN thermoelements do have a relatively low thermal conductivity and good resistance to corrosion in moist atmospheres at low temperatures.

Type N thermocouples are best suited for use in oxidizing or inert atmospheres. Their suggested upper temperature limit, when used in conventional closed-end protecting tubes, is set at 1260 °C by the ASTM [10] for 3.25 mm diameter thermoelements. Their maximum upper temperature limit is defined by the melting temperatures of the thermoelements, which are nominally 1410 °C for type NP and 1340 °C for type NN [11]. The thermoelectric stability and physical life of type N thermocouples when used in air at elevated temperatures will depend upon factors such as the temperature, the time at temperature, the diameter of the thermoelements, and the conditions of use. Their thermoelectric stability and oxidation resistance in air have been investigated and compared with those of type K thermocouples by Burley [1], by Burley and others [4,12-15], by Wang and Starr [3,16-18], by McLaren and Murdock [19], by Bentley [8], and by Hess [20].

Type N thermocouples, in general, are subject to the same environmental restrictions as types E and K. They are not recommended for use at high temperatures in sulfurous, reducing, or alternately oxidizing and reducing atmospheres unless suitably protected with protecting tubes. They also should not be used in vacuum (at high temperatures) for extended times because the chromium and silicon in the positive thermoelement, a nickel-chromium-silicon alloy, vaporize out of solution and alter the calibration. In addition, their use in atmospheres

with low, but not negligible, oxygen content is not recommended, since it can lead to changes in calibration due to the preferential oxidation of chromium in the positive thermoelement. Nevertheless, Wang and Starr [18] studied the performances of type N thermocouples in reducing atmospheres, as well as in stagnant air, at temperatures in the 870 °C to 1180 °C range and found them to be markedly more stable thermoelectrically than type K thermocouples under similar conditions.

The performance of type N thermocouples fabricated in metal-sheathed, compacted ceramic insulated form also has been the subject of considerable study. Anderson and others [21], Bentley and Morgan [22], and Wang and Bediones [23] have evaluated the high-temperature, thermoelectric stability of thermocouples insulated with magnesium oxide and sheathed in Inconel and in stainless steel. Their studies showed that the thermoelectric instabilities of such assemblies increase rapidly with temperature above 1000 °C. It was found also that the smaller the diameter of the sheath the greater the instability. Additionally, thermocouples sheathed in Inconel showed substantially less instability above 1000 °C than those sheathed in stainless steel. Bentley and Morgan [22] stressed the importance of using Inconel sheathing with a very low manganese content to achieve the most stable performance. The use of special Ni-Cr based alloys for sheathing to improve the chemical and physical compatibility with the thermoelements also has been investigated by Burley [24-26] and by Bentley [27-30].

Neither thermoelement of a type N thermocouple is extremely sensitive to minor differences in heat treatment (provided that the treatment does not violate any of the restrictions mentioned above). For most general applications, they may be used with the heat treatment routinely given by the wire manufacturer. Bentley [31,32] ,however, has reported reversible changes in the Seebeck coefficient of types NP and NN thermoelements when heated at temperatures between 200 °C and 1000 °C. These impose limitations on the accuracy obtainable with type N thermocouples. The magnitude of such changes was found to depend on the source of the thermoelements. Consequently, when the highest accuracy and stability are sought, selective testing of materials, as well as special preparatory heat treatments beyond those given by the manufacturer, will usually be necessary. Bentley's articles [31,32] should be consulted for guidelines and details.

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [10] specifies that the initial calibration tolerances for type N commercial thermocouples be ± 2.2 °C or ± 0.75% (whichever is greater) between 0 °C and 1250 °C. Type N thermocouples can also be supplied to meet special tolerances that are equal to approximately one-half the standard tolerances given above. Tolerances are not specified for type N thermocouples below 0 °C.

The suggested upper temperature limit of 1260 °C given in the ASTM standard [10] for protected type N thermocouples applies to AWG 8 (3.25 mm) wire. It decreases to 1090 °C for AWG 14 (1.63 mm), 980 °C for AWG 20 (0.81 mm), 870 °C for AWG 24 or 28 (0.51 mm or 0.33 mm), and 760 °C for AWG 30 (0.25 mm). These temperature limits apply to thermocouples used in conventional closed-end protecting tubes and they are intended only as a rough guide to the user. They do not apply to thermocouples having compacted mineral oxide insulation.

8.2. Construction of Reference Functions

8.2.1. Type N thermocouples

The reference function for type N thermocouples is based on the polynomial representations in NBS Monograph 161 [4] and the difference in values of temperature expressed on the IPTS-68 and the ITS-90 [33] as given by

$$\Delta t = t_{90} - t_{68},$$

where t_{90} and t_{68} indicate temperature (°C) on the ITS-90 and the IPTS-68, respectively.

Monograph 161 gives a polynomial representation of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the temperature range −270 °C to 0 °C for type N thermocouples made from AWG-28 wire and another polynomial of the same form to cover the range 0 °C to 1300 °C for type N thermocouples made from AWG-14 wire. In terms of t_{90}, these are replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i (t_{90})^i \quad for\ j = 1, 2.$$

Thermoelectric voltages, Y_t, where

$$Y_t = 0.999990736\ g(t_{90} - \Delta t),$$

were fitted by least-squares to corresponding values of t_{90} to obtain the coefficients, c_i, of $f_j(t_{90})$ in terms of the ITS-90 and the SI volt [34]. The data for this

analysis come from four sources. To generate Y_t values for the range 20 K to 630 °C, Δt values at 10 °C intervals were taken from the table of Preston-Thomas [33]. Between 630 °C and 1064 °C, Δt values were obtained at 10 °C intervals from the fifth degree polynomial in t_{90} given by Guthrie *et al.* [35]. Above 1064 °C, Δt values were generated at 10 °C intervals from the relationship given by Mangum and Furukawa [36], namely,

$$(t_{90} - t_{68})/°C = -0.25[(t_{90}/°C + 273.15)/1337.33]^2.$$

Below 20 K, the function $g(t)$ in Monograph 161 is expressed on the acoustic temperature scale, NBS 2-20 [9]. Given the table of temperature differences between NBS 2-20 and EPT-76 published by the BIPM [37], thermoelectric voltages,

$$Y_t = 0.999990736\, g(T_{NBS2\text{-}20} - 273.15),$$

and corresponding temperatures, T_{76}, were computed at roughly 1 °C intervals. These in turn are related to temperatures, t_{90}, by the following equations [38]:

$$T_{90} - T_{76} = -5.6 \times 10^{-6}(T_{76})^2,$$

where $T_{90}/K = t_{90}/°C + 273.15$.

A single polynomial is not satisfactory to cover the temperature range −270 °C to 1300 °C, and, as in NBS Monograph 161, the range is broken at 0 °C into two segments. A separate polynomial is defined for each segment.

The appropriate degree for each polynomial is at issue, and the least-squares criteria for testing the appropriateness of a model do not strictly apply because the Δt data, derived by smoothing of experimental data, are not contaminated by random error. The approach used was to choose the lowest degree polynomial for which the largest difference between a fitted value, $f_j(t_{90})$, and a corresponding data point, Y_t, was not more than 0.08 μV for temperatures below 0 °C and not more than $0.025 f_j'(t_{90})$ μV for temperatures above 0 °C (except in the range 600 °C to 660 °C). In the 600 °C to 660 °C temperature range, the residuals are greater than $0.025 f_j'(t_{90})$ μV because the model chosen to fit the corresponding values of Y_t and t_{90} does not account for the discontinuity at 630.615 °C that is induced by the discontinuity [35] in the first derivative of the Δt values at that temperature. For temperatures in the range −270 °C to 0 °C, an eighth degree polynomial, $f_1(t_{90})$, satisfies the criterion and for the range 0 °C to 1300 °C, a tenth degree polynomial, $f_2(t_{90})$, is adequate. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 8.3 to 11 significant digits. The reader is cautioned that further rounding or truncation of the coefficients could adversely affect computations which depend on this reference function.

Equality at the break-point (0 °C) was achieved by constraining the polynomials to give 0 μV at 0 °C. The first and second derivatives of the polynomials were not constrained at the break-point since the two polynomials were derived for thermoelements of different diameter that actually had slightly different thermoelectric properties, as described in NBS Monograph 161.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The uncertainty for each temperature range is estimated by computing the maximum difference between $f_j(t_{90})$ and Y_t over that range. This difference was computed for three subranges of the 0 °C to 1300 °C range. These biases are

Temperature range °C			Bias μV
−270	to	0	0.061
0	to	600	0.600
600	to	660	1.535
660	to	1300	1.119

These biases describe the disagreement between the voltage produced by the new reference function for a particular value of t_{90} and the voltage that would be obtained by substituting $t_{90} - \Delta t$ into the IPTS-68 reference function. They do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function. These latter uncertainties, which are not known, would be needed to make a statement about the absolute uncertainty of voltages or temperatures derived using this reference function.

8.2.2. Positive thermoelement, type NP, versus platinum, Pt-67

The construction of the reference function for the positive thermoelement, type NP, versus Pt-67 parallels the conversion outlined for the total thermocouple, type N. For the positive thermoelement, NBS Monograph 161 gives a polynomial representation of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i (t_{68})^i,$$

to cover the temperature range −200 °C to 0 °C for AWG-28 thermoelements versus Pt-67 and another polynomial of the same form to cover the range 0 °C to 1300 °C for AWG-14 thermoelements versus

Pt-67. In terms of t_{90}, these are replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i \quad for\ j = 1, 2.$$

As discussed in NBS Monograph 161, the data for type NP and type NN thermoelements versus Pt-67 could not be fitted below −200 °C because they were double valued (negative Seebeck coefficients and reversal in sign of the thermoelectric voltage).

The criteria in section 8.2.1 for determining the lowest degree polynomials which fit the corresponding values of Y_t and t_{90} are too strict for the type NP thermoelement for temperatures below 0 °C. For temperatures in the range −200 °C to 0 °C, a sixth degree polynomial, $f_1(t_{90})$, is satisfactory in the sense that the residuals from the fit could not be reduced substantially by a higher order polynomial. For the range 0 °C to 1300 °C, a tenth degreee polynomial, $f_2(t_{90})$, gives a satisfactory fit to the data for the same reason. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 8.4 to 11 significant digits.

Equality at the break-point (0 °C) was achieved by constraining the polynomials to give 0 μV at 0 °C. The first and second derivatives of the polynomials were not constrained at the break-point since the two polynomials were derived for thermoelements of different diameter that actually had slightly different thermoelectric properties, as described in NBS Monograph 161.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum difference between $f_j(t_{90})$ and Y_t for each temperature range was computed as in section 8.2.1. This difference was computed for three subranges of the 0 °C to 1300 °C range. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in section 8.2.1, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
−200	to	0	0.111
0	to	600	0.444
600	to	660	1.099
660	to	1300	0.810

8.2.3. Platinum, Pt-67, versus the negative thermoelement, type NN

The construction of the reference function for Pt-67 versus the negative thermoelement, type NN, is based on the reference function for the type N thermocouple and the reference function for its positive thermoelement, type NP. Two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i \quad for\ j = 1, 2,$$

are defined to cover the temperature range −200 °C to 1300 °C. Each polynomial is the algebraic difference of the reference function for the type N thermocouple (see sec. 8.2.1) and the reference function for the type NP thermoelement versus Pt-67 (see sec. 8.2.2) in the appropriate range. This results in an eighth degree polynomial, $f_1(t_{90})$, for the range −200 °C to 0 °C and a tenth degree polynomial, $f_2(t_{90})$, for the range 0 °C to 1300 °C. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 8.5 to 11 significant digits.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum difference between $f_j(t_{90})$ and Y_t for each temperature range was computed as in sections 8.2.1 and 8.2.2. This difference was computed for three subranges of the 0 °C to 1300 °C range. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in sections 8.2.1 and 8.2.2, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
−200	to	0	0.113
0	to	600	0.228
600	to	660	0.496
660	to	1300	0.424

8.3. Reference Function and Table for Type N Thermocouples

The coefficients, c_i, for the eighth degree polynomial and for the tenth degree polynomial that give the thermoelectric voltage, E, of type N thermocouples as a function of temperature, t_{90}, in the −270 °C to 0 °C and 0 °C to 1300 °C ranges, respectively, are

given in table 8.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type N thermocouples at selected fixed points are given in table 8.3.2. The reference values for type N thermocouples are given at 1 °C intervals from −270 °C to 1300 °C in table 8.3.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 8.3.1, 8.3.2, and 8.3.3, respectively. The discontinuities in the first and second derivatives at 0 °C are apparent in figures 8.3.2 and 8.3.3. As discussed in section 8.2, these discontinuities result from the reference equations for the different temperature regions being joined without constraints on their derivatives.

It should be stressed that **type N thermocouple materials that conform closely to the high temperature tabular values may not necessarily conform closely at temperatures below 0 °C and vice versa.** If type N thermocouples are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 8.3.1. *Type N thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−270 °C to 0 °C	0 °C to 1300 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	$2.615\ 910\ 596\ 2 \times 10^{1}$	$2.592\ 939\ 460\ 1 \times 10^{1}$
c_2 =	$1.095\ 748\ 422\ 8 \times 10^{-2}$	$1.571\ 014\ 188\ 0 \times 10^{-2}$
c_3 =	$-9.384\ 111\ 155\ 4 \times 10^{-5}$	$4.382\ 562\ 723\ 7 \times 10^{-5}$
c_4 =	$-4.641\ 203\ 975\ 9 \times 10^{-8}$	$-2.526\ 116\ 979\ 4 \times 10^{-7}$
c_5 =	$-2.630\ 335\ 771\ 6 \times 10^{-9}$	$6.431\ 181\ 933\ 9 \times 10^{-10}$
c_6 =	$-2.265\ 343\ 800\ 3 \times 10^{-11}$	$-1.006\ 347\ 151\ 9 \times 10^{-12}$
c_7 =	$-7.608\ 930\ 079\ 1 \times 10^{-14}$	$9.974\ 533\ 899\ 2 \times 10^{-16}$
c_8 =	$-9.341\ 966\ 783\ 5 \times 10^{-17}$	$-6.086\ 324\ 560\ 7 \times 10^{-19}$
c_9 =		$2.084\ 922\ 933\ 9 \times 10^{-22}$
c_{10} =		$-3.068\ 219\ 615\ 1 \times 10^{-26}$

TABLE 8.3.2. *Thermoelectric values at fixed points for type N thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
e-Hydrogen TP	−259.3467	−4 334.64	1.661	131.26
Neon TP	−248.5939	−4 309.00	3.122	139.52
Oxygen TP	−218.7916	−4 152.96	7.351	140.47
Argon TP	−189.3442	−3 877.06	11.329	128.83
Mercury TP	−38.8344	−993.79	24.875	44.74
Ice MP	0.000	0.00	25.929	31.42
Water TP	0.01	0.3	25.930	31.42
Gallium MP	29.7646	786.7	26.957	36.88
Indium FP	156.5985	4 510.0	31.651	32.98
Tin FP	231.928	6 980.9	33.861	25.79
Cadmium FP	321.069	10 091.9	35.834	18.82
Lead FP	327.462	10 321.3	35.953	18.39
Zinc FP	419.527	13 701.2	37.390	13.02
Antimony FP	630.63	21 808.5	39.086	3.61
Aluminum FP	660.323	22 970.5	39.178	2.58
Silver FP	961.78	34 776.1	38.800	−4.54
Gold FP	1064.18	38 721.7	38.227	−6.58
Copper FP	1084.62	39 501.6	38.089	−6.92

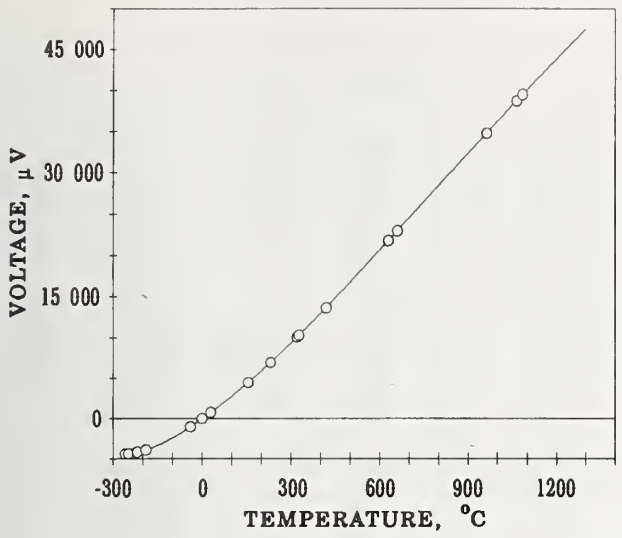

FIGURE 8.3.1. *Thermoelectric voltage for type N thermocouples. The circles indicate values at various thermometric fixed points.*

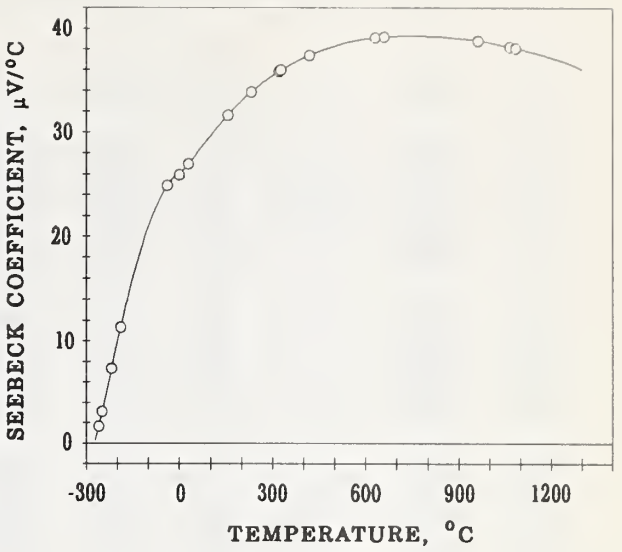

FIGURE 8.3.2. *Seebeck coefficient for type N thermocouples. The circles indicate values at various thermometric fixed points.*

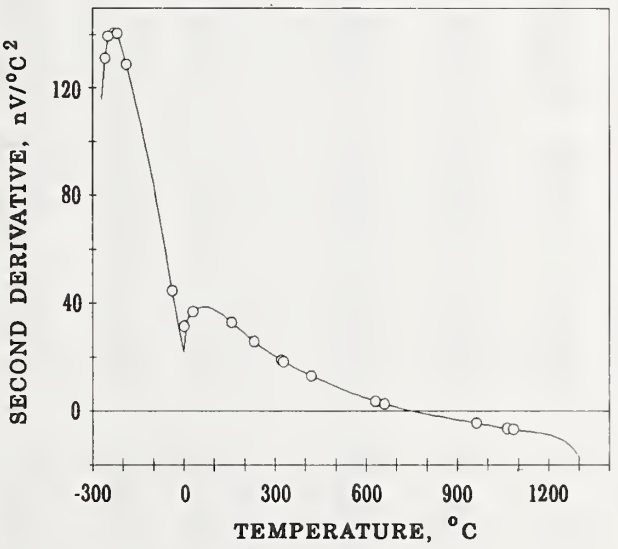

FIGURE 8.3.3. *Second derivative of thermoelectric voltage for type N thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−270	−4 345.14	0.337	115.87	−230	−4 226.48	5.763	142.66	−190	−3 884.47	11.244	129.13
−269	−4 344.74	0.454	117.69	−229	−4 220.64	5.905	142.55	−189	−3 873.16	11.373	128.68
−268	−4 344.23	0.573	119.42	−228	−4 214.67	6.048	142.43	−188	−3 861.72	11.501	128.22
−267	−4 343.59	0.693	121.07	−227	−4 208.55	6.190	142.29	−187	−3 850.15	11.629	127.76
−266	−4 342.84	0.815	122.65	−226	−4 202.29	6.332	142.12	−186	−3 838.46	11.757	127.30
−265	−4 341.96	0.938	124.14	−225	−4 195.88	6.475	141.94	−185	−3 826.64	11.884	126.84
−264	−4 340.96	1.063	125.56	−224	−4 189.34	6.616	141.75	−184	−3 814.69	12.011	126.38
−263	−4 339.84	1.189	126.91	−223	−4 182.65	6.758	141.53	−183	−3 802.62	12.137	125.92
−262	−4 338.58	1.317	128.19	−222	−4 175.82	6.899	141.30	−182	−3 790.42	12.263	125.45
−261	−4 337.20	1.446	129.40	−221	−4 168.85	7.041	141.06	−181	−3 778.10	12.388	124.99
−260	−4 335.69	1.576	130.55	−220	−4 161.74	7.182	140.80	−180	−3 765.64	12.512	124.52
−259	−4 334.05	1.707	131.63	−219	−4 154.49	7.322	140.53	−179	−3 753.07	12.637	124.06
−258	−4 332.28	1.839	132.65	−218	−4 147.10	7.463	140.24	−178	−3 740.37	12.761	123.59
−257	−4 330.37	1.972	133.60	−217	−4 139.56	7.603	139.95	−177	−3 727.55	12.884	123.13
−256	−4 328.33	2.106	134.50	−216	−4 131.89	7.742	139.64	−176	−3 714.60	13.007	122.66
−255	−4 326.16	2.241	135.35	−215	−4 124.08	7.882	139.32	−175	−3 701.54	13.129	122.19
−254	−4 323.85	2.377	136.14	−214	−4 116.13	8.021	138.99	−174	−3 688.35	13.251	121.73
−253	−4 321.41	2.513	136.87	−213	−4 108.04	8.160	138.65	−173	−3 675.03	13.373	121.26
−252	−4 318.83	2.650	137.55	−212	−4 099.81	8.298	138.30	−172	−3 661.60	13.494	120.79
−251	−4 316.11	2.788	138.19	−211	−4 091.44	8.437	137.94	−171	−3 648.05	13.614	120.33
−250	−4 313.25	2.927	138.78	−210	−4 082.93	8.574	137.58	−170	−3 634.37	13.734	119.86
−249	−4 310.25	3.066	139.32	−209	−4 074.29	8.712	137.20	−169	−3 620.58	13.854	119.39
−248	−4 307.12	3.205	139.81	−208	−4 065.51	8.849	136.82	−168	−3 606.66	13.973	118.92
−247	−4 303.84	3.345	140.26	−207	−4 056.59	8.985	136.43	−167	−3 592.63	14.092	118.45
−246	−4 300.43	3.486	140.67	−206	−4 047.54	9.122	136.04	−166	−3 578.48	14.210	117.98
−245	−4 296.87	3.627	141.05	−205	−4 038.35	9.257	135.64	−165	−3 564.21	14.328	117.52
−244	−4 293.17	3.768	141.38	−204	−4 029.02	9.393	135.23	−164	−3 549.82	14.445	117.05
−243	−4 289.33	3.910	141.67	−203	−4 019.56	9.528	134.82	−163	−3 535.32	14.562	116.58
−242	−4 285.35	4.051	141.93	−202	−4 009.97	9.662	134.41	−162	−3 520.70	14.678	116.11
−241	−4 281.23	4.193	142.15	−201	−4 000.24	9.797	133.98	−161	−3 505.96	14.794	115.64
−240	−4 276.97	4.336	142.34	−200	−3 990.38	9.930	133.56	−160	−3 491.11	14.910	115.17
−239	−4 272.56	4.478	142.50	−199	−3 980.38	10.064	133.13	−159	−3 476.15	15.024	114.69
−238	−4 268.01	4.621	142.63	−198	−3 970.25	10.197	132.70	−158	−3 461.06	15.139	114.22
−237	−4 263.32	4.763	142.72	−197	−3 959.99	10.329	132.26	−157	−3 445.87	15.253	113.75
−236	−4 258.48	4.906	142.79	−196	−3 949.59	10.461	131.82	−156	−3 430.56	15.366	113.28
−235	−4 253.51	5.049	142.83	−195	−3 939.06	10.593	131.38	−155	−3 415.13	15.479	112.80
−234	−4 248.39	5.192	142.84	−194	−3 928.40	10.724	130.93	−154	−3 399.60	15.592	112.33
−233	−4 243.12	5.335	142.83	−193	−3 917.62	10.855	130.49	−153	−3 383.95	15.704	111.86
−232	−4 237.72	5.477	142.80	−192	−3 906.70	10.985	130.04	−152	−3 368.19	15.816	111.38
−231	−4 232.17	5.620	142.74	−191	−3 895.65	11.115	129.58	−151	−3 352.32	15.927	110.90
−230	−4 226.48	5.763	142.66	−190	−3 884.47	11.244	129.13	−150	−3 336.34	16.038	110.43

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C --Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−3 336.34	16.038	110.43	−100	−2 406.81	20.924	84.02	−50	−1 268.60	24.335	51.92
−149	−3 320.24	16.148	109.95	−99	−2 385.85	21.008	83.43	−49	−1 244.24	24.387	51.27
−148	−3 304.04	16.257	109.47	−98	−2 364.80	21.091	82.83	−48	−1 219.82	24.438	50.62
−147	−3 287.73	16.367	108.99	−97	−2 343.66	21.174	82.22	−47	−1 195.36	24.488	49.97
−146	−3 271.31	16.475	108.51	−96	−2 322.45	21.255	81.62	−46	−1 170.85	24.538	49.32
−145	−3 254.78	16.584	108.02	−95	−2 301.15	21.337	81.01	−45	−1 146.29	24.587	48.68
−144	−3 238.14	16.691	107.54	−94	−2 279.78	21.417	80.40	−44	−1 121.67	24.635	48.03
−143	−3 221.40	16.799	107.05	−93	−2 258.32	21.498	79.79	−43	−1 097.02	24.683	47.39
−142	−3 204.54	16.906	106.57	−92	−2 236.78	21.577	79.17	−42	−1 072.31	24.730	46.75
−141	−3 187.59	17.012	106.08	−91	−2 215.16	21.656	78.55	−41	−1 047.56	24.776	46.11
−140	−3 170.52	17.118	105.59	−90	−2 193.47	21.734	77.93	−40	−1 022.76	24.822	45.48
−139	−3 153.35	17.223	105.09	−89	−2 171.70	21.812	77.31	−39	−997.91	24.867	44.84
−138	−3 136.07	17.328	104.60	−88	−2 149.85	21.889	76.68	−38	−973.02	24.912	44.21
−137	−3 118.69	17.432	104.10	−87	−2 127.92	21.965	76.05	−37	−948.09	24.956	43.58
−136	−3 101.21	17.536	103.61	−86	−2 105.92	22.041	75.42	−36	−923.11	24.999	42.96
−135	−3 083.62	17.640	103.11	−85	−2 083.84	22.116	74.79	−35	−898.09	25.042	42.33
−134	−3 065.93	17.742	102.61	−84	−2 061.68	22.190	74.15	−34	−873.03	25.084	41.71
−133	−3 048.14	17.845	102.10	−83	−2 039.46	22.264	73.52	−33	−847.92	25.125	41.09
−132	−3 030.24	17.947	101.60	−82	−2 017.16	22.337	72.88	−32	−822.78	25.166	40.47
−131	−3 012.24	18.048	101.09	−81	−1 994.78	22.410	72.24	−31	−797.59	25.206	39.86
−130	−2 994.15	18.149	100.58	−80	−1 972.34	22.482	71.59	−30	−772.37	25.246	39.25
−129	−2 975.95	18.249	100.07	−79	−1 949.82	22.553	70.95	−29	−747.10	25.285	38.64
−128	−2 957.65	18.349	99.55	−78	−1 927.23	22.624	70.30	−28	−721.80	25.323	38.03
−127	−2 939.25	18.448	99.03	−77	−1 904.57	22.694	69.65	−27	−696.46	25.361	37.43
−126	−2 920.75	18.547	98.51	−76	−1 881.84	22.763	69.00	−26	−671.08	25.398	36.83
−125	−2 902.16	18.645	97.99	−75	−1 859.04	22.832	68.35	−25	−645.66	25.434	36.23
−124	−2 883.46	18.743	97.47	−74	−1 836.18	22.900	67.70	−24	−620.21	25.470	35.63
−123	−2 864.67	18.840	96.94	−73	−1 813.24	22.967	67.05	−23	−594.72	25.506	35.04
−122	−2 845.78	18.937	96.41	−72	−1 790.24	23.034	66.39	−22	−569.20	25.540	34.45
−121	−2 826.80	19.033	95.88	−71	−1 767.18	23.100	65.74	−21	−543.64	25.574	33.86
−120	−2 807.72	19.129	95.34	−70	−1 744.04	23.165	65.08	−20	−518.05	25.608	33.28
−119	−2 788.54	19.224	94.80	−69	−1 720.85	23.230	64.42	−19	−492.42	25.641	32.69
−118	−2 769.27	19.318	94.26	−68	−1 697.58	23.294	63.77	−18	−466.77	25.673	32.11
−117	−2 749.90	19.412	93.72	−67	−1 674.26	23.358	63.11	−17	−441.08	25.705	31.53
−116	−2 730.44	19.506	93.17	−66	−1 650.87	23.420	62.45	−16	−415.36	25.736	30.96
−115	−2 710.89	19.599	92.62	−65	−1 627.42	23.483	61.79	−15	−389.61	25.767	30.38
−114	−2 691.25	19.691	92.07	−64	−1 603.90	23.544	61.13	−14	−363.82	25.797	29.81
−113	−2 671.51	19.783	91.51	−63	−1 580.33	23.605	60.47	−13	−338.01	25.827	29.24
−112	−2 651.68	19.874	90.96	−62	−1 556.69	23.665	59.81	−12	−312.17	25.856	28.67
−111	−2 631.76	19.965	90.39	−61	−1 533.00	23.724	59.15	−11	−286.30	25.884	28.10
−110	−2 611.75	20.055	89.83	−60	−1 509.25	23.783	58.49	−10	−260.40	25.912	27.54
−109	−2 591.65	20.144	89.26	−59	−1 485.43	23.841	57.83	−9	−234.48	25.939	26.97
−108	−2 571.47	20.233	88.69	−58	−1 461.56	23.899	57.17	−8	−208.52	25.966	26.41
−107	−2 551.19	20.322	88.12	−57	−1 437.64	23.956	56.51	−7	−182.54	25.992	25.85
−106	−2 530.82	20.409	87.54	−56	−1 413.65	24.012	55.85	−6	−156.54	26.018	25.28
−105	−2 510.37	20.497	86.96	−55	−1 389.61	24.068	55.19	−5	−130.51	26.043	24.72
−104	−2 489.83	20.583	86.38	−54	−1 365.52	24.122	54.54	−4	−104.46	26.067	24.16
−103	−2 469.20	20.669	85.80	−53	−1 341.37	24.177	53.88	−3	−78.38	26.091	23.60
−102	−2 448.49	20.755	85.21	−52	−1 317.16	24.230	53.23	−2	−52.27	26.114	23.04
−101	−2 427.69	20.840	84.62	−51	−1 292.91	24.283	52.57	−1	−26.15	26.137	22.48
−100	−2 406.81	20.924	84.02	−50	−1 268.60	24.335	51.92	0	0.00	26.159	21.91

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
0	0.0	25.929	31.42	50	1 339.8	27.721	38.42	100	2 774.1	29.643	37.63
1	25.9	25.961	31.68	51	1 367.6	27.760	38.46	101	2 803.8	29.681	37.57
2	51.9	25.993	31.93	52	1 395.3	27.798	38.50	102	2 833.5	29.719	37.51
3	77.9	26.025	32.18	53	1 423.2	27.837	38.54	103	2 863.2	29.756	37.45
4	104.0	26.057	32.42	54	1 451.0	27.875	38.57	104	2 893.0	29.793	37.39
5	130.0	26.090	32.66	55	1 478.9	27.914	38.60	105	2 922.8	29.831	37.32
6	156.2	26.122	32.89	56	1 506.9	27.952	38.62	106	2 952.7	29.868	37.26
7	182.3	26.155	33.12	57	1 534.8	27.991	38.65	107	2 982.5	29.905	37.19
8	208.5	26.189	33.34	58	1 562.8	28.030	38.67	108	3 012.5	29.942	37.12
9	234.7	26.222	33.55	59	1 590.9	28.068	38.69	109	3 042.4	29.980	37.05
10	260.9	26.256	33.76	60	1 619.0	28.107	38.70	110	3 072.4	30.017	36.98
11	287.2	26.290	33.96	61	1 647.1	28.146	38.72	111	3 102.5	30.054	36.91
12	313.5	26.324	34.16	62	1 675.3	28.184	38.73	112	3 132.5	30.090	36.84
13	339.8	26.358	34.35	63	1 703.5	28.223	38.74	113	3 162.6	30.127	36.77
14	366.2	26.392	34.54	64	1 731.7	28.262	38.74	114	3 192.8	30.164	36.69
15	392.6	26.427	34.72	65	1 760.0	28.301	38.74	115	3 223.0	30.201	36.62
16	419.1	26.462	34.90	66	1 788.3	28.339	38.75	116	3 253.2	30.237	36.54
17	445.5	26.497	35.08	67	1 816.7	28.378	38.74	117	3 283.4	30.274	36.47
18	472.0	26.532	35.24	68	1 845.1	28.417	38.74	118	3 313.7	30.310	36.39
19	498.6	26.567	35.41	69	1 873.5	28.456	38.73	119	3 344.1	30.346	36.31
20	525.2	26.603	35.57	70	1 902.0	28.494	38.73	120	3 374.4	30.383	36.24
21	551.8	26.638	35.72	71	1 930.5	28.533	38.72	121	3 404.8	30.419	36.16
22	578.5	26.674	35.87	72	1 959.0	28.572	38.70	122	3 435.3	30.455	36.08
23	605.2	26.710	36.01	73	1 987.6	28.610	38.69	123	3 465.7	30.491	36.00
24	631.9	26.746	36.15	74	2 016.3	28.649	38.67	124	3 496.3	30.527	35.91
25	658.6	26.782	36.29	75	2 044.9	28.688	38.66	125	3 526.8	30.563	35.83
26	685.4	26.819	36.42	76	2 073.6	28.726	38.63	126	3 557.4	30.599	35.75
27	712.3	26.855	36.55	77	2 102.4	28.765	38.61	127	3 588.0	30.634	35.66
28	739.2	26.892	36.67	78	2 131.2	28.804	38.59	128	3 618.6	30.670	35.58
29	766.1	26.929	36.79	79	2 160.0	28.842	38.56	129	3 649.3	30.706	35.50
30	793.0	26.966	36.90	80	2 188.9	28.881	38.53	130	3 680.1	30.741	35.41
31	820.0	27.002	37.02	81	2 217.8	28.919	38.50	131	3 710.8	30.776	35.32
32	847.0	27.040	37.12	82	2 246.7	28.958	38.47	132	3 741.6	30.812	35.24
33	874.1	27.077	37.22	83	2 275.7	28.996	38.44	133	3 772.4	30.847	35.15
34	901.2	27.114	37.32	84	2 304.7	29.035	38.40	134	3 803.3	30.882	35.06
35	928.3	27.151	37.42	85	2 333.7	29.073	38.37	135	3 834.2	30.917	34.98
36	955.5	27.189	37.51	86	2 362.8	29.111	38.33	136	3 865.1	30.952	34.89
37	982.7	27.226	37.60	87	2 392.0	29.150	38.29	137	3 896.1	30.987	34.80
38	1 009.9	27.264	37.68	88	2 421.1	29.188	38.25	138	3 927.1	31.022	34.71
39	1 037.2	27.302	37.76	89	2 450.3	29.226	38.20	139	3 958.2	31.056	34.62
40	1 064.5	27.340	37.84	90	2 479.6	29.264	38.16	140	3 989.2	31.091	34.53
41	1 091.9	27.377	37.91	91	2 508.9	29.303	38.11	141	4 020.3	31.125	34.44
42	1 119.3	27.415	37.98	92	2 538.2	29.341	38.06	142	4 051.5	31.160	34.35
43	1 146.7	27.453	38.05	93	2 567.5	29.379	38.01	143	4 082.7	31.194	34.25
44	1 174.2	27.491	38.11	94	2 596.9	29.417	37.96	144	4 113.9	31.228	34.16
45	1 201.7	27.530	38.17	95	2 626.4	29.455	37.91	145	4 145.1	31.262	34.07
46	1 229.3	27.568	38.23	96	2 655.9	29.492	37.86	146	4 176.4	31.296	33.98
47	1 256.8	27.606	38.28	97	2 685.4	29.530	37.80	147	4 207.7	31.330	33.88
48	1 284.5	27.644	38.33	98	2 714.9	29.568	37.75	148	4 239.0	31.364	33.79
49	1 312.1	27.683	38.38	99	2 744.5	29.606	37.69	149	4 270.4	31.398	33.70
50	1 339.8	27.721	38.42	100	2 774.1	29.643	37.63	150	4 301.8	31.431	33.60

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	4 301.8	31.431	33.60	**200**	5 913.4	32.991	28.76	**250**	7 597.0	34.313	24.21
151	4 333.3	31.465	33.51	**201**	5 946.4	33.020	28.67	**251**	7 631.3	34.337	24.12
152	4 364.8	31.498	33.41	**202**	5 979.5	33.048	28.57	**252**	7 665.6	34.361	24.04
153	4 396.3	31.532	33.32	**203**	6 012.5	33.077	28.47	**253**	7 700.0	34.385	23.95
154	4 427.8	31.565	33.22	**204**	6 045.6	33.105	28.38	**254**	7 734.4	34.409	23.87
155	4 459.4	31.598	33.13	**205**	6 078.7	33.134	28.28	**255**	7 768.8	34.433	23.78
156	4 491.0	31.631	33.03	**206**	6 111.9	33.162	28.19	**256**	7 803.3	34.457	23.70
157	4 522.7	31.664	32.94	**207**	6 145.1	33.190	28.09	**257**	7 837.7	34.480	23.62
158	4 554.4	31.697	32.84	**208**	6 178.3	33.218	28.00	**258**	7 872.2	34.504	23.53
159	4 586.1	31.730	32.75	**209**	6 211.5	33.246	27.90	**259**	7 906.7	34.527	23.45
160	4 617.8	31.763	32.65	**210**	6 244.7	33.274	27.81	**260**	7 941.3	34.551	23.37
161	4 649.6	31.795	32.55	**211**	6 278.0	33.301	27.71	**261**	7 975.8	34.574	23.29
162	4 681.4	31.828	32.46	**212**	6 311.3	33.329	27.62	**262**	8 010.4	34.597	23.21
163	4 713.3	31.860	32.36	**213**	6 344.7	33.357	27.53	**263**	8 045.0	34.620	23.12
164	4 745.1	31.893	32.26	**214**	6 378.1	33.384	27.43	**264**	8 079.7	34.643	23.04
165	4 777.0	31.925	32.17	**215**	6 411.5	33.412	27.34	**265**	8 114.3	34.666	22.96
166	4 809.0	31.957	32.07	**216**	6 444.9	33.439	27.25	**266**	8 149.0	34.689	22.88
167	4 841.0	31.989	31.97	**217**	6 478.3	33.466	27.15	**267**	8 183.7	34.712	22.80
168	4 873.0	32.021	31.87	**218**	6 511.8	33.493	27.06	**268**	8 218.4	34.735	22.72
169	4 905.0	32.053	31.78	**219**	6 545.3	33.520	26.97	**269**	8 253.2	34.758	22.64
170	4 937.1	32.084	31.68	**220**	6 578.9	33.547	26.87	**270**	8 287.9	34.780	22.56
171	4 969.2	32.116	31.58	**221**	6 612.4	33.574	26.78	**271**	8 322.7	34.803	22.48
172	5 001.3	32.148	31.48	**222**	6 646.0	33.601	26.69	**272**	8 357.5	34.825	22.40
173	5 033.5	32.179	31.39	**223**	6 679.6	33.627	26.60	**273**	8 392.4	34.848	22.32
174	5 065.7	32.210	31.29	**224**	6 713.3	33.654	26.51	**274**	8 427.2	34.870	22.24
175	5 097.9	32.242	31.19	**225**	6 746.9	33.680	26.41	**275**	8 462.1	34.892	22.16
176	5 130.1	32.273	31.09	**226**	6 780.6	33.707	26.32	**276**	8 497.0	34.914	22.08
177	5 162.4	32.304	31.00	**227**	6 814.3	33.733	26.23	**277**	8 532.0	34.936	22.01
178	5 194.7	32.335	30.90	**228**	6 848.1	33.759	26.14	**278**	8 566.9	34.958	21.93
179	5 227.1	32.366	30.80	**229**	6 881.9	33.785	26.05	**279**	8 601.9	34.980	21.85
180	5 259.5	32.396	30.70	**230**	6 915.7	33.811	25.96	**280**	8 636.9	35.002	21.77
181	5 291.9	32.427	30.61	**231**	6 949.5	33.837	25.87	**281**	8 671.9	35.024	21.70
182	5 324.3	32.458	30.51	**232**	6 983.3	33.863	25.78	**282**	8 706.9	35.045	21.62
183	5 356.8	32.488	30.41	**233**	7 017.2	33.889	25.69	**283**	8 742.0	35.067	21.54
184	5 389.3	32.518	30.31	**234**	7 051.1	33.914	25.60	**284**	8 777.0	35.088	21.47
185	5 421.8	32.549	30.21	**235**	7 085.0	33.940	25.51	**285**	8 812.1	35.110	21.39
186	5 454.4	32.579	30.12	**236**	7 119.0	33.965	25.42	**286**	8 847.3	35.131	21.32
187	5 487.0	32.609	30.02	**237**	7 153.0	33.991	25.34	**287**	8 882.4	35.152	21.24
188	5 519.6	32.639	29.92	**238**	7 187.0	34.016	25.25	**288**	8 917.6	35.174	21.17
189	5 552.3	32.669	29.82	**239**	7 221.0	34.041	25.16	**289**	8 952.7	35.195	21.09
190	5 585.0	32.698	29.73	**240**	7 255.1	34.066	25.07	**290**	8 988.0	35.216	21.02
191	5 617.7	32.728	29.63	**241**	7 289.1	34.091	24.98	**291**	9 023.2	35.237	20.94
192	5 650.4	32.758	29.53	**242**	7 323.2	34.116	24.90	**292**	9 058.4	35.258	20.87
193	5 683.2	32.787	29.44	**243**	7 357.4	34.141	24.81	**293**	9 093.7	35.279	20.79
194	5 716.0	32.817	29.34	**244**	7 391.5	34.166	24.72	**294**	9 129.0	35.299	20.72
195	5 748.8	32.846	29.24	**245**	7 425.7	34.191	24.64	**295**	9 164.3	35.320	20.65
196	5 781.7	32.875	29.15	**246**	7 459.9	34.215	24.55	**296**	9 199.6	35.341	20.57
197	5 814.6	32.904	29.05	**247**	7 494.1	34.240	24.46	**297**	9 235.0	35.361	20.50
198	5 847.5	32.933	28.95	**248**	7 528.4	34.264	24.38	**298**	9 270.3	35.382	20.43
199	5 880.4	32.962	28.86	**249**	7 562.7	34.289	24.29	**299**	9 305.7	35.402	20.35
200	5 913.4	32.991	28.76	**250**	7 597.0	34.313	24.21	**300**	9 341.2	35.422	20.28

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	9 341.2	35.422	20.28	**350**	11 136.2	36.351	16.96	**400**	12 973.7	37.125	14.07
301	9 376.6	35.443	20.21	**351**	11 172.5	36.368	16.89	**401**	13 010.8	37.139	14.01
302	9 412.0	35.463	20.14	**352**	11 208.9	36.385	16.83	**402**	13 048.0	37.153	13.96
303	9 447.5	35.483	20.07	**353**	11 245.3	36.402	16.77	**403**	13 085.1	37.167	13.91
304	9 483.0	35.503	20.00	**354**	11 281.7	36.418	16.71	**404**	13 122.3	37.181	13.85
305	9 518.5	35.523	19.93	**355**	11 318.1	36.435	16.65	**405**	13 159.5	37.195	13.80
306	9 554.0	35.543	19.85	**356**	11 354.6	36.452	16.59	**406**	13 196.7	37.209	13.74
307	9 589.6	35.563	19.78	**357**	11 391.0	36.468	16.53	**407**	13 233.9	37.222	13.69
308	9 625.2	35.582	19.71	**358**	11 427.5	36.485	16.47	**408**	13 271.1	37.236	13.64
309	9 660.8	35.602	19.64	**359**	11 464.0	36.501	16.41	**409**	13 308.4	37.250	13.58
310	9 696.4	35.622	19.57	**360**	11 500.5	36.518	16.35	**410**	13 345.6	37.263	13.53
311	9 732.0	35.641	19.50	**361**	11 537.1	36.534	16.29	**411**	13 382.9	37.277	13.48
312	9 767.7	35.661	19.43	**362**	11 573.6	36.550	16.23	**412**	13 420.2	37.290	13.42
313	9 803.3	35.680	19.37	**363**	11 610.2	36.566	16.17	**413**	13 457.5	37.304	13.37
314	9 839.0	35.699	19.30	**364**	11 646.7	36.582	16.11	**414**	13 494.8	37.317	13.32
315	9 874.7	35.719	19.23	**365**	11 683.3	36.599	16.05	**415**	13 532.1	37.330	13.26
316	9 910.5	35.738	19.16	**366**	11 719.9	36.615	15.99	**416**	13 569.5	37.343	13.21
317	9 946.2	35.757	19.09	**367**	11 756.5	36.631	15.93	**417**	13 606.8	37.357	13.16
318	9 982.0	35.776	19.02	**368**	11 793.2	36.646	15.87	**418**	13 644.2	37.370	13.10
319	10 017.8	35.795	18.96	**369**	11 829.8	36.662	15.82	**419**	13 681.5	37.383	13.05
320	10 053.6	35.814	18.89	**370**	11 866.5	36.678	15.76	**420**	13 718.9	37.396	13.00
321	10 089.4	35.833	18.82	**371**	11 903.2	36.694	15.70	**421**	13 756.3	37.409	12.95
322	10 125.2	35.851	18.75	**372**	11 939.9	36.709	15.64	**422**	13 793.7	37.422	12.89
323	10 161.1	35.870	18.69	**373**	11 976.6	36.725	15.58	**423**	13 831.2	37.435	12.84
324	10 197.0	35.889	18.62	**374**	12 013.3	36.741	15.53	**424**	13 868.6	37.447	12.79
325	10 232.9	35.907	18.55	**375**	12 050.1	36.756	15.47	**425**	13 906.1	37.460	12.74
326	10 268.8	35.926	18.49	**376**	12 086.9	36.772	15.41	**426**	13 943.5	37.473	12.69
327	10 304.7	35.944	18.42	**377**	12 123.6	36.787	15.35	**427**	13 981.0	37.486	12.63
328	10 340.7	35.963	18.36	**378**	12 160.4	36.802	15.30	**428**	14 018.5	37.498	12.58
329	10 376.6	35.981	18.29	**379**	12 197.2	36.818	15.24	**429**	14 056.0	37.511	12.53
330	10 412.6	35.999	18.22	**380**	12 234.1	36.833	15.18	**430**	14 093.5	37.523	12.48
331	10 448.6	36.018	18.16	**381**	12 270.9	36.848	15.12	**431**	14 131.1	37.536	12.43
332	10 484.7	36.036	18.09	**382**	12 307.8	36.863	15.07	**432**	14 168.6	37.548	12.38
333	10 520.7	36.054	18.03	**383**	12 344.6	36.878	15.01	**433**	14 206.2	37.560	12.32
334	10 556.8	36.072	17.96	**384**	12 381.5	36.893	14.95	**434**	14 243.7	37.573	12.27
335	10 592.9	36.090	17.90	**385**	12 418.4	36.908	14.90	**435**	14 281.3	37.585	12.22
336	10 629.0	36.108	17.84	**386**	12 455.3	36.923	14.84	**436**	14 318.9	37.597	12.17
337	10 665.1	36.125	17.77	**387**	12 492.3	36.938	14.79	**437**	14 356.5	37.609	12.12
338	10 701.2	36.143	17.71	**388**	12 529.2	36.952	14.73	**438**	14 394.1	37.621	12.07
339	10 737.4	36.161	17.64	**389**	12 566.2	36.967	14.67	**439**	14 431.7	37.633	12.02
340	10 773.5	36.178	17.58	**390**	12 603.1	36.982	14.62	**440**	14 469.4	37.645	11.97
341	10 809.7	36.196	17.52	**391**	12 640.1	36.996	14.56	**441**	14 507.0	37.657	11.92
342	10 845.9	36.213	17.45	**392**	12 677.1	37.011	14.51	**442**	14 544.7	37.669	11.87
343	10 882.1	36.231	17.39	**393**	12 714.2	37.025	14.45	**443**	14 582.4	37.681	11.82
344	10 918.4	36.248	17.33	**394**	12 751.2	37.040	14.40	**444**	14 620.1	37.693	11.77
345	10 954.6	36.266	17.27	**395**	12 788.2	37.054	14.34	**445**	14 657.8	37.705	11.71
346	10 990.9	36.283	17.20	**396**	12 825.3	37.068	14.29	**446**	14 695.5	37.716	11.66
347	11 027.2	36.300	17.14	**397**	12 862.4	37.083	14.23	**447**	14 733.2	37.728	11.61
348	11 063.5	36.317	17.08	**398**	12 899.5	37.097	14.18	**448**	14 770.9	37.740	11.56
349	11 099.8	36.334	17.02	**399**	12 936.6	37.111	14.12	**449**	14 808.7	37.751	11.51
350	11 136.2	36.351	16.96	**400**	12 973.7	37.125	14.07	**450**	14 846.4	37.763	11.46

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	14 846.4	37.763	11.46	**500**	16 747.9	38.275	9.05	**550**	18 672.0	38.670	6.81
451	14 884.2	37.774	11.41	**501**	16 786.1	38.284	9.00	**551**	18 710.6	38.677	6.76
452	14 922.0	37.785	11.36	**502**	16 824.4	38.293	8.96	**552**	18 749.3	38.684	6.72
453	14 959.8	37.797	11.31	**503**	16 862.7	38.302	8.91	**553**	18 788.0	38.691	6.68
454	14 997.6	37.808	11.26	**504**	16 901.0	38.311	8.87	**554**	18 826.7	38.697	6.63
455	15 035.4	37.819	11.21	**505**	16 939.3	38.319	8.82	**555**	18 865.4	38.704	6.59
456	15 073.2	37.830	11.17	**506**	16 977.7	38.328	8.77	**556**	18 904.1	38.711	6.55
457	15 111.0	37.842	11.12	**507**	17 016.0	38.337	8.73	**557**	18 942.8	38.717	6.51
458	15 148.9	37.853	11.07	**508**	17 054.3	38.346	8.68	**558**	18 981.5	38.724	6.46
459	15 186.7	37.864	11.02	**509**	17 092.7	38.354	8.63	**559**	19 020.3	38.730	6.42
460	15 224.6	37.875	10.97	**510**	17 131.0	38.363	8.59	**560**	19 059.0	38.736	6.38
461	15 262.5	37.886	10.92	**511**	17 169.4	38.371	8.54	**561**	19 097.7	38.743	6.34
462	15 300.4	37.897	10.87	**512**	17 207.8	38.380	8.50	**562**	19 136.5	38.749	6.29
463	15 338.3	37.907	10.82	**513**	17 246.2	38.388	8.45	**563**	19 175.2	38.755	6.25
464	15 376.2	37.918	10.77	**514**	17 284.6	38.397	8.41	**564**	19 214.0	38.762	6.21
465	15 414.1	37.929	10.72	**515**	17 323.0	38.405	8.36	**565**	19 252.8	38.768	6.17
466	15 452.1	37.940	10.67	**516**	17 361.4	38.414	8.31	**566**	19 291.5	38.774	6.13
467	15 490.0	37.950	10.62	**517**	17 399.8	38.422	8.27	**567**	19 330.3	38.780	6.08
468	15 528.0	37.961	10.58	**518**	17 438.2	38.430	8.22	**568**	19 369.1	38.786	6.04
469	15 565.9	37.971	10.53	**519**	17 476.7	38.438	8.18	**569**	19 407.9	38.792	6.00
470	15 603.9	37.982	10.48	**520**	17 515.1	38.447	8.13	**570**	19 446.7	38.798	5.96
471	15 641.9	37.992	10.43	**521**	17 553.6	38.455	8.09	**571**	19 485.5	38.804	5.92
472	15 679.9	38.003	10.38	**522**	17 592.0	38.463	8.04	**572**	19 524.3	38.810	5.88
473	15 717.9	38.013	10.33	**523**	17 630.5	38.471	8.00	**573**	19 563.1	38.816	5.84
474	15 755.9	38.023	10.28	**524**	17 669.0	38.479	7.95	**574**	19 601.9	38.822	5.79
475	15 793.9	38.034	10.24	**525**	17 707.4	38.487	7.91	**575**	19 640.7	38.827	5.75
476	15 832.0	38.044	10.19	**526**	17 745.9	38.495	7.86	**576**	19 679.6	38.833	5.71
477	15 870.0	38.054	10.14	**527**	17 784.4	38.502	7.82	**577**	19 718.4	38.839	5.67
478	15 908.1	38.064	10.09	**528**	17 822.9	38.510	7.77	**578**	19 757.2	38.844	5.63
479	15 946.2	38.074	10.04	**529**	17 861.4	38.518	7.73	**579**	19 796.1	38.850	5.59
480	15 984.2	38.084	10.00	**530**	17 900.0	38.526	7.68	**580**	19 834.9	38.856	5.55
481	16 022.3	38.094	9.95	**531**	17 938.5	38.533	7.64	**581**	19 873.8	38.861	5.51
482	16 060.4	38.104	9.90	**532**	17 977.0	38.541	7.59	**582**	19 912.7	38.867	5.47
483	16 098.5	38.114	9.85	**533**	18 015.6	38.548	7.55	**583**	19 951.5	38.872	5.43
484	16 136.7	38.124	9.80	**534**	18 054.1	38.556	7.51	**584**	19 990.4	38.877	5.39
485	16 174.8	38.134	9.76	**535**	18 092.7	38.563	7.46	**585**	20 029.3	38.883	5.35
486	16 212.9	38.143	9.71	**536**	18 131.3	38.571	7.42	**586**	20 068.2	38.888	5.31
487	16 251.1	38.153	9.66	**537**	18 169.8	38.578	7.37	**587**	20 107.1	38.893	5.27
488	16 289.2	38.163	9.61	**538**	18 208.4	38.586	7.33	**588**	20 146.0	38.899	5.23
489	16 327.4	38.172	9.57	**539**	18 247.0	38.593	7.28	**589**	20 184.9	38.904	5.19
490	16 365.6	38.182	9.52	**540**	18 285.6	38.600	7.24	**590**	20 223.8	38.909	5.15
491	16 403.8	38.191	9.47	**541**	18 324.2	38.607	7.20	**591**	20 262.7	38.914	5.11
492	16 442.0	38.201	9.43	**542**	18 362.8	38.615	7.15	**592**	20 301.6	38.919	5.07
493	16 480.2	38.210	9.38	**543**	18 401.4	38.622	7.11	**593**	20 340.5	38.924	5.03
494	16 518.4	38.220	9.33	**544**	18 440.1	38.629	7.07	**594**	20 379.4	38.929	4.99
495	16 556.6	38.229	9.28	**545**	18 478.7	38.636	7.02	**595**	20 418.4	38.934	4.95
496	16 594.8	38.238	9.24	**546**	18 517.3	38.643	6.98	**596**	20 457.3	38.939	4.91
497	16 633.1	38.247	9.19	**547**	18 556.0	38.650	6.94	**597**	20 496.3	38.944	4.87
498	16 671.3	38.257	9.14	**548**	18 594.6	38.657	6.89	**598**	20 535.2	38.949	4.83
499	16 709.6	38.266	9.10	**549**	18 633.3	38.664	6.85	**599**	20 574.2	38.954	4.79
500	16 747.9	38.275	9.05	**550**	18 672.0	38.670	6.81	**600**	20 613.1	38.959	4.75

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	20 613.1	38.959	4.75	**650**	22 566.2	39.150	2.93	**700**	24 526.7	39.256	1.36
601	20 652.1	38.963	4.71	**651**	22 605.3	39.153	2.90	**701**	24 565.9	39.257	1.33
602	20 691.0	38.968	4.68	**652**	22 644.5	39.155	2.86	**702**	24 605.2	39.258	1.30
603	20 730.0	38.973	4.64	**653**	22 683.7	39.158	2.83	**703**	24 644.4	39.260	1.27
604	20 769.0	38.977	4.60	**654**	22 722.8	39.161	2.79	**704**	24 683.7	39.261	1.24
605	20 808.0	38.982	4.56	**655**	22 762.0	39.164	2.76	**705**	24 722.9	39.262	1.21
606	20 846.9	38.986	4.52	**656**	22 801.1	39.167	2.73	**706**	24 762.2	39.263	1.18
607	20 885.9	38.991	4.48	**657**	22 840.3	39.169	2.69	**707**	24 801.5	39.264	1.15
608	20 924.9	38.995	4.45	**658**	22 879.5	39.172	2.66	**708**	24 840.7	39.266	1.13
609	20 963.9	39.000	4.41	**659**	22 918.7	39.175	2.63	**709**	24 880.0	39.267	1.10
610	21 002.9	39.004	4.37	**660**	22 957.8	39.177	2.59	**710**	24 919.3	39.268	1.07
611	21 041.9	39.009	4.33	**661**	22 997.0	39.180	2.56	**711**	24 958.5	39.269	1.04
612	21 080.9	39.013	4.29	**662**	23 036.2	39.182	2.53	**712**	24 997.8	39.270	1.01
613	21 120.0	39.017	4.26	**663**	23 075.4	39.185	2.50	**713**	25 037.1	39.271	0.99
614	21 159.0	39.021	4.22	**664**	23 114.6	39.187	2.46	**714**	25 076.4	39.272	0.96
615	21 198.0	39.026	4.18	**665**	23 153.7	39.190	2.43	**715**	25 115.6	39.273	0.93
616	21 237.0	39.030	4.14	**666**	23 192.9	39.192	2.40	**716**	25 154.9	39.274	0.90
617	21 276.1	39.034	4.11	**667**	23 232.1	39.195	2.37	**717**	25 194.2	39.275	0.87
618	21 315.1	39.038	4.07	**668**	23 271.3	39.197	2.33	**718**	25 233.4	39.275	0.85
619	21 354.1	39.042	4.03	**669**	23 310.5	39.199	2.30	**719**	25 272.7	39.276	0.82
620	21 393.2	39.046	3.99	**670**	23 349.7	39.202	2.27	**720**	25 312.0	39.277	0.79
621	21 432.2	39.050	3.96	**671**	23 388.9	39.204	2.24	**721**	25 351.3	39.278	0.77
622	21 471.3	39.054	3.92	**672**	23 428.1	39.206	2.21	**722**	25 390.6	39.279	0.74
623	21 510.3	39.058	3.88	**673**	23 467.3	39.208	2.17	**723**	25 429.8	39.279	0.71
624	21 549.4	39.062	3.85	**674**	23 506.5	39.210	2.14	**724**	25 469.1	39.280	0.68
625	21 588.5	39.065	3.81	**675**	23 545.8	39.212	2.11	**725**	25 508.4	39.281	0.66
626	21 627.5	39.069	3.77	**676**	23 585.0	39.215	2.08	**726**	25 547.7	39.281	0.63
627	21 666.6	39.073	3.74	**677**	23 624.2	39.217	2.05	**727**	25 587.0	39.282	0.60
628	21 705.7	39.077	3.70	**678**	23 663.4	39.219	2.02	**728**	25 626.2	39.283	0.58
629	21 744.7	39.080	3.67	**679**	23 702.6	39.221	1.99	**729**	25 665.5	39.283	0.55
630	21 783.8	39.084	3.63	**680**	23 741.8	39.223	1.95	**730**	25 704.8	39.284	0.53
631	21 822.9	39.088	3.59	**681**	23 781.1	39.225	1.92	**731**	25 744.1	39.284	0.50
632	21 862.0	39.091	3.56	**682**	23 820.3	39.227	1.89	**732**	25 783.4	39.285	0.47
633	21 901.1	39.095	3.52	**683**	23 859.5	39.228	1.86	**733**	25 822.7	39.285	0.45
634	21 940.2	39.098	3.49	**684**	23 898.8	39.230	1.83	**734**	25 861.9	39.286	0.42
635	21 979.3	39.102	3.45	**685**	23 938.0	39.232	1.80	**735**	25 901.2	39.286	0.39
636	22 018.4	39.105	3.42	**686**	23 977.2	39.234	1.77	**736**	25 940.5	39.286	0.37
637	22 057.5	39.109	3.38	**687**	24 016.5	39.236	1.74	**737**	25 979.8	39.287	0.34
638	22 096.6	39.112	3.34	**688**	24 055.7	39.237	1.71	**738**	26 019.1	39.287	0.32
639	22 135.7	39.115	3.31	**689**	24 094.9	39.239	1.68	**739**	26 058.4	39.287	0.29
640	22 174.8	39.119	3.27	**690**	24 134.2	39.241	1.65	**740**	26 097.7	39.288	0.27
641	22 214.0	39.122	3.24	**691**	24 173.4	39.242	1.62	**741**	26 137.0	39.288	0.24
642	22 253.1	39.125	3.20	**692**	24 212.7	39.244	1.59	**742**	26 176.2	39.288	0.21
643	22 292.2	39.128	3.17	**693**	24 251.9	39.245	1.56	**743**	26 215.5	39.288	0.19
644	22 331.3	39.131	3.14	**694**	24 291.1	39.247	1.53	**744**	26 254.8	39.288	0.16
645	22 370.5	39.135	3.10	**695**	24 330.4	39.249	1.50	**745**	26 294.1	39.289	0.14
646	22 409.6	39.138	3.07	**696**	24 369.6	39.250	1.47	**746**	26 333.4	39.289	0.11
647	22 448.8	39.141	3.03	**697**	24 408.9	39.251	1.44	**747**	26 372.7	39.289	0.09
648	22 487.9	39.144	3.00	**698**	24 448.1	39.253	1.41	**748**	26 412.0	39.289	0.06
649	22 527.0	39.147	2.96	**699**	24 487.4	39.254	1.38	**749**	26 451.3	39.289	0.04
650	22 566.2	39.150	2.93	**700**	24 526.7	39.256	1.36	**750**	26 490.5	39.289	0.01

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	26 490.5	39.289	0.01	**800**	28 454.5	39.260	−1.15	**850**	30 415.6	39.176	−2.21
751	26 529.8	39.289	−0.01	**801**	28 493.8	39.259	−1.17	**851**	30 454.8	39.174	−2.23
752	26 569.1	39.289	−0.04	**802**	28 533.0	39.258	−1.19	**852**	30 494.0	39.172	−2.25
753	26 608.4	39.289	−0.06	**803**	28 572.3	39.257	−1.21	**853**	30 533.2	39.169	−2.27
754	26 647.7	39.289	−0.08	**804**	28 611.6	39.255	−1.23	**854**	30 572.3	39.167	−2.29
755	26 687.0	39.289	−0.11	**805**	28 650.8	39.254	−1.26	**855**	30 611.5	39.165	−2.31
756	26 726.3	39.289	−0.13	**806**	28 690.1	39.253	−1.28	**856**	30 650.7	39.162	−2.33
757	26 765.6	39.289	−0.16	**807**	28 729.3	39.252	−1.30	**857**	30 689.8	39.160	−2.35
758	26 804.9	39.288	−0.18	**808**	28 768.6	39.250	−1.32	**858**	30 729.0	39.158	−2.37
759	26 844.1	39.288	−0.21	**809**	28 807.8	39.249	−1.34	**859**	30 768.1	39.155	−2.39
760	26 883.4	39.288	−0.23	**810**	28 847.1	39.248	−1.36	**860**	30 807.3	39.153	−2.41
761	26 922.7	39.288	−0.25	**811**	28 886.3	39.246	−1.39	**861**	30 846.4	39.151	−2.43
762	26 962.0	39.287	−0.28	**812**	28 925.6	39.245	−1.41	**862**	30 885.6	39.148	−2.45
763	27 001.3	39.287	−0.30	**813**	28 964.8	39.243	−1.43	**863**	30 924.7	39.146	−2.48
764	27 040.6	39.287	−0.33	**814**	29 004.0	39.242	−1.45	**864**	30 963.9	39.143	−2.50
765	27 079.9	39.287	−0.35	**815**	29 043.3	39.240	−1.47	**865**	31 003.0	39.141	−2.52
766	27 119.2	39.286	−0.37	**816**	29 082.5	39.239	−1.49	**866**	31 042.2	39.138	−2.54
767	27 158.4	39.286	−0.40	**817**	29 121.8	39.237	−1.51	**867**	31 081.3	39.136	−2.56
768	27 197.7	39.285	−0.42	**818**	29 161.0	39.236	−1.54	**868**	31 120.4	39.133	−2.58
769	27 237.0	39.285	−0.44	**819**	29 200.2	39.234	−1.56	**869**	31 159.6	39.130	−2.60
770	27 276.3	39.284	−0.47	**820**	29 239.5	39.233	−1.58	**870**	31 198.7	39.128	−2.62
771	27 315.6	39.284	−0.49	**821**	29 278.7	39.231	−1.60	**871**	31 237.8	39.125	−2.64
772	27 354.9	39.283	−0.51	**822**	29 317.9	39.230	−1.62	**872**	31 276.9	39.122	−2.66
773	27 394.2	39.283	−0.54	**823**	29 357.2	39.228	−1.64	**873**	31 316.1	39.120	−2.68
774	27 433.4	39.282	−0.56	**824**	29 396.4	39.226	−1.66	**874**	31 355.2	39.117	−2.70
775	27 472.7	39.282	−0.58	**825**	29 435.6	39.225	−1.68	**875**	31 394.3	39.114	−2.72
776	27 512.0	39.281	−0.61	**826**	29 474.8	39.223	−1.71	**876**	31 433.4	39.112	−2.74
777	27 551.3	39.281	−0.63	**827**	29 514.1	39.221	−1.73	**877**	31 472.5	39.109	−2.76
778	27 590.6	39.280	−0.65	**828**	29 553.3	39.220	−1.75	**878**	31 511.6	39.106	−2.79
779	27 629.8	39.279	−0.68	**829**	29 592.5	39.218	−1.77	**879**	31 550.7	39.103	−2.81
780	27 669.1	39.279	−0.70	**830**	29 631.7	39.216	−1.79	**880**	31 589.8	39.101	−2.83
781	27 708.4	39.278	−0.72	**831**	29 670.9	39.214	−1.81	**881**	31 628.9	39.098	−2.85
782	27 747.7	39.277	−0.74	**832**	29 710.1	39.212	−1.83	**882**	31 668.0	39.095	−2.87
783	27 786.9	39.276	−0.77	**833**	29 749.3	39.211	−1.85	**883**	31 707.1	39.092	−2.89
784	27 826.2	39.276	−0.79	**834**	29 788.6	39.209	−1.87	**884**	31 746.2	39.089	−2.91
785	27 865.5	39.275	−0.81	**835**	29 827.8	39.207	−1.89	**885**	31 785.3	39.086	−2.93
786	27 904.8	39.274	−0.84	**836**	29 867.0	39.205	−1.92	**886**	31 824.4	39.083	−2.95
787	27 944.0	39.273	−0.86	**837**	29 906.2	39.203	−1.94	**887**	31 863.5	39.080	−2.97
788	27 983.3	39.272	−0.88	**838**	29 945.4	39.201	−1.96	**888**	31 902.6	39.077	−2.99
789	28 022.6	39.271	−0.90	**839**	29 984.6	39.199	−1.98	**889**	31 941.6	39.074	−3.01
790	28 061.9	39.270	−0.93	**840**	30 023.8	39.197	−2.00	**890**	31 980.7	39.071	−3.03
791	28 101.1	39.270	−0.95	**841**	30 063.0	39.195	−2.02	**891**	32 019.8	39.068	−3.05
792	28 140.4	39.269	−0.97	**842**	30 102.2	39.193	−2.04	**892**	32 058.8	39.065	−3.07
793	28 179.7	39.268	−0.99	**843**	30 141.4	39.191	−2.06	**393**	32 097.9	39.062	−3.10
794	28 218.9	39.267	−1.01	**844**	30 180.5	39.189	−2.08	**894**	32 137.0	39.059	−3.12
795	28 258.2	39.266	−1.04	**845**	30 219.7	39.187	−2.10	**895**	32 176.0	39.056	−3.14
796	28 297.5	39.265	−1.06	**846**	30 258.9	39.185	−2.12	**896**	32 215.1	39.053	−3.16
797	28 336.7	39.263	−1.08	**847**	30 298.1	39.183	−2.14	**897**	32 254.1	39.049	−3.18
798	28 376.0	39.262	−1.10	**848**	30 337.3	39.180	−2.17	**898**	32 293.2	39.046	−3.20
799	28 415.3	39.261	−1.12	**849**	30 376.5	39.178	−2.19	**899**	32 332.2	39.043	−3.22
800	28 454.5	39.260	−1.15	**850**	30 415.6	39.176	−2.21	**900**	32 371.3	39.040	−3.24

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
900	32 371.3	39.040	−3.24	**950**	34 318.8	38.852	−4.29	**1000**	36 255.5	38.611	−5.34
901	32 410.3	39.037	−3.26	**951**	34 357.6	38.847	−4.31	**1001**	36 294.1	38.605	−5.37
902	32 449.3	39.033	−3.28	**952**	34 396.5	38.843	−4.33	**1002**	36 332.7	38.600	−5.39
903	32 488.4	39.030	−3.30	**953**	34 435.3	38.839	−4.36	**1003**	36 371.3	38.594	−5.41
904	32 527.4	39.027	−3.32	**954**	34 474.1	38.834	−4.38	**1004**	36 409.9	38.589	−5.43
905	32 566.4	39.023	−3.35	**955**	34 513.0	38.830	−4.40	**1005**	36 448.5	38.584	−5.45
906	32 605.4	39.020	−3.37	**956**	34 551.8	38.825	−4.42	**1006**	36 487.1	38.578	−5.47
907	32 644.5	39.017	−3.39	**957**	34 590.6	38.821	−4.44	**1007**	36 525.7	38.573	−5.49
908	32 683.5	39.013	−3.41	**958**	34 629.4	38.817	−4.46	**1008**	36 564.3	38.567	−5.51
909	32 722.5	39.010	−3.43	**959**	34 668.3	38.812	−4.48	**1009**	36 602.8	38.562	−5.53
910	32 761.5	39.006	−3.45	**960**	34 707.1	38.808	−4.50	**1010**	36 641.4	38.556	−5.55
911	32 800.5	39.003	−3.47	**961**	34 745.9	38.803	−4.53	**1011**	36 679.9	38.551	−5.57
912	32 839.5	38.999	−3.49	**962**	34 784.7	38.799	−4.55	**1012**	36 718.5	38.545	−5.59
913	32 878.5	38.996	−3.51	**963**	34 823.5	38.794	−4.57	**1013**	36 757.0	38.539	−5.61
914	32 917.5	38.992	−3.53	**964**	34 862.3	38.789	−4.59	**1014**	36 795.6	38.534	−5.63
915	32 956.5	38.989	−3.55	**965**	34 901.0	38.785	−4.61	**1015**	36 834.1	38.528	−5.65
916	32 995.5	38.985	−3.58	**966**	34 939.8	38.780	−4.63	**1016**	36 872.6	38.522	−5.67
917	33 034.4	38.982	−3.60	**967**	34 978.6	38.776	−4.65	**1017**	36 911.1	38.517	−5.69
918	33 073.4	38.978	−3.62	**968**	35 017.4	38.771	−4.67	**1018**	36 949.6	38.511	−5.71
919	33 112.4	38.975	−3.64	**969**	35 056.1	38.766	−4.69	**1019**	36 988.2	38.505	−5.73
920	33 151.4	38.971	−3.66	**970**	35 094.9	38.762	−4.72	**1020**	37 026.7	38.500	−5.75
921	33 190.3	38.967	−3.68	**971**	35 133.7	38.757	−4.74	**1021**	37 065.2	38.494	−5.77
922	33 229.3	38.964	−3.70	**972**	35 172.4	38.752	−4.76	**1022**	37 103.6	38.488	−5.79
923	33 268.3	38.960	−3.72	**973**	35 211.2	38.747	−4.78	**1023**	37 142.1	38.482	−5.81
924	33 307.2	38.956	−3.74	**974**	35 249.9	38.742	−4.80	**1024**	37 180.6	38.476	−5.83
925	33 346.2	38.952	−3.76	**975**	35 288.7	38.738	−4.82	**1025**	37 219.1	38.471	−5.85
926	33 385.1	38.949	−3.79	**976**	35 327.4	38.733	−4.84	**1026**	37 257.5	38.465	−5.87
927	33 424.1	38.945	−3.81	**977**	35 366.1	38.728	−4.86	**1027**	37 296.0	38.459	−5.89
928	33 463.0	38.941	−3.83	**978**	35 404.8	38.723	−4.89	**1028**	37 334.5	38.453	−5.91
929	33 502.0	38.937	−3.85	**979**	35 443.6	38.718	−4.91	**1029**	37 372.9	38.447	−5.93
930	33 540.9	38.933	−3.87	**980**	35 482.3	38.713	−4.93	**1030**	37 411.4	38.441	−5.95
931	33 579.8	38.929	−3.89	**981**	35 521.0	38.708	−4.95	**1031**	37 449.8	38.435	−5.97
932	33 618.8	38.925	−3.91	**982**	35 559.7	38.703	−4.97	**1032**	37 488.2	38.429	−5.99
933	33 657.7	38.922	−3.93	**983**	35 598.4	38.698	−4.99	**1033**	37 526.7	38.423	−6.01
934	33 696.6	38.918	−3.95	**984**	35 637.1	38.693	−5.01	**1034**	37 565.1	38.417	−6.03
935	33 735.5	38.914	−3.97	**985**	35 675.8	38.688	−5.03	**1035**	37 603.5	38.411	−6.05
936	33 774.4	38.910	−4.00	**986**	35 714.5	38.683	−5.05	**1036**	37 641.9	38.405	−6.06
937	33 813.3	38.906	−4.02	**987**	35 753.2	38.678	−5.07	**1037**	37 680.3	38.399	−6.08
938	33 852.2	38.902	−4.04	**988**	35 791.8	38.673	−5.10	**1038**	37 718.7	38.393	−6.10
939	33 891.1	38.898	−4.06	**989**	35 830.5	38.668	−5.12	**1039**	37 757.1	38.387	−6.12
940	33 930.0	38.893	−4.08	**990**	35 869.2	38.663	−5.14	**1040**	37 795.5	38.381	−6.14
941	33 968.9	38.889	−4.10	**991**	35 907.8	38.658	−5.16	**1041**	37 833.8	38.374	−6.16
942	34 007.8	38.885	−4.12	**992**	35 946.5	38.653	−5.18	**1042**	37 872.2	38.368	−6.18
943	34 046.7	38.881	−4.14	**993**	35 985.1	38.647	−5.20	**1043**	37 910.6	38.362	−6.20
944	34 085.6	38.877	−4.17	**994**	36 023.8	38.642	−5.22	**1044**	37 948.9	38.356	−6.22
945	34 124.5	38.873	−4.19	**995**	36 062.4	38.637	−5.24	**1045**	37 987.3	38.350	−6.23
946	34 163.3	38.869	−4.21	**996**	36 101.1	38.632	−5.26	**1046**	38 025.6	38.343	−6.25
947	34 202.2	38.864	−4.23	**997**	36 139.7	38.627	−5.28	**1047**	38 064.0	38.337	−6.27
948	34 241.1	38.860	−4.25	**998**	36 178.3	38.621	−5.30	**1048**	38 102.3	38.331	−6.29
949	34 279.9	38.856	−4.27	**999**	36 216.9	38.616	−5.32	**1049**	38 140.6	38.325	−6.31
950	34 318.8	38.852	−4.29	**1000**	36 255.5	38.611	−5.34	**1050**	38 179.0	38.318	−6.33

TABLE 8.3.3. ***Type N thermocouples*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1050	38 179.0	38.318	−6.33	1100	40 086.6	37.980	−7.16	1150	41 976.4	37.604	−7.89
1051	38 217.3	38.312	−6.35	1101	40 124.6	37.973	−7.18	1151	42 014.0	37.596	−7.90
1052	38 255.6	38.306	−6.36	1102	40 162.6	37.966	−7.19	1152	42 051.6	37.588	−7.92
1053	38 293.9	38.299	−6.38	1103	40 200.5	37.959	−7.21	1153	42 089.1	37.580	−7.93
1054	38 332.2	38.293	−6.40	1104	40 238.5	37.952	−7.22	1154	42 126.7	37.572	−7.95
1055	38 370.5	38.286	−6.42	1105	40 276.4	37.944	−7.24	1155	42 164.3	37.564	−7.96
1056	38 408.8	38.280	−6.44	1106	40 314.4	37.937	−7.25	1156	42 201.8	37.556	−7.98
1057	38 447.0	38.274	−6.45	1107	40 352.3	37.930	−7.27	1157	42 239.4	37.548	−7.99
1058	38 485.3	38.267	−6.47	1108	40 390.2	37.923	−7.28	1158	42 276.9	37.540	−8.01
1059	38 523.6	38.261	−6.49	1109	40 428.1	37.915	−7.30	1159	42 314.5	37.532	−8.03
1060	38 561.8	38.254	−6.51	1110	40 466.0	37.908	−7.31	1160	42 352.0	37.524	−8.04
1061	38 600.1	38.248	−6.53	1111	40 504.0	37.901	−7.33	1161	42 389.5	37.516	−8.06
1062	38 638.3	38.241	−6.54	1112	40 541.8	37.893	−7.34	1162	42 427.0	37.508	−8.07
1063	38 676.6	38.235	−6.56	1113	40 579.7	37.886	−7.36	1163	42 464.5	37.500	−8.09
1064	38 714.8	38.228	−6.58	1114	40 617.6	37.879	−7.37	1164	42 502.0	37.492	−8.11
1065	38 753.0	38.221	−6.60	1115	40 655.5	37.871	−7.38	1165	42 539.5	37.484	−8.12
1066	38 791.2	38.215	−6.61	1116	40 693.4	37.864	−7.40	1166	42 577.0	37.476	−8.14
1067	38 829.4	38.208	−6.63	1117	40 731.2	37.856	−7.41	1167	42 614.5	37.468	−8.16
1068	38 867.7	38.201	−6.65	1118	40 769.1	37.849	−7.43	1168	42 651.9	37.460	−8.17
1069	38 905.9	38.195	−6.66	1119	40 806.9	37.842	−7.44	1169	42 689.4	37.451	−8.19
1070	38 944.0	38.188	−6.68	1120	40 844.8	37.834	−7.46	1170	42 726.8	37.443	−8.21
1071	38 982.2	38.181	−6.70	1121	40 882.6	37.827	−7.47	1171	42 764.3	37.435	−8.23
1072	39 020.4	38.175	−6.72	1122	40 920.4	37.819	−7.48	1172	42 801.7	37.427	−8.25
1073	39 058.6	38.168	−6.73	1123	40 958.2	37.812	−7.50	1173	42 839.1	37.418	−8.26
1074	39 096.7	38.161	−6.75	1124	40 996.0	37.804	−7.51	1174	42 876.6	37.410	−8.28
1075	39 134.9	38.155	−6.77	1125	41 033.8	37.797	−7.53	1175	42 914.0	37.402	−8.30
1076	39 173.0	38.148	−6.78	1126	41 071.6	37.789	−7.54	1176	42 951.4	37.394	−8.32
1077	39 211.2	38.141	−6.80	1127	41 109.4	37.782	−7.56	1177	42 988.7	37.385	−8.34
1078	39 249.3	38.134	−6.82	1128	41 147.2	37.774	−7.57	1178	43 026.1	37.377	−8.36
1079	39 287.5	38.127	−6.83	1129	41 185.0	37.766	−7.58	1179	43 063.5	37.369	−8.38
1080	39 325.6	38.121	−6.85	1130	41 222.7	37.759	−7.60	1180	43 100.9	37.360	−8.40
1081	39 363.7	38.114	−6.87	1131	41 260.5	37.751	−7.61	1181	43 138.2	37.352	−8.42
1082	39 401.8	38.107	−6.88	1132	41 298.2	37.744	−7.63	1182	43 175.6	37.343	−8.44
1083	39 439.9	38.100	−6.90	1133	41 336.0	37.736	−7.64	1183	43 212.9	37.335	−8.46
1084	39 478.0	38.093	−6.91	1134	41 373.7	37.728	−7.65	1184	43 250.2	37.326	−8.48
1085	39 516.1	38.086	−6.93	1135	41 411.4	37.721	−7.67	1185	43 287.6	37.318	−8.50
1086	39 554.2	38.079	−6.95	1136	41 449.1	37.713	−7.68	1186	43 324.9	37.309	−8.52
1087	39 592.3	38.072	−6.96	1137	41 486.9	37.705	−7.70	1187	43 362.2	37.301	−8.55
1088	39 630.3	38.065	−6.98	1138	41 524.6	37.698	−7.71	1188	43 399.5	37.292	−8.57
1089	39 668.4	38.058	−6.99	1139	41 562.2	37.690	−7.73	1189	43 436.8	37.284	−8.59
1090	39 706.4	38.051	−7.01	1140	41 599.9	37.682	−7.74	1190	43 474.0	37.275	−8.62
1091	39 744.5	38.044	−7.02	1141	41 637.6	37.674	−7.75	1191	43 511.3	37.266	−8.64
1092	39 782.5	38.037	−7.04	1142	41 675.3	37.667	−7.77	1192	43 548.6	37.258	−8.66
1093	39 820.6	38.030	−7.06	1143	41 712.9	37.659	−7.78	1193	43 585.8	37.249	−8.69
1094	39 858.6	38.023	−7.07	1144	41 750.6	37.651	−7.80	1194	43 623.1	37.240	−8.71
1095	39 896.6	38.016	−7.09	1145	41 788.2	37.643	−7.81	1195	43 660.3	37.232	−8.74
1096	39 934.6	38.009	−7.10	1146	41 825.9	37.635	−7.83	1196	43 697.5	37.223	−8.76
1097	39 972.6	38.002	−7.12	1147	41 863.5	37.628	−7.84	1197	43 734.8	37.214	−8.79
1098	40 010.6	37.995	−7.13	1148	41 901.1	37.620	−7.86	1198	43 772.0	37.205	−8.82
1099	40 048.6	37.987	−7.15	1149	41 938.8	37.612	−7.87	1199	43 809.2	37.197	−8.84
1100	40 086.6	37.980	−7.16	1150	41 976.4	37.604	−7.89	1200	43 846.4	37.188	−8.87

TABLE 8.3.3. *Type N thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1200	43 846.4	37.188	−8.87	**1235**	45 142.3	36.856	−10.24	**1270**	46 425.5	36.455	−12.94
1201	43 883.5	37.179	−8.90	**1236**	45 179.1	36.846	−10.30	**1271**	46 461.9	36.442	−13.05
1202	43 920.7	37.170	−8.93	**1237**	45 216.0	36.835	−10.35	**1272**	46 498.4	36.429	−13.15
1203	43 957.9	37.161	−8.96	**1238**	45 252.8	36.825	−10.41	**1273**	46 534.8	36.416	−13.26
1204	43 995.0	37.152	−8.99	**1239**	45 289.6	36.814	−10.47	**1274**	46 571.2	36.403	−13.38
1205	44 032.2	37.143	−9.02	**1240**	45 326.4	36.804	−10.53	**1275**	46 607.6	36.389	−13.49
1206	44 069.3	37.134	−9.05	**1241**	45 363.2	36.793	−10.59	**1276**	46 644.0	36.376	−13.61
1207	44 106.5	37.125	−9.08	**1242**	45 400.0	36.783	−10.65	**1277**	46 680.3	36.362	−13.72
1208	44 143.6	37.116	−9.11	**1243**	45 436.8	36.772	−10.71	**1278**	46 716.7	36.348	−13.85
1209	44 180.7	37.107	−9.14	**1244**	45 473.5	36.761	−10.78	**1279**	46 753.0	36.334	−13.97
1210	44 217.8	37.098	−9.18	**1245**	45 510.3	36.751	−10.84	**1280**	46 789.4	36.320	−14.09
1211	44 254.9	37.088	−9.21	**1246**	45 547.0	36.740	−10.91	**1281**	46 825.7	36.306	−14.22
1212	44 292.0	37.079	−9.24	**1247**	45 583.8	36.729	−10.97	**1282**	46 862.0	36.292	−14.35
1213	44 329.0	37.070	−9.28	**1248**	45 620.5	36.718	−11.04	**1283**	46 898.3	36.277	−14.48
1214	44 366.1	37.061	−9.31	**1249**	45 657.2	36.707	−11.11	**1284**	46 934.5	36.263	−14.62
1215	44 403.2	37.051	−9.35	**1250**	45 693.9	36.695	−11.18	**1285**	46 970.8	36.248	−14.75
1216	44 440.2	37.042	−9.39	**1251**	45 730.6	36.684	−11.26	**1286**	47 007.0	36.233	−14.89
1217	44 477.2	37.032	−9.42	**1252**	45 767.3	36.673	−11.33	**1287**	47 043.3	36.218	−15.04
1218	44 514.3	37.023	−9.46	**1253**	45 803.9	36.662	−11.41	**1288**	47 079.5	36.203	−15.18
1219	44 551.3	37.014	−9.50	**1254**	45 840.6	36.650	−11.48	**1289**	47 115.7	36.188	−15.33
1220	44 588.3	37.004	−9.54	**1255**	45 877.2	36.639	−11.56	**1290**	47 151.8	36.173	−15.48
1221	44 625.3	36.994	−9.58	**1256**	45 913.9	36.627	−11.64	**1291**	47 188.0	36.157	−15.63
1222	44 662.3	36.985	−9.62	**1257**	45 950.5	36.615	−11.72	**1292**	47 224.2	36.141	−15.78
1223	44 699.3	36.975	−9.67	**1258**	45 987.1	36.604	−11.81	**1293**	47 260.3	36.126	−15.94
1224	44 736.2	36.965	−9.71	**1259**	46 023.7	36.592	−11.89	**1294**	47 296.4	36.110	−16.10
1225	44 773.2	36.956	−9.75	**1260**	46 060.3	36.580	−11.98	**1295**	47 332.5	36.093	−16.26
1226	44 810.1	36.946	−9.80	**1261**	46 096.9	36.568	−12.07	**1296**	47 368.6	36.077	−16.43
1227	44 847.1	36.936	−9.84	**1262**	46 133.4	36.556	−12.16	**1297**	47 404.7	36.061	−16.60
1228	44 884.0	36.926	−9.89	**1263**	46 170.0	36.543	−12.25	**1298**	47 440.7	36.044	−16.77
1229	44 920.9	36.916	−9.94	**1264**	46 206.5	36.531	−12.34	**1299**	47 476.8	36.027	−16.95
1230	44 957.9	36.906	−9.99	**1265**	46 243.0	36.519	−12.44	**1300**	47 512.8	36.010	−17.12
1231	44 994.8	36.896	−10.04	**1266**	46 279.6	36.506	−12.53				
1232	45 031.6	36.886	−10.09	**1267**	46 316.1	36.494	−12.63				
1233	45 068.5	36.876	−10.14	**1268**	46 352.5	36.481	−12.73				
1234	45 105.4	36.866	−10.19	**1269**	46 389.0	36.468	−12.83				
1235	45 142.3	36.856	−10.24	**1270**	46 425.5	36.455	−12.94				

8.4. Reference Function and Table for the Positive Thermoelement, Type NP, a Nickel-Chromium-Silicon Alloy Versus Platinum, Pt-67

The coefficients, c_i, for the sixth degree polynomial and for the tenth degree polynomial that give the thermoelectric voltage, E, of type NP thermoelements versus Pt-67 as a function of temperature, t_{90}, in the −200 °C to 0 °C and 0 °C to 1300 °C ranges, respectively, are given in table 8.4.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type NP thermoelements versus Pt-67 at selected fixed points are given in table 8.4.2. The reference values for type NP thermoelements versus Pt-67 are given at 1 °C intervals from −200 °C to 1300 °C in table 8.4.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 8.4.1, 8.4.2, and 8.4.3, respectively.

It should be stressed that **type NP thermoelement materials that conform closely to the high temperature tabular values may not necessarily conform closely at temperatures below 0 °C and vice versa.** If type NP thermoelements are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 8.4.1. *Type NP thermoelements versus platinum, Pt-67 --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−200 °C to 0 °C	0 °C to 1300 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	1.541 798 843 0 X 10^{1}	1.544 538 594 7 X 10^{1}
c_2 =	2.570 738 245 7 X 10^{-2}	2.672 234 128 9 X 10^{-2}
c_3 =	−9.018 782 577 1 X 10^{-5}	−2.559 531 305 2 X 10^{-5}
c_4 =	−5.365 479 300 5 X 10^{-7}	−3.302 809 741 4 X 10^{-8}
c_5 =	−3.352 621 597 6 X 10^{-9}	2.007 532 297 1 X 10^{-10}
c_6 =	−7.272 344 767 0 X 10^{-12}	−4.270 815 423 0 X 10^{-13}
c_7 =		5.181 347 352 2 X 10^{-16}
c_8 =		−3.688 712 493 1 X 10^{-19}
c_9 =		1.426 873 470 8 X 10^{-22}
c_{10} =		−2.312 130 215 4 X 10^{-26}

TABLE 8.4.2. *Thermoelectric values at fixed points for type NP thermoelements versus platinum, Pt-67*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
Argon TP	−189.3442	−1 594.28	−0.375	97.79
Mercury TP	−38.8344	−555.65	13.105	66.15
Ice MP	0.000	0.00	15.445	53.44
Water TP	0.01	0.2	15.446	53.44
Gallium MP	29.7646	482.7	16.965	48.62
Indium FP	156.5985	2 969.6	21.834	29.16
Tin FP	231.928	4 688.9	23.715	21.27
Cadmium FP	321.069	6 878.2	25.312	15.01
Lead FP	327.462	7 040.3	25.407	14.66
Zinc FP	419.527	9 435.1	26.554	10.52
Antimony FP	630.63	15 230.9	28.205	6.20
Aluminum FP	660.323	16 071.1	28.387	6.06
Silver FP	961.78	24 893.5	30.066	4.22
Gold FP	1064.18	27 991.5	30.415	2.70
Copper FP	1084.62	28 613.7	30.468	2.50

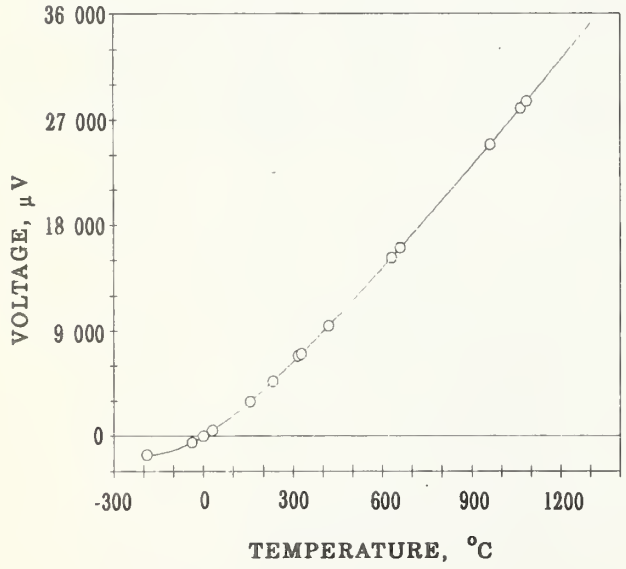

FIGURE 8.4.1. *Thermoelectric voltage for type NP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

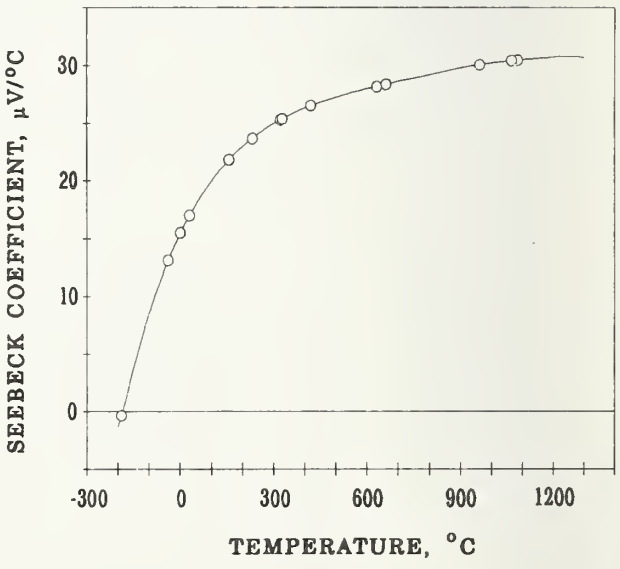

FIGURE 8.4.2. *Seebeck coefficient for type NP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

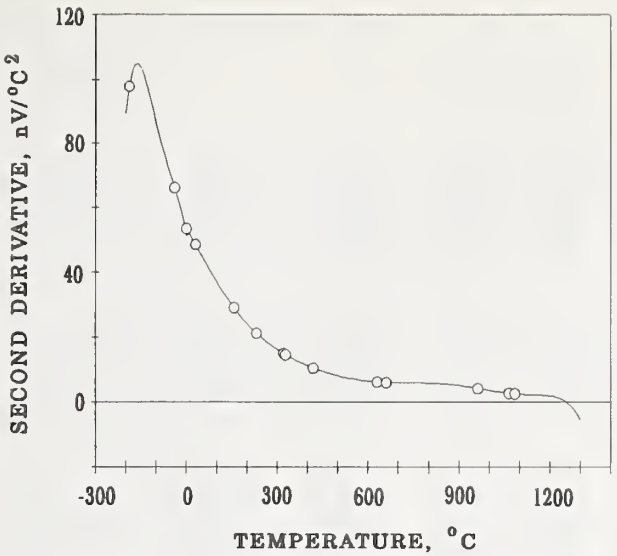

FIGURE 8.4.3. *Second derivative of thermoelectric voltage for type NP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

TABLE 8.4.3. ***Type NP thermoelements versus platinum, Pt-67*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
				−190	−1 594.01	−0.439	97.39	−170	−1 582.66	1.597	104.54
				−189	−1 594.40	−0.341	98.00	−169	−1 581.02	1.702	104.65
				−188	−1 594.69	−0.243	98.59	−168	−1 579.26	1.806	104.75
				−187	−1 594.89	−0.144	99.14	−167	−1 577.40	1.911	104.82
				−186	−1 594.98	−0.045	99.66	−166	−1 575.44	2.016	104.87
				−185	−1 594.97	0.055	100.16	−165	−1 573.37	2.121	104.91
				−184	−1 594.87	0.156	100.63	−164	−1 571.20	2.226	104.93
				−183	−1 594.66	0.256	101.07	−163	−1 568.92	2.331	104.93
				−182	−1 594.36	0.358	101.48	−162	−1 566.53	2.436	104.91
				−181	−1 593.95	0.459	101.87	−161	−1 564.05	2.541	104.88
−200	−1 584.87	−1.376	89.44	−180	−1 593.44	0.561	102.23	−160	−1 561.45	2.645	104.83
−199	−1 586.20	−1.286	90.40	−179	−1 592.83	0.664	102.57	−159	−1 558.76	2.750	104.77
−198	−1 587.44	−1.195	91.31	−178	−1 592.11	0.767	102.88	−158	−1 555.95	2.855	104.69
−197	−1 588.59	−1.104	92.19	−177	−1 591.29	0.870	103.17	−157	−1 553.05	2.960	104.60
−196	−1 589.65	−1.011	93.03	−176	−1 590.37	0.973	103.43	−156	−1 550.03	3.064	104.49
−195	−1 590.61	−0.917	93.84	−175	−1 589.35	1.076	103.67	−155	−1 546.92	3.169	104.37
−194	−1 591.48	−0.823	94.62	−174	−1 588.22	1.180	103.89	−154	−1 543.70	3.273	104.23
−193	−1 592.26	−0.728	95.36	−173	−1 586.99	1.284	104.08	−153	−1 540.37	3.377	104.09
−192	−1 592.94	−0.633	96.07	−172	−1 585.65	1.388	104.26	−152	−1 536.94	3.481	103.93
−191	−1 593.52	−0.536	96.74	−171	−1 584.21	1.493	104.41	−151	−1 533.41	3.585	103.75
−190	−1 594.01	−0.439	97.39	−170	−1 582.66	1.597	104.54	−150	−1 529.77	3.689	103.57

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−1 529.77	3.689	103.57	−100	−1 221.94	8.477	86.38	−50	−697.78	12.348	69.39
−149	−1 526.03	3.792	103.37	−99	−1 213.42	8.563	85.99	−49	−685.39	12.417	69.10
−148	−1 522.19	3.895	103.17	−98	−1 204.81	8.649	85.60	−48	−672.94	12.486	68.81
−147	−1 518.24	3.998	102.95	−97	−1 196.12	8.734	85.21	−47	−660.42	12.555	68.52
−146	−1 514.19	4.101	102.72	−96	−1 187.34	8.819	84.82	−46	−647.83	12.623	68.23
−145	−1 510.04	4.204	102.48	−95	−1 178.48	8.904	84.43	−45	−635.18	12.691	67.94
−144	−1 505.78	4.306	102.23	−94	−1 169.53	8.988	84.05	−44	−622.45	12.759	67.65
−143	−1 501.43	4.408	101.98	−93	−1 160.50	9.072	83.67	−43	−609.66	12.827	67.36
−142	−1 496.97	4.510	101.71	−92	−1 151.39	9.156	83.29	−42	−596.80	12.894	67.07
−141	−1 492.41	4.612	101.44	−91	−1 142.19	9.239	82.91	−41	−583.87	12.961	66.78
−140	−1 487.74	4.713	101.16	−90	−1 132.91	9.321	82.53	−40	−570.88	13.027	66.49
−139	−1 482.98	4.814	100.87	−89	−1 123.55	9.404	82.16	−39	−557.82	13.094	66.20
−138	−1 478.12	4.915	100.57	−88	−1 114.11	9.486	81.78	−38	−544.69	13.160	65.90
−137	−1 473.15	5.015	100.26	−87	−1 104.58	9.567	81.41	−37	−531.50	13.226	65.61
−136	−1 468.09	5.115	99.95	−86	−1 094.97	9.649	81.05	−36	−518.24	13.291	65.31
−135	−1 462.92	5.215	99.63	−85	−1 085.28	9.730	80.68	−35	−504.91	13.356	65.01
−134	−1 457.66	5.315	99.31	−84	−1 075.51	9.810	80.32	−34	−491.53	13.421	64.71
−133	−1 452.29	5.414	98.98	−83	−1 065.66	9.890	79.96	−33	−478.07	13.486	64.41
−132	−1 446.83	5.513	98.64	−82	−1 055.73	9.970	79.60	−32	−464.55	13.550	64.11
−131	−1 441.27	5.611	98.30	−81	−1 045.72	10.049	79.25	−31	−450.97	13.614	63.80
−130	−1 435.61	5.709	97.95	−80	−1 035.63	10.128	78.89	−30	−437.33	13.677	63.49
−129	−1 429.85	5.807	97.60	−79	−1 025.47	10.207	78.54	−29	−423.62	13.741	63.17
−128	−1 423.99	5.904	97.24	−78	−1 015.22	10.285	78.19	−28	−409.84	13.804	62.86
−127	−1 418.04	6.001	96.88	−77	−1 004.89	10.364	77.85	−27	−396.01	13.867	62.54
−126	−1 411.99	6.098	96.52	−76	−994.49	10.441	77.51	−26	−382.11	13.929	62.21
−125	−1 405.84	6.194	96.15	−75	−984.01	10.519	77.17	−25	−368.15	13.991	61.88
−124	−1 399.60	6.290	95.78	−74	−973.46	10.596	76.83	−24	−354.13	14.053	61.55
−123	−1 393.26	6.386	95.40	−73	−962.82	10.672	76.49	−23	−340.05	14.114	61.21
−122	−1 386.83	6.481	95.03	−72	−952.11	10.749	76.16	−22	−325.90	14.175	60.87
−121	−1 380.30	6.576	94.64	−71	−941.32	10.825	75.83	−21	−311.70	14.236	60.52
−120	−1 373.68	6.670	94.26	−70	−930.46	10.900	75.51	−20	−297.43	14.296	60.16
−119	−1 366.96	6.765	93.88	−69	−919.52	10.976	75.18	−19	−283.10	14.356	59.80
−118	−1 360.15	6.858	93.49	−68	−908.51	11.051	74.86	−18	−268.72	14.416	59.44
−117	−1 353.24	6.952	93.10	−67	−897.42	11.125	74.54	−17	−254.27	14.475	59.06
−116	−1 346.25	7.044	92.71	−66	−886.26	11.200	74.22	−16	−239.77	14.534	58.68
−115	−1 339.15	7.137	92.31	−65	−875.02	11.274	73.90	−15	−225.21	14.592	58.30
−114	−1 331.97	7.229	91.92	−64	−863.71	11.347	73.59	−14	−210.58	14.650	57.90
−113	−1 324.70	7.321	91.53	−63	−852.33	11.421	73.28	−13	−195.91	14.708	57.50
−112	−1 317.33	7.412	91.13	−62	−840.87	11.494	72.97	−12	−181.17	14.765	57.09
−111	−1 309.87	7.503	90.73	−61	−829.34	11.567	72.66	−11	−166.37	14.822	56.67
−110	−1 302.32	7.594	90.34	−60	−817.74	11.639	72.36	−10	−151.52	14.879	56.25
−109	−1 294.69	7.684	89.94	−59	−806.06	11.712	72.06	−9	−136.62	14.935	55.81
−108	−1 286.96	7.773	89.54	−58	−794.32	11.783	71.75	−8	−121.65	14.990	55.37
−107	−1 279.14	7.863	89.14	−57	−782.50	11.855	71.45	−7	−106.64	15.046	54.91
−106	−1 271.23	7.952	88.75	−56	−770.61	11.926	71.16	−6	−91.56	15.100	54.44
−105	−1 263.24	8.040	88.35	−55	−758.64	11.997	70.86	−5	−76.44	15.154	53.97
−104	−1 255.15	8.128	87.95	−54	−746.61	12.068	70.56	−4	−61.25	15.208	53.48
−103	−1 246.98	8.216	87.56	−53	−734.51	12.138	70.27	−3	−46.02	15.261	52.98
−102	−1 238.72	8.304	87.16	−52	−722.33	12.209	69.98	−2	−30.73	15.314	52.47
−101	−1 230.37	8.391	86.77	−51	−710.09	12.278	69.68	−1	−15.39	15.366	51.95
−100	−1 221.94	8.477	86.38	−50	−697.78	12.348	69.39	0	0.00	15.418	51.41

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	15.445	53.44	**50**	835.7	17.915	45.20	**100**	1 784.5	19.968	37.06
1	15.5	15.499	53.29	**51**	853.7	17.960	45.03	**101**	1 804.5	20.005	36.90
2	31.0	15.552	53.14	**52**	871.6	18.005	44.87	**102**	1 824.5	20.042	36.75
3	46.6	15.605	52.98	**53**	889.7	18.050	44.70	**103**	1 844.6	20.078	36.60
4	62.2	15.658	52.82	**54**	907.7	18.094	44.53	**104**	1 864.7	20.115	36.44
5	77.9	15.711	52.67	**55**	925.9	18.139	44.36	**105**	1 884.8	20.151	36.29
6	93.6	15.763	52.51	**56**	944.0	18.183	44.19	**106**	1 905.0	20.188	36.14
7	109.4	15.816	52.35	**57**	962.2	18.227	44.02	**107**	1 925.2	20.224	35.99
8	125.3	15.868	52.19	**58**	980.5	18.271	43.86	**108**	1 945.4	20.260	35.84
9	141.2	15.920	52.03	**59**	998.8	18.315	43.69	**109**	1 965.7	20.295	35.69
10	157.1	15.972	51.87	**60**	1 017.1	18.358	43.52	**110**	1 986.0	20.331	35.54
11	173.1	16.024	51.71	**61**	1 035.5	18.402	43.35	**111**	2 006.3	20.366	35.39
12	189.1	16.075	51.55	**62**	1 053.9	18.445	43.19	**112**	2 026.7	20.402	35.24
13	205.2	16.127	51.39	**63**	1 072.4	18.488	43.02	**113**	2 047.2	20.437	35.09
14	221.4	16.178	51.23	**64**	1 090.9	18.531	42.85	**114**	2 067.6	20.472	34.95
15	237.6	16.229	51.06	**65**	1 109.4	18.574	42.69	**115**	2 088.1	20.507	34.80
16	253.9	16.280	50.90	**66**	1 128.0	18.616	42.52	**116**	2 108.6	20.541	34.65
17	270.2	16.331	50.74	**67**	1 146.7	18.659	42.35	**117**	2 129.2	20.576	34.51
18	286.5	16.382	50.57	**68**	1 165.3	18.701	42.19	**118**	2 149.8	20.611	34.36
19	302.9	16.432	50.41	**69**	1 184.1	18.743	42.02	**119**	2 170.4	20.645	34.22
20	319.4	16.483	50.24	**70**	1 202.8	18.785	41.86	**120**	2 191.1	20.679	34.07
21	335.9	16.533	50.08	**71**	1 221.6	18.827	41.69	**121**	2 211.8	20.713	33.93
22	352.5	16.583	49.91	**72**	1 240.5	18.869	41.53	**122**	2 232.5	20.747	33.79
23	369.1	16.633	49.75	**73**	1 259.4	18.910	41.36	**123**	2 253.3	20.781	33.64
24	385.7	16.682	49.58	**74**	1 278.3	18.951	41.20	**124**	2 274.0	20.814	33.50
25	402.4	16.732	49.42	**75**	1 297.3	18.992	41.03	**125**	2 294.9	20.848	33.36
26	419.2	16.781	49.25	**76**	1 316.3	19.033	40.87	**126**	2 315.7	20.881	33.22
27	436.0	16.830	49.08	**77**	1 335.3	19.074	40.71	**127**	2 336.6	20.914	33.08
28	452.8	16.879	48.91	**78**	1 354.4	19.115	40.54	**128**	2 357.6	20.947	32.94
29	469.7	16.928	48.75	**79**	1 373.6	19.155	40.38	**129**	2 378.5	20.980	32.80
30	486.7	16.977	48.58	**80**	1 392.8	19.195	40.22	**130**	2 399.5	21.013	32.66
31	503.7	17.025	48.41	**81**	1 412.0	19.236	40.06	**131**	2 420.6	21.045	32.52
32	520.7	17.074	48.24	**82**	1 431.2	19.276	39.90	**132**	2 441.6	21.078	32.38
33	537.8	17.122	48.08	**83**	1 450.5	19.315	39.73	**133**	2 462.7	21.110	32.24
34	555.0	17.170	47.91	**84**	1 469.9	19.355	39.57	**134**	2 483.8	21.142	32.11
35	572.2	17.218	47.74	**85**	1 489.2	19.395	39.41	**135**	2 505.0	21.174	31.97
36	589.4	17.265	47.57	**86**	1 508.6	19.434	39.25	**136**	2 526.2	21.206	31.84
37	606.7	17.313	47.40	**87**	1 528.1	19.473	39.09	**137**	2 547.4	21.238	31.70
38	624.1	17.360	47.23	**88**	1 547.6	19.512	38.93	**138**	2 568.7	21.269	31.57
39	641.4	17.407	47.06	**89**	1 567.1	19.551	38.78	**139**	2 589.9	21.301	31.43
40	658.9	17.454	46.89	**90**	1 586.7	19.590	38.62	**140**	2 611.3	21.332	31.30
41	676.3	17.501	46.72	**91**	1 606.3	19.628	38.46	**141**	2 632.6	21.364	31.16
42	693.9	17.548	46.56	**92**	1 625.9	19.667	38.30	**142**	2 654.0	21.395	31.03
43	711.4	17.594	46.39	**93**	1 645.6	19.705	38.14	**143**	2 675.4	21.426	30.90
44	729.1	17.640	46.22	**94**	1 665.4	19.743	37.99	**144**	2 696.8	21.456	30.77
45	746.7	17.687	46.05	**95**	1 685.1	19.781	37.83	**145**	2 718.3	21.487	30.64
46	764.4	17.733	45.88	**96**	1 704.9	19.819	37.68	**146**	2 739.8	21.518	30.51
47	782.2	17.778	45.71	**97**	1 724.8	19.856	37.52	**147**	2 761.4	21.548	30.38
48	800.0	17.824	45.54	**98**	1 744.6	19.894	37.36	**148**	2 782.9	21.578	30.25
49	817.8	17.869	45.37	**99**	1 764.5	19.931	37.21	**149**	2 804.5	21.609	30.12
50	835.7	17.915	45.20	**100**	1 784.5	19.968	37.06	**150**	2 826.1	21.639	29.99

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	2 826.1	21.639	29.99	**200**	3 943.0	22.990	24.27	**250**	5 120.8	24.086	19.77
151	2 847.8	21.669	29.86	**201**	3 966.0	23.014	24.16	**251**	5 144.9	24.106	19.69
152	2 869.5	21.698	29.74	**202**	3 989.1	23.038	24.06	**252**	5 169.1	24.125	19.61
153	2 891.2	21.728	29.61	**203**	4 012.1	23.062	23.96	**253**	5 193.2	24.145	19.54
154	2 912.9	21.758	29.48	**204**	4 035.2	23.086	23.86	**254**	5 217.3	24.164	19.46
155	2 934.7	21.787	29.36	**205**	4 058.3	23.110	23.76	**255**	5 241.5	24.184	19.38
156	2 956.5	21.816	29.23	**206**	4 081.4	23.133	23.67	**256**	5 265.7	24.203	19.30
157	2 978.3	21.846	29.11	**207**	4 104.5	23.157	23.57	**257**	5 289.9	24.222	19.23
158	3 000.2	21.875	28.98	**208**	4 127.7	23.180	23.47	**258**	5 314.2	24.241	19.15
159	3 022.1	21.903	28.86	**209**	4 150.9	23.204	23.37	**259**	5 338.4	24.261	19.07
160	3 044.0	21.932	28.74	**210**	4 174.1	23.227	23.28	**260**	5 362.7	24.280	19.00
161	3 065.9	21.961	28.62	**211**	4 197.4	23.250	23.18	**261**	5 387.0	24.299	18.92
162	3 087.9	21.990	28.49	**212**	4 220.6	23.274	23.08	**262**	5 411.3	24.317	18.85
163	3 109.9	22.018	28.37	**213**	4 243.9	23.297	22.99	**263**	5 435.6	24.336	18.77
164	3 132.0	22.046	28.25	**214**	4 267.2	23.320	22.89	**264**	5 460.0	24.355	18.70
165	3 154.0	22.074	28.13	**215**	4 290.5	23.342	22.80	**265**	5 484.3	24.374	18.63
166	3 176.1	22.103	28.01	**216**	4 313.9	23.365	22.70	**266**	5 508.7	24.392	18.55
167	3 198.2	22.130	27.89	**217**	4 337.3	23.388	22.61	**267**	5 533.1	24.411	18.48
168	3 220.4	22.158	27.78	**218**	4 360.7	23.410	22.52	**268**	5 557.5	24.429	18.41
169	3 242.5	22.186	27.66	**219**	4 384.1	23.433	22.42	**269**	5 582.0	24.448	18.34
170	3 264.7	22.214	27.54	**220**	4 407.5	23.455	22.33	**270**	5 606.4	24.466	18.26
171	3 287.0	22.241	27.42	**221**	4 431.0	23.477	22.24	**271**	5 630.9	24.484	18.19
172	3 309.2	22.268	27.31	**222**	4 454.5	23.500	22.15	**272**	5 655.4	24.502	18.12
173	3 331.5	22.296	27.19	**223**	4 478.0	23.522	22.06	**273**	5 679.9	24.520	18.05
174	3 353.8	22.323	27.08	**224**	4 501.5	23.544	21.97	**274**	5 704.4	24.538	17.98
175	3 376.1	22.350	26.96	**225**	4 525.1	23.566	21.88	**275**	5 729.0	24.556	17.91
176	3 398.5	22.377	26.85	**226**	4 548.7	23.588	21.79	**276**	5 753.5	24.574	17.84
177	3 420.9	22.404	26.73	**227**	4 572.3	23.609	21.70	**277**	5 778.1	24.592	17.77
178	3 443.3	22.430	26.62	**228**	4 595.9	23.631	21.61	**278**	5 802.7	24.610	17.70
179	3 465.8	22.457	26.51	**229**	4 619.5	23.653	21.52	**279**	5 827.3	24.627	17.63
180	3 488.2	22.483	26.40	**230**	4 643.2	23.674	21.44	**280**	5 852.0	24.645	17.56
181	3 510.7	22.510	26.28	**231**	4 666.9	23.695	21.35	**281**	5 876.6	24.663	17.50
182	3 533.2	22.536	26.17	**232**	4 690.6	23.717	21.26	**282**	5 901.3	24.680	17.43
183	3 555.8	22.562	26.06	**233**	4 714.3	23.738	21.18	**283**	5 926.0	24.697	17.36
184	3 578.4	22.588	25.95	**234**	4 738.1	23.759	21.09	**284**	5 950.7	24.715	17.29
185	3 601.0	22.614	25.84	**235**	4 761.8	23.780	21.00	**285**	5 975.4	24.732	17.23
186	3 623.6	22.640	25.74	**236**	4 785.6	23.801	20.92	**286**	6 000.2	24.749	17.16
187	3 646.3	22.665	25.63	**237**	4 809.4	23.822	20.83	**287**	6 024.9	24.766	17.09
188	3 668.9	22.691	25.52	**238**	4 833.3	23.843	20.75	**288**	6 049.7	24.783	17.03
189	3 691.6	22.716	25.41	**239**	4 857.1	23.863	20.67	**289**	6 074.5	24.800	16.96
190	3 714.4	22.742	25.31	**240**	4 881.0	23.884	20.58	**290**	6 099.3	24.817	16.90
191	3 737.1	22.767	25.20	**241**	4 904.9	23.905	20.50	**291**	6 124.1	24.834	16.83
192	3 759.9	22.792	25.09	**242**	4 928.8	23.925	20.42	**292**	6 149.0	24.851	16.77
193	3 782.7	22.817	24.99	**243**	4 952.7	23.945	20.34	**293**	6 173.8	24.868	16.70
194	3 805.5	22.842	24.88	**244**	4 976.7	23.966	20.25	**294**	6 198.7	24.884	16.64
195	3 828.4	22.867	24.78	**245**	5 000.7	23.986	20.17	**295**	6 223.6	24.901	16.58
196	3 851.3	22.892	24.68	**246**	5 024.7	24.006	20.09	**296**	6 248.5	24.918	16.51
197	3 874.2	22.916	24.57	**247**	5 048.7	24.026	20.01	**297**	6 273.4	24.934	16.45
198	3 897.1	22.941	24.47	**248**	5 072.7	24.046	19.93	**298**	6 298.4	24.950	16.39
199	3 920.1	22.965	24.37	**249**	5 096.8	24.066	19.85	**299**	6 323.3	24.967	16.32
200	3 943.0	22.990	24.27	**250**	5 120.8	24.086	19.77	**300**	6 348.3	24.983	16.26

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
300	6 348.3	24.983	16.26	**350**	7 616.6	25.724	13.49	**400**	8 918.6	26.341	11.27
301	6 373.3	24.999	16.20	**351**	7 642.3	25.738	13.44	**401**	8 945.0	26.352	11.23
302	6 398.3	25.015	16.14	**352**	7 668.0	25.751	13.39	**402**	8 971.3	26.363	11.19
303	6 423.3	25.032	16.08	**353**	7 693.8	25.764	13.34	**403**	8 997.7	26.375	11.15
304	6 448.4	25.048	16.01	**354**	7 719.6	25.778	13.29	**404**	9 024.1	26.386	11.11
305	6 473.4	25.064	15.95	**355**	7 745.3	25.791	13.24	**405**	9 050.5	26.397	11.07
306	6 498.5	25.080	15.89	**356**	7 771.1	25.804	13.19	**406**	9 076.9	26.408	11.03
307	6 523.6	25.095	15.83	**357**	7 797.0	25.817	13.15	**407**	9 103.3	26.419	10.99
308	6 548.7	25.111	15.77	**358**	7 822.8	25.830	13.10	**408**	9 129.7	26.430	10.95
309	6 573.8	25.127	15.71	**359**	7 848.6	25.844	13.05	**409**	9 156.2	26.441	10.91
310	6 598.9	25.143	15.65	**360**	7 874.5	25.857	13.00	**410**	9 182.6	26.452	10.88
311	6 624.1	25.158	15.60	**361**	7 900.3	25.870	12.96	**411**	9 209.1	26.462	10.84
312	6 649.2	25.174	15.54	**362**	7 926.2	25.882	12.91	**412**	9 235.5	26.473	10.80
313	6 674.4	25.189	15.48	**363**	7 952.1	25.895	12.86	**413**	9 262.0	26.484	10.76
314	6 699.6	25.205	15.42	**364**	7 978.0	25.908	12.82	**414**	9 288.5	26.495	10.73
315	6 724.8	25.220	15.36	**365**	8 003.9	25.921	12.77	**415**	9 315.0	26.506	10.69
316	6 750.1	25.235	15.30	**366**	8 029.8	25.934	12.72	**416**	9 341.5	26.516	10.65
317	6 775.3	25.251	15.25	**367**	8 055.8	25.946	12.68	**417**	9 368.0	26.527	10.61
318	6 800.6	25.266	15.19	**368**	8 081.7	25.959	12.63	**418**	9 394.6	26.537	10.58
319	6 825.8	25.281	15.13	**369**	8 107.7	25.972	12.59	**419**	9 421.1	26.548	10.54
320	6 851.1	25.296	15.08	**370**	8 133.7	25.984	12.54	**420**	9 447.7	26.558	10.50
321	6 876.4	25.311	15.02	**371**	8 159.7	25.997	12.49	**421**	9 474.2	26.569	10.47
322	6 901.8	25.326	14.96	**372**	8 185.7	26.009	12.45	**422**	9 500.8	26.579	10.43
323	6 927.1	25.341	14.91	**373**	8 211.7	26.022	12.40	**423**	9 527.4	26.590	10.40
324	6 952.4	25.356	14.85	**374**	8 237.7	26.034	12.36	**424**	9 554.0	26.600	10.36
325	6 977.8	25.371	14.80	**375**	8 263.7	26.046	12.32	**425**	9 580.6	26.611	10.32
326	7 003.2	25.386	14.74	**376**	8 289.8	26.059	12.27	**426**	9 607.2	26.621	10.29
327	7 028.6	25.400	14.69	**377**	8 315.9	26.071	12.23	**427**	9 633.8	26.631	10.25
328	7 054.0	25.415	14.63	**378**	8 341.9	26.083	12.18	**428**	9 660.5	26.641	10.22
329	7 079.4	25.430	14.58	**379**	8 368.0	26.095	12.14	**429**	9 687.1	26.652	10.18
330	7 104.8	25.444	14.52	**380**	8 394.1	26.107	12.10	**430**	9 713.8	26.662	10.15
331	7 130.3	25.459	14.47	**381**	8 420.2	26.120	12.05	**431**	9 740.4	26.672	10.11
332	7 155.8	25.473	14.41	**382**	8 446.4	26.132	12.01	**432**	9 767.1	26.682	10.08
333	7 181.2	25.488	14.36	**383**	8 472.5	26.144	11.97	**433**	9 793.8	26.692	10.04
334	7 206.7	25.502	14.31	**384**	8 498.7	26.155	11.92	**434**	9 820.5	26.702	10.01
335	7 232.2	25.516	14.25	**385**	8 524.8	26.167	11.88	**435**	9 847.2	26.712	9.98
336	7 257.8	25.530	14.20	**386**	8 551.0	26.179	11.84	**436**	9 873.9	26.722	9.94
337	7 283.3	25.545	14.15	**387**	8 577.2	26.191	11.80	**437**	9 900.6	26.732	9.91
338	7 308.9	25.559	14.10	**388**	8 603.4	26.203	11.76	**438**	9 927.4	26.742	9.88
339	7 334.4	25.573	14.04	**389**	8 629.6	26.215	11.71	**439**	9 954.1	26.752	9.84
340	7 360.0	25.587	13.99	**390**	8 655.8	26.226	11.67	**440**	9 980.9	26.762	9.81
341	7 385.6	25.601	13.94	**391**	8 682.0	26.238	11.63	**441**	10 007.7	26.771	9.78
342	7 411.2	25.615	13.89	**392**	8 708.3	26.250	11.59	**442**	10 034.4	26.781	9.74
343	7 436.8	25.628	13.84	**393**	8 734.5	26.261	11.55	**443**	10 061.2	26.791	9.71
344	7 462.5	25.642	13.79	**394**	8 760.8	26.273	11.51	**444**	10 088.0	26.800	9.68
345	7 488.1	25.656	13.74	**395**	8 787.1	26.284	11.47	**445**	10 114.8	26.810	9.65
346	7 513.8	25.670	13.69	**396**	8 813.4	26.296	11.43	**446**	10 141.6	26.820	9.61
347	7 539.4	25.683	13.64	**397**	8 839.7	26.307	11.39	**447**	10 168.5	26.829	9.58
348	7 565.1	25.697	13.59	**398**	8 866.0	26.318	11.34	**448**	10 195.3	26.839	9.55
349	7 590.8	25.711	13.54	**399**	8 892.3	26.330	11.30	**449**	10 222.1	26.848	9.52
350	7 616.6	25.724	13.49	**400**	8 918.6	26.341	11.27	**450**	10 249.0	26.858	9.49

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
450	10 249.0	26.858	9.49	**500**	11 603.1	27.296	8.10	**550**	12 977.6	27.674	7.10
451	10 275.9	26.867	9.45	**501**	11 630.4	27.304	8.08	**551**	13 005.3	27.682	7.08
452	10 302.7	26.877	9.42	**502**	11 657.7	27.312	8.05	**552**	13 033.0	27.689	7.06
453	10 329.6	26.886	9.39	**503**	11 685.1	27.320	8.03	**553**	13 060.7	27.696	7.05
454	10 356.5	26.896	9.36	**504**	11 712.4	27.328	8.01	**554**	13 088.4	27.703	7.03
455	10 383.4	26.905	9.33	**505**	11 739.7	27.336	7.98	**555**	13 116.1	27.710	7.02
456	10 410.3	26.914	9.30	**506**	11 767.1	27.344	7.96	**556**	13 143.8	27.717	7.00
457	10 437.2	26.924	9.27	**507**	11 794.4	27.352	7.94	**557**	13 171.5	27.724	6.98
458	10 464.2	26.933	9.24	**508**	11 821.8	27.360	7.92	**558**	13 199.2	27.731	6.97
459	10 491.1	26.942	9.21	**509**	11 849.1	27.368	7.89	**559**	13 227.0	27.738	6.95
460	10 518.0	26.951	9.18	**510**	11 876.5	27.376	7.87	**560**	13 254.7	27.745	6.94
461	10 545.0	26.960	9.15	**511**	11 903.9	27.384	7.85	**561**	13 282.4	27.752	6.92
462	10 572.0	26.970	9.12	**512**	11 931.3	27.392	7.83	**562**	13 310.2	27.758	6.91
463	10 598.9	26.979	9.09	**513**	11 958.7	27.399	7.80	**563**	13 338.0	27.765	6.89
464	10 625.9	26.988	9.06	**514**	11 986.1	27.407	7.78	**564**	13 365.7	27.772	6.88
465	10 652.9	26.997	9.03	**515**	12 013.5	27.415	7.76	**565**	13 393.5	27.779	6.86
466	10 679.9	27.006	9.00	**516**	12 040.9	27.423	7.74	**566**	13 421.3	27.786	6.85
467	10 706.9	27.015	8.97	**517**	12 068.3	27.430	7.72	**567**	13 449.1	27.793	6.84
468	10 733.9	27.024	8.94	**518**	12 095.7	27.438	7.70	**568**	13 476.9	27.800	6.82
469	10 761.0	27.033	8.91	**519**	12 123.2	27.446	7.68	**569**	13 504.7	27.806	6.81
470	10 788.0	27.042	8.89	**520**	12 150.6	27.454	7.66	**570**	13 532.5	27.813	6.79
471	10 815.1	27.050	8.86	**521**	12 178.1	27.461	7.63	**571**	13 560.3	27.820	6.78
472	10 842.1	27.059	8.83	**522**	12 205.6	27.469	7.61	**572**	13 588.1	27.827	6.77
473	10 869.2	27.068	8.80	**523**	12 233.0	27.476	7.59	**573**	13 616.0	27.834	6.75
474	10 896.2	27.077	8.77	**524**	12 260.5	27.484	7.57	**574**	13 643.8	27.840	6.74
475	10 923.3	27.086	8.75	**525**	12 288.0	27.492	7.55	**575**	13 671.6	27.847	6.73
476	10 950.4	27.094	8.72	**526**	12 315.5	27.499	7.53	**576**	13 699.5	27.854	6.72
477	10 977.5	27.103	8.69	**527**	12 343.0	27.507	7.51	**577**	13 727.3	27.861	6.70
478	11 004.6	27.112	8.66	**528**	12 370.5	27.514	7.49	**578**	13 755.2	27.867	6.69
479	11 031.7	27.120	8.64	**529**	12 398.0	27.522	7.47	**579**	13 783.1	27.874	6.68
480	11 058.9	27.129	8.61	**530**	12 425.6	27.529	7.45	**580**	13 811.0	27.881	6.66
481	11 086.0	27.138	8.58	**531**	12 453.1	27.537	7.43	**581**	13 838.8	27.887	6.65
482	11 113.1	27.146	8.56	**532**	12 480.6	27.544	7.42	**582**	13 866.7	27.894	6.64
483	11 140.3	27.155	8.53	**533**	12 508.2	27.551	7.40	**583**	13 894.6	27.901	6.63
484	11 167.4	27.163	8.50	**534**	12 535.7	27.559	7.38	**584**	13 922.5	27.907	6.62
485	11 194.6	27.172	8.48	**535**	12 563.3	27.566	7.36	**585**	13 950.4	27.914	6.61
486	11 221.8	27.180	8.45	**536**	12 590.9	27.573	7.34	**586**	13 978.4	27.920	6.59
487	11 249.0	27.189	8.43	**537**	12 618.4	27.581	7.32	**587**	14 006.3	27.927	6.58
488	11 276.2	27.197	8.40	**538**	12 646.0	27.588	7.30	**588**	14 034.2	27.934	6.57
489	11 303.4	27.205	8.37	**539**	12 673.6	27.595	7.29	**589**	14 062.2	27.940	6.56
490	11 330.6	27.214	8.35	**540**	12 701.2	27.603	7.27	**590**	14 090.1	27.947	6.55
491	11 357.8	27.222	8.32	**541**	12 728.8	27.610	7.25	**591**	14 118.0	27.953	6.54
492	11 385.0	27.230	8.30	**542**	12 756.4	27.617	7.23	**592**	14 146.0	27.960	6.53
493	11 412.3	27.239	8.27	**543**	12 784.1	27.624	7.21	**593**	14 174.0	27.966	6.52
494	11 439.5	27.247	8.25	**544**	12 811.7	27.632	7.20	**594**	14 201.9	27.973	6.51
495	11 466.7	27.255	8.22	**545**	12 839.3	27.639	7.18	**595**	14 229.9	27.979	6.50
496	11 494.0	27.263	8.20	**546**	12 867.0	27.646	7.16	**596**	14 257.9	27.986	6.48
497	11 521.3	27.272	8.17	**547**	12 894.6	27.653	7.15	**597**	14 285.9	27.992	6.47
498	11 548.6	27.280	8.15	**548**	12 922.3	27.660	7.13	**598**	14 313.9	27.999	6.46
499	11 575.8	27.288	8.13	**549**	12 949.9	27.667	7.11	**599**	14 341.9	28.005	6.45
500	11 603.1	27.296	8.10	**550**	12 977.6	27.674	7.10	**600**	14 369.9	28.012	6.45

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
600	14 369.9	28.012	6.45	**650**	15 778.4	28.324	6.10	**700**	17 202.1	28.625	5.97
601	14 397.9	28.018	6.44	**651**	15 806.7	28.330	6.10	**701**	17 230.7	28.631	5.97
602	14 425.9	28.024	6.43	**652**	15 835.0	28.336	6.09	**702**	17 259.4	28.637	5.97
603	14 454.0	28.031	6.42	**653**	15 863.4	28.342	6.09	**703**	17 288.0	28.643	5.97
604	14 482.0	28.037	6.41	**654**	15 891.7	28.348	6.08	**704**	17 316.7	28.649	5.97
605	14 510.0	28.044	6.40	**655**	15 920.1	28.355	6.08	**705**	17 345.3	28.655	5.97
606	14 538.1	28.050	6.39	**656**	15 948.4	28.361	6.08	**706**	17 374.0	28.661	5.97
607	14 566.1	28.056	6.38	**657**	15 976.8	28.367	6.07	**707**	17 402.6	28.667	5.97
608	14 594.2	28.063	6.37	**658**	16 005.1	28.373	6.07	**708**	17 431.3	28.673	5.97
609	14 622.3	28.069	6.36	**659**	16 033.5	28.379	6.07	**709**	17 460.0	28.679	5.97
610	14 650.3	28.076	6.35	**660**	16 061.9	28.385	6.06	**710**	17 488.7	28.685	5.96
611	14 678.4	28.082	6.35	**661**	16 090.3	28.391	6.06	**711**	17 517.4	28.691	5.96
612	14 706.5	28.088	6.34	**662**	16 118.7	28.397	6.06	**712**	17 546.1	28.697	5.96
613	14 734.6	28.095	6.33	**663**	16 147.1	28.403	6.05	**713**	17 574.8	28.703	5.96
614	14 762.7	28.101	6.32	**664**	16 175.5	28.409	6.05	**714**	17 603.5	28.709	5.96
615	14 790.8	28.107	6.31	**665**	16 203.9	28.415	6.05	**715**	17 632.2	28.715	5.96
616	14 818.9	28.114	6.31	**666**	16 232.3	28.421	6.04	**716**	17 660.9	28.721	5.96
617	14 847.0	28.120	6.30	**667**	16 260.7	28.427	6.04	**717**	17 689.6	28.727	5.96
618	14 875.1	28.126	6.29	**668**	16 289.2	28.433	6.04	**718**	17 718.3	28.733	5.96
619	14 903.3	28.132	6.28	**669**	16 317.6	28.439	6.03	**719**	17 747.1	28.739	5.96
620	14 931.4	28.139	6.27	**670**	16 346.1	28.445	6.03	**720**	17 775.8	28.745	5.96
621	14 959.5	28.145	6.27	**671**	16 374.5	28.451	6.03	**721**	17 804.6	28.751	5.96
622	14 987.7	28.151	6.26	**672**	16 403.0	28.457	6.03	**722**	17 833.3	28.757	5.96
623	15 015.8	28.158	6.25	**673**	16 431.4	28.463	6.02	**723**	17 862.1	28.763	5.96
624	15 044.0	28.164	6.25	**674**	16 459.9	28.469	6.02	**724**	17 890.8	28.768	5.96
625	15 072.2	28.170	6.24	**675**	16 488.4	28.476	6.02	**725**	17 919.6	28.774	5.95
626	15 100.3	28.176	6.23	**676**	16 516.8	28.482	6.02	**726**	17 948.4	28.780	5.95
627	15 128.5	28.182	6.23	**677**	16 545.3	28.488	6.01	**727**	17 977.2	28.786	5.95
628	15 156.7	28.189	6.22	**678**	16 573.8	28.494	6.01	**728**	18 006.0	28.792	5.95
629	15 184.9	28.195	6.21	**679**	16 602.3	28.500	6.01	**729**	18 034.8	28.798	5.95
630	15 213.1	28.201	6.21	**680**	16 630.8	28.506	6.01	**730**	18 063.6	28.804	5.95
631	15 241.3	28.207	6.20	**681**	16 659.3	28.512	6.00	**731**	18 092.4	28.810	5.95
632	15 269.5	28.214	6.19	**682**	16 687.8	28.518	6.00	**732**	18 121.2	28.816	5.95
633	15 297.7	28.220	6.19	**683**	16 716.4	28.524	6.00	**733**	18 150.0	28.822	5.95
634	15 326.0	28.226	6.18	**684**	16 744.9	28.530	6.00	**734**	18 178.8	28.828	5.95
635	15 354.2	28.232	6.18	**685**	16 773.4	28.536	6.00	**735**	18 207.7	28.834	5.95
636	15 382.4	28.238	6.17	**686**	16 801.9	28.542	5.99	**736**	18 236.5	28.840	5.95
637	15 410.7	28.244	6.17	**687**	16 830.5	28.548	5.99	**737**	18 265.3	28.846	5.95
638	15 438.9	28.251	6.16	**688**	16 859.0	28.554	5.99	**738**	18 294.2	28.852	5.95
639	15 467.2	28.257	6.15	**689**	16 887.6	28.560	5.99	**739**	18 323.0	28.858	5.95
640	15 495.4	28.263	6.15	**690**	16 916.2	28.566	5.99	**740**	18 351.9	28.864	5.95
641	15 523.7	28.269	6.14	**691**	16 944.7	28.572	5.99	**741**	18 380.8	28.870	5.95
642	15 552.0	28.275	6.14	**692**	16 973.3	28.578	5.98	**742**	18 409.6	28.876	5.95
643	15 580.2	28.281	6.13	**693**	17 001.9	28.583	5.98	**743**	18 438.5	28.882	5.95
644	15 608.5	28.287	6.13	**694**	17 030.5	28.589	5.98	**744**	18 467.4	28.887	5.94
645	15 636.8	28.294	6.12	**695**	17 059.1	28.595	5.98	**745**	18 496.3	28.893	5.94
646	15 665.1	28.300	6.12	**696**	17 087.7	28.601	5.98	**746**	18 525.2	28.899	5.94
647	15 693.4	28.306	6.11	**697**	17 116.3	28.607	5.98	**747**	18 554.1	28.905	5.94
648	15 721.7	28.312	6.11	**698**	17 144.9	28.613	5.98	**748**	18 583.0	28.911	5.94
649	15 750.0	28.318	6.11	**699**	17 173.5	28.619	5.98	**749**	18 611.9	28.917	5.94
650	15 778.4	28.324	6.10	**700**	17 202.1	28.625	5.97	**750**	18 640.8	28.923	5.94

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
750	18 640.8	28.923	5.94	**800**	20 094.4	29.219	5.86	**850**	21 562.6	29.506	5.61
751	18 669.8	28.929	5.94	**801**	20 123.6	29.224	5.86	**851**	21 592.1	29.512	5.60
752	18 698.7	28.935	5.94	**802**	20 152.8	29.230	5.85	**852**	21 621.6	29.517	5.60
753	18 727.6	28.941	5.94	**803**	20 182.1	29.236	5.85	**853**	21 651.1	29.523	5.59
754	18 756.6	28.947	5.94	**804**	20 211.3	29.242	5.85	**854**	21 680.6	29.529	5.58
755	18 785.5	28.953	5.94	**805**	20 240.6	29.248	5.84	**855**	21 710.2	29.534	5.57
756	18 814.5	28.959	5.94	**806**	20 269.8	29.254	5.84	**856**	21 739.7	29.540	5.56
757	18 843.4	28.965	5.94	**807**	20 299.1	29.260	5.84	**857**	21 769.3	29.545	5.56
758	18 872.4	28.971	5.93	**808**	20 328.3	29.265	5.83	**858**	21 798.8	29.551	5.55
759	18 901.4	28.977	5.93	**809**	20 357.6	29.271	5.83	**859**	21 828.4	29.556	5.54
760	18 930.4	28.983	5.93	**810**	20 386.9	29.277	5.83	**860**	21 857.9	29.562	5.53
761	18 959.3	28.988	5.93	**811**	20 416.2	29.283	5.82	**861**	21 887.5	29.568	5.52
762	18 988.3	28.994	5.93	**812**	20 445.4	29.289	5.82	**862**	21 917.0	29.573	5.52
763	19 017.3	29.000	5.93	**813**	20 474.7	29.295	5.82	**863**	21 946.6	29.579	5.51
764	19 046.3	29.006	5.93	**814**	20 504.0	29.300	5.81	**864**	21 976.2	29.584	5.50
765	19 075.4	29.012	5.93	**815**	20 533.3	29.306	5.81	**865**	22 005.8	29.590	5.49
766	19 104.4	29.018	5.93	**816**	20 562.6	29.312	5.80	**866**	22 035.4	29.595	5.48
767	19 133.4	29.024	5.93	**817**	20 592.0	29.318	5.80	**867**	22 065.0	29.601	5.47
768	19 162.4	29.030	5.92	**818**	20 621.3	29.324	5.79	**868**	22 094.6	29.606	5.46
769	19 191.4	29.036	5.92	**819**	20 650.6	29.329	5.79	**869**	22 124.2	29.611	5.45
770	19 220.5	29.042	5.92	**820**	20 679.9	29.335	5.79	**870**	22 153.8	29.617	5.44
771	19 249.5	29.048	5.92	**821**	20 709.3	29.341	5.78	**871**	22 183.4	29.622	5.43
772	19 278.6	29.054	5.92	**822**	20 738.6	29.347	5.78	**872**	22 213.1	29.628	5.43
773	19 307.6	29.060	5.92	**823**	20 768.0	29.352	5.77	**873**	22 242.7	29.633	5.42
774	19 336.7	29.065	5.92	**824**	20 797.3	29.358	5.77	**874**	22 272.3	29.639	5.41
775	19 365.8	29.071	5.91	**825**	20 826.7	29.364	5.76	**875**	22 302.0	29.644	5.40
776	19 394.8	29.077	5.91	**826**	20 856.1	29.370	5.76	**876**	22 331.6	29.649	5.39
777	19 423.9	29.083	5.91	**827**	20 885.4	29.376	5.75	**877**	22 361.3	29.655	5.38
778	19 453.0	29.089	5.91	**828**	20 914.8	29.381	5.75	**878**	22 390.9	29.660	5.37
779	19 482.1	29.095	5.91	**829**	20 944.2	29.387	5.74	**879**	22 420.6	29.666	5.36
780	19 511.2	29.101	5.91	**830**	20 973.6	29.393	5.74	**880**	22 450.2	29.671	5.35
781	19 540.3	29.107	5.90	**831**	21 003.0	29.399	5.73	**881**	22 479.9	29.676	5.34
782	19 569.4	29.113	5.90	**832**	21 032.4	29.404	5.73	**882**	22 509.6	29.682	5.33
783	19 598.5	29.119	5.90	**833**	21 061.8	29.410	5.72	**883**	22 539.3	29.687	5.31
784	19 627.7	29.125	5.90	**834**	21 091.2	29.416	5.71	**884**	22 569.0	29.692	5.30
785	19 656.8	29.130	5.90	**835**	21 120.6	29.421	5.71	**885**	22 598.7	29.697	5.29
786	19 685.9	29.136	5.90	**836**	21 150.0	29.427	5.70	**886**	22 628.4	29.703	5.28
787	19 715.1	29.142	5.89	**837**	21 179.5	29.433	5.70	**887**	22 658.1	29.708	5.27
788	19 744.2	29.148	5.89	**838**	21 208.9	29.438	5.69	**888**	22 687.8	29.713	5.26
789	19 773.3	29.154	5.89	**839**	21 238.3	29.444	5.68	**889**	22 717.5	29.719	5.25
790	19 802.5	29.160	5.89	**840**	21 267.8	29.450	5.68	**890**	22 747.2	29.724	5.24
791	19 831.7	29.166	5.88	**841**	21 297.2	29.456	5.67	**891**	22 776.9	29.729	5.23
792	19 860.8	29.172	5.88	**842**	21 326.7	29.461	5.66	**892**	22 806.7	29.734	5.22
793	19 890.0	29.178	5.88	**843**	21 356.2	29.467	5.66	**893**	22 836.4	29.739	5.20
794	19 919.2	29.183	5.88	**844**	21 385.6	29.473	5.65	**894**	22 866.2	29.745	5.19
795	19 948.4	29.189	5.87	**845**	21 415.1	29.478	5.65	**895**	22 895.9	29.750	5.18
796	19 977.6	29.195	5.87	**846**	21 444.6	29.484	5.64	**896**	22 925.7	29.755	5.17
797	20 006.8	29.201	5.87	**847**	21 474.1	29.489	5.63	**897**	22 955.4	29.760	5.16
798	20 036.0	29.207	5.87	**848**	21 503.6	29.495	5.62	**898**	22 985.2	29.765	5.15
799	20 065.2	29.213	5.86	**849**	21 533.1	29.501	5.62	**899**	23 014.9	29.770	5.13
800	20 094.4	29.219	5.86	**850**	21 562.6	29.506	5.61	**900**	23 044.7	29.776	5.12

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
900	23 044.7	29.776	5.12	**950**	24 539.6	30.015	4.41	**1000**	26 045.5	30.215	3.59
901	23 074.5	29.781	5.11	**951**	24 569.6	30.019	4.40	**1001**	26 075.8	30.218	3.58
902	23 104.3	29.786	5.10	**952**	24 599.7	30.023	4.38	**1002**	26 106.0	30.222	3.56
903	23 134.1	29.791	5.08	**953**	24 629.7	30.028	4.36	**1003**	26 136.2	30.226	3.55
904	23 163.9	29.796	5.07	**954**	24 659.7	30.032	4.35	**1004**	26 166.4	30.229	3.53
905	23 193.7	29.801	5.06	**955**	24 689.8	30.037	4.33	**1005**	26 196.7	30.233	3.51
906	23 223.5	29.806	5.05	**956**	24 719.8	30.041	4.32	**1006**	26 226.9	30.236	3.50
907	23 253.3	29.811	5.03	**957**	24 749.8	30.045	4.30	**1007**	26 257.1	30.240	3.48
908	23 283.1	29.816	5.02	**958**	24 779.9	30.049	4.28	**1008**	26 287.4	30.243	3.47
909	23 312.9	29.821	5.01	**959**	24 809.9	30.054	4.27	**1009**	26 317.6	30.247	3.45
910	23 342.7	29.826	4.99	**960**	24 840.0	30.058	4.25	**1010**	26 347.9	30.250	3.43
911	23 372.6	29.831	4.98	**961**	24 870.1	30.062	4.23	**1011**	26 378.1	30.253	3.42
912	23 402.4	29.836	4.97	**962**	24 900.1	30.066	4.22	**1012**	26 408.4	30.257	3.40
913	23 432.2	29.841	4.95	**963**	24 930.2	30.071	4.20	**1013**	26 438.6	30.260	3.39
914	23 462.1	29.846	4.94	**964**	24 960.3	30.075	4.19	**1014**	26 468.9	30.264	3.37
915	23 491.9	29.851	4.93	**965**	24 990.3	30.079	4.17	**1015**	26 499.2	30.267	3.36
916	23 521.8	29.856	4.91	**966**	25 020.4	30.083	4.15	**1016**	26 529.4	30.270	3.34
917	23 551.6	29.861	4.90	**967**	25 050.5	30.087	4.14	**1017**	26 559.7	30.274	3.33
918	23 581.5	29.866	4.89	**968**	25 080.6	30.091	4.12	**1018**	26 590.0	30.277	3.31
919	23 611.4	29.871	4.87	**969**	25 110.7	30.096	4.10	**1019**	26 620.2	30.280	3.29
920	23 641.2	29.875	4.86	**970**	25 140.8	30.100	4.09	**1020**	26 650.5	30.284	3.28
921	23 671.1	29.880	4.85	**971**	25 170.9	30.104	4.07	**1021**	26 680.8	30.287	3.26
922	23 701.0	29.885	4.83	**972**	25 201.0	30.108	4.05	**1022**	26 711.1	30.290	3.25
923	23 730.9	29.890	4.82	**973**	25 231.1	30.112	4.04	**1023**	26 741.4	30.293	3.23
924	23 760.8	29.895	4.80	**974**	25 261.2	30.116	4.02	**1024**	26 771.7	30.297	3.22
925	23 790.7	29.900	4.79	**975**	25 291.3	30.120	4.01	**1025**	26 802.0	30.300	3.20
926	23 820.6	29.904	4.77	**976**	25 321.5	30.124	3.99	**1026**	26 832.3	30.303	3.19
927	23 850.5	29.909	4.76	**977**	25 351.6	30.128	3.97	**1027**	26 862.6	30.306	3.18
928	23 880.4	29.914	4.75	**978**	25 381.7	30.132	3.96	**1028**	26 892.9	30.309	3.16
929	23 910.3	29.919	4.73	**979**	25 411.8	30.136	3.94	**1029**	26 923.2	30.313	3.15
930	23 940.2	29.923	4.72	**980**	25 442.0	30.140	3.92	**1030**	26 953.5	30.316	3.13
931	23 970.2	29.928	4.70	**981**	25 472.1	30.144	3.91	**1031**	26 983.8	30.319	3.12
932	24 000.1	29.933	4.69	**982**	25 502.3	30.148	3.89	**1032**	27 014.2	30.322	3.10
933	24 030.0	29.937	4.67	**983**	25 532.4	30.151	3.87	**1033**	27 044.5	30.325	3.09
934	24 060.0	29.942	4.66	**984**	25 562.6	30.155	3.86	**1034**	27 074.8	30.328	3.07
935	24 089.9	29.947	4.64	**985**	25 592.7	30.159	3.84	**1035**	27 105.1	30.331	3.06
936	24 119.9	29.951	4.63	**986**	25 622.9	30.163	3.82	**1036**	27 135.5	30.334	3.05
937	24 149.8	29.956	4.61	**987**	25 653.1	30.167	3.81	**1037**	27 165.8	30.337	3.03
938	24 179.8	29.961	4.60	**988**	25 683.2	30.171	3.79	**1038**	27 196.2	30.340	3.02
939	24 209.7	29.965	4.58	**989**	25 713.4	30.174	3.77	**1039**	27 226.5	30.343	3.00
940	24 239.7	29.970	4.57	**990**	25 743.6	30.178	3.76	**1040**	27 256.8	30.346	2.99
941	24 269.7	29.974	4.55	**991**	25 773.7	30.182	3.74	**1041**	27 287.2	30.349	2.98
942	24 299.7	29.979	4.54	**992**	25 803.9	30.186	3.73	**1042**	27 317.5	30.352	2.96
943	24 329.6	29.983	4.52	**993**	25 834.1	30.189	3.71	**1043**	27 347.9	30.355	2.95
944	24 359.6	29.988	4.51	**994**	25 864.3	30.193	3.69	**1044**	27 378.2	30.358	2.94
945	24 389.6	29.992	4.49	**995**	25 894.5	30.197	3.68	**1045**	27 408.6	30.361	2.92
946	24 419.6	29.997	4.47	**996**	25 924.7	30.200	3.66	**1046**	27 439.0	30.364	2.91
947	24 449.6	30.001	4.46	**997**	25 954.9	30.204	3.64	**1047**	27 469.3	30.367	2.90
948	24 479.6	30.006	4.44	**998**	25 985.1	30.208	3.63	**1048**	27 499.7	30.370	2.89
949	24 509.6	30.010	4.43	**999**	26 015.3	30.211	3.61	**1049**	27 530.1	30.373	2.87
950	24 539.6	30.015	4.41	**1000**	26 045.5	30.215	3.59	**1050**	27 560.4	30.376	2.86

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
1050	27 560.4	30.376	2.86	1100	29 082.6	30.506	2.39	1150	30 610.7	30.620	2.21
1051	27 590.8	30.378	2.85	1101	29 113.1	30.508	2.39	1151	30 641.4	30.622	2.21
1052	27 621.2	30.381	2.84	1102	29 143.6	30.510	2.38	1152	30 672.0	30.624	2.21
1053	27 651.6	30.384	2.82	1103	29 174.1	30.513	2.38	1153	30 702.6	30.627	2.21
1054	27 682.0	30.387	2.81	1104	29 204.6	30.515	2.37	1154	30 733.2	30.629	2.20
1055	27 712.4	30.390	2.80	1105	29 235.1	30.517	2.37	1155	30 763.9	30.631	2.20
1056	27 742.8	30.392	2.79	1106	29 265.6	30.520	2.36	1156	30 794.5	30.633	2.20
1057	27 773.1	30.395	2.78	1107	29 296.2	30.522	2.36	1157	30 825.1	30.635	2.20
1058	27 803.5	30.398	2.77	1108	29 326.7	30.525	2.35	1158	30 855.8	30.638	2.19
1059	27 833.9	30.401	2.75	1109	29 357.2	30.527	2.35	1159	30 886.4	30.640	2.19
1060	27 864.3	30.404	2.74	1110	29 387.7	30.529	2.34	1160	30 917.1	30.642	2.19
1061	27 894.7	30.406	2.73	1111	29 418.3	30.532	2.34	1161	30 947.7	30.644	2.18
1062	27 925.2	30.409	2.72	1112	29 448.8	30.534	2.33	1162	30 978.3	30.646	2.18
1063	27 955.6	30.412	2.71	1113	29 479.3	30.536	2.33	1163	31 009.0	30.649	2.18
1064	27 986.0	30.414	2.70	1114	29 509.9	30.539	2.32	1164	31 039.6	30.651	2.18
1065	28 016.4	30.417	2.69	1115	29 540.4	30.541	2.32	1165	31 070.3	30.653	2.17
1066	28 046.8	30.420	2.68	1116	29 571.0	30.543	2.31	1166	31 100.9	30.655	2.17
1067	28 077.2	30.422	2.67	1117	29 601.5	30.545	2.31	1167	31 131.6	30.657	2.16
1068	28 107.7	30.425	2.66	1118	29 632.1	30.548	2.31	1168	31 162.3	30.659	2.16
1069	28 138.1	30.428	2.65	1119	29 662.6	30.550	2.30	1169	31 192.9	30.662	2.16
1070	28 168.5	30.430	2.64	1120	29 693.2	30.552	2.30	1170	31 223.6	30.664	2.15
1071	28 198.9	30.433	2.63	1121	29 723.7	30.555	2.29	1171	31 254.2	30.666	2.15
1072	28 229.4	30.436	2.62	1122	29 754.3	30.557	2.29	1172	31 284.9	30.668	2.14
1073	28 259.8	30.438	2.61	1123	29 784.8	30.559	2.29	1173	31 315.6	30.670	2.14
1074	28 290.3	30.441	2.60	1124	29 815.4	30.562	2.28	1174	31 346.3	30.672	2.13
1075	28 320.7	30.443	2.59	1125	29 845.9	30.564	2.28	1175	31 376.9	30.674	2.13
1076	28 351.1	30.446	2.58	1126	29 876.5	30.566	2.28	1176	31 407.6	30.677	2.12
1077	28 381.6	30.449	2.57	1127	29 907.1	30.568	2.27	1177	31 438.3	30.679	2.12
1078	28 412.0	30.451	2.56	1128	29 937.6	30.571	2.27	1178	31 469.0	30.681	2.11
1079	28 442.5	30.454	2.55	1129	29 968.2	30.573	2.27	1179	31 499.6	30.683	2.11
1080	28 472.9	30.456	2.54	1130	29 998.8	30.575	2.26	1180	31 530.3	30.685	2.10
1081	28 503.4	30.459	2.53	1131	30 029.4	30.577	2.26	1181	31 561.0	30.687	2.09
1082	28 533.9	30.461	2.52	1132	30 059.9	30.580	2.26	1182	31 591.7	30.689	2.09
1083	28 564.3	30.464	2.52	1133	30 090.5	30.582	2.26	1183	31 622.4	30.691	2.08
1084	28 594.8	30.466	2.51	1134	30 121.1	30.584	2.25	1184	31 653.1	30.693	2.07
1085	28 625.3	30.469	2.50	1135	30 151.7	30.586	2.25	1185	31 683.8	30.695	2.07
1086	28 655.7	30.471	2.49	1136	30 182.3	30.589	2.25	1186	31 714.5	30.697	2.06
1087	28 686.2	30.474	2.48	1137	30 212.9	30.591	2.25	1187	31 745.2	30.700	2.05
1088	28 716.7	30.476	2.48	1138	30 243.5	30.593	2.24	1188	31 775.9	30.702	2.04
1089	28 747.2	30.479	2.47	1139	30 274.1	30.595	2.24	1189	31 806.6	30.704	2.03
1090	28 777.6	30.481	2.46	1140	30 304.7	30.598	2.24	1190	31 837.3	30.706	2.02
1091	28 808.1	30.484	2.45	1141	30 335.3	30.600	2.24	1191	31 868.0	30.708	2.01
1092	28 838.6	30.486	2.45	1142	30 365.9	30.602	2.23	1192	31 898.7	30.710	2.00
1093	28 869.1	30.489	2.44	1143	30 396.5	30.604	2.23	1193	31 929.4	30.712	1.99
1094	28 899.6	30.491	2.43	1144	30 427.1	30.607	2.23	1194	31 960.1	30.714	1.98
1095	28 930.1	30.493	2.43	1145	30 457.7	30.609	2.23	1195	31 990.8	30.716	1.97
1096	28 960.6	30.496	2.42	1146	30 488.3	30.611	2.22	1196	32 021.6	30.718	1.96
1097	28 991.1	30.498	2.41	1147	30 518.9	30.613	2.22	1197	32 052.3	30.720	1.95
1098	29 021.6	30.501	2.41	1148	30 549.5	30.616	2.22	1198	32 083.0	30.721	1.93
1099	29 052.1	30.503	2.40	1149	30 580.1	30.618	2.22	1199	32 113.7	30.723	1.92
1100	29 082.6	30.506	2.39	1150	30 610.7	30.620	2.21	1200	32 144.4	30.725	1.91

TABLE 8.4.3. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
1200	32 144.4	30.725	1.91	**1235**	33 220.9	30.779	1.00	**1270**	34 298.4	30.779	−1.35
1201	32 175.2	30.727	1.89	**1236**	33 251.6	30.780	0.96	**1271**	34 329.1	30.777	−1.45
1202	32 205.9	30.729	1.88	**1237**	33 282.4	30.781	0.92	**1272**	34 359.9	30.776	−1.55
1203	32 236.6	30.731	1.86	**1238**	33 313.2	30.782	0.87	**1273**	34 390.7	30.774	−1.66
1204	32 267.4	30.733	1.85	**1239**	33 344.0	30.783	0.83	**1274**	34 421.5	30.773	−1.76
1205	32 298.1	30.735	1.83	**1240**	33 374.8	30.784	0.78	**1275**	34 452.2	30.771	−1.87
1206	32 328.8	30.736	1.82	**1241**	33 405.5	30.784	0.73	**1276**	34 483.0	30.769	−1.98
1207	32 359.6	30.738	1.80	**1242**	33 436.3	30.785	0.68	**1277**	34 513.8	30.767	−2.10
1208	32 390.3	30.740	1.78	**1243**	33 467.1	30.786	0.63	**1278**	34 544.5	30.765	−2.21
1209	32 421.0	30.742	1.76	**1244**	33 497.9	30.786	0.58	**1279**	34 575.3	30.762	−2.33
1210	32 451.8	30.744	1.74	**1245**	33 528.7	30.787	0.52	**1280**	34 606.1	30.760	−2.45
1211	32 482.5	30.745	1.72	**1246**	33 559.5	30.787	0.47	**1281**	34 636.8	30.757	−2.58
1212	32 513.3	30.747	1.70	**1247**	33 590.3	30.788	0.41	**1282**	34 667.6	30.755	−2.70
1213	32 544.0	30.749	1.68	**1248**	33 621.1	30.788	0.35	**1283**	34 698.3	30.752	−2.83
1214	32 574.8	30.750	1.66	**1249**	33 651.8	30.788	0.29	**1284**	34 729.1	30.749	−2.96
1215	32 605.5	30.752	1.64	**1250**	33 682.6	30.789	0.23	**1285**	34 759.8	30.746	−3.10
1216	32 636.3	30.754	1.61	**1251**	33 713.4	30.789	0.17	**1286**	34 790.6	30.743	−3.23
1217	32 667.0	30.755	1.59	**1252**	33 744.2	30.789	0.11	**1287**	34 821.3	30.740	−3.37
1218	32 697.8	30.757	1.56	**1253**	33 775.0	30.789	0.04	**1288**	34 852.0	30.736	−3.52
1219	32 728.5	30.758	1.54	**1254**	33 805.8	30.789	−0.03	**1289**	34 882.8	30.733	−3.66
1220	32 759.3	30.760	1.51	**1255**	33 836.6	30.789	−0.10	**1290**	34 913.5	30.729	−3.81
1221	32 790.1	30.761	1.48	**1256**	33 867.4	30.789	−0.17	**1291**	34 944.2	30.725	−3.96
1222	32 820.8	30.763	1.46	**1257**	33 898.2	30.789	−0.24	**1292**	34 975.0	30.721	−4.12
1223	32 851.6	30.764	1.43	**1258**	33 928.9	30.788	−0.31	**1293**	35 005.7	30.717	−4.27
1224	32 882.4	30.766	1.40	**1259**	33 959.7	30.788	−0.39	**1294**	35 036.4	30.712	−4.43
1225	32 913.1	30.767	1.37	**1260**	33 990.5	30.788	−0.47	**1295**	35 067.1	30.708	−4.60
1226	32 943.9	30.769	1.33	**1261**	34 021.3	30.787	−0.55	**1296**	35 097.8	30.703	−4.76
1227	32 974.7	30.770	1.30	**1262**	34 052.1	30.787	−0.63	**1297**	35 128.5	30.698	−4.93
1228	33 005.4	30.771	1.27	**1263**	34 082.9	30.786	−0.71	**1298**	35 159.2	30.693	−5.11
1229	33 036.2	30.772	1.23	**1264**	34 113.7	30.785	−0.80	**1299**	35 189.9	30.688	−5.28
1230	33 067.0	30.774	1.20	**1265**	34 144.4	30.784	−0.89	**1300**	35 220.6	30.683	−5.46
1231	33 097.7	30.775	1.16	**1266**	34 175.2	30.783	−0.97				
1232	33 128.5	30.776	1.12	**1267**	34 206.0	30.782	−1.07				
1233	33 159.3	30.777	1.08	**1268**	34 236.8	30.781	−1.16				
1234	33 190.1	30.778	1.04	**1269**	34 267.6	30.780	−1.25				
1235	33 220.9	30.779	1.00	**1270**	34 298.4	30.779	−1.35				

8.5. Reference Function and Table for Platinum, Pt-67, Versus the Negative Thermoelement, Type NN, a Nickel-Silicon-Magnesium Alloy

The coefficients, c_i, for the eighth degree polynomial and for the tenth degree polynomial that give the thermoelectric voltage, E, of Pt-67 versus type NN thermoelements as a function of temperature, t_{90}, in the −200 °C to 0 °C and 0 °C to 1300 °C ranges, respectively, are given in table 8.5.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for Pt-67 versus type NN thermoelements at selected fixed points are given in table 8.5.2. The reference values for Pt-67 versus type NN thermoelements are given at 1 °C intervals from −200 °C to 1300 °C in table 8.5.3. Graphs of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative are given in figures 8.5.1, 8.5.2, and 8.5.3, respectively. The discontinuities in the first and second derivatives at 0 °C are apparent in figures 8.5.2 and 8.5.3. As discussed in the section 8.2, these discontinuities result from the reference equations for the different temperature regions being joined without constraints on their derivatives.

It should be stressed that **type NN thermoelement materials that conform closely to the high temperature tabular values may not necessarily conform closely at temperatures below 0 °C and vice versa.** If type NN thermoelements are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 8.5.1. *Platinum, Pt-67, versus type NN thermoelements --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−200 °C to 0 °C	0 °C to 1300 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	1.074 111 753 2 X 10^{1}	1.048 400 865 5 X 10^{1}
c_2 =	−1.474 989 822 9 X 10^{-2}	−1.101 219 940 9 X 10^{-2}
c_3 =	−3.653 285 783 2 X 10^{-6}	6.942 094 028 9 X 10^{-5}
c_4 =	4.901 358 902 9 X 10^{-7}	−2.195 836 005 3 X 10^{-7}
c_5 =	7.222 858 260 4 X 10^{-10}	4.423 649 636 8 X 10^{-10}
c_6 =	−1.538 109 323 6 X 10^{-11}	−5.792 656 096 4 X 10^{-13}
c_7 =	−7.608 930 079 1 X 10^{-14}	4.793 186 547 0 X 10^{-16}
c_8 =	−9.341 966 783 5 X 10^{-17}	−2.397 612 067 6 X 10^{-19}
c_9 =		6.580 494 631 8 X 10^{-23}
c_{10} =		−7.560 893 996 5 X 10^{-27}

TABLE 8.5.2. *Thermoelectric values at fixed points for platinum, Pt-67, versus type NN thermoelements*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
Argon TP	−189.3442	−2 282.79	11.704	31.04
Mercury TP	−38.8344	−438.15	11.770	−21.41
Ice MP	0.000	0.00	10.484	−22.02
Water TP	0.01	0.1	10.484	−22.02
Gallium MP	29.7646	304.0	9.991	−11.74
Indium FP	156.5985	1 540.4	9.817	3.82
Tin FP	231.928	2 292.0	10.146	4.52
Cadmium FP	321.069	3 213.7	10.522	3.80
Lead FP	327.462	3 281.0	10.546	3.73
Zinc FP	419.527	4 266.1	10.836	2.50
Antimony FP	630.63	6 577.6	10.881	−2.60
Aluminum FP	660.323	6 899.4	10.791	−3.48
Silver FP	961.78	9 882.6	8.734	−8.76
Gold FP	1064.18	10 730.2	7.812	−9.28
Copper FP	1084.62	10 887.9	7.621	−9.43

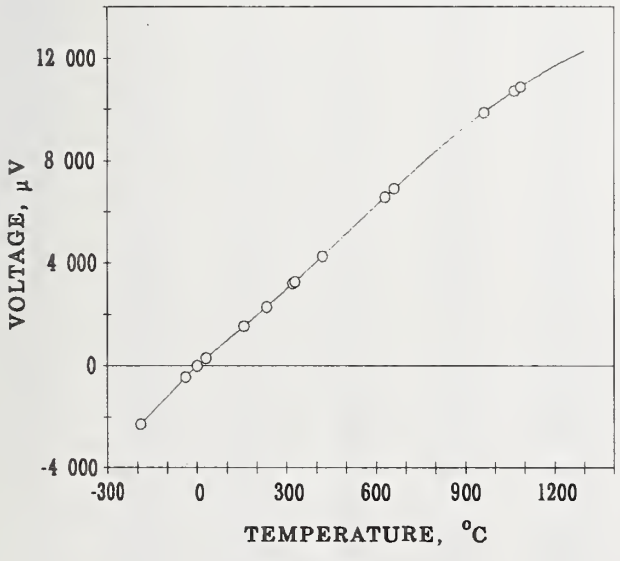

FIGURE 8.5.1. *Thermoelectric voltage for platinum, Pt-67, versus type NN thermoelements. The circles indicate values at various thermometric fixed points.*

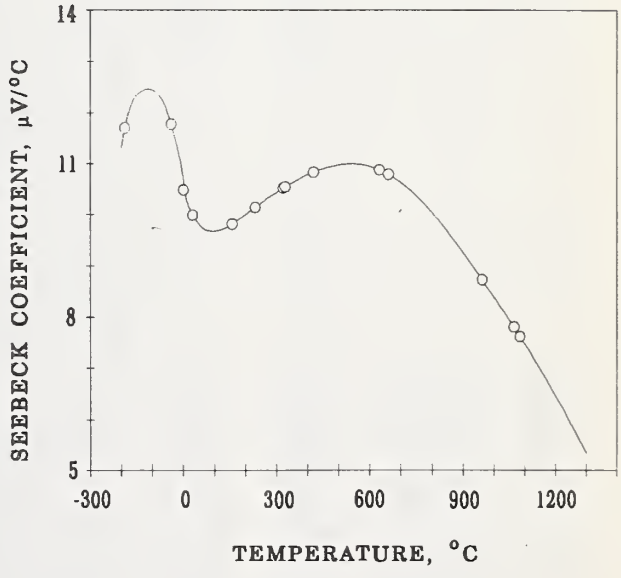

FIGURE 8.5.2. *Seebeck coefficient for platinum, Pt-67, versus type NN thermoelements. The circles indicate values at various thermometric fixed points.*

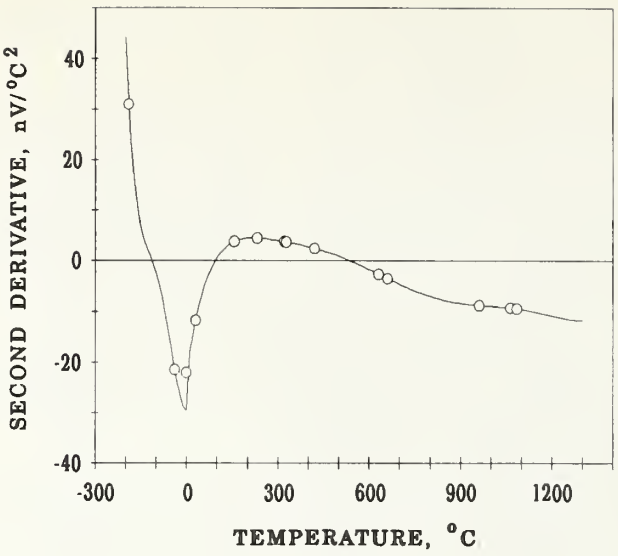

FIGURE 8.5.3. *Second derivative of thermoelectric voltage for platinum, Pt-67, versus type NN thermoelements. The circles indicate values at various thermometric fixed points.*

TABLE 8.5.3. ***Platinum, Pt-67, versus type NN thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
				−190	−2 290.46	11.683	31.74	−170	−2 051.71	12.137	15.32
				−189	−2 278.76	11.714	30.67	−169	−2 039.56	12.152	14.74
				−188	−2 267.03	11.745	29.63	−168	−2 027.40	12.167	14.18
				−187	−2 255.27	11.774	28.62	−167	−2 015.23	12.181	13.63
				−186	−2 243.48	11.802	27.64	−166	−2 003.04	12.194	13.11
				−185	−2 231.67	11.829	26.68	−165	−1 990.84	12.207	12.60
				−184	−2 219.82	11.855	25.75	−164	−1 978.63	12.219	12.12
				−183	−2 207.96	11.880	24.85	−163	−1 966.40	12.231	11.65
				−182	−2 196.06	11.905	23.97	−162	−1 954.17	12.243	11.19
				−181	−2 184.15	11.928	23.12	−161	−1 941.92	12.254	10.75
−200	−2 405.51	11.306	44.12	−180	−2 172.21	11.951	22.29	−160	−1 929.66	12.264	10.33
−199	−2 394.18	11.350	42.74	−179	−2 160.24	11.973	21.49	−159	−1 917.39	12.274	9.92
−198	−2 382.81	11.392	41.39	−178	−2 148.26	11.994	20.72	−158	−1 905.11	12.284	9.53
−197	−2 371.40	11.433	40.07	−177	−2 136.26	12.014	19.96	−157	−1 892.82	12.293	9.15
−196	−2 359.94	11.472	38.79	−176	−2 124.23	12.034	19.23	−156	−1 880.52	12.302	8.79
−195	−2 348.45	11.510	37.54	−175	−2 112.19	12.053	18.52	−155	−1 868.22	12.311	8.44
−194	−2 336.92	11.547	36.32	−174	−2 100.13	12.071	17.84	−154	−1 855.90	12.319	8.10
−193	−2 325.36	11.583	35.13	−173	−2 088.05	12.089	17.18	−153	−1 843.58	12.327	7.77
−192	−2 313.76	11.617	33.97	−172	−2 075.95	12.105	16.54	−152	−1 831.25	12.335	7.45
−191	−2 302.12	11.651	32.84	−171	−2 063.84	12.122	15.92	−151	−1 818.91	12.342	7.15
−190	−2 290.46	11.683	31.74	−170	−2 051.71	12.137	15.32	−150	−1 806.56	12.349	6.86

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−1 806.56	12.349	6.86	−100	−1 184.87	12.447	−2.35	−50	−570.82	11.987	−17.47
−149	−1 794.21	12.356	6.57	−99	−1 172.43	12.445	−2.56	−49	−558.84	11.970	−17.83
−148	−1 781.85	12.362	6.30	−98	−1 159.98	12.442	−2.77	−48	−546.88	11.952	−18.19
−147	−1 769.49	12.368	6.04	−97	−1 147.54	12.439	−2.98	−47	−534.94	11.933	−18.55
−146	−1 757.12	12.374	5.79	−96	−1 135.11	12.436	−3.20	−46	−523.02	11.915	−18.91
−145	−1 744.74	12.380	5.54	−95	−1 122.67	12.433	−3.42	−45	−511.11	11.895	−19.27
−144	−1 732.36	12.385	5.30	−94	−1 110.24	12.429	−3.65	−44	−499.22	11.876	−19.62
−143	−1 719.97	12.390	5.07	−93	−1 097.81	12.425	−3.88	−43	−487.36	11.856	−19.97
−142	−1 707.58	12.395	4.85	−92	−1 085.39	12.421	−4.12	−42	−475.51	11.836	−20.32
−141	−1 695.18	12.400	4.64	−91	−1 072.97	12.417	−4.36	−41	−463.69	11.816	−20.67
−140	−1 682.78	12.405	4.43	−90	−1 060.56	12.413	−4.60	−40	−451.88	11.795	−21.01
−139	−1 670.37	12.409	4.23	−89	−1 048.15	12.408	−4.85	−39	−440.10	11.774	−21.35
−138	−1 657.96	12.413	4.03	−88	−1 035.74	12.403	−5.10	−38	−428.33	11.752	−21.69
−137	−1 645.54	12.417	3.84	−87	−1 023.34	12.398	−5.36	−37	−416.59	11.730	−22.03
−136	−1 633.12	12.421	3.66	−86	−1 010.94	12.392	−5.63	−36	−404.87	11.708	−22.36
−135	−1 620.70	12.424	3.47	−85	−998.56	12.386	−5.89	−35	−393.18	11.685	−22.68
−134	−1 608.28	12.428	3.30	−84	−986.17	12.380	−6.17	−34	−381.50	11.663	−23.00
−133	−1 595.85	12.431	3.13	−83	−973.79	12.374	−6.44	−33	−369.85	11.639	−23.32
−132	−1 583.41	12.434	2.96	−82	−961.42	12.368	−6.72	−32	−358.22	11.616	−23.63
−131	−1 570.98	12.437	2.79	−81	−949.06	12.361	−7.01	−31	−346.62	11.592	−23.94
−130	−1 558.54	12.440	2.63	−80	−936.70	12.354	−7.30	−30	−335.04	11.568	−24.24
−129	−1 546.10	12.442	2.47	−79	−924.35	12.346	−7.59	−29	−323.48	11.544	−24.53
−128	−1 533.66	12.445	2.31	−78	−912.01	12.338	−7.89	−28	−311.95	11.519	−24.82
−127	−1 521.21	12.447	2.15	−77	−899.68	12.330	−8.20	−27	−300.45	11.494	−25.11
−126	−1 508.76	12.449	2.00	−76	−887.35	12.322	−8.50	−26	−288.96	11.469	−25.38
−125	−1 496.31	12.451	1.84	−75	−875.03	12.313	−8.81	−25	−277.51	11.443	−25.65
−124	−1 483.86	12.453	1.69	−74	−862.72	12.304	−9.13	−24	−266.08	11.418	−25.91
−123	−1 471.41	12.454	1.54	−73	−850.42	12.295	−9.45	−23	−254.67	11.391	−26.17
−122	−1 458.95	12.456	1.38	−72	−838.13	12.285	−9.77	−22	−243.30	11.365	−26.42
−121	−1 446.50	12.457	1.23	−71	−825.85	12.276	−10.09	−21	−231.94	11.339	−26.66
−120	−1 434.04	12.458	1.08	−70	−813.58	12.265	−10.42	−20	−220.62	11.312	−26.89
−119	−1 421.58	12.459	0.93	−69	−801.32	12.255	−10.76	−19	−209.32	11.285	−27.11
−118	−1 409.12	12.460	0.77	−68	−789.07	12.244	−11.09	−18	−198.05	11.258	−27.33
−117	−1 396.66	12.461	0.62	−67	−776.83	12.232	−11.43	−17	−186.80	11.230	−27.53
−116	−1 384.20	12.461	0.46	−66	−764.61	12.221	−11.77	−16	−175.59	11.203	−27.73
−115	−1 371.74	12.462	0.31	−65	−752.39	12.209	−12.12	−15	−164.40	11.175	−27.92
−114	−1 359.28	12.462	0.15	−64	−740.19	12.197	−12.46	−14	−153.24	11.147	−28.10
−113	−1346.81	12.462	−0.01	−63	−728.00	12.184	−12.81	−13	−142.11	11.119	−28.26
−112	−1334.35	12.462	−0.17	−62	−715.82	12.171	−13.16	−12	−131.00	11.090	−28.42
−111	−1321.89	12.462	−0.34	−61	−703.66	12.158	−13.52	−11	−119.93	11.062	−28.57
−110	−1309.43	12.461	−0.51	−60	−691.51	12.144	−13.87	−10	−108.88	11.033	−28.71
−109	−1296.97	12.461	−0.68	−59	−679.37	12.130	−14.23	−9	−97.86	11.004	−28.84
−108	−1284.51	12.460	−0.85	−58	−667.25	12.116	−14.58	−8	−86.87	10.975	−28.96
−107	−1272.05	12.459	−1.03	−57	−655.14	12.101	−14.94	−7	−75.91	10.946	−29.06
−106	−1259.59	12.458	−1.20	−56	−643.05	12.086	−15.30	−6	−64.98	10.917	−29.16
−105	−1247.13	12.456	−1.39	−55	−630.97	12.070	−15.66	−5	−54.07	10.888	−29.25
−104	−1234.68	12.455	−1.57	−54	−618.91	12.054	−16.03	−4	−43.20	10.859	−29.32
−103	−1222.22	12.453	−1.76	−53	−606.86	12.038	−16.39	−3	−32.36	10.829	−29.38
−102	−1209.77	12.451	−1.96	−52	−594.83	12.022	−16.75	−2	−21.54	10.800	−29.43
−101	−1197.32	12.449	−2.15	−51	−582.82	12.005	−17.11	−1	−10.76	10.771	−29.47
−100	−1184.87	12.447	−2.35	−50	−570.82	11.987	−17.47	0	0.00	10.741	−29.50

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	10.484	−22.02	50	504.1	9.806	−6.78	100	989.6	9.675	0.58
1	10.5	10.462	−21.61	51	513.9	9.800	−6.57	101	999.3	9.676	0.67
2	20.9	10.441	−21.20	52	523.7	9.793	−6.37	102	1 009.0	9.677	0.76
3	31.4	10.420	−20.80	53	533.5	9.787	−6.16	103	1 018.7	9.678	0.85
4	41.8	10.399	−20.40	54	543.3	9.781	−5.96	104	1 028.3	9.679	0.94
5	52.2	10.379	−20.01	55	553.1	9.775	−5.76	105	1 038.0	9.679	1.03
6	62.5	10.359	−19.62	56	562.8	9.769	−5.57	106	1 047.7	9.681	1.11
7	72.9	10.340	−19.23	57	572.6	9.764	−5.38	107	1 057.4	9.682	1.20
8	83.2	10.321	−18.86	58	582.4	9.759	−5.19	108	1 067.1	9.683	1.28
9	93.5	10.302	−18.48	59	592.1	9.754	−5.00	109	1 076.7	9.684	1.36
10	103.8	10.284	−18.11	60	601.9	9.749	−4.82	110	1 086.4	9.686	1.44
11	114.1	10.266	−17.75	61	611.6	9.744	−4.64	111	1 096.1	9.687	1.52
12	124.3	10.248	−17.39	62	621.4	9.739	−4.46	112	1 105.8	9.689	1.60
13	134.6	10.231	−17.04	63	631.1	9.735	−4.28	113	1 115.5	9.690	1.67
14	144.8	10.214	−16.69	64	640.8	9.731	−4.11	114	1 125.2	9.692	1.75
15	155.0	10.198	−16.34	65	650.6	9.727	−3.94	115	1 134.9	9.694	1.82
16	165.2	10.181	−16.00	66	660.3	9.723	−3.77	116	1 144.6	9.696	1.89
17	175.4	10.166	−15.66	67	670.0	9.719	−3.61	117	1 154.3	9.698	1.96
18	185.5	10.150	−15.33	68	679.7	9.716	−3.45	118	1 164.0	9.700	2.03
19	195.7	10.135	−15.00	69	689.4	9.712	−3.29	119	1 173.7	9.702	2.10
20	205.8	10.120	−14.68	70	699.1	9.709	−3.13	120	1 183.4	9.704	2.16
21	215.9	10.106	−14.36	71	708.8	9.706	−2.97	121	1 193.1	9.706	2.23
22	226.0	10.091	−14.05	72	718.6	9.703	−2.82	122	1 202.8	9.708	2.29
23	236.1	10.078	−13.74	73	728.3	9.700	−2.67	123	1 212.5	9.711	2.35
24	246.2	10.064	−13.43	74	738.0	9.698	−2.52	124	1 222.2	9.713	2.41
25	256.2	10.051	−13.13	75	747.6	9.695	−2.38	125	1 231.9	9.715	2.47
26	266.3	10.038	−12.83	76	757.3	9.693	−2.24	126	1 241.6	9.718	2.53
27	276.3	10.025	−12.53	77	767.0	9.691	−2.09	127	1 251.4	9.720	2.59
28	286.3	10.013	−12.24	78	776.7	9.689	−1.96	128	1 261.1	9.723	2.64
29	296.3	10.001	−11.96	79	786.4	9.687	−1.82	129	1 270.8	9.726	2.70
30	306.3	9.989	−11.67	80	796.1	9.685	−1.69	130	1 280.5	9.728	2.75
31	316.3	9.977	−11.40	81	805.8	9.684	−1.55	131	1 290.3	9.731	2.80
32	326.3	9.966	−11.12	82	815.5	9.682	−1.42	132	1 300.0	9.734	2.86
33	336.2	9.955	−10.85	83	825.1	9.681	−1.30	133	1 309.7	9.737	2.91
34	346.2	9.944	−10.58	84	834.8	9.680	−1.17	134	1 319.5	9.740	2.96
35	356.1	9.934	−10.32	85	844.5	9.678	−1.05	135	1 329.2	9.743	3.00
36	366.0	9.924	−10.06	86	854.2	9.677	−0.93	136	1 339.0	9.746	3.05
37	376.0	9.914	−9.80	87	863.9	9.677	−0.81	137	1 348.7	9.749	3.10
38	385.9	9.904	−9.55	88	873.5	9.676	−0.69	138	1 358.4	9.752	3.14
39	395.8	9.895	−9.30	89	883.2	9.675	−0.57	139	1 368.2	9.755	3.19
40	405.7	9.885	−9.06	90	892.9	9.675	−0.46	140	1 378.0	9.758	3.23
41	415.5	9.876	−8.81	91	902.6	9.674	−0.35	141	1 387.7	9.762	3.27
42	425.4	9.868	−8.57	92	912.2	9.674	−0.24	142	1 397.5	9.765	3.31
43	435.3	9.859	−8.34	93	921.9	9.674	−0.13	143	1 407.2	9.768	3.35
44	445.1	9.851	−8.11	94	931.6	9.674	−0.02	144	1 417.0	9.772	3.39
45	455.0	9.843	−7.88	95	941.3	9.674	0.08	145	1 426.8	9.775	3.43
46	464.8	9.835	−7.65	96	950.9	9.674	0.18	146	1 436.6	9.779	3.47
47	474.7	9.828	−7.43	97	960.6	9.674	0.28	147	1 446.3	9.782	3.51
48	484.5	9.820	−7.21	98	970.3	9.674	0.38	148	1 456.1	9.786	3.54
49	494.3	9.813	−7.00	99	980.0	9.675	0.48	149	1 465.9	9.789	3.58
50	504.1	9.806	−6.78	100	989.6	9.675	0.58	150	1 475.7	9.793	3.61

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	1 475.7	9.793	3.61	**200**	1 970.4	10.001	4.50	**250**	2 476.1	10.227	4.44
151	1 485.5	9.796	3.65	**201**	1 980.4	10.006	4.50	**251**	2 486.3	10.231	4.43
152	1 495.3	9.800	3.68	**202**	1 990.4	10.010	4.51	**252**	2 496.6	10.236	4.42
153	1 505.1	9.804	3.71	**203**	2 000.4	10.015	4.51	**253**	2 506.8	10.240	4.42
154	1 514.9	9.807	3.74	**204**	2 010.4	10.019	4.51	**254**	2 517.1	10.245	4.41
155	1 524.7	9.811	3.77	**205**	2 020.4	10.024	4.52	**255**	2 527.3	10.249	4.40
156	1 534.5	9.815	3.80	**206**	2 030.5	10.028	4.52	**256**	2 537.6	10.253	4.40
157	1 544.4	9.819	3.83	**207**	2 040.5	10.033	4.53	**257**	2 547.8	10.258	4.39
158	1 554.2	9.823	3.86	**208**	2 050.5	10.037	4.53	**258**	2 558.1	10.262	4.38
159	1 564.0	9.827	3.88	**209**	2 060.6	10.042	4.53	**259**	2 568.3	10.267	4.38
160	1 573.8	9.830	3.91	**210**	2 070.6	10.047	4.53	**260**	2 578.6	10.271	4.37
161	1 583.7	9.834	3.94	**211**	2 080.7	10.051	4.54	**261**	2 588.9	10.275	4.36
162	1 593.5	9.838	3.96	**212**	2 090.7	10.056	4.54	**262**	2 599.2	10.280	4.36
163	1 603.3	9.842	3.99	**213**	2 100.8	10.060	4.54	**263**	2 609.4	10.284	4.35
164	1 613.2	9.846	4.01	**214**	2 110.8	10.065	4.54	**264**	2 619.7	10.288	4.34
165	1 623.0	9.850	4.03	**215**	2 120.9	10.069	4.54	**265**	2 630.0	10.293	4.33
166	1 632.9	9.854	4.06	**216**	2 131.0	10.074	4.54	**266**	2 640.3	10.297	4.33
167	1 642.7	9.858	4.08	**217**	2 141.1	10.078	4.54	**267**	2 650.6	10.301	4.32
168	1 652.6	9.863	4.10	**218**	2 151.1	10.083	4.54	**268**	2 660.9	10.306	4.31
169	1 662.5	9.867	4.12	**219**	2 161.2	10.087	4.54	**269**	2 671.2	10.310	4.30
170	1 672.3	9.871	4.14	**220**	2 171.3	10.092	4.54	**270**	2 681.5	10.314	4.29
171	1 682.2	9.875	4.16	**221**	2 181.4	10.096	4.54	**271**	2 691.8	10.319	4.29
172	1 692.1	9.879	4.18	**222**	2 191.5	10.101	4.54	**272**	2 702.2	10.323	4.28
173	1 702.0	9.883	4.20	**223**	2 201.6	10.106	4.54	**273**	2 712.5	10.327	4.27
174	1 711.8	9.887	4.21	**224**	2 211.7	10.110	4.54	**274**	2 722.8	10.331	4.26
175	1 721.7	9.892	4.23	**225**	2 221.8	10.115	4.54	**275**	2 733.2	10.336	4.25
176	1 731.6	9.896	4.25	**226**	2 232.0	10.119	4.53	**276**	2 743.5	10.340	4.24
177	1 741.5	9.900	4.26	**227**	2 242.1	10.124	4.53	**277**	2 753.8	10.344	4.24
178	1 751.4	9.904	4.28	**228**	2 252.2	10.128	4.53	**278**	2 764.2	10.348	4.23
179	1 761.3	9.909	4.29	**229**	2 262.3	10.133	4.53	**279**	2 774.5	10.353	4.22
180	1 771.2	9.913	4.31	**230**	2 272.5	10.137	4.52	**280**	2 784.9	10.357	4.21
181	1 781.2	9.917	4.32	**231**	2 282.6	10.142	4.52	**281**	2 795.2	10.361	4.20
182	1 791.1	9.922	4.33	**232**	2 292.7	10.146	4.52	**282**	2 805.6	10.365	4.19
183	1 801.0	9.926	4.35	**233**	2 302.9	10.151	4.52	**283**	2 816.0	10.369	4.18
184	1 810.9	9.930	4.36	**234**	2 313.0	10.155	4.51	**284**	2 826.3	10.374	4.17
185	1 820.9	9.935	4.37	**235**	2 323.2	10.160	4.51	**285**	2 836.7	10.378	4.17
186	1 830.8	9.939	4.38	**236**	2 333.4	10.164	4.51	**286**	2 847.1	10.382	4.16
187	1 840.7	9.944	4.39	**237**	2 343.5	10.169	4.50	**287**	2 857.5	10.386	4.15
188	1 850.7	9.948	4.40	**238**	2 353.7	10.173	4.50	**288**	2 867.9	10.390	4.14
189	1 860.6	9.952	4.41	**239**	2 363.9	10.178	4.49	**289**	2 878.3	10.394	4.13
190	1 870.6	9.957	4.42	**240**	2 374.1	10.182	4.49	**290**	2 888.7	10.399	4.12
191	1 880.6	9.961	4.43	**241**	2 384.2	10.187	4.48	**291**	2 899.1	10.403	4.11
192	1 890.5	9.966	4.44	**242**	2 394.4	10.191	4.48	**292**	2 909.5	10.407	4.10
193	1 900.5	9.970	4.45	**243**	2 404.6	10.196	4.47	**293**	2 919.9	10.411	4.09
194	1 910.5	9.974	4.46	**244**	2 414.8	10.200	4.47	**294**	2 930.3	10.415	4.08
195	1 920.4	9.979	4.46	**245**	2 425.0	10.205	4.46	**295**	2 940.7	10.419	4.07
196	1 930.4	9.983	4.47	**246**	2 435.2	10.209	4.46	**296**	2 951.1	10.423	4.06
197	1 940.4	9.988	4.48	**247**	2 445.4	10.214	4.45	**297**	2 961.6	10.427	4.05
198	1 950.4	9.992	4.48	**248**	2 455.7	10.218	4.45	**298**	2 972.0	10.431	4.04
199	1 960.4	9.997	4.49	**249**	2 465.9	10.223	4.44	**299**	2 982.4	10.435	4.03
200	1 970.4	10.001	4.50	**250**	2 476.1	10.227	4.44	**300**	2 992.9	10.439	4.02

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
300	2 992.9	10.439	4.02	**350**	3 519.6	10.627	3.47	**400**	4 055.0	10.784	2.80
301	3 003.3	10.443	4.01	**351**	3 530.3	10.630	3.46	**401**	4 065.8	10.787	2.79
302	3 013.7	10.447	4.00	**352**	3 540.9	10.634	3.44	**402**	4 076.6	10.790	2.77
303	3 024.2	10.451	3.99	**353**	3 551.5	10.637	3.43	**403**	4 087.4	10.793	2.76
304	3 034.6	10.455	3.98	**354**	3 562.2	10.641	3.42	**404**	4 098.2	10.795	2.74
305	3 045.1	10.459	3.97	**355**	3 572.8	10.644	3.41	**405**	4 109.0	10.798	2.73
306	3 055.6	10.463	3.96	**356**	3 583.4	10.648	3.40	**406**	4 119.8	10.801	2.71
307	3 066.0	10.467	3.95	**357**	3 594.1	10.651	3.38	**407**	4 130.6	10.804	2.70
308	3 076.5	10.471	3.94	**358**	3 604.7	10.654	3.37	**408**	4 141.4	10.806	2.68
309	3 087.0	10.475	3.93	**359**	3 615.4	10.658	3.36	**409**	4 152.2	10.809	2.67
310	3 097.4	10.479	3.92	**360**	3 626.1	10.661	3.35	**410**	4 163.0	10.812	2.65
311	3 107.9	10.483	3.91	**361**	3 636.7	10.664	3.33	**411**	4 173.8	10.814	2.64
312	3 118.4	10.487	3.90	**362**	3 647.4	10.668	3.32	**412**	4 184.6	10.817	2.62
313	3 128.9	10.491	3.89	**363**	3 658.1	10.671	3.31	**413**	4 195.5	10.819	2.61
314	3 139.4	10.495	3.88	**364**	3 668.7	10.674	3.30	**414**	4 206.3	10.822	2.59
315	3 149.9	10.498	3.87	**365**	3 679.4	10.678	3.28	**415**	4 217.1	10.825	2.57
316	3 160.4	10.502	3.86	**366**	3 690.1	10.681	3.27	**416**	4 227.9	10.827	2.56
317	3 170.9	10.506	3.85	**367**	3 700.8	10.684	3.26	**417**	4 238.8	10.830	2.54
318	3 181.4	10.510	3.83	**368**	3 711.5	10.687	3.24	**418**	4 249.6	10.832	2.53
319	3 191.9	10.514	3.82	**369**	3 722.1	10.691	3.23	**419**	4 260.4	10.835	2.51
320	3 202.4	10.518	3.81	**370**	3 732.8	10.694	3.22	**420**	4 271.3	10.837	2.50
321	3 212.9	10.521	3.80	**371**	3 743.5	10.697	3.20	**421**	4 282.1	10.840	2.48
322	3 223.5	10.525	3.79	**372**	3 754.2	10.700	3.19	**422**	4 292.9	10.842	2.46
323	3 234.0	10.529	3.78	**373**	3 764.9	10.703	3.18	**423**	4 303.8	10.845	2.45
324	3 244.5	10.533	3.77	**374**	3 775.6	10.707	3.17	**424**	4 314.6	10.847	2.43
325	3 255.1	10.537	3.76	**375**	3 786.3	10.710	3.15	**425**	4 325.5	10.850	2.41
326	3 265.6	10.540	3.75	**376**	3 797.1	10.713	3.14	**426**	4 336.3	10.852	2.40
327	3 276.1	10.544	3.74	**377**	3 807.8	10.716	3.13	**427**	4 347.2	10.854	2.38
328	3 286.7	10.548	3.72	**378**	3 818.5	10.719	3.11	**428**	4 358.0	10.857	2.36
329	3 297.2	10.551	3.71	**379**	3 829.2	10.722	3.10	**429**	4 368.9	10.859	2.35
330	3 307.8	10.555	3.70	**380**	3 839.9	10.725	3.09	**430**	4 379.8	10.861	2.33
331	3 318.3	10.559	3.69	**381**	3 850.7	10.728	3.07	**431**	4 390.6	10.864	2.31
332	3 328.9	10.563	3.68	**382**	3 861.4	10.731	3.06	**432**	4 401.5	10.866	2.30
333	3 339.5	10.566	3.67	**383**	3 872.1	10.735	3.04	**433**	4 412.4	10.868	2.28
334	3 350.0	10.570	3.66	**384**	3 882.9	10.738	3.03	**434**	4 423.2	10.871	2.26
335	3 360.6	10.574	3.65	**385**	3 893.6	10.741	3.02	**435**	4 434.1	10.873	2.25
336	3 371.2	10.577	3.63	**386**	3 904.3	10.744	3.00	**436**	4 445.0	10.875	2.23
337	3 381.8	10.581	3.62	**387**	3 915.1	10.747	2.99	**437**	4 455.8	10.877	2.21
338	3 392.4	10.584	3.61	**388**	3 925.8	10.750	2.98	**438**	4 466.7	10.880	2.19
339	3 402.9	10.588	3.60	**389**	3 936.6	10.753	2.96	**439**	4 477.6	10.882	2.18
340	3 413.5	10.592	3.59	**390**	3 947.3	10.756	2.95	**440**	4 488.5	10.884	2.16
341	3 424.1	10.595	3.58	**391**	3 958.1	10.758	2.93	**441**	4 499.4	10.886	2.14
342	3 434.7	10.599	3.56	**392**	3 968.9	10.761	2.92	**442**	4 510.3	10.888	2.12
343	3 445.3	10.602	3.55	**393**	3 979.6	10.764	2.90	**443**	4 521.2	10.890	2.11
344	3 455.9	10.606	3.54	**394**	3 990.4	10.767	2.89	**444**	4 532.0	10.892	2.09
345	3 466.5	10.609	3.53	**395**	4 001.2	10.770	2.88	**445**	4 542.9	10.894	2.07
346	3 477.1	10.613	3.52	**396**	4 011.9	10.773	2.86	**446**	4 553.8	10.897	2.05
347	3 487.8	10.616	3.50	**397**	4 022.7	10.776	2.85	**447**	4 564.7	10.899	2.03
348	3 498.4	10.620	3.49	**398**	4 033.5	10.779	2.83	**448**	4 575.6	10.901	2.01
349	3 509.0	10.623	3.48	**399**	4 044.3	10.781	2.82	**449**	4 586.5	10.903	2.00
350	3 519.6	10.627	3.47	**400**	4 055.0	10.784	2.80	**450**	4 597.4	10.905	1.98

TABLE 8.5.3. ***Platinum, Pt-67, versus type NN thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
450	4 597.4	10.905	1.98	**500**	5 144.7	10.979	0.95	**550**	5 694.4	10.996	−0.29
451	4 608.3	10.907	1.96	**501**	5 155.7	10.980	0.93	**551**	5 705.3	10.996	−0.32
452	4 619.2	10.908	1.94	**502**	5 166.7	10.980	0.90	**552**	5 716.3	10.995	−0.34
453	4 630.2	10.910	1.92	**503**	5 177.7	10.981	0.88	**553**	5 727.3	10.995	−0.37
454	4 641.1	10.912	1.90	**504**	5 188.7	10.982	0.86	**554**	5 738.3	10.995	−0.40
455	4 652.0	10.914	1.88	**505**	5 199.6	10.983	0.83	**555**	5 749.3	10.994	−0.42
456	4 662.9	10.916	1.87	**506**	5 210.6	10.984	0.81	**556**	5 760.3	10.994	−0.45
457	4 673.8	10.918	1.85	**507**	5 221.6	10.985	0.79	**557**	5 771.3	10.993	−0.48
458	4 684.7	10.920	1.83	**508**	5 232.6	10.986	0.76	**558**	5 782.3	10.993	−0.50
459	4 695.7	10.922	1.81	**509**	5 243.6	10.986	0.74	**559**	5 793.3	10.992	−0.53
460	4 706.6	10.923	1.79	**510**	5 254.6	10.987	0.72	**560**	5 804.3	10.992	−0.56
461	4 717.5	10.925	1.77	**511**	5 265.5	10.988	0.69	**561**	5 815.3	10.991	−0.59
462	4 728.4	10.927	1.75	**512**	5 276.5	10.988	0.67	**562**	5 826.3	10.991	−0.61
463	4 739.4	10.929	1.73	**513**	5 287.5	10.989	0.65	**563**	5 837.3	10.990	−0.64
464	4 750.3	10.930	1.71	**514**	5 298.5	10.990	0.62	**564**	5 848.3	10.989	−0.67
465	4 761.2	10.932	1.69	**515**	5 309.5	10.990	0.60	**565**	5 859.2	10.989	−0.70
466	4 772.1	10.934	1.67	**516**	5 320.5	10.991	0.57	**566**	5 870.2	10.988	−0.72
467	4 783.1	10.935	1.65	**517**	5 331.5	10.991	0.55	**567**	5 881.2	10.987	−0.75
468	4 794.0	10.937	1.63	**518**	5 342.5	10.992	0.53	**568**	5 892.2	10.986	−0.78
469	4 805.0	10.939	1.61	**519**	5 353.5	10.992	0.50	**569**	5 903.2	10.986	−0.81
470	4 815.9	10.940	1.59	**520**	5 364.5	10.993	0.48	**570**	5 914.2	10.985	−0.83
471	4 826.8	10.942	1.57	**521**	5 375.5	10.993	0.45	**571**	5 925.2	10.984	−0.86
472	4 837.8	10.943	1.55	**522**	5 386.4	10.994	0.43	**572**	5 936.1	10.983	−0.89
473	4 848.7	10.945	1.53	**523**	5 397.4	10.994	0.40	**573**	5 947.1	10.982	−0.92
474	4 859.7	10.947	1.51	**524**	5 408.4	10.995	0.38	**574**	5 958.1	10.981	−0.95
475	4 870.6	10.948	1.49	**525**	5 419.4	10.995	0.35	**575**	5 969.1	10.980	−0.97
476	4 881.6	10.950	1.47	**526**	5 430.4	10.995	0.33	**576**	5 980.1	10.979	−1.00
477	4 892.5	10.951	1.45	**527**	5 441.4	10.996	0.30	**577**	5 991.0	10.978	−1.03
478	4 903.5	10.952	1.43	**528**	5 452.4	10.996	0.28	**578**	6 002.0	10.977	−1.06
479	4 914.4	10.954	1.41	**529**	5 463.4	10.996	0.25	**579**	6 013.0	10.976	−1.09
480	4 925.4	10.955	1.39	**530**	5 474.4	10.997	0.23	**580**	6 024.0	10.975	−1.12
481	4 936.3	10.957	1.37	**531**	5 485.4	10.997	0.20	**581**	6 035.0	10.974	−1.14
482	4 947.3	10.958	1.34	**532**	5 496.4	10.997	0.18	**582**	6 045.9	10.973	−1.17
483	4 958.2	10.959	1.32	**533**	5 507.4	10.997	0.15	**583**	6 056.9	10.972	−1.20
484	4 969.2	10.961	1.30	**534**	5 518.4	10.997	0.13	**584**	6 067.9	10.970	−1.23
485	4 980.2	10.962	1.28	**535**	5 529.4	10.997	0.10	**585**	6 078.8	10.969	−1.26
486	4 991.1	10.963	1.26	**536**	5 540.4	10.997	0.08	**586**	6 089.8	10.968	−1.29
487	5 002.1	10.964	1.24	**537**	5 551.4	10.997	0.05	**587**	6 100.8	10.966	−1.32
488	5 013.1	10.966	1.22	**538**	5 562.4	10.998	0.03	**588**	6 111.7	10.965	−1.34
489	5 024.0	10.967	1.19	**539**	5 573.4	10.998	−0.00	**589**	6 122.7	10.964	−1.37
490	5 035.0	10.968	1.17	**540**	5 584.4	10.998	−0.03	**590**	6 133.7	10.962	−1.40
491	5 046.0	10.969	1.15	**541**	5 595.4	10.997	−0.05	**591**	6 144.6	10.961	−1.43
492	5 056.9	10.970	1.13	**542**	5 606.4	10.997	−0.08	**592**	6 155.6	10.960	−1.46
493	5 067.9	10.971	1.11	**543**	5 617.4	10.997	−0.10	**593**	6 166.5	10.958	−1.49
494	5 078.9	10.973	1.08	**544**	5 628.4	10.997	−0.13	**594**	6 177.5	10.957	−1.52
495	5 089.8	10.974	1.06	**545**	5 639.4	10.997	−0.16	**595**	6 188.5	10.955	−1.55
496	5 100.8	10.975	1.04	**546**	5 650.4	10.997	−0.18	**596**	6 199.4	10.953	−1.58
497	5 111.8	10.976	1.02	**547**	5 661.4	10.997	−0.21	**597**	6 210.4	10.952	−1.60
498	5 122.8	10.977	0.99	**548**	5 672.4	10.996	−0.24	**598**	6 221.3	10.950	−1.63
499	5 133.8	10.978	0.97	**549**	5 683.4	10.996	−0.26	**599**	6 232.3	10.949	−1.66
500	5 144.7	10.979	0.95	**550**	5 694.4	10.996	−0.29	**600**	6 243.2	10.947	−1.69

TABLE 8.5.3. ***Platinum, Pt-67, versus type NN thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
600	6 243.2	10.947	−1.69	**650**	6 787.8	10.825	−3.17	**700**	7 324.5	10.630	−4.62
601	6 254.2	10.945	−1.72	**651**	6 798.7	10.822	−3.20	**701**	7 335.2	10.626	−4.65
602	6 265.1	10.944	−1.75	**652**	6 809.5	10.819	−3.23	**702**	7 345.8	10.621	−4.68
603	6 276.0	10.942	−1.78	**653**	6 820.3	10.816	−3.26	**703**	7 356.4	10.616	−4.70
604	6 287.0	10.940	−1.81	**654**	6 831.1	10.813	−3.29	**704**	7 367.0	10.612	−4.73
605	6 297.9	10.938	−1.84	**655**	6 841.9	10.809	−3.32	**705**	7 377.6	10.607	−4.76
606	6 308.9	10.936	−1.87	**656**	6 852.7	10.806	−3.35	**706**	7 388.2	10.602	−4.79
607	6 319.8	10.934	−1.90	**657**	6 863.5	10.803	−3.38	**707**	7 398.8	10.597	−4.81
608	6 330.7	10.932	−1.93	**658**	6 874.3	10.799	−3.41	**708**	7 409.4	10.592	−4.84
609	6 341.7	10.931	−1.96	**659**	6 885.1	10.796	−3.44	**709**	7 420.0	10.588	−4.87
610	6 352.6	10.929	−1.98	**660**	6 895.9	10.792	−3.47	**710**	7 430.6	10.583	−4.90
611	6 363.5	10.927	−2.01	**661**	6 906.7	10.789	−3.50	**711**	7 441.2	10.578	−4.92
612	6 374.4	10.925	−2.04	**662**	6 917.5	10.785	−3.53	**712**	7 451.8	10.573	−4.95
613	6 385.4	10.922	−2.07	**663**	6 928.3	10.782	−3.56	**713**	7 462.3	10.568	−4.98
614	6 396.3	10.920	−2.10	**664**	6 939.1	10.778	−3.59	**714**	7 472.9	10.563	−5.00
615	6 407.2	10.918	−2.13	**665**	6 949.8	10.775	−3.61	**715**	7 483.5	10.558	−5.03
616	6 418.1	10.916	−2.16	**666**	6 960.6	10.771	−3.64	**716**	7 494.0	10.553	−5.06
617	6 429.0	10.914	−2.19	**667**	6 971.4	10.767	−3.67	**717**	7 504.6	10.548	−5.08
618	6 440.0	10.912	−2.22	**668**	6 982.2	10.764	−3.70	**718**	7 515.1	10.543	−5.11
619	6 450.9	10.910	−2.25	**669**	6 992.9	10.760	−3.73	**719**	7 525.6	10.538	−5.14
620	6 461.8	10.907	−2.28	**670**	7 003.7	10.756	−3.76	**720**	7 536.2	10.532	−5.16
621	6 472.7	10.905	−2.31	**671**	7 014.4	10.752	−3.79	**721**	7 546.7	10.527	−5.19
622	6 483.6	10.903	−2.34	**672**	7 025.2	10.749	−3.82	**722**	7 557.2	10.522	−5.22
623	6 494.5	10.900	−2.37	**673**	7 035.9	10.745	−3.85	**723**	7 567.8	10.517	−5.24
624	6 505.4	10.898	−2.40	**674**	7 046.7	10.741	−3.88	**724**	7 578.3	10.512	−5.27
625	6 516.3	10.895	−2.43	**675**	7 057.4	10.737	−3.91	**725**	7 588.8	10.506	−5.30
626	6 527.2	10.893	−2.46	**676**	7 068.1	10.733	−3.94	**726**	7 599.3	10.501	−5.32
627	6 538.1	10.891	−2.49	**677**	7 078.9	10.729	−3.96	**727**	7 609.8	10.496	−5.35
628	6 549.0	10.888	−2.52	**678**	7 089.6	10.725	−3.99	**728**	7 620.3	10.490	−5.38
629	6 559.8	10.886	−2.55	**679**	7 100.3	10.721	−4.02	**729**	7 630.8	10.485	−5.40
630	6 570.7	10.883	−2.58	**680**	7 111.0	10.717	−4.05	**730**	7 641.2	10.479	−5.43
631	6 581.6	10.880	−2.61	**681**	7 121.8	10.713	−4.08	**731**	7 651.7	10.474	−5.45
632	6 592.5	10.878	−2.64	**682**	7 132.5	10.709	−4.11	**732**	7 662.2	10.469	−5.48
633	6 603.4	10.875	−2.67	**683**	7 143.2	10.705	−4.14	**733**	7 672.7	10.463	−5.50
634	6 614.2	10.872	−2.70	**684**	7 153.9	10.701	−4.17	**734**	7 683.1	10.458	−5.53
635	6 625.1	10.870	−2.73	**685**	7 164.6	10.696	−4.20	**735**	7 693.6	10.452	−5.55
636	6 636.0	10.867	−2.76	**686**	7 175.3	10.692	−4.22	**736**	7 704.0	10.446	−5.58
637	6 646.8	10.864	−2.79	**687**	7 186.0	10.688	−4.25	**737**	7 714.5	10.441	−5.61
638	6 657.7	10.861	−2.81	**688**	7 196.6	10.684	−4.28	**738**	7 724.9	10.435	−5.63
639	6 668.6	10.859	−2.84	**689**	7 207.3	10.679	−4.31	**739**	7 735.3	10.430	−5.66
640	6 679.4	10.856	−2.87	**690**	7 218.0	10.675	−4.34	**740**	7 745.8	10.424	−5.68
641	6 690.3	10.853	−2.90	**691**	7 228.7	10.671	−4.37	**741**	7 756.2	10.418	−5.71
642	6 701.1	10.850	−2.93	**692**	7 239.3	10.666	−4.39	**742**	7 766.6	10.413	−5.73
643	6 712.0	10.847	−2.96	**693**	7 250.0	10.662	−4.42	**743**	7 777.0	10.407	−5.76
644	6 722.8	10.844	−2.99	**694**	7 260.7	10.658	−4.45	**744**	7 787.4	10.401	−5.78
645	6 733.7	10.841	−3.02	**695**	7 271.3	10.653	−4.48	**745**	7 797.8	10.395	−5.80
646	6 744.5	10.838	−3.05	**696**	7 282.0	10.649	−4.51	**746**	7 808.2	10.389	−5.83
647	6 755.3	10.835	−3.08	**697**	7 292.6	10.644	−4.54	**747**	7 818.6	10.384	−5.85
648	6 766.2	10.832	−3.11	**698**	7 303.3	10.640	−4.56	**748**	7 829.0	10.378	−5.88
649	6 777.0	10.829	−3.14	**699**	7 313.9	10.635	−4.59	**749**	7 839.3	10.372	−5.90
650	6 787.8	10.825	−3.17	**700**	7 324.5	10.630	−4.62	**750**	7 849.7	10.366	−5.93

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
750	7 849.7	10.366	−5.93	**800**	8 360.1	10.041	−7.01	**850**	8 853.1	9.670	−7.82
751	7 860.1	10.360	−5.95	**801**	8 370.2	10.034	−7.03	**851**	8 862.7	9.662	−7.83
752	7 870.4	10.354	−5.97	**802**	8 380.2	10.027	−7.04	**852**	8 872.4	9.654	−7.84
753	7 880.8	10.348	−6.00	**803**	8 390.2	10.020	−7.06	**853**	8 882.0	9.646	−7.86
754	7 891.1	10.342	−6.02	**804**	8 400.2	10.013	−7.08	**854**	8 891.7	9.638	−7.87
755	7 901.5	10.336	−6.05	**805**	8 410.2	10.006	−7.10	**855**	8 901.3	9.631	−7.88
756	7 911.8	10.330	−6.07	**806**	8 420.2	9.999	−7.12	**856**	8 910.9	9.623	−7.90
757	7 922.1	10.324	−6.09	**807**	8 430.2	9.992	−7.14	**857**	8 920.6	9.615	−7.91
758	7 932.4	10.318	−6.12	**808**	8 440.2	9.985	−7.16	**858**	8 930.2	9.607	−7.92
759	7 942.8	10.312	−6.14	**809**	8 450.2	9.978	−7.17	**859**	8 939.8	9.599	−7.93
760	7 953.1	10.305	−6.16	**810**	8 460.2	9.970	−7.19	**860**	8 949.4	9.591	−7.95
761	7 963.4	10.299	−6.19	**811**	8 470.2	9.963	−7.21	**861**	8 959.0	9.583	−7.96
762	7 973.7	10.293	−6.21	**812**	8 480.1	9.956	−7.23	**862**	8 968.5	9.575	−7.97
763	7 984.0	10.287	−6.23	**813**	8 490.1	9.949	−7.24	**863**	8 978.1	9.567	−7.98
764	7 994.2	10.281	−6.25	**814**	8 500.0	9.942	−7.26	**864**	8 987.7	9.559	−7.99
765	8 004.5	10.274	−6.28	**815**	8 509.9	9.934	−7.28	**865**	8 997.2	9.551	−8.01
766	8 014.8	10.268	−6.30	**816**	8 519.9	9.927	−7.30	**866**	9 006.8	9.543	−8.02
767	8 025.1	10.262	−6.32	**817**	8 529.8	9.920	−7.31	**867**	9 016.3	9.535	−8.03
768	8 035.3	10.255	−6.34	**818**	8 539.7	9.912	−7.33	**868**	9 025.8	9.527	−8.04
769	8 045.6	10.249	−6.37	**819**	8 549.6	9.905	−7.35	**869**	9 035.4	9.519	−8.05
770	8 055.8	10.243	−6.39	**820**	8 559.5	9.898	−7.36	**870**	9 044.9	9.511	−8.06
771	8 066.1	10.236	−6.41	**821**	8 569.4	9.890	−7.38	**871**	9 054.4	9.503	−8.08
772	8 076.3	10.230	−6.43	**822**	8 579.3	9.883	−7.40	**872**	9 063.9	9.495	−8.09
773	8 086.5	10.223	−6.46	**823**	8 589.2	9.876	−7.41	**873**	9 073.4	9.487	−8.10
774	8 096.7	10.217	−6.48	**824**	8 599.1	9.868	−7.43	**874**	9 082.9	9.479	−8.11
775	8 106.9	10.210	−6.50	**825**	8 608.9	9.861	−7.45	**875**	9 092.3	9.470	−8.12
776	8 117.2	10.204	−6.52	**826**	8 618.8	9.853	−7.46	**876**	9 101.8	9.462	−8.13
777	8 127.4	10.197	−6.54	**827**	8 628.6	9.846	−7.48	**877**	9 111.3	9.454	−8.14
778	8 137.5	10.191	−6.56	**828**	8 638.5	9.838	−7.49	**878**	9 120.7	9.446	−8.15
779	8 147.7	10.184	−6.58	**829**	8 648.3	9.831	−7.51	**879**	9 130.2	9.438	−8.16
780	8 157.9	10.178	−6.61	**830**	8 658.1	9.823	−7.53	**880**	9 139.6	9.430	−8.17
781	8 168.1	10.171	−6.63	**831**	8 668.0	9.816	−7.54	**881**	9 149.0	9.422	−8.18
782	8 178.3	10.164	−6.65	**832**	8 677.8	9.808	−7.56	**882**	9 158.4	9.413	−8.19
783	8 188.4	10.158	−6.67	**833**	8 687.6	9.801	−7.57	**883**	9 167.8	9.405	−8.20
784	8 198.6	10.151	−6.69	**834**	8 697.4	9.793	−7.59	**884**	9 177.2	9.397	−8.21
785	8 208.7	10.144	−6.71	**835**	8 707.2	9.785	−7.60	**885**	9 186.6	9.389	−8.22
786	8 218.9	10.138	−6.73	**836**	8 716.9	9.778	−7.62	**886**	9 196.0	9.380	−8.23
787	8 229.0	10.131	−6.75	**837**	8 726.7	9.770	−7.63	**887**	9 205.4	9.372	−8.24
788	8 239.1	10.124	−6.77	**838**	8 736.5	9.763	−7.65	**888**	9 214.8	9.364	−8.25
789	8 249.2	10.117	−6.79	**839**	8 746.2	9.755	−7.66	**889**	9 224.1	9.356	−8.26
790	8 259.4	10.111	−6.81	**840**	8 756.0	9.747	−7.68	**890**	9 233.5	9.347	−8.27
791	8 269.5	10.104	−6.83	**841**	8 765.7	9.740	−7.69	**891**	9 242.8	9.339	−8.28
792	8 279.6	10.097	−6.85	**842**	8 775.5	9.732	−7.71	**892**	9 252.2	9.331	−8.29
793	8 289.7	10.090	−6.87	**843**	8 785.2	9.724	−7.72	**893**	9 261.5	9.323	−8.30
794	8 299.7	10.083	−6.89	**844**	8 794.9	9.716	−7.73	**894**	9 270.8	9.314	−8.31
795	8 309.8	10.076	−6.91	**845**	8 804.6	9.709	−7.75	**895**	9 280.1	9.306	−8.32
796	8 319.9	10.069	−6.93	**846**	8 814.3	9.701	−7.76	**896**	9 289.4	9.298	−8.33
797	8 330.0	10.062	−6.95	**847**	8 824.0	9.693	−7.78	**897**	9 298.7	9.289	−8.34
798	8 340.0	10.055	−6.97	**848**	8 833.7	9.685	−7.79	**898**	9 308.0	9.281	−8.34
799	8 350.1	10.048	−6.99	**849**	8 843.4	9.678	−7.80	**899**	9 317.3	9.273	−8.35
800	8 360.1	10.041	−7.01	**850**	8 853.1	9.670	−7.82	**900**	9 326.5	9.264	−8.36

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	9 326.5	9.264	−8.36	950	9 779.1	8.837	−8.70	1000	10 210.0	8.396	−8.94
901	9 335.8	9.256	−8.37	951	9 788.0	8.828	−8.71	1001	10 218.4	8.387	−8.94
902	9 345.0	9.248	−8.38	952	9 796.8	8.820	−8.71	1002	10 226.8	8.378	−8.95
903	9 354.3	9.239	−8.39	953	9 805.6	8.811	−8.72	1003	10 235.2	8.369	−8.95
904	9 363.5	9.231	−8.40	954	9 814.4	8.802	−8.72	1004	10 243.5	8.360	−8.96
905	9 372.8	9.222	−8.40	955	9 823.2	8.793	−8.73	1005	10 251.9	8.351	−8.96
906	9 382.0	9.214	−8.41	956	9 832.0	8.785	−8.74	1006	10 260.2	8.342	−8.97
907	9 391.2	9.206	−8.42	957	9 840.8	8.776	−8.74	1007	10 268.6	8.333	−8.97
908	9 400.4	9.197	−8.43	958	9 849.6	8.767	−8.75	1008	10 276.9	8.324	−8.98
909	9 409.6	9.189	−8.44	959	9 858.3	8.758	−8.75	1009	10 285.2	8.315	−8.98
910	9 418.8	9.180	−8.44	960	9 867.1	8.750	−8.76	1010	10 293.5	8.306	−8.98
911	9 427.9	9.172	−8.45	961	9 875.8	8.741	−8.76	1011	10 301.8	8.297	−8.99
912	9 437.1	9.163	−8.46	962	9 884.6	8.732	−8.77	1012	10 310.1	8.288	−8.99
913	9 446.3	9.155	−8.47	963	9 893.3	8.723	−8.77	1013	10 318.4	8.279	−9.00
914	9 455.4	9.146	−8.47	964	9 902.0	8.715	−8.78	1014	10 326.7	8.270	−9.00
915	9 464.6	9.138	−8.48	965	9 910.7	8.706	−8.78	1015	10 334.9	8.261	−9.01
916	9 473.7	9.129	−8.49	966	9 919.4	8.697	−8.78	1016	10 343.2	8.252	−9.01
917	9 482.8	9.121	−8.50	967	9 928.1	8.688	−8.79	1017	10 351.4	8.243	−9.02
918	9 491.9	9.112	−8.50	968	9 936.8	8.679	−8.79	1018	10 359.7	8.234	−9.02
919	9 501.0	9.104	−8.51	969	9 945.5	8.671	−8.80	1019	10 367.9	8.225	−9.03
920	9 510.1	9.095	−8.52	970	9 954.1	8.662	−8.80	1020	10 376.1	8.216	−9.03
921	9 519.2	9.087	−8.53	971	9 962.8	8.653	−8.81	1021	10 384.3	8.207	−9.04
922	9 528.3	9.078	−8.53	972	9 971.4	8.644	−8.81	1022	10 392.5	8.198	−9.04
923	9 537.4	9.070	−8.54	973	9 980.1	8.635	−8.82	1023	10 400.7	8.189	−9.05
924	9 546.5	9.061	−8.55	974	9 988.7	8.627	−8.82	1024	10 408.9	8.180	−9.05
925	9 555.5	9.053	−8.55	975	9 997.3	8.618	−8.83	1025	10 417.1	8.171	−9.06
926	9 564.6	9.044	−8.56	976	10 005.9	8.609	−8.83	1026	10 425.3	8.162	−9.06
927	9 573.6	9.036	−8.57	977	10 014.5	8.600	−8.84	1027	10 433.4	8.153	−9.06
928	9 582.6	9.027	−8.57	978	10 023.1	8.591	−8.84	1028	10 441.6	8.144	−9.07
929	9 591.7	9.018	−8.58	979	10 031.7	8.582	−8.85	1029	10 449.7	8.135	−9.07
930	9 600.7	9.010	−8.59	980	10 040.3	8.574	−8.85	1030	10 457.8	8.125	−9.08
931	9 609.7	9.001	−8.59	981	10 048.9	8.565	−8.85	1031	10 466.0	8.116	−9.08
932	9 618.7	8.993	−8.60	982	10 057.4	8.556	−8.86	1032	10 474.1	8.107	−9.09
933	9 627.7	8.984	−8.60	983	10 066.0	8.547	−8.86	1033	10 482.2	8.098	−9.10
934	9 636.6	8.975	−8.61	984	10 074.5	8.538	−8.87	1034	10 490.3	8.089	−9.10
935	9 645.6	8.967	−8.62	985	10 083.1	8.529	−8.87	1035	10 498.3	8.080	−9.11
936	9 654.6	8.958	−8.62	986	10 091.6	8.520	−8.88	1036	10 506.4	8.071	−9.11
937	9 663.5	8.950	−8.63	987	10 100.1	8.512	−8.88	1037	10 514.5	8.062	−9.12
938	9 672.5	8.941	−8.64	988	10 108.6	8.503	−8.89	1038	10 522.5	8.053	−9.12
939	9 681.4	8.932	−8.64	989	10 117.1	8.494	−8.89	1039	10 530.6	8.044	−9.13
940	9 690.3	8.924	−8.65	990	10 125.6	8.485	−8.89	1040	10 538.6	8.034	−9.13
941	9 699.3	8.915	−8.65	991	10 134.1	8.476	−8.90	1041	10 546.7	8.025	−9.14
942	9 708.2	8.906	−8.66	992	10 142.6	8.467	−8.90	1042	10 554.7	8.016	−9.14
943	9 717.1	8.898	−8.66	993	10 151.0	8.458	−8.91	1043	10 562.7	8.007	−9.15
944	9 726.0	8.889	−8.67	994	10 159.5	8.449	−8.91	1044	10 570.7	7.998	−9.15
945	9 734.8	8.880	−8.68	995	10 167.9	8.440	−8.92	1045	10 578.7	7.989	−9.16
946	9 743.7	8.872	−8.68	996	10 176.3	8.431	−8.92	1046	10 586.7	7.980	−9.17
947	9 752.6	8.863	−8.69	997	10 184.8	8.422	−8.93	1047	10 594.6	7.970	−9.17
948	9 761.4	8.854	−8.69	998	10 193.2	8.414	−8.93	1048	10 602.6	7.961	−9.18
949	9 770.3	8.846	−8.70	999	10 201.6	8.405	−8.93	1049	10 610.6	7.952	−9.18
950	9 779.1	8.837	−8.70	1000	10 210.0	8.396	−8.94	1050	10 618.5	7.943	−9.19

TABLE 8.5.3. ***Platinum, Pt-67, versus type NN thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1050	10 618.5	7.943	−9.19	**1100**	11 004.0	7.475	−9.56	**1150**	11 365.6	6.984	−10.10
1051	10 626.5	7.934	−9.19	**1101**	11 011.5	7.465	−9.57	**1151**	11 372.6	6.974	−10.11
1052	10 634.4	7.924	−9.20	**1102**	11 019.0	7.456	−9.58	**1152**	11 379.6	6.964	−10.13
1053	10 642.3	7.915	−9.21	**1103**	11 026.4	7.446	−9.59	**1153**	11 386.5	6.954	−10.14
1054	10 650.2	7.906	−9.21	**1104**	11 033.9	7.436	−9.59	**1154**	11 393.5	6.944	−10.15
1055	10 658.1	7.897	−9.22	**1105**	11 041.3	7.427	−9.60	**1155**	11 400.4	6.933	−10.16
1056	10 666.0	7.888	−9.22	**1106**	11 048.7	7.417	−9.61	**1156**	11 407.3	6.923	−10.18
1057	10 673.9	7.878	−9.23	**1107**	11 056.1	7.408	−9.62	**1157**	11 414.3	6.913	−10.19
1058	10 681.8	7.869	−9.24	**1108**	11 063.5	7.398	−9.63	**1158**	11 421.2	6.903	−10.20
1059	10 689.6	7.860	−9.24	**1109**	11 070.9	7.388	−9.64	**1159**	11 428.1	6.893	−10.22
1060	10 697.5	7.851	−9.25	**1110**	11 078.3	7.379	−9.65	**1160**	11 435.0	6.882	−10.23
1061	10 705.3	7.841	−9.26	**1111**	11 085.7	7.369	−9.66	**1161**	11 441.8	6.872	−10.24
1062	10 713.2	7.832	−9.26	**1112**	11 093.0	7.359	−9.67	**1162**	11 448.7	6.862	−10.26
1063	10 721.0	7.823	−9.27	**1113**	11 100.4	7.350	−9.68	**1163**	11 455.6	6.852	−10.27
1064	10 728.8	7.814	−9.28	**1114**	11 107.7	7.340	−9.69	**1164**	11 462.4	6.841	−10.28
1065	10 736.6	7.804	−9.28	**1115**	11 115.1	7.330	−9.70	**1165**	11 469.2	6.831	−10.30
1066	10 744.4	7.795	−9.29	**1116**	11 122.4	7.321	−9.71	**1166**	11 476.1	6.821	−10.31
1067	10 752.2	7.786	−9.30	**1117**	11 129.7	7.311	−9.72	**1167**	11 482.9	6.810	−10.32
1068	10 760.0	7.776	−9.30	**1118**	11 137.0	7.301	−9.73	**1168**	11 489.7	6.800	−10.34
1069	10 767.8	7.767	−9.31	**1119**	11 144.3	7.291	−9.74	**1169**	11 496.5	6.790	−10.35
1070	10 775.5	7.758	−9.32	**1120**	11 151.6	7.282	−9.75	**1170**	11 503.3	6.779	−10.36
1071	10 783.3	7.748	−9.32	**1121**	11 158.9	7.272	−9.76	**1171**	11 510.0	6.769	−10.38
1072	10 791.0	7.739	−9.33	**1122**	11 166.1	7.262	−9.77	**1172**	11 516.8	6.759	−10.39
1073	10 798.8	7.730	−9.34	**1123**	11 173.4	7.252	−9.79	**1173**	11 523.6	6.748	−10.40
1074	10 806.5	7.720	−9.35	**1124**	11 180.7	7.243	−9.80	**1174**	11 530.3	6.738	−10.42
1075	10 814.2	7.711	−9.35	**1125**	11 187.9	7.233	−9.81	**1175**	11 537.0	6.727	−10.43
1076	10 821.9	7.702	−9.36	**1126**	11 195.1	7.223	−9.82	**1176**	11 543.8	6.717	−10.44
1077	10 829.6	7.692	−9.37	**1127**	11 202.3	7.213	−9.83	**1177**	11 550.5	6.707	−10.46
1078	10 837.3	7.683	−9.38	**1128**	11 209.5	7.203	−9.84	**1178**	11 557.2	6.696	−10.47
1079	10 845.0	7.674	−9.38	**1129**	11 216.7	7.194	−9.85	**1179**	11 563.9	6.686	−10.49
1080	10 852.6	7.664	−9.39	**1130**	11 223.9	7.184	−9.86	**1180**	11 570.5	6.675	−10.50
1081	10 860.3	7.655	−9.40	**1131**	11 231.1	7.174	−9.87	**1181**	11 577.2	6.665	−10.51
1082	10 867.9	7.645	−9.41	**1132**	11 238.3	7.164	−9.89	**1182**	11 583.9	6.654	−10.53
1083	10 875.6	7.636	−9.41	**1133**	11 245.4	7.154	−9.90	**1183**	11 590.5	6.644	−10.54
1084	10 883.2	7.627	−9.42	**1134**	11 252.6	7.144	−9.91	**1184**	11 597.2	6.633	−10.55
1085	10 890.8	7.617	−9.43	**1135**	11 259.7	7.134	−9.92	**1185**	11 603.8	6.622	−10.57
1086	10 898.5	7.608	−9.44	**1136**	11 266.9	7.124	−9.93	**1186**	11 610.4	6.612	−10.58
1087	10 906.1	7.598	−9.45	**1137**	11 274.0	7.114	−9.94	**1187**	11 617.0	6.601	−10.60
1088	10 913.7	7.589	−9.45	**1138**	11 281.1	7.104	−9.95	**1188**	11 623.6	6.591	−10.61
1089	10 921.2	7.579	−9.46	**1139**	11 288.2	7.094	−9.97	**1189**	11 630.2	6.580	−10.62
1090	10 928.8	7.570	−9.47	**1140**	11 295.3	7.084	−9.98	**1190**	11 636.8	6.569	−10.64
1091	10 936.4	7.560	−9.48	**1141**	11 302.4	7.074	−9.99	**1191**	11 643.3	6.559	−10.65
1092	10 943.9	7.551	−9.49	**1142**	11 309.4	7.064	−10.00	**1192**	11 649.9	6.548	−10.67
1093	10 951.5	7.541	−9.50	**1143**	11 316.5	7.054	−10.01	**1193**	11 656.4	6.537	−10.68
1094	10 959.0	7.532	−9.50	**1144**	11 323.5	7.044	−10.03	**1194**	11 663.0	6.527	−10.69
1095	10 966.5	7.522	−9.51	**1145**	11 330.6	7.034	−10.04	**1195**	11 669.5	6.516	−10.71
1096	10 974.1	7.513	−9.52	**1146**	11 337.6	7.024	−10.05	**1196**	11 676.0	6.505	−10.72
1097	10 981.6	7.503	−9.53	**1147**	11 344.6	7.014	−10.06	**1197**	11 682.5	6.495	−10.74
1098	10 989.1	7.494	−9.54	**1148**	11 351.6	7.004	−10.08	**1198**	11 689.0	6.484	−10.75
1099	10 996.6	7.484	−9.55	**1149**	11 358.6	6.994	−10.09	**1199**	11 695.5	6.473	−10.77
1100	11 004.0	7.475	−9.56	**1150**	11 365.6	6.984	−10.10	**1200**	11 701.9	6.462	−10.78

TABLE 8.5.3. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
1200	11 701.9	6.462	−10.78	**1235**	11 921.4	6.077	−11.25	**1270**	12 127.1	5.677	−11.59
1201	11 708.4	6.452	−10.79	**1236**	11 927.5	6.066	−11.26	**1271**	12 132.8	5.665	−11.59
1202	11 714.8	6.441	−10.81	**1237**	11 933.5	6.054	−11.27	**1272**	12 138.5	5.653	−11.60
1203	11 721.3	6.430	−10.82	**1238**	11 939.6	6.043	−11.28	**1273**	12 144.1	5.642	−11.61
1204	11 727.7	6.419	−10.83	**1239**	11 945.6	6.032	−11.29	**1274**	12 149.7	5.630	−11.61
1205	11 734.1	6.408	−10.85	**1240**	11 951.6	6.020	−11.31	**1275**	12 155.4	5.619	−11.62
1206	11 740.5	6.397	−10.86	**1241**	11 957.7	6.009	−11.32	**1276**	12 161.0	5.607	−11.62
1207	11 746.9	6.387	−10.88	**1242**	11 963.7	5.998	−11.33	**1277**	12 166.6	5.595	−11.63
1208	11 753.3	6.376	−10.89	**1243**	11 969.7	5.986	−11.34	**1278**	12 172.2	5.584	−11.63
1209	11 759.6	6.365	−10.90	**1244**	11 975.6	5.975	−11.35	**1279**	12 177.7	5.572	−11.64
1210	11 766.0	6.354	−10.92	**1245**	11 981.6	5.964	−11.36	**1280**	12 183.3	5.560	−11.64
1211	11 772.4	6.343	−10.93	**1246**	11 987.6	5.952	−11.37	**1281**	12 188.9	5.549	−11.64
1212	11 778.7	6.332	−10.95	**1247**	11 993.5	5.941	−11.38	**1282**	12 194.4	5.537	−11.65
1213	11 785.0	6.321	−10.96	**1248**	11 999.4	5.930	−11.39	**1283**	12 199.9	5.526	−11.65
1214	11 791.3	6.310	−10.97	**1249**	12 005.4	5.918	−11.41	**1284**	12 205.5	5.514	−11.65
1215	11 797.6	6.299	−10.99	**1250**	12 011.3	5.907	−11.42	**1285**	12 211.0	5.502	−11.66
1216	11 803.9	6.288	−11.00	**1251**	12 017.2	5.895	−11.43	**1286**	12 216.5	5.491	−11.66
1217	11 810.2	6.277	−11.01	**1252**	12 023.1	5.884	−11.44	**1287**	12 221.9	5.479	−11.66
1218	11 816.5	6.266	−11.03	**1253**	12 029.0	5.872	−11.45	**1288**	12 227.4	5.467	−11.66
1219	11 822.7	6.255	−11.04	**1254**	12 034.8	5.861	−11.46	**1289**	12 232.9	5.456	−11.66
1220	11 829.0	6.244	−11.05	**1255**	12 040.7	5.850	−11.47	**1290**	12 238.3	5.444	−11.67
1221	11 835.2	6.233	−11.07	**1256**	12 046.5	5.838	−11.47	**1291**	12 243.8	5.432	−11.67
1222	11 841.5	6.222	−11.08	**1257**	12 052.4	5.827	−11.48	**1292**	12 249.2	5.421	−11.67
1223	11 847.7	6.211	−11.09	**1258**	12 058.2	5.815	−11.49	**1293**	12 254.6	5.409	−11.67
1224	11 853.9	6.200	−11.11	**1259**	12 064.0	5.804	−11.50	**1294**	12 260.0	5.397	−11.67
1225	11 860.1	6.189	−11.12	**1260**	12 069.8	5.792	−11.51	**1295**	12 265.4	5.386	−11.67
1226	11 866.3	6.177	−11.13	**1261**	12 075.6	5.781	−11.52	**1296**	12 270.8	5.374	−11.67
1227	11 872.4	6.166	−11.15	**1262**	12 081.3	5.769	−11.53	**1297**	12 276.2	5.362	−11.67
1228	11 878.6	6.155	−11.16	**1263**	12 087.1	5.758	−11.54	**1298**	12 281.5	5.351	−11.66
1229	11 884.7	6.144	−11.17	**1264**	12 092.9	5.746	−11.54	**1299**	12 286.9	5.339	−11.66
1230	11 890.9	6.133	−11.18	**1265**	12 098.6	5.734	−11.55	**1300**	12 292.2	5.327	−11.66
1231	11 897.0	6.122	−11.20	**1266**	12 104.3	5.723	−11.56				
1232	11 903.1	6.110	−11.21	**1267**	12 110.0	5.711	−11.57				
1233	11 909.2	6.099	−11.22	**1268**	12 115.7	5.700	−11.57				
1234	11 915.3	6.088	−11.23	**1269**	12 121.4	5.688	−11.58				
1235	11 921.4	6.077	−11.25	**1270**	12 127.1	5.677	−11.59				

8.6. References

[1] Burley, N. A. Nicrosil and nisil: highly stable nickel-base alloys for thermocouples. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4, Plumb, H. H., ed.; Pittsburgh: Instrument Society of America; 1972. 1677-1695.

[2] Burley, N. A.; Powell, R. L.; Burns, G. W. Nicrosil and nisil; their development and standardization. *Temperature Measurement, 1975*; Billing, B. F.; Quinn, T. J., ed.; London and Bristol: Institute of Physics; 1975. 162-171.

[3] Starr, C. D.; Wang, T. P. A new stable nickel-base thermocouple. *Journal of Testing and Evaluation* **4**(1), 42-56; 1976.

[4] Burley, N. A.; Powell, R. L.; Burns, G. W.; Scroger, M. G. The nicrosil versus nisil thermocouple: properties and thermoelectric reference data. *Natl. Bur. Stand. (U.S.) Mongr. 161*; 1978 April. 167 p.

[5] Fenton, F. W. Errors in thermoelectric thermometers. *Proc. Inst. Elect. Eng. Part 2* **116**, 1277-1289; 1969.

[6] Fenton, F. W. The travelling gradient approach to thermocouple research. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 4, Plumb, H. H., ed.; Pittsburgh: Instrument Society of America; 1972. 1973-1990.

[7] Kollie, T. G.; Horton, J. L.; Carr, K. R.; Herskovitz, M. B.; Mossman, C. A. Temperature measurement errors with type K (Chromel vs Alumel) thermocouples due to short-ranged ordering in Chromel. *Rev. Sci. Instrum.* **46**, 1447-1461; 1975.

[8] Bentley, R. E. Short-term instabilities in thermocouples containing nickel-based alloys. *High Temperatures-High Pressures* **15**, 599-611; 1983.

[9] Plumb, H. H.; Cataland, G. Acoustical thermometer and the National Bureau of Standards Provisional Temperature Scale 2-20 (1965). *Metrologia* **2**, 127-139; 1966.

[10] ASTM, American Society for Testing and Materials, Standard E230-87, *1992 Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[11] ASTM, American Society for Testing and Materials. Manual on the use of thermocouples in temperature measurement. *Special Tech. Publ. 470B*; edited by Benedict, R. P.; Philadelphia: ASTM; 1981. 258 p.

[12] Burley, N. A.; Jones, T. P. Practical performance of nicrosil-nisil thermocouples. *Temperature Measurement, 1975*; Billing, B. F.; Quinn, T. J., ed.; London and Bristol: Institute of Physics; 1975. 172-180.

[13] Burley, N. A.; Hess, R. M.; Howie, C. F. Nicrosil and nisil: new nickel-based thermocouple alloys of ultra-high thermoelectric stability. *High Temperatures-High Pressures* **12**, 403-410; 1980.

[14] Burley, N. A.; Cocking, J. L.; Burns. G. W.; Scroger, M. G. The nicrosil versus nisil thermocouple: the influence of magnesium on the thermoelectric stability and oxidation resistance of the alloys. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5, Schooley, J. F., ed.; New York: American Institute of Physics; 1982. 1129-1145.

[15] Burley, N. A.; Hess, R. M.; Howie, C. F.; Coleman, J. A. The nicrosil versus nisil thermocouple: a critical comparison with the ANSI standard letter-designated base-metal thermocouples. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5, Schooley, J. F., ed.; New York: American Institute of Physics; 1982. 1159-1166.

[16] Wang, T. P.; Starr C. D. Nicrosil-nisil thermocouples in production furnaces in the 538 °C (1000 °F) to 1177 °C (2150 °F) range. *ISA Transactions* **18**(4), 83-99; 1979.

[17] Wang, T. P.; Starr, C. D. Electromotive force stability of nicrosil-nisil. *Journal of Testing and Evaluation* **8**(4), 192-198; 1980.

[18] Wang, T. P.; Starr, C. D. Oxidation resistance and stability of nicrosil-nisil in air and in reducing atmospheres. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5, Schooley, J. F., ed.; New York: American Institute of Physics; 1982. 1147-1157.

[19] McLaren, E. H.; Murdock, E. G. Properties of some noble and base metal thermocouples at fixed points in the range 0-1100 °C. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5, Schooley, J. F., ed.; New York: American Institute of Physics; 1982. 953-975.

[20] Hess, T. G. Nicrosil-nisil: high-performance thermocouple alloys. *ISA Transactions* **16**(3), 81-84; 1977.

[21] Anderson, R. L.; Lyons, J. D.; Kollie, T. G.; Christie, W. H.; Eby, R. Decalibration of sheathed thermocouples. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 5, Schooley, J. F., ed.; New York: American Institute of Physics; 1982. 977-1007.

[22] Bentley, R. E.; Morgan, T. L. Ni-based thermocouples in the mineral-insulated metal-sheathed format: thermoelectric instabilities to 1100 °C. *J. Phys. E: Sci. Instrum.* **19**, 262-268; 1986.

[23] Wang, T. P.; Bediones, D. 10,000 hr. stability test of types K, N, and a Ni-Mo/Ni-Co thermocouple in air and short-term tests in reducing atmospheres. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 595-600.

[24] Burley, N. A. N-CLAD-N: A novel advanced type N integrally-sheathed thermocouple of ultra-high thermoelectric stability. *High Temperatures-High Pressures* **8**, 609-616; 1986

[25] Burley, N. A. A novel advanced integrally-sheathed type N thermocouple of ultra-high thermoelectric stability. *Thermal and Temperature Measurement in Science and Industry;* 3rd Int. IMEKO Conf.; Sheffield; Sept. 1987. 115-125.

[26] Burley, N. A. 'N-CLAD-N' A novel integrally sheathed thermocouple: optimum design rationale for ultra-high thermoelectric stability. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 579-584.

[27] Bentley, R. E. The new nicrosil-sheathed type N MIMS thermocouple: an assessment of the first production batch. *Mater. Australas.* **18**(6), 16-18; 1986.

[28] Bentley. R. E.; Russell, Nicrosil sheathed mineral-insulated type N thermocouple probes for short-term variable-immersion applications to 1100 °C. *Sensors and Actuators* **16**, 89-100; 1989.

[29] Bentley, R. E. Irreversible thermoelectric changes in type K and type N thermocouple alloys within nicrosil-sheathed MIMS cable. *J. Phys. D.* **22**, 1908-1915; 1989.

[30] Bentley, R. E. Thermoelectric behavior of Ni-based ID-MIMS thermocouples using the nicrosil-plus sheathing alloy. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 585-590.

[31] Bentley, R. E. Thermoelectric hysteresis in nicrosil and nisil. *J. Phys. E: Sci. Instrum.* **20**, 1368-1373; 1987.

[32] Bentley, R. E. Thermoelectric hysteresis in nickel-based thermocouple alloys. *J. Phys. D.* **22**, 1902-1907; 1989.

[33] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10; 1990. *ibid.* p. 107.

[34] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. (U.S.) Tech. Note 1263*; 1989 June. 72 p.

[35] Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; Battuello, M.; Lee, H. K.; Kim, J. C.; Gam, K. S.; Rhee, C.; Chattle, M.; Arai, M.; Sakurai, H.; Pokhodun, A. I.; Moiseeva, N. P.; Perevalova, S. A.; de Groot, M. J.; Zhang, J.; Fan, K.; Wu, S. Statistical analysis of type S thermocouple measurements on the International Temperature Scale of 1990. *Temperature: Its Measurement and Control in Science and Industry*; Vol. 6; Schooley, J. F., ed.; New York: American Institute of Physics; 1992. 547-552.

[36] Mangum, B. W.; Furukawa, G. T. Guidelines for realizing the International Temperature Scale of 1990 (ITS-90). *Natl. Inst. Stand. Technol. Tech. Note 1265*; 1990 August. 190 p.

[37] Bureau International des Poids et Mesures. The 1976 Provisional 0.5 to 30 K Temperature Scale. *Metrologia* **15**, 65-68; 1979.

[38] Bureau International des Poids et Mesures, Supplementary information for the International Temperature Scale of 1990. Pavillion de Breteuil, F-92310 Sevres; 1990 December. 177 p.

9. TYPE T—Copper Versus Copper-Nickel Alloy Thermocouples

9.1. Material Specifications and Precautions

This type is one of the oldest and most popular thermocouples for determining temperatures within the range from about 370 °C down to the triple point of neon (−248.5939 °C). Its positive thermoelement, TP, is typically copper of high electrical conductivity and low oxygen content that conforms to ASTM Specification B3 for soft or annealed bare copper wire. Such material is about 99.95% pure copper with an oxygen content varying from 0.02 to 0.07% (depending on sulfur content) and with other impurities totaling about 0.01%. Above about −200 °C the thermoelectric properties of type TP thermoelements, which satisfy the above conditions, are exceptionally uniform and exhibit little variation between lots. Below about −200 °C the thermoelectric properties are affected more strongly by the presence of dilute transition metal solutes, particularly iron.

The negative thermoelement, TN or EN, is a copper-nickel alloy known ambiguously as constantan. As discussed in section 6.1, the word constantan refers to a family of copper-nickel alloys containing anywhere from 45 to 60% copper. These alloys also typically contain small percentages of cobalt, manganese and iron, as well as trace impurities of other elements such as carbon, magnesium, silicon, *etc.* Constantan is also known by various trade names such as Advance [1] and Cupron [2]. The constantan for type T thermocouples usually contains about 55% copper, 45% nickel, and small but thermoelectrically significant amounts, about 0.1% or larger, of cobalt, iron and manganese. **It should be emphasized that type TN (or EN) thermoelements are NOT generally interchangeable with type JN thermoelements although they are all referred to as "constantan".** In order to provide some differentiation in nomenclature, type TN (or EN) is often referred to as Adams' (or RP1080) constantan and type JN is usually referred to as SAMA constantan.

The thermoelectric relations for type TN and type EN thermoelements are the same, that is the voltage versus temperature equations and tables for platinum versus type TN thermoelements apply to both types of thermoelements over the temperature range recommended for each thermocouple type. However, it should not be assumed that type TN and type EN thermoelements may be used interchangeably or that they have the same commercial initial calibration tolerances.

The first reference tables of temperature-thermoelectric voltage values for type T thermocouples to be used on an industry-wide basis were those prepared by Roeser and Dahl [3] in 1938. Roeser and Dahl studied the temperature-voltage relations of a large number of type T thermocouples obtained from various instrument and wire manufacturers. The mean of the temperature-voltage relations of the thermocouples included in their study agreed very closely with the tabular data for type T thermocouples reported in 1920 by Adams [4]. Roeser and Dahl concluded that any temperature-voltage relation they might develop for the thermocouple would not differ significantly from the Adams' relation. Hence, they derived their reference tables from the Adams' relation.

Roeser and Dahl [3] also prepared reference tables for both thermoelements of the type T thermocouple against the platinum thermoelectric standard Pt-27. Above 0 °C the tabular values were derived from calibration data determined for nine samples of copper versus Pt-27 between 0 °C and 1000 °C and for 17 samples of constantan versus Pt-27 between 0 °C and 1000 °C. They indicated that their tabular values for the thermoelements, as well as for the thermocouple, were intended primarily for use above 0 °C. They presented values of the thermoelectric voltage in the −200 °C to 0 °C range as a matter of convenience only and the values were based upon measurements of only a few selected samples. A few years later, however, Scott [5] established more representative tabular values for the thermocouple in the −192 °C to 0 °C range.

In 1951, Shenker and others at NBS combined Roeser and Dahl's tabular values [3] for the thermocouple above 0 °C with those of Scott [5] below 0 °C and corrected the values to account for changes that had occurred in the international temperature scale (from the ITS-27 to the ITS-48) and in the electrical units (from international to absolute). Their revised reference tables for the thermocouple, which covered the range from −192 °C to 400 °C, were presented in NBS Circular 508 [6] and again, several years later, in NBS Circular 561 [7].

Extensive research on the low-temperature properties of the commonly used thermocouple types was conducted during the 1960s and early 1970s by Sparks, Powell, and others of the NBS Cryogenics Division in Boulder. Their research led to the establishment of a type T thermocouple reference function and table covering the range from 7 °C down to −270 °C to satisfy a need for thermocouple reference data in the cryogenic temperature range. Their reference function and table, which were based on the NBS 2-20 temperature scale [8] at temperatures below 20 K and on the IPTS-68 above 20 K, were presented in NBS Monograph 124 [9]. Powell and others at NBS then combined this low-

temperature reference function with a high-temperature function that they obtained by fitting selected tabular values taken from NBS Circular 561 at temperatures above 0 °C, after correcting the latter values to account for the change in the international temperature scale from the IPTS-48 to the IPTS-68. The revised table, which covered the range from −270 °C to 400 °C, was published in 1974 in NBS Monograph 125 [10].

The low-temperature research [9] by members of the NBS Cryogenics Division showed that the type T thermocouple may be used down to liquid helium temperatures (about 4 K) but that its Seebeck coefficient becomes quite small below 20 K. Its Seebeck coefficient at 20 K is only about 5.6 μV/K, being roughly two-thirds that of the type E thermocouple. The thermoelectric homogeneity of most type TP and type TN (or EN) thermoelements is reasonably good. There is considerable variability, however, in the thermoelectric properties of type TP thermoelements below about 70 K caused by variations in the amounts and types of impurities present in these nearly pure materials. The high thermal conductivity of the type TP thermoelements can also be troublesome in precise applications. For these reasons, type T thermocouples are generally unsuitable for use below about 20 K. As discussed in section 5.1, type E thermocouples are recommended as the most suitable of the letter-designated thermocouple types for general low-temperature use, since they offer the best overall combination of desirable properties.

Type T thermocouples are recommended by the ASTM [11] for use in the temperature range from −200 °C to 370 °C in vacuum or in oxidizing, reducing or inert atmospheres. The suggested upper temperature limit for continuous service of protected type T thermocouples is set at 370 °C for AWG 14 (1.63 mm) thermoelements since type TP thermoelements oxidize rapidly above this temperature. However, the thermoelectric properties of type TP thermoelements are apparently not grossly affected by oxidation since negligible changes in the thermoelectric voltage were observed at NBS [3] for AWG 12, 18, and 22 type TP thermoelements during 30 hours of heating in air at 500 °C. At this temperature the type TN thermoelements have good resistance to oxidation and exhibit only small voltage changes when heated in air for long periods of time, as shown by the studies of Dahl [12]. Higher operating temperatures, up to at least 800 °C, are possible in inert atmospheres where the deterioration of the type TP thermoelement is no longer a problem. The use of type T thermocouples in hydrogen atmospheres at temperatures above about 370 °C is not recommended since type TP thermoelements may become brittle.

Type T thermocouples are not well suited for use in nuclear environments since both thermoelements are subject to significant changes in composition under thermal neutron irradiation. The copper in the thermoelements is converted to nickel and zinc.

Because of the high thermal conductivity of type TP thermoelements, special care should be exercised when using the thermocouples to ensure that the measuring and reference junctions assume the desired temperatures. Errors in temperature measurements arising from insufficient immersion of type TP thermoelements in ice baths have been evaluated experimentally by Caldwell [13] and by McLaren and Murdock [14] and their work should be consulted for details.

ASTM Standard E230-87 in the 1992 Annual Book of ASTM Standards [15] specifies that the initial calibration tolerances for type T commercial thermocouples be ± 1 °C or ± 0.75% (whichever is greater) between 0 °C and 350 °C, and ± 1 °C or ± 1.5% (whichever is greater) between −200 °C and 0 °C. Type T thermocouples can also be supplied to meet special tolerances which are equal to approximately one-half the standard tolerances given above. Type T thermocouple materials are normally supplied to meet the tolerances specified for temperatures above 0 °C. However, the same materials may not satisfy the tolerances specified for the −200 °C to 0 °C range. If materials are required to meet the tolerances below 0 °C, this should be specified when they are purchased.

The suggested upper temperature limit of 370 °C given in the ASTM standard [15] for protected type T thermocouples applies to AWG 14 (1.63 mm) wire. It decreases to 260 °C for AWG 20 (0.81 mm), 200 °C for AWG 24 or 28 (0.51 mm or 0.33 mm), and 150 °C for AWG 30 (0.25 mm). These temperature limits apply to thermocouples used in conventional closed-end protecting tubes and they are intended only as a rough guide to the user. They do not apply to thermocouples having compacted mineral oxide insulation.

9.2. Construction of Reference Functions

9.2.1. Type T thermocouples

The reference function for type T thermocouples is based on the polynomial representations in NBS Monograph 125 [10] and the difference in values of temperature expressed on the IPTS-68 and the ITS-90 [16] as given by

$$\Delta t = t_{90} - t_{68},$$

where t_{90} and t_{68} indicate temperature (°C) on the ITS-90 and the IPTS-68, respectively.

Monograph 125 gives polynomial representations of the thermoelectric voltage as a function of t_{68} of the form:

$$g(t) = \sum_{i=0}^{m} b_i(t_{68})^i,$$

to cover the temperature range −270 °C to 400 °C. In terms of t_{90}, these are replaced by two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i \quad for\ j = 1, 2.$$

Thermoelectric voltages, Y_t, where

$$Y_t = 0.999990736\ g(t_{90} - \Delta t),$$

are fitted by the method of least-squares to corresponding values of t_{90} to obtain the coefficients, c_i, of $f_j(t_{90})$ in terms of the ITS-90 and the SI volt [17]. The data for this analysis come from two sources. To generate Y_t values for the range 20 K to 400 °C, Δt values at 10 °C intervals were taken from the table of Preston-Thomas [16]. Below 20 K, the function $g(t)$ in Monograph 125 was expressed on the acoustic temperature scale, NBS 2-20 [8]. Given the table of temperature differences beween NBS 2-20 and EPT-76 published by the BIPM [18], thermoelectric voltages given by

$$Y_t = 0.999990736\ g(T_{NBS2\text{-}20} - 273.15),$$

and corresponding temperatures, T_{76}, were computed at roughly 1 °C intervals. These in turn were related to temperatures, t_{90}, by the following equations [19]:

$$T_{90} - T_{76} = -5.6 \times 10^{-6}(T_{76})^2,$$

where $T_{90}/K = t_{90}/°C + 273.15$.

A single polynomial is not satisfactory to cover the temperature range from −270 °C to 400 °C, and, as in Monograph 125, the range is broken at 0 °C into two segments. A separate polynomial is defined for each segment.

The appropriate degree for each polynomial is at issue, and the least-squares criteria for testing the aptness of a model do not strictly apply because the Δt data, derived by smoothing of experimental data, are not contaminated by random error. The approach used was to choose the lowest degree polynomial for which the largest absolute difference between a fitted value, $f_j(t_{90})$, and a corresponding data point, Y_t, was less than 0.05 μV. For temperatures in the range −270 °C to 0 °C, a fourteenth degree polynomial, $f_1(t_{90})$, satisfies the criterion and for the range 0 °C to 400 °C, an eighth degree polynomial, $f_2(t_{90})$, is adequate. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 9.3 to 11 significant digits. The reader is cautioned that further rounding or truncation of the coefficients could adversely affect computations which depend on this reference function.

Equality at the break-point (0 °C) was achieved by constraining the polynomials to give 0 μV at 0 °C. Also, the polynomial for the range below 0 °C was constrained to have the same first deviative at 0 °C as that of the polynomial for the range above 0 °C. The second derivatives of the polynomials were not constrained at the break-point.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The uncertainty for each temperature range is estimated by computing the maximum absolute difference between $f_j(t_{90})$ and Y_t over that range. These biases are tabulated below.

Temperature range °C			Bias μV
−270	to	0	0.049
0	to	400	0.025

These biases describe the disagreement between the voltage produced by the new reference function for a particular value of t_{90} and the voltage that would be obtained by substituting $t_{90} - \Delta t$ into the IPTS-68 reference function. They do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function. These latter uncertainties, which are not known, would be needed to make a statement about the absolute uncertainty of voltages or temperatures derived using this reference function.

9.2.2. Positive thermoelement, type TP, versus platinum, Pt-67

The construction of the reference function for the positive thermoelement, type TP, versus Pt-67 is based on the reference function for the total thermocouple, type T, and the reference function for its negative thermoelement, type TN. Two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i \quad for\ j = 1, 2,$$

are defined to cover the temperature range −270 °C to 400 °C. Each polynomial is the algebraic difference of the reference function for the type T

thermocouple (see sec. 9.2.1) and the reference function for Pt-67 versus the type TN thermoelement (see sec. 9.2.3) in the appropriate range. This results in a fourteenth degree polynomial, $f_1(t_{90})$, for the range −270 °C to 0 °C; and a tenth degree polynomial, $f_2(t_{90})$, for the range 0 °C to 400 °C. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 9.4 to 11 significant digits.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum absolute difference between $f_j(t_{90})$ and Y_t for each temperature range is computed as in section 9.2.1. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in section 9.2.1, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
−270	to	0	0.038
0	to	400	0.670

9.2.3. Platinum, Pt-67, versus the negative thermoelement, type TN

The construction of the reference function for Pt-67 versus the negative thermoelement, type TN (same as EN), is based on the reference function for the type E thermocouple and the reference function for its positive thermoelement, type EP (same as KP). Two polynomials of the form:

$$f_j(t_{90}) = \sum_{i=0}^{n} c_i(t_{90})^i \quad for\ j = 1, 2,$$

are defined to cover the temperature range −270 °C to 1000 °C. Each polynomial is the algebraic difference of the reference function for the type E thermocouple (see sec. 5.2) and the reference function for the type EP thermoelement versus Pt-67 (see sec. 7.2.2) in the appropriate range. This results in a thirteenth degree polynomial, $f_1(t_{90})$, for the range −270 °C to 0 °C and a tenth degree polynomial, $f_2(t_{90})$, for the range 0 °C to 1000 °C. Coefficients of $f_1(t_{90})$ and $f_2(t_{90})$ are given in section 9.5 to 11 significant digits.

The uncertainty in the new reference function is given as its bias relative to the IPTS-68 reference function. The maximum absolute difference between $f_j(t_{90})$ and Y_t for each temperature range is computed as in sections 9.2.1 and 9.2.2. This difference is computed for three subranges of the 0 °C to 1000 °C range. These maximum biases for the conversion of the reference function from the IPTS-68 to the ITS-90 are tabulated below. As in sections 9.2.1 and 9.2.2, these biases do not include the uncertainty associated with Δt or the uncertainty associated with the IPTS-68 reference function.

Temperature range °C			Bias μV
−270	to	0	0.057
0	to	600	0.833
600	to	660	0.607
660	to	1000	1.313

9.3. Reference Function and Table for Type T Thermocouples

The coefficients, c_i, for the fourteenth degree polynomial and for the eighth degree polynomial that give the thermoelectric voltage, E, of type T thermocouples as a function of temperature, t_{90}, in the −270 °C to 0 °C and 0 °C to 400 °C ranges, respectively, are given in table 9.3.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i(t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type T thermocouples at selected fixed points are given in table 9.3.2. The reference values for type T thermocouples are given at 1 °C intervals from −270 °C to 400 °C in table 9.3.3. Graphs of the thermoelectric voltage, its first derivative, and second derivative are given in figures 9.3.1, 9.3.2, and 9.3.3, respectively. The discontinuity in the second derivative at 0 °C is apparent in figure 9.3.3. It results from the equations for the two temperature regions being joined without constraints on their second derivatives.

It should be stressed that **type T thermocouple materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type T thermocouples are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 9.3.1. *Type T thermocouples --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−270 °C to 0 °C	0 °C to 400 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	$3.874\,810\,636\,4 \times 10^{1}$	$3.874\,810\,636\,4 \times 10^{1}$
c_2 =	$4.419\,443\,434\,7 \times 10^{-2}$	$3.329\,222\,788\,0 \times 10^{-2}$
c_3 =	$1.184\,432\,310\,5 \times 10^{-4}$	$2.061\,824\,340\,4 \times 10^{-4}$
c_4 =	$2.003\,297\,355\,4 \times 10^{-5}$	$-2.188\,225\,684\,6 \times 10^{-6}$
c_5 =	$9.013\,801\,955\,9 \times 10^{-7}$	$1.099\,688\,092\,8 \times 10^{-8}$
c_6 =	$2.265\,115\,659\,3 \times 10^{-8}$	$-3.081\,575\,877\,2 \times 10^{-11}$
c_7 =	$3.607\,115\,420\,5 \times 10^{-10}$	$4.547\,913\,529\,0 \times 10^{-14}$
c_8 =	$3.849\,393\,988\,3 \times 10^{-12}$	$-2.751\,290\,167\,3 \times 10^{-17}$
c_9 =	$2.821\,352\,192\,5 \times 10^{-14}$	
c_{10} =	$1.425\,159\,477\,9 \times 10^{-16}$	
c_{11} =	$4.876\,866\,228\,6 \times 10^{-19}$	
c_{12} =	$1.079\,553\,927\,0 \times 10^{-21}$	
c_{13} =	$1.394\,502\,706\,2 \times 10^{-24}$	
c_{14} =	$7.979\,515\,392\,7 \times 10^{-28}$	

TABLE 9.3.2. *Thermoelectric values at fixed points for type T thermocouples*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
e-Hydrogen TP	−259.3467	−6 229.15	4.080	244.61
Neon TP	−248.5939	−6 171.27	6.686	242.22
Oxygen TP	−218.7916	−5 872.99	12.917	166.29
Argon TP	−189.3442	−5 427.39	17.205	135.43
Mercury TP	−38.8344	−1 434.23	35.029	100.37
Ice MP	0.000	0.00	38.748	66.58
Water TP	0.01	0.4	38.749	66.60
Gallium MP	29.7646	1 186.8	41.086	85.26
Indium FP	156.5985	7 036.4	50.571	62.19
Tin FP	231.928	11 013.2	54.886	52.00
Cadmium FP	321.069	16 095.2	58.977	41.60
Lead FP	327.462	16 473.1	59.242	41.30

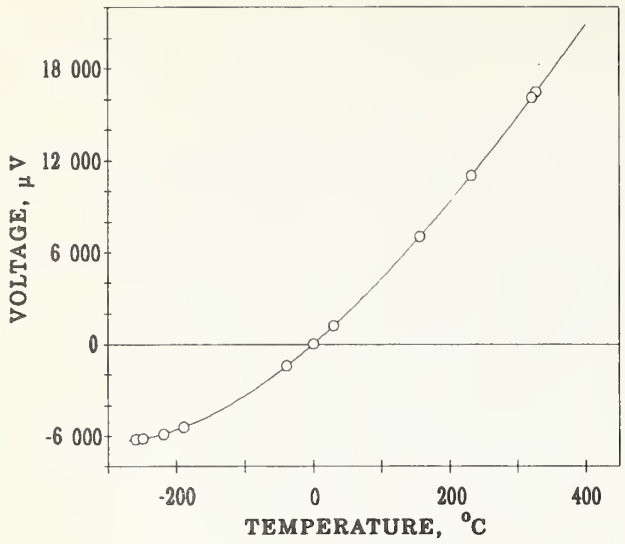

FIGURE 9.3.1. *Thermoelectric voltage for type T thermocouples. The circles indicate values at various thermometric fixed points.*

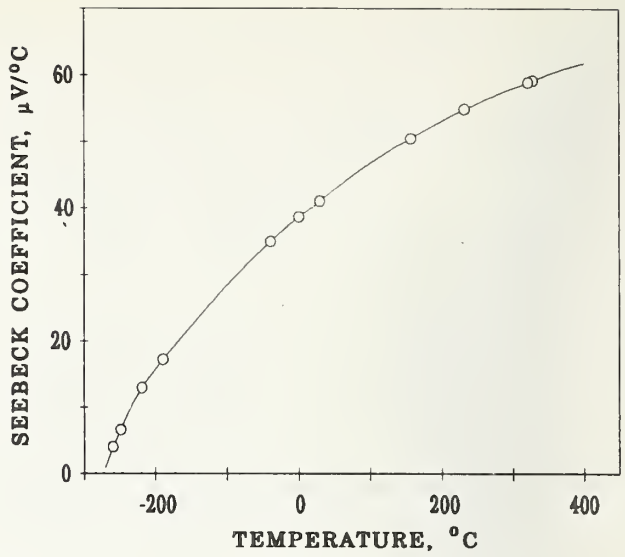

FIGURE 9.3.2. *Seebeck coefficient for type T thermocouples. The circles indicate values at various thermometric fixed points.*

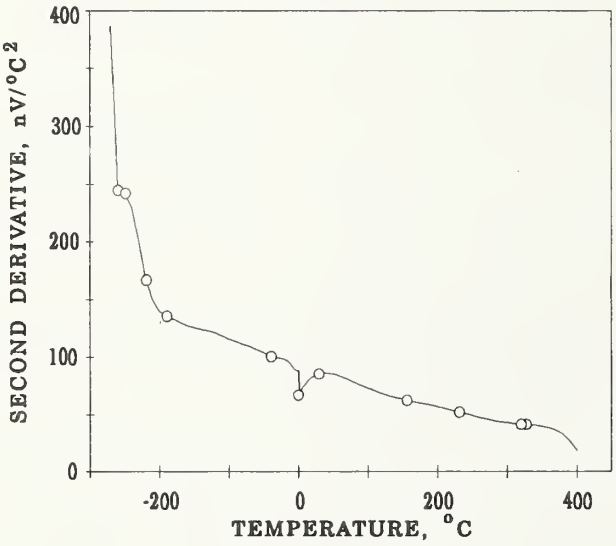

FIGURE 9.3.3. *Second derivative of thermoelectric voltage for type T thermocouples. The circles indicate values at various thermometric fixed points.*

TABLE 9.3.3. *Type T thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−270	−6 257.51	1.008	386.53	**−230**	−6 006.69	10.878	199.30	**−190**	−5 438.64	17.116	135.63
−269	−6 256.31	1.379	355.63	**−229**	−5 995.72	11.076	196.02	**−189**	−5 421.46	17.251	135.33
−268	−6 254.76	1.721	330.11	**−228**	−5 984.54	11.270	192.77	**−188**	−5 404.14	17.386	135.04
−267	−6 252.87	2.040	309.23	**−227**	−5 973.18	11.461	189.57	**−187**	−5 386.69	17.521	134.75
−266	−6 250.68	2.341	292.33	**−226**	−5 961.62	11.649	186.42	**−186**	−5 369.10	17.656	134.48
−265	−6 248.20	2.626	278.84	**−225**	−5 949.88	11.834	183.34	**−185**	−5 351.38	17.790	134.21
−264	−6 245.43	2.900	268.22	**−224**	−5 937.95	12.016	180.34	**−184**	−5 333.52	17.924	133.94
−263	−6 242.40	3.164	260.02	**−223**	−5 925.85	12.195	177.42	**−183**	−5 315.53	18.058	133.67
−262	−6 239.11	3.420	253.84	**−222**	−5 913.56	12.371	174.61	**−182**	−5 297.40	18.192	133.40
−261	−6 235.56	3.672	249.31	**−221**	−5 901.11	12.544	171.90	**−181**	−5 279.15	18.325	133.13
−260	−6 231.77	3.919	246.11	**−220**	−5 888.48	12.715	169.29	**−180**	−5 260.75	18.458	132.86
−259	−6 227.72	4.164	243.98	**−219**	−5 875.68	12.883	166.80	**−179**	−5 242.23	18.591	132.59
−258	−6 223.44	4.408	242.66	**−218**	−5 862.71	13.048	164.42	**−178**	−5 223.57	18.723	132.31
−257	−6 218.91	4.650	241.97	**−217**	−5 849.58	13.212	162.16	**−177**	−5 204.78	18.855	132.04
−256	−6 214.14	4.892	241.71	**−216**	−5 836.29	13.373	160.02	**−176**	−5 185.86	18.987	131.76
−255	−6 209.13	5.133	241.75	**−215**	−5 822.84	13.532	158.00	**−175**	−5 166.81	19.119	131.48
−254	−6 203.87	5.375	241.94	**−214**	−5 809.23	13.689	156.09	**−174**	−5 147.63	19.250	131.20
−253	−6 198.38	5.617	242.20	**−213**	−5 795.46	13.844	154.30	**−173**	−5 128.31	19.381	130.91
−252	−6 192.64	5.860	242.44	**−212**	−5 781.54	13.997	152.63	**−172**	−5 108.86	19.512	130.63
−251	−6 186.66	6.102	242.57	**−211**	−5 767.47	14.149	151.06	**−171**	−5 089.29	19.642	130.35
−250	−6 180.43	6.345	242.56	**−210**	−5 753.24	14.300	149.60	**−170**	−5 069.58	19.773	130.06
−249	−6 173.97	6.587	242.36	**−209**	−5 738.87	14.449	148.25	**−169**	−5 049.74	19.902	129.78
−248	−6 167.26	6.829	241.94	**−208**	−5 724.34	14.596	146.99	**−168**	−5 029.77	20.032	129.50
−247	−6 160.31	7.071	241.27	**−207**	−5 709.68	14.743	145.83	**−167**	−5 009.68	20.161	129.22
−246	−6 153.12	7.312	240.36	**−206**	−5 694.86	14.888	144.75	**−166**	−4 989.45	20.291	128.95
−245	−6 145.69	7.552	239.19	**−205**	−5 679.90	15.032	143.77	**−165**	−4 969.10	20.419	128.68
−244	−6 138.01	7.790	237.76	**−204**	−5 664.80	15.175	142.86	**−164**	−4 948.61	20.548	128.41
−243	−6 130.11	8.027	236.08	**−203**	−5 649.55	15.318	142.02	**−163**	−4 928.00	20.676	128.15
−242	−6 121.96	8.262	234.17	**−202**	−5 634.16	15.459	141.26	**−162**	−4 907.26	20.804	127.89
−241	−6 113.58	8.495	232.03	**−201**	−5 618.63	15.600	140.55	**−161**	−4 886.39	20.932	127.64
−240	−6 104.97	8.726	229.68	**−200**	−5 602.96	15.741	139.91	**−160**	−4 865.40	21.060	127.40
−239	−6 096.13	8.955	227.15	**−199**	−5 587.15	15.880	139.32	**−159**	−4 844.27	21.187	127.17
−238	−6 087.06	9.180	224.45	**−198**	−5 571.20	16.019	138.77	**−158**	−4 823.02	21.314	126.94
−237	−6 077.77	9.403	221.60	**−197**	−5 555.11	16.158	138.27	**−157**	−4 801.65	21.441	126.72
−236	−6 068.26	9.624	218.62	**−196**	−5 538.89	16.296	137.81	**−156**	−4 780.14	21.567	126.50
−235	−6 058.52	9.841	215.54	**−195**	−5 522.52	16.433	137.39	**−155**	−4 758.51	21.694	126.30
−234	−6 048.58	10.055	212.38	**−194**	−5 506.02	16.571	136.99	**−154**	−4 736.75	21.820	126.10
−233	−6 038.42	10.265	209.15	**−193**	−5 489.38	16.707	136.62	**−153**	−4 714.87	21.946	125.92
−232	−6 028.05	10.473	205.88	**−192**	−5 472.60	16.844	136.27	**−152**	−4 692.86	22.072	125.74
−231	−6 017.47	10.677	202.60	**−191**	−5 455.69	16.980	135.94	**−151**	−4 670.73	22.197	125.56
−230	−6 006.69	10.878	199.30	**−190**	−5 438.64	17.116	135.63	**−150**	−4 648.47	22.323	125.40

TABLE 9.3.3. *Type T thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−150	−4 648.47	22.323	125.40	−100	−3 378.58	28.395	115.74	−50	−1 819.04	33.892	103.50
−149	−4 626.08	22.448	125.24	−99	−3 350.13	28.510	115.47	−49	−1 785.09	33.995	103.18
−148	−4 603.57	22.573	125.09	−98	−3 321.56	28.626	115.19	−48	−1 751.05	34.098	102.86
−147	−4 580.94	22.698	124.95	−97	−3 292.88	28.741	114.92	−47	−1 716.90	34.201	102.55
−146	−4 558.17	22.823	124.81	−96	−3 264.08	28.855	114.66	−46	−1 682.64	34.304	102.24
−145	−4 535.29	22.948	124.67	−95	−3 235.17	28.970	114.40	−45	−1 648.29	34.406	101.94
−144	−4 512.28	23.073	124.55	−94	−3 206.14	29.084	114.14	−44	−1 613.83	34.507	101.66
−143	−4 489.14	23.197	124.42	−93	−3 177.00	29.198	113.89	−43	−1 579.27	34.609	101.38
−142	−4 465.88	23.321	124.30	−92	−3 147.74	29.312	113.65	−42	−1 544.61	34.710	101.12
−141	−4 442.50	23.446	124.18	−91	−3 118.38	29.426	113.41	−41	−1 509.85	34.811	100.87
−140	−4 418.99	23.570	124.06	−90	−3 088.89	29.539	113.18	−40	−1 474.99	34.912	100.63
−139	−4 395.36	23.694	123.95	−89	−3 059.30	29.652	112.95	−39	−1 440.03	35.012	100.41
−138	−4 371.61	23.818	123.83	−88	−3 029.59	29.765	112.73	−38	−1 404.97	35.113	100.21
−137	−4 347.73	23.941	123.72	−87	−2 999.77	29.877	112.51	−37	−1 369.80	35.213	100.02
−136	−4 323.72	24.065	123.60	−86	−2 969.83	29.990	112.30	−36	−1 334.54	35.313	99.85
−135	−4 299.60	24.189	123.48	−85	−2 939.79	30.102	112.09	−35	−1 299.18	35.413	99.69
−134	−4 275.35	24.312	123.36	−84	−2 909.63	30.214	111.89	−34	−1 263.72	35.512	99.55
−133	−4 250.97	24.435	123.23	−83	−2 879.36	30.326	111.69	−33	−1 228.15	35.612	99.43
−132	−4 226.48	24.559	123.10	−82	−2 848.98	30.437	111.49	−32	−1 192.49	35.711	99.32
−131	−4 201.86	24.682	122.97	−81	−2 818.49	30.549	111.30	−31	−1 156.73	35.810	99.21
−130	−4 177.11	24.804	122.83	−80	−2 787.88	30.660	111.11	−30	−1 120.87	35.909	99.12
−129	−4 152.25	24.927	122.68	−79	−2 757.17	30.771	110.92	−29	−1 084.91	36.009	99.04
−128	−4 127.26	25.050	122.53	−78	−2 726.34	30.882	110.73	−28	−1 048.86	36.108	98.95
−127	−4 102.15	25.172	122.37	−77	−2 695.40	30.992	110.54	−27	−1 012.70	36.206	98.87
−126	−4 076.91	25.295	122.21	−76	−2 664.36	31.103	110.35	−26	−976.44	36.305	98.78
−125	−4 051.56	25.417	122.03	−75	−2 633.20	31.213	110.15	−25	−940.09	36.404	98.68
−124	−4 026.08	25.539	121.85	−74	−2 601.93	31.323	109.96	−24	−903.63	36.503	98.57
−123	−4 000.48	25.660	121.67	−73	−2 570.55	31.433	109.76	−23	−867.08	36.601	98.43
−122	−3 974.76	25.782	121.47	−72	−2 539.06	31.543	109.56	−22	−830.43	36.699	98.27
−121	−3 948.92	25.903	121.27	−71	−2 507.47	31.652	109.36	−21	−793.68	36.798	98.08
−120	−3 922.95	26.024	121.05	−70	−2 475.76	31.761	109.15	−20	−756.84	36.896	97.86
−119	−3 896.87	26.145	120.84	−69	−2 443.94	31.870	108.93	−19	−719.89	36.993	97.59
−118	−3 870.66	26.266	120.61	−68	−2 412.02	31.979	108.71	−18	−682.85	37.091	97.28
−117	−3 844.34	26.387	120.38	−67	−2 379.99	32.088	108.48	−17	−645.71	37.188	96.91
−116	−3 817.89	26.507	120.13	−66	−2 347.84	32.196	108.24	−16	−608.48	37.285	96.49
−115	−3 791.32	26.627	119.89	−65	−2 315.59	32.304	107.99	−15	−571.14	37.381	96.01
−114	−3 764.64	26.747	119.63	−64	−2 283.23	32.412	107.74	−14	−533.71	37.477	95.47
−113	−3 737.83	26.866	119.37	−63	−2 250.77	32.520	107.48	−13	−496.19	37.572	94.88
−112	−3 710.90	26.985	119.11	−62	−2 218.20	32.627	107.21	−12	−458.57	37.666	94.22
−111	−3 683.86	27.104	118.84	−61	−2 185.51	32.734	106.93	−11	−420.86	37.760	93.52
−110	−3 656.69	27.223	118.56	−60	−2 152.73	32.841	106.65	−10	−383.05	37.853	92.77
−109	−3 629.41	27.342	118.29	−59	−2 119.83	32.947	106.36	−9	−345.15	37.946	91.99
−108	−3 602.01	27.460	118.01	−58	−2 086.83	33.054	106.06	−8	−307.16	38.037	91.20
−107	−3 574.49	27.578	117.73	−57	−2 053.73	33.160	105.75	−7	−269.08	38.128	90.41
−106	−3 546.86	27.695	117.44	−56	−2 020.51	33.265	105.44	−6	−230.90	38.218	89.66
−105	−3 519.10	27.812	117.16	−55	−1 987.20	33.370	105.12	−5	−192.64	38.307	88.97
−104	−3 491.23	27.929	116.87	−54	−1 953.77	33.475	104.80	−4	−154.29	38.396	88.40
−103	−3 463.24	28.046	116.59	−53	−1 920.24	33.580	104.48	−3	−115.85	38.484	87.99
−102	−3 435.14	28.163	116.30	−52	−1 886.61	33.684	104.15	−2	−77.32	38.572	87.80
−101	−3 406.92	28.279	116.02	−51	−1 852.88	33.788	103.83	−1	−38.70	38.660	87.90
−100	−3 378.58	28.395	115.74	−50	−1 819.04	33.892	103.50	0	0.00	38.748	88.39

TABLE 9.3.3. *Type T thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
0	0.0	38.748	66.58	50	2 035.7	42.820	85.08	100	4 278.5	46.785	72.76
1	38.8	38.815	67.80	51	2 078.6	42.905	84.93	101	4 325.3	46.858	72.51
2	77.6	38.884	68.96	52	2 121.5	42.990	84.77	102	4 372.2	46.930	72.26
3	116.5	38.953	70.07	53	2 164.6	43.075	84.60	103	4 419.2	47.002	72.01
4	155.5	39.024	71.13	54	2 207.7	43.159	84.43	104	4 466.2	47.074	71.77
5	194.6	39.095	72.14	55	2 250.9	43.244	84.24	105	4 513.3	47.146	71.53
6	233.7	39.168	73.11	56	2 294.2	43.328	84.05	106	4 560.5	47.217	71.29
7	272.9	39.242	74.03	57	2 337.5	43.412	83.85	107	4 607.8	47.288	71.05
8	312.2	39.316	74.91	58	2 381.0	43.496	83.65	108	4 655.1	47.359	70.81
9	351.6	39.391	75.75	59	2 424.5	43.579	83.44	109	4 702.5	47.430	70.58
10	391.0	39.468	76.54	60	2 468.2	43.662	83.22	110	4 750.0	47.500	70.35
11	430.5	39.545	77.29	61	2 511.9	43.745	82.99	111	4 797.5	47.571	70.13
12	470.1	39.622	78.01	62	2 555.6	43.828	82.77	112	4 845.1	47.641	69.90
13	509.7	39.701	78.69	63	2 599.5	43.911	82.53	113	4 892.8	47.710	69.68
14	549.5	39.780	79.33	64	2 643.5	43.993	82.29	114	4 940.5	47.780	69.46
15	589.3	39.859	79.93	65	2 687.5	44.076	82.05	115	4 988.3	47.849	69.24
16	629.2	39.939	80.50	66	2 731.6	44.158	81.80	116	5 036.2	47.918	69.03
17	669.2	40.020	81.03	67	2 775.8	44.239	81.55	117	5 084.2	47.987	68.81
18	709.2	40.101	81.53	68	2 820.1	44.321	81.30	118	5 132.2	48.056	68.60
19	749.4	40.183	82.00	69	2 864.5	44.402	81.04	119	5 180.3	48.125	68.40
20	789.6	40.265	82.44	70	2 908.9	44.483	80.78	120	5 228.4	48.193	68.19
21	829.9	40.348	82.85	71	2 953.4	44.563	80.52	121	5 276.7	48.261	67.99
22	870.3	40.431	83.23	72	2 998.0	44.644	80.26	122	5 325.0	48.329	67.79
23	910.8	40.515	83.58	73	3 042.7	44.724	79.99	123	5 373.3	48.397	67.59
24	951.3	40.598	83.90	74	3 087.5	44.804	79.72	124	5 421.8	48.464	67.40
25	992.0	40.682	84.19	75	3 132.3	44.883	79.46	125	5 470.3	48.531	67.21
26	1 032.7	40.767	84.46	76	3 177.2	44.963	79.18	126	5 518.8	48.598	67.02
27	1 073.5	40.851	84.71	77	3 222.2	45.042	78.91	127	5 567.5	48.665	66.83
28	1 114.4	40.936	84.93	78	3 267.3	45.120	78.64	128	5 616.2	48.732	66.65
29	1 155.4	41.021	85.13	79	3 312.5	45.199	78.37	129	5 664.9	48.799	66.46
30	1 196.4	41.106	85.30	80	3 357.7	45.277	78.09	130	5 713.8	48.865	66.28
31	1 237.6	41.192	85.45	81	3 403.0	45.355	77.82	131	5 762.7	48.931	66.11
32	1 278.8	41.277	85.58	82	3 448.4	45.433	77.54	132	5 811.6	48.997	65.93
33	1 320.1	41.363	85.69	83	3 493.9	45.510	77.27	133	5 860.6	49.063	65.76
34	1 361.6	41.449	85.78	84	3 539.4	45.587	77.00	134	5 909.7	49.129	65.59
35	1 403.0	41.534	85.86	85	3 585.1	45.664	76.72	135	5 958.9	49.194	65.42
36	1 444.6	41.620	85.91	86	3 630.8	45.741	76.45	136	6 008.1	49.260	65.25
37	1 486.3	41.706	85.95	87	3 676.6	45.817	76.18	137	6 057.4	49.325	65.08
38	1 528.0	41.792	85.96	88	3 722.4	45.893	75.91	138	6 106.8	49.390	64.92
39	1 569.9	41.878	85.97	89	3 768.3	45.969	75.64	139	6 156.2	49.455	64.76
40	1 611.8	41.964	85.95	90	3 814.3	46.044	75.37	140	6 205.7	49.519	64.60
41	1 653.8	42.050	85.92	91	3 860.4	46.120	75.10	141	6 255.2	49.584	64.44
42	1 695.9	42.136	85.88	92	3 906.6	46.195	74.83	142	6 304.9	49.648	64.29
43	1 738.1	42.222	85.82	93	3 952.8	46.269	74.57	143	6 354.5	49.712	64.13
44	1 780.3	42.308	85.75	94	3 999.1	46.344	74.30	144	6 404.3	49.776	63.98
45	1 822.7	42.393	85.67	95	4 045.5	46.418	74.04	145	6 454.1	49.840	63.83
46	1 865.1	42.479	85.57	96	4 092.0	46.492	73.78	146	6 504.0	49.904	63.68
47	1 907.6	42.564	85.47	97	4 138.5	46.566	73.52	147	6 553.9	49.968	63.54
48	1 950.3	42.650	85.35	98	4 185.1	46.639	73.27	148	6 603.9	50.031	63.39
49	1 992.9	42.735	85.22	99	4 231.8	46.712	73.01	149	6 654.0	50.094	63.25
50	2 035.7	42.820	85.08	100	4 278.5	46.785	72.76	150	6 704.1	50.158	63.10

TABLE 9.3.3. *Type T thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	6 704.1	50.158	63.10	200	9 288.1	53.150	56.63	250	12 013.4	55.800	49.19
151	6 754.3	50.221	62.96	201	9 341.3	53.206	56.50	251	12 069.2	55.849	49.04
152	6 804.5	50.284	62.82	202	9 394.5	53.263	56.36	252	12 125.1	55.898	48.89
153	6 854.8	50.346	62.68	203	9 447.8	53.319	56.23	253	12 181.0	55.947	48.73
154	6 905.2	50.409	62.54	204	9 501.2	53.375	56.09	254	12 237.0	55.996	48.58
155	6 955.7	50.471	62.41	205	9 554.6	53.431	55.95	255	12 293.0	56.044	48.43
156	7 006.2	50.534	62.27	206	9 608.0	53.487	55.82	256	12 349.1	56.093	48.28
157	7 056.7	50.596	62.14	207	9 661.5	53.543	55.68	257	12 405.2	56.141	48.13
158	7 107.4	50.658	62.00	208	9 715.1	53.598	55.54	258	12 461.4	56.189	47.98
159	7 158.0	50.720	61.87	209	9 768.7	53.654	55.40	259	12 517.6	56.237	47.83
160	7 208.8	50.782	61.74	210	9 822.4	53.709	55.26	260	12 573.8	56.284	47.68
161	7 259.6	50.843	61.61	211	9 876.1	53.764	55.11	261	12 630.2	56.332	47.53
162	7 310.5	50.905	61.48	212	9 929.9	53.820	54.97	262	12 686.5	56.380	47.39
163	7 361.4	50.966	61.35	213	9 983.8	53.874	54.83	263	12 742.9	56.427	47.24
164	7 412.4	51.028	61.22	214	10 037.7	53.929	54.68	264	12 799.4	56.474	47.10
165	7 463.5	51.089	61.09	215	10 091.6	53.984	54.54	265	12 855.9	56.521	46.95
166	7 514.6	51.150	60.97	216	10 145.7	54.038	54.39	266	12 912.4	56.568	46.81
167	7 565.8	51.211	60.84	217	10 199.7	54.093	54.25	267	12 969.0	56.615	46.67
168	7 617.0	51.272	60.71	218	10 253.8	54.147	54.10	268	13 025.6	56.661	46.53
169	7 668.3	51.332	60.59	219	10 308.0	54.201	53.96	269	13 082.3	56.708	46.39
170	7 719.7	51.393	60.46	220	10 362.2	54.255	53.81	270	13 139.1	56.754	46.26
171	7 771.1	51.453	60.33	221	10 416.5	54.308	53.66	271	13 195.8	56.800	46.12
172	7 822.6	51.513	60.21	222	10 470.9	54.362	53.51	272	13 252.7	56.846	45.99
173	7 874.1	51.574	60.08	223	10 525.2	54.415	53.36	273	13 309.5	56.892	45.85
174	7 925.7	51.634	59.96	224	10 579.7	54.469	53.21	274	13 366.4	56.938	45.72
175	7 977.4	51.693	59.83	225	10 634.2	54.522	53.06	275	13 423.4	56.984	45.59
176	8 029.1	51.753	59.71	226	10 688.7	54.575	52.91	276	13 480.4	57.029	45.46
177	8 080.9	51.813	59.58	227	10 743.3	54.628	52.76	277	13 537.5	57.075	45.34
178	8 132.7	51.872	59.46	228	10 798.0	54.680	52.60	278	13 594.6	57.120	45.21
179	8 184.6	51.932	59.33	229	10 852.7	54.733	52.45	279	13 651.7	57.165	45.09
180	8 236.6	51.991	59.21	230	10 907.5	54.785	52.30	280	13 708.9	57.210	44.97
181	8 288.6	52.050	59.08	231	10 962.3	54.837	52.14	281	13 766.1	57.255	44.85
182	8 340.7	52.109	58.96	232	11 017.1	54.890	51.99	282	13 823.4	57.300	44.73
183	8 392.8	52.168	58.83	233	11 072.0	54.941	51.83	283	13 880.7	57.344	44.61
184	8 445.0	52.227	58.71	234	11 127.0	54.993	51.68	284	13 938.1	57.389	44.50
185	8 497.3	52.286	58.58	235	11 182.0	55.045	51.52	285	13 995.5	57.433	44.38
186	8 549.6	52.344	58.45	236	11 237.1	55.096	51.37	286	14 052.9	57.478	44.27
187	8 602.0	52.402	58.33	237	11 292.2	55.148	51.21	287	14 110.4	57.522	44.16
188	8 654.4	52.461	58.20	238	11 347.4	55.199	51.06	288	14 168.0	57.566	44.06
189	8 706.9	52.519	58.07	239	11 402.6	55.250	50.90	289	14 225.6	57.610	43.95
190	8 759.5	52.577	57.94	240	11 457.9	55.300	50.75	290	14 283.2	57.654	43.85
191	8 812.1	52.635	57.82	241	11 513.2	55.351	50.59	291	14 340.9	57.698	43.75
192	8 864.7	52.692	57.69	242	11 568.6	55.402	50.44	292	14 398.6	57.741	43.65
193	8 917.4	52.750	57.56	243	11 624.0	55.452	50.28	293	14 456.4	57.785	43.55
194	8 970.2	52.808	57.43	244	11 679.5	55.502	50.12	294	14 514.2	57.829	43.46
195	9 023.1	52.865	57.30	245	11 735.0	55.552	49.97	295	14 572.0	57.872	43.36
196	9 076.0	52.922	57.16	246	11 790.6	55.602	49.81	296	14 629.9	57.915	43.27
197	9 128.9	52.979	57.03	247	11 846.2	55.652	49.66	297	14 687.9	57.959	43.18
198	9 181.9	53.036	56.90	248	11 901.9	55.701	49.50	298	14 745.8	58.002	43.10
199	9 235.0	53.093	56.77	249	11 957.6	55.751	49.35	299	14 803.9	58.045	43.01
200	9 288.1	53.150	56.63	250	12 013.4	55.800	49.19	300	14 861.9	58.088	42.93

TABLE 9.3.3. *Type T thermocouples --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
300	14 861.9	58.088	42.93	**335**	16 920.8	59.552	40.94	**370**	19 029.7	60.928	36.37
301	14 920.0	58.131	42.85	**336**	16 980.4	59.593	40.89	**371**	19 090.6	60.964	36.07
302	14 978.2	58.173	42.77	**337**	17 040.0	59.634	40.84	**372**	19 151.6	61.000	35.77
303	15 036.4	58.216	42.69	**338**	17 099.7	59.675	40.78	**373**	19 212.6	61.036	35.44
304	15 094.6	58.259	42.62	**339**	17 159.4	59.715	40.73	**374**	19 273.7	61.071	35.11
305	15 152.9	58.301	42.55	**340**	17 219.1	59.756	40.67	**375**	19 334.7	61.106	34.75
306	15 211.2	58.344	42.47	**341**	17 278.9	59.797	40.61	**376**	19 395.9	61.141	34.38
307	15 269.6	58.386	42.41	**342**	17 338.7	59.837	40.54	**377**	19 457.0	61.175	33.99
308	15 328.0	58.429	42.34	**343**	17 398.5	59.878	40.48	**378**	19 518.2	61.208	33.58
309	15 386.4	58.471	42.27	**344**	17 458.4	59.918	40.41	**379**	19 579.4	61.242	33.15
310	15 444.9	58.513	42.21	**345**	17 518.4	59.958	40.33	**380**	19 640.7	61.275	32.71
311	15 503.5	58.555	42.15	**346**	17 578.4	59.999	40.26	**381**	19 702.0	61.307	32.24
312	15 562.0	58.598	42.09	**347**	17 638.4	60.039	40.17	**382**	19 763.3	61.339	31.75
313	15 620.7	58.640	42.03	**348**	17 698.4	60.079	40.09	**383**	19 824.7	61.371	31.24
314	15 679.3	58.682	41.97	**349**	17 758.5	60.119	40.00	**384**	19 886.1	61.402	30.70
315	15 738.0	58.724	41.91	**350**	17 818.7	60.159	39.90	**385**	19 947.5	61.432	30.15
316	15 796.8	58.765	41.86	**351**	17 878.8	60.199	39.80	**386**	20 008.9	61.462	29.56
317	15 855.6	58.807	41.81	**352**	17 939.1	60.239	39.70	**387**	20 070.4	61.491	28.96
318	15 914.4	58.849	41.75	**353**	17 999.3	60.278	39.58	**388**	20 131.9	61.520	28.33
319	15 973.3	58.891	41.70	**354**	18 059.6	60.318	39.46	**389**	20 193.4	61.548	27.67
320	16 032.2	58.932	41.65	**355**	18 120.0	60.357	39.34	**390**	20 255.0	61.575	26.98
321	16 091.1	58.974	41.60	**356**	18 180.3	60.397	39.21	**391**	20 316.6	61.602	26.26
322	16 150.1	59.016	41.56	**357**	18 240.8	60.436	39.07	**392**	20 378.2	61.628	25.52
323	16 209.2	59.057	41.51	**358**	18 301.2	60.475	38.92	**393**	20 439.8	61.653	24.75
324	16 268.2	59.099	41.46	**359**	18 361.7	60.514	38.76	**394**	20 501.5	61.677	23.94
325	16 327.4	59.140	41.41	**360**	18 422.2	60.552	38.60	**395**	20 563.2	61.701	23.10
326	16 386.5	59.181	41.37	**361**	18 482.8	60.591	38.42	**396**	20 624.9	61.723	22.23
327	16 445.7	59.223	41.32	**362**	18 543.4	60.629	38.24	**397**	20 686.6	61.745	21.33
328	16 505.0	59.264	41.28	**363**	18 604.1	60.667	38.05	**398**	20 748.4	61.766	20.39
329	16 564.2	59.305	41.23	**364**	18 664.8	60.705	37.84	**399**	20 810.2	61.786	19.41
330	16 623.6	59.347	41.18	**365**	18 725.5	60.743	37.63	**400**	20 872.0	61.805	18.40
331	16 682.9	59.388	41.14	**366**	18 786.2	60.780	37.40				
332	16 742.3	59.429	41.09	**367**	18 847.0	60.818	37.16				
333	16 801.8	59.470	41.04	**368**	18 907.9	60.855	36.91				
334	16 861.3	59.511	40.99	**369**	18 968.7	60.891	36.64				
335	16 920.8	59.552	40.94	**370**	19 029.7	60.928	36.37				

9.4. Reference Function and Table for the Positive Thermoelement, Type TP, Copper Versus Platinum, Pt-67

The coefficients, c_i, for the fourteenth degree polynomial and for the tenth degree polynomial that give the thermoelectric voltage, E, of type TP thermoelements versus Pt-67 as a function of temperature, t_{90}, in the −270 °C to 0 °C and 0 °C to 400 °C ranges, respectively, are given in table 9.4.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for type TP thermoelements versus Pt-67 at selected fixed points are given in table 9.4.2. The reference values for type TP thermoelements versus Pt-67 are given at 1 °C intervals from −270 °C to 400 °C in table 9.4.3. Graphs of the thermoelectric voltage, its first derivative, and second derivative are given in figures 9.4.1, 9.4.2, and 9.4.3, respectively. The discontinuity in the second derivative at 0 °C is apparent in figure 9.4.3. It results from the equations for the two temperature regions being joined without constraints on their second derivatives.

It should be stressed that **type TP thermoelement materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type TP thermoelements are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 9.4.1. *Type TP thermoelements versus platinum, Pt-67 --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−270 °C to 0 °C	0 °C to 400 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	5.894 548 229 7 . . .	5.894 548 226 5 . . .
c_2 =	$2.177\ 354\ 616\ 7 \times 10^{-2}$	$1.509\ 134\ 765\ 2 \times 10^{-2}$
c_3 =	$2.826\ 761\ 733\ 1 \times 10^{-4}$	$1.385\ 988\ 324\ 2 \times 10^{-4}$
c_4 =	$2.256\ 129\ 063\ 2 \times 10^{-5}$	$-1.827\ 351\ 164\ 9 \times 10^{-6}$
c_5 =	$9.502\ 026\ 902\ 0 \times 10^{-7}$	$1.033\ 635\ 649\ 1 \times 10^{-8}$
c_6 =	$2.412\ 716\ 823\ 3 \times 10^{-8}$	$-3.065\ 826\ 553\ 4 \times 10^{-11}$
c_7 =	$3.910\ 747\ 567\ 8 \times 10^{-10}$	$4.681\ 530\ 823\ 5 \times 10^{-14}$
c_8 =	$4.217\ 403\ 476\ 6 \times 10^{-12}$	$-2.974\ 071\ 681\ 2 \times 10^{-17}$
c_9 =	$3.094\ 671\ 890\ 4 \times 10^{-14}$	$1.474\ 503\ 431\ 3 \times 10^{-21}$
c_{10} =	$1.551\ 930\ 033\ 9 \times 10^{-16}$	$-3.659\ 405\ 308\ 7 \times 10^{-25}$
c_{11} =	$5.235\ 860\ 981\ 1 \times 10^{-19}$	
c_{12} =	$1.136\ 383\ 791\ 3 \times 10^{-21}$	
c_{13} =	$1.433\ 054\ 079\ 2 \times 10^{-24}$	
c_{14} =	$7.979\ 515\ 392\ 7 \times 10^{-28}$	

TABLE 9.4.2. *Thermoelectric values at fixed points for type TP thermoelements versus platinum, Pt-67*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
e-Hydrogen TP	−259.3467	15.00	−1.183	−132.47
Neon TP	−248.5939	−4.71	−2.421	−99.03
Oxygen TP	−218.7916	−110.97	−4.369	−27.85
Argon TP	−189.3442	−239.56	−4.004	43.94
Mercury TP	−38.8344	−197.91	4.282	43.55
Ice MP	0.000	0.00	5.895	30.18
Water TP	0.01	0.1	5.895	30.19
Gallium MP	29.7646	191.3	7.005	40.28
Indium FP	156.5985	1345.2	10.793	24.27
Tin FP	231.928	2229.0	12.687	25.15
Cadmium FP	321.069	3455.2	14.783	22.82
Lead FP	327.462	3550.2	14.930	22.92

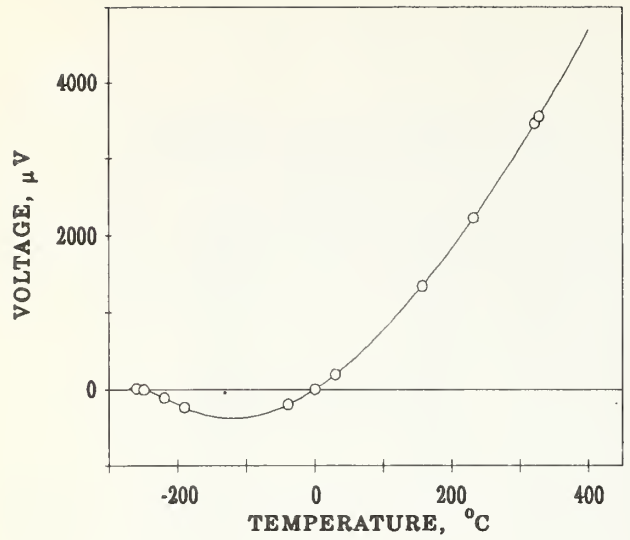

FIGURE 9.4.1. *Thermoelectric voltage for type TP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

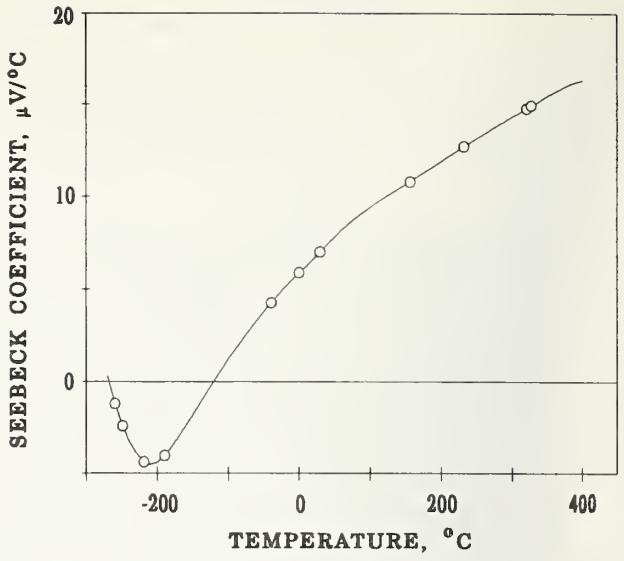

FIGURE 9.4.2. *Seebeck coefficient for type TP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

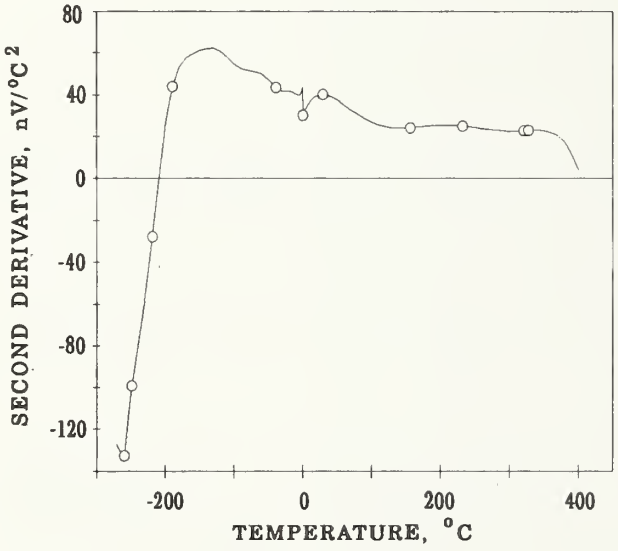

FIGURE 9.4.3. *Second derivative of thermoelectric voltage for type TP thermoelements versus platinum, Pt-67. The circles indicate values at various thermometric fixed points.*

TABLE 9.4.3. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
−270	19.68	0.304	−127.42	−230	−64.42	−3.880	−58.35	−190	−236.93	−4.032	43.04
−269	19.91	0.172	−134.49	−229	−68.33	−3.937	−55.92	−189	−240.94	−3.988	44.40
−268	20.02	0.035	−139.37	−228	−72.29	−3.992	−53.43	−188	−244.91	−3.943	45.67
−267	19.98	−0.106	−142.42	−227	−76.31	−4.044	−50.88	−187	−248.83	−3.897	46.87
−266	19.81	−0.249	−143.97	−226	−80.38	−4.094	−48.26	−186	−252.70	−3.850	47.98
−265	19.49	−0.393	−144.27	−225	−84.50	−4.141	−45.58	−185	−256.52	−3.801	49.02
−264	19.02	−0.537	−143.57	−224	−88.66	−4.185	−42.85	−184	−260.30	−3.752	49.99
−263	18.41	−0.680	−142.08	−223	−92.87	−4.226	−40.06	−183	−264.03	−3.701	50.88
−262	17.66	−0.821	−139.98	−222	−97.11	−4.265	−37.22	−182	−267.70	−3.650	51.71
−261	16.77	−0.960	−137.41	−221	−101.40	−4.301	−34.34	−181	−271.33	−3.598	52.47
−260	15.74	−1.096	−134.50	−220	−105.71	−4.334	−31.42	−180	−274.90	−3.545	53.17
−259	14.58	−1.229	−131.36	−219	−110.06	−4.364	−28.47	−179	−278.42	−3.491	53.82
−258	13.28	−1.359	−128.09	−218	−114.44	−4.390	−25.49	−178	−281.88	−3.437	54.41
−257	11.86	−1.485	−124.74	−217	−118.84	−4.414	−22.50	−177	−285.29	−3.383	54.96
−256	10.32	−1.608	−121.38	−216	−123.27	−4.435	−19.49	−176	−288.65	−3.327	55.45
−255	8.65	−1.728	−118.05	−215	−127.71	−4.453	−16.48	−175	−291.95	−3.272	55.90
−254	6.86	−1.844	−114.79	−214	−132.17	−4.468	−13.48	−174	−295.19	−3.216	56.31
−253	4.96	−1.957	−111.62	−213	−136.65	−4.480	−10.48	−173	−298.38	−3.159	56.69
−252	2.95	−2.067	−108.56	−212	−141.13	−4.489	−7.50	−172	−301.51	−3.102	57.03
−251	0.83	−2.175	−105.61	−211	−145.63	−4.495	−4.54	−171	−304.58	−3.045	57.35
−250	−1.40	−2.279	−102.79	−210	−150.12	−4.499	−1.62	−170	−307.60	−2.988	57.63
−249	−3.73	−2.380	−100.09	−209	−154.62	−4.499	1.27	−169	−310.56	−2.930	57.89
−248	−6.16	−2.479	−97.51	−208	−159.12	−4.496	4.11	−168	−313.46	−2.872	58.13
−247	−8.69	−2.575	−95.04	−207	−163.61	−4.490	6.91	−167	−316.30	−2.814	58.36
−246	−11.31	−2.669	−92.67	−206	−168.10	−4.482	9.65	−166	−319.08	−2.755	58.56
−245	−14.03	−2.761	−90.39	−205	−172.58	−4.471	12.33	−165	−321.81	−2.696	58.75
−244	−16.83	−2.850	−88.19	−204	−177.04	−4.458	14.94	−164	−324.48	−2.638	58.93
−243	−19.72	−2.937	−86.04	−203	−181.49	−4.441	17.49	−163	−327.08	−2.579	59.10
−242	−22.70	−3.022	−83.95	−202	−185.92	−4.423	19.96	−162	−329.63	−2.519	59.26
−241	−25.77	−3.105	−81.90	−201	−190.34	−4.401	22.35	−161	−332.12	−2.460	59.42
−240	−28.91	−3.186	−79.86	−200	−194.73	−4.378	24.67	−160	−334.55	−2.401	59.57
−239	−32.14	−3.265	−77.84	−199	−199.09	−4.352	26.90	−159	−336.92	−2.341	59.72
−238	−35.44	−3.341	−75.81	−198	−203.43	−4.324	29.04	−158	−339.23	−2.281	59.86
−237	−38.82	−3.416	−73.76	−197	−207.74	−4.294	31.10	−157	−341.49	−2.221	60.00
−236	−42.27	−3.489	−71.70	−196	−212.02	−4.262	33.07	−156	−343.68	−2.161	60.14
−235	−45.80	−3.560	−69.60	−195	−216.26	−4.228	34.96	−155	−345.81	−2.101	60.28
−234	−49.39	−3.628	−67.45	−194	−220.47	−4.192	36.75	−154	−347.88	−2.041	60.41
−233	−53.05	−3.695	−65.26	−193	−224.65	−4.154	38.46	−153	−349.89	−1.980	60.55
−232	−56.78	−3.759	−63.02	−192	−228.78	−4.115	40.07	−152	−351.84	−1.919	60.69
−231	−60.57	−3.821	−60.71	−191	−232.88	−4.074	41.60	−151	−353.73	−1.859	60.82
−230	−64.42	−3.880	−58.35	−190	−236.93	−4.032	43.04	−150	−355.56	−1.798	60.95

TABLE 9.4.3. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
−150	−355.56	−1.798	60.95	−100	−368.79	1.213	54.73	−50	−242.94	3.776	47.24
−149	−357.32	−1.737	61.08	−99	−367.55	1.267	54.45	−49	−239.14	3.823	46.90
−148	−359.03	−1.676	61.21	−98	−366.25	1.322	54.18	−48	−235.29	3.870	46.56
−147	−360.67	−1.614	61.34	−97	−364.90	1.376	53.92	−47	−231.40	3.916	46.21
−146	−362.26	−1.553	61.46	−96	−363.50	1.429	53.68	−46	−227.46	3.962	45.86
−145	−363.78	−1.491	61.58	−95	−362.05	1.483	53.45	−45	−223.48	4.008	45.51
−144	−365.24	−1.430	61.69	−94	−360.54	1.536	53.23	−44	−219.45	4.053	45.17
−143	−366.64	−1.368	61.79	−93	−358.97	1.589	53.02	−43	−215.37	4.098	44.83
−142	−367.98	−1.306	61.89	−92	−357.36	1.642	52.83	−42	−211.25	4.143	44.50
−141	−369.25	−1.244	61.98	−91	−355.69	1.695	52.66	−41	−207.08	4.187	44.19
−140	−370.47	−1.182	62.07	−90	−353.97	1.748	52.50	−40	−202.88	4.231	43.88
−139	−371.62	−1.120	62.14	−89	−352.19	1.800	52.35	−39	−198.62	4.275	43.59
−138	−372.71	−1.058	62.20	−88	−350.37	1.852	52.22	−38	−194.33	4.318	43.32
−137	−373.73	−0.996	62.25	−87	−348.49	1.904	52.10	−37	−189.99	4.362	43.07
−136	−374.70	−0.933	62.28	−86	−346.56	1.957	51.99	−36	−185.60	4.405	42.84
−135	−375.60	−0.871	62.31	−85	−344.58	2.008	51.89	−35	−181.18	4.447	42.63
−134	−376.44	−0.809	62.32	−84	−342.54	2.060	51.81	−34	−176.71	4.490	42.45
−133	−377.22	−0.747	62.31	−83	−340.46	2.112	51.74	−33	−172.20	4.532	42.28
−132	−377.93	−0.684	62.29	−82	−338.32	2.164	51.68	−32	−167.64	4.574	42.14
−131	−378.59	−0.622	62.25	−81	−336.13	2.215	51.63	−31	−163.05	4.616	42.03
−130	−379.18	−0.560	62.20	−80	−333.89	2.267	51.58	−30	−158.41	4.658	41.93
−129	−379.70	−0.498	62.12	−79	−331.59	2.319	51.54	−29	−153.73	4.700	41.86
−128	−380.17	−0.436	62.04	−78	−329.25	2.370	51.51	−28	−149.01	4.742	41.81
−127	−380.58	−0.374	61.93	−77	−326.85	2.422	51.47	−27	−144.25	4.784	41.77
−126	−380.92	−0.312	61.81	−76	−324.41	2.473	51.44	−26	−139.44	4.826	41.75
−125	−381.20	−0.250	61.67	−75	−321.91	2.525	51.41	−25	−134.60	4.867	41.74
−124	−381.42	−0.188	61.51	−74	−319.36	2.576	51.38	−24	−129.71	4.909	41.74
−123	−381.58	−0.127	61.34	−73	−316.76	2.627	51.35	−23	−124.78	4.951	41.74
−122	−381.67	−0.066	61.15	−72	−314.10	2.679	51.31	−22	−119.81	4.993	41.74
−121	−381.71	−0.005	60.94	−71	−311.40	2.730	51.27	−21	−114.79	5.034	41.74
−120	−381.68	0.056	60.72	−70	−308.64	2.781	51.21	−20	−109.74	5.076	41.73
−119	−381.60	0.117	60.48	−69	−305.84	2.832	51.15	−19	−104.64	5.118	41.71
−118	−381.45	0.177	60.23	−68	−302.98	2.883	51.08	−18	−99.50	5.160	41.66
−117	−381.24	0.237	59.97	−67	−300.07	2.934	51.00	−17	−94.32	5.201	41.60
−116	−380.97	0.297	59.70	−66	−297.11	2.985	50.90	−16	−89.10	5.243	41.51
−115	−380.65	0.357	59.41	−65	−294.10	3.036	50.79	−15	−83.83	5.284	41.40
−114	−380.26	0.416	59.12	−64	−291.04	3.087	50.67	−14	−78.53	5.326	41.25
−113	−379.81	0.475	58.81	−63	−287.92	3.138	50.53	−13	−73.18	5.367	41.09
−112	−379.31	0.534	58.50	−62	−284.76	3.188	50.37	−12	−67.80	5.408	40.89
−111	−378.75	0.592	58.19	−61	−281.55	3.238	50.20	−11	−62.37	5.449	40.68
−110	−378.13	0.650	57.87	−60	−278.28	3.288	50.01	−10	−56.90	5.489	40.47
−109	−377.45	0.708	57.55	−59	−274.97	3.338	49.80	−9	−51.39	5.529	40.25
−108	−376.71	0.765	57.22	−58	−271.61	3.388	49.58	−8	−45.84	5.570	40.06
−107	−375.92	0.822	56.90	−57	−268.20	3.438	49.33	−7	−40.25	5.610	39.91
−106	−375.07	0.879	56.57	−56	−264.73	3.487	49.08	−6	−34.62	5.649	39.83
−105	−374.16	0.935	56.25	−55	−261.22	3.536	48.80	−5	−28.95	5.689	39.86
−104	−373.20	0.991	55.93	−54	−257.66	3.584	48.52	−4	−23.24	5.729	40.05
−103	−372.18	1.047	55.62	−53	−254.05	3.633	48.21	−3	−17.49	5.769	40.44
−102	−371.10	1.103	55.32	−52	−250.40	3.681	47.90	−2	−11.70	5.810	41.10
−101	−369.97	1.158	55.02	−51	−246.69	3.728	47.58	−1	−5.87	5.852	42.10
−100	−368.79	1.213	54.73	−50	−242.94	3.776	47.24	0	0.00	5.895	43.55

TABLE 9.4.3. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
0	0.0	5.895	30.18	**50**	341.1	7.800	37.62	**100**	773.3	9.394	26.82
1	5.9	5.925	30.99	**51**	349.0	7.837	37.41	**101**	782.7	9.421	26.67
2	11.9	5.957	31.76	**52**	356.8	7.875	37.19	**102**	792.2	9.447	26.53
3	17.8	5.989	32.49	**53**	364.7	7.912	36.97	**103**	801.6	9.474	26.40
4	23.8	6.021	33.17	**54**	372.6	7.949	36.74	**104**	811.1	9.500	26.26
5	29.9	6.055	33.82	**55**	380.6	7.985	36.51	**105**	820.6	9.526	26.14
6	35.9	6.089	34.43	**56**	388.6	8.022	36.28	**106**	830.2	9.553	26.01
7	42.0	6.124	35.00	**57**	396.7	8.058	36.04	**107**	839.7	9.578	25.89
8	48.2	6.159	35.53	**58**	404.7	8.094	35.80	**108**	849.3	9.604	25.78
9	54.4	6.195	36.04	**59**	412.8	8.129	35.56	**109**	858.9	9.630	25.66
10	60.6	6.231	36.50	**60**	421.0	8.165	35.32	**110**	868.6	9.656	25.56
11	66.8	6.268	36.94	**61**	429.2	8.200	35.08	**111**	878.3	9.681	25.45
12	73.1	6.305	37.34	**62**	437.4	8.235	34.83	**112**	887.9	9.707	25.35
13	79.4	6.343	37.72	**63**	445.6	8.270	34.59	**113**	897.7	9.732	25.26
14	85.8	6.380	38.06	**64**	453.9	8.304	34.35	**114**	907.4	9.757	25.17
15	92.2	6.419	38.38	**65**	462.3	8.338	34.10	**115**	917.2	9.782	25.08
16	98.6	6.457	38.66	**66**	470.6	8.372	33.86	**116**	927.0	9.807	25.00
17	105.1	6.496	38.92	**67**	479.0	8.406	33.61	**117**	936.8	9.832	24.92
18	111.6	6.535	39.16	**68**	487.4	8.440	33.37	**118**	946.6	9.857	24.84
19	118.2	6.574	39.37	**69**	495.9	8.473	33.12	**119**	956.5	9.882	24.77
20	124.8	6.614	39.56	**70**	504.4	8.506	32.88	**120**	966.4	9.907	24.70
21	131.4	6.653	39.72	**71**	512.9	8.539	32.64	**121**	976.3	9.931	24.64
22	138.1	6.693	39.86	**72**	521.4	8.571	32.40	**122**	986.3	9.956	24.58
23	144.8	6.733	39.98	**73**	530.0	8.603	32.16	**123**	996.2	9.980	24.52
24	151.5	6.773	40.08	**74**	538.6	8.636	31.92	**124**	1006.2	10.005	24.47
25	158.3	6.813	40.16	**75**	547.3	8.667	31.69	**125**	1016.2	10.029	24.42
26	165.2	6.853	40.22	**76**	556.0	8.699	31.46	**126**	1026.3	10.054	24.37
27	172.0	6.894	40.26	**77**	564.7	8.730	31.23	**127**	1036.3	10.078	24.33
28	179.0	6.934	40.28	**78**	573.4	8.761	31.00	**128**	1046.4	10.102	24.29
29	185.9	6.974	40.29	**79**	582.2	8.792	30.77	**129**	1056.6	10.127	24.26
30	192.9	7.015	40.28	**80**	591.0	8.823	30.55	**130**	1066.7	10.151	24.22
31	199.9	7.055	40.25	**81**	599.9	8.853	30.33	**131**	1076.9	10.175	24.19
32	207.0	7.095	40.21	**82**	608.7	8.884	30.11	**132**	1087.0	10.199	24.17
33	214.1	7.135	40.16	**83**	617.6	8.914	29.90	**133**	1097.3	10.223	24.14
34	221.3	7.175	40.09	**84**	626.6	8.943	29.69	**134**	1107.5	10.248	24.12
35	228.5	7.215	40.01	**85**	635.5	8.973	29.48	**135**	1117.7	10.272	24.11
36	235.7	7.255	39.92	**86**	644.5	9.002	29.28	**136**	1128.0	10.296	24.09
37	243.0	7.295	39.81	**87**	653.5	9.032	29.08	**137**	1138.3	10.320	24.08
38	250.3	7.335	39.70	**88**	662.6	9.060	28.88	**138**	1148.7	10.344	24.07
39	257.7	7.375	39.57	**89**	671.6	9.089	28.69	**139**	1159.0	10.368	24.06
40	265.1	7.414	39.43	**90**	680.7	9.118	28.50	**140**	1169.4	10.392	24.06
41	272.5	7.453	39.29	**91**	689.9	9.146	28.31	**141**	1179.8	10.416	24.06
42	280.0	7.493	39.13	**92**	699.0	9.174	28.13	**142**	1190.2	10.440	24.06
43	287.5	7.532	38.97	**93**	708.2	9.203	27.95	**143**	1200.7	10.464	24.06
44	295.0	7.571	38.79	**94**	717.4	9.230	27.78	**144**	1211.2	10.488	24.06
45	302.6	7.609	38.62	**95**	726.7	9.258	27.61	**145**	1221.7	10.512	24.07
46	310.2	7.648	38.43	**96**	736.0	9.286	27.44	**146**	1232.2	10.536	24.08
47	317.9	7.686	38.24	**97**	745.3	9.313	27.28	**147**	1242.7	10.561	24.09
48	325.6	7.724	38.04	**98**	754.6	9.340	27.12	**148**	1253.3	10.585	24.10
49	333.4	7.762	37.83	**99**	763.9	9.367	26.97	**149**	1263.9	10.609	24.12
50	341.1	7.800	37.62	**100**	773.3	9.394	26.82	**150**	1274.5	10.633	24.13

TABLE 9.4.3. ***Type TP thermoelements versus platinum, Pt-67*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	1274.5	10.633	24.13	**200**	1836.9	11.875	25.47	**250**	2462.4	13.135	24.44
151	1285.2	10.657	24.15	**201**	1848.8	11.900	25.49	**251**	2475.5	13.159	24.39
152	1295.8	10.681	24.17	**202**	1860.7	11.926	25.50	**252**	2488.7	13.184	24.35
153	1306.5	10.705	24.19	**203**	1872.7	11.951	25.50	**253**	2501.9	13.208	24.30
154	1317.3	10.730	24.21	**204**	1884.6	11.977	25.51	**254**	2515.1	13.232	24.25
155	1328.0	10.754	24.23	**205**	1896.6	12.002	25.52	**255**	2528.4	13.257	24.21
156	1338.8	10.778	24.26	**206**	1908.6	12.028	25.52	**256**	2541.6	13.281	24.16
157	1349.6	10.802	24.28	**207**	1920.7	12.053	25.53	**257**	2554.9	13.305	24.11
158	1360.4	10.827	24.31	**208**	1932.7	12.079	25.53	**258**	2568.2	13.329	24.07
159	1371.2	10.851	24.34	**209**	1944.8	12.104	25.53	**259**	2581.6	13.353	24.02
160	1382.1	10.875	24.37	**210**	1956.9	12.130	25.53	**260**	2594.9	13.377	23.97
161	1393.0	10.900	24.40	**211**	1969.1	12.155	25.52	**261**	2608.3	13.401	23.92
162	1403.9	10.924	24.43	**212**	1981.2	12.181	25.52	**262**	2621.7	13.425	23.88
163	1414.8	10.949	24.46	**213**	1993.4	12.206	25.52	**263**	2635.2	13.449	23.83
164	1425.8	10.973	24.49	**214**	2005.7	12.232	25.51	**264**	2648.6	13.473	23.78
165	1436.8	10.998	24.52	**215**	2017.9	12.257	25.50	**265**	2662.1	13.496	23.74
166	1447.8	11.022	24.55	**216**	2030.2	12.283	25.49	**266**	2675.6	13.520	23.69
167	1458.8	11.047	24.59	**217**	2042.5	12.308	25.48	**267**	2689.2	13.544	23.65
168	1469.9	11.071	24.62	**218**	2054.8	12.334	25.47	**268**	2702.7	13.567	23.60
169	1480.9	11.096	24.65	**219**	2067.1	12.359	25.45	**269**	2716.3	13.591	23.56
170	1492.0	11.121	24.69	**220**	2079.5	12.385	25.44	**270**	2729.9	13.615	23.52
171	1503.2	11.145	24.72	**221**	2091.9	12.410	25.42	**271**	2743.5	13.638	23.47
172	1514.3	11.170	24.75	**222**	2104.3	12.436	25.40	**272**	2757.2	13.661	23.43
173	1525.5	11.195	24.79	**223**	2116.8	12.461	25.38	**273**	2770.9	13.685	23.39
174	1536.7	11.220	24.82	**224**	2129.3	12.486	25.36	**274**	2784.6	13.708	23.35
175	1548.0	11.244	24.85	**225**	2141.7	12.512	25.34	**275**	2798.3	13.732	23.31
176	1559.2	11.269	24.89	**226**	2154.3	12.537	25.32	**276**	2812.0	13.755	23.27
177	1570.5	11.294	24.92	**227**	2166.8	12.562	25.29	**277**	2825.8	13.778	23.23
178	1581.8	11.319	24.95	**228**	2179.4	12.588	25.27	**278**	2839.6	13.801	23.19
179	1593.1	11.344	24.98	**229**	2192.0	12.613	25.24	**279**	2853.4	13.825	23.16
180	1604.5	11.369	25.02	**230**	2204.6	12.638	25.21	**280**	2867.2	13.848	23.12
181	1615.9	11.394	25.05	**231**	2217.3	12.663	25.18	**281**	2881.1	13.871	23.09
182	1627.3	11.419	25.08	**232**	2230.0	12.688	25.15	**282**	2895.0	13.894	23.06
183	1638.7	11.444	25.11	**233**	2242.7	12.714	25.12	**283**	2908.9	13.917	23.02
184	1650.2	11.469	25.14	**234**	2255.4	12.739	25.09	**284**	2922.8	13.940	22.99
185	1661.7	11.495	25.16	**235**	2268.1	12.764	25.05	**285**	2936.7	13.963	22.96
186	1673.2	11.520	25.19	**236**	2280.9	12.789	25.02	**286**	2950.7	13.986	22.94
187	1684.7	11.545	25.22	**237**	2293.7	12.814	24.98	**287**	2964.7	14.009	22.91
188	1696.2	11.570	25.24	**238**	2306.5	12.839	24.94	**288**	2978.7	14.032	22.88
189	1707.8	11.595	25.27	**239**	2319.4	12.864	24.91	**289**	2992.8	14.055	22.86
190	1719.4	11.621	25.29	**240**	2332.3	12.888	24.87	**290**	3006.8	14.077	22.84
191	1731.1	11.646	25.32	**241**	2345.2	12.913	24.83	**291**	3020.9	14.100	22.82
192	1742.7	11.671	25.34	**242**	2358.1	12.938	24.79	**292**	3035.0	14.123	22.80
193	1754.4	11.697	25.36	**243**	2371.0	12.963	24.74	**293**	3049.2	14.146	22.78
194	1766.1	11.722	25.38	**244**	2384.0	12.988	24.70	**294**	3063.3	14.169	22.76
195	1777.9	11.747	25.40	**245**	2397.0	13.012	24.66	**295**	3077.5	14.191	22.74
196	1789.6	11.773	25.42	**246**	2410.0	13.037	24.62	**296**	3091.7	14.214	22.73
197	1801.4	11.798	25.43	**247**	2423.1	13.062	24.57	**297**	3105.9	14.237	22.72
198	1813.2	11.824	25.45	**248**	2436.2	13.086	24.53	**298**	3120.2	14.259	22.71
199	1825.1	11.849	25.46	**249**	2449.3	13.111	24.48	**299**	3134.5	14.282	22.70
200	1836.9	11.875	25.47	**250**	2462.4	13.135	24.44	**300**	3148.8	14.305	22.69

TABLE 9.4.3. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
300	3148.8	14.305	22.69	335	3663.4	15.103	23.03	370	4205.9	15.887	20.45
301	3163.1	14.328	22.68	336	3678.5	15.126	23.03	371	4221.8	15.907	20.21
302	3177.4	14.350	22.68	337	3693.6	15.149	23.04	372	4237.7	15.928	19.96
303	3191.8	14.373	22.67	338	3708.8	15.172	23.05	373	4253.7	15.947	19.69
304	3206.2	14.396	22.67	339	3723.9	15.195	23.05	374	4269.6	15.967	19.41
305	3220.6	14.418	22.67	340	3739.2	15.218	23.05	375	4285.6	15.986	19.11
306	3235.0	14.441	22.67	341	3754.4	15.241	23.05	376	4301.6	16.005	18.79
307	3249.5	14.464	22.67	342	3769.6	15.264	23.04	377	4317.6	16.024	18.46
308	3263.9	14.486	22.67	343	3784.9	15.287	23.03	378	4333.6	16.042	18.11
309	3278.4	14.509	22.68	344	3800.2	15.310	23.02	379	4349.7	16.060	17.73
310	3292.9	14.532	22.68	345	3815.5	15.333	23.01	380	4365.8	16.078	17.34
311	3307.5	14.554	22.69	346	3830.9	15.356	22.99	381	4381.8	16.095	16.93
312	3322.1	14.577	22.70	347	3846.2	15.379	22.96	382	4398.0	16.111	16.50
313	3336.6	14.600	22.71	348	3861.6	15.402	22.93	383	4414.1	16.128	16.04
314	3351.3	14.622	22.72	349	3877.0	15.425	22.90	384	4430.2	16.143	15.56
315	3365.9	14.645	22.73	350	3892.5	15.448	22.86	385	4446.4	16.159	15.06
316	3380.5	14.668	22.74	351	3907.9	15.471	22.82	386	4462.5	16.174	14.54
317	3395.2	14.691	22.76	352	3923.4	15.493	22.77	387	4478.7	16.188	13.99
318	3409.9	14.713	22.77	353	3938.9	15.516	22.71	388	4494.9	16.202	13.41
319	3424.6	14.736	22.78	354	3954.5	15.539	22.65	389	4511.1	16.215	12.81
320	3439.4	14.759	22.80	355	3970.0	15.562	22.58	390	4527.3	16.227	12.18
321	3454.2	14.782	22.81	356	3985.6	15.584	22.51	391	4543.6	16.239	11.52
322	3469.0	14.805	22.83	357	4001.2	15.607	22.42	392	4559.8	16.250	10.83
323	3483.8	14.827	22.85	358	4016.8	15.629	22.33	393	4576.1	16.261	10.11
324	3498.6	14.850	22.86	359	4032.4	15.651	22.23	394	4592.3	16.270	9.37
325	3513.5	14.873	22.88	360	4048.1	15.673	22.12	395	4608.6	16.279	8.59
326	3528.4	14.896	22.90	361	4063.8	15.695	22.00	396	4624.9	16.288	7.77
327	3543.3	14.919	22.91	362	4079.5	15.717	21.88	397	4641.2	16.295	6.92
328	3558.2	14.942	22.93	363	4095.2	15.739	21.74	398	4657.5	16.301	6.04
329	3573.2	14.965	22.95	364	4111.0	15.761	21.59	399	4673.8	16.307	5.13
330	3588.1	14.988	22.96	365	4126.7	15.782	21.43	400	4690.1	16.312	4.17
331	3603.1	15.011	22.98	366	4142.5	15.804	21.26				
332	3618.1	15.034	22.99	367	4158.3	15.825	21.07				
333	3633.2	15.057	23.00	368	4174.2	15.846	20.88				
334	3648.3	15.080	23.02	369	4190.0	15.867	20.67				
335	3663.4	15.103	23.03	370	4205.9	15.887	20.45				

9.5. Reference Function and Table for Platinum, Pt-67, Versus the Negative Thermoelement, Type TN, a Copper-Nickel Alloy

The coefficients, c_i, for the thirteenth degree polynomial and for the tenth degree polynomial that give the thermoelectric voltage, E, of Pt-67 versus type TN (or EN) thermoelements as a function of temperature, t_{90}, in the −270 °C to 0 °C and 0 °C to 1000 °C ranges, respectively, are given in table 9.5.1. The polynomials are of the form:

$$E = \sum_{i=0}^{n} c_i (t_{90})^i,$$

where E is in microvolts and t_{90} is in degrees Celsius (ITS-90).

Values of the thermoelectric voltage, its first derivative (Seebeck coefficient), and second derivative for Pt-67 versus type TN (or EN) thermoelements at selected fixed points are given in table 9.5.2. The reference values for Pt-67 versus type TN (or EN) thermoelements are given at 1 °C intervals from −270 °C to 1000 °C in table 9.5.3. Graphs of the thermoelectric voltage, its first derivative, and second derivative are given in figures 9.5.1, 9.5.2, and 9.5.3, respectively. The discontinuity in the second derivative at 0 °C is apparent in figure 9.5.3. It results from the equations for the two temperature regions being joined without constraints on their second derivatives.

It should be stressed that **type TN (or EN) thermoelement materials that conform closely to the high temperature tabular values may not necessarily conform closely at low temperatures (below 0 °C) and vice versa.** If type TN (or EN) thermoelements are to be used for accurate measurements both above and below 0 °C, then the material must be calibrated in the full temperature range, both above and below 0 °C. Special selection of material will usually be required.

TABLE 9.5.1. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- coefficients, c_i, of reference equations giving the thermoelectric voltage, E, as a function of temperature, t_{90}, for the indicated temperature ranges. The equations are of the form: $E = \sum_{i=0}^{n} c_i (t_{90})^i$, where E is in microvolts and t_{90} is in degrees Celsius.*

Temperature Range:	−270 °C to 0 °C	0 °C to 1000 °C
c_0 =	0.000 000 000 0 . . .	0.000 000 000 0 . . .
c_1 =	$3.285\,355\,813\,4 \times 10^{1}$	$3.285\,355\,813\,8 \times 10^{1}$
c_2 =	$2.242\,088\,818\,1 \times 10^{-2}$	$1.820\,088\,022\,7 \times 10^{-2}$
c_3 =	$-1.642\,329\,422\,6 \times 10^{-4}$	$6.758\,360\,162\,4 \times 10^{-5}$
c_4 =	$-2.528\,317\,078\,0 \times 10^{-6}$	$-3.608\,745\,197\,5 \times 10^{-7}$
c_5 =	$-4.882\,249\,460\,9 \times 10^{-8}$	$6.605\,244\,362\,3 \times 10^{-10}$
c_6 =	$-1.476\,011\,640\,4 \times 10^{-9}$	$-1.574\,932\,377\,1 \times 10^{-13}$
c_7 =	$-3.036\,321\,473\,1 \times 10^{-11}$	$-1.336\,172\,944\,2 \times 10^{-15}$
c_8 =	$-3.680\,094\,883\,0 \times 10^{-13}$	$2.227\,815\,139\,1 \times 10^{-18}$
c_9 =	$-2.733\,196\,978\,5 \times 10^{-15}$	$-1.474\,503\,431\,3 \times 10^{-21}$
c_{10} =	$-1.267\,705\,560\,5 \times 10^{-17}$	$3.659\,405\,308\,7 \times 10^{-25}$
c_{11} =	$-3.589\,947\,524\,7 \times 10^{-20}$	
c_{12} =	$-5.682\,986\,428\,0 \times 10^{-23}$	
c_{13} =	$-3.855\,137\,308\,5 \times 10^{-26}$	

TABLE 9.5.2. *Thermoelectric values at fixed points for platinum, Pt-67, versus type TN (or EN) thermoelements*

Fixed Point	Temperature °C	E μV	S μV/°C	dS/dt_{90} $nV/°C^2$
e-Hydrogen TP	−259.3467	−6244.16	5.263	377.08
Neon TP	−248.5939	−6166.57	9.106	341.24
Oxygen TP	−218.7916	−5762.02	17.287	194.14
Argon TP	−189.3442	−5187.83	21.208	91.49
Mercury TP	−38.8344	−1236.32	30.747	56.83
Ice MP	0.000	0.00	32.854	36.40
Water TP	0.01	0.3	32.854	36.41
Gallium MP	29.7646	995.5	34.081	44.98
Indium FP	156.5985	5691.2	39.778	37.92
Tin FP	231.928	8784.1	42.199	26.85
Cadmium FP	321.069	12640.0	44.194	18.78
Lead FP	327.462	12922.9	44.312	18.38
Zinc FP	419.527	17072.9	45.760	13.07
Antimony FP	630.63	26912.8	46.919	−1.68
Aluminum FP	660.323	28305.0	46.851	−2.83
Silver FP	961.78	42177.6	44.526	−11.37

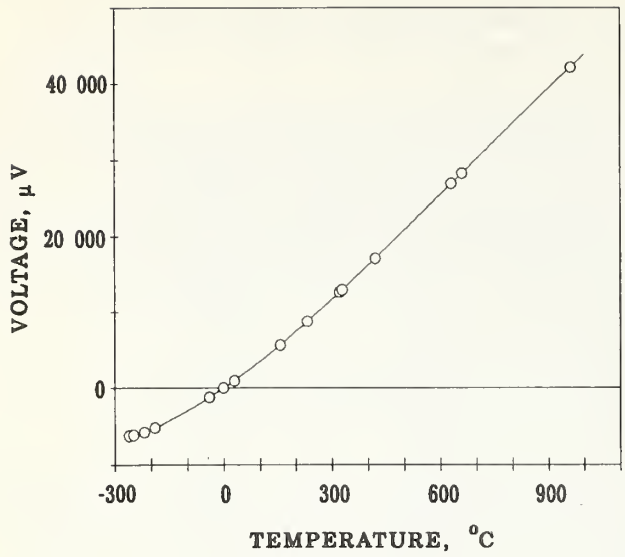

FIGURE 9.5.1. *Thermoelectric voltage for platinum, Pt-67, versus type TN thermoelements. The circles indicate values at various thermometric fixed points.*

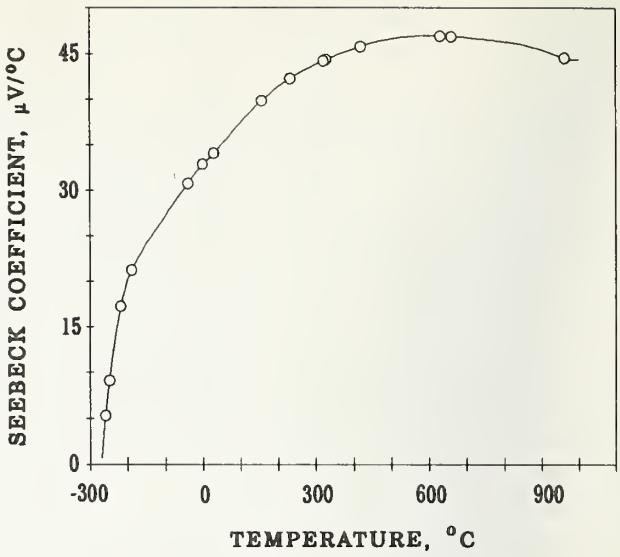

FIGURE 9.5.2. *Seebeck coefficient for platinum, Pt-67, versus type TN thermoelements. The circles indicate values at various thermometric fixed points.*

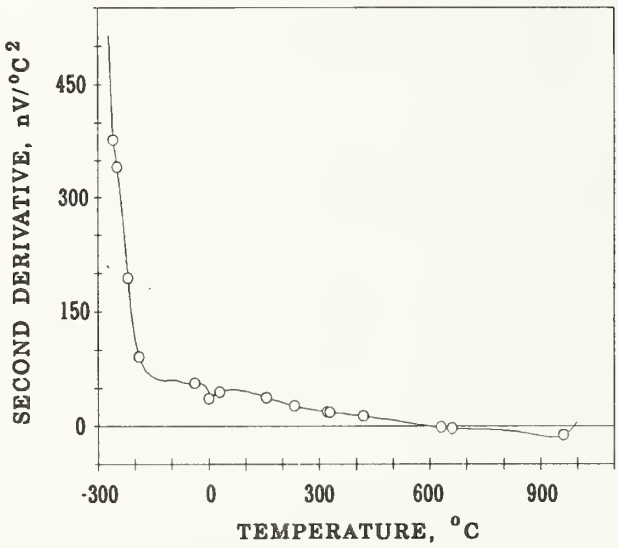

FIGURE 9.5.3. *Second derivative of thermoelectric voltage for platinum, Pt-67, versus type TN thermoelements. The circles indicate values at various thermometric fixed points.*

TABLE 9.5.3. ***Platinum, Pt-67, versus type TN (or EN) thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C²
−270	−6 277.19	0.705	513.94	−230	−5 942.27	14.758	257.65	−190	−5 201.72	21.148	92.58
−269	−6 276.23	1.207	490.12	−229	−5 927.39	15.013	251.94	−189	−5 180.52	21.239	90.93
−268	−6 274.78	1.686	469.48	−228	−5 912.25	15.262	246.20	−188	−5 159.24	21.330	89.36
−267	−6 272.87	2.147	451.65	−227	−5 896.87	15.506	240.44	−187	−5 137.86	21.418	87.89
−266	−6 270.50	2.590	436.29	−226	−5 881.24	15.743	234.67	−186	−5 116.40	21.505	86.49
−265	−6 267.69	3.020	423.10	−225	−5 865.38	15.975	228.91	−185	−5 094.85	21.591	85.18
−264	−6 264.46	3.437	411.78	−224	−5 849.29	16.201	223.18	−184	−5 073.22	21.676	83.95
−263	−6 260.82	3.844	402.10	−223	−5 832.98	16.421	217.48	−183	−5 051.50	21.759	82.79
−262	−6 256.78	4.242	393.81	−222	−5 816.45	16.636	211.83	−182	−5 029.70	21.841	81.69
−261	−6 252.34	4.632	386.71	−221	−5 799.71	16.845	206.23	−181	−5 007.82	21.923	80.66
−260	−6 247.51	5.016	380.61	−220	−5 782.76	17.048	200.71	−180	−4 985.86	22.003	79.68
−259	−6 242.31	5.393	375.34	−219	−5 765.62	17.246	195.27	−179	−4 963.81	22.082	78.77
−258	−6 236.73	5.766	370.74	−218	−5 748.27	17.439	189.92	−178	−4 941.69	22.160	77.90
−257	−6 230.78	6.135	366.70	−217	−5 730.74	17.626	184.66	−177	−4 919.49	22.238	77.08
−256	−6 224.46	6.500	363.08	−216	−5 713.02	17.808	179.52	−176	−4 897.22	22.314	76.31
−255	−6 217.78	6.861	359.79	−215	−5 695.13	17.985	174.48	−175	−4 874.86	22.390	75.57
−254	−6 210.74	7.220	356.73	−214	−5 677.05	18.157	169.57	−174	−4 852.44	22.466	74.88
−253	−6 203.34	7.575	353.82	−213	−5 658.81	18.324	164.78	−173	−4 829.93	22.540	74.22
−252	−6 195.59	7.927	350.99	−212	−5 640.41	18.487	160.13	−172	−4 807.36	22.614	73.60
−251	−6 187.49	8.277	348.18	−211	−5 621.84	18.645	155.60	−171	−4 784.71	22.687	73.00
−250	−6 179.04	8.624	345.35	−210	−5 603.12	18.798	151.22	−170	−4 761.98	22.760	72.43
−249	−6 170.24	8.968	342.45	−209	−5 584.25	18.947	146.97	−169	−4 739.19	22.832	71.89
−248	−6 161.10	9.309	339.45	−208	−5 565.23	19.092	142.87	−168	−4 716.32	22.904	71.37
−247	−6 151.63	9.646	336.31	−207	−5 546.06	19.233	138.92	−167	−4 693.38	22.975	70.87
−246	−6 141.81	9.981	333.03	−206	−5 526.76	19.370	135.10	−166	−4 670.37	23.046	70.39
−245	−6 131.66	10.312	329.57	−205	−5 507.32	19.503	131.44	−165	−4 647.29	23.116	69.92
−244	−6 121.19	10.640	325.94	−204	−5 487.76	19.633	127.91	−164	−4 624.14	23.185	69.48
−243	−6 110.38	10.964	322.12	−203	−5 468.06	19.759	124.53	−163	−4 600.92	23.255	69.04
−242	−6 099.26	11.284	318.12	−202	−5 448.24	19.882	121.30	−162	−4 577.63	23.324	68.63
−241	−6 087.82	11.600	313.92	−201	−5 428.30	20.002	118.20	−161	−4 554.27	23.392	68.22
−240	−6 076.06	11.912	309.54	−200	−5 408.24	20.119	115.24	−160	−4 530.84	23.460	67.83
−239	−6 063.99	12.219	304.98	−199	−5 388.06	20.232	112.42	−159	−4 507.35	23.528	67.45
−238	−6 051.62	12.522	300.25	−198	−5 367.77	20.343	109.73	−158	−4 483.79	23.595	67.08
−237	−6 038.95	12.820	295.36	−197	−5 347.37	20.452	107.17	−157	−4 460.16	23.662	66.72
−236	−6 025.99	13.113	290.31	−196	−5 326.87	20.558	104.74	−156	−4 436.46	23.728	66.37
−235	−6 012.73	13.400	285.13	−195	−5 306.26	20.661	102.43	−155	−4 412.70	23.795	66.02
−234	−5 999.19	13.683	279.83	−194	−5 285.55	20.763	100.24	−154	−4 388.88	23.860	65.69
−233	−5 985.36	13.960	274.41	−193	−5 264.73	20.862	98.16	−153	−4 364.98	23.926	65.37
−232	−5 971.27	14.232	268.90	−192	−5 243.82	20.959	96.20	−152	−4 341.02	23.991	65.05
−231	−5 956.90	14.498	263.31	−191	−5 222.82	21.054	94.34	−151	−4 317.00	24.056	64.74
−230	−5 942.27	14.758	257.65	−190	−5 201.72	21.148	92.58	−150	−4 292.91	24.121	64.45

TABLE 9.5.3. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
−150	−4 292.91	24.121	64.45	−100	−3 009.79	27.182	61.01	−50	−1 576.10	30.116	56.26
−149	−4 268.76	24.185	64.16	−99	−2 982.58	27.243	61.02	−49	−1 545.95	30.172	56.28
−148	−4 244.54	24.249	63.88	−98	−2 955.31	27.304	61.01	−48	−1 515.75	30.229	56.30
−147	−4 220.26	24.313	63.61	−97	−2 927.97	27.365	61.00	−47	−1 485.49	30.285	56.34
−146	−4 195.92	24.376	63.35	−96	−2 900.58	27.426	60.98	−46	−1 455.18	30.341	56.38
−145	−4 171.51	24.439	63.10	−95	−2 873.12	27.487	60.95	−45	−1 424.81	30.398	56.43
−144	−4 147.04	24.502	62.86	−94	−2 845.60	27.548	60.92	−44	−1 394.39	30.454	56.49
−143	−4 122.50	24.565	62.63	−93	−2 818.03	27.609	60.87	−43	−1 363.90	30.511	56.55
−142	−4 097.91	24.628	62.41	−92	−2 790.39	27.670	60.82	−42	−1 333.36	30.567	56.61
−141	−4 073.25	24.690	62.20	−91	−2 762.69	27.730	60.75	−41	−1 302.77	30.624	56.68
−140	−4 048.53	24.752	62.00	−90	−2 734.93	27.791	60.68	−40	−1 272.12	30.681	56.75
−139	−4 023.75	24.814	61.81	−89	−2 707.10	27.852	60.60	−39	−1 241.41	30.737	56.81
−138	−3 998.90	24.876	61.63	−88	−2 679.22	27.912	60.51	−38	−1 210.64	30.794	56.88
−137	−3 973.99	24.937	61.47	−87	−2 651.28	27.973	60.41	−37	−1 179.82	30.851	56.95
−136	−3 949.03	24.999	61.31	−86	−2 623.28	28.033	60.31	−36	−1 148.94	30.908	57.01
−135	−3 924.00	25.060	61.17	−85	−2 595.21	28.093	60.19	−35	−1 118.00	30.965	57.06
−134	−3 898.91	25.121	61.04	−84	−2 567.09	28.154	60.07	−34	−1 087.01	31.022	57.11
−133	−3 873.76	25.182	60.92	−83	−2 538.91	28.214	59.95	−33	−1 055.96	31.079	57.14
−132	−3 848.54	25.243	60.81	−82	−2 510.66	28.274	59.81	−32	−1 024.85	31.137	57.17
−131	−3 823.27	25.304	60.72	−81	−2 482.36	28.333	59.67	−31	− 993.68	31.194	57.19
−130	−3 797.94	25.364	60.63	−80	−2 454.00	28.393	59.53	−30	− 962.46	31.251	57.19
−129	−3 772.54	25.425	60.56	−79	−2 425.57	28.452	59.38	−29	− 931.18	31.308	57.18
−128	−3 747.09	25.485	60.49	−78	−2 397.09	28.512	59.22	−28	− 899.85	31.365	57.14
−127	−3 721.57	25.546	60.44	−77	−2 368.55	28.571	59.06	−27	− 868.45	31.422	57.10
−126	−3 695.99	25.606	60.40	−76	−2 339.95	28.630	58.90	−26	− 837.00	31.480	57.03
−125	−3 670.36	25.667	60.37	−75	−2 311.29	28.689	58.74	−25	− 805.49	31.536	56.94
−124	−3 644.66	25.727	60.34	−74	−2 282.57	28.747	58.58	−24	− 773.93	31.593	56.83
−123	−3 618.90	25.787	60.33	−73	−2 253.80	28.806	58.41	−23	− 742.31	31.650	56.69
−122	−3 593.09	25.848	60.32	−72	−2 224.96	28.864	58.25	−22	− 710.63	31.707	56.53
−121	−3 567.21	25.908	60.33	−71	−2 196.07	28.922	58.09	−21	− 678.89	31.763	56.34
−120	−3 541.27	25.968	60.34	−70	−2 167.12	28.980	57.93	−20	− 647.10	31.819	56.13
−119	−3 515.27	26.029	60.35	−69	−2 138.11	29.038	57.78	−19	− 615.25	31.875	55.88
−118	−3 489.21	26.089	60.38	−68	−2 109.04	29.096	57.62	−18	− 583.35	31.931	55.61
−117	−3 463.09	26.149	60.40	−67	−2 079.92	29.153	57.48	−17	− 551.39	31.987	55.31
−116	−3 436.92	26.210	60.44	−66	−2 050.73	29.211	57.34	−16	− 519.38	32.042	54.98
−115	−3 410.68	26.270	60.48	−65	−2 021.49	29.268	57.20	−15	− 487.31	32.097	54.61
−114	−3 384.37	26.331	60.52	−64	−1 992.20	29.325	57.07	−14	− 455.18	32.151	54.22
−113	−3 358.01	26.391	60.56	−63	−1 962.84	29.382	56.95	−13	− 423.01	32.205	53.79
−112	−3 331.59	26.452	60.60	−62	−1 933.43	29.439	56.84	−12	− 390.77	32.259	53.33
−111	−3 305.11	26.512	60.65	−61	−1 903.97	29.496	56.74	−11	− 358.49	32.312	52.83
−110	−3 278.57	26.573	60.70	−60	−1 874.44	29.553	56.64	−10	− 326.15	32.364	52.30
−109	−3 251.96	26.634	60.74	−59	−1 844.86	29.609	56.56	−9	− 293.76	32.416	51.74
−108	−3 225.30	26.695	60.79	−58	−1 815.22	29.666	56.48	−8	− 261.32	32.468	51.14
−107	−3 198.57	26.755	60.83	−57	−1 785.53	29.722	56.42	−7	− 228.83	32.519	50.50
−106	−3 171.79	26.816	60.87	−56	−1 755.78	29.778	56.36	−6	− 196.28	32.569	49.82
−105	−3 144.94	26.877	60.90	−55	−1 725.97	29.835	56.32	−5	− 163.69	32.618	49.11
−104	−3 118.03	26.938	60.94	−54	−1 696.11	29.891	56.29	−4	− 131.05	32.667	48.35
−103	−3 091.07	26.999	60.96	−53	−1 666.19	29.947	56.26	−3	− 98.35	32.715	47.55
−102	−3 064.04	27.060	60.99	−52	−1 636.22	30.004	56.25	−2	− 65.62	32.762	46.70
−101	−3 036.95	27.121	61.00	−51	−1 606.18	30.060	56.25	−1	− 32.83	32.808	45.80
−100	−3 009.79	27.182	61.01	−50	−1 576.10	30.116	56.26	0	0.00	32.854	44.84

TABLE 9.5.3. ***Platinum, Pt-67, versus type TN (or EN) thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E µV	S µV/°C	dS/dt_{90} nV/°C^2
0	0.0	32.854	36.40	50	1 694.6	35.020	47.46	100	3 505.2	37.391	45.94
1	32.9	32.890	36.80	51	1 729.6	35.068	47.52	101	3 542.6	37.437	45.83
2	65.8	32.927	37.20	52	1 764.7	35.115	47.58	102	3 580.1	37.483	45.73
3	98.7	32.965	37.58	53	1 799.9	35.163	47.64	103	3 617.6	37.528	45.62
4	131.7	33.002	37.96	54	1 835.0	35.211	47.69	104	3 655.1	37.574	45.50
5	164.7	33.040	38.32	55	1 870.3	35.258	47.73	105	3 692.7	37.619	45.39
6	197.8	33.079	38.68	56	1 905.6	35.306	47.78	106	3 730.4	37.665	45.28
7	230.9	33.118	39.03	57	1 940.9	35.354	47.81	107	3 768.1	37.710	45.16
8	264.0	33.157	39.38	58	1 976.3	35.402	47.84	108	3 805.8	37.755	45.04
9	297.2	33.197	39.71	59	2 011.7	35.450	47.87	109	3 843.6	37.800	44.92
10	330.4	33.236	40.04	60	2 047.2	35.497	47.90	110	3 881.4	37.845	44.80
11	363.7	33.277	40.36	61	2 082.7	35.545	47.92	111	3 919.3	37.889	44.67
12	397.0	33.317	40.67	62	2 118.3	35.593	47.93	112	3 957.2	37.934	44.55
13	430.3	33.358	40.97	63	2 153.9	35.641	47.94	113	3 995.1	37.979	44.42
14	463.7	33.399	41.27	64	2 189.5	35.689	47.95	114	4 033.1	38.023	44.29
15	497.1	33.440	41.55	65	2 225.2	35.737	47.95	115	4 071.2	38.067	44.16
16	530.6	33.482	41.83	66	2 261.0	35.785	47.95	116	4 109.3	38.111	44.03
17	564.1	33.524	42.11	67	2 296.8	35.833	47.94	117	4 147.4	38.155	43.90
18	597.6	33.566	42.37	68	2 332.7	35.881	47.93	118	4 185.6	38.199	43.76
19	631.2	33.609	42.63	69	2 368.6	35.929	47.92	119	4 223.8	38.243	43.63
20	664.8	33.652	42.88	70	2 404.5	35.977	47.90	120	4 262.0	38.286	43.49
21	698.5	33.695	43.13	71	2 440.5	36.025	47.88	121	4 300.4	38.330	43.35
22	732.2	33.738	43.37	72	2 476.6	36.073	47.86	122	4 338.7	38.373	43.21
23	766.0	33.781	43.60	73	2 512.7	36.120	47.83	123	4 377.1	38.416	43.07
24	799.8	33.825	43.82	74	2 548.8	36.168	47.80	124	4 415.5	38.459	42.93
25	833.6	33.869	44.04	75	2 585.0	36.216	47.77	125	4 454.0	38.502	42.79
26	867.5	33.913	44.25	76	2 621.3	36.264	47.73	126	4 492.5	38.545	42.64
27	901.5	33.958	44.45	77	2 657.5	36.311	47.69	127	4 531.1	38.587	42.50
28	935.4	34.002	44.65	78	2 693.9	36.359	47.64	128	4 569.7	38.630	42.35
29	969.5	34.047	44.84	79	2 730.3	36.407	47.59	129	4 608.4	38.672	42.21
30	1 003.5	34.092	45.02	80	2 766.7	36.454	47.54	130	4 647.1	38.714	42.06
31	1 037.7	34.137	45.20	81	2 803.2	36.502	47.49	131	4 685.8	38.756	41.91
32	1 071.8	34.182	45.37	82	2 839.7	36.549	47.43	132	4 724.6	38.798	41.76
33	1 106.0	34.228	45.53	83	2 876.3	36.597	47.37	133	4 763.4	38.840	41.61
34	1 140.3	34.273	45.69	84	2 912.9	36.644	47.31	134	4 802.3	38.881	41.46
35	1 174.6	34.319	45.85	85	2 949.6	36.691	47.24	135	4 841.2	38.923	41.31
36	1 208.9	34.365	45.99	86	2 986.3	36.739	47.17	136	4 880.1	38.964	41.16
37	1 243.3	34.411	46.13	87	3 023.0	36.786	47.10	137	4 919.1	39.005	41.01
38	1 277.7	34.457	46.27	88	3 059.8	36.833	47.03	138	4 958.1	39.046	40.85
39	1 312.2	34.504	46.40	89	3 096.7	36.880	46.95	139	4 997.2	39.087	40.70
40	1 346.7	34.550	46.52	90	3 133.6	36.927	46.87	140	5 036.3	39.127	40.54
41	1 381.3	34.597	46.64	91	3 170.6	36.973	46.79	141	5 075.4	39.168	40.39
42	1 415.9	34.643	46.75	92	3 207.5	37.020	46.70	142	5 114.6	39.208	40.23
43	1 450.6	34.690	46.86	93	3 244.6	37.067	46.62	143	5 153.8	39.248	40.08
44	1 485.3	34.737	46.96	94	3 281.7	37.113	46.53	144	5 193.1	39.288	39.92
45	1 520.1	34.784	47.06	95	3 318.8	37.160	46.43	145	5 232.4	39.328	39.76
46	1 554.9	34.831	47.15	96	3 356.0	37.206	46.34	146	5 271.8	39.368	39.60
47	1 589.7	34.878	47.23	97	3 393.2	37.253	46.24	147	5 311.2	39.407	39.45
48	1 624.6	34.926	47.31	98	3 430.5	37.299	46.14	148	5 350.6	39.446	39.29
49	1 659.6	34.973	47.39	99	3 467.8	37.345	46.04	149	5 390.0	39.486	39.13
50	1 694.6	35.020	47.46	100	3 505.2	37.391	45.94	150	5 429.6	39.525	38.97

TABLE 9.5.3. ***Platinum, Pt-67, versus type TN (or EN) thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
150	5 429.6	39.525	38.97	200	7 451.2	41.275	31.16	250	9 551.0	42.665	24.76
151	5 469.1	39.564	38.81	201	7 492.5	41.306	31.01	251	9 593.7	42.690	24.65
152	5 508.7	39.602	38.65	202	7 533.8	41.337	30.87	252	9 636.4	42.714	24.54
153	5 548.3	39.641	38.49	203	7 575.2	41.368	30.72	253	9 679.1	42.739	24.43
154	5 588.0	39.679	38.33	204	7 616.5	41.399	30.58	254	9 721.9	42.763	24.33
155	5 627.7	39.718	38.17	205	7 657.9	41.429	30.44	255	9 764.7	42.788	24.22
156	5 667.4	39.756	38.01	206	7 699.4	41.460	30.29	256	9 807.5	42.812	24.12
157	5 707.2	39.794	37.85	207	7 740.9	41.490	30.15	257	9 850.3	42.836	24.02
158	5 747.0	39.831	37.69	208	7 782.4	41.520	30.01	258	9 893.1	42.860	23.91
159	5 786.8	39.869	37.53	209	7 823.9	41.550	29.87	259	9 936.0	42.884	23.81
160	5 826.7	39.906	37.37	210	7 865.5	41.580	29.73	260	9 978.9	42.907	23.71
161	5 866.6	39.944	37.21	211	7 907.1	41.609	29.59	261	10 021.8	42.931	23.61
162	5 906.6	39.981	37.05	212	7 948.7	41.639	29.45	262	10 064.8	42.955	23.51
163	5 946.6	40.018	36.89	213	7 990.3	41.668	29.31	263	10 107.7	42.978	23.41
164	5 986.6	40.055	36.73	214	8 032.0	41.697	29.18	264	10 150.7	43.001	23.31
165	6 026.7	40.091	36.57	215	8 073.7	41.726	29.04	265	10 193.7	43.025	23.22
166	6 066.8	40.128	36.41	216	8 115.5	41.755	28.90	266	10 236.8	43.048	23.12
167	6 107.0	40.164	36.25	217	8 157.3	41.784	28.77	267	10 279.8	43.071	23.02
168	6 147.2	40.200	36.09	218	8 199.0	41.813	28.64	268	10 322.9	43.094	22.93
169	6 187.4	40.236	35.93	219	8 240.9	41.842	28.50	269	10 366.0	43.117	22.83
170	6 227.6	40.272	35.77	220	8 282.7	41.870	28.37	270	10 409.1	43.140	22.74
171	6 267.9	40.308	35.61	221	8 324.6	41.898	28.24	271	10 452.3	43.162	22.65
172	6 308.2	40.343	35.46	222	8 366.5	41.926	28.11	272	10 495.5	43.185	22.56
173	6 348.6	40.379	35.30	223	8 408.5	41.955	27.98	273	10 538.7	43.207	22.46
174	6 389.0	40.414	35.14	224	8 450.4	41.982	27.85	274	10 581.9	43.230	22.37
175	6 429.4	40.449	34.98	225	8 492.4	42.010	27.72	275	10 625.1	43.252	22.28
176	6 469.9	40.484	34.82	226	8 534.5	42.038	27.59	276	10 668.4	43.274	22.19
177	6 510.4	40.519	34.66	227	8 576.5	42.065	27.46	277	10 711.7	43.296	22.10
178	6 550.9	40.553	34.51	228	8 618.6	42.093	27.34	278	10 755.0	43.319	22.02
179	6 591.5	40.588	34.35	229	8 660.7	42.120	27.21	279	10 798.3	43.341	21.93
180	6 632.1	40.622	34.19	230	8 702.8	42.147	27.09	280	10 841.7	43.362	21.84
181	6 672.8	40.656	34.04	231	8 745.0	42.174	26.96	281	10 885.0	43.384	21.76
182	6 713.4	40.690	33.88	232	8 787.2	42.201	26.84	282	10 928.4	43.406	21.67
183	6 754.1	40.724	33.73	233	8 829.4	42.228	26.72	283	10 971.8	43.428	21.59
184	6 794.9	40.758	33.57	234	8 871.6	42.255	26.59	284	11 015.3	43.449	21.50
185	6 835.6	40.791	33.42	235	8 913.9	42.281	26.47	285	11 058.7	43.471	21.42
186	6 876.5	40.824	33.26	236	8 956.2	42.308	26.35	286	11 102.2	43.492	21.34
187	6 917.3	40.858	33.11	237	8 998.5	42.334	26.23	287	11 145.7	43.513	21.25
188	6 958.2	40.891	32.96	238	9 040.9	42.360	26.12	288	11 189.3	43.534	21.17
189	6 999.1	40.923	32.80	239	9 083.2	42.386	26.00	289	11 232.8	43.556	21.09
190	7 040.0	40.956	32.65	240	9 125.6	42.412	25.88	290	11 276.4	43.577	21.01
191	7 081.0	40.989	32.50	241	9 168.1	42.438	25.76	291	11 319.9	43.598	20.93
192	7 122.0	41.021	32.35	242	9 210.5	42.464	25.65	292	11 363.6	43.618	20.85
193	7 163.0	41.053	32.20	243	9 253.0	42.489	25.54	293	11 407.2	43.639	20.77
194	7 204.1	41.086	32.05	244	9 295.5	42.515	25.42	294	11 450.8	43.660	20.70
195	7 245.2	41.118	31.90	245	9 338.0	42.540	25.31	295	11 494.5	43.681	20.62
196	7 286.3	41.149	31.75	246	9 380.6	42.565	25.20	296	11 538.2	43.701	20.54
197	7 327.5	41.181	31.60	247	9 423.1	42.590	25.09	297	11 581.9	43.722	20.47
198	7 368.7	41.213	31.45	248	9 465.7	42.615	24.97	298	11 625.6	43.742	20.39
199	7 409.9	41.244	31.30	249	9 508.4	42.640	24.87	299	11 669.4	43.763	20.32
200	7 451.2	41.275	31.16	250	9 551.0	42.665	24.76	300	11 713.2	43.783	20.24

TABLE 9.5.3. ***Platinum, Pt-67, versus type TN (or EN) thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
300	11 713.2	43.783	20.24	**350**	13 926.2	44.711	17.04	**400**	16 181.9	45.493	14.23
301	11 757.0	43.803	20.17	**351**	13 970.9	44.728	16.98	**401**	16 227.4	45.507	14.17
302	11 800.8	43.823	20.09	**352**	14 015.6	44.745	16.93	**402**	16 272.9	45.522	14.11
303	11 844.6	43.843	20.02	**353**	14 060.4	44.762	16.87	**403**	16 318.4	45.536	14.06
304	11 888.5	43.863	19.95	**354**	14 105.2	44.779	16.81	**404**	16 364.0	45.550	14.00
305	11 932.3	43.883	19.88	**355**	14 150.0	44.796	16.76	**405**	16 409.5	45.564	13.94
306	11 976.2	43.903	19.81	**356**	14 194.8	44.813	16.70	**406**	16 455.1	45.578	13.88
307	12 020.1	43.923	19.73	**357**	14 239.6	44.829	16.64	**407**	16 500.7	45.591	13.82
308	12 064.1	43.942	19.66	**358**	14 284.4	44.846	16.59	**408**	16 546.3	45.605	13.76
309	12 108.0	43.962	19.59	**359**	14 329.3	44.862	16.53	**409**	16 591.9	45.619	13.70
310	12 152.0	43.982	19.52	**360**	14 374.1	44.879	16.48	**410**	16 637.5	45.633	13.64
311	12 196.0	44.001	19.46	**361**	14 419.0	44.895	16.42	**411**	16 683.2	45.646	13.58
312	12 240.0	44.021	19.39	**362**	14 463.9	44.912	16.36	**412**	16 728.8	45.660	13.52
313	12 284.0	44.040	19.32	**363**	14 508.8	44.928	16.31	**413**	16 774.5	45.673	13.46
314	12 328.1	44.059	19.25	**364**	14 553.8	44.944	16.25	**414**	16 820.2	45.687	13.40
315	12 372.1	44.078	19.18	**365**	14 598.7	44.961	16.20	**415**	16 865.8	45.700	13.34
316	12 416.2	44.098	19.12	**366**	14 643.7	44.977	16.14	**416**	16 911.6	45.713	13.28
317	12 460.3	44.117	19.05	**367**	14 688.7	44.993	16.09	**417**	16 957.3	45.727	13.22
318	12 504.5	44.136	18.98	**368**	14 733.7	45.009	16.03	**418**	17 003.0	45.740	13.16
319	12 548.6	44.155	18.92	**369**	14 778.7	45.025	15.97	**419**	17 048.8	45.753	13.10
320	12 592.8	44.173	18.85	**370**	14 823.7	45.041	15.92	**420**	17 094.5	45.766	13.04
321	12 637.0	44.192	18.79	**371**	14 868.8	45.057	15.86	**421**	17 140.3	45.779	12.98
322	12 681.2	44.211	18.72	**372**	14 913.9	45.073	15.81	**422**	17 186.1	45.792	12.92
323	12 725.4	44.230	18.66	**373**	14 958.9	45.088	15.75	**423**	17 231.9	45.805	12.85
324	12 769.6	44.248	18.60	**374**	15 004.0	45.104	15.70	**424**	17 277.7	45.818	12.79
325	12 813.9	44.267	18.53	**375**	15 049.1	45.120	15.64	**425**	17 323.5	45.830	12.73
326	12 858.2	44.285	18.47	**376**	15 094.3	45.135	15.59	**426**	17 369.3	45.843	12.67
327	12 902.4	44.304	18.41	**377**	15 139.4	45.151	15.53	**427**	17 415.2	45.856	12.60
328	12 946.8	44.322	18.35	**378**	15 184.6	45.166	15.47	**428**	17 461.1	45.868	12.54
329	12 991.1	44.341	18.28	**379**	15 229.7	45.182	15.42	**429**	17 506.9	45.881	12.48
330	13 035.4	44.359	18.22	**380**	15 274.9	45.197	15.36	**430**	17 552.8	45.893	12.41
331	13 079.8	44.377	18.16	**381**	15 320.1	45.213	15.31	**431**	17 598.7	45.906	12.35
332	13 124.2	44.395	18.10	**382**	15 365.4	45.228	15.25	**432**	17 644.6	45.918	12.28
333	13 168.6	44.413	18.04	**383**	15 410.6	45.243	15.20	**433**	17 690.5	45.930	12.22
334	13 213.0	44.431	17.98	**384**	15 455.8	45.258	15.14	**434**	17 736.5	45.942	12.16
335	13 257.5	44.449	17.92	**385**	15 501.1	45.273	15.08	**435**	17 782.4	45.955	12.09
336	13 301.9	44.467	17.86	**386**	15 546.4	45.288	15.03	**436**	17 828.4	45.967	12.03
337	13 346.4	44.485	17.80	**387**	15 591.7	45.303	14.97	**437**	17 874.4	45.979	11.96
338	13 390.9	44.503	17.74	**388**	15 637.0	45.318	14.91	**438**	17 920.4	45.991	11.89
339	13 435.4	44.520	17.68	**389**	15 682.3	45.333	14.86	**439**	17 966.3	46.002	11.83
340	13 479.9	44.538	17.62	**390**	15 727.7	45.348	14.80	**440**	18 012.4	46.014	11.76
341	13 524.5	44.556	17.56	**391**	15 773.0	45.363	14.75	**441**	18 058.4	46.026	11.70
342	13 569.0	44.573	17.50	**392**	15 818.4	45.378	14.69	**442**	18 104.4	46.038	11.63
343	13 613.6	44.591	17.44	**393**	15 863.8	45.392	14.63	**443**	18 150.5	46.049	11.56
344	13 658.2	44.608	17.39	**394**	15 909.2	45.407	14.57	**444**	18 196.5	46.061	11.50
345	13 702.8	44.625	17.33	**395**	15 954.6	45.421	14.52	**445**	18 242.6	46.072	11.43
346	13 747.5	44.643	17.27	**396**	16 000.0	45.436	14.46	**446**	18 288.7	46.084	11.36
347	13 792.1	44.660	17.21	**397**	16 045.5	45.450	14.40	**447**	18 334.7	46.095	11.29
348	13 836.8	44.677	17.15	**398**	16 090.9	45.465	14.35	**448**	18 380.8	46.106	11.23
349	13 881.5	44.694	17.10	**399**	16 136.4	45.479	14.29	**449**	18 427.0	46.117	11.16
350	13 926.2	44.711	17.04	**400**	16 181.9	45.493	14.23	**450**	18 473.1	46.129	11.09

TABLE 9.5.3. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C^2
450	18 473.1	46.129	11.09	**500**	20 791.9	46.593	7.39	**550**	23 129.1	46.864	3.47
451	18 519.2	46.140	11.02	**501**	20 838.5	46.600	7.32	**551**	23 176.0	46.867	3.39
452	18 565.4	46.151	10.95	**502**	20 885.1	46.607	7.24	**552**	23 222.8	46.871	3.32
453	18 611.5	46.161	10.88	**503**	20 931.7	46.614	7.16	**553**	23 269.7	46.874	3.24
454	18 657.7	46.172	10.81	**504**	20 978.3	46.622	7.08	**554**	23 316.6	46.877	3.16
455	18 703.9	46.183	10.74	**505**	21 024.9	46.629	7.00	**555**	23 363.5	46.880	3.09
456	18 750.0	46.194	10.67	**506**	21 071.6	46.636	6.92	**556**	23 410.3	46.883	3.01
457	18 796.2	46.204	10.60	**507**	21 118.2	46.642	6.85	**557**	23 457.2	46.886	2.94
458	18 842.5	46.215	10.53	**508**	21 164.8	46.649	6.77	**558**	23 504.1	46.889	2.86
459	18 888.7	46.225	10.46	**509**	21 211.5	46.656	6.69	**559**	23 551.0	46.892	2.79
460	18 934.9	46.236	10.39	**510**	21 258.2	46.663	6.61	**560**	23 597.9	46.895	2.71
461	18 981.1	46.246	10.32	**511**	21 304.8	46.669	6.53	**561**	23 644.8	46.897	2.64
462	19 027.4	46.257	10.25	**512**	21 351.5	46.676	6.45	**562**	23 691.7	46.900	2.56
463	19 073.7	46.267	10.18	**513**	21 398.2	46.682	6.37	**563**	23 738.6	46.903	2.49
464	19 119.9	46.277	10.11	**514**	21 444.9	46.688	6.29	**564**	23 785.5	46.905	2.42
465	19 166.2	46.287	10.03	**515**	21 491.6	46.695	6.21	**565**	23 832.4	46.907	2.34
466	19 212.5	46.297	9.96	**516**	21 538.2	46.701	6.14	**566**	23 879.3	46.910	2.27
467	19 258.8	46.307	9.89	**517**	21 585.0	46.707	6.06	**567**	23 926.2	46.912	2.20
468	19 305.1	46.317	9.82	**518**	21 631.7	46.713	5.98	**568**	23 973.1	46.914	2.12
469	19 351.4	46.327	9.74	**519**	21 678.4	46.719	5.90	**569**	24 020.1	46.916	2.05
470	19 397.8	46.336	9.67	**520**	21 725.1	46.725	5.82	**570**	24 067.0	46.918	1.98
471	19 444.1	46.346	9.60	**521**	21 771.8	46.731	5.74	**571**	24 113.9	46.920	1.91
472	19 490.5	46.355	9.52	**522**	21 818.6	46.736	5.66	**572**	24 160.8	46.922	1.84
473	19 536.8	46.365	9.45	**523**	21 865.3	46.742	5.58	**573**	24 207.7	46.924	1.76
474	19 583.2	46.374	9.38	**524**	21 912.0	46.747	5.50	**574**	24 254.7	46.926	1.69
475	19 629.6	46.384	9.30	**525**	21 958.8	46.753	5.42	**575**	24 301.6	46.927	1.62
476	19 676.0	46.393	9.23	**526**	22 005.6	46.758	5.34	**576**	24 348.5	46.929	1.55
477	19 722.4	46.402	9.15	**527**	22 052.3	46.764	5.27	**577**	24 395.4	46.930	1.48
478	19 768.8	46.411	9.08	**528**	22 099.1	46.769	5.19	**578**	24 442.4	46.932	1.41
479	19 815.2	46.420	9.00	**529**	22 145.8	46.774	5.11	**579**	24 489.3	46.933	1.34
480	19 861.6	46.429	8.93	**530**	22 192.6	46.779	5.03	**580**	24 536.2	46.934	1.27
481	19 908.0	46.438	8.85	**531**	22 239.4	46.784	4.95	**581**	24 583.2	46.936	1.21
482	19 954.5	46.447	8.78	**532**	22 286.2	46.789	4.87	**582**	24 630.1	46.937	1.14
483	20 000.9	46.456	8.70	**533**	22 333.0	46.794	4.79	**583**	24 677.1	46.938	1.07
484	20 047.4	46.464	8.63	**534**	22 379.8	46.798	4.71	**584**	24 724.0	46.939	1.00
485	20 093.9	46.473	8.55	**535**	22 426.6	46.803	4.63	**585**	24 770.9	46.940	0.93
486	20 140.3	46.481	8.47	**536**	22 473.4	46.808	4.56	**586**	24 817.9	46.941	0.87
487	20 186.8	46.490	8.40	**537**	22 520.2	46.812	4.48	**587**	24 864.8	46.942	0.80
488	20 233.3	46.498	8.32	**538**	22 567.0	46.817	4.40	**588**	24 911.8	46.942	0.73
489	20 279.8	46.507	8.25	**539**	22 613.8	46.821	4.32	**589**	24 958.7	46.943	0.67
490	20 326.3	46.515	8.17	**540**	22 660.7	46.825	4.24	**590**	25 005.6	46.944	0.60
491	20 372.9	46.523	8.09	**541**	22 707.5	46.830	4.17	**591**	25 052.6	46.944	0.54
492	20 419.4	46.531	8.01	**542**	22 754.3	46.834	4.09	**592**	25 099.5	46.945	0.47
493	20 465.9	46.539	7.94	**543**	22 801.1	46.838	4.01	**593**	25 146.5	46.945	0.41
494	20 512.5	46.547	7.86	**544**	22 848.0	46.842	3.93	**594**	25 193.4	46.946	0.35
495	20 559.0	46.555	7.78	**545**	22 894.8	46.846	3.85	**595**	25 240.4	46.946	0.28
496	20 605.6	46.562	7.71	**546**	22 941.7	46.849	3.78	**596**	25 287.3	46.946	0.22
497	20 652.1	46.570	7.63	**547**	22 988.5	46.853	3.70	**597**	25 334.3	46.946	0.16
498	20 698.7	46.578	7.55	**548**	23 035.4	46.857	3.62	**598**	25 381.2	46.947	0.09
499	20 745.3	46.585	7.47	**549**	23 082.2	46.860	3.55	**599**	25 428.2	46.947	0.03
500	20 791.9	46.593	7.39	**550**	23 129.1	46.864	3.47	**600**	25 475.1	46.947	−0.03

TABLE 9.5.3. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
600	25 475.1	46.947	−0.03	**650**	27 821.2	46.879	−2.48	**700**	30 161.4	46.719	−3.73
601	25 522.0	46.947	−0.09	**651**	27 868.1	46.876	−2.52	**701**	30 208.2	46.715	−3.75
602	25 569.0	46.946	−0.15	**652**	27 915.0	46.874	−2.55	**702**	30 254.9	46.711	−3.76
603	25 615.9	46.946	−0.21	**653**	27 961.9	46.871	−2.59	**703**	30 301.6	46.708	−3.78
604	25 662.9	46.946	−0.27	**654**	28 008.7	46.869	−2.62	**704**	30 348.3	46.704	−3.79
605	25 709.8	46.946	−0.33	**655**	28 055.6	46.866	−2.66	**705**	30 395.0	46.700	−3.81
606	25 756.8	46.945	−0.39	**656**	28 102.5	46.863	−2.69	**706**	30 441.7	46.696	−3.82
607	25 803.7	46.945	−0.44	**657**	28 149.3	46.861	−2.72	**707**	30 488.4	46.692	−3.84
608	25 850.7	46.945	−0.50	**658**	28 196.2	46.858	−2.76	**708**	30 535.1	46.689	−3.85
609	25 897.6	46.944	−0.56	**659**	28 243.1	46.855	−2.79	**709**	30 581.8	46.685	−3.86
610	25 944.6	46.943	−0.62	**660**	28 289.9	46.852	−2.82	**710**	30 628.5	46.681	−3.88
611	25 991.5	46.943	−0.67	**661**	28 336.8	46.849	−2.85	**711**	30 675.1	46.677	−3.89
612	26 038.4	46.942	−0.73	**662**	28 383.6	46.846	−2.88	**712**	30 721.8	46.673	−3.90
613	26 085.4	46.941	−0.78	**663**	28 430.4	46.844	−2.91	**713**	30 768.5	46.669	−3.92
614	26 132.3	46.940	−0.84	**664**	28 477.3	46.841	−2.94	**714**	30 815.1	46.665	−3.93
615	26 179.3	46.940	−0.89	**665**	28 524.1	46.838	−2.97	**715**	30 861.8	46.661	−3.94
616	26 226.2	46.939	−0.95	**666**	28 571.0	46.835	−3.00	**716**	30 908.5	46.657	−3.95
617	26 273.1	46.938	−1.00	**667**	28 617.8	46.832	−3.03	**717**	30 955.1	46.653	−3.97
618	26 320.1	46.937	−1.05	**668**	28 664.6	46.829	−3.06	**718**	31 001.8	46.649	−3.98
619	26 367.0	46.936	−1.11	**669**	28 711.5	46.826	−3.08	**719**	31 048.4	46.646	−3.99
620	26 414.0	46.934	−1.16	**670**	28 758.3	46.822	−3.11	**720**	31 095.1	46.642	−4.00
621	26 460.9	46.933	−1.21	**671**	28 805.1	46.819	−3.14	**721**	31 141.7	46.637	−4.01
622	26 507.8	46.932	−1.26	**672**	28 851.9	46.816	−3.16	**722**	31 188.3	46.633	−4.03
623	26 554.7	46.931	−1.31	**673**	28 898.7	46.813	−3.19	**723**	31 235.0	46.629	−4.04
624	26 601.7	46.929	−1.36	**674**	28 945.5	46.810	−3.21	**724**	31 281.6	46.625	−4.05
625	26 648.6	46.928	−1.41	**675**	28 992.4	46.807	−3.24	**725**	31 328.2	46.621	−4.06
626	26 695.5	46.927	−1.46	**676**	29 039.2	46.803	−3.26	**726**	31 374.8	46.617	−4.07
627	26 742.5	46.925	−1.51	**677**	29 086.0	46.800	−3.29	**727**	31 421.5	46.613	−4.08
628	26 789.4	46.924	−1.56	**678**	29 132.8	46.797	−3.31	**728**	31 468.1	46.609	−4.10
629	26 836.3	46.922	−1.60	**679**	29 179.6	46.793	−3.33	**729**	31 514.7	46.605	−4.11
630	26 883.2	46.920	−1.65	**680**	29 226.3	46.790	−3.36	**730**	31 561.3	46.601	−4.12
631	26 930.1	46.919	−1.70	**681**	29 273.1	46.787	−3.38	**731**	31 607.9	46.597	−4.13
632	26 977.1	46.917	−1.74	**682**	29 319.9	46.783	−3.40	**732**	31 654.5	46.593	−4.14
633	27 024.0	46.915	−1.79	**683**	29 366.7	46.780	−3.42	**733**	31 701.1	46.588	−4.15
634	27 070.9	46.913	−1.83	**684**	29 413.5	46.777	−3.44	**734**	31 747.6	46.584	−4.17
635	27 117.8	46.912	−1.88	**685**	29 460.3	46.773	−3.46	**735**	31 794.2	46.580	−4.18
636	27 164.7	46.910	−1.92	**686**	29 507.0	46.770	−3.48	**736**	31 840.8	46.576	−4.19
637	27 211.6	46.908	−1.96	**687**	29 553.8	46.766	−3.50	**737**	31 887.4	46.572	−4.20
638	27 258.5	46.906	−2.01	**688**	29 600.6	46.763	−3.52	**738**	31 934.0	46.568	−4.21
639	27 305.4	46.904	−2.05	**689**	29 647.3	46.759	−3.54	**739**	31 980.5	46.563	−4.23
640	27 352.3	46.902	−2.09	**690**	29 694.1	46.755	−3.56	**740**	32 027.1	46.559	−4.24
641	27 399.2	46.900	−2.13	**691**	29 740.8	46.752	−3.58	**741**	32 073.6	46.555	−4.25
642	27 446.1	46.897	−2.17	**692**	29 787.6	46.748	−3.60	**742**	32 120.2	46.551	−4.26
643	27 493.0	46.895	−2.21	**693**	29 834.3	46.745	−3.62	**743**	32 166.7	46.546	−4.28
644	27 539.9	46.893	−2.25	**694**	29 881.1	46.741	−3.63	**744**	32 213.3	46.542	−4.29
645	27 586.8	46.891	−2.29	**695**	29 927.8	46.737	−3.65	**745**	32 259.8	46.538	−4.30
646	27 633.7	46.888	−2.33	**696**	29 974.5	46.734	−3.67	**746**	32 306.4	46.533	−4.32
647	27 680.6	46.886	−2.37	**697**	30 021.3	46.730	−3.68	**747**	32 352.9	46.529	−4.33
648	27 727.5	46.884	−2.41	**698**	30 068.0	46.726	−3.70	**748**	32 399.4	46.525	−4.34
649	27 774.4	46.881	−2.44	**699**	30 114.7	46.723	−3.72	**749**	32 445.9	46.520	−4.36
650	27 821.2	46.879	−2.48	**700**	30 161.4	46.719	−3.73	**750**	32 492.5	46.516	−4.37

TABLE 9.5.3. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
750	32 492.5	46.516	−4.37	800	34 812.4	46.271	−5.65	850	37 117.8	45.920	−8.76
751	32 539.0	46.512	−4.39	801	34 858.7	46.266	−5.69	851	37 163.7	45.911	−8.84
752	32 585.5	46.507	−4.40	802	34 904.9	46.260	−5.74	852	37 209.6	45.902	−8.93
753	32 632.0	46.503	−4.42	803	34 951.2	46.254	−5.78	853	37 255.5	45.893	−9.01
754	32 678.5	46.498	−4.43	804	34 997.4	46.248	−5.82	854	37 301.4	45.884	−9.09
755	32 725.0	46.494	−4.45	805	35 043.7	46.242	−5.87	855	37 347.3	45.875	−9.18
756	32 771.5	46.490	−4.46	806	35 089.9	46.237	−5.91	856	37 393.2	45.866	−9.26
757	32 818.0	46.485	−4.48	807	35 136.2	46.231	−5.96	857	37 439.0	45.856	−9.35
758	32 864.4	46.481	−4.50	808	35 182.4	46.225	−6.01	858	37 484.9	45.847	−9.44
759	32 910.9	46.476	−4.51	809	35 228.6	46.219	−6.06	859	37 530.7	45.837	−9.52
760	32 957.4	46.472	−4.53	810	35 274.8	46.212	−6.10	860	37 576.6	45.828	−9.61
761	33 003.9	46.467	−4.55	811	35 321.0	46.206	−6.15	861	37 622.4	45.818	−9.70
762	33 050.3	46.462	−4.57	812	35 367.2	46.200	−6.21	862	37 668.2	45.808	−9.79
763	33 096.8	46.458	−4.58	813	35 413.4	46.194	−6.26	863	37 714.0	45.799	−9.88
764	33 143.2	46.453	−4.60	814	35 459.6	46.188	−6.31	864	37 759.8	45.789	−9.97
765	33 189.7	46.449	−4.62	815	35 505.8	46.181	−6.36	865	37 805.6	45.779	−10.06
766	33 236.1	46.444	−4.64	816	35 552.0	46.175	−6.42	866	37 851.3	45.769	−10.15
767	33 282.6	46.439	−4.66	817	35 598.2	46.168	−6.47	867	37 897.1	45.758	−10.24
768	33 329.0	46.435	−4.68	818	35 644.3	46.162	−6.53	868	37 942.9	45.748	−10.33
769	33 375.5	46.430	−4.70	819	35 690.5	46.155	−6.58	869	37 988.6	45.738	−10.42
770	33 421.9	46.425	−4.73	820	35 736.6	46.149	−6.64	870	38 034.3	45.727	−10.51
771	33 468.3	46.421	−4.75	821	35 782.8	46.142	−6.70	871	38 080.1	45.717	−10.60
772	33 514.7	46.416	−4.77	822	35 828.9	46.135	−6.76	872	38 125.8	45.706	−10.69
773	33 561.1	46.411	−4.79	823	35 875.0	46.129	−6.82	873	38 171.5	45.695	−10.78
774	33 607.5	46.406	−4.82	824	35 921.2	46.122	−6.88	874	38 217.2	45.684	−10.87
775	33 653.9	46.401	−4.84	825	35 967.3	46.115	−6.94	875	38 262.8	45.674	−10.96
776	33 700.3	46.397	−4.87	826	36 013.4	46.108	−7.01	876	38 308.5	45.663	−11.05
777	33 746.7	46.392	−4.89	827	36 059.5	46.101	−7.07	877	38 354.2	45.651	−11.15
778	33 793.1	46.387	−4.92	828	36 105.6	46.094	−7.13	878	38 399.8	45.640	−11.24
779	33 839.5	46.382	−4.94	829	36 151.7	46.087	−7.20	879	38 445.4	45.629	−11.33
780	33 885.9	46.377	−4.97	830	36 197.8	46.079	−7.27	880	38 491.1	45.618	−11.42
781	33 932.3	46.372	−5.00	831	36 243.9	46.072	−7.33	881	38 536.7	45.606	−11.51
782	33 978.6	46.367	−5.03	832	36 289.9	46.065	−7.40	882	38 582.3	45.595	−11.60
783	34 025.0	46.362	−5.05	833	36 336.0	46.057	−7.47	883	38 627.9	45.583	−11.69
784	34 071.4	46.357	−5.08	834	36 382.0	46.050	−7.54	884	38 673.5	45.571	−11.78
785	34 117.7	46.352	−5.11	835	36 428.1	46.042	−7.61	885	38 719.0	45.559	−11.87
786	34 164.1	46.347	−5.15	836	36 474.1	46.035	−7.68	886	38 764.6	45.547	−11.96
787	34 210.4	46.341	−5.18	837	36 520.1	46.027	−7.75	887	38 810.1	45.535	−12.04
788	34 256.7	46.336	−5.21	838	36 566.2	46.019	−7.83	888	38 855.6	45.523	−12.13
789	34 303.1	46.331	−5.24	839	36 612.2	46.011	−7.90	889	38 901.2	45.511	−12.22
790	34 349.4	46.326	−5.28	840	36 658.2	46.003	−7.97	890	38 946.7	45.499	−12.31
791	34 395.7	46.320	−5.31	841	36 704.2	45.995	−8.05	891	38 992.2	45.487	−12.39
792	34 442.1	46.315	−5.34	842	36 750.2	45.987	−8.13	892	39 037.6	45.474	−12.48
793	34 488.4	46.310	−5.38	843	36 796.2	45.979	−8.20	893	39 083.1	45.462	−12.56
794	34 534.7	46.304	−5.42	844	36 842.1	45.971	−8.28	894	39 128.6	45.449	−12.64
795	34 581.0	46.299	−5.45	845	36 888.1	45.962	−8.36	895	39 174.0	45.436	−12.73
796	34 627.3	46.293	−5.49	846	36 934.1	45.954	−8.44	896	39 219.4	45.424	−12.81
797	34 673.6	46.288	−5.53	847	36 980.0	45.946	−8.52	897	39 264.8	45.411	−12.89
798	34 719.8	46.282	−5.57	848	37 026.0	45.937	−8.60	898	39 310.3	45.398	−12.97
799	34 766.1	46.277	−5.61	849	37 071.9	45.928	−8.68	899	39 355.6	45.385	−13.04
800	34 812.4	46.271	−5.65	850	37 117.8	45.920	−8.76	900	39 401.0	45.372	−13.12

TABLE 9.5.3. ***Platinum, Pt-67, versus type TN (or EN) thermoelements*** *--- thermoelectric voltages, $E(t_{90})$, Seebeck coefficients, $S(t_{90})$, and first derivative of the Seebeck coefficients, dS/dt_{90}; reference junctions at 0 °C--Continued*

t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²	t_{90} °C	E μV	S μV/°C	dS/dt_{90} nV/°C²
900	39 401.0	45.372	−13.12	**935**	40 980.6	44.881	−14.33	**970**	42 543.2	44.440	−9.27
901	39 446.4	45.359	−13.19	**936**	41 025.4	44.867	−14.30	**971**	42 587.6	44.431	−8.96
902	39 491.7	45.345	−13.27	**937**	41 070.3	44.852	−14.27	**972**	42 632.1	44.423	−8.65
903	39 537.1	45.332	−13.34	**938**	41 115.2	44.838	−14.23	**973**	42 676.5	44.414	−8.32
904	39 582.4	45.319	−13.41	**939**	41 160.0	44.824	−14.18	**974**	42 720.9	44.406	−7.98
905	39 627.7	45.305	−13.48	**940**	41 204.8	44.810	−14.13	**975**	42 765.3	44.398	−7.63
906	39 673.0	45.292	−13.55	**941**	41 249.6	44.796	−14.07	**976**	42 809.7	44.391	−7.27
907	39 718.3	45.278	−13.61	**942**	41 294.4	44.782	−14.01	**977**	42 854.1	44.384	−6.89
908	39 763.6	45.264	−13.68	**943**	41 339.2	44.768	−13.95	**978**	42 898.5	44.377	−6.50
909	39 808.8	45.251	−13.74	**944**	41 383.9	44.754	−13.87	**979**	42 942.8	44.371	−6.10
910	39 854.1	45.237	−13.80	**945**	41 428.7	44.740	−13.79	**980**	42 987.2	44.365	−5.68
911	39 899.3	45.223	−13.85	**946**	41 473.4	44.726	−13.71	**981**	43 031.6	44.359	−5.25
912	39 944.5	45.209	−13.91	**947**	41 518.1	44.713	−13.61	**982**	43 075.9	44.354	−4.81
913	39 989.7	45.195	−13.96	**948**	41 562.8	44.699	−13.51	**983**	43 120.3	44.350	−4.35
914	40 034.9	45.181	−14.01	**949**	41 607.5	44.685	−13.41	**984**	43 164.6	44.346	−3.88
915	40 080.1	45.167	−14.06	**950**	41 652.2	44.672	−13.29	**985**	43 209.0	44.342	−3.39
916	40 125.2	45.153	−14.10	**951**	41 696.9	44.659	−13.17	**986**	43 253.3	44.339	−2.89
917	40 170.4	45.139	−14.15	**952**	41 741.5	44.646	−13.04	**987**	43 297.6	44.336	−2.37
918	40 215.5	45.125	−14.19	**953**	41 786.2	44.633	−12.91	**988**	43 342.0	44.334	−1.84
919	40 260.6	45.111	−14.22	**954**	41 830.8	44.620	−12.77	**989**	43 386.3	44.332	−1.29
920	40 305.7	45.096	−14.26	**955**	41 875.4	44.607	−12.61	**990**	43 430.6	44.331	−0.72
921	40 350.8	45.082	−14.29	**956**	41 920.0	44.595	−12.47	**991**	43 475.0	44.331	−0.14
922	40 395.9	45.068	−14.32	**957**	41 964.6	44.582	−12.30	**992**	43 519.3	44.331	0.46
923	40 441.0	45.054	−14.34	**958**	42 009.2	44.570	−12.12	**993**	43 563.6	44.332	1.07
924	40 486.0	45.039	−14.36	**959**	42 053.7	44.558	−11.93	**994**	43 608.0	44.333	1.71
925	40 531.0	45.025	−14.38	**960**	42 098.3	44.546	−11.74	**995**	43 652.3	44.335	2.36
926	40 576.1	45.010	−14.39	**961**	42 142.8	44.535	−11.54	**996**	43 696.6	44.338	3.02
927	40 621.1	44.996	−14.40	**962**	42 187.4	44.523	−11.33	**997**	43 741.0	44.341	3.71
928	40 666.1	44.982	−14.41	**963**	42 231.9	44.512	−11.11	**998**	43 785.3	44.345	4.42
929	40 711.0	44.967	−14.41	**964**	42 276.4	44.501	−10.87	**999**	43 829.7	44.350	5.14
930	40 756.0	44.953	−14.41	**965**	42 320.9	44.490	−10.63	**1000**	43 874.0	44.356	5.89
931	40 800.9	44.938	−14.40	**966**	42 365.4	44.480	−10.38				
932	40 845.9	44.924	−14.39	**967**	42 409.8	44.470	−10.12				
933	40 890.8	44.910	−14.37	**968**	42 454.3	44.460	−9.84				
934	40 935.7	44.895	−14.35	**969**	42 498.8	44.450	−9.56				
935	40 980.6	44.881	−14.33	**970**	42 543.2	44.440	−9.27				

9.6. References

[1] Trademark -- Driver Harris Company.

[2] Trademark -- Carpenter Technology Corporation.

[3] Roeser, W. F.; Dahl, A. I. Reference tables for iron-constantan and copper-constantan thermocouples. *J. Res. Natl. Bur. Stand. (U.S.)* **20**, 337-355; RP1080; 1938 March.

[4] Adams, L. H. Tables and curves for use in measuring temperatures with thermocouples. *Pyrometry*, p. 165 (Symposium published by Am. Inst. Mining Met. Engrs.: New York; 1920).

[5] Scott, R. B. Calibration of thermocouples at low temperatures. *J. Res. Natl. Bur. Stand. (U.S.)* **25**, 459-474; RP1339; 1940 October.

[6] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 508*; 1951 May. 73 p.

[7] Shenker, H.; Lauritzen, J. I., Jr.; Corruccini, R. J.; Lonberger, S. T. Reference tables for thermocouples. *Natl. Bur. Stand. (U.S.) Circular 561*; 1955 April. 87 p.

[8] Plumb, H. H.; Cataland, G. Acoustical thermometer and the National Bureau of Standards Provisional Temperature Scale 2-20 (1965). *Metrologia* **2**, 127-139 (1966).

[9] Sparks, L. L.; Powell, R. L.; Hall, W. J. Reference tables for low-temperature thermocouples. *Natl. Bur. Stand. (U.S.) Monogr. 124*; 1972 June. 61 p.

[10] Powell, R. L.; Hall, W. J.; Hyink, C. H., Jr.; Sparks, L. L.; Burns, G. W.; Scroger, M. G.; Plumb, H. H. Thermocouple reference tables based on the IPTS-68. *Natl. Bur. Stand. (U.S.) Monogr. 125*; 1974 March. 410 p.

[11] ASTM, American Society for Testing and Materials. Manual on the use of thermocouples in temperature measurement. *Special Tech. Publ. 470B*; edited by Benedict, R. P.; Philadelphia: ASTM; 1981. 258 p.

[12] Dahl, A. I. Stability of base-metal thermocouples in air from 800 to 2200 °F. *J. Res. Natl. Bur. Stand. (U.S.)* **24**, 205-224; RP1278; 1940 February.

[13] Caldwell, F. R. Temperatures of thermocouple reference junctions in an ice bath. *J. Res. Natl. Bur. Stand. (U.S.)* **69C**(2), 95-101; 1965 April-June.

[14] McLaren, E. H.; Murdock E. G. The properties of pt/pt-rh thermocouples for thermometry in the range 0-1100 °C: I. Basic measurements with standard thermocouples. *Nat. Res. Council Canada Monogr. NRCC 17407*; 1979 March. 126 p.

[15] ASTM, American Society for Testing and Materials, Standard E230-87, 1992 *Annual Book of ASTM Standards*. Vol. **14.03**; Philadelphia: ASTM; 1992. 102-230.

[16] Preston-Thomas, H. The International Temperature Scale of 1990 (ITS-90). *Metrologia* **27**, 3-10 (1990); ibid. p.107.

[17] Belecki, N. B.; Dziuba, R. F.; Field, B. F.; Taylor, B. N. Guidelines for implementing the new representations of the volt and ohm effective January 1, 1990. *Natl. Inst. Stand. Technol. Tech. Note 1263*; 1989 June. 72 p.

[18] Bureau International de Poids et Mesures. The 1976 Provisional 0.5 to 30 K Temperature Scale. *Metrologia* **15**, 65-68 (1979).

[19] Bureau International des Poids et Mesures, Supplementary information for the International Temperature Scale of 1990. Pavillion de Breteuil, F-92310 Sevres; 1990 December. 177 p.

Appendices

Appendix A. Approximate Inverse Functions giving Temperature (in Degrees Celsius) as a Function of the Thermoelectric Voltage (in Microvolts) for the Letter-Designated Thermocouple Types

A1. Introduction

The reference equations, $E = f(t_{90})$, presented for the various letter-designated thermocouple types in the main text are useful for generating reference tables giving values of thermoelectric voltage, E, as a function of temperature, t_{90}. They are not well suited, however, for calculating values of temperature from values of thermoelectric voltage. While temperature values may be obtained from voltage values by iteration of such equations, it is much more convenient to use approximate inverse functions that give temperature as a function of voltage for this purpose.

Approximate inverse functions fitted to the data in selected temperature and voltage ranges are presented in this appendix for each of the thermocouple types: B, R, S, E, J, K, N, and T. These inverse functions give approximate values of temperature and are of the form:

$$t_{90} = c_0 + c_1 E + c_2 E^2 + \ldots c_i E^i ,$$

where E is in microvolts and t_{90} is in degrees Celsius. They range from fourth to tenth degree polynomials. The number of such functions given for a particular thermocouple type varies from a minimum of two for types B, E, and T to a maximum of four for types N, R, and S. The error in temperature values obtained from each of these approximate inverse functions relative to temperature values obtained from the respective reference function is given. With a few exceptions, the approximate inverse functions match the reference data to within 0.05 °C.

The sets of approximate inverse functions presented in this appendix are incomplete, in that they do not completely cover, except for thermocouple types J, R, and S, the full temperature range of the reference functions. The approximate inverse functions given for types E, K, N, and T do not extend below −200 °C, and those given for type B do not extend below 250 °C.

All the approximate inverse functions presented in this appendix are based on reference junctions at 0 °C.

A2. Approximate Inverse Functions for Type B — Platinum-30% Rhodium Alloy Versus Platinum-6% Rhodium Alloy Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type B thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A2.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type B thermocouples presented in the main text (see table 2.3.1). The error in temperature values calculated from the approximate inverse functions for the 250 °C to 700 °C and 700 °C to 1820 °C ranges is shown in figures A2.1 and A2.2, respectively.

TABLE A2.1. ***Type B thermocouples*** *--- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	250 °C to 700 °C	700 °C to 1820 °C
Voltage Range:	291 μV to 2431 μV	2431 μV to 13 820 μV
c_0 =	$9.842\,332\,1 \times 10^{1}$	$2.131\,507\,1 \times 10^{2}$
c_1 =	$6.997\,150\,0 \times 10^{-1}$	$2.851\,050\,4 \times 10^{-1}$
c_2 =	$-8.476\,530\,4 \times 10^{-4}$	$-5.274\,288\,7 \times 10^{-5}$
c_3 =	$1.005\,264\,4 \times 10^{-6}$	$9.916\,080\,4 \times 10^{-9}$
c_4 =	$-8.334\,595\,2 \times 10^{-10}$	$-1.296\,530\,3 \times 10^{-12}$
c_5 =	$4.550\,854\,2 \times 10^{-13}$	$1.119\,587\,0 \times 10^{-16}$
c_6 =	$-1.552\,303\,7 \times 10^{-16}$	$-6.062\,519\,9 \times 10^{-21}$
c_7 =	$2.988\,675\,0 \times 10^{-20}$	$1.866\,169\,6 \times 10^{-25}$
c_8 =	$-2.474\,286\,0 \times 10^{-24}$	$-2.487\,858\,5 \times 10^{-30}$
Error Range:	0.03 °C to −0.02 °C	0.02 °C to −0.01 °C

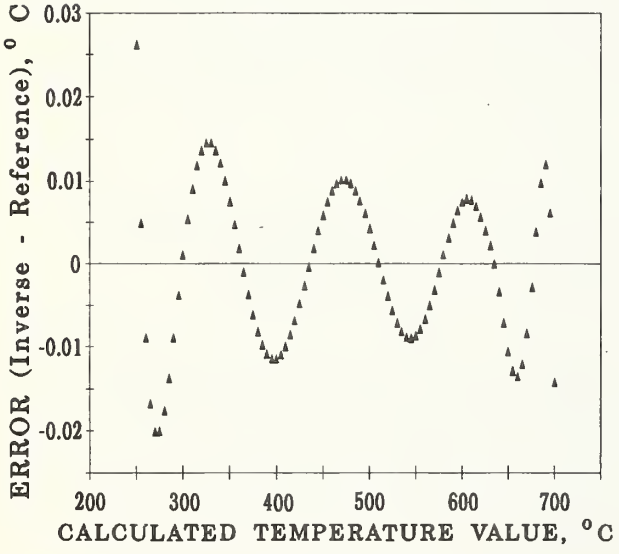

FIGURE A2.1. *Error in temperature values calculated from the inverse function given in table A2.1 for type B thermocouples in the 250 °C to 700 °C range.*

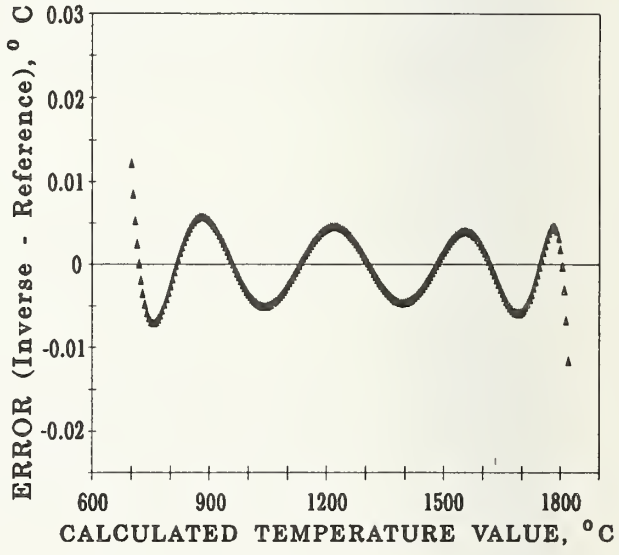

FIGURE A2.2. *Error in temperature values calculated from the inverse function given in table A2.1 for type B thermocouples in the 700 °C to 1820 °C range.*

A3. Approximate Inverse Functions for Type R — Platinum-13% Rhodium Alloy Versus Platinum Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type R thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A3.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type R thermocouples presented in the main text (see table 3.3.1). The error in temperature values calculated from the approximate inverse functions for the −50 °C to 250 °C, 250 °C to 1200 °C, 1064 °C to 1664.5 °C, and 1664.5 °C to 1768.1 °C ranges is shown in figures A3.1, A3.2, A3.3, and A3.4, respectively.

TABLE A3.1. ***Type R thermocouples*** *--- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−50 °C to 250 °C	250 °C to 1200 °C	1064 °C to 1664.5 °C	1664.5 °C to 1768.1 °C
Voltage Range:	−226 μV to 1923 μV	1923 μV to 13 228 μV	11 361 μV to 19 739 μV	19 739 μV to 21 103 μV
c_0 =	0.000 000 0 . . .	$1.334\,584\,505 \times 10^{1}$	$-8.199\,599\,416 \times 10^{1}$	$3.406\,177\,836 \times 10^{4}$
c_1 =	$1.889\,138\,0 \times 10^{-1}$	$1.472\,644\,573 \times 10^{-1}$	$1.553\,962\,042 \times 10^{-1}$	−7.023 729 171 . . .
c_2 =	$-9.383\,529\,0 \times 10^{-5}$	$-1.844\,024\,844 \times 10^{-5}$	$-8.342\,197\,663 \times 10^{-6}$	$5.582\,903\,813 \times 10^{-4}$
c_3 =	$1.306\,861\,9 \times 10^{-7}$	$4.031\,129\,726 \times 10^{-9}$	$4.279\,433\,549 \times 10^{-10}$	$-1.952\,394\,635 \times 10^{-8}$
c_4 =	$-2.270\,358\,0 \times 10^{-10}$	$-6.249\,428\,360 \times 10^{-13}$	$-1.191\,577\,910 \times 10^{-14}$	$2.560\,740\,231 \times 10^{-13}$
c_5 =	$3.514\,565\,9 \times 10^{-13}$	$6.468\,412\,046 \times 10^{-17}$	$1.492\,290\,091 \times 10^{-19}$	
c_6 =	$-3.895\,390\,0 \times 10^{-16}$	$-4.458\,750\,426 \times 10^{-21}$		
c_7 =	$2.823\,947\,1 \times 10^{-19}$	$1.994\,710\,149 \times 10^{-25}$		
c_8 =	$-1.260\,728\,1 \times 10^{-22}$	$-5.313\,401\,790 \times 10^{-30}$		
c_9 =	$3.135\,361\,1 \times 10^{-26}$	$6.481\,976\,217 \times 10^{-35}$		
c_{10} =	$-3.318\,776\,9 \times 10^{-30}$			
Error Range:	0.02 °C to −0.02 °C	0.005 °C to −0.005 °C	0.001 °C to −0.0005 °C	0.002 °C to −0.001 °C

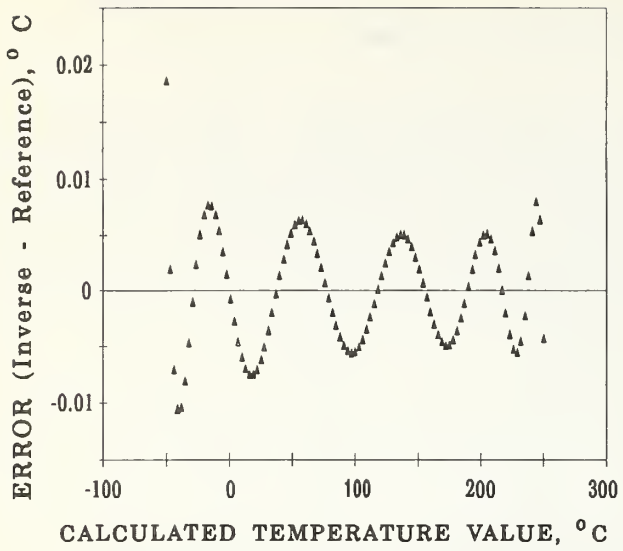

FIGURE A3.1. *Error in temperature values calculated from the inverse function given in table A3.1 for type R thermocouples in the −50 °C to 250 °C range.*

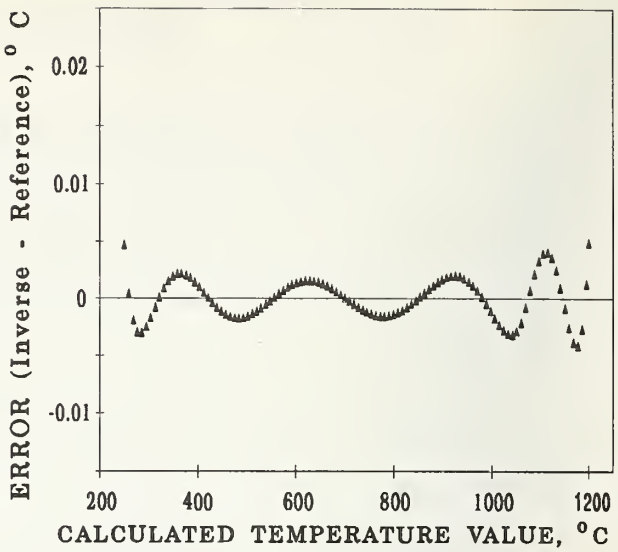

FIGURE A3.2. *Error in temperature values calculated from the inverse function given in table A3.1 for type R thermocouples in the 250 °C to 1200 °C range.*

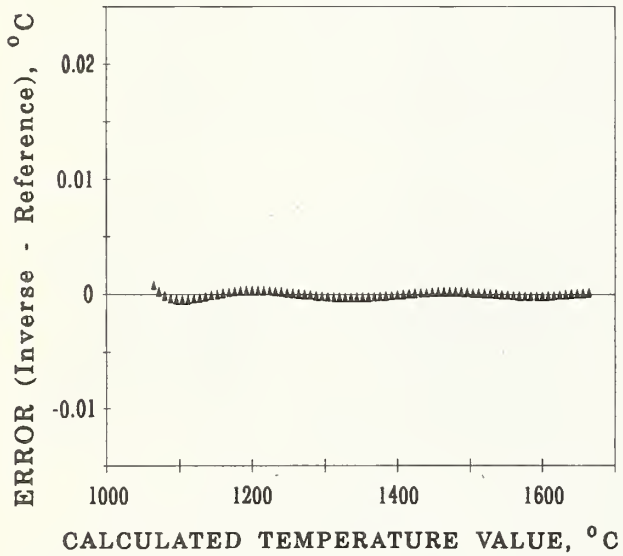

FIGURE A3.3. *Error in temperature values calculated from the inverse function given in table A3.1 for type R thermocouples in the 1064 °C to 1664.5 °C range.*

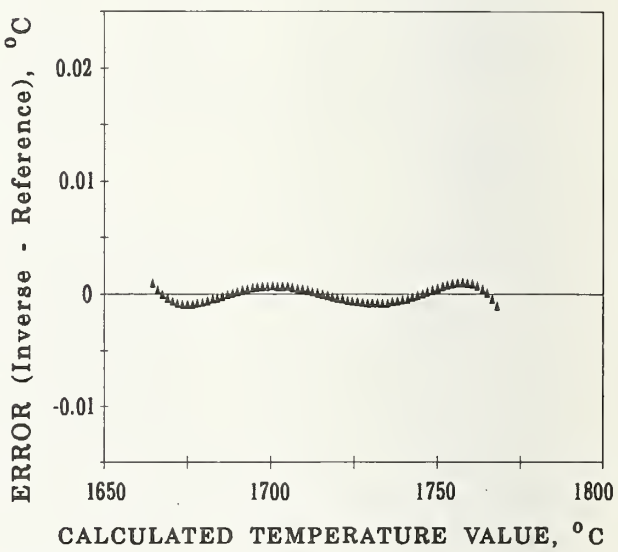

FIGURE A3.4. *Error in temperature values calculated from the inverse function given in table A3.1 for type R thermocouples in the 1664.5 °C to 1768.1 °C range.*

A4. Approximate Inverse Functions for Type S — Platinum-10% Rhodium Alloy Versus Platinum Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type S thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A4.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type S thermocouples presented in the main text (see table 4.3.1). The error in temperature values calculated from the approximate inverse functions for the −50 °C to 250 °C, 250 °C to 1200 °C, 1064 °C to 1664.5 °C, and 1664.5 °C to 1768.1 °C ranges is shown in figures A4.1, A4.2, A4.3, and A4.4, respectively.

TABLE A4.1. *Type S thermocouples --- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−50 °C to 250 °C	250 °C to 1200 °C	1064 °C to 1664.5 °C	1664.5 °C to 1768.1 °C
Voltage Range:	−235 μV to 1874 μV	1874 μV to 11 950 μV	10 332 μV to 17 536 μV	17 536 μV to 18 693 μV
c_0 =	0.000 000 00 . . .	$1.291\,507\,177 \times 10^{1}$	$-8.087\,801\,117 \times 10^{1}$	$5.333\,875\,126 \times 10^{4}$
c_1 =	$1.849\,494\,60 \times 10^{-1}$	$1.466\,298\,863 \times 10^{-1}$	$1.621\,573\,104 \times 10^{-1}$	$-1.235\,892\,298 \times 10^{1}$
c_2 =	$-8.005\,040\,62 \times 10^{-5}$	$-1.534\,713\,402 \times 10^{-5}$	$-8.536\,869\,453 \times 10^{-6}$	$1.092\,657\,613 \times 10^{-3}$
c_3 =	$1.022\,374\,30 \times 10^{-7}$	$3.145\,945\,973 \times 10^{-9}$	$4.719\,686\,976 \times 10^{-10}$	$-4.265\,693\,686 \times 10^{-8}$
c_4 =	$-1.522\,485\,92 \times 10^{-10}$	$-4.163\,257\,839 \times 10^{-13}$	$-1.441\,693\,666 \times 10^{-14}$	$6.247\,205\,420 \times 10^{-13}$
c_5 =	$1.888\,213\,43 \times 10^{-13}$	$3.187\,963\,771 \times 10^{-17}$	$2.081\,618\,890 \times 10^{-19}$	
c_6 =	$-1.590\,859\,41 \times 10^{-16}$	$-1.291\,637\,500 \times 10^{-21}$		
c_7 =	$8.230\,278\,80 \times 10^{-20}$	$2.183\,475\,087 \times 10^{-26}$		
c_8 =	$-2.341\,819\,44 \times 10^{-23}$	$-1.447\,379\,511 \times 10^{-31}$		
c_9 =	$2.797\,862\,60 \times 10^{-27}$	$8.211\,272\,125 \times 10^{-36}$		
Error Range:	0.02 °C to −0.02 °C	0.01 °C to −0.01 °C	0.0002 °C to −0.0002 °C	0.002 °C to −0.002 °C

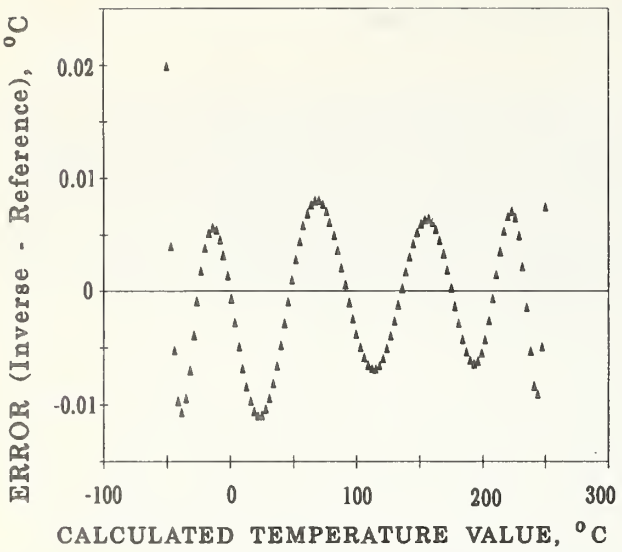

FIGURE A4.1. *Error in temperature values calculated from the inverse function given in table A4.1 for type S thermocouples in the −50 °C to 250 °C range.*

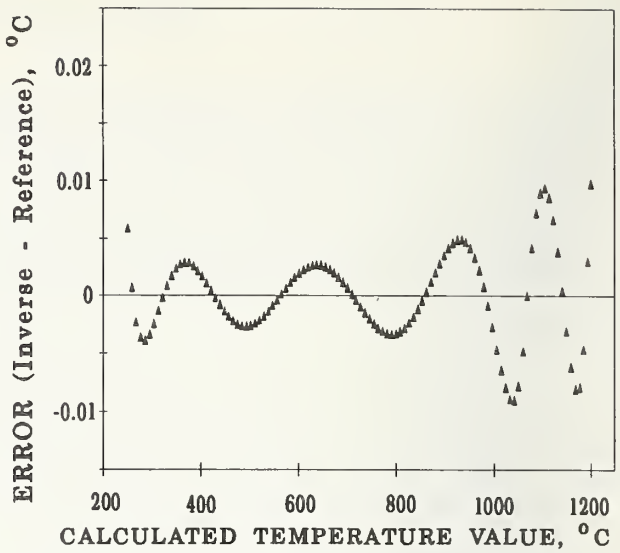

FIGURE A4.2. *Error in temperature values calculated from the inverse function given in table A4.1 for type S thermocouples in the 250 °C to 1200 °C range.*

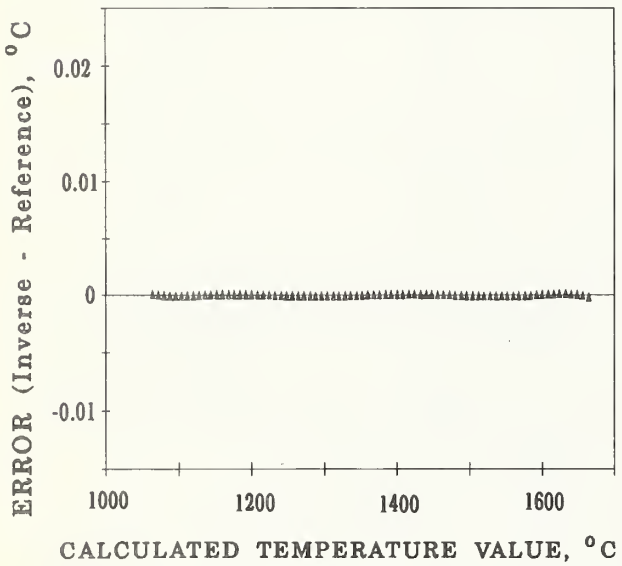

FIGURE A4.3. *Error in temperature values calculated from the inverse function given in table A4.1 for type S thermocouples in the 1064 °C to 1664.5 °C range.*

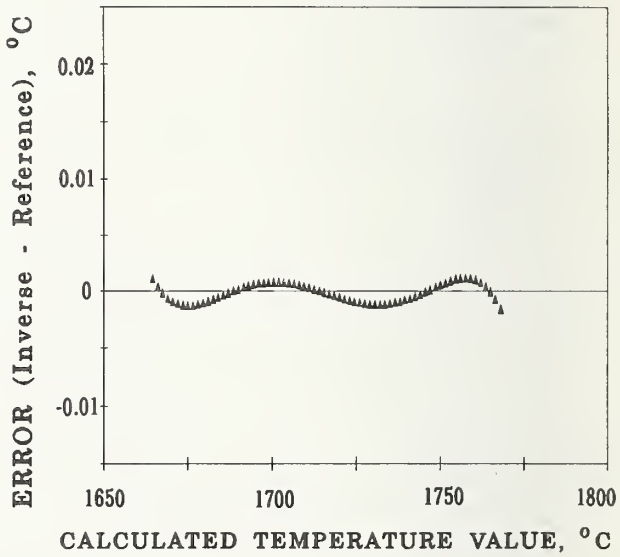

FIGURE A4.4. *Error in temperature values calculated from the inverse function given in table A4.1 for type S thermocouples in the 1664.5 °C to 1768.1 °C range.*

A5. Approximate Inverse Functions for Type E — Nickel-Chromium Alloy Versus Copper-Nickel Alloy Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type E thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A5.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type E thermocouples presented in the main text (see table 5.3.1). The error in temperature values calculated from the approximate inverse functions for the −200 °C to 0 °C and 0 °C to 1000 °C ranges is shown in figures A5.1 and A5.2, respectively.

TABLE A5.1. *Type E thermocouples --- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−200 °C to 0 °C	0 °C to 1000 °C
Voltage Range:	−8825 μV to 0 μV	0 μV to 76 373 μV
c_0 =	0.000 000 0 . . .	0.000 000 0 . . .
c_1 =	$1.697\,728\,8 \times 10^{-2}$	$1.705\,703\,5 \times 10^{-2}$
c_2 =	$-4.351\,497\,0 \times 10^{-7}$	$-2.330\,175\,9 \times 10^{-7}$
c_3 =	$-1.585\,969\,7 \times 10^{-10}$	$6.543\,558\,5 \times 10^{-12}$
c_4 =	$-9.250\,287\,1 \times 10^{-14}$	$-7.356\,274\,9 \times 10^{-17}$
c_5 =	$-2.608\,431\,4 \times 10^{-17}$	$-1.789\,600\,1 \times 10^{-21}$
c_6 =	$-4.136\,019\,9 \times 10^{-21}$	$8.403\,616\,5 \times 10^{-26}$
c_7 =	$-3.403\,403\,0 \times 10^{-25}$	$-1.373\,587\,9 \times 10^{-30}$
c_8 =	$-1.156\,489\,0 \times 10^{-29}$	$1.062\,982\,3 \times 10^{-35}$
c_9 =		$-3.244\,708\,7 \times 10^{-41}$
Error Range:	0.03 °C to −0.01 °C	0.02 °C to −0.02 °C

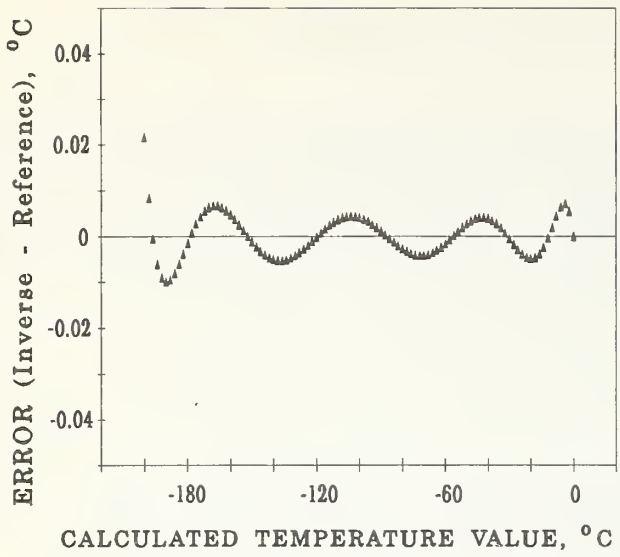

FIGURE A5.1. *Error in temperature values calculated from the inverse function given in table A5.1 for type E thermocouples in the −200 °C to 0 °C range.*

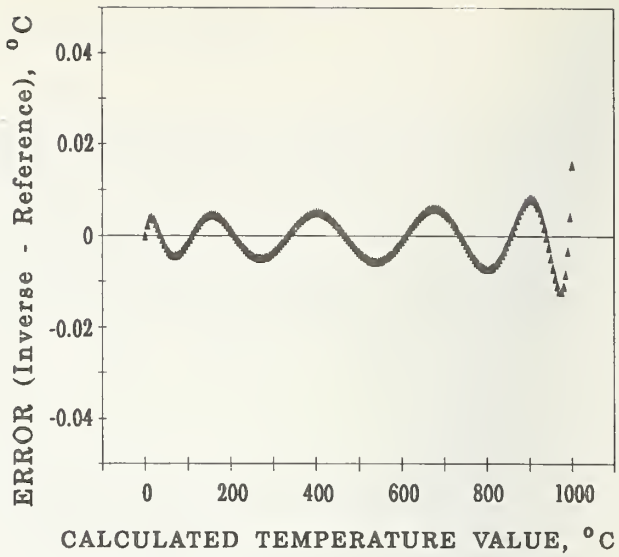

FIGURE A5.2. *Error in temperature values calculated from the inverse function given in table A5.1 for type E thermocouples in the 0 °C to 1000 °C range.*

A6. Approximate Inverse Functions for Type J — Iron Versus Copper-Nickel Alloy (SAMA) Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type J thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A6.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type J thermocouples presented in the main text (see table 6.3.1). The error in temperature values calculated from the approximate inverse functions for the −210 °C to 0 °C, 0 °C to 760 °C, and 760 °C to 1200 °C ranges is shown in figures A6.1, A6.2, and A6.3, respectively.

TABLE A6.1. *Type J thermocouples --- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−210 °C to 0 °C	0 °C to 760 °C	760 °C to 1200 °C
Voltage Range:	−8095 μV to 0 μV	0 μV to 42 919 μV	42 919 μV to 69 553 μV
c_0 =	0.000 000 0 . . .	0.000 000 . . .	$-3.113\ 581\ 87 \times 10^{3}$
c_1 =	$1.952\ 826\ 8 \times 10^{-2}$	$1.978\ 425 \times 10^{-2}$	$3.005\ 436\ 84 \times 10^{-1}$
c_2 =	$-1.228\ 618\ 5 \times 10^{-6}$	$-2.001\ 204 \times 10^{-7}$	$-9.947\ 732\ 30 \times 10^{-6}$
c_3 =	$-1.075\ 217\ 8 \times 10^{-9}$	$1.036\ 969 \times 10^{-11}$	$1.702\ 766\ 30 \times 10^{-10}$
c_4 =	$-5.908\ 693\ 3 \times 10^{-13}$	$-2.549\ 687 \times 10^{-16}$	$-1.430\ 334\ 68 \times 10^{-15}$
c_5 =	$-1.725\ 671\ 3 \times 10^{-16}$	$3.585\ 153 \times 10^{-21}$	$4.738\ 860\ 84 \times 10^{-21}$
c_6 =	$-2.813\ 151\ 3 \times 10^{-20}$	$-5.344\ 285 \times 10^{-26}$	
c_7 =	$-2.396\ 337\ 0 \times 10^{-24}$	$5.099\ 890 \times 10^{-31}$	
c_8 =	$-8.382\ 332\ 1 \times 10^{-29}$		
Error Range:	0.03 °C to −0.05 °C	0.04 °C to −0.04 °C	0.03 °C to −0.04 °C

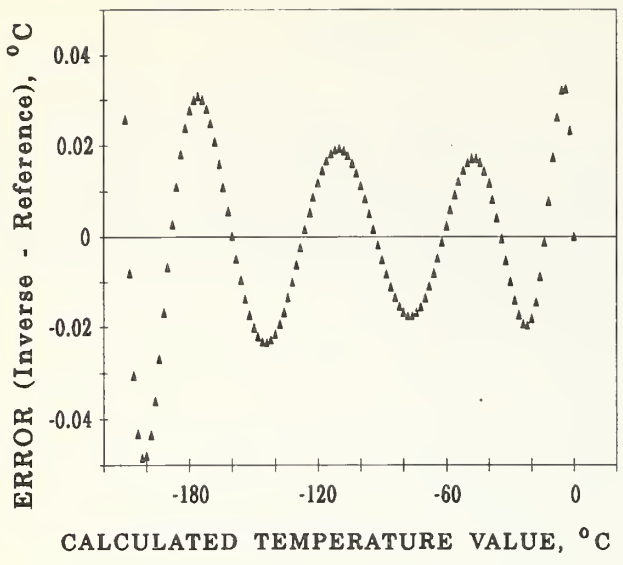

FIGURE A6.1. *Error in temperature values calculated from the inverse function given in table A6.1 for type J thermocouples in the −210 °C to 0 °C range.*

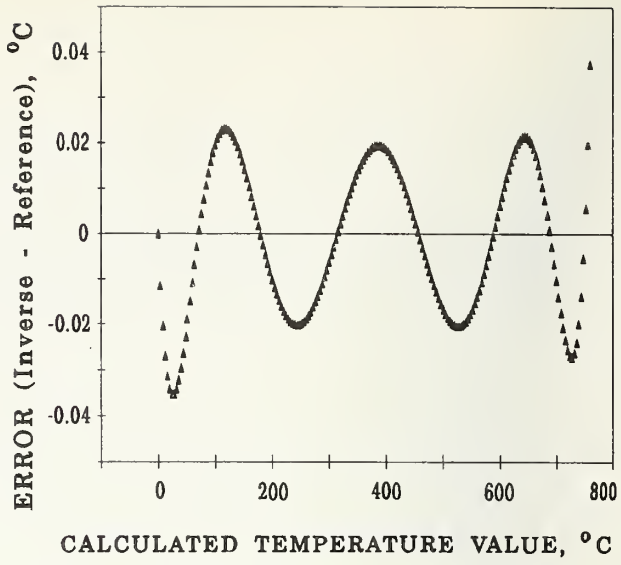

FIGURE A6.2. *Error in temperature values calculated from the inverse function given in table A6.1 for type J thermocouples in the 0 °C to 760 °C range.*

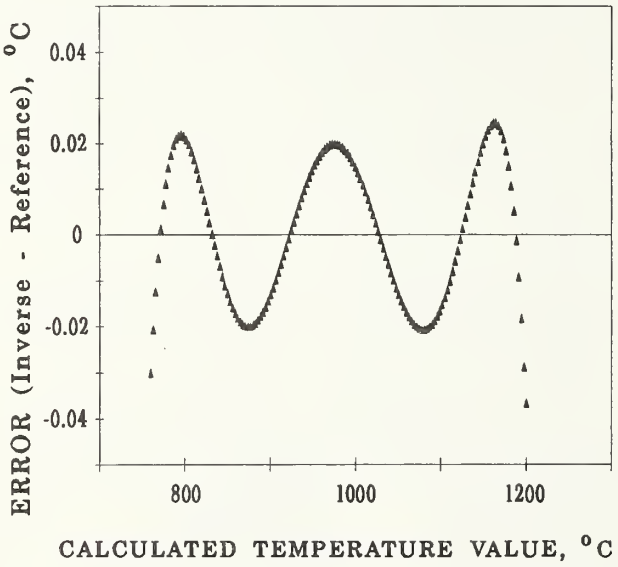

FIGURE A6.3. *Error in temperature values calculated from the inverse function given in table A6.1 for type J thermocouples in the 760 °C to 1200 °C range.*

A7. Approximate Inverse Functions for Type K — Nickel-Chromium Alloy Versus Nickel-Aluminum Alloy Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type K thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A7.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type K thermocouples presented in the main text (see table 7.3.1). The error in temperature values calculated from the approximate inverse functions for the −200 °C to 0 °C, 0 °C to 500 °C, and 500 °C to 1372 °C ranges is shown in figures A7.1, A7.2, and A7.3, respectively.

TABLE A7.1. *Type K thermocouples --- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−200 °C to 0 °C	0 °C to 500 °C	500 °C to 1372 °C
Voltage Range:	−5891 μV to 0 μV	0 μV to 20 644 μV	20 644 μV to 54 886 μV
c_0 =	0.000 000 0 . . .	0.000 000 . . .	$-1.318\ 058 \times 10^{2}$
c_1 =	$2.517\ 346\ 2 \times 10^{-2}$	$2.508\ 355 \times 10^{-2}$	$4.830\ 222 \times 10^{-2}$
c_2 =	$-1.166\ 287\ 8 \times 10^{-6}$	$7.860\ 106 \times 10^{-8}$	$-1.646\ 031 \times 10^{-6}$
c_3 =	$-1.083\ 363\ 8 \times 10^{-9}$	$-2.503\ 131 \times 10^{-10}$	$5.464\ 731 \times 10^{-11}$
c_4 =	$-8.977\ 354\ 0 \times 10^{-13}$	$8.315\ 270 \times 10^{-14}$	$-9.650\ 715 \times 10^{-16}$
c_5 =	$-3.734\ 237\ 7 \times 10^{-16}$	$-1.228\ 034 \times 10^{-17}$	$8.802\ 193 \times 10^{-21}$
c_6 =	$-8.663\ 264\ 3 \times 10^{-20}$	$9.804\ 036 \times 10^{-22}$	$-3.110\ 810 \times 10^{-26}$
c_7 =	$-1.045\ 059\ 8 \times 10^{-23}$	$-4.413\ 030 \times 10^{-26}$	
c_8 =	$-5.192\ 057\ 7 \times 10^{-28}$	$1.057\ 734 \times 10^{-30}$	
c_9 =		$-1.052\ 755 \times 10^{-35}$	
Error Range:	0.04 °C to −0.02 °C	0.04 °C to −0.05 °C	0.06 °C to −0.05 °C

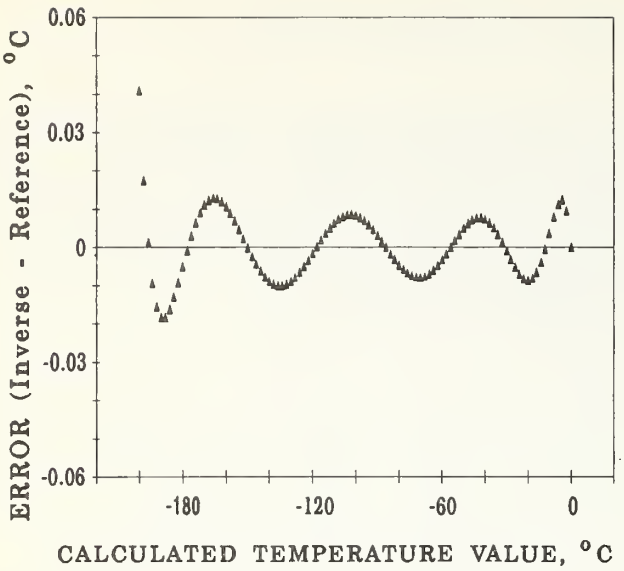

FIGURE A7.1. *Error in temperature values calculated from the inverse function given in table A7.1 for type K thermocouples in the −200 °C to 0 °C range.*

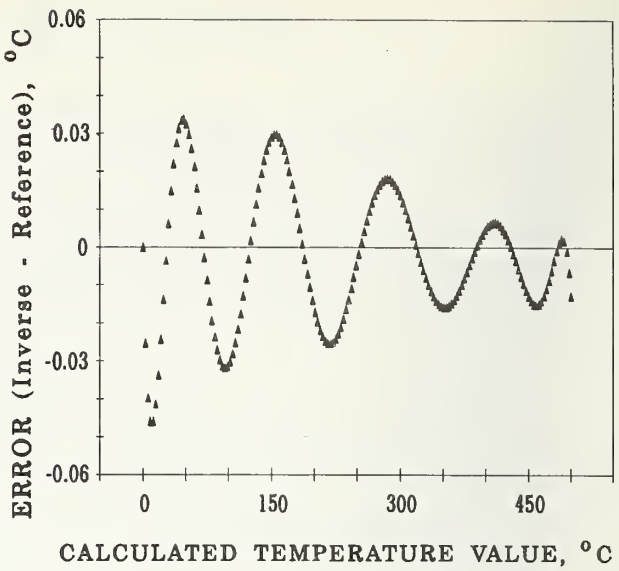

FIGURE A7.2. *Error in temperature values calculated from the inverse function given in table A7.1 for type K thermocouples in the 0 °C to 500 °C range.*

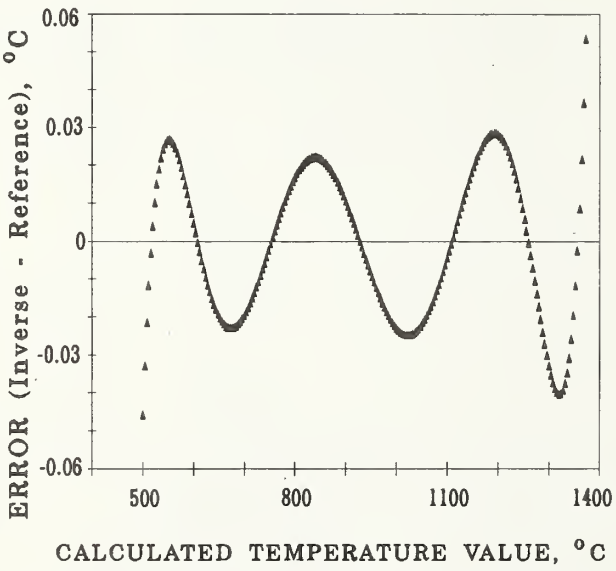

FIGURE A7.3. *Error in temperature values calculated from the inverse function given in table A7.1 for type K thermocouples in the 500 °C to 1372 °C range.*

A8. Approximate Inverse Functions for Type N — Nickel-Chromium-Silicon Alloy Versus Nickel-Silicon-Magnesium Alloy Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type N thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A8.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type N thermocouples presented in the main text (see table 8.3.1). The error in temperature values calculated from the approximate inverse functions for the −200 °C to 0 °C, 0 °C to 600 °C, 600 °C to 1300 °C, and 0 °C to 1300 °C ranges is shown in figures A8.1, A8.2, A8.3, and A8.4, respectively.

TABLE A8.1. *Type N thermocouples --- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−200 °C to 0 °C	0 °C to 600 °C	600 °C to 1300 °C	0 °C to 1300 °C
Voltage Range:	−3990 μV to 0 μV	0 μV to 20 613 μV	20 613 μV to 47 513 μV	0 μV to 47 513 μV
c_0 =	0.000 000 0 . . .	0.000 00 . . .	$1.972\,485 \times 10^{1}$	0.000 000 0 . . .
c_1 =	$3.843\,684\,7 \times 10^{-2}$	$3.868\,96 \times 10^{-2}$	$3.300\,943 \times 10^{-2}$	$3.878\,327\,7 \times 10^{-2}$
c_2 =	$1.101\,048\,5 \times 10^{-6}$	$-1.082\,67 \times 10^{-6}$	$-3.915\,159 \times 10^{-7}$	$-1.161\,234\,4 \times 10^{-6}$
c_3 =	$5.222\,931\,2 \times 10^{-9}$	$4.702\,05 \times 10^{-11}$	$9.855\,391 \times 10^{-12}$	$6.952\,565\,5 \times 10^{-11}$
c_4 =	$7.206\,052\,5 \times 10^{-12}$	$-2.121\,69 \times 10^{-18}$	$-1.274\,371 \times 10^{-16}$	$-3.009\,007\,7 \times 10^{-15}$
c_5 =	$5.848\,858\,6 \times 10^{-15}$	$-1.172\,72 \times 10^{-19}$	$7.767\,022 \times 10^{-22}$	$8.831\,158\,4 \times 10^{-20}$
c_6 =	$2.775\,491\,6 \times 10^{-18}$	$5.392\,80 \times 10^{-24}$		$-1.621\,383\,9 \times 10^{-24}$
c_7 =	$7.707\,516\,6 \times 10^{-22}$	$-7.981\,56 \times 10^{-29}$		$1.669\,336\,2 \times 10^{-29}$
c_8 =	$1.158\,266\,5 \times 10^{-25}$			$-7.311\,754\,0 \times 10^{-35}$
c_9 =	$7.313\,886\,8 \times 10^{-30}$			
Error Range:	0.03 °C to −0.02 °C	0.03 °C to −0.02 °C	0.02 °C to −0.04 °C	0.06 °C to −0.06 °C

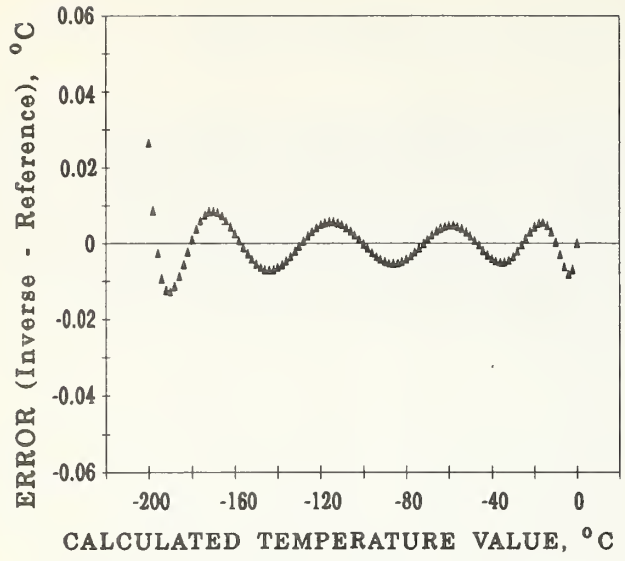

FIGURE A8.1. *Error in temperature values calculated from the inverse function given in table A8.1 for type N thermocouples in the −200 °C to 0 °C range.*

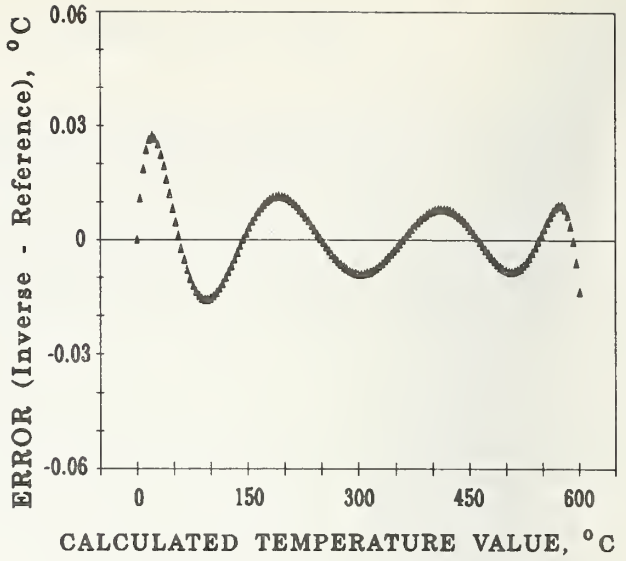

FIGURE A8.2. *Error in temperature values calculated from the inverse function given in table A8.1 for type N thermocouples in the 0 °C to 600 °C range.*

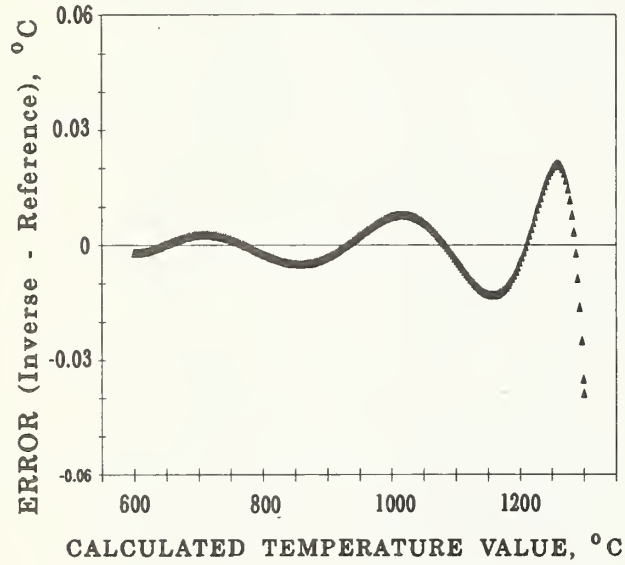

FIGURE A8.3. *Error in temperature values calculated from the inverse function given in table A8.1 for type N thermocouples in the 600 °C to 1300 °C range.*

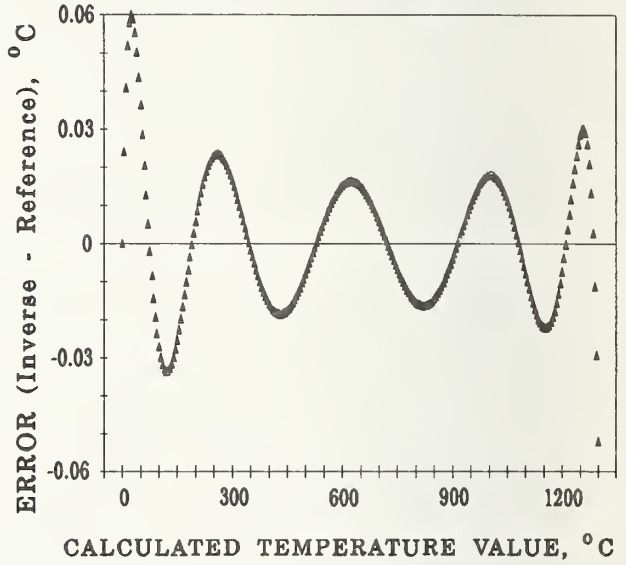

FIGURE A8.4. *Error in temperature values calculated from the inverse function given in table A8.1 for type N thermocouples in the 0 °C to 1300 °C range.*

A9. Approximate Inverse Functions for Type T — Copper Versus Copper-Nickel Alloy Thermocouples

The coefficients, c_i, of approximate inverse functions that were fitted to the reference data for type T thermocouples and that give temperature as a function of thermoelectric voltage in selected temperature and voltage ranges are given in table A9.1. The error range given in the table represents the maximum difference between temperature values calculated from the approximate inverse function and those obtained from the reference function for type T thermocouples presented in the main text (see table 9.3.1). The error in temperature values calculated from the approximate inverse functions for the −200 °C to 0 °C and 0 °C to 400 °C ranges is shown in figures A9.1 and A9.2, respectively.

TABLE A9.1. *Type T thermocouples --- coefficients of approximate inverse functions giving temperature, t_{90}, as a function of the thermoelectric voltage, E, in selected temperature and voltage ranges. The functions are of the form: $t_{90} = c_0 + c_1E + c_2E^2 + \ldots c_iE^i$, where E is in microvolts and t_{90} is in degrees Celsius*

Temperature Range:	−200 °C to 0 °C	0 °C to 400 °C
Voltage Range:	−5603 μV to 0 μV	0 μV to 20 872 μV
c_0 =	0.000 000 0 . . .	0.000 000 . . .
c_1 =	$2.594\,919\,2 \times 10^{-2}$	$2.592\,800 \times 10^{-2}$
c_2 =	$-2.131\,696\,7 \times 10^{-7}$	$-7.602\,961 \times 10^{-7}$
c_3 =	$7.901\,869\,2 \times 10^{-10}$	$4.637\,791 \times 10^{-11}$
c_4 =	$4.252\,777\,7 \times 10^{-13}$	$-2.165\,394 \times 10^{-15}$
c_5 =	$1.330\,447\,3 \times 10^{-16}$	$6.048\,144 \times 10^{-20}$
c_6 =	$2.024\,144\,6 \times 10^{-20}$	$-7.293\,422 \times 10^{-25}$
c_7 =	$1.266\,817\,1 \times 10^{-24}$	
Error Range:	0.04 °C to −0.02 °C	0.03 °C to −0.03 °C

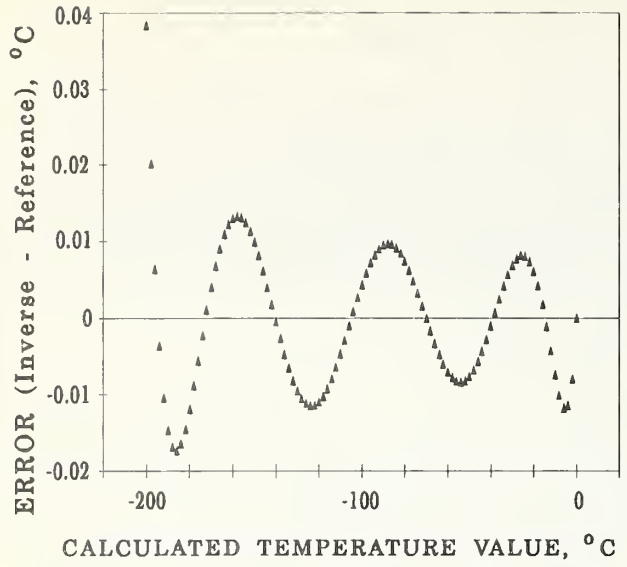

FIGURE A9.1. *Error in temperature values calculated from the inverse function given in table A9.1 for type T thermocouples in the −200 °C to 0 °C range.*

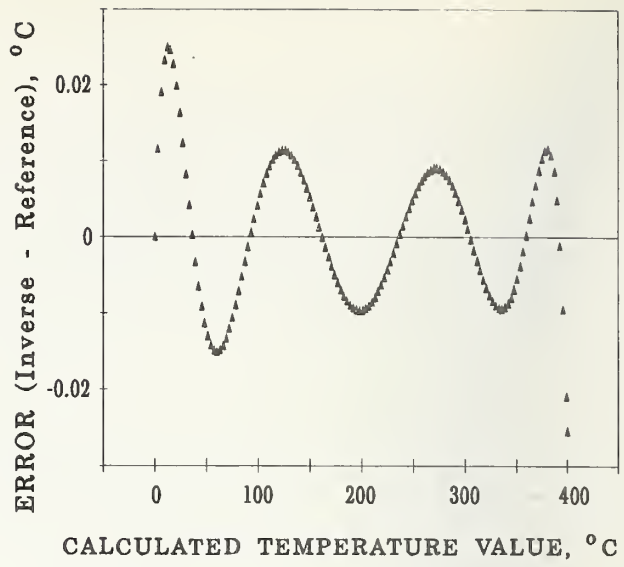

FIGURE A9.2. *Error in temperature values calculated from the inverse function given in table A9.1 for type T thermocouples in the 0 °C to 400 °C range.*

Appendix B. Supplementary Reference Tables of Temperature-Thermoelectric Voltage for the Letter-Designated Thermocouple Types

B1. Introduction

The reference tables presented in the main text for the various letter-designated thermocouple types give the thermoelectric voltage to more digits than is often necessary. Also, the form of the tables is not always the most usable for many applications. The purpose of the supplementary reference tables included in this appendix is to present the same temperature-thermoelectricvoltage data in different formats to satisfy special needs. Four tables are presented for each of the thermocouple types: B, R, S, E, J, K, N, and T. The four tables are:

(1) Thermoelectric voltage as a function of temperature, with values of temperature in degrees Celsius (ITS-90) and with reference junctions at 0 °C. The temperature interval is 1 °C and the values of thermoelectric voltage are expressed in millivolts rather than microvolts. The voltage values are given to the nearest microvolt (the reference tables given in the main text have a resolution of either 0.1 μV or 0.01 μV, depending on the thermocouple type and temperature range).

(2) Thermoelectric voltage as a function of temperature, with values of temperature in degrees Fahrenheit and with reference junctions at 32 °F. These tables are similar to those discussed in (1) except that the degree Fahrenheit results in a finer temperature grid. In these tables a value in degrees Fahrenheit, t_F, is defined by the relation $t_F = (9/5)t_{90} + 32$, where t_{90} is the value in degrees Celsius (ITS-90).

(3) Temperature as a function of thermoelectric voltage, with values of temperature in degrees Celsius (ITS-90) and with reference junctions at 0 °C. These tables, obtained by iteration of the reference functions given in the main text, are presented with 0.01 mV intervals in the thermoelectric voltage values (which are expressed in millivolts) and with 0.01 °C resolution in the temperature values. This is essentially an inverse of the table described in (1) above.

(4) Temperature as a function of thermoelectric voltage, with values of temperature in degrees Fahrenheit and with reference junctions at 32 °F. These tables are similar to those discussed in (3) except that the temperature values are given in degrees Fahrenheit. This is essentially an inverse of the table described in (2) above.

The numbering scheme for the tables in the appendix uses four characters, *e.g.,* B2.1.1. The first two characters, which correspond to the section number in this appendix, identify the particular thermocouple type, *e.g.,* B2. represents type B, B3. represents type R, etc. The third character indicates whether the tabular values are presented as a function of temperature (.1.) or as a function of voltage (.2.). The fourth character indicates whether the temperature values are given in degrees Celsius (.1.) or in degrees Fahrenheit (.2.).

B2. Supplementary Reference Tables for Type B — Platinum-30% Rhodium Alloy Versus Platinum-6% Rhodium Alloy Thermocouples

B2.1. Tables with Voltage as a Function of Temperature

The reference function for type B thermocouples given in the main text (see table 2.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B2.1.1 and B2.1.2. Table B2.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from 0 °C to 1820 °C, and table B2.1.2 presents voltage values at 1 °F intervals from 32 °F to 3308 °F.

TABLE B2.1.1. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.000	0.000	−0.001	−0.001	−0.001	−0.001	−0.001	−0.002	−0.002	−0.002	0
10	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.003	−0.003	−0.003	10
20	−0.003	−0.003	−0.003	−0.003	−0.003	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	20
30	−0.002	−0.002	−0.002	−0.002	−0.002	−0.001	−0.001	−0.001	−0.001	−0.001	0.000	30
40	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002	40
50	0.002	0.003	0.003	0.003	0.004	0.004	0.004	0.005	0.005	0.006	0.006	50
60	0.006	0.007	0.007	0.008	0.008	0.009	0.009	0.010	0.010	0.011	0.011	60
70	0.011	0.012	0.012	0.013	0.014	0.014	0.015	0.015	0.016	0.017	0.017	70
80	0.017	0.018	0.019	0.020	0.020	0.021	0.022	0.022	0.023	0.024	0.025	80
90	0.025	0.026	0.026	0.027	0.028	0.029	0.030	0.031	0.031	0.032	0.033	90
100	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.040	0.041	0.042	0.043	100
110	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.050	0.051	0.052	0.053	110
120	0.053	0.055	0.056	0.057	0.058	0.059	0.060	0.062	0.063	0.064	0.065	120
130	0.065	0.066	0.068	0.069	0.070	0.072	0.073	0.074	0.075	0.077	0.078	130
140	0.078	0.079	0.081	0.082	0.084	0.085	0.086	0.088	0.089	0.091	0.092	140
150	0.092	0.094	0.095	0.096	0.098	0.099	0.101	0.102	0.104	0.106	0.107	150
160	0.107	0.109	0.110	0.112	0.113	0.115	0.117	0.118	0.120	0.122	0.123	160
170	0.123	0.125	0.127	0.128	0.130	0.132	0.134	0.135	0.137	0.139	0.141	170
180	0.141	0.142	0.144	0.146	0.148	0.150	0.151	0.153	0.155	0.157	0.159	180
190	0.159	0.161	0.163	0.165	0.166	0.168	0.170	0.172	0.174	0.176	0.178	190
200	0.178	0.180	0.182	0.184	0.186	0.188	0.190	0.192	0.195	0.197	0.199	200
210	0.199	0.201	0.203	0.205	0.207	0.209	0.212	0.214	0.216	0.218	0.220	210
220	0.220	0.222	0.225	0.227	0.229	0.231	0.234	0.236	0.238	0.241	0.243	220
230	0.243	0.245	0.248	0.250	0.252	0.255	0.257	0.259	0.262	0.264	0.267	230
240	0.267	0.269	0.271	0.274	0.276	0.279	0.281	0.284	0.286	0.289	0.291	240
250	0.291	0.294	0.296	0.299	0.301	0.304	0.307	0.309	0.312	0.314	0.317	250
260	0.317	0.320	0.322	0.325	0.328	0.330	0.333	0.336	0.338	0.341	0.344	260
270	0.344	0.347	0.349	0.352	0.355	0.358	0.360	0.363	0.366	0.369	0.372	270
280	0.372	0.375	0.377	0.380	0.383	0.386	0.389	0.392	0.395	0.398	0.401	280
290	0.401	0.404	0.407	0.410	0.413	0.416	0.419	0.422	0.425	0.428	0.431	290
300	0.431	0.434	0.437	0.440	0.443	0.446	0.449	0.452	0.455	0.458	0.462	300
310	0.462	0.465	0.468	0.471	0.474	0.478	0.481	0.484	0.487	0.490	0.494	310
320	0.494	0.497	0.500	0.503	0.507	0.510	0.513	0.517	0.520	0.523	0.527	320
330	0.527	0.530	0.533	0.537	0.540	0.544	0.547	0.550	0.554	0.557	0.561	330
340	0.561	0.564	0.568	0.571	0.575	0.578	0.582	0.585	0.589	0.592	0.596	340
350	0.596	0.599	0.603	0.607	0.610	0.614	0.617	0.621	0.625	0.628	0.632	350
360	0.632	0.636	0.639	0.643	0.647	0.650	0.654	0.658	0.662	0.665	0.669	360
370	0.669	0.673	0.677	0.680	0.684	0.688	0.692	0.696	0.700	0.703	0.707	370
380	0.707	0.711	0.715	0.719	0.723	0.727	0.731	0.735	0.738	0.742	0.746	380
390	0.746	0.750	0.754	0.758	0.762	0.766	0.770	0.774	0.778	0.782	0.787	390
400	0.787	0.791	0.795	0.799	0.803	0.807	0.811	0.815	0.819	0.824	0.828	400
410	0.828	0.832	0.836	0.840	0.844	0.849	0.853	0.857	0.861	0.866	0.870	410
420	0.870	0.874	0.878	0.883	0.887	0.891	0.896	0.900	0.904	0.909	0.913	420
430	0.913	0.917	0.922	0.926	0.930	0.935	0.939	0.944	0.948	0.953	0.957	430
440	0.957	0.961	0.966	0.970	0.975	0.979	0.984	0.988	0.993	0.997	1.002	440
450	1.002	1.007	1.011	1.016	1.020	1.025	1.030	1.034	1.039	1.043	1.048	450
460	1.048	1.053	1.057	1.062	1.067	1.071	1.076	1.081	1.086	1.090	1.095	460
470	1.095	1.100	1.105	1.109	1.114	1.119	1.124	1.129	1.133	1.138	1.143	470
480	1.143	1.148	1.153	1.158	1.163	1.167	1.172	1.177	1.182	1.187	1.192	480
490	1.192	1.197	1.202	1.207	1.212	1.217	1.222	1.227	1.232	1.237	1.242	490
500	1.242	1.247	1.252	1.257	1.262	1.267	1.272	1.277	1.282	1.288	1.293	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B2.1.1. ***Type B thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued***

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	1.242	1.247	1.252	1.257	1.262	1.267	1.272	1.277	1.282	1.288	1.293	500
510	1.293	1.298	1.303	1.308	1.313	1.318	1.324	1.329	1.334	1.339	1.344	510
520	1.344	1.350	1.355	1.360	1.365	1.371	1.376	1.381	1.387	1.392	1.397	520
530	1.397	1.402	1.408	1.413	1.418	1.424	1.429	1.435	1.440	1.445	1.451	530
540	1.451	1.456	1.462	1.467	1.472	1.478	1.483	1.489	1.494	1.500	1.505	540
550	1.505	1.511	1.516	1.522	1.527	1.533	1.539	1.544	1.550	1.555	1.561	550
560	1.561	1.566	1.572	1.578	1.583	1.589	1.595	1.600	1.606	1.612	1.617	560
570	1.617	1.623	1.629	1.634	1.640	1.646	1.652	1.657	1.663	1.669	1.675	570
580	1.675	1.680	1.686	1.692	1.698	1.704	1.709	1.715	1.721	1.727	1.733	580
590	1.733	1.739	1.745	1.750	1.756	1.762	1.768	1.774	1.780	1.786	1.792	590
600	1.792	1.798	1.804	1.810	1.816	1.822	1.828	1.834	1.840	1.846	1.852	600
610	1.852	1.858	1.864	1.870	1.876	1.882	1.888	1.894	1.901	1.907	1.913	610
620	1.913	1.919	1.925	1.931	1.937	1.944	1.950	1.956	1.962	1.968	1.975	620
630	1.975	1.981	1.987	1.993	1.999	2.006	2.012	2.018	2.025	2.031	2.037	630
640	2.037	2.043	2.050	2.056	2.062	2.069	2.075	2.082	2.088	2.094	2.101	640
650	2.101	2.107	2.113	2.120	2.126	2.133	2.139	2.146	2.152	2.158	2.165	650
660	2.165	2.171	2.178	2.184	2.191	2.197	2.204	2.210	2.217	2.224	2.230	660
670	2.230	2.237	2.243	2.250	2.256	2.263	2.270	2.276	2.283	2.289	2.296	670
680	2.296	2.303	2.309	2.316	2.323	2.329	2.336	2.343	2.350	2.356	2.363	680
690	2.363	2.370	2.376	2.383	2.390	2.397	2.403	2.410	2.417	2.424	2.431	690
700	2.431	2.437	2.444	2.451	2.458	2.465	2.472	2.479	2.485	2.492	2.499	700
710	2.499	2.506	2.513	2.520	2.527	2.534	2.541	2.548	2.555	2.562	2.569	710
720	2.569	2.576	2.583	2.590	2.597	2.604	2.611	2.618	2.625	2.632	2.639	720
730	2.639	2.646	2.653	2.660	2.667	2.674	2.681	2.688	2.696	2.703	2.710	730
740	2.710	2.717	2.724	2.731	2.738	2.746	2.753	2.760	2.767	2.775	2.782	740
750	2.782	2.789	2.796	2.803	2.811	2.818	2.825	2.833	2.840	2.847	2.854	750
760	2.854	2.862	2.869	2.876	2.884	2.891	2.898	2.906	2.913	2.921	2.928	760
770	2.928	2.935	2.943	2.950	2.958	2.965	2.973	2.980	2.987	2.995	3.002	770
780	3.002	3.010	3.017	3.025	3.032	3.040	3.047	3.055	3.062	3.070	3.078	780
790	3.078	3.085	3.093	3.100	3.108	3.116	3.123	3.131	3.138	3.146	3.154	790
800	3.154	3.161	3.169	3.177	3.184	3.192	3.200	3.207	3.215	3.223	3.230	800
810	3.230	3.238	3.246	3.254	3.261	3.269	3.277	3.285	3.292	3.300	3.308	810
820	3.308	3.316	3.324	3.331	3.339	3.347	3.355	3.363	3.371	3.379	3.386	820
830	3.386	3.394	3.402	3.410	3.418	3.426	3.434	3.442	3.450	3.458	3.466	830
840	3.466	3.474	3.482	3.490	3.498	3.506	3.514	3.522	3.530	3.538	3.546	840
850	3.546	3.554	3.562	3.570	3.578	3.586	3.594	3.602	3.610	3.618	3.626	850
860	3.626	3.634	3.643	3.651	3.659	3.667	3.675	3.683	3.692	3.700	3.708	860
870	3.708	3.716	3.724	3.732	3.741	3.749	3.757	3.765	3.774	3.782	3.790	870
880	3.790	3.798	3.807	3.815	3.823	3.832	3.840	3.848	3.857	3.865	3.873	880
890	3.873	3.882	3.890	3.898	3.907	3.915	3.923	3.932	3.940	3.949	3.957	890
900	3.957	3.965	3.974	3.982	3.991	3.999	4.008	4.016	4.024	4.033	4.041	900
910	4.041	4.050	4.058	4.067	4.075	4.084	4.093	4.101	4.110	4.118	4.127	910
920	4.127	4.135	4.144	4.152	4.161	4.170	4.178	4.187	4.195	4.204	4.213	920
930	4.213	4.221	4.230	4.239	4.247	4.256	4.265	4.273	4.282	4.291	4.299	930
940	4.299	4.308	4.317	4.326	4.334	4.343	4.352	4.360	4.369	4.378	4.387	940
950	4.387	4.396	4.404	4.413	4.422	4.431	4.440	4.448	4.457	4.466	4.475	950
960	4.475	4.484	4.493	4.501	4.510	4.519	4.528	4.537	4.546	4.555	4.564	960
970	4.564	4.573	4.582	4.591	4.599	4.608	4.617	4.626	4.635	4.644	4.653	970
980	4.653	4.662	4.671	4.680	4.689	4.698	4.707	4.716	4.725	4.734	4.743	980
990	4.743	4.753	4.762	4.771	4.780	4.789	4.798	4.807	4.816	4.825	4.834	990
1000	4.834	4.843	4.853	4.862	4.871	4.880	4.889	4.898	4.908	4.917	4.926	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B2.1.1. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	4.834	4.843	4.853	4.862	4.871	4.880	4.889	4.898	4.908	4.917	4.926	1000
1010	4.926	4.935	4.944	4.954	4.963	4.972	4.981	4.990	5.000	5.009	5.018	1010
1020	5.018	5.027	5.037	5.046	5.055	5.065	5.074	5.083	5.092	5.102	5.111	1020
1030	5.111	5.120	5.130	5.139	5.148	5.158	5.167	5.176	5.186	5.195	5.205	1030
1040	5.205	5.214	5.223	5.233	5.242	5.252	5.261	5.270	5.280	5.289	5.299	1040
1050	5.299	5.308	5.318	5.327	5.337	5.346	5.356	5.365	5.375	5.384	5.394	1050
1060	5.394	5.403	5.413	5.422	5.432	5.441	5.451	5.460	5.470	5.480	5.489	1060
1070	5.489	5.499	5.508	5.518	5.528	5.537	5.547	5.556	5.566	5.576	5.585	1070
1080	5.585	5.595	5.605	5.614	5.624	5.634	5.643	5.653	5.663	5.672	5.682	1080
1090	5.682	5.692	5.702	5.711	5.721	5.731	5.740	5.750	5.760	5.770	5.780	1090
1100	5.780	5.789	5.799	5.809	5.819	5.828	5.838	5.848	5.858	5.868	5.878	1100
1110	5.878	5.887	5.897	5.907	5.917	5.927	5.937	5.947	5.956	5.966	5.976	1110
1120	5.976	5.986	5.996	6.006	6.016	6.026	6.036	6.046	6.055	6.065	6.075	1120
1130	6.075	6.085	6.095	6.105	6.115	6.125	6.135	6.145	6.155	6.165	6.175	1130
1140	6.175	6.185	6.195	6.205	6.215	6.225	6.235	6.245	6.256	6.266	6.276	1140
1150	6.276	6.286	6.296	6.306	6.316	6.326	6.336	6.346	6.356	6.367	6.377	1150
1160	6.377	6.387	6.397	6.407	6.417	6.427	6.438	6.448	6.458	6.468	6.478	1160
1170	6.478	6.488	6.499	6.509	6.519	6.529	6.539	6.550	6.560	6.570	6.580	1170
1180	6.580	6.591	6.601	6.611	6.621	6.632	6.642	6.652	6.663	6.673	6.683	1180
1190	6.683	6.693	6.704	6.714	6.724	6.735	6.745	6.755	6.766	6.776	6.786	1190
1200	6.786	6.797	6.807	6.818	6.828	6.838	6.849	6.859	6.869	6.880	6.890	1200
1210	6.890	6.901	6.911	6.922	6.932	6.942	6.953	6.963	6.974	6.984	6.995	1210
1220	6.995	7.005	7.016	7.026	7.037	7.047	7.058	7.068	7.079	7.089	7.100	1220
1230	7.100	7.110	7.121	7.131	7.142	7.152	7.163	7.173	7.184	7.194	7.205	1230
1240	7.205	7.216	7.226	7.237	7.247	7.258	7.269	7.279	7.290	7.300	7.311	1240
1250	7.311	7.322	7.332	7.343	7.353	7.364	7.375	7.385	7.396	7.407	7.417	1250
1260	7.417	7.428	7.439	7.449	7.460	7.471	7.482	7.492	7.503	7.514	7.524	1260
1270	7.524	7.535	7.546	7.557	7.567	7.578	7.589	7.600	7.610	7.621	7.632	1270
1280	7.632	7.643	7.653	7.664	7.675	7.686	7.697	7.707	7.718	7.729	7.740	1280
1290	7.740	7.751	7.761	7.772	7.783	7.794	7.805	7.816	7.827	7.837	7.848	1290
1300	7.848	7.859	7.870	7.881	7.892	7.903	7.914	7.924	7.935	7.946	7.957	1300
1310	7.957	7.968	7.979	7.990	8.001	8.012	8.023	8.034	8.045	8.056	8.066	1310
1320	8.066	8.077	8.088	8.099	8.110	8.121	8.132	8.143	8.154	8.165	8.176	1320
1330	8.176	8.187	8.198	8.209	8.220	8.231	8.242	8.253	8.264	8.275	8.286	1330
1340	8.286	8.298	8.309	8.320	8.331	8.342	8.353	8.364	8.375	8.386	8.397	1340
1350	8.397	8.408	8.419	8.430	8.441	8.453	8.464	8.475	8.486	8.497	8.508	1350
1360	8.508	8.519	8.530	8.542	8.553	8.564	8.575	8.586	8.597	8.608	8.620	1360
1370	8.620	8.631	8.642	8.653	8.664	8.675	8.687	8.698	8.709	8.720	8.731	1370
1380	8.731	8.743	8.754	8.765	8.776	8.787	8.799	8.810	8.821	8.832	8.844	1380
1390	8.844	8.855	8.866	8.877	8.889	8.900	8.911	8.922	8.934	8.945	8.956	1390
1400	8.956	8.967	8.979	8.990	9.001	9.013	9.024	9.035	9.047	9.058	9.069	1400
1410	9.069	9.080	9.092	9.103	9.114	9.126	9.137	9.148	9.160	9.171	9.182	1410
1420	9.182	9.194	9.205	9.216	9.228	9.239	9.251	9.262	9.273	9.285	9.296	1420
1430	9.296	9.307	9.319	9.330	9.342	9.353	9.364	9.376	9.387	9.398	9.410	1430
1440	9.410	9.421	9.433	9.444	9.456	9.467	9.478	9.490	9.501	9.513	9.524	1440
1450	9.524	9.536	9.547	9.558	9.570	9.581	9.593	9.604	9.616	9.627	9.639	1450
1460	9.639	9.650	9.662	9.673	9.684	9.696	9.707	9.719	9.730	9.742	9.753	1460
1470	9.753	9.765	9.776	9.788	9.799	9.811	9.822	9.834	9.845	9.857	9.868	1470
1480	9.868	9.880	9.891	9.903	9.914	9.926	9.937	9.949	9.961	9.972	9.984	1480
1490	9.984	9.995	10.007	10.018	10.030	10.041	10.053	10.064	10.076	10.088	10.099	1490
1500	10.099	10.111	10.122	10.134	10.145	10.157	10.168	10.180	10.192	10.203	10.215	1500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B2.1.1. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1500	10.099	10.111	10.122	10.134	10.145	10.157	10.168	10.180	10.192	10.203	10.215	**1500**
1510	10.215	10.226	10.238	10.249	10.261	10.273	10.284	10.296	10.307	10.319	10.331	**1510**
1520	10.331	10.342	10.354	10.365	10.377	10.389	10.400	10.412	10.423	10.435	10.447	**1520**
1530	10.447	10.458	10.470	10.482	10.493	10.505	10.516	10.528	10.540	10.551	10.563	**1530**
1540	10.563	10.575	10.586	10.598	10.609	10.621	10.633	10.644	10.656	10.668	10.679	**1540**
1550	10.679	10.691	10.703	10.714	10.726	10.738	10.749	10.761	10.773	10.784	10.796	**1550**
1560	10.796	10.808	10.819	10.831	10.843	10.854	10.866	10.877	10.889	10.901	10.913	**1560**
1570	10.913	10.924	10.936	10.948	10.959	10.971	10.983	10.994	11.006	11.018	11.029	**1570**
1580	11.029	11.041	11.053	11.064	11.076	11.088	11.099	11.111	11.123	11.134	11.146	**1580**
1590	11.146	11.158	11.169	11.181	11.193	11.205	11.216	11.228	11.240	11.251	11.263	**1590**
1600	11.263	11.275	11.286	11.298	11.310	11.321	11.333	11.345	11.357	11.368	11.380	**1600**
1610	11.380	11.392	11.403	11.415	11.427	11.438	11.450	11.462	11.474	11.485	11.497	**1610**
1620	11.497	11.509	11.520	11.532	11.544	11.555	11.567	11.579	11.591	11.602	11.614	**1620**
1630	11.614	11.626	11.637	11.649	11.661	11.673	11.684	11.696	11.708	11.719	11.731	**1630**
1640	11.731	11.743	11.754	11.766	11.778	11.790	11.801	11.813	11.825	11.836	11.848	**1640**
1650	11.848	11.860	11.871	11.883	11.895	11.907	11.918	11.930	11.942	11.953	11.965	**1650**
1660	11.965	11.977	11.988	12.000	12.012	12.024	12.035	12.047	12.059	12.070	12.082	**1660**
1670	12.082	12.094	12.105	12.117	12.129	12.141	12.152	12.164	12.176	12.187	12.199	**1670**
1680	12.199	12.211	12.222	12.234	12.246	12.257	12.269	12.281	12.292	12.304	12.316	**1680**
1690	12.316	12.327	12.339	12.351	12.363	12.374	12.386	12.398	12.409	12.421	12.433	**1690**
1700	12.433	12.444	12.456	12.468	12.479	12.491	12.503	12.514	12.526	12.538	12.549	**1700**
1710	12.549	12.561	12.572	12.584	12.596	12.607	12.619	12.631	12.642	12.654	12.666	**1710**
1720	12.666	12.677	12.689	12.701	12.712	12.724	12.736	12.747	12.759	12.770	12.782	**1720**
1730	12.782	12.794	12.805	12.817	12.829	12.840	12.852	12.863	12.875	12.887	12.898	**1730**
1740	12.898	12.910	12.921	12.933	12.945	12.956	12.968	12.980	12.991	13.003	13.014	**1740**
1750	13.014	13.026	13.037	13.049	13.061	13.072	13.084	13.095	13.107	13.119	13.130	**1750**
1760	13.130	13.142	13.153	13.165	13.176	13.188	13.200	13.211	13.223	13.234	13.246	**1760**
1770	13.246	13.257	13.269	13.280	13.292	13.304	13.315	13.327	13.338	13.350	13.361	**1770**
1780	13.361	13.373	13.384	13.396	13.407	13.419	13.430	13.442	13.453	13.465	13.476	**1780**
1790	13.476	13.488	13.499	13.511	13.522	13.534	13.545	13.557	13.568	13.580	13.591	**1790**
1800	13.591	13.603	13.614	13.626	13.637	13.649	13.660	13.672	13.683	13.694	13.706	**1800**
1810	13.706	13.717	13.729	13.740	13.752	13.763	13.775	13.786	13.797	13.809	13.820	**1810**
1820	13.820											**1820**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE B2.1.2. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
					Thermoelectric Voltage in Millivolts							
30			0.000	0.000	0.000	0.000	−0.001	−0.001	−0.001	−0.001	−0.001	30
40	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.002	−0.002	−0.002	−0.002	−0.002	40
50	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	50
60	−0.002	−0.002	−0.002	−0.003	−0.003	−0.003	−0.003	−0.003	−0.003	−0.003	−0.003	60
70	−0.003	−0.003	−0.003	−0.003	−0.003	−0.003	−0.003	−0.002	−0.002	−0.002	−0.002	70
80	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	80
90	−0.002	−0.002	−0.002	−0.002	−0.002	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	90
100	−0.001	−0.001	−0.001	−0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	100
110	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	110
120	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.004	120
130	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.006	0.006	0.006	130
140	0.006	0.006	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.009	0.009	140
150	0.009	0.009	0.009	0.010	0.010	0.010	0.011	0.011	0.011	0.012	0.012	150
160	0.012	0.012	0.013	0.013	0.013	0.014	0.014	0.014	0.015	0.015	0.015	160
170	0.015	0.016	0.016	0.016	0.017	0.017	0.017	0.018	0.018	0.019	0.019	170
180	0.019	0.019	0.020	0.020	0.021	0.021	0.021	0.022	0.022	0.023	0.023	180
190	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026	0.027	0.027	0.027	190
200	0.027	0.028	0.028	0.029	0.029	0.030	0.030	0.031	0.031	0.032	0.032	200
210	0.032	0.033	0.033	0.034	0.034	0.035	0.035	0.036	0.036	0.037	0.037	210
220	0.037	0.038	0.038	0.039	0.039	0.040	0.041	0.041	0.042	0.042	0.043	220
230	0.043	0.043	0.044	0.044	0.045	0.046	0.046	0.047	0.047	0.048	0.049	230
240	0.049	0.049	0.050	0.050	0.051	0.052	0.052	0.053	0.053	0.054	0.055	240
250	0.055	0.055	0.056	0.057	0.057	0.058	0.059	0.059	0.060	0.060	0.061	250
260	0.061	0.062	0.062	0.063	0.064	0.065	0.065	0.066	0.067	0.067	0.068	260
270	0.068	0.069	0.069	0.070	0.071	0.072	0.072	0.073	0.074	0.074	0.075	270
280	0.075	0.076	0.077	0.077	0.078	0.079	0.080	0.080	0.081	0.082	0.083	280
290	0.083	0.083	0.084	0.085	0.086	0.086	0.087	0.088	0.089	0.090	0.090	290
300	0.090	0.091	0.092	0.093	0.094	0.094	0.095	0.096	0.097	0.098	0.099	300
310	0.099	0.099	0.100	0.101	0.102	0.103	0.104	0.105	0.105	0.106	0.107	310
320	0.107	0.108	0.109	0.110	0.111	0.112	0.112	0.113	0.114	0.115	0.116	320
330	0.116	0.117	0.118	0.119	0.120	0.121	0.121	0.122	0.123	0.124	0.125	330
340	0.125	0.126	0.127	0.128	0.129	0.130	0.131	0.132	0.133	0.134	0.135	340
350	0.135	0.136	0.137	0.138	0.139	0.140	0.141	0.142	0.143	0.144	0.145	350
360	0.145	0.146	0.147	0.148	0.149	0.150	0.151	0.152	0.153	0.154	0.155	360
370	0.155	0.156	0.157	0.158	0.159	0.160	0.161	0.162	0.163	0.164	0.165	370
380	0.165	0.166	0.167	0.168	0.170	0.171	0.172	0.173	0.174	0.175	0.176	380
390	0.176	0.177	0.178	0.179	0.180	0.182	0.183	0.184	0.185	0.186	0.187	390
400	0.187	0.188	0.190	0.191	0.192	0.193	0.194	0.195	0.196	0.198	0.199	400
410	0.199	0.200	0.201	0.202	0.203	0.205	0.206	0.207	0.208	0.209	0.211	410
420	0.211	0.212	0.213	0.214	0.215	0.217	0.218	0.219	0.220	0.222	0.223	420
430	0.223	0.224	0.225	0.226	0.228	0.229	0.230	0.231	0.233	0.234	0.235	430
440	0.235	0.236	0.238	0.239	0.240	0.242	0.243	0.244	0.245	0.247	0.248	440
450	0.248	0.249	0.251	0.252	0.253	0.255	0.256	0.257	0.259	0.260	0.261	450
460	0.261	0.263	0.264	0.265	0.267	0.268	0.269	0.271	0.272	0.273	0.275	460
470	0.275	0.276	0.277	0.279	0.280	0.282	0.283	0.284	0.286	0.287	0.288	470
480	0.288	0.290	0.291	0.293	0.294	0.296	0.297	0.298	0.300	0.301	0.303	480
490	0.303	0.304	0.305	0.307	0.308	0.310	0.311	0.313	0.314	0.316	0.317	490
500	0.317	0.319	0.320	0.321	0.323	0.324	0.326	0.327	0.329	0.330	0.332	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B2.1.2. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	0.317	0.319	0.320	0.321	0.323	0.324	0.326	0.327	0.329	0.330	0.332	500
510	0.332	0.333	0.335	0.336	0.338	0.339	0.341	0.342	0.344	0.345	0.347	510
520	0.347	0.348	0.350	0.352	0.353	0.355	0.356	0.358	0.359	0.361	0.362	520
530	0.362	0.364	0.365	0.367	0.369	0.370	0.372	0.373	0.375	0.377	0.378	530
540	0.378	0.380	0.381	0.383	0.384	0.386	0.388	0.389	0.391	0.393	0.394	540
550	0.394	0.396	0.397	0.399	0.401	0.402	0.404	0.406	0.407	0.409	0.411	550
560	0.411	0.412	0.414	0.416	0.417	0.419	0.421	0.422	0.424	0.426	0.427	560
570	0.427	0.429	0.431	0.432	0.434	0.436	0.437	0.439	0.441	0.443	0.444	570
580	0.444	0.446	0.448	0.449	0.451	0.453	0.455	0.456	0.458	0.460	0.462	580
590	0.462	0.463	0.465	0.467	0.469	0.470	0.472	0.474	0.476	0.478	0.479	590
600	0.479	0.481	0.483	0.485	0.486	0.488	0.490	0.492	0.494	0.495	0.497	600
610	0.497	0.499	0.501	0.503	0.505	0.506	0.508	0.510	0.512	0.514	0.516	610
620	0.516	0.517	0.519	0.521	0.523	0.525	0.527	0.529	0.530	0.532	0.534	620
630	0.534	0.536	0.538	0.540	0.542	0.544	0.546	0.547	0.549	0.551	0.553	630
640	0.553	0.555	0.557	0.559	0.561	0.563	0.565	0.567	0.569	0.570	0.572	640
650	0.572	0.574	0.576	0.578	0.580	0.582	0.584	0.586	0.588	0.590	0.592	650
660	0.592	0.594	0.596	0.598	0.600	0.602	0.604	0.606	0.608	0.610	0.612	660
670	0.612	0.614	0.616	0.618	0.620	0.622	0.624	0.626	0.628	0.630	0.632	670
680	0.632	0.634	0.636	0.638	0.640	0.642	0.644	0.646	0.648	0.650	0.653	680
690	0.653	0.655	0.657	0.659	0.661	0.663	0.665	0.667	0.669	0.671	0.673	690
700	0.673	0.675	0.678	0.680	0.682	0.684	0.686	0.688	0.690	0.692	0.694	700
710	0.694	0.697	0.699	0.701	0.703	0.705	0.707	0.709	0.712	0.714	0.716	710
720	0.716	0.718	0.720	0.722	0.725	0.727	0.729	0.731	0.733	0.735	0.738	720
730	0.738	0.740	0.742	0.744	0.746	0.749	0.751	0.753	0.755	0.757	0.760	730
740	0.760	0.762	0.764	0.766	0.769	0.771	0.773	0.775	0.778	0.780	0.782	740
750	0.782	0.784	0.787	0.789	0.791	0.793	0.796	0.798	0.800	0.802	0.805	750
760	0.805	0.807	0.809	0.812	0.814	0.816	0.818	0.821	0.823	0.825	0.828	760
770	0.828	0.830	0.832	0.835	0.837	0.839	0.842	0.844	0.846	0.849	0.851	770
780	0.851	0.853	0.856	0.858	0.860	0.863	0.865	0.867	0.870	0.872	0.875	780
790	0.875	0.877	0.879	0.882	0.884	0.886	0.889	0.891	0.894	0.896	0.898	790
800	0.898	0.901	0.903	0.906	0.908	0.910	0.913	0.915	0.918	0.920	0.923	800
810	0.923	0.925	0.927	0.930	0.932	0.935	0.937	0.940	0.942	0.945	0.947	810
820	0.947	0.950	0.952	0.955	0.957	0.959	0.962	0.964	0.967	0.969	0.972	820
830	0.972	0.974	0.977	0.979	0.982	0.984	0.987	0.989	0.992	0.994	0.997	830
840	0.997	1.000	1.002	1.005	1.007	1.010	1.012	1.015	1.017	1.020	1.022	840
850	1.022	1.025	1.027	1.030	1.033	1.035	1.038	1.040	1.043	1.045	1.048	850
860	1.048	1.051	1.053	1.056	1.058	1.061	1.064	1.066	1.069	1.071	1.074	860
870	1.074	1.077	1.079	1.082	1.085	1.087	1.090	1.092	1.095	1.098	1.100	870
880	1.100	1.103	1.106	1.108	1.111	1.114	1.116	1.119	1.122	1.124	1.127	880
890	1.127	1.130	1.132	1.135	1.138	1.140	1.143	1.146	1.148	1.151	1.154	890
900	1.154	1.157	1.159	1.162	1.165	1.167	1.170	1.173	1.176	1.178	1.181	900
910	1.181	1.184	1.186	1.189	1.192	1.195	1.197	1.200	1.203	1.206	1.208	910
920	1.208	1.211	1.214	1.217	1.220	1.222	1.225	1.228	1.231	1.233	1.236	920
930	1.236	1.239	1.242	1.245	1.247	1.250	1.253	1.256	1.259	1.262	1.264	930
940	1.264	1.267	1.270	1.273	1.276	1.278	1.281	1.284	1.287	1.290	1.293	940
950	1.293	1.296	1.298	1.301	1.304	1.307	1.310	1.313	1.316	1.318	1.321	950
960	1.321	1.324	1.327	1.330	1.333	1.336	1.339	1.342	1.344	1.347	1.350	960
970	1.350	1.353	1.356	1.359	1.362	1.365	1.368	1.371	1.374	1.377	1.379	970
980	1.379	1.382	1.385	1.388	1.391	1.394	1.397	1.400	1.403	1.406	1.409	980
990	1.409	1.412	1.415	1.418	1.421	1.424	1.427	1.430	1.433	1.436	1.439	990
1000	1.439	1.442	1.445	1.448	1.451	1.454	1.457	1.460	1.463	1.466	1.469	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B2.1.2. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	1.439	1.442	1.445	1.448	1.451	1.454	1.457	1.460	1.463	1.466	1.469	**1000**
1010	1.469	1.472	1.475	1.478	1.481	1.484	1.487	1.490	1.493	1.496	1.499	**1010**
1020	1.499	1.502	1.505	1.508	1.511	1.515	1.518	1.521	1.524	1.527	1.530	**1020**
1030	1.530	1.533	1.536	1.539	1.542	1.545	1.548	1.552	1.555	1.558	1.561	**1030**
1040	1.561	1.564	1.567	1.570	1.573	1.576	1.580	1.583	1.586	1.589	1.592	**1040**
1050	1.592	1.595	1.598	1.601	1.605	1.608	1.611	1.614	1.617	1.620	1.624	**1050**
1060	1.624	1.627	1.630	1.633	1.636	1.639	1.643	1.646	1.649	1.652	1.655	**1060**
1070	1.655	1.659	1.662	1.665	1.668	1.671	1.675	1.678	1.681	1.684	1.687	**1070**
1080	1.687	1.691	1.694	1.697	1.700	1.704	1.707	1.710	1.713	1.716	1.720	**1080**
1090	1.720	1.723	1.726	1.729	1.733	1.736	1.739	1.743	1.746	1.749	1.752	**1090**
1100	1.752	1.756	1.759	1.762	1.765	1.769	1.772	1.775	1.779	1.782	1.785	**1100**
1110	1.785	1.789	1.792	1.795	1.798	1.802	1.805	1.808	1.812	1.815	1.818	**1110**
1120	1.818	1.822	1.825	1.828	1.832	1.835	1.838	1.842	1.845	1.849	1.852	**1120**
1130	1.852	1.855	1.859	1.862	1.865	1.869	1.872	1.875	1.879	1.882	1.886	**1130**
1140	1.886	1.889	1.892	1.896	1.899	1.903	1.906	1.909	1.913	1.916	1.920	**1140**
1150	1.920	1.923	1.926	1.930	1.933	1.937	1.940	1.944	1.947	1.950	1.954	**1150**
1160	1.954	1.957	1.961	1.964	1.968	1.971	1.975	1.978	1.981	1.985	1.988	**1160**
1170	1.988	1.992	1.995	1.999	2.002	2.006	2.009	2.013	2.016	2.020	2.023	**1170**
1180	2.023	2.027	2.030	2.034	2.037	2.041	2.044	2.048	2.051	2.055	2.058	**1180**
1190	2.058	2.062	2.065	2.069	2.072	2.076	2.079	2.083	2.086	2.090	2.094	**1190**
1200	2.094	2.097	2.101	2.104	2.108	2.111	2.115	2.118	2.122	2.126	2.129	**1200**
1210	2.129	2.133	2.136	2.140	2.143	2.147	2.151	2.154	2.158	2.161	2.165	**1210**
1220	2.165	2.169	2.172	2.176	2.179	2.183	2.187	2.190	2.194	2.197	2.201	**1220**
1230	2.201	2.205	2.208	2.212	2.216	2.219	2.223	2.226	2.230	2.234	2.237	**1230**
1240	2.237	2.241	2.245	2.248	2.252	2.256	2.259	2.263	2.267	2.270	2.274	**1240**
1250	2.274	2.278	2.281	2.285	2.289	2.292	2.296	2.300	2.303	2.307	2.311	**1250**
1260	2.311	2.315	2.318	2.322	2.326	2.329	2.333	2.337	2.341	2.344	2.348	**1260**
1270	2.348	2.352	2.355	2.359	2.363	2.367	2.370	2.374	2.378	2.382	2.385	**1270**
1280	2.385	2.389	2.393	2.397	2.400	2.404	2.408	2.412	2.416	2.419	2.423	**1280**
1290	2.423	2.427	2.431	2.434	2.438	2.442	2.446	2.450	2.453	2.457	2.461	**1290**
1300	2.461	2.465	2.469	2.472	2.476	2.480	2.484	2.488	2.492	2.495	2.499	**1300**
1310	2.499	2.503	2.507	2.511	2.515	2.518	2.522	2.526	2.530	2.534	2.538	**1310**
1320	2.538	2.541	2.545	2.549	2.553	2.557	2.561	2.565	2.569	2.572	2.576	**1320**
1330	2.576	2.580	2.584	2.588	2.592	2.596	2.600	2.604	2.607	2.611	2.615	**1330**
1340	2.615	2.619	2.623	2.627	2.631	2.635	2.639	2.643	2.647	2.651	2.654	**1340**
1350	2.654	2.658	2.662	2.666	2.670	2.674	2.678	2.682	2.686	2.690	2.694	**1350**
1360	2.694	2.698	2.702	2.706	2.710	2.714	2.718	2.722	2.726	2.730	2.734	**1360**
1370	2.734	2.738	2.742	2.746	2.750	2.754	2.758	2.762	2.766	2.770	2.774	**1370**
1380	2.774	2.778	2.782	2.786	2.790	2.794	2.798	2.802	2.806	2.810	2.814	**1380**
1390	2.814	2.818	2.822	2.826	2.830	2.834	2.838	2.842	2.846	2.850	2.854	**1390**
1400	2.854	2.859	2.863	2.867	2.871	2.875	2.879	2.883	2.887	2.891	2.895	**1400**
1410	2.895	2.899	2.903	2.908	2.912	2.916	2.920	2.924	2.928	2.932	2.936	**1410**
1420	2.936	2.940	2.944	2.949	2.953	2.957	2.961	2.965	2.969	2.973	2.978	**1420**
1430	2.978	2.982	2.986	2.990	2.994	2.998	3.002	3.007	3.011	3.015	3.019	**1430**
1440	3.019	3.023	3.027	3.032	3.036	3.040	3.044	3.048	3.052	3.057	3.061	**1440**
1450	3.061	3.065	3.069	3.073	3.078	3.082	3.086	3.090	3.094	3.099	3.103	**1450**
1460	3.103	3.107	3.111	3.116	3.120	3.124	3.128	3.132	3.137	3.141	3.145	**1460**
1470	3.145	3.149	3.154	3.158	3.162	3.166	3.171	3.175	3.179	3.183	3.188	**1470**
1480	3.188	3.192	3.196	3.200	3.205	3.209	3.213	3.218	3.222	3.226	3.230	**1480**
1490	3.230	3.235	3.239	3.243	3.248	3.252	3.256	3.261	3.265	3.269	3.273	**1490**
1500	3.273	3.278	3.282	3.286	3.291	3.295	3.299	3.304	3.308	3.312	3.317	**1500**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

TABLE B2.1.2. ***Type B thermocouples*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	3.273	3.278	3.282	3.286	3.291	3.295	3.299	3.304	3.308	3.312	3.317	1500
1510	3.317	3.321	3.325	3.330	3.334	3.338	3.343	3.347	3.352	3.356	3.360	1510
1520	3.360	3.365	3.369	3.373	3.378	3.382	3.386	3.391	3.395	3.400	3.404	1520
1530	3.404	3.408	3.413	3.417	3.422	3.426	3.430	3.435	3.439	3.444	3.448	1530
1540	3.448	3.452	3.457	3.461	3.466	3.470	3.474	3.479	3.483	3.488	3.492	1540
1550	3.492	3.497	3.501	3.506	3.510	3.514	3.519	3.523	3.528	3.532	3.537	1550
1560	3.537	3.541	3.546	3.550	3.555	3.559	3.563	3.568	3.572	3.577	3.581	1560
1570	3.581	3.586	3.590	3.595	3.599	3.604	3.608	3.613	3.617	3.622	3.626	1570
1580	3.626	3.631	3.635	3.640	3.644	3.649	3.653	3.658	3.662	3.667	3.672	1580
1590	3.672	3.676	3.681	3.685	3.690	3.694	3.699	3.703	3.708	3.712	3.717	1590
1600	3.717	3.722	3.726	3.731	3.735	3.740	3.744	3.749	3.753	3.758	3.763	1600
1610	3.763	3.767	3.772	3.776	3.781	3.786	3.790	3.795	3.799	3.804	3.809	1610
1620	3.809	3.813	3.818	3.822	3.827	3.832	3.836	3.841	3.845	3.850	3.855	1620
1630	3.855	3.859	3.864	3.869	3.873	3.878	3.882	3.887	3.892	3.896	3.901	1630
1640	3.901	3.906	3.910	3.915	3.920	3.924	3.929	3.934	3.938	3.943	3.948	1640
1650	3.948	3.952	3.957	3.962	3.966	3.971	3.976	3.980	3.985	3.990	3.994	1650
1660	3.994	3.999	4.004	4.009	4.013	4.018	4.023	4.027	4.032	4.037	4.041	1660
1670	4.041	4.046	4.051	4.056	4.060	4.065	4.070	4.075	4.079	4.084	4.089	1670
1680	4.089	4.093	4.098	4.103	4.108	4.112	4.117	4.122	4.127	4.131	4.136	1680
1690	4.136	4.141	4.146	4.151	4.155	4.160	4.165	4.170	4.174	4.179	4.184	1690
1700	4.184	4.189	4.194	4.198	4.203	4.208	4.213	4.217	4.222	4.227	4.232	1700
1710	4.232	4.237	4.242	4.246	4.251	4.256	4.261	4.266	4.270	4.275	4.280	1710
1720	4.280	4.285	4.290	4.295	4.299	4.304	4.309	4.314	4.319	4.324	4.328	1720
1730	4.328	4.333	4.338	4.343	4.348	4.353	4.358	4.362	4.367	4.372	4.377	1730
1740	4.377	4.382	4.387	4.392	4.397	4.401	4.406	4.411	4.416	4.421	4.426	1740
1750	4.426	4.431	4.436	4.441	4.445	4.450	4.455	4.460	4.465	4.470	4.475	1750
1760	4.475	4.480	4.485	4.490	4.495	4.500	4.504	4.509	4.514	4.519	4.524	1760
1770	4.524	4.529	4.534	4.539	4.544	4.549	4.554	4.559	4.564	4.569	4.574	1770
1780	4.574	4.579	4.584	4.589	4.593	4.598	4.603	4.608	4.613	4.618	4.623	1780
1790	4.623	4.628	4.633	4.638	4.643	4.648	4.653	4.658	4.663	4.668	4.673	1790
1800	4.673	4.678	4.683	4.688	4.693	4.698	4.703	4.708	4.713	4.718	4.723	1800
1810	4.723	4.728	4.733	4.738	4.743	4.748	4.754	4.759	4.764	4.769	4.774	1810
1820	4.774	4.779	4.784	4.789	4.794	4.799	4.804	4.809	4.814	4.819	4.824	1820
1830	4.824	4.829	4.834	4.839	4.844	4.850	4.855	4.860	4.865	4.870	4.875	1830
1840	4.875	4.880	4.885	4.890	4.895	4.900	4.905	4.911	4.916	4.921	4.926	1840
1850	4.926	4.931	4.936	4.941	4.946	4.951	4.957	4.962	4.967	4.972	4.977	1850
1860	4.977	4.982	4.987	4.992	4.998	5.003	5.008	5.013	5.018	5.023	5.028	1860
1870	5.028	5.034	5.039	5.044	5.049	5.054	5.059	5.065	5.070	5.075	5.080	1870
1880	5.080	5.085	5.090	5.096	5.101	5.106	5.111	5.116	5.121	5.127	5.132	1880
1890	5.132	5.137	5.142	5.147	5.153	5.158	5.163	5.168	5.173	5.179	5.184	1890
1900	5.184	5.189	5.194	5.199	5.205	5.210	5.215	5.220	5.225	5.231	5.236	1900
1910	5.236	5.241	5.246	5.252	5.257	5.262	5.267	5.273	5.278	5.283	5.288	1910
1920	5.288	5.294	5.299	5.304	5.309	5.315	5.320	5.325	5.330	5.336	5.341	1920
1930	5.341	5.346	5.351	5.357	5.362	5.367	5.373	5.378	5.383	5.388	5.394	1930
1940	5.394	5.399	5.404	5.410	5.415	5.420	5.425	5.431	5.436	5.441	5.447	1940
1950	5.447	5.452	5.457	5.463	5.468	5.473	5.479	5.484	5.489	5.495	5.500	1950
1960	5.500	5.505	5.511	5.516	5.521	5.527	5.532	5.537	5.543	5.548	5.553	1960
1970	5.553	5.559	5.564	5.569	5.575	5.580	5.585	5.591	5.596	5.601	5.607	1970
1980	5.607	5.612	5.618	5.623	5.628	5.634	5.639	5.644	5.650	5.655	5.661	1980
1990	5.661	5.666	5.671	5.677	5.682	5.688	5.693	5.698	5.704	5.709	5.715	1990
2000	5.715	5.720	5.725	5.731	5.736	5.742	5.747	5.752	5.758	5.763	5.769	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B2.1.2. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	5.715	5.720	5.725	5.731	5.736	5.742	5.747	5.752	5.758	5.763	5.769	2000
2010	5.769	5.774	5.780	5.785	5.790	5.796	5.801	5.807	5.812	5.818	5.823	2010
2020	5.823	5.828	5.834	5.839	5.845	5.850	5.856	5.861	5.867	5.872	5.878	2020
2030	5.878	5.883	5.888	5.894	5.899	5.905	5.910	5.916	5.921	5.927	5.932	2030
2040	5.932	5.938	5.943	5.949	5.954	5.960	5.965	5.971	5.976	5.982	5.987	2040
2050	5.987	5.993	5.998	6.004	6.009	6.015	6.020	6.026	6.031	6.037	6.042	2050
2060	6.042	6.048	6.053	6.059	6.064	6.070	6.075	6.081	6.086	6.092	6.098	2060
2070	6.098	6.103	6.109	6.114	6.120	6.125	6.131	6.136	6.142	6.147	6.153	2070
2080	6.153	6.159	6.164	6.170	6.175	6.181	6.186	6.192	6.197	6.203	6.209	2080
2090	6.209	6.214	6.220	6.225	6.231	6.237	6.242	6.248	6.253	6.259	6.264	2090
2100	6.264	6.270	6.276	6.281	6.287	6.292	6.298	6.304	6.309	6.315	6.320	2100
2110	6.320	6.326	6.332	6.337	6.343	6.349	6.354	6.360	6.365	6.371	6.377	2110
2120	6.377	6.382	6.388	6.394	6.399	6.405	6.410	6.416	6.422	6.427	6.433	2120
2130	6.433	6.439	6.444	6.450	6.456	6.461	6.467	6.473	6.478	6.484	6.490	2130
2140	6.490	6.495	6.501	6.507	6.512	6.518	6.524	6.529	6.535	6.541	6.546	2140
2150	6.546	6.552	6.558	6.563	6.569	6.575	6.580	6.586	6.592	6.597	6.603	2150
2160	6.603	6.609	6.615	6.620	6.626	6.632	6.637	6.643	6.649	6.655	6.660	2160
2170	6.660	6.666	6.672	6.677	6.683	6.689	6.695	6.700	6.706	6.712	6.718	2170
2180	6.718	6.723	6.729	6.735	6.740	6.746	6.752	6.758	6.763	6.769	6.775	2180
2190	6.775	6.781	6.786	6.792	6.798	6.804	6.809	6.815	6.821	6.827	6.833	2190
2200	6.833	6.838	6.844	6.850	6.856	6.861	6.867	6.873	6.879	6.884	6.890	2200
2210	6.890	6.896	6.902	6.908	6.913	6.919	6.925	6.931	6.937	6.942	6.948	2210
2220	6.948	6.954	6.960	6.966	6.971	6.977	6.983	6.989	6.995	7.000	7.006	2220
2230	7.006	7.012	7.018	7.024	7.030	7.035	7.041	7.047	7.053	7.059	7.065	2230
2240	7.065	7.070	7.076	7.082	7.088	7.094	7.100	7.105	7.111	7.117	7.123	2240
2250	7.123	7.129	7.135	7.141	7.146	7.152	7.158	7.164	7.170	7.176	7.182	2250
2260	7.182	7.187	7.193	7.199	7.205	7.211	7.217	7.223	7.229	7.234	7.240	2260
2270	7.240	7.246	7.252	7.258	7.264	7.270	7.276	7.281	7.287	7.293	7.299	2270
2280	7.299	7.305	7.311	7.317	7.323	7.329	7.335	7.340	7.346	7.352	7.358	2280
2290	7.358	7.364	7.370	7.376	7.382	7.388	7.394	7.400	7.406	7.412	7.417	2290
2300	7.417	7.423	7.429	7.435	7.441	7.447	7.453	7.459	7.465	7.471	7.477	2300
2310	7.477	7.483	7.489	7.495	7.501	7.507	7.512	7.518	7.524	7.530	7.536	2310
2320	7.536	7.542	7.548	7.554	7.560	7.566	7.572	7.578	7.584	7.590	7.596	2320
2330	7.596	7.602	7.608	7.614	7.620	7.626	7.632	7.638	7.644	7.650	7.656	2330
2340	7.656	7.662	7.668	7.674	7.680	7.686	7.692	7.698	7.704	7.710	7.716	2340
2350	7.716	7.722	7.728	7.734	7.740	7.746	7.752	7.758	7.764	7.770	7.776	2350
2360	7.776	7.782	7.788	7.794	7.800	7.806	7.812	7.818	7.824	7.830	7.836	2360
2370	7.836	7.842	7.848	7.854	7.860	7.866	7.872	7.878	7.884	7.891	7.897	2370
2380	7.897	7.903	7.909	7.915	7.921	7.927	7.933	7.939	7.945	7.951	7.957	2380
2390	7.957	7.963	7.969	7.975	7.981	7.987	7.994	8.000	8.006	8.012	8.018	2390
2400	8.018	8.024	8.030	8.036	8.042	8.048	8.054	8.060	8.066	8.073	8.079	2400
2410	8.079	8.085	8.091	8.097	8.103	8.109	8.115	8.121	8.127	8.134	8.140	2410
2420	8.140	8.146	8.152	8.158	8.164	8.170	8.176	8.182	8.188	8.195	8.201	2420
2430	8.201	8.207	8.213	8.219	8.225	8.231	8.237	8.244	8.250	8.256	8.262	2430
2440	8.262	8.268	8.274	8.280	8.286	8.293	8.299	8.305	8.311	8.317	8.323	2440
2450	8.323	8.329	8.336	8.342	8.348	8.354	8.360	8.366	8.372	8.379	8.385	2450
2460	8.385	8.391	8.397	8.403	8.409	8.416	8.422	8.428	8.434	8.440	8.446	2460
2470	8.446	8.453	8.459	8.465	8.471	8.477	8.483	8.490	8.496	8.502	8.508	2470
2480	8.508	8.514	8.521	8.527	8.533	8.539	8.545	8.551	8.558	8.564	8.570	2480
2490	8.570	8.576	8.582	8.589	8.595	8.601	8.607	8.613	8.620	8.626	8.632	2490
2500	8.632	8.638	8.644	8.651	8.657	8.663	8.669	8.675	8.682	8.688	8.694	2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B2.1.2. ***Type B thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued***

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2500	8.632	8.638	8.644	8.651	8.657	8.663	8.669	8.675	8.682	8.688	8.694	2500
2510	8.694	8.700	8.707	8.713	8.719	8.725	8.731	8.738	8.744	8.750	8.756	2510
2520	8.756	8.763	8.769	8.775	8.781	8.787	8.794	8.800	8.806	8.812	8.819	2520
2530	8.819	8.825	8.831	8.837	8.844	8.850	8.856	8.862	8.869	8.875	8.881	2530
2540	8.881	8.887	8.894	8.900	8.906	8.912	8.919	8.925	8.931	8.937	8.944	2540
2550	8.944	8.950	8.956	8.962	8.969	8.975	8.981	8.988	8.994	9.000	9.006	2550
2560	9.006	9.013	9.019	9.025	9.031	9.038	9.044	9.050	9.057	9.063	9.069	2560
2570	9.069	9.075	9.082	9.088	9.094	9.101	9.107	9.113	9.119	9.126	9.132	2570
2580	9.132	9.138	9.145	9.151	9.157	9.164	9.170	9.176	9.182	9.189	9.195	2580
2590	9.195	9.201	9.208	9.214	9.220	9.227	9.233	9.239	9.245	9.252	9.258	2590
2600	9.258	9.264	9.271	9.277	9.283	9.290	9.296	9.302	9.309	9.315	9.321	2600
2610	9.321	9.328	9.334	9.340	9.347	9.353	9.359	9.366	9.372	9.378	9.385	2610
2620	9.385	9.391	9.397	9.404	9.410	9.416	9.423	9.429	9.435	9.442	9.448	2620
2630	9.448	9.454	9.461	9.467	9.473	9.480	9.486	9.492	9.499	9.505	9.511	2630
2640	9.511	9.518	9.524	9.530	9.537	9.543	9.550	9.556	9.562	9.569	9.575	2640
2650	9.575	9.581	9.588	9.594	9.600	9.607	9.613	9.619	9.626	9.632	9.639	2650
2660	9.639	9.645	9.651	9.658	9.664	9.670	9.677	9.683	9.690	9.696	9.702	2660
2670	9.702	9.709	9.715	9.721	9.728	9.734	9.741	9.747	9.753	9.760	9.766	2670
2680	9.766	9.772	9.779	9.785	9.792	9.798	9.804	9.811	9.817	9.824	9.830	2680
2690	9.830	9.836	9.843	9.849	9.856	9.862	9.868	9.875	9.881	9.888	9.894	2690
2700	9.894	9.900	9.907	9.913	9.920	9.926	9.932	9.939	9.945	9.952	9.958	2700
2710	9.958	9.964	9.971	9.977	9.984	9.990	9.996	10.003	10.009	10.016	10.022	2710
2720	10.022	10.028	10.035	10.041	10.048	10.054	10.061	10.067	10.073	10.080	10.086	2720
2730	10.086	10.093	10.099	10.105	10.112	10.118	10.125	10.131	10.138	10.144	10.150	2730
2740	10.150	10.157	10.163	10.170	10.176	10.183	10.189	10.195	10.202	10.208	10.215	2740
2750	10.215	10.221	10.228	10.234	10.240	10.247	10.253	10.260	10.266	10.273	10.279	2750
2760	10.279	10.286	10.292	10.298	10.305	10.311	10.318	10.324	10.331	10.337	10.344	2760
2770	10.344	10.350	10.356	10.363	10.369	10.376	10.382	10.389	10.395	10.402	10.408	2770
2780	10.408	10.414	10.421	10.427	10.434	10.440	10.447	10.453	10.460	10.466	10.473	2780
2790	10.473	10.479	10.485	10.492	10.498	10.505	10.511	10.518	10.524	10.531	10.537	2790
2800	10.537	10.544	10.550	10.556	10.563	10.569	10.576	10.582	10.589	10.595	10.602	2800
2810	10.602	10.608	10.615	10.621	10.628	10.634	10.641	10.647	10.653	10.660	10.666	2810
2820	10.666	10.673	10.679	10.686	10.692	10.699	10.705	10.712	10.718	10.725	10.731	2820
2830	10.731	10.738	10.744	10.751	10.757	10.763	10.770	10.776	10.783	10.789	10.796	2830
2840	10.796	10.802	10.809	10.815	10.822	10.828	10.835	10.841	10.848	10.854	10.861	2840
2850	10.861	10.867	10.874	10.880	10.887	10.893	10.900	10.906	10.913	10.919	10.925	2850
2860	10.925	10.932	10.938	10.945	10.951	10.958	10.964	10.971	10.977	10.984	10.990	2860
2870	10.990	10.997	11.003	11.010	11.016	11.023	11.029	11.036	11.042	11.049	11.055	2870
2880	11.055	11.062	11.068	11.075	11.081	11.088	11.094	11.101	11.107	11.114	11.120	2880
2890	11.120	11.127	11.133	11.140	11.146	11.153	11.159	11.166	11.172	11.179	11.185	2890
2900	11.185	11.192	11.198	11.205	11.211	11.218	11.224	11.231	11.237	11.244	11.250	2900
2910	11.250	11.257	11.263	11.270	11.276	11.282	11.289	11.295	11.302	11.308	11.315	2910
2920	11.315	11.321	11.328	11.334	11.341	11.347	11.354	11.360	11.367	11.373	11.380	2920
2930	11.380	11.386	11.393	11.399	11.406	11.412	11.419	11.425	11.432	11.438	11.445	2930
2940	11.445	11.451	11.458	11.464	11.471	11.477	11.484	11.490	11.497	11.503	11.510	2940
2950	11.510	11.516	11.523	11.529	11.536	11.542	11.549	11.555	11.562	11.568	11.575	2950
2960	11.575	11.582	11.588	11.595	11.601	11.608	11.614	11.621	11.627	11.634	11.640	2960
2970	11.640	11.647	11.653	11.660	11.666	11.673	11.679	11.686	11.692	11.699	11.705	2970
2980	11.705	11.712	11.718	11.725	11.731	11.738	11.744	11.751	11.757	11.764	11.770	2980
2990	11.770	11.777	11.783	11.790	11.796	11.803	11.809	11.816	11.822	11.829	11.835	2990
3000	11.835	11.842	11.848	11.855	11.861	11.868	11.874	11.881	11.887	11.894	11.900	3000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B2.1.2. *Type B thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	11.835	11.842	11.848	11.855	11.861	11.868	11.874	11.881	11.887	11.894	11.900	3000
3010	11.900	11.907	11.913	11.920	11.926	11.933	11.939	11.946	11.952	11.959	11.965	3010
3020	11.965	11.972	11.978	11.985	11.991	11.998	12.004	12.011	12.017	12.024	12.030	3020
3030	12.030	12.037	12.043	12.050	12.056	12.063	12.069	12.076	12.082	12.089	12.095	3030
3040	12.095	12.102	12.108	12.115	12.121	12.128	12.134	12.141	12.147	12.154	12.160	3040
3050	12.160	12.166	12.173	12.179	12.186	12.192	12.199	12.205	12.212	12.218	12.225	3050
3060	12.225	12.231	12.238	12.244	12.251	12.257	12.264	12.270	12.277	12.283	12.290	3060
3070	12.290	12.296	12.303	12.309	12.316	12.322	12.329	12.335	12.342	12.348	12.355	3070
3080	12.355	12.361	12.368	12.374	12.381	12.387	12.394	12.400	12.407	12.413	12.420	3080
3090	12.420	12.426	12.433	12.439	12.446	12.452	12.458	12.465	12.471	12.478	12.484	3090
3100	12.484	12.491	12.497	12.504	12.510	12.517	12.523	12.530	12.536	12.543	12.549	3100
3110	12.549	12.556	12.562	12.569	12.575	12.582	12.588	12.595	12.601	12.607	12.614	3110
3120	12.614	12.620	12.627	12.633	12.640	12.646	12.653	12.659	12.666	12.672	12.679	3120
3130	12.679	12.685	12.692	12.698	12.704	12.711	12.717	12.724	12.730	12.737	12.743	3130
3140	12.743	12.750	12.756	12.763	12.769	12.776	12.782	12.789	12.795	12.801	12.808	3140
3150	12.808	12.814	12.821	12.827	12.834	12.840	12.847	12.853	12.860	12.866	12.872	3150
3160	12.872	12.879	12.885	12.892	12.898	12.905	12.911	12.918	12.924	12.931	12.937	3160
3170	12.937	12.943	12.950	12.956	12.963	12.969	12.976	12.982	12.989	12.995	13.001	3170
3180	13.001	13.008	13.014	13.021	13.027	13.034	13.040	13.047	13.053	13.059	13.066	3180
3190	13.066	13.072	13.079	13.085	13.092	13.098	13.104	13.111	13.117	13.124	13.130	3190
3200	13.130	13.137	13.143	13.149	13.156	13.162	13.169	13.175	13.182	13.188	13.194	3200
3210	13.194	13.201	13.207	13.214	13.220	13.227	13.233	13.239	13.246	13.252	13.259	3210
3220	13.259	13.265	13.271	13.278	13.284	13.291	13.297	13.304	13.310	13.316	13.323	3220
3230	13.323	13.329	13.336	13.342	13.348	13.355	13.361	13.368	13.374	13.380	13.387	3230
3240	13.387	13.393	13.400	13.406	13.412	13.419	13.425	13.432	13.438	13.444	13.451	3240
3250	13.451	13.457	13.464	13.470	13.476	13.483	13.489	13.496	13.502	13.508	13.515	3250
3260	13.515	13.521	13.527	13.534	13.540	13.547	13.553	13.559	13.566	13.572	13.579	3260
3270	13.579	13.585	13.591	13.598	13.604	13.610	13.617	13.623	13.630	13.636	13.642	3270
3280	13.642	13.649	13.655	13.661	13.668	13.674	13.680	13.687	13.693	13.700	13.706	3280
3290	13.706	13.712	13.719	13.725	13.731	13.738	13.744	13.750	13.757	13.763	13.769	3290
3300	13.769	13.776	13.782	13.789	13.795	13.801	13.808	13.814	13.820			3300
°F	0	1	2	3	4	5	6	7	8	9	10	°F

B2.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B2.2.1 and B2.2.2 was obtained by iteration of the reference function for type B thermocouples given in the main text (see table 2.3.1). Table B2.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from 0.00 mV to 13.82 mV, and table B2.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B2.2.1. *Type B thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
0.00	0.00	67.72	83.67	96.36	107.23	116.89	125.69	133.82	141.42	148.57	155.36	0.00
0.10	155.36	161.83	168.02	173.97	179.70	185.24	190.60	195.81	200.87	205.80	210.60	0.10
0.20	210.60	215.29	219.88	224.36	228.75	233.05	237.28	241.42	245.49	249.49	253.43	0.20
0.30	253.43	257.30	261.11	264.87	268.57	272.22	275.82	279.38	282.88	286.35	289.77	0.30
0.40	289.77	293.15	296.49	299.79	303.05	306.28	309.48	312.64	315.77	318.87	321.94	0.40
0.50	321.94	324.98	327.99	330.98	333.93	336.86	339.77	342.65	345.51	348.34	351.15	0.50
0.60	351.15	353.94	356.71	359.45	362.18	364.88	367.57	370.23	372.88	375.51	378.12	0.60
0.70	378.12	380.71	383.28	385.84	388.38	390.91	393.42	395.91	398.39	400.85	403.30	0.70
0.80	403.30	405.74	408.16	410.56	412.95	415.33	417.70	420.05	422.39	424.72	427.03	0.80
0.90	427.03	429.34	431.63	433.91	436.18	438.43	440.68	442.91	445.14	447.35	449.55	0.90
1.00	449.55	451.74	453.93	456.10	458.26	460.41	462.56	464.69	466.81	468.93	471.03	1.00
1.10	471.03	473.13	475.22	477.30	479.37	481.43	483.49	485.53	487.57	489.60	491.62	1.10
1.20	491.62	493.64	495.64	497.64	499.63	501.62	503.59	505.56	507.52	509.48	511.43	1.20
1.30	511.43	513.37	515.30	517.23	519.15	521.06	522.97	524.87	526.77	528.65	530.54	1.30
1.40	530.54	532.41	534.28	536.15	538.00	539.86	541.70	543.54	545.38	547.20	549.03	1.40
1.50	549.03	550.85	552.66	554.46	556.27	558.06	559.85	561.64	563.42	565.19	566.96	1.50
1.60	566.96	568.73	570.49	572.24	573.99	575.74	577.48	579.21	580.94	582.67	584.39	1.60
1.70	584.39	586.11	587.82	589.53	591.23	592.93	594.63	596.32	598.00	599.69	601.36	1.70
1.80	601.36	603.04	604.71	606.37	608.03	609.69	611.34	612.99	614.64	616.28	617.92	1.80
1.90	617.92	619.55	621.18	622.80	624.43	626.04	627.66	629.27	630.88	632.48	634.08	1.90
2.00	634.08	635.68	637.27	638.86	640.45	642.03	643.61	645.19	646.76	648.33	649.90	2.00
2.10	649.90	651.46	653.02	654.58	656.14	657.69	659.23	660.78	662.32	663.86	665.40	2.10
2.20	665.40	666.93	668.46	669.98	671.51	673.03	674.55	676.06	677.57	679.08	680.59	2.20
2.30	680.59	682.09	683.59	685.09	686.58	688.07	689.56	691.05	692.53	694.01	695.49	2.30
2.40	695.49	696.97	698.44	699.91	701.38	702.84	704.30	705.76	707.22	708.67	710.12	2.40
2.50	710.12	711.57	713.02	714.46	715.90	717.34	718.78	720.21	721.64	723.07	724.49	2.50
2.60	724.49	725.92	727.34	728.76	730.17	731.59	733.00	734.41	735.82	737.22	738.62	2.60
2.70	738.62	740.02	741.42	742.82	744.21	745.60	746.99	748.38	749.76	751.14	752.52	2.70
2.80	752.52	753.90	755.28	756.65	758.02	759.39	760.76	762.12	763.48	764.85	766.20	2.80
2.90	766.20	767.56	768.92	770.27	771.62	772.97	774.31	775.66	777.00	778.34	779.68	2.90
3.00	779.68	781.02	782.35	783.68	785.01	786.34	787.67	788.99	790.32	791.64	792.96	3.00
3.10	792.96	794.28	795.59	796.91	798.22	799.53	800.84	802.14	803.45	804.75	806.05	3.10
3.20	806.05	807.35	808.65	809.95	811.24	812.53	813.82	815.11	816.40	817.68	818.97	3.20
3.30	818.97	820.25	821.53	822.81	824.09	825.36	826.64	827.91	829.18	830.45	831.72	3.30
3.40	831.72	832.98	834.25	835.51	836.77	838.03	839.29	840.55	841.80	843.06	844.31	3.40
3.50	844.31	845.56	846.81	848.06	849.30	850.55	851.79	853.03	854.27	855.51	856.75	3.50
3.60	856.75	857.98	859.22	860.45	861.68	862.91	864.14	865.37	866.59	867.82	869.04	3.60
3.70	869.04	870.26	871.48	872.70	873.92	875.13	876.35	877.56	878.77	879.98	881.19	3.70
3.80	881.19	882.40	883.61	884.81	886.02	887.22	888.42	889.62	890.82	892.02	893.21	3.80
3.90	893.21	894.41	895.60	896.79	897.98	899.17	900.36	901.55	902.74	903.92	905.11	3.90
4.00	905.11	906.29	907.47	908.65	909.83	911.01	912.18	913.36	914.53	915.70	916.88	4.00
4.10	916.88	918.05	919.22	920.38	921.55	922.72	923.88	925.05	926.21	927.37	928.53	4.10
4.20	928.53	929.69	930.85	932.00	933.16	934.31	935.47	936.62	937.77	938.92	940.07	4.20
4.30	940.07	941.22	942.37	943.51	944.66	945.80	946.94	948.09	949.23	950.37	951.50	4.30
4.40	951.50	952.64	953.78	954.91	956.05	957.18	958.31	959.45	960.58	961.70	962.83	4.40
4.50	962.83	963.96	965.09	966.21	967.34	968.46	969.58	970.70	971.82	972.94	974.06	4.50
4.60	974.06	975.18	976.30	977.41	978.53	979.64	980.75	981.86	982.97	984.08	985.19	4.60
4.70	985.19	986.30	987.41	988.51	989.62	990.72	991.83	992.93	994.03	995.13	996.23	4.70
4.80	996.23	997.33	998.43	999.52	1000.62	1001.72	1002.81	1003.90	1005.00	1006.09	1007.18	4.80
4.90	1007.18	1008.27	1009.36	1010.45	1011.53	1012.62	1013.70	1014.79	1015.87	1016.96	1018.04	4.90
5.00	1018.04	1019.12	1020.20	1021.28	1022.36	1023.44	1024.51	1025.59	1026.67	1027.74	1028.81	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B2.2.1. *Type B thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	1018.04	1019.12	1020.20	1021.28	1022.36	1023.44	1024.51	1025.59	1026.67	1027.74	1028.81	**5.00**
5.10	1028.81	1029.89	1030.96	1032.03	1033.10	1034.17	1035.24	1036.31	1037.38	1038.44	1039.51	**5.10**
5.20	1039.51	1040.57	1041.64	1042.70	1043.76	1044.83	1045.89	1046.95	1048.01	1049.07	1050.12	**5.20**
5.30	1050.12	1051.18	1052.24	1053.29	1054.35	1055.40	1056.46	1057.51	1058.56	1059.61	1060.66	**5.30**
5.40	1060.66	1061.71	1062.76	1063.81	1064.86	1065.90	1066.95	1067.99	1069.04	1070.08	1071.13	**5.40**
5.50	1071.13	1072.17	1073.21	1074.25	1075.29	1076.33	1077.37	1078.41	1079.45	1080.48	1081.52	**5.50**
5.60	1081.52	1082.55	1083.59	1084.62	1085.66	1086.69	1087.72	1088.75	1089.78	1090.81	1091.84	**5.60**
5.70	1091.84	1092.87	1093.90	1094.92	1095.95	1096.98	1098.00	1099.03	1100.05	1101.07	1102.09	**5.70**
5.80	1102.09	1103.12	1104.14	1105.16	1106.18	1107.20	1108.22	1109.23	1110.25	1111.27	1112.28	**5.80**
5.90	1112.28	1113.30	1114.31	1115.33	1116.34	1117.35	1118.37	1119.38	1120.39	1121.40	1122.41	**5.90**
6.00	1122.41	1123.42	1124.43	1125.43	1126.44	1127.45	1128.45	1129.46	1130.46	1131.47	1132.47	**6.00**
6.10	1132.47	1133.47	1134.48	1135.48	1136.48	1137.48	1138.48	1139.48	1140.48	1141.47	1142.47	**6.10**
6.20	1142.47	1143.47	1144.47	1145.46	1146.46	1147.45	1148.45	1149.44	1150.43	1151.42	1152.42	**6.20**
6.30	1152.42	1153.41	1154.40	1155.39	1156.38	1157.37	1158.35	1159.34	1160.33	1161.32	1162.30	**6.30**
6.40	1162.30	1163.29	1164.27	1165.26	1166.24	1167.22	1168.21	1169.19	1170.17	1171.15	1172.13	**6.40**
6.50	1172.13	1173.11	1174.09	1175.07	1176.05	1177.03	1178.01	1178.98	1179.96	1180.94	1181.91	**6.50**
6.60	1181.91	1182.89	1183.86	1184.83	1185.81	1186.78	1187.75	1188.72	1189.70	1190.67	1191.64	**6.60**
6.70	1191.64	1192.61	1193.57	1194.54	1195.51	1196.48	1197.45	1198.41	1199.38	1200.34	1201.31	**6.70**
6.80	1201.31	1202.27	1203.24	1204.20	1205.17	1206.13	1207.09	1208.05	1209.01	1209.97	1210.93	**6.80**
6.90	1210.93	1211.89	1212.85	1213.81	1214.77	1215.73	1216.69	1217.64	1218.60	1219.56	1220.51	**6.90**
7.00	1220.51	1221.47	1222.42	1223.38	1224.33	1225.28	1226.24	1227.19	1228.14	1229.09	1230.04	**7.00**
7.10	1230.04	1230.99	1231.94	1232.89	1233.84	1234.79	1235.74	1236.69	1237.63	1238.58	1239.53	**7.10**
7.20	1239.53	1240.47	1241.42	1242.36	1243.31	1244.25	1245.20	1246.14	1247.08	1248.03	1248.97	**7.20**
7.30	1248.97	1249.91	1250.85	1251.79	1252.73	1253.67	1254.61	1255.55	1256.49	1257.43	1258.37	**7.30**
7.40	1258.37	1259.30	1260.24	1261.18	1262.11	1263.05	1263.98	1264.92	1265.85	1266.79	1267.72	**7.40**
7.50	1267.72	1268.66	1269.59	1270.52	1271.45	1272.39	1273.32	1274.25	1275.18	1276.11	1277.04	**7.50**
7.60	1277.04	1277.97	1278.90	1279.83	1280.75	1281.68	1282.61	1283.54	1284.46	1285.39	1286.32	**7.60**
7.70	1286.32	1287.24	1288.17	1289.09	1290.02	1290.94	1291.86	1292.79	1293.71	1294.63	1295.56	**7.70**
7.80	1295.56	1296.48	1297.40	1298.32	1299.24	1300.16	1301.08	1302.00	1302.92	1303.84	1304.76	**7.80**
7.90	1304.76	1305.68	1306.60	1307.51	1308.43	1309.35	1310.26	1311.18	1312.10	1313.01	1313.93	**7.90**
8.00	1313.93	1314.84	1315.76	1316.67	1317.58	1318.50	1319.41	1320.32	1321.24	1322.15	1323.06	**8.00**
8.10	1323.06	1323.97	1324.88	1325.79	1326.70	1327.61	1328.52	1329.43	1330.34	1331.25	1332.16	**8.10**
8.20	1332.16	1333.07	1333.97	1334.88	1335.79	1336.70	1337.60	1338.51	1339.41	1340.32	1341.23	**8.20**
8.30	1341.23	1342.13	1343.04	1343.94	1344.84	1345.75	1346.65	1347.55	1348.46	1349.36	1350.26	**8.30**
8.40	1350.26	1351.16	1352.06	1352.97	1353.87	1354.77	1355.67	1356.57	1357.47	1358.37	1359.27	**8.40**
8.50	1359.27	1360.17	1361.06	1361.96	1362.86	1363.76	1364.66	1365.55	1366.45	1367.35	1368.24	**8.50**
8.60	1368.24	1369.14	1370.04	1370.93	1371.83	1372.72	1373.62	1374.51	1375.41	1376.30	1377.19	**8.60**
8.70	1377.19	1378.09	1378.98	1379.87	1380.76	1381.66	1382.55	1383.44	1384.33	1385.22	1386.11	**8.70**
8.80	1386.11	1387.01	1387.90	1388.79	1389.68	1390.57	1391.45	1392.34	1393.23	1394.12	1395.01	**8.80**
8.90	1395.01	1395.90	1396.79	1397.67	1398.56	1399.45	1400.34	1401.22	1402.11	1402.99	1403.88	**8.90**
9.00	1403.88	1404.77	1405.65	1406.54	1407.42	1408.31	1409.19	1410.08	1410.96	1411.84	1412.73	**9.00**
9.10	1412.73	1413.61	1414.49	1415.38	1416.26	1417.14	1418.02	1418.91	1419.79	1420.67	1421.55	**9.10**
9.20	1421.55	1422.43	1423.31	1424.19	1425.07	1425.95	1426.83	1427.71	1428.59	1429.47	1430.35	**9.20**
9.30	1430.35	1431.23	1432.11	1432.99	1433.87	1434.74	1435.62	1436.50	1437.38	1438.26	1439.13	**9.30**
9.40	1439.13	1440.01	1440.89	1441.76	1442.64	1443.52	1444.39	1445.27	1446.14	1447.02	1447.89	**9.40**
9.50	1447.89	1448.77	1449.64	1450.52	1451.39	1452.27	1453.14	1454.01	1454.89	1455.76	1456.63	**9.50**
9.60	1456.63	1457.51	1458.38	1459.25	1460.12	1461.00	1461.87	1462.74	1463.61	1464.48	1465.36	**9.60**
9.70	1465.36	1466.23	1467.10	1467.97	1468.84	1469.71	1470.58	1471.45	1472.32	1473.19	1474.06	**9.70**
9.80	1474.06	1474.93	1475.80	1476.67	1477.54	1478.41	1479.28	1480.14	1481.01	1481.88	1482.75	**9.80**
9.90	1482.75	1483.62	1484.49	1485.35	1486.22	1487.09	1487.96	1488.82	1489.69	1490.56	1491.42	**9.90**
10.00	1491.42	1492.29	1493.16	1494.02	1494.89	1495.75	1496.62	1497.49	1498.35	1499.22	1500.08	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B2.2.1. *Type B thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	1491.42	1492.29	1493.16	1494.02	1494.89	1495.75	1496.62	1497.49	1498.35	1499.22	1500.08	**10.00**
10.10	1500.08	1500.95	1501.81	1502.68	1503.54	1504.41	1505.27	1506.13	1507.00	1507.86	1508.73	**10.10**
10.20	1508.73	1509.59	1510.45	1511.32	1512.18	1513.04	1513.91	1514.77	1515.63	1516.50	1517.36	**10.20**
10.30	1517.36	1518.22	1519.08	1519.94	1520.81	1521.67	1522.53	1523.39	1524.25	1525.12	1525.98	**10.30**
10.40	1525.98	1526.84	1527.70	1528.56	1529.42	1530.28	1531.14	1532.00	1532.87	1533.73	1534.59	**10.40**
10.50	1534.59	1535.45	1536.31	1537.17	1538.03	1538.89	1539.75	1540.61	1541.47	1542.33	1543.19	**10.50**
10.60	1543.19	1544.04	1544.90	1545.76	1546.62	1547.48	1548.34	1549.20	1550.06	1550.92	1551.77	**10.60**
10.70	1551.77	1552.63	1553.49	1554.35	1555.21	1556.07	1556.92	1557.78	1558.64	1559.50	1560.36	**10.70**
10.80	1560.36	1561.21	1562.07	1562.93	1563.79	1564.64	1565.50	1566.36	1567.21	1568.07	1568.93	**10.80**
10.90	1568.93	1569.79	1570.64	1571.50	1572.36	1573.21	1574.07	1574.93	1575.78	1576.64	1577.50	**10.90**
11.00	1577.50	1578.35	1579.21	1580.06	1580.92	1581.78	1582.63	1583.49	1584.34	1585.20	1586.06	**11.00**
11.10	1586.06	1586.91	1587.77	1588.62	1589.48	1590.33	1591.19	1592.05	1592.90	1593.76	1594.61	**11.10**
11.20	1594.61	1595.47	1596.32	1597.18	1598.03	1598.89	1599.74	1600.60	1601.45	1602.31	1603.16	**11.20**
11.30	1603.16	1604.02	1604.87	1605.73	1606.58	1607.44	1608.29	1609.15	1610.00	1610.86	1611.71	**11.30**
11.40	1611.71	1612.57	1613.42	1614.28	1615.13	1615.99	1616.84	1617.69	1618.55	1619.40	1620.26	**11.40**
11.50	1620.26	1621.11	1621.97	1622.82	1623.68	1624.53	1625.39	1626.24	1627.09	1627.95	1628.80	**11.50**
11.60	1628.80	1629.66	1630.51	1631.37	1632.22	1633.07	1633.93	1634.78	1635.64	1636.49	1637.35	**11.60**
11.70	1637.35	1638.20	1639.06	1639.91	1640.76	1641.62	1642.47	1643.33	1644.18	1645.04	1645.89	**11.70**
11.80	1645.89	1646.75	1647.60	1648.45	1649.31	1650.16	1651.02	1651.87	1652.73	1653.58	1654.44	**11.80**
11.90	1654.44	1655.29	1656.15	1657.00	1657.86	1658.71	1659.56	1660.42	1661.27	1662.13	1662.98	**11.90**
12.00	1662.98	1663.84	1664.69	1665.55	1666.40	1667.26	1668.11	1668.97	1669.82	1670.68	1671.53	**12.00**
12.10	1671.53	1672.39	1673.24	1674.10	1674.96	1675.81	1676.67	1677.52	1678.38	1679.23	1680.09	**12.10**
12.20	1680.09	1680.94	1681.80	1682.66	1683.51	1684.37	1685.22	1686.08	1686.94	1687.79	1688.65	**12.20**
12.30	1688.65	1689.50	1690.36	1691.22	1692.07	1692.93	1693.79	1694.64	1695.50	1696.35	1697.21	**12.30**
12.40	1697.21	1698.07	1698.93	1699.78	1700.64	1701.50	1702.35	1703.21	1704.07	1704.92	1705.78	**12.40**
12.50	1705.78	1706.64	1707.50	1708.35	1709.21	1710.07	1710.93	1711.79	1712.64	1713.50	1714.36	**12.50**
12.60	1714.36	1715.22	1716.08	1716.94	1717.79	1718.65	1719.51	1720.37	1721.23	1722.09	1722.95	**12.60**
12.70	1722.95	1723.81	1724.67	1725.52	1726.38	1727.24	1728.10	1728.96	1729.82	1730.68	1731.54	**12.70**
12.80	1731.54	1732.40	1733.26	1734.12	1734.98	1735.84	1736.70	1737.57	1738.43	1739.29	1740.15	**12.80**
12.90	1740.15	1741.01	1741.87	1742.73	1743.59	1744.46	1745.32	1746.18	1747.04	1747.90	1748.77	**12.90**
13.00	1748.77	1749.63	1750.49	1751.35	1752.22	1753.08	1753.94	1754.80	1755.67	1756.53	1757.39	**13.00**
13.10	1757.39	1758.26	1759.12	1759.99	1760.85	1761.71	1762.58	1763.44	1764.31	1765.17	1766.04	**13.10**
13.20	1766.04	1766.90	1767.77	1768.63	1769.50	1770.36	1771.23	1772.09	1772.96	1773.83	1774.69	**13.20**
13.30	1774.69	1775.56	1776.43	1777.29	1778.16	1779.03	1779.89	1780.76	1781.63	1782.50	1783.36	**13.30**
13.40	1783.36	1784.23	1785.10	1785.97	1786.84	1787.71	1788.58	1789.44	1790.31	1791.18	1792.05	**13.40**
13.50	1792.05	1792.92	1793.79	1794.66	1795.53	1796.40	1797.27	1798.14	1799.02	1799.89	1800.76	**13.50**
13.60	1800.76	1801.63	1802.50	1803.37	1804.24	1805.12	1805.99	1806.86	1807.74	1808.61	1809.48	**13.60**
13.70	1809.48	1810.35	1811.23	1812.10	1812.98	1813.85	1814.72	1815.60	1816.47	1817.35	1818.22	**13.70**
13.80	1818.22	1819.10	1819.98									**13.80**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B2.2.2 *Type B thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	153.89	182.61	205.44	225.01	242.41	258.25	272.88	286.55	299.43	311.64	0.00
0.10	311.64	323.29	334.43	345.14	355.46	365.43	375.09	384.46	393.57	402.44	411.08	0.10
0.20	411.08	419.53	427.78	435.85	443.75	451.50	459.10	466.56	473.88	481.09	488.17	0.20
0.30	488.17	495.14	502.01	508.77	515.43	522.00	528.48	534.88	541.19	547.42	553.58	0.30
0.40	553.58	559.66	565.67	571.62	577.49	583.31	589.06	594.75	600.39	605.97	611.49	0.40
0.50	611.49	616.96	622.38	627.76	633.08	638.35	643.58	648.77	653.91	659.01	664.07	0.50
0.60	664.07	669.09	674.07	679.01	683.92	688.79	693.62	698.42	703.18	707.91	712.61	0.60
0.70	712.61	717.27	721.91	726.51	731.09	735.63	740.15	744.64	749.10	753.53	757.94	0.70
0.80	757.94	762.32	766.68	771.01	775.32	779.60	783.86	788.09	792.30	796.49	800.66	0.80
0.90	800.66	804.81	808.93	813.03	817.12	821.18	825.22	829.24	833.25	837.23	841.19	0.90
1.00	841.19	845.14	849.07	852.98	856.87	860.74	864.60	868.44	872.26	876.07	879.86	1.00
1.10	879.86	883.64	887.40	891.14	894.87	898.58	902.28	905.96	909.63	913.28	916.92	1.10
1.20	916.92	920.55	924.16	927.75	931.34	934.91	938.47	942.01	945.54	949.06	952.57	1.20
1.30	952.57	956.06	959.54	963.01	966.47	969.91	973.35	976.77	980.18	983.58	986.97	1.30
1.40	986.97	990.34	993.71	997.06	1000.41	1003.74	1007.06	1010.37	1013.68	1016.97	1020.25	1.40
1.50	1020.25	1023.52	1026.78	1030.03	1033.28	1036.51	1039.73	1042.95	1046.15	1049.35	1052.53	1.50
1.60	1052.53	1055.71	1058.88	1062.04	1065.19	1068.33	1071.46	1074.58	1077.70	1080.81	1083.91	1.60
1.70	1083.91	1087.00	1090.08	1093.15	1096.22	1099.28	1102.33	1105.37	1108.41	1111.44	1114.46	1.70
1.80	1114.46	1117.47	1120.47	1123.47	1126.46	1129.44	1132.42	1135.39	1138.35	1141.30	1144.25	1.80
1.90	1144.25	1147.19	1150.12	1153.05	1155.97	1158.88	1161.78	1164.68	1167.58	1170.46	1173.34	1.90
2.00	1173.34	1176.22	1179.09	1181.95	1184.81	1187.66	1190.50	1193.34	1196.17	1199.00	1201.82	2.00
2.10	1201.82	1204.63	1207.44	1210.25	1213.04	1215.84	1218.62	1221.40	1224.18	1226.95	1229.71	2.10
2.20	1229.71	1232.47	1235.22	1237.97	1240.71	1243.45	1246.18	1248.91	1251.63	1254.35	1257.06	2.20
2.30	1257.06	1259.76	1262.46	1265.16	1267.85	1270.53	1273.21	1275.89	1278.56	1281.22	1283.88	2.30
2.40	1283.88	1286.54	1289.19	1291.83	1294.48	1297.11	1299.74	1302.37	1304.99	1307.61	1310.22	2.40
2.50	1310.22	1312.83	1315.43	1318.03	1320.62	1323.21	1325.80	1328.38	1330.95	1333.52	1336.09	2.50
2.60	1336.09	1338.65	1341.21	1343.76	1346.31	1348.86	1351.40	1353.94	1356.47	1359.00	1361.52	2.60
2.70	1361.52	1364.04	1366.56	1369.07	1371.58	1374.08	1376.58	1379.08	1381.57	1384.06	1386.54	2.70
2.80	1386.54	1389.02	1391.50	1393.97	1396.44	1398.90	1401.36	1403.82	1406.27	1408.72	1411.17	2.80
2.90	1411.17	1413.61	1416.05	1418.48	1420.91	1423.34	1425.76	1428.18	1430.60	1433.01	1435.42	2.90
3.00	1435.42	1437.83	1440.23	1442.63	1445.02	1447.42	1449.80	1452.19	1454.57	1456.95	1459.32	3.00
3.10	1459.32	1461.70	1464.06	1466.43	1468.79	1471.15	1473.50	1475.86	1478.21	1480.55	1482.89	3.10
3.20	1482.89	1485.23	1487.57	1489.90	1492.23	1494.56	1496.88	1499.20	1501.52	1503.83	1506.14	3.20
3.30	1506.14	1508.45	1510.76	1513.06	1515.36	1517.66	1519.95	1522.24	1524.53	1526.81	1529.09	3.30
3.40	1529.09	1531.37	1533.65	1535.92	1538.19	1540.46	1542.72	1544.99	1547.25	1549.50	1551.76	3.40
3.50	1551.76	1554.01	1556.25	1558.50	1560.74	1562.98	1565.22	1567.45	1569.69	1571.92	1574.14	3.50
3.60	1574.14	1576.37	1578.59	1580.81	1583.02	1585.24	1587.45	1589.66	1591.86	1594.07	1596.27	3.60
3.70	1596.27	1598.47	1600.66	1602.86	1605.05	1607.24	1609.42	1611.61	1613.79	1615.97	1618.14	3.70
3.80	1618.14	1620.32	1622.49	1624.66	1626.83	1628.99	1631.15	1633.32	1635.47	1637.63	1639.78	3.80
3.90	1639.78	1641.93	1644.08	1646.23	1648.37	1650.51	1652.65	1654.79	1656.93	1659.06	1661.19	3.90
4.00	1661.19	1663.32	1665.44	1667.57	1669.69	1671.81	1673.93	1676.04	1678.16	1680.27	1682.38	4.00
4.10	1682.38	1684.48	1686.59	1688.69	1690.79	1692.89	1694.99	1697.08	1699.18	1701.27	1703.35	4.10
4.20	1703.35	1705.44	1707.52	1709.61	1711.69	1713.77	1715.84	1717.92	1719.99	1722.06	1724.13	4.20
4.30	1724.13	1726.20	1728.26	1730.32	1732.38	1734.44	1736.50	1738.55	1740.61	1742.66	1744.71	4.30
4.40	1744.71	1746.76	1748.80	1750.84	1752.89	1754.93	1756.96	1759.00	1761.04	1763.07	1765.10	4.40
4.50	1765.10	1767.13	1769.16	1771.18	1773.21	1775.23	1777.25	1779.27	1781.28	1783.30	1785.31	4.50
4.60	1785.31	1787.32	1789.33	1791.34	1793.35	1795.35	1797.35	1799.35	1801.35	1803.35	1805.35	4.60
4.70	1805.35	1807.34	1809.33	1811.32	1813.31	1815.30	1817.29	1819.27	1821.25	1823.24	1825.22	4.70
4.80	1825.22	1827.19	1829.17	1831.14	1833.12	1835.09	1837.06	1839.03	1840.99	1842.96	1844.92	4.80
4.90	1844.92	1846.88	1848.84	1850.80	1852.76	1854.71	1856.67	1858.62	1860.57	1862.52	1864.47	4.90
5.00	1864.47	1866.42	1868.36	1870.30	1872.25	1874.19	1876.13	1878.06	1880.00	1881.93	1883.87	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B2.2.2 *Type B thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	1864.47	1866.42	1868.36	1870.30	1872.25	1874.19	1876.13	1878.06	1880.00	1881.93	1883.87	5.00
5.10	1883.87	1885.80	1887.73	1889.66	1891.58	1893.51	1895.43	1897.36	1899.28	1901.20	1903.12	5.10
5.20	1903.12	1905.03	1906.95	1908.86	1910.78	1912.69	1914.60	1916.51	1918.41	1920.32	1922.22	5.20
5.30	1922.22	1924.13	1926.03	1927.93	1929.83	1931.72	1933.62	1935.52	1937.41	1939.30	1941.19	5.30
5.40	1941.19	1943.08	1944.97	1946.86	1948.74	1950.63	1952.51	1954.39	1956.27	1958.15	1960.03	5.40
5.50	1960.03	1961.90	1963.78	1965.65	1967.53	1969.40	1971.27	1973.13	1975.00	1976.87	1978.73	5.50
5.60	1978.73	1980.60	1982.46	1984.32	1986.18	1988.04	1989.90	1991.75	1993.61	1995.46	1997.31	5.60
5.70	1997.31	1999.16	2001.01	2002.86	2004.71	2006.56	2008.40	2010.25	2012.09	2013.93	2015.77	5.70
5.80	2015.77	2017.61	2019.45	2021.28	2023.12	2024.96	2026.79	2028.62	2030.45	2032.28	2034.11	5.80
5.90	2034.11	2035.94	2037.76	2039.59	2041.41	2043.24	2045.06	2046.88	2048.70	2050.52	2052.33	5.90
6.00	2052.33	2054.15	2055.97	2057.78	2059.59	2061.40	2063.21	2065.02	2066.83	2068.64	2070.45	6.00
6.10	2070.45	2072.25	2074.06	2075.86	2077.66	2079.46	2081.26	2083.06	2084.86	2086.65	2088.45	6.10
6.20	2088.45	2090.24	2092.04	2093.83	2095.62	2097.41	2099.20	2100.99	2102.78	2104.56	2106.35	6.20
6.30	2106.35	2108.13	2109.92	2111.70	2113.48	2115.26	2117.04	2118.82	2120.59	2122.37	2124.14	6.30
6.40	2124.14	2125.92	2127.69	2129.46	2131.23	2133.00	2134.77	2136.54	2138.31	2140.08	2141.84	6.40
6.50	2141.84	2143.60	2145.37	2147.13	2148.89	2150.65	2152.41	2154.17	2155.93	2157.68	2159.44	6.50
6.60	2159.44	2161.19	2162.95	2164.70	2166.45	2168.20	2169.95	2171.70	2173.45	2175.20	2176.94	6.60
6.70	2176.94	2178.69	2180.43	2182.18	2183.92	2185.66	2187.40	2189.14	2190.88	2192.62	2194.36	6.70
6.80	2194.36	2196.09	2197.83	2199.56	2201.30	2203.03	2204.76	2206.49	2208.23	2209.95	2211.68	6.80
6.90	2211.68	2213.41	2215.14	2216.86	2218.59	2220.31	2222.04	2223.76	2225.48	2227.20	2228.92	6.90
7.00	2228.92	2230.64	2232.36	2234.08	2235.79	2237.51	2239.22	2240.94	2242.65	2244.36	2246.08	7.00
7.10	2246.08	2247.79	2249.50	2251.21	2252.91	2254.62	2256.33	2258.04	2259.74	2261.44	2263.15	7.10
7.20	2263.15	2264.85	2266.55	2268.25	2269.96	2271.66	2273.35	2275.05	2276.75	2278.45	2280.14	7.20
7.30	2280.14	2281.84	2283.53	2285.23	2286.92	2288.61	2290.30	2291.99	2293.68	2295.37	2297.06	7.30
7.40	2297.06	2298.75	2300.43	2302.12	2303.80	2305.49	2307.17	2308.86	2310.54	2312.22	2313.90	7.40
7.50	2313.90	2315.58	2317.26	2318.94	2320.62	2322.29	2323.97	2325.65	2327.32	2329.00	2330.67	7.50
7.60	2330.67	2332.34	2334.02	2335.69	2337.36	2339.03	2340.70	2342.37	2344.04	2345.70	2347.37	7.60
7.70	2347.37	2349.04	2350.70	2352.37	2354.03	2355.69	2357.36	2359.02	2360.68	2362.34	2364.00	7.70
7.80	2364.00	2365.66	2367.32	2368.98	2370.63	2372.29	2373.95	2375.60	2377.26	2378.91	2380.57	7.80
7.90	2380.57	2382.22	2383.87	2385.52	2387.17	2388.82	2390.47	2392.12	2393.77	2395.42	2397.07	7.90
8.00	2397.07	2398.71	2400.36	2402.01	2403.65	2405.29	2406.94	2408.58	2410.22	2411.86	2413.51	8.00
8.10	2413.51	2415.15	2416.79	2418.43	2420.06	2421.70	2423.34	2424.98	2426.61	2428.25	2429.88	8.10
8.20	2429.88	2431.52	2433.15	2434.79	2436.42	2438.05	2439.68	2441.32	2442.95	2444.58	2446.21	8.20
8.30	2446.21	2447.83	2449.46	2451.09	2452.72	2454.35	2455.97	2457.60	2459.22	2460.85	2462.47	8.30
8.40	2462.47	2464.09	2465.72	2467.34	2468.96	2470.58	2472.20	2473.82	2475.44	2477.06	2478.68	8.40
8.50	2478.68	2480.30	2481.92	2483.53	2485.15	2486.77	2488.38	2490.00	2491.61	2493.23	2494.84	8.50
8.60	2494.84	2496.45	2498.06	2499.68	2501.29	2502.90	2504.51	2506.12	2507.73	2509.34	2510.95	8.60
8.70	2510.95	2512.56	2514.16	2515.77	2517.38	2518.98	2520.59	2522.19	2523.80	2525.40	2527.01	8.70
8.80	2527.01	2528.61	2530.21	2531.81	2533.42	2535.02	2536.62	2538.22	2539.82	2541.42	2543.02	8.80
8.90	2543.02	2544.62	2546.22	2547.81	2549.41	2551.01	2552.60	2554.20	2555.80	2557.39	2558.99	8.90
9.00	2558.99	2560.58	2562.17	2563.77	2565.36	2566.95	2568.54	2570.14	2571.73	2573.32	2574.91	9.00
9.10	2574.91	2576.50	2578.09	2579.68	2581.27	2582.86	2584.44	2586.03	2587.62	2589.21	2590.79	9.10
9.20	2590.79	2592.38	2593.96	2595.55	2597.13	2598.72	2600.30	2601.89	2603.47	2605.05	2606.63	9.20
9.30	2606.63	2608.22	2609.80	2611.38	2612.96	2614.54	2616.12	2617.70	2619.28	2620.86	2622.44	9.30
9.40	2622.44	2624.02	2625.60	2627.17	2628.75	2630.33	2631.90	2633.48	2635.06	2636.63	2638.21	9.40
9.50	2638.21	2639.78	2641.36	2642.93	2644.50	2646.08	2647.65	2649.22	2650.80	2652.37	2653.94	9.50
9.60	2653.94	2655.51	2657.08	2658.65	2660.22	2661.79	2663.36	2664.93	2666.50	2668.07	2669.64	9.60
9.70	2669.64	2671.21	2672.78	2674.34	2675.91	2677.48	2679.05	2680.61	2682.18	2683.74	2685.31	9.70
9.80	2685.31	2686.88	2688.44	2690.00	2691.57	2693.13	2694.70	2696.26	2697.82	2699.39	2700.95	9.80
9.90	2700.95	2702.51	2704.07	2705.64	2707.20	2708.76	2710.32	2711.88	2713.44	2715.00	2716.56	9.90
10.00	2716.56	2718.12	2719.68	2721.24	2722.80	2724.36	2725.92	2727.47	2729.03	2730.59	2732.15	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B2.2.2 *Type B thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	2716.56	2718.12	2719.68	2721.24	2722.80	2724.36	2725.92	2727.47	2729.03	2730.59	2732.15	**10.00**
10.10	2732.15	2733.70	2735.26	2736.82	2738.37	2739.93	2741.49	2743.04	2744.60	2746.15	2747.71	**10.10**
10.20	2747.71	2749.26	2750.82	2752.37	2753.92	2755.48	2757.03	2758.59	2760.14	2761.69	2763.24	**10.20**
10.30	2763.24	2764.80	2766.35	2767.90	2769.45	2771.00	2772.56	2774.11	2775.66	2777.21	2778.76	**10.30**
10.40	2778.76	2780.31	2781.86	2783.41	2784.96	2786.51	2788.06	2789.61	2791.16	2792.71	2794.26	**10.40**
10.50	2794.26	2795.80	2797.35	2798.90	2800.45	2802.00	2803.54	2805.09	2806.64	2808.19	2809.73	**10.50**
10.60	2809.73	2811.28	2812.83	2814.37	2815.92	2817.47	2819.01	2820.56	2822.10	2823.65	2825.19	**10.60**
10.70	2825.19	2826.74	2828.28	2829.83	2831.37	2832.92	2834.46	2836.01	2837.55	2839.10	2840.64	**10.70**
10.80	2840.64	2842.18	2843.73	2845.27	2846.81	2848.36	2849.90	2851.44	2852.99	2854.53	2856.07	**10.80**
10.90	2856.07	2857.61	2859.16	2860.70	2862.24	2863.78	2865.32	2866.87	2868.41	2869.95	2871.49	**10.90**
11.00	2871.49	2873.03	2874.57	2876.12	2877.66	2879.20	2880.74	2882.28	2883.82	2885.36	2886.90	**11.00**
11.10	2886.90	2888.44	2889.98	2891.52	2893.06	2894.60	2896.14	2897.68	2899.22	2900.76	2902.30	**11.10**
11.20	2902.30	2903.84	2905.38	2906.92	2908.46	2910.00	2911.54	2913.08	2914.62	2916.16	2917.69	**11.20**
11.30	2917.69	2919.23	2920.77	2922.31	2923.85	2925.39	2926.93	2928.47	2930.00	2931.54	2933.08	**11.30**
11.40	2933.08	2934.62	2936.16	2937.70	2939.24	2940.77	2942.31	2943.85	2945.39	2946.93	2948.46	**11.40**
11.50	2948.46	2950.00	2951.54	2953.08	2954.62	2956.16	2957.69	2959.23	2960.77	2962.31	2963.85	**11.50**
11.60	2963.85	2965.38	2966.92	2968.46	2970.00	2971.53	2973.07	2974.61	2976.15	2977.69	2979.22	**11.60**
11.70	2979.22	2980.76	2982.30	2983.84	2985.38	2986.91	2988.45	2989.99	2991.53	2993.07	2994.60	**11.70**
11.80	2994.60	2996.14	2997.68	2999.22	3000.76	3002.29	3003.83	3005.37	3006.91	3008.45	3009.99	**11.80**
11.90	3009.99	3011.52	3013.06	3014.60	3016.14	3017.68	3019.22	3020.76	3022.29	3023.83	3025.37	**11.90**
12.00	3025.37	3026.91	3028.45	3029.99	3031.53	3033.07	3034.60	3036.14	3037.68	3039.22	3040.76	**12.00**
12.10	3040.76	3042.30	3043.84	3045.38	3046.92	3048.46	3050.00	3051.54	3053.08	3054.62	3056.16	**12.10**
12.20	3056.16	3057.70	3059.24	3060.78	3062.32	3063.86	3065.40	3066.94	3068.48	3070.02	3071.57	**12.20**
12.30	3071.57	3073.11	3074.65	3076.19	3077.73	3079.27	3080.81	3082.35	3083.90	3085.44	3086.98	**12.30**
12.40	3086.98	3088.52	3090.07	3091.61	3093.15	3094.69	3096.24	3097.78	3099.32	3100.86	3102.41	**12.40**
12.50	3102.41	3103.95	3105.50	3107.04	3108.58	3110.13	3111.67	3113.22	3114.76	3116.30	3117.85	**12.50**
12.60	3117.85	3119.39	3120.94	3122.48	3124.03	3125.57	3127.12	3128.67	3130.21	3131.76	3133.30	**12.60**
12.70	3133.30	3134.85	3136.40	3137.94	3139.49	3141.04	3142.59	3144.13	3145.68	3147.23	3148.78	**12.70**
12.80	3148.78	3150.32	3151.87	3153.42	3154.97	3156.52	3158.07	3159.62	3161.17	3162.72	3164.27	**12.80**
12.90	3164.27	3165.82	3167.37	3168.92	3170.47	3172.02	3173.57	3175.12	3176.67	3178.23	3179.78	**12.90**
13.00	3179.78	3181.33	3182.88	3184.44	3185.99	3187.54	3189.09	3190.65	3192.20	3193.76	3195.31	**13.00**
13.10	3195.31	3196.86	3198.42	3199.97	3201.53	3203.09	3204.64	3206.20	3207.75	3209.31	3210.87	**13.10**
13.20	3210.87	3212.42	3213.98	3215.54	3217.10	3218.65	3220.21	3221.77	3223.33	3224.89	3226.45	**13.20**
13.30	3226.45	3228.01	3229.57	3231.13	3232.69	3234.25	3235.81	3237.37	3238.93	3240.49	3242.06	**13.30**
13.40	3242.06	3243.62	3245.18	3246.75	3248.31	3249.87	3251.44	3253.00	3254.56	3256.13	3257.69	**13.40**
13.50	3257.69	3259.26	3260.83	3262.39	3263.96	3265.53	3267.09	3268.66	3270.23	3271.80	3273.36	**13.50**
13.60	3273.36	3274.93	3276.50	3278.07	3279.64	3281.21	3282.78	3284.35	3285.92	3287.49	3289.07	**13.60**
13.70	3289.07	3290.64	3292.21	3293.78	3295.36	3296.93	3298.50	3300.08	3301.65	3303.23	3304.80	**13.70**
13.80	3304.80	3306.38	3307.96									**13.80**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

B3. Supplementary Reference Tables for Type R—Platinum-13% Rhodium Alloy Versus Platinum Thermocouples

B3.1. Tables with Voltage as a Function of Temperature

The reference function for type R thermocouples given in the main text (see table 3.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B3.1.1 and B3.1.2. Table B3.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −50 °C to 1768 °C, and table B3.1.2 presents voltage values at 1 °F intervals from −58 °F to 3214 °F.

TABLE B3.1.1. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−50	−0.226											−50
−40	−0.188	−0.192	−0.196	−0.200	−0.204	−0.208	−0.211	−0.215	−0.219	−0.223	−0.226	−40
−30	−0.145	−0.150	−0.154	−0.158	−0.163	−0.167	−0.171	−0.175	−0.180	−0.184	−0.188	−30
−20	−0.100	−0.105	−0.109	−0.114	−0.119	−0.123	−0.128	−0.132	−0.137	−0.141	−0.145	−20
−10	−0.051	−0.056	−0.061	−0.066	−0.071	−0.076	−0.081	−0.086	−0.091	−0.095	−0.100	−10
0	0.000	−0.005	−0.011	−0.016	−0.021	−0.026	−0.031	−0.036	−0.041	−0.046	−0.051	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B3.1.1. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.005	0.011	0.016	0.021	0.027	0.032	0.038	0.043	0.049	0.054	0
10	0.054	0.060	0.065	0.071	0.077	0.082	0.088	0.094	0.100	0.105	0.111	10
20	0.111	0.117	0.123	0.129	0.135	0.141	0.147	0.153	0.159	0.165	0.171	20
30	0.171	0.177	0.183	0.189	0.195	0.201	0.207	0.214	0.220	0.226	0.232	30
40	0.232	0.239	0.245	0.251	0.258	0.264	0.271	0.277	0.284	0.290	0.296	40
50	0.296	0.303	0.310	0.316	0.323	0.329	0.336	0.343	0.349	0.356	0.363	50
60	0.363	0.369	0.376	0.383	0.390	0.397	0.403	0.410	0.417	0.424	0.431	60
70	0.431	0.438	0.445	0.452	0.459	0.466	0.473	0.480	0.487	0.494	0.501	70
80	0.501	0.508	0.516	0.523	0.530	0.537	0.544	0.552	0.559	0.566	0.573	80
90	0.573	0.581	0.588	0.595	0.603	0.610	0.618	0.625	0.632	0.640	0.647	90
100	0.647	0.655	0.662	0.670	0.677	0.685	0.693	0.700	0.708	0.715	0.723	100
110	0.723	0.731	0.738	0.746	0.754	0.761	0.769	0.777	0.785	0.792	0.800	110
120	0.800	0.808	0.816	0.824	0.832	0.839	0.847	0.855	0.863	0.871	0.879	120
130	0.879	0.887	0.895	0.903	0.911	0.919	0.927	0.935	0.943	0.951	0.959	130
140	0.959	0.967	0.976	0.984	0.992	1.000	1.008	1.016	1.025	1.033	1.041	140
150	1.041	1.049	1.058	1.066	1.074	1.082	1.091	1.099	1.107	1.116	1.124	150
160	1.124	1.132	1.141	1.149	1.158	1.166	1.175	1.183	1.191	1.200	1.208	160
170	1.208	1.217	1.225	1.234	1.242	1.251	1.260	1.268	1.277	1.285	1.294	170
180	1.294	1.303	1.311	1.320	1.329	1.337	1.346	1.355	1.363	1.372	1.381	180
190	1.381	1.389	1.398	1.407	1.416	1.425	1.433	1.442	1.451	1.460	1.469	190
200	1.469	1.477	1.486	1.495	1.504	1.513	1.522	1.531	1.540	1.549	1.558	200
210	1.558	1.567	1.575	1.584	1.593	1.602	1.611	1.620	1.629	1.639	1.648	210
220	1.648	1.657	1.666	1.675	1.684	1.693	1.702	1.711	1.720	1.729	1.739	220
230	1.739	1.748	1.757	1.766	1.775	1.784	1.794	1.803	1.812	1.821	1.831	230
240	1.831	1.840	1.849	1.858	1.868	1.877	1.886	1.895	1.905	1.914	1.923	240
250	1.923	1.933	1.942	1.951	1.961	1.970	1.980	1.989	1.998	2.008	2.017	250
260	2.017	2.027	2.036	2.046	2.055	2.064	2.074	2.083	2.093	2.102	2.112	260
270	2.112	2.121	2.131	2.140	2.150	2.159	2.169	2.179	2.188	2.198	2.207	270
280	2.207	2.217	2.226	2.236	2.246	2.255	2.265	2.275	2.284	2.294	2.304	280
290	2.304	2.313	2.323	2.333	2.342	2.352	2.362	2.371	2.381	2.391	2.401	290
300	2.401	2.410	2.420	2.430	2.440	2.449	2.459	2.469	2.479	2.488	2.498	300
310	2.498	2.508	2.518	2.528	2.538	2.547	2.557	2.567	2.577	2.587	2.597	310
320	2.597	2.607	2.617	2.626	2.636	2.646	2.656	2.666	2.676	2.686	2.696	320
330	2.696	2.706	2.716	2.726	2.736	2.746	2.756	2.766	2.776	2.786	2.796	330
340	2.796	2.806	2.816	2.826	2.836	2.846	2.856	2.866	2.876	2.886	2.896	340
350	2.896	2.906	2.916	2.926	2.937	2.947	2.957	2.967	2.977	2.987	2.997	350
360	2.997	3.007	3.018	3.028	3.038	3.048	3.058	3.068	3.079	3.089	3.099	360
370	3.099	3.109	3.119	3.130	3.140	3.150	3.160	3.171	3.181	3.191	3.201	370
380	3.201	3.212	3.222	3.232	3.242	3.253	3.263	3.273	3.284	3.294	3.304	380
390	3.304	3.315	3.325	3.335	3.346	3.356	3.366	3.377	3.387	3.397	3.408	390
400	3.408	3.418	3.428	3.439	3.449	3.460	3.470	3.480	3.491	3.501	3.512	400
410	3.512	3.522	3.533	3.543	3.553	3.564	3.574	3.585	3.595	3.606	3.616	410
420	3.616	3.627	3.637	3.648	3.658	3.669	3.679	3.690	3.700	3.711	3.721	420
430	3.721	3.732	3.742	3.753	3.764	3.774	3.785	3.795	3.806	3.816	3.827	430
440	3.827	3.838	3.848	3.859	3.869	3.880	3.891	3.901	3.912	3.922	3.933	440
450	3.933	3.944	3.954	3.965	3.976	3.986	3.997	4.008	4.018	4.029	4.040	450
460	4.040	4.050	4.061	4.072	4.083	4.093	4.104	4.115	4.125	4.136	4.147	460
470	4.147	4.158	4.168	4.179	4.190	4.201	4.211	4.222	4.233	4.244	4.255	470
480	4.255	4.265	4.276	4.287	4.298	4.309	4.319	4.330	4.341	4.352	4.363	480
490	4.363	4.373	4.384	4.395	4.406	4.417	4.428	4.439	4.449	4.460	4.471	490
500	4.471	4.482	4.493	4.504	4.515	4.526	4.537	4.548	4.558	4.569	4.580	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B3.1.1. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	4.471	4.482	4.493	4.504	4.515	4.526	4.537	4.548	4.558	4.569	4.580	500
510	4.580	4.591	4.602	4.613	4.624	4.635	4.646	4.657	4.668	4.679	4.690	510
520	4.690	4.701	4.712	4.723	4.734	4.745	4.756	4.767	4.778	4.789	4.800	520
530	4.800	4.811	4.822	4.833	4.844	4.855	4.866	4.877	4.888	4.899	4.910	530
540	4.910	4.922	4.933	4.944	4.955	4.966	4.977	4.988	4.999	5.010	5.021	540
550	5.021	5.033	5.044	5.055	5.066	5.077	5.088	5.099	5.111	5.122	5.133	550
560	5.133	5.144	5.155	5.166	5.178	5.189	5.200	5.211	5.222	5.234	5.245	560
570	5.245	5.256	5.267	5.279	5.290	5.301	5.312	5.323	5.335	5.346	5.357	570
580	5.357	5.369	5.380	5.391	5.402	5.414	5.425	5.436	5.448	5.459	5.470	580
590	5.470	5.481	5.493	5.504	5.515	5.527	5.538	5.549	5.561	5.572	5.583	590
600	5.583	5.595	5.606	5.618	5.629	5.640	5.652	5.663	5.674	5.686	5.697	600
610	5.697	5.709	5.720	5.731	5.743	5.754	5.766	5.777	5.789	5.800	5.812	610
620	5.812	5.823	5.834	5.846	5.857	5.869	5.880	5.892	5.903	5.915	5.926	620
630	5.926	5.938	5.949	5.961	5.972	5.984	5.995	6.007	6.018	6.030	6.041	630
640	6.041	6.053	6.065	6.076	6.088	6.099	6.111	6.122	6.134	6.146	6.157	640
650	6.157	6.169	6.180	6.192	6.204	6.215	6.227	6.238	6.250	6.262	6.273	650
660	6.273	6.285	6.297	6.308	6.320	6.332	6.343	6.355	6.367	6.378	6.390	660
670	6.390	6.402	6.413	6.425	6.437	6.448	6.460	6.472	6.484	6.495	6.507	670
680	6.507	6.519	6.531	6.542	6.554	6.566	6.578	6.589	6.601	6.613	6.625	680
690	6.625	6.636	6.648	6.660	6.672	6.684	6.695	6.707	6.719	6.731	6.743	690
700	6.743	6.755	6.766	6.778	6.790	6.802	6.814	6.826	6.838	6.849	6.861	700
710	6.861	6.873	6.885	6.897	6.909	6.921	6.933	6.945	6.956	6.968	6.980	710
720	6.980	6.992	7.004	7.016	7.028	7.040	7.052	7.064	7.076	7.088	7.100	720
730	7.100	7.112	7.124	7.136	7.148	7.160	7.172	7.184	7.196	7.208	7.220	730
740	7.220	7.232	7.244	7.256	7.268	7.280	7.292	7.304	7.316	7.328	7.340	740
750	7.340	7.352	7.364	7.376	7.389	7.401	7.413	7.425	7.437	7.449	7.461	750
760	7.461	7.473	7.485	7.498	7.510	7.522	7.534	7.546	7.558	7.570	7.583	760
770	7.583	7.595	7.607	7.619	7.631	7.644	7.656	7.668	7.680	7.692	7.705	770
780	7.705	7.717	7.729	7.741	7.753	7.766	7.778	7.790	7.802	7.815	7.827	780
790	7.827	7.839	7.851	7.864	7.876	7.888	7.901	7.913	7.925	7.938	7.950	790
800	7.950	7.962	7.974	7.987	7.999	8.011	8.024	8.036	8.048	8.061	8.073	800
810	8.073	8.086	8.098	8.110	8.123	8.135	8.147	8.160	8.172	8.185	8.197	810
820	8.197	8.209	8.222	8.234	8.247	8.259	8.272	8.284	8.296	8.309	8.321	820
830	8.321	8.334	8.346	8.359	8.371	8.384	8.396	8.409	8.421	8.434	8.446	830
840	8.446	8.459	8.471	8.484	8.496	8.509	8.521	8.534	8.546	8.559	8.571	840
850	8.571	8.584	8.597	8.609	8.622	8.634	8.647	8.659	8.672	8.685	8.697	850
860	8.697	8.710	8.722	8.735	8.748	8.760	8.773	8.785	8.798	8.811	8.823	860
870	8.823	8.836	8.849	8.861	8.874	8.887	8.899	8.912	8.925	8.937	8.950	870
880	8.950	8.963	8.975	8.988	9.001	9.014	9.026	9.039	9.052	9.065	9.077	880
890	9.077	9.090	9.103	9.115	9.128	9.141	9.154	9.167	9.179	9.192	9.205	890
900	9.205	9.218	9.230	9.243	9.256	9.269	9.282	9.294	9.307	9.320	9.333	900
910	9.333	9.346	9.359	9.371	9.384	9.397	9.410	9.423	9.436	9.449	9.461	910
920	9.461	9.474	9.487	9.500	9.513	9.526	9.539	9.552	9.565	9.578	9.590	920
930	9.590	9.603	9.616	9.629	9.642	9.655	9.668	9.681	9.694	9.707	9.720	930
940	9.720	9.733	9.746	9.759	9.772	9.785	9.798	9.811	9.824	9.837	9.850	940
950	9.850	9.863	9.876	9.889	9.902	9.915	9.928	9.941	9.954	9.967	9.980	950
960	9.980	9.993	10.006	10.019	10.032	10.046	10.059	10.072	10.085	10.098	10.111	960
970	10.111	10.124	10.137	10.150	10.163	10.177	10.190	10.203	10.216	10.229	10.242	970
980	10.242	10.255	10.268	10.282	10.295	10.308	10.321	10.334	10.347	10.361	10.374	980
990	10.374	10.387	10.400	10.413	10.427	10.440	10.453	10.466	10.480	10.493	10.506	990
1000	10.506	10.519	10.532	10.546	10.559	10.572	10.585	10.599	10.612	10.625	10.638	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B3.1.1. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	10.506	10.519	10.532	10.546	10.559	10.572	10.585	10.599	10.612	10.625	10.638	1000
1010	10.638	10.652	10.665	10.678	10.692	10.705	10.718	10.731	10.745	10.758	10.771	1010
1020	10.771	10.785	10.798	10.811	10.825	10.838	10.851	10.865	10.878	10.891	10.905	1020
1030	10.905	10.918	10.932	10.945	10.958	10.972	10.985	10.998	11.012	11.025	11.039	1030
1040	11.039	11.052	11.065	11.079	11.092	11.106	11.119	11.132	11.146	11.159	11.173	1040
1050	11.173	11.186	11.200	11.213	11.227	11.240	11.253	11.267	11.280	11.294	11.307	1050
1060	11.307	11.321	11.334	11.348	11.361	11.375	11.388	11.402	11.415	11.429	11.442	1060
1070	11.442	11.456	11.469	11.483	11.496	11.510	11.524	11.537	11.551	11.564	11.578	1070
1080	11.578	11.591	11.605	11.618	11.632	11.646	11.659	11.673	11.686	11.700	11.714	1080
1090	11.714	11.727	11.741	11.754	11.768	11.782	11.795	11.809	11.822	11.836	11.850	1090
1100	11.850	11.863	11.877	11.891	11.904	11.918	11.931	11.945	11.959	11.972	11.986	1100
1110	11.986	12.000	12.013	12.027	12.041	12.054	12.068	12.082	12.096	12.109	12.123	1110
1120	12.123	12.137	12.150	12.164	12.178	12.191	12.205	12.219	12.233	12.246	12.260	1120
1130	12.260	12.274	12.288	12.301	12.315	12.329	12.342	12.356	12.370	12.384	12.397	1130
1140	12.397	12.411	12.425	12.439	12.453	12.466	12.480	12.494	12.508	12.521	12.535	1140
1150	12.535	12.549	12.563	12.577	12.590	12.604	12.618	12.632	12.646	12.659	12.673	1150
1160	12.673	12.687	12.701	12.715	12.729	12.742	12.756	12.770	12.784	12.798	12.812	1160
1170	12.812	12.825	12.839	12.853	12.867	12.881	12.895	12.909	12.922	12.936	12.950	1170
1180	12.950	12.964	12.978	12.992	13.006	13.019	13.033	13.047	13.061	13.075	13.089	1180
1190	13.089	13.103	13.117	13.131	13.145	13.158	13.172	13.186	13.200	13.214	13.228	1190
1200	13.228	13.242	13.256	13.270	13.284	13.298	13.311	13.325	13.339	13.353	13.367	1200
1210	13.367	13.381	13.395	13.409	13.423	13.437	13.451	13.465	13.479	13.493	13.507	1210
1220	13.507	13.521	13.535	13.549	13.563	13.577	13.590	13.604	13.618	13.632	13.646	1220
1230	13.646	13.660	13.674	13.688	13.702	13.716	13.730	13.744	13.758	13.772	13.786	1230
1240	13.786	13.800	13.814	13.828	13.842	13.856	13.870	13.884	13.898	13.912	13.926	1240
1250	13.926	13.940	13.954	13.968	13.982	13.996	14.010	14.024	14.038	14.052	14.066	1250
1260	14.066	14.081	14.095	14.109	14.123	14.137	14.151	14.165	14.179	14.193	14.207	1260
1270	14.207	14.221	14.235	14.249	14.263	14.277	14.291	14.305	14.319	14.333	14.347	1270
1280	14.347	14.361	14.375	14.390	14.404	14.418	14.432	14.446	14.460	14.474	14.488	1280
1290	14.488	14.502	14.516	14.530	14.544	14.558	14.572	14.586	14.601	14.615	14.629	1290
1300	14.629	14.643	14.657	14.671	14.685	14.699	14.713	14.727	14.741	14.755	14.770	1300
1310	14.770	14.784	14.798	14.812	14.826	14.840	14.854	14.868	14.882	14.896	14.911	1310
1320	14.911	14.925	14.939	14.953	14.967	14.981	14.995	15.009	15.023	15.037	15.052	1320
1330	15.052	15.066	15.080	15.094	15.108	15.122	15.136	15.150	15.164	15.179	15.193	1330
1340	15.193	15.207	15.221	15.235	15.249	15.263	15.277	15.291	15.306	15.320	15.334	1340
1350	15.334	15.348	15.362	15.376	15.390	15.404	15.419	15.433	15.447	15.461	15.475	1350
1360	15.475	15.489	15.503	15.517	15.531	15.546	15.560	15.574	15.588	15.602	15.616	1360
1370	15.616	15.630	15.645	15.659	15.673	15.687	15.701	15.715	15.729	15.743	15.758	1370
1380	15.758	15.772	15.786	15.800	15.814	15.828	15.842	15.856	15.871	15.885	15.899	1380
1390	15.899	15.913	15.927	15.941	15.955	15.969	15.984	15.998	16.012	16.026	16.040	1390
1400	16.040	16.054	16.068	16.082	16.097	16.111	16.125	16.139	16.153	16.167	16.181	1400
1410	16.181	16.196	16.210	16.224	16.238	16.252	16.266	16.280	16.294	16.309	16.323	1410
1420	16.323	16.337	16.351	16.365	16.379	16.393	16.407	16.422	16.436	16.450	16.464	1420
1430	16.464	16.478	16.492	16.506	16.520	16.534	16.549	16.563	16.577	16.591	16.605	1430
1440	16.605	16.619	16.633	16.647	16.662	16.676	16.690	16.704	16.718	16.732	16.746	1440
1450	16.746	16.760	16.774	16.789	16.803	16.817	16.831	16.845	16.859	16.873	16.887	1450
1460	16.887	16.901	16.915	16.930	16.944	16.958	16.972	16.986	17.000	17.014	17.028	1460
1470	17.028	17.042	17.056	17.071	17.085	17.099	17.113	17.127	17.141	17.155	17.169	1470
1480	17.169	17.183	17.197	17.211	17.225	17.240	17.254	17.268	17.282	17.296	17.310	1480
1490	17.310	17.324	17.338	17.352	17.366	17.380	17.394	17.408	17.423	17.437	17.451	1490
1500	17.451	17.465	17.479	17.493	17.507	17.521	17.535	17.549	17.563	17.577	17.591	1500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B3.1.1. ***Type R thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued***

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1500	17.451	17.465	17.479	17.493	17.507	17.521	17.535	17.549	17.563	17.577	17.591	1500
1510	17.591	17.605	17.619	17.633	17.647	17.661	17.676	17.690	17.704	17.718	17.732	1510
1520	17.732	17.746	17.760	17.774	17.788	17.802	17.816	17.830	17.844	17.858	17.872	1520
1530	17.872	17.886	17.900	17.914	17.928	17.942	17.956	17.970	17.984	17.998	18.012	1530
1540	18.012	18.026	18.040	18.054	18.068	18.082	18.096	18.110	18.124	18.138	18.152	1540
1550	18.152	18.166	18.180	18.194	18.208	18.222	18.236	18.250	18.264	18.278	18.292	1550
1560	18.292	18.306	18.320	18.334	18.348	18.362	18.376	18.390	18.404	18.417	18.431	1560
1570	18.431	18.445	18.459	18.473	18.487	18.501	18.515	18.529	18.543	18.557	18.571	1570
1580	18.571	18.585	18.599	18.613	18.627	18.640	18.654	18.668	18.682	18.696	18.710	1580
1590	18.710	18.724	18.738	18.752	18.766	18.779	18.793	18.807	18.821	18.835	18.849	1590
1600	18.849	18.863	18.877	18.891	18.904	18.918	18.932	18.946	18.960	18.974	18.988	1600
1610	18.988	19.002	19.015	19.029	19.043	19.057	19.071	19.085	19.098	19.112	19.126	1610
1620	19.126	19.140	19.154	19.168	19.181	19.195	19.209	19.223	19.237	19.250	19.264	1620
1630	19.264	19.278	19.292	19.306	19.319	19.333	19.347	19.361	19.375	19.388	19.402	1630
1640	19.402	19.416	19.430	19.444	19.457	19.471	19.485	19.499	19.512	19.526	19.540	1640
1650	19.540	19.554	19.567	19.581	19.595	19.609	19.622	19.636	19.650	19.663	19.677	1650
1660	19.677	19.691	19.705	19.718	19.732	19.746	19.759	19.773	19.787	19.800	19.814	1660
1670	19.814	19.828	19.841	19.855	19.869	19.882	19.896	19.910	19.923	19.937	19.951	1670
1680	19.951	19.964	19.978	19.992	20.005	20.019	20.032	20.046	20.060	20.073	20.087	1680
1690	20.087	20.100	20.114	20.127	20.141	20.154	20.168	20.181	20.195	20.208	20.222	1690
1700	20.222	20.235	20.249	20.262	20.275	20.289	20.302	20.316	20.329	20.342	20.356	1700
1710	20.356	20.369	20.382	20.396	20.409	20.422	20.436	20.449	20.462	20.475	20.488	1710
1720	20.488	20.502	20.515	20.528	20.541	20.554	20.567	20.581	20.594	20.607	20.620	1720
1730	20.620	20.633	20.646	20.659	20.672	20.685	20.698	20.711	20.724	20.736	20.749	1730
1740	20.749	20.762	20.775	20.788	20.801	20.813	20.826	20.839	20.852	20.864	20.877	1740
1750	20.877	20.890	20.902	20.915	20.928	20.940	20.953	20.965	20.978	20.990	21.003	1750
1760	21.003	21.015	21.027	21.040	21.052	21.065	21.077	21.089	21.101			1760
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B3.1.2. ***Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F***

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−50	−0.210	−0.212	−0.214	−0.216	−0.218	−0.220	−0.222	−0.224	−0.226			−50
−40	−0.188	−0.190	−0.192	−0.194	−0.197	−0.199	−0.201	−0.203	−0.205	−0.208	−0.210	−40
−30	−0.165	−0.167	−0.169	−0.172	−0.174	−0.176	−0.179	−0.181	−0.183	−0.185	−0.188	−30
−20	−0.141	−0.143	−0.145	−0.148	−0.150	−0.153	−0.155	−0.158	−0.160	−0.162	−0.165	−20
−10	−0.116	−0.118	−0.121	−0.123	−0.126	−0.128	−0.131	−0.133	−0.136	−0.138	−0.141	−10
0	−0.090	−0.092	−0.095	−0.097	−0.100	−0.103	−0.105	−0.108	−0.110	−0.113	−0.116	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.090	−0.087	−0.084	−0.082	−0.079	−0.076	−0.073	−0.071	−0.068	−0.065	−0.063	0
10	−0.063	−0.060	−0.057	−0.054	−0.051	−0.049	−0.046	−0.043	−0.040	−0.037	−0.035	10
20	−0.035	−0.032	−0.029	−0.026	−0.023	−0.020	−0.017	−0.015	−0.012	−0.009	−0.006	20
30	−0.006	−0.003	0.000	0.003	0.006	0.009	0.012	0.015	0.018	0.021	0.024	30
40	0.024	0.027	0.030	0.033	0.036	0.039	0.042	0.045	0.048	0.051	0.054	40
50	0.054	0.057	0.060	0.064	0.067	0.070	0.073	0.076	0.079	0.082	0.086	50
60	0.086	0.089	0.092	0.095	0.098	0.102	0.105	0.108	0.111	0.114	0.118	60
70	0.118	0.121	0.124	0.127	0.131	0.134	0.137	0.141	0.144	0.147	0.151	70
80	0.151	0.154	0.157	0.161	0.164	0.167	0.171	0.174	0.177	0.181	0.184	80
90	0.184	0.188	0.191	0.194	0.198	0.201	0.205	0.208	0.212	0.215	0.218	90
100	0.218	0.222	0.225	0.229	0.232	0.236	0.239	0.243	0.246	0.250	0.254	100
110	0.254	0.257	0.261	0.264	0.268	0.271	0.275	0.278	0.282	0.286	0.289	110
120	0.289	0.293	0.296	0.300	0.304	0.307	0.311	0.315	0.318	0.322	0.326	120
130	0.326	0.329	0.333	0.337	0.340	0.344	0.348	0.352	0.355	0.359	0.363	130
140	0.363	0.366	0.370	0.374	0.378	0.382	0.385	0.389	0.393	0.397	0.400	140
150	0.400	0.404	0.408	0.412	0.416	0.420	0.423	0.427	0.431	0.435	0.439	150
160	0.439	0.443	0.447	0.450	0.454	0.458	0.462	0.466	0.470	0.474	0.478	160
170	0.478	0.482	0.486	0.489	0.493	0.497	0.501	0.505	0.509	0.513	0.517	170
180	0.517	0.521	0.525	0.529	0.533	0.537	0.541	0.545	0.549	0.553	0.557	180
190	0.557	0.561	0.565	0.569	0.573	0.578	0.582	0.586	0.590	0.594	0.598	190
200	0.598	0.602	0.606	0.610	0.614	0.618	0.623	0.627	0.631	0.635	0.639	200
210	0.639	0.643	0.647	0.652	0.656	0.660	0.664	0.668	0.672	0.677	0.681	210
220	0.681	0.685	0.689	0.693	0.698	0.702	0.706	0.710	0.715	0.719	0.723	220
230	0.723	0.727	0.732	0.736	0.740	0.744	0.749	0.753	0.757	0.761	0.766	230
240	0.766	0.770	0.774	0.779	0.783	0.787	0.792	0.796	0.800	0.805	0.809	240
250	0.809	0.813	0.818	0.822	0.826	0.831	0.835	0.839	0.844	0.848	0.853	250
260	0.853	0.857	0.861	0.866	0.870	0.875	0.879	0.883	0.888	0.892	0.897	260
270	0.897	0.901	0.906	0.910	0.915	0.919	0.923	0.928	0.932	0.937	0.941	270
280	0.941	0.946	0.950	0.955	0.959	0.964	0.968	0.973	0.977	0.982	0.986	280
290	0.986	0.991	0.995	1.000	1.005	1.009	1.014	1.018	1.023	1.027	1.032	290
300	1.032	1.036	1.041	1.046	1.050	1.055	1.059	1.064	1.069	1.073	1.078	300
310	1.078	1.082	1.087	1.092	1.096	1.101	1.105	1.110	1.115	1.119	1.124	310
320	1.124	1.129	1.133	1.138	1.143	1.147	1.152	1.157	1.161	1.166	1.171	320
330	1.171	1.175	1.180	1.185	1.190	1.194	1.199	1.204	1.208	1.213	1.218	330
340	1.218	1.223	1.227	1.232	1.237	1.242	1.246	1.251	1.256	1.261	1.265	340
350	1.265	1.270	1.275	1.280	1.284	1.289	1.294	1.299	1.304	1.308	1.313	350
360	1.313	1.318	1.323	1.328	1.332	1.337	1.342	1.347	1.352	1.356	1.361	360
370	1.361	1.366	1.371	1.376	1.381	1.386	1.390	1.395	1.400	1.405	1.410	370
380	1.410	1.415	1.420	1.425	1.429	1.434	1.439	1.444	1.449	1.454	1.459	380
390	1.459	1.464	1.469	1.473	1.478	1.483	1.488	1.493	1.498	1.503	1.508	390
400	1.508	1.513	1.518	1.523	1.528	1.533	1.538	1.543	1.548	1.553	1.558	400
410	1.558	1.563	1.568	1.572	1.577	1.582	1.587	1.592	1.597	1.602	1.607	410
420	1.607	1.612	1.617	1.622	1.627	1.632	1.638	1.643	1.648	1.653	1.658	420
430	1.658	1.663	1.668	1.673	1.678	1.683	1.688	1.693	1.698	1.703	1.708	430
440	1.708	1.713	1.718	1.723	1.728	1.733	1.739	1.744	1.749	1.754	1.759	440
450	1.759	1.764	1.769	1.774	1.779	1.784	1.790	1.795	1.800	1.805	1.810	450
460	1.810	1.815	1.820	1.825	1.831	1.836	1.841	1.846	1.851	1.856	1.861	460
470	1.861	1.867	1.872	1.877	1.882	1.887	1.892	1.898	1.903	1.908	1.913	470
480	1.913	1.918	1.923	1.929	1.934	1.939	1.944	1.949	1.955	1.960	1.965	480
490	1.965	1.970	1.975	1.981	1.986	1.991	1.996	2.002	2.007	2.012	2.017	490
500	2.017	2.022	2.028	2.033	2.038	2.043	2.049	2.054	2.059	2.064	2.070	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	2.017	2.022	2.028	2.033	2.038	2.043	2.049	2.054	2.059	2.064	2.070	500
510	2.070	2.075	2.080	2.085	2.091	2.096	2.101	2.107	2.112	2.117	2.122	510
520	2.122	2.128	2.133	2.138	2.144	2.149	2.154	2.159	2.165	2.170	2.175	520
530	2.175	2.181	2.186	2.191	2.197	2.202	2.207	2.213	2.218	2.223	2.229	530
540	2.229	2.234	2.239	2.245	2.250	2.255	2.261	2.266	2.271	2.277	2.282	540
550	2.282	2.287	2.293	2.298	2.304	2.309	2.314	2.320	2.325	2.330	2.336	550
560	2.336	2.341	2.347	2.352	2.357	2.363	2.368	2.374	2.379	2.384	2.390	560
570	2.390	2.395	2.401	2.406	2.411	2.417	2.422	2.428	2.433	2.438	2.444	570
580	2.444	2.449	2.455	2.460	2.466	2.471	2.477	2.482	2.487	2.493	2.498	580
590	2.498	2.504	2.509	2.515	2.520	2.526	2.531	2.537	2.542	2.547	2.553	590
600	2.553	2.558	2.564	2.569	2.575	2.580	2.586	2.591	2.597	2.602	2.608	600
610	2.608	2.613	2.619	2.624	2.630	2.635	2.641	2.646	2.652	2.657	2.663	610
620	2.663	2.668	2.674	2.679	2.685	2.690	2.696	2.701	2.707	2.713	2.718	620
630	2.718	2.724	2.729	2.735	2.740	2.746	2.751	2.757	2.762	2.768	2.773	630
640	2.773	2.779	2.785	2.790	2.796	2.801	2.807	2.812	2.818	2.824	2.829	640
650	2.829	2.835	2.840	2.846	2.851	2.857	2.863	2.868	2.874	2.879	2.885	650
660	2.885	2.891	2.896	2.902	2.907	2.913	2.919	2.924	2.930	2.935	2.941	660
670	2.941	2.947	2.952	2.958	2.964	2.969	2.975	2.980	2.986	2.992	2.997	670
680	2.997	3.003	3.009	3.014	3.020	3.026	3.031	3.037	3.042	3.048	3.054	680
690	3.054	3.059	3.065	3.071	3.076	3.082	3.088	3.093	3.099	3.105	3.110	690
700	3.110	3.116	3.122	3.127	3.133	3.139	3.144	3.150	3.156	3.161	3.167	700
710	3.167	3.173	3.179	3.184	3.190	3.196	3.201	3.207	3.213	3.218	3.224	710
720	3.224	3.230	3.236	3.241	3.247	3.253	3.258	3.264	3.270	3.276	3.281	720
730	3.281	3.287	3.293	3.298	3.304	3.310	3.316	3.321	3.327	3.333	3.339	730
740	3.339	3.344	3.350	3.356	3.362	3.367	3.373	3.379	3.385	3.390	3.396	740
750	3.396	3.402	3.408	3.413	3.419	3.425	3.431	3.437	3.442	3.448	3.454	750
760	3.454	3.460	3.465	3.471	3.477	3.483	3.489	3.494	3.500	3.506	3.512	760
770	3.512	3.517	3.523	3.529	3.535	3.541	3.546	3.552	3.558	3.564	3.570	770
780	3.570	3.576	3.581	3.587	3.593	3.599	3.605	3.610	3.616	3.622	3.628	780
790	3.628	3.634	3.640	3.645	3.651	3.657	3.663	3.669	3.675	3.680	3.686	790
800	3.686	3.692	3.698	3.704	3.710	3.716	3.721	3.727	3.733	3.739	3.745	800
810	3.745	3.751	3.757	3.762	3.768	3.774	3.780	3.786	3.792	3.798	3.803	810
820	3.803	3.809	3.815	3.821	3.827	3.833	3.839	3.845	3.851	3.856	3.862	820
830	3.862	3.868	3.874	3.880	3.886	3.892	3.898	3.904	3.909	3.915	3.921	830
840	3.921	3.927	3.933	3.939	3.945	3.951	3.957	3.963	3.969	3.975	3.980	840
850	3.980	3.986	3.992	3.998	4.004	4.010	4.016	4.022	4.028	4.034	4.040	850
860	4.040	4.046	4.052	4.058	4.064	4.069	4.075	4.081	4.087	4.093	4.099	860
870	4.099	4.105	4.111	4.117	4.123	4.129	4.135	4.141	4.147	4.153	4.159	870
880	4.159	4.165	4.171	4.177	4.183	4.189	4.195	4.201	4.207	4.213	4.219	880
890	4.219	4.225	4.231	4.237	4.243	4.249	4.255	4.261	4.267	4.273	4.279	890
900	4.279	4.285	4.291	4.297	4.303	4.309	4.315	4.321	4.327	4.333	4.339	900
910	4.339	4.345	4.351	4.357	4.363	4.369	4.375	4.381	4.387	4.393	4.399	910
920	4.399	4.405	4.411	4.417	4.423	4.429	4.435	4.441	4.447	4.453	4.459	920
930	4.459	4.465	4.471	4.477	4.483	4.489	4.495	4.502	4.508	4.514	4.520	930
940	4.520	4.526	4.532	4.538	4.544	4.550	4.556	4.562	4.568	4.574	4.580	940
950	4.580	4.586	4.593	4.599	4.605	4.611	4.617	4.623	4.629	4.635	4.641	950
960	4.641	4.647	4.653	4.659	4.666	4.672	4.678	4.684	4.690	4.696	4.702	960
970	4.702	4.708	4.714	4.720	4.727	4.733	4.739	4.745	4.751	4.757	4.763	970
980	4.763	4.769	4.775	4.782	4.788	4.794	4.800	4.806	4.812	4.818	4.824	980
990	4.824	4.831	4.837	4.843	4.849	4.855	4.861	4.867	4.874	4.880	4.886	990
1000	4.886	4.892	4.898	4.904	4.910	4.917	4.923	4.929	4.935	4.941	4.947	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	4.886	4.892	4.898	4.904	4.910	4.917	4.923	4.929	4.935	4.941	4.947	1000
1010	4.947	4.954	4.960	4.966	4.972	4.978	4.984	4.991	4.997	5.003	5.009	1010
1020	5.009	5.015	5.021	5.028	5.034	5.040	5.046	5.052	5.059	5.065	5.071	1020
1030	5.071	5.077	5.083	5.090	5.096	5.102	5.108	5.114	5.121	5.127	5.133	1030
1040	5.133	5.139	5.145	5.152	5.158	5.164	5.170	5.176	5.183	5.189	5.195	1040
1050	5.195	5.201	5.207	5.214	5.220	5.226	5.232	5.239	5.245	5.251	5.257	1050
1060	5.257	5.264	5.270	5.276	5.282	5.289	5.295	5.301	5.307	5.313	5.320	1060
1070	5.320	5.326	5.332	5.338	5.345	5.351	5.357	5.364	5.370	5.376	5.382	1070
1080	5.382	5.389	5.395	5.401	5.407	5.414	5.420	5.426	5.432	5.439	5.445	1080
1090	5.445	5.451	5.458	5.464	5.470	5.476	5.483	5.489	5.495	5.502	5.508	1090
1100	5.508	5.514	5.520	5.527	5.533	5.539	5.546	5.552	5.558	5.565	5.571	1100
1110	5.571	5.577	5.583	5.590	5.596	5.602	5.609	5.615	5.621	5.628	5.634	1110
1120	5.634	5.640	5.647	5.653	5.659	5.666	5.672	5.678	5.685	5.691	5.697	1120
1130	5.697	5.704	5.710	5.716	5.723	5.729	5.735	5.742	5.748	5.754	5.761	1130
1140	5.761	5.767	5.773	5.780	5.786	5.792	5.799	5.805	5.812	5.818	5.824	1140
1150	5.824	5.831	5.837	5.843	5.850	5.856	5.862	5.869	5.875	5.882	5.888	1150
1160	5.888	5.894	5.901	5.907	5.913	5.920	5.926	5.933	5.939	5.945	5.952	1160
1170	5.952	5.958	5.965	5.971	5.977	5.984	5.990	5.997	6.003	6.009	6.016	1170
1180	6.016	6.022	6.029	6.035	6.041	6.048	6.054	6.061	6.067	6.074	6.080	1180
1190	6.080	6.086	6.093	6.099	6.106	6.112	6.119	6.125	6.131	6.138	6.144	1190
1200	6.144	6.151	6.157	6.164	6.170	6.176	6.183	6.189	6.196	6.202	6.209	1200
1210	6.209	6.215	6.222	6.228	6.235	6.241	6.247	6.254	6.260	6.267	6.273	1210
1220	6.273	6.280	6.286	6.293	6.299	6.306	6.312	6.319	6.325	6.332	6.338	1220
1230	6.338	6.345	6.351	6.358	6.364	6.370	6.377	6.383	6.390	6.396	6.403	1230
1240	6.403	6.409	6.416	6.422	6.429	6.435	6.442	6.448	6.455	6.461	6.468	1240
1250	6.468	6.474	6.481	6.488	6.494	6.501	6.507	6.514	6.520	6.527	6.533	1250
1260	6.533	6.540	6.546	6.553	6.559	6.566	6.572	6.579	6.585	6.592	6.598	1260
1270	6.598	6.605	6.612	6.618	6.625	6.631	6.638	6.644	6.651	6.657	6.664	1270
1280	6.664	6.671	6.677	6.684	6.690	6.697	6.703	6.710	6.716	6.723	6.730	1280
1290	6.730	6.736	6.743	6.749	6.756	6.762	6.769	6.776	6.782	6.789	6.795	1290
1300	6.795	6.802	6.809	6.815	6.822	6.828	6.835	6.841	6.848	6.855	6.861	1300
1310	6.861	6.868	6.874	6.881	6.888	6.894	6.901	6.907	6.914	6.921	6.927	1310
1320	6.927	6.934	6.941	6.947	6.954	6.960	6.967	6.974	6.980	6.987	6.994	1320
1330	6.994	7.000	7.007	7.013	7.020	7.027	7.033	7.040	7.047	7.053	7.060	1330
1340	7.060	7.067	7.073	7.080	7.086	7.093	7.100	7.106	7.113	7.120	7.126	1340
1350	7.126	7.133	7.140	7.146	7.153	7.160	7.166	7.173	7.180	7.186	7.193	1350
1360	7.193	7.200	7.206	7.213	7.220	7.226	7.233	7.240	7.247	7.253	7.260	1360
1370	7.260	7.267	7.273	7.280	7.287	7.293	7.300	7.307	7.313	7.320	7.327	1370
1380	7.327	7.334	7.340	7.347	7.354	7.360	7.367	7.374	7.381	7.387	7.394	1380
1390	7.394	7.401	7.407	7.414	7.421	7.428	7.434	7.441	7.448	7.454	7.461	1390
1400	7.461	7.468	7.475	7.481	7.488	7.495	7.502	7.508	7.515	7.522	7.529	1400
1410	7.529	7.535	7.542	7.549	7.556	7.562	7.569	7.576	7.583	7.589	7.596	1410
1420	7.596	7.603	7.610	7.616	7.623	7.630	7.637	7.644	7.650	7.657	7.664	1420
1430	7.664	7.671	7.677	7.684	7.691	7.698	7.705	7.711	7.718	7.725	7.732	1430
1440	7.732	7.739	7.745	7.752	7.759	7.766	7.772	7.779	7.786	7.793	7.800	1440
1450	7.800	7.807	7.813	7.820	7.827	7.834	7.841	7.847	7.854	7.861	7.868	1450
1460	7.868	7.875	7.882	7.888	7.895	7.902	7.909	7.916	7.922	7.929	7.936	1460
1470	7.936	7.943	7.950	7.957	7.964	7.970	7.977	7.984	7.991	7.998	8.005	1470
1480	8.005	8.011	8.018	8.025	8.032	8.039	8.046	8.053	8.059	8.066	8.073	1480
1490	8.073	8.080	8.087	8.094	8.101	8.108	8.114	8.121	8.128	8.135	8.142	1490
1500	8.142	8.149	8.156	8.163	8.169	8.176	8.183	8.190	8.197	8.204	8.211	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	8.142	8.149	8.156	8.163	8.169	8.176	8.183	8.190	8.197	8.204	8.211	1500
1510	8.211	8.218	8.225	8.232	8.238	8.245	8.252	8.259	8.266	8.273	8.280	1510
1520	8.280	8.287	8.294	8.301	8.308	8.314	8.321	8.328	8.335	8.342	8.349	1520
1530	8.349	8.356	8.363	8.370	8.377	8.384	8.391	8.398	8.405	8.411	8.418	1530
1540	8.418	8.425	8.432	8.439	8.446	8.453	8.460	8.467	8.474	8.481	8.488	1540
1550	8.488	8.495	8.502	8.509	8.516	8.523	8.530	8.537	8.544	8.551	8.557	1550
1560	8.557	8.564	8.571	8.578	8.585	8.592	8.599	8.606	8.613	8.620	8.627	1560
1570	8.627	8.634	8.641	8.648	8.655	8.662	8.669	8.676	8.683	8.690	8.697	1570
1580	8.697	8.704	8.711	8.718	8.725	8.732	8.739	8.746	8.753	8.760	8.767	1580
1590	8.767	8.774	8.781	8.788	8.795	8.802	8.809	8.816	8.823	8.830	8.837	1590
1600	8.837	8.844	8.852	8.859	8.866	8.873	8.880	8.887	8.894	8.901	8.908	1600
1610	8.908	8.915	8.922	8.929	8.936	8.943	8.950	8.957	8.964	8.971	8.978	1610
1620	8.978	8.985	8.992	8.999	9.007	9.014	9.021	9.028	9.035	9.042	9.049	1620
1630	9.049	9.056	9.063	9.070	9.077	9.084	9.091	9.098	9.106	9.113	9.120	1630
1640	9.120	9.127	9.134	9.141	9.148	9.155	9.162	9.169	9.176	9.184	9.191	1640
1650	9.191	9.198	9.205	9.212	9.219	9.226	9.233	9.240	9.248	9.255	9.262	1650
1660	9.262	9.269	9.276	9.283	9.290	9.297	9.304	9.312	9.319	9.326	9.333	1660
1670	9.333	9.340	9.347	9.354	9.361	9.369	9.376	9.383	9.390	9.397	9.404	1670
1680	9.404	9.411	9.419	9.426	9.433	9.440	9.447	9.454	9.461	9.469	9.476	1680
1690	9.476	9.483	9.490	9.497	9.504	9.512	9.519	9.526	9.533	9.540	9.547	1690
1700	9.547	9.555	9.562	9.569	9.576	9.583	9.590	9.598	9.605	9.612	9.619	1700
1710	9.619	9.626	9.634	9.641	9.648	9.655	9.662	9.670	9.677	9.684	9.691	1710
1720	9.691	9.698	9.706	9.713	9.720	9.727	9.734	9.742	9.749	9.756	9.763	1720
1730	9.763	9.770	9.778	9.785	9.792	9.799	9.806	9.814	9.821	9.828	9.835	1730
1740	9.835	9.843	9.850	9.857	9.864	9.872	9.879	9.886	9.893	9.900	9.908	1740
1750	9.908	9.915	9.922	9.929	9.937	9.944	9.951	9.958	9.966	9.973	9.980	1750
1760	9.980	9.987	9.995	10.002	10.009	10.016	10.024	10.031	10.038	10.046	10.053	1760
1770	10.053	10.060	10.067	10.075	10.082	10.089	10.096	10.104	10.111	10.118	10.126	1770
1780	10.126	10.133	10.140	10.147	10.155	10.162	10.169	10.177	10.184	10.191	10.198	1780
1790	10.198	10.206	10.213	10.220	10.228	10.235	10.242	10.250	10.257	10.264	10.271	1790
1800	10.271	10.279	10.286	10.293	10.301	10.308	10.315	10.323	10.330	10.337	10.345	1800
1810	10.345	10.352	10.359	10.367	10.374	10.381	10.389	10.396	10.403	10.411	10.418	1810
1820	10.418	10.425	10.433	10.440	10.447	10.455	10.462	10.469	10.477	10.484	10.491	1820
1830	10.491	10.499	10.506	10.513	10.521	10.528	10.535	10.543	10.550	10.557	10.565	1830
1840	10.565	10.572	10.580	10.587	10.594	10.602	10.609	10.616	10.624	10.631	10.638	1840
1850	10.638	10.646	10.653	10.661	10.668	10.675	10.683	10.690	10.698	10.705	10.712	1850
1860	10.712	10.720	10.727	10.734	10.742	10.749	10.757	10.764	10.771	10.779	10.786	1860
1870	10.786	10.794	10.801	10.808	10.816	10.823	10.831	10.838	10.845	10.853	10.860	1870
1880	10.860	10.868	10.875	10.883	10.890	10.897	10.905	10.912	10.920	10.927	10.934	1880
1890	10.934	10.942	10.949	10.957	10.964	10.972	10.979	10.986	10.994	11.001	11.009	1890
1900	11.009	11.016	11.024	11.031	11.039	11.046	11.053	11.061	11.068	11.076	11.083	1900
1910	11.083	11.091	11.098	11.106	11.113	11.121	11.128	11.135	11.143	11.150	11.158	1910
1920	11.158	11.165	11.173	11.180	11.188	11.195	11.203	11.210	11.218	11.225	11.233	1920
1930	11.233	11.240	11.247	11.255	11.262	11.270	11.277	11.285	11.292	11.300	11.307	1930
1940	11.307	11.315	11.322	11.330	11.337	11.345	11.352	11.360	11.367	11.375	11.382	1940
1950	11.382	11.390	11.397	11.405	11.412	11.420	11.427	11.435	11.442	11.450	11.457	1950
1960	11.457	11.465	11.472	11.480	11.487	11.495	11.502	11.510	11.518	11.525	11.533	1960
1970	11.533	11.540	11.548	11.555	11.563	11.570	11.578	11.585	11.593	11.600	11.608	1970
1980	11.608	11.615	11.623	11.631	11.638	11.646	11.653	11.661	11.668	11.676	11.683	1980
1990	11.683	11.691	11.698	11.706	11.714	11.721	11.729	11.736	11.744	11.751	11.759	1990
2000	11.759	11.766	11.774	11.782	11.789	11.797	11.804	11.812	11.819	11.827	11.834	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	11.759	11.766	11.774	11.782	11.789	11.797	11.804	11.812	11.819	11.827	11.834	2000
2010	11.834	11.842	11.850	11.857	11.865	11.872	11.880	11.888	11.895	11.903	11.910	2010
2020	11.910	11.918	11.925	11.933	11.941	11.948	11.956	11.963	11.971	11.979	11.986	2020
2030	11.986	11.994	12.001	12.009	12.016	12.024	12.032	12.039	12.047	12.054	12.062	2030
2040	12.062	12.070	12.077	12.085	12.092	12.100	12.108	12.115	12.123	12.131	12.138	2040
2050	12.138	12.146	12.153	12.161	12.169	12.176	12.184	12.191	12.199	12.207	12.214	2050
2060	12.214	12.222	12.230	12.237	12.245	12.252	12.260	12.268	12.275	12.283	12.291	2060
2070	12.291	12.298	12.306	12.313	12.321	12.329	12.336	12.344	12.352	12.359	12.367	2070
2080	12.367	12.375	12.382	12.390	12.397	12.405	12.413	12.420	12.428	12.436	12.443	2080
2090	12.443	12.451	12.459	12.466	12.474	12.482	12.489	12.497	12.505	12.512	12.520	2090
2100	12.520	12.528	12.535	12.543	12.551	12.558	12.566	12.574	12.581	12.589	12.597	2100
2110	12.597	12.604	12.612	12.620	12.627	12.635	12.643	12.650	12.658	12.666	12.673	2110
2120	12.673	12.681	12.689	12.696	12.704	12.712	12.719	12.727	12.735	12.742	12.750	2120
2130	12.750	12.758	12.765	12.773	12.781	12.788	12.796	12.804	12.812	12.819	12.827	2130
2140	12.827	12.835	12.842	12.850	12.858	12.865	12.873	12.881	12.889	12.896	12.904	2140
2150	12.904	12.912	12.919	12.927	12.935	12.942	12.950	12.958	12.966	12.973	12.981	2150
2160	12.981	12.989	12.996	13.004	13.012	13.019	13.027	13.035	13.043	13.050	13.058	2160
2170	13.058	13.066	13.073	13.081	13.089	13.097	13.104	13.112	13.120	13.128	13.135	2170
2180	13.135	13.143	13.151	13.158	13.166	13.174	13.182	13.189	13.197	13.205	13.213	2180
2190	13.213	13.220	13.228	13.236	13.243	13.251	13.259	13.267	13.274	13.282	13.290	2190
2200	13.290	13.298	13.305	13.313	13.321	13.329	13.336	13.344	13.352	13.359	13.367	2200
2210	13.367	13.375	13.383	13.390	13.398	13.406	13.414	13.421	13.429	13.437	13.445	2210
2220	13.445	13.452	13.460	13.468	13.476	13.483	13.491	13.499	13.507	13.514	13.522	2220
2230	13.522	13.530	13.538	13.545	13.553	13.561	13.569	13.577	13.584	13.592	13.600	2230
2240	13.600	13.608	13.615	13.623	13.631	13.639	13.646	13.654	13.662	13.670	13.677	2240
2250	13.677	13.685	13.693	13.701	13.709	13.716	13.724	13.732	13.740	13.747	13.755	2250
2260	13.755	13.763	13.771	13.778	13.786	13.794	13.802	13.810	13.817	13.825	13.833	2260
2270	13.833	13.841	13.848	13.856	13.864	13.872	13.880	13.887	13.895	13.903	13.911	2270
2280	13.911	13.919	13.926	13.934	13.942	13.950	13.957	13.965	13.973	13.981	13.989	2280
2290	13.989	13.996	14.004	14.012	14.020	14.028	14.035	14.043	14.051	14.059	14.066	2290
2300	14.066	14.074	14.082	14.090	14.098	14.105	14.113	14.121	14.129	14.137	14.144	2300
2310	14.144	14.152	14.160	14.168	14.176	14.183	14.191	14.199	14.207	14.215	14.222	2310
2320	14.222	14.230	14.238	14.246	14.254	14.261	14.269	14.277	14.285	14.293	14.300	2320
2330	14.300	14.308	14.316	14.324	14.332	14.340	14.347	14.355	14.363	14.371	14.379	2330
2340	14.379	14.386	14.394	14.402	14.410	14.418	14.425	14.433	14.441	14.449	14.457	2340
2350	14.457	14.465	14.472	14.480	14.488	14.496	14.504	14.511	14.519	14.527	14.535	2350
2360	14.535	14.543	14.551	14.558	14.566	14.574	14.582	14.590	14.597	14.605	14.613	2360
2370	14.613	14.621	14.629	14.637	14.644	14.652	14.660	14.668	14.676	14.683	14.691	2370
2380	14.691	14.699	14.707	14.715	14.723	14.730	14.738	14.746	14.754	14.762	14.770	2380
2390	14.770	14.777	14.785	14.793	14.801	14.809	14.817	14.824	14.832	14.840	14.848	2390
2400	14.848	14.856	14.864	14.871	14.879	14.887	14.895	14.903	14.911	14.918	14.926	2400
2410	14.926	14.934	14.942	14.950	14.958	14.965	14.973	14.981	14.989	14.997	15.005	2410
2420	15.005	15.012	15.020	15.028	15.036	15.044	15.052	15.059	15.067	15.075	15.083	2420
2430	15.083	15.091	15.099	15.106	15.114	15.122	15.130	15.138	15.146	15.153	15.161	2430
2440	15.161	15.169	15.177	15.185	15.193	15.200	15.208	15.216	15.224	15.232	15.240	2440
2450	15.240	15.248	15.255	15.263	15.271	15.279	15.287	15.295	15.302	15.310	15.318	2450
2460	15.318	15.326	15.334	15.342	15.349	15.357	15.365	15.373	15.381	15.389	15.397	2460
2470	15.397	15.404	15.412	15.420	15.428	15.436	15.444	15.451	15.459	15.467	15.475	2470
2480	15.475	15.483	15.491	15.499	15.506	15.514	15.522	15.530	15.538	15.546	15.553	2480
2490	15.553	15.561	15.569	15.577	15.585	15.593	15.601	15.608	15.616	15.624	15.632	2490
2500	15.632	15.640	15.648	15.655	15.663	15.671	15.679	15.687	15.695	15.703	15.710	2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2500	15.632	15.640	15.648	15.655	15.663	15.671	15.679	15.687	15.695	15.703	15.710	2500
2510	15.710	15.718	15.726	15.734	15.742	15.750	15.758	15.765	15.773	15.781	15.789	2510
2520	15.789	15.797	15.805	15.812	15.820	15.828	15.836	15.844	15.852	15.860	15.867	2520
2530	15.867	15.875	15.883	15.891	15.899	15.907	15.915	15.922	15.930	15.938	15.946	2530
2540	15.946	15.954	15.962	15.969	15.977	15.985	15.993	16.001	16.009	16.017	16.024	2540
2550	16.024	16.032	16.040	16.048	16.056	16.064	16.071	16.079	16.087	16.095	16.103	2550
2560	16.103	16.111	16.119	16.126	16.134	16.142	16.150	16.158	16.166	16.174	16.181	2560
2570	16.181	16.189	16.197	16.205	16.213	16.221	16.228	16.236	16.244	16.252	16.260	2570
2580	16.260	16.268	16.276	16.283	16.291	16.299	16.307	16.315	16.323	16.330	16.338	2580
2590	16.338	16.346	16.354	16.362	16.370	16.378	16.385	16.393	16.401	16.409	16.417	2590
2600	16.417	16.425	16.432	16.440	16.448	16.456	16.464	16.472	16.480	16.487	16.495	2600
2610	16.495	16.503	16.511	16.519	16.527	16.534	16.542	16.550	16.558	16.566	16.574	2610
2620	16.574	16.582	16.589	16.597	16.605	16.613	16.621	16.629	16.636	16.644	16.652	2620
2630	16.652	16.660	16.668	16.676	16.683	16.691	16.699	16.707	16.715	16.723	16.731	2630
2640	16.731	16.738	16.746	16.754	16.762	16.770	16.778	16.785	16.793	16.801	16.809	2640
2650	16.809	16.817	16.825	16.832	16.840	16.848	16.856	16.864	16.872	16.879	16.887	2650
2660	16.887	16.895	16.903	16.911	16.919	16.926	16.934	16.942	16.950	16.958	16.966	2660
2670	16.966	16.973	16.981	16.989	16.997	17.005	17.013	17.020	17.028	17.036	17.044	2670
2680	17.044	17.052	17.060	17.067	17.075	17.083	17.091	17.099	17.107	17.114	17.122	2680
2690	17.122	17.130	17.138	17.146	17.154	17.161	17.169	17.177	17.185	17.193	17.200	2690
2700	17.200	17.208	17.216	17.224	17.232	17.240	17.247	17.255	17.263	17.271	17.279	2700
2710	17.279	17.286	17.294	17.302	17.310	17.318	17.326	17.333	17.341	17.349	17.357	2710
2720	17.357	17.365	17.373	17.380	17.388	17.396	17.404	17.412	17.419	17.427	17.435	2720
2730	17.435	17.443	17.451	17.458	17.466	17.474	17.482	17.490	17.498	17.505	17.513	2730
2740	17.513	17.521	17.529	17.537	17.544	17.552	17.560	17.568	17.576	17.583	17.591	2740
2750	17.591	17.599	17.607	17.615	17.622	17.630	17.638	17.646	17.654	17.661	17.669	2750
2760	17.669	17.677	17.685	17.693	17.700	17.708	17.716	17.724	17.732	17.739	17.747	2760
2770	17.747	17.755	17.763	17.771	17.778	17.786	17.794	17.802	17.810	17.817	17.825	2770
2780	17.825	17.833	17.841	17.849	17.856	17.864	17.872	17.880	17.888	17.895	17.903	2780
2790	17.903	17.911	17.919	17.926	17.934	17.942	17.950	17.958	17.965	17.973	17.981	2790
2800	17.981	17.989	17.997	18.004	18.012	18.020	18.028	18.035	18.043	18.051	18.059	2800
2810	18.059	18.067	18.074	18.082	18.090	18.098	18.105	18.113	18.121	18.129	18.137	2810
2820	18.137	18.144	18.152	18.160	18.168	18.175	18.183	18.191	18.199	18.206	18.214	2820
2830	18.214	18.222	18.230	18.238	18.245	18.253	18.261	18.269	18.276	18.284	18.292	2830
2840	18.292	18.300	18.307	18.315	18.323	18.331	18.338	18.346	18.354	18.362	18.369	2840
2850	18.369	18.377	18.385	18.393	18.400	18.408	18.416	18.424	18.431	18.439	18.447	2850
2860	18.447	18.455	18.462	18.470	18.478	18.486	18.493	18.501	18.509	18.517	18.524	2860
2870	18.524	18.532	18.540	18.548	18.555	18.563	18.571	18.579	18.586	18.594	18.602	2870
2880	18.602	18.610	18.617	18.625	18.633	18.640	18.648	18.656	18.664	18.671	18.679	2880
2890	18.679	18.687	18.695	18.702	18.710	18.718	18.725	18.733	18.741	18.749	18.756	2890
2900	18.756	18.764	18.772	18.779	18.787	18.795	18.803	18.810	18.818	18.826	18.834	2900
2910	18.834	18.841	18.849	18.857	18.864	18.872	18.880	18.887	18.895	18.903	18.911	2910
2920	18.911	18.918	18.926	18.934	18.941	18.949	18.957	18.965	18.972	18.980	18.988	2920
2930	18.988	18.995	19.003	19.011	19.018	19.026	19.034	19.042	19.049	19.057	19.065	2930
2940	19.065	19.072	19.080	19.088	19.095	19.103	19.111	19.118	19.126	19.134	19.141	2940
2950	19.141	19.149	19.157	19.165	19.172	19.180	19.188	19.195	19.203	19.211	19.218	2950
2960	19.218	19.226	19.234	19.241	19.249	19.257	19.264	19.272	19.280	19.287	19.295	2960
2970	19.295	19.303	19.310	19.318	19.326	19.333	19.341	19.349	19.356	19.364	19.372	2970
2980	19.372	19.379	19.387	19.395	19.402	19.410	19.418	19.425	19.433	19.440	19.448	2980
2990	19.448	19.456	19.463	19.471	19.479	19.486	19.494	19.502	19.509	19.517	19.525	2990
3000	19.525	19.532	19.540	19.547	19.555	19.563	19.570	19.578	19.586	19.593	19.601	3000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B3.1.2. *Type R thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	19.525	19.532	19.540	19.547	19.555	19.563	19.570	19.578	19.586	19.593	19.601	3000
3010	19.601	19.609	19.616	19.624	19.631	19.639	19.647	19.654	19.662	19.670	19.677	3010
3020	19.677	19.685	19.692	19.700	19.708	19.715	19.723	19.730	19.738	19.746	19.753	3020
3030	19.753	19.761	19.769	19.776	19.784	19.791	19.799	19.807	19.814	19.822	19.829	3030
3040	19.829	19.837	19.845	19.852	19.860	19.867	19.875	19.882	19.890	19.898	19.905	3040
3050	19.905	19.913	19.920	19.928	19.936	19.943	19.951	19.958	19.966	19.973	19.981	3050
3060	19.981	19.989	19.996	20.004	20.011	20.019	20.026	20.034	20.041	20.049	20.056	3060
3070	20.056	20.064	20.072	20.079	20.087	20.094	20.102	20.109	20.117	20.124	20.132	3070
3080	20.132	20.139	20.147	20.154	20.162	20.169	20.177	20.184	20.192	20.199	20.207	3080
3090	20.207	20.214	20.222	20.229	20.237	20.244	20.252	20.259	20.266	20.274	20.281	3090
3100	20.281	20.289	20.296	20.304	20.311	20.319	20.326	20.333	20.341	20.348	20.356	3100
3110	20.356	20.363	20.371	20.378	20.385	20.393	20.400	20.407	20.415	20.422	20.430	3110
3120	20.430	20.437	20.444	20.452	20.459	20.466	20.474	20.481	20.488	20.496	20.503	3120
3130	20.503	20.510	20.518	20.525	20.532	20.540	20.547	20.554	20.562	20.569	20.576	3130
3140	20.576	20.583	20.591	20.598	20.605	20.612	20.620	20.627	20.634	20.641	20.649	3140
3150	20.649	20.656	20.663	20.670	20.678	20.685	20.692	20.699	20.706	20.714	20.721	3150
3160	20.721	20.728	20.735	20.742	20.749	20.756	20.764	20.771	20.778	20.785	20.792	3160
3170	20.792	20.799	20.806	20.813	20.821	20.828	20.835	20.842	20.849	20.856	20.863	3170
3180	20.863	20.870	20.877	20.884	20.891	20.898	20.905	20.912	20.919	20.926	20.933	3180
3190	20.933	20.940	20.947	20.954	20.961	20.968	20.975	20.982	20.989	20.996	21.003	3190
3200	21.003	21.010	21.016	21.023	21.030	21.037	21.044	21.051	21.058	21.065	21.071	3200
3210	21.071	21.078	21.085	21.092	21.099							3210
°F	0	1	2	3	4	5	6	7	8	9	10	°F

B3.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B3.2.1 and B3.2.2 was obtained by iteration of the reference function for type R thermocouples given in the main text (see table 3.3.1). Table B3.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −0.22 mV to 21.10 mV, and table B3.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B3.2.1. *Type R thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
−0.20	−43.08	−45.64	−48.27									−0.20
−0.10	−19.99	−22.14	−24.31	−26.51	−28.75	−31.03	−33.35	−35.71	−38.12	−40.57	−43.08	−0.10
0.00	0.00	−1.90	−3.82	−5.76	−7.72	−9.70	−11.71	−13.74	−15.80	−17.88	−19.99	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B3.2.1. *Type R thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
0.00	0.00	1.88	3.74	5.59	7.42	9.23	11.03	12.81	14.58	16.33	18.07	0.00
0.10	18.07	19.80	21.51	23.21	24.90	26.58	28.25	29.90	31.55	33.18	34.80	0.10
0.20	34.80	36.42	38.02	39.62	41.20	42.78	44.35	45.91	47.46	49.00	50.54	0.20
0.30	50.54	52.06	53.58	55.10	56.60	58.10	59.59	61.08	62.55	64.03	65.49	0.30
0.40	65.49	66.95	68.40	69.85	71.29	72.72	74.15	75.58	76.99	78.41	79.81	0.40
0.50	79.81	81.22	82.61	84.00	85.39	86.77	88.15	89.52	90.89	92.26	93.62	0.50
0.60	93.62	94.97	96.32	97.67	99.01	100.35	101.68	103.01	104.34	105.66	106.98	0.60
0.70	106.98	108.29	109.60	110.91	112.22	113.52	114.81	116.11	117.40	118.68	119.97	0.70
0.80	119.97	121.25	122.52	123.80	125.07	126.33	127.60	128.86	130.12	131.37	132.63	0.80
0.90	132.63	133.88	135.12	136.37	137.61	138.85	140.08	141.32	142.55	143.77	145.00	0.90
1.00	145.00	146.22	147.44	148.66	149.88	151.09	152.30	153.51	154.71	155.92	157.12	1.00
1.10	157.12	158.32	159.51	160.71	161.90	163.09	164.28	165.47	166.65	167.83	169.01	1.10
1.20	169.01	170.19	171.37	172.54	173.71	174.88	176.05	177.21	178.38	179.54	180.70	1.20
1.30	180.70	181.86	183.02	184.17	185.32	186.48	187.63	188.77	189.92	191.06	192.21	1.30
1.40	192.21	193.35	194.49	195.63	196.76	197.90	199.03	200.16	201.29	202.42	203.54	1.40
1.50	203.54	204.67	205.79	206.92	208.04	209.16	210.27	211.39	212.50	213.62	214.73	1.50
1.60	214.73	215.84	216.95	218.06	219.16	220.27	221.37	222.48	223.58	224.68	225.78	1.60
1.70	225.78	226.87	227.97	229.06	230.16	231.25	232.34	233.43	234.52	235.60	236.69	1.70
1.80	236.69	237.78	238.86	239.94	241.02	242.10	243.18	244.26	245.34	246.41	247.49	1.80
1.90	247.49	248.56	249.63	250.70	251.77	252.84	253.91	254.98	256.04	257.11	258.17	1.90
2.00	258.17	259.23	260.30	261.36	262.42	263.48	264.53	265.59	266.65	267.70	268.75	2.00
2.10	268.75	269.81	270.86	271.91	272.96	274.01	275.06	276.10	277.15	278.19	279.24	2.10
2.20	279.24	280.28	281.32	282.37	283.41	284.45	285.49	286.52	287.56	288.60	289.63	2.20
2.30	289.63	290.67	291.70	292.74	293.77	294.80	295.83	296.86	297.89	298.92	299.94	2.30
2.40	299.94	300.97	302.00	303.02	304.04	305.07	306.09	307.11	308.13	309.15	310.17	2.40
2.50	310.17	311.19	312.21	313.23	314.24	315.26	316.27	317.29	318.30	319.32	320.33	2.50
2.60	320.33	321.34	322.35	323.36	324.37	325.38	326.39	327.39	328.40	329.41	330.41	2.60
2.70	330.41	331.42	332.42	333.42	334.42	335.43	336.43	337.43	338.43	339.43	340.43	2.70
2.80	340.43	341.42	342.42	343.42	344.41	345.41	346.40	347.40	348.39	349.38	350.38	2.80
2.90	350.38	351.37	352.36	353.35	354.34	355.33	356.32	357.30	358.29	359.28	360.27	2.90
3.00	360.27	361.25	362.24	363.22	364.20	365.19	366.17	367.15	368.13	369.12	370.10	3.00
3.10	370.10	371.08	372.06	373.03	374.01	374.99	375.97	376.94	377.92	378.90	379.87	3.10
3.20	379.87	380.84	381.82	382.79	383.76	384.74	385.71	386.68	387.65	388.62	389.59	3.20
3.30	389.59	390.56	391.53	392.50	393.46	394.43	395.40	396.36	397.33	398.29	399.26	3.30
3.40	399.26	400.22	401.19	402.15	403.11	404.07	405.04	406.00	406.96	407.92	408.88	3.40
3.50	408.88	409.84	410.80	411.75	412.71	413.67	414.63	415.58	416.54	417.49	418.45	3.50
3.60	418.45	419.40	420.36	421.31	422.26	423.22	424.17	425.12	426.07	427.02	427.97	3.60
3.70	427.97	428.92	429.87	430.82	431.77	432.72	433.66	434.61	435.56	436.51	437.45	3.70
3.80	437.45	438.40	439.34	440.29	441.23	442.17	443.12	444.06	445.00	445.94	446.89	3.80
3.90	446.89	447.83	448.77	449.71	450.65	451.59	452.53	453.47	454.40	455.34	456.28	3.90
4.00	456.28	457.22	458.15	459.09	460.02	460.96	461.89	462.83	463.76	464.70	465.63	4.00
4.10	465.63	466.56	467.49	468.43	469.36	470.29	471.22	472.15	473.08	474.01	474.94	4.10
4.20	474.94	475.87	476.80	477.73	478.65	479.58	480.51	481.43	482.36	483.29	484.21	4.20
4.30	484.21	485.14	486.06	486.99	487.91	488.83	489.76	490.68	491.60	492.52	493.44	4.30
4.40	493.44	494.37	495.29	496.21	497.13	498.05	498.97	499.88	500.80	501.72	502.64	4.40
4.50	502.64	503.56	504.47	505.39	506.31	507.22	508.14	509.05	509.97	510.88	511.80	4.50
4.60	511.80	512.71	513.62	514.54	515.45	516.36	517.27	518.19	519.10	520.01	520.92	4.60
4.70	520.92	521.83	522.74	523.65	524.56	525.46	526.37	527.28	528.19	529.10	530.00	4.70
4.80	530.00	530.91	531.82	532.72	533.63	534.53	535.44	536.34	537.25	538.15	539.05	4.80
4.90	539.05	539.96	540.86	541.76	542.66	543.57	544.47	545.37	546.27	547.17	548.07	4.90
5.00	548.07	548.97	549.87	550.77	551.67	552.56	553.46	554.36	555.26	556.15	557.05	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B3.2.1. *Type R thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	548.07	548.97	549.87	550.77	551.67	552.56	553.46	554.36	555.26	556.15	557.05	5.00
5.10	557.05	557.95	558.84	559.74	560.63	561.53	562.42	563.32	564.21	565.10	566.00	5.10
5.20	566.00	566.89	567.78	568.67	569.57	570.46	571.35	572.24	573.13	574.02	574.91	5.20
5.30	574.91	575.80	576.69	577.58	578.47	579.36	580.24	581.13	582.02	582.91	583.79	5.30
5.40	583.79	584.68	585.56	586.45	587.34	588.22	589.11	589.99	590.87	591.76	592.64	5.40
5.50	592.64	593.52	594.41	595.29	596.17	597.05	597.93	598.82	599.70	600.58	601.46	5.50
5.60	601.46	602.34	603.22	604.10	604.97	605.85	606.73	607.61	608.49	609.36	610.24	5.60
5.70	610.24	611.12	611.99	612.87	613.75	614.62	615.50	616.37	617.25	618.12	618.99	5.70
5.80	618.99	619.87	620.74	621.61	622.49	623.36	624.23	625.10	625.97	626.84	627.71	5.80
5.90	627.71	628.58	629.45	630.32	631.19	632.06	632.93	633.80	634.67	635.54	636.40	5.90
6.00	636.40	637.27	638.14	639.01	639.87	640.74	641.60	642.47	643.33	644.20	645.06	6.00
6.10	645.06	645.93	646.79	647.66	648.52	649.38	650.24	651.11	651.97	652.83	653.69	6.10
6.20	653.69	654.55	655.41	656.27	657.14	658.00	658.85	659.71	660.57	661.43	662.29	6.20
6.30	662.29	663.15	664.01	664.86	665.72	666.58	667.44	668.29	669.15	670.00	670.86	6.30
6.40	670.86	671.71	672.57	673.42	674.28	675.13	675.99	676.84	677.69	678.54	679.40	6.40
6.50	679.40	680.25	681.10	681.95	682.80	683.66	684.51	685.36	686.21	687.06	687.91	6.50
6.60	687.91	688.76	689.60	690.45	691.30	692.15	693.00	693.85	694.69	695.54	696.39	6.60
6.70	696.39	697.23	698.08	698.92	699.77	700.61	701.46	702.30	703.15	703.99	704.84	6.70
6.80	704.84	705.68	706.52	707.37	708.21	709.05	709.89	710.73	711.58	712.42	713.26	6.80
6.90	713.26	714.10	714.94	715.78	716.62	717.46	718.30	719.14	719.98	720.81	721.65	6.90
7.00	721.65	722.49	723.33	724.16	725.00	725.84	726.67	727.51	728.35	729.18	730.02	7.00
7.10	730.02	730.85	731.69	732.52	733.35	734.19	735.02	735.86	736.69	737.52	738.35	7.10
7.20	738.35	739.19	740.02	740.85	741.68	742.51	743.34	744.17	745.00	745.83	746.66	7.20
7.30	746.66	747.49	748.32	749.15	749.98	750.81	751.64	752.46	753.29	754.12	754.94	7.30
7.40	754.94	755.77	756.60	757.42	758.25	759.08	759.90	760.73	761.55	762.37	763.20	7.40
7.50	763.20	764.02	764.85	765.67	766.49	767.32	768.14	768.96	769.78	770.60	771.43	7.50
7.60	771.43	772.25	773.07	773.89	774.71	775.53	776.35	777.17	777.99	778.81	779.63	7.60
7.70	779.63	780.45	781.26	782.08	782.90	783.72	784.53	785.35	786.17	786.98	787.80	7.70
7.80	787.80	788.62	789.43	790.25	791.06	791.88	792.69	793.51	794.32	795.14	795.95	7.80
7.90	795.95	796.76	797.58	798.39	799.20	800.01	800.83	801.64	802.45	803.26	804.07	7.90
8.00	804.07	804.88	805.69	806.50	807.31	808.12	808.93	809.74	810.55	811.36	812.17	8.00
8.10	812.17	812.98	813.78	814.59	815.40	816.21	817.01	817.82	818.63	819.43	820.24	8.10
8.20	820.24	821.04	821.85	822.65	823.46	824.26	825.07	825.87	826.68	827.48	828.28	8.20
8.30	828.28	829.09	829.89	830.69	831.50	832.30	833.10	833.90	834.70	835.50	836.31	8.30
8.40	836.31	837.11	837.91	838.71	839.51	840.31	841.11	841.91	842.71	843.50	844.30	8.40
8.50	844.30	845.10	845.90	846.70	847.49	848.29	849.09	849.89	850.68	851.48	852.28	8.50
8.60	852.28	853.07	853.87	854.66	855.46	856.25	857.05	857.84	858.64	859.43	860.22	8.60
8.70	860.22	861.02	861.81	862.60	863.40	864.19	864.98	865.77	866.57	867.36	868.15	8.70
8.80	868.15	868.94	869.73	870.52	871.31	872.10	872.89	873.68	874.47	875.26	876.05	8.80
8.90	876.05	876.84	877.63	878.42	879.21	879.99	880.78	881.57	882.36	883.14	883.93	8.90
9.00	883.93	884.72	885.50	886.29	887.07	887.86	888.65	889.43	890.22	891.00	891.79	9.00
9.10	891.79	892.57	893.35	894.14	894.92	895.71	896.49	897.27	898.05	898.84	899.62	9.10
9.20	899.62	900.40	901.18	901.97	902.75	903.53	904.31	905.09	905.87	906.65	907.43	9.20
9.30	907.43	908.21	908.99	909.77	910.55	911.33	912.11	912.89	913.66	914.44	915.22	9.30
9.40	915.22	916.00	916.78	917.55	918.33	919.11	919.88	920.66	921.44	922.21	922.99	9.40
9.50	922.99	923.76	924.54	925.32	926.09	926.87	927.64	928.41	929.19	929.96	930.74	9.50
9.60	930.74	931.51	932.28	933.06	933.83	934.60	935.37	936.15	936.92	937.69	938.46	9.60
9.70	938.46	939.23	940.00	940.78	941.55	942.32	943.09	943.86	944.63	945.40	946.17	9.70
9.80	946.17	946.94	947.71	948.47	949.24	950.01	950.78	951.55	952.32	953.08	953.85	9.80
9.90	953.85	954.62	955.39	956.15	956.92	957.69	958.45	959.22	959.99	960.75	961.52	9.90
10.00	961.52	962.28	963.05	963.81	964.58	965.34	966.11	966.87	967.63	968.40	969.16	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B3.2.1. *Type R thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
10.00	961.52	962.28	963.05	963.81	964.58	965.34	966.11	966.87	967.63	968.40	969.16	**10.00**
10.10	969.16	969.93	970.69	971.45	972.21	972.98	973.74	974.50	975.26	976.03	976.79	**10.10**
10.20	976.79	977.55	978.31	979.07	979.83	980.59	981.35	982.11	982.87	983.63	984.39	**10.20**
10.30	984.39	985.15	985.91	986.67	987.43	988.19	988.95	989.71	990.47	991.22	991.98	**10.30**
10.40	991.98	992.74	993.50	994.25	995.01	995.77	996.52	997.28	998.04	998.79	999.55	**10.40**
10.50	999.55	1000.31	1001.06	1001.82	1002.57	1003.33	1004.08	1004.84	1005.59	1006.35	1007.10	**10.50**
10.60	1007.10	1007.85	1008.61	1009.36	1010.11	1010.87	1011.62	1012.37	1013.13	1013.88	1014.63	**10.60**
10.70	1014.63	1015.38	1016.14	1016.89	1017.64	1018.39	1019.14	1019.89	1020.64	1021.39	1022.15	**10.70**
10.80	1022.15	1022.90	1023.65	1024.40	1025.15	1025.90	1026.65	1027.39	1028.14	1028.89	1029.64	**10.80**
10.90	1029.64	1030.39	1031.14	1031.89	1032.63	1033.38	1034.13	1034.88	1035.63	1036.37	1037.12	**10.90**
11.00	1037.12	1037.87	1038.61	1039.36	1040.11	1040.85	1041.60	1042.34	1043.09	1043.84	1044.58	**11.00**
11.10	1044.58	1045.33	1046.07	1046.82	1047.56	1048.31	1049.05	1049.79	1050.54	1051.28	1052.03	**11.10**
11.20	1052.03	1052.77	1053.51	1054.26	1055.00	1055.74	1056.48	1057.23	1057.97	1058.71	1059.45	**11.20**
11.30	1059.45	1060.20	1060.94	1061.68	1062.42	1063.16	1063.90	1064.64	1065.38	1066.12	1066.87	**11.30**
11.40	1066.87	1067.61	1068.35	1069.09	1069.83	1070.56	1071.30	1072.04	1072.78	1073.52	1074.26	**11.40**
11.50	1074.26	1075.00	1075.74	1076.48	1077.21	1077.95	1078.69	1079.43	1080.17	1080.90	1081.64	**11.50**
11.60	1081.64	1082.38	1083.11	1083.85	1084.59	1085.32	1086.06	1086.80	1087.53	1088.27	1089.01	**11.60**
11.70	1089.01	1089.74	1090.48	1091.21	1091.95	1092.68	1093.42	1094.15	1094.89	1095.62	1096.36	**11.70**
11.80	1096.36	1097.09	1097.82	1098.56	1099.29	1100.03	1100.76	1101.49	1102.23	1102.96	1103.69	**11.80**
11.90	1103.69	1104.43	1105.16	1105.89	1106.62	1107.36	1108.09	1108.82	1109.55	1110.28	1111.02	**11.90**
12.00	1111.02	1111.75	1112.48	1113.21	1113.94	1114.67	1115.40	1116.13	1116.86	1117.60	1118.33	**12.00**
12.10	1118.33	1119.06	1119.79	1120.52	1121.25	1121.98	1122.71	1123.44	1124.16	1124.89	1125.62	**12.10**
12.20	1125.62	1126.35	1127.08	1127.81	1128.54	1129.27	1130.00	1130.72	1131.45	1132.18	1132.91	**12.20**
12.30	1132.91	1133.64	1134.36	1135.09	1135.82	1136.55	1137.27	1138.00	1138.73	1139.45	1140.18	**12.30**
12.40	1140.18	1140.91	1141.63	1142.36	1143.09	1143.81	1144.54	1145.27	1145.99	1146.72	1147.44	**12.40**
12.50	1147.44	1148.17	1148.89	1149.62	1150.35	1151.07	1151.80	1152.52	1153.25	1153.97	1154.69	**12.50**
12.60	1154.69	1155.42	1156.14	1156.87	1157.59	1158.32	1159.04	1159.76	1160.49	1161.21	1161.93	**12.60**
12.70	1161.93	1162.66	1163.38	1164.10	1164.83	1165.55	1166.27	1167.00	1167.72	1168.44	1169.16	**12.70**
12.80	1169.16	1169.89	1170.61	1171.33	1172.05	1172.78	1173.50	1174.22	1174.94	1175.66	1176.38	**12.80**
12.90	1176.38	1177.11	1177.83	1178.55	1179.27	1179.99	1180.71	1181.43	1182.15	1182.87	1183.60	**12.90**
13.00	1183.60	1184.32	1185.04	1185.76	1186.48	1187.20	1187.92	1188.64	1189.36	1190.08	1190.80	**13.00**
13.10	1190.80	1191.52	1192.24	1192.96	1193.68	1194.39	1195.11	1195.83	1196.55	1197.27	1197.99	**13.10**
13.20	1197.99	1198.71	1199.43	1200.15	1200.86	1201.58	1202.30	1203.02	1203.74	1204.46	1205.17	**13.20**
13.30	1205.17	1205.89	1206.61	1207.33	1208.05	1208.76	1209.48	1210.20	1210.92	1211.63	1212.35	**13.30**
13.40	1212.35	1213.07	1213.79	1214.50	1215.22	1215.94	1216.65	1217.37	1218.09	1218.80	1219.52	**13.40**
13.50	1219.52	1220.24	1220.95	1221.67	1222.38	1223.10	1223.82	1224.53	1225.25	1225.96	1226.68	**13.50**
13.60	1226.68	1227.40	1228.11	1228.83	1229.54	1230.26	1230.97	1231.69	1232.40	1233.12	1233.84	**13.60**
13.70	1233.84	1234.55	1235.27	1235.98	1236.69	1237.41	1238.12	1238.84	1239.55	1240.27	1240.98	**13.70**
13.80	1240.98	1241.70	1242.41	1243.13	1243.84	1244.55	1245.27	1245.98	1246.70	1247.41	1248.12	**13.80**
13.90	1248.12	1248.84	1249.55	1250.26	1250.98	1251.69	1252.41	1253.12	1253.83	1254.55	1255.26	**13.90**
14.00	1255.26	1255.97	1256.69	1257.40	1258.11	1258.82	1259.54	1260.25	1260.96	1261.68	1262.39	**14.00**
14.10	1262.39	1263.10	1263.81	1264.53	1265.24	1265.95	1266.66	1267.38	1268.09	1268.80	1269.51	**14.10**
14.20	1269.51	1270.22	1270.94	1271.65	1272.36	1273.07	1273.78	1274.50	1275.21	1275.92	1276.63	**14.20**
14.30	1276.63	1277.34	1278.05	1278.77	1279.48	1280.19	1280.90	1281.61	1282.32	1283.03	1283.75	**14.30**
14.40	1283.75	1284.46	1285.17	1285.88	1286.59	1287.30	1288.01	1288.72	1289.43	1290.14	1290.85	**14.40**
14.50	1290.85	1291.57	1292.28	1292.99	1293.70	1294.41	1295.12	1295.83	1296.54	1297.25	1297.96	**14.50**
14.60	1297.96	1298.67	1299.38	1300.09	1300.80	1301.51	1302.22	1302.93	1303.64	1304.35	1305.06	**14.60**
14.70	1305.06	1305.77	1306.48	1307.19	1307.90	1308.61	1309.32	1310.03	1310.74	1311.45	1312.16	**14.70**
14.80	1312.16	1312.87	1313.58	1314.29	1315.00	1315.71	1316.42	1317.13	1317.84	1318.55	1319.25	**14.80**
14.90	1319.25	1319.96	1320.67	1321.38	1322.09	1322.80	1323.51	1324.22	1324.93	1325.64	1326.35	**14.90**
15.00	1326.35	1327.06	1327.76	1328.47	1329.18	1329.89	1330.60	1331.31	1332.02	1332.73	1333.44	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B3.2.1. *Type R thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
15.00	1326.35	1327.06	1327.76	1328.47	1329.18	1329.89	1330.60	1331.31	1332.02	1332.73	1333.44	**15.00**
15.10	1333.44	1334.14	1334.85	1335.56	1336.27	1336.98	1337.69	1338.40	1339.10	1339.81	1340.52	**15.10**
15.20	1340.52	1341.23	1341.94	1342.65	1343.36	1344.06	1344.77	1345.48	1346.19	1346.90	1347.61	**15.20**
15.30	1347.61	1348.31	1349.02	1349.73	1350.44	1351.15	1351.86	1352.56	1353.27	1353.98	1354.69	**15.30**
15.40	1354.69	1355.40	1356.11	1356.81	1357.52	1358.23	1358.94	1359.65	1360.35	1361.06	1361.77	**15.40**
15.50	1361.77	1362.48	1363.19	1363.89	1364.60	1365.31	1366.02	1366.73	1367.43	1368.14	1368.85	**15.50**
15.60	1368.85	1369.56	1370.27	1370.97	1371.68	1372.39	1373.10	1373.80	1374.51	1375.22	1375.93	**15.60**
15.70	1375.93	1376.64	1377.34	1378.05	1378.76	1379.47	1380.18	1380.88	1381.59	1382.30	1383.01	**15.70**
15.80	1383.01	1383.71	1384.42	1385.13	1385.84	1386.55	1387.25	1387.96	1388.67	1389.38	1390.08	**15.80**
15.90	1390.08	1390.79	1391.50	1392.21	1392.92	1393.62	1394.33	1395.04	1395.75	1396.45	1397.16	**15.90**
16.00	1397.16	1397.87	1398.58	1399.29	1399.99	1400.70	1401.41	1402.12	1402.82	1403.53	1404.24	**16.00**
16.10	1404.24	1404.95	1405.66	1406.36	1407.07	1407.78	1408.49	1409.19	1409.90	1410.61	1411.32	**16.10**
16.20	1411.32	1412.03	1412.73	1413.44	1414.15	1414.86	1415.57	1416.27	1416.98	1417.69	1418.40	**16.20**
16.30	1418.40	1419.11	1419.81	1420.52	1421.23	1421.94	1422.65	1423.35	1424.06	1424.77	1425.48	**16.30**
16.40	1425.48	1426.19	1426.89	1427.60	1428.31	1429.02	1429.73	1430.43	1431.14	1431.85	1432.56	**16.40**
16.50	1432.56	1433.27	1433.98	1434.68	1435.39	1436.10	1436.81	1437.52	1438.23	1438.93	1439.64	**16.50**
16.60	1439.64	1440.35	1441.06	1441.77	1442.48	1443.18	1443.89	1444.60	1445.31	1446.02	1446.73	**16.60**
16.70	1446.73	1447.44	1448.14	1448.85	1449.56	1450.27	1450.98	1451.69	1452.40	1453.11	1453.81	**16.70**
16.80	1453.81	1454.52	1455.23	1455.94	1456.65	1457.36	1458.07	1458.78	1459.49	1460.19	1460.90	**16.80**
16.90	1460.90	1461.61	1462.32	1463.03	1463.74	1464.45	1465.16	1465.87	1466.58	1467.29	1468.00	**16.90**
17.00	1468.00	1468.71	1469.41	1470.12	1470.83	1471.54	1472.25	1472.96	1473.67	1474.38	1475.09	**17.00**
17.10	1475.09	1475.80	1476.51	1477.22	1477.93	1478.64	1479.35	1480.06	1480.77	1481.48	1482.19	**17.10**
17.20	1482.19	1482.90	1483.61	1484.32	1485.03	1485.74	1486.45	1487.16	1487.87	1488.58	1489.29	**17.20**
17.30	1489.29	1490.00	1490.71	1491.42	1492.13	1492.85	1493.56	1494.27	1494.98	1495.69	1496.40	**17.30**
17.40	1496.40	1497.11	1497.82	1498.53	1499.24	1499.95	1500.66	1501.38	1502.09	1502.80	1503.51	**17.40**
17.50	1503.51	1504.22	1504.93	1505.64	1506.35	1507.07	1507.78	1508.49	1509.20	1509.91	1510.62	**17.50**
17.60	1510.62	1511.34	1512.05	1512.76	1513.47	1514.18	1514.90	1515.61	1516.32	1517.03	1517.74	**17.60**
17.70	1517.74	1518.46	1519.17	1519.88	1520.59	1521.31	1522.02	1522.73	1523.44	1524.16	1524.87	**17.70**
17.80	1524.87	1525.58	1526.30	1527.01	1527.72	1528.43	1529.15	1529.86	1530.57	1531.29	1532.00	**17.80**
17.90	1532.00	1532.71	1533.43	1534.14	1534.85	1535.57	1536.28	1537.00	1537.71	1538.42	1539.14	**17.90**
18.00	1539.14	1539.85	1540.56	1541.28	1541.99	1542.71	1543.42	1544.14	1544.85	1545.56	1546.28	**18.00**
18.10	1546.28	1546.99	1547.71	1548.42	1549.14	1549.85	1550.57	1551.28	1552.00	1552.71	1553.43	**18.10**
18.20	1553.43	1554.14	1554.86	1555.57	1556.29	1557.01	1557.72	1558.44	1559.15	1559.87	1560.58	**18.20**
18.30	1560.58	1561.30	1562.02	1562.73	1563.45	1564.16	1564.88	1565.60	1566.31	1567.03	1567.75	**18.30**
18.40	1567.75	1568.46	1569.18	1569.90	1570.61	1571.33	1572.05	1572.77	1573.48	1574.20	1574.92	**18.40**
18.50	1574.92	1575.63	1576.35	1577.07	1577.79	1578.51	1579.22	1579.94	1580.66	1581.38	1582.10	**18.50**
18.60	1582.10	1582.81	1583.53	1584.25	1584.97	1585.69	1586.41	1587.12	1587.84	1588.56	1589.28	**18.60**
18.70	1589.28	1590.00	1590.72	1591.44	1592.16	1592.88	1593.60	1594.32	1595.04	1595.76	1596.48	**18.70**
18.80	1596.48	1597.20	1597.92	1598.64	1599.36	1600.08	1600.80	1601.52	1602.24	1602.96	1603.68	**18.80**
18.90	1603.68	1604.40	1605.12	1605.84	1606.56	1607.28	1608.01	1608.73	1609.45	1610.17	1610.89	**18.90**
19.00	1610.89	1611.61	1612.34	1613.06	1613.78	1614.50	1615.22	1615.95	1616.67	1617.39	1618.11	**19.00**
19.10	1618.11	1618.84	1619.56	1620.28	1621.01	1621.73	1622.45	1623.18	1623.90	1624.62	1625.35	**19.10**
19.20	1625.35	1626.07	1626.79	1627.52	1628.24	1628.97	1629.69	1630.41	1631.14	1631.86	1632.59	**19.20**
19.30	1632.59	1633.31	1634.04	1634.76	1635.49	1636.21	1636.94	1637.66	1638.39	1639.11	1639.84	**19.30**
19.40	1639.84	1640.57	1641.29	1642.02	1642.74	1643.47	1644.20	1644.92	1645.65	1646.38	1647.10	**19.40**
19.50	1647.10	1647.83	1648.56	1649.29	1650.01	1650.74	1651.47	1652.20	1652.92	1653.65	1654.38	**19.50**
19.60	1654.38	1655.11	1655.84	1656.56	1657.29	1658.02	1658.75	1659.48	1660.21	1660.94	1661.67	**19.60**
19.70	1661.67	1662.40	1663.13	1663.86	1664.59	1665.32	1666.05	1666.78	1667.51	1668.24	1668.97	**19.70**
19.80	1668.97	1669.70	1670.43	1671.16	1671.89	1672.62	1673.35	1674.09	1674.82	1675.55	1676.28	**19.80**
19.90	1676.28	1677.02	1677.75	1678.48	1679.21	1679.95	1680.68	1681.42	1682.15	1682.89	1683.62	**19.90**
20.00	1683.62	1684.36	1685.09	1685.83	1686.56	1687.30	1688.04	1688.77	1689.51	1690.25	1690.99	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B3.2.1. *Type R thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
20.00	1683.62	1684.36	1685.09	1685.83	1686.56	1687.30	1688.04	1688.77	1689.51	1690.25	1690.99	20.00
20.10	1690.99	1691.73	1692.46	1693.20	1693.94	1694.68	1695.42	1696.16	1696.91	1697.65	1698.39	20.10
20.20	1698.39	1699.13	1699.87	1700.62	1701.36	1702.10	1702.85	1703.59	1704.34	1705.09	1705.83	20.20
20.30	1705.83	1706.58	1707.33	1708.07	1708.82	1709.57	1710.32	1711.07	1711.82	1712.57	1713.32	20.30
20.40	1713.32	1714.08	1714.83	1715.58	1716.34	1717.09	1717.85	1718.60	1719.36	1720.12	1720.87	20.40
20.50	1720.87	1721.63	1722.39	1723.15	1723.91	1724.67	1725.43	1726.20	1726.96	1727.72	1728.49	20.50
20.60	1728.49	1729.25	1730.02	1730.79	1731.55	1732.32	1733.09	1733.86	1734.63	1735.40	1736.18	20.60
20.70	1736.18	1736.95	1737.72	1738.50	1739.28	1740.05	1740.83	1741.61	1742.39	1743.17	1743.95	20.70
20.80	1743.95	1744.73	1745.51	1746.30	1747.08	1747.87	1748.66	1749.45	1750.23	1751.02	1751.82	20.80
20.90	1751.82	1752.61	1753.40	1754.20	1754.99	1755.79	1756.59	1757.38	1758.18	1758.99	1759.79	20.90
21.00	1759.79	1760.59	1761.40	1762.20	1763.01	1763.82	1764.63	1765.44	1766.25	1767.06	1767.88	21.00
21.10	1767.88											21.10
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B3.2.2. *Type R thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−0.20	−45.54	−50.15	−54.89									−0.20
−0.10	−3.99	−7.84	−11.75	−15.72	−19.76	−23.86	−28.03	−32.28	−36.61	−41.03	−45.54	−0.10
0.00	32.00	28.58	25.12	21.63	18.10	14.53	10.92	7.26	3.56	−0.19	−3.99	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B3.2.2. *Type R thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
0.00	32.00	35.39	38.74	42.06	45.35	48.62	51.85	55.06	58.24	61.40	64.53	0.00
0.10	64.53	67.64	70.72	73.78	76.82	79.84	82.84	85.82	88.78	91.72	94.65	0.10
0.20	94.65	97.55	100.44	103.31	106.17	109.00	111.83	114.63	117.43	120.20	122.97	0.20
0.30	122.97	125.72	128.45	131.17	133.88	136.58	139.26	141.94	144.60	147.25	149.88	0.30
0.40	149.88	152.51	155.12	157.73	160.32	162.90	165.47	168.04	170.59	173.13	175.66	0.40
0.50	175.66	178.19	180.70	183.21	185.71	188.19	190.67	193.14	195.61	198.06	200.51	0.50
0.60	200.51	202.95	205.38	207.80	210.22	212.63	215.03	217.42	219.81	222.19	224.56	0.60
0.70	224.56	226.93	229.29	231.64	233.99	236.33	238.66	240.99	243.31	245.63	247.94	0.70
0.80	247.94	250.24	252.54	254.83	257.12	259.40	261.68	263.95	266.21	268.47	270.73	0.80
0.90	270.73	272.98	275.22	277.46	279.69	281.92	284.15	286.37	288.58	290.79	293.00	0.90
1.00	293.00	295.20	297.40	299.59	301.78	303.96	306.14	308.31	310.48	312.65	314.81	1.00
1.10	314.81	316.97	319.13	321.28	323.42	325.57	327.70	329.84	331.97	334.10	336.22	1.10
1.20	336.22	338.34	340.46	342.57	344.68	346.79	348.89	350.99	353.08	355.17	357.26	1.20
1.30	357.26	359.35	361.43	363.51	365.58	367.66	369.73	371.79	373.86	375.92	377.97	1.30
1.40	377.97	380.03	382.08	384.13	386.17	388.21	390.25	392.29	394.32	396.35	398.38	1.40
1.50	398.38	400.41	402.43	404.45	406.47	408.48	410.49	412.50	414.51	416.51	418.51	1.50
1.60	418.51	420.51	422.51	424.50	426.50	428.48	430.47	432.46	434.44	436.42	438.40	1.60
1.70	438.40	440.37	442.34	444.31	446.28	448.25	450.21	452.17	454.13	456.09	458.04	1.70
1.80	458.04	460.00	461.95	463.89	465.84	467.79	469.73	471.67	473.61	475.54	477.48	1.80
1.90	477.48	479.41	481.34	483.27	485.19	487.12	489.04	490.96	492.88	494.79	496.71	1.90
2.00	496.71	498.62	500.53	502.44	504.35	506.26	508.16	510.06	511.96	513.86	515.76	2.00
2.10	515.76	517.65	519.54	521.44	523.33	525.21	527.10	528.99	530.87	532.75	534.63	2.10
2.20	534.63	536.51	538.38	540.26	542.13	544.00	545.87	547.74	549.61	551.48	553.34	2.20
2.30	553.34	555.20	557.06	558.92	560.78	562.64	564.49	566.35	568.20	570.05	571.90	2.30
2.40	571.90	573.75	575.59	577.44	579.28	581.12	582.96	584.80	586.64	588.48	590.31	2.40
2.50	590.31	592.15	593.98	595.81	597.64	599.47	601.29	603.12	604.94	606.77	608.59	2.50
2.60	608.59	610.41	612.23	614.05	615.86	617.68	619.49	621.31	623.12	624.93	626.74	2.60
2.70	626.74	628.55	630.35	632.16	633.96	635.77	637.57	639.37	641.17	642.97	644.77	2.70
2.80	644.77	646.56	648.36	650.15	651.94	653.74	655.53	657.32	659.10	660.89	662.68	2.80
2.90	662.68	664.46	666.25	668.03	669.81	671.59	673.37	675.15	676.93	678.70	680.48	2.90
3.00	680.48	682.25	684.03	685.80	687.57	689.34	691.11	692.87	694.64	696.41	698.17	3.00
3.10	698.17	699.94	701.70	703.46	705.22	706.98	708.74	710.50	712.26	714.01	715.77	3.10
3.20	715.77	717.52	719.27	721.03	722.78	724.53	726.28	728.02	729.77	731.52	733.26	3.20
3.30	733.26	735.01	736.75	738.49	740.24	741.98	743.72	745.45	747.19	748.93	750.67	3.30
3.40	750.67	752.40	754.14	755.87	757.60	759.33	761.07	762.80	764.52	766.25	767.98	3.40
3.50	767.98	769.71	771.43	773.16	774.88	776.60	778.33	780.05	781.77	783.49	785.21	3.50
3.60	785.21	786.92	788.64	790.36	792.07	793.79	795.50	797.22	798.93	800.64	802.35	3.60
3.70	802.35	804.06	805.77	807.48	809.18	810.89	812.60	814.30	816.01	817.71	819.41	3.70
3.80	819.41	821.11	822.81	824.51	826.21	827.91	829.61	831.31	833.00	834.70	836.39	3.80
3.90	836.39	838.09	839.78	841.47	843.17	844.86	846.55	848.24	849.93	851.61	853.30	3.90
4.00	853.30	854.99	856.67	858.36	860.04	861.73	863.41	865.09	866.77	868.45	870.13	4.00
4.10	870.13	871.81	873.49	875.17	876.85	878.52	880.20	881.87	883.55	885.22	886.89	4.10
4.20	886.89	888.56	890.24	891.91	893.58	895.25	896.91	898.58	900.25	901.91	903.58	4.20
4.30	903.58	905.25	906.91	908.57	910.24	911.90	913.56	915.22	916.88	918.54	920.20	4.30
4.40	920.20	921.86	923.51	925.17	926.83	928.48	930.14	931.79	933.44	935.10	936.75	4.40
4.50	936.75	938.40	940.05	941.70	943.35	945.00	946.65	948.30	949.94	951.59	953.23	4.50
4.60	953.23	954.88	956.52	958.17	959.81	961.45	963.09	964.73	966.37	968.01	969.65	4.60
4.70	969.65	971.29	972.93	974.56	976.20	977.84	979.47	981.11	982.74	984.37	986.01	4.70
4.80	986.01	987.64	989.27	990.90	992.53	994.16	995.79	997.42	999.04	1000.67	1002.30	4.80
4.90	1002.30	1003.92	1005.55	1007.17	1008.79	1010.42	1012.04	1013.66	1015.28	1016.90	1018.52	4.90
5.00	1018.52	1020.14	1021.76	1023.38	1025.00	1026.61	1028.23	1029.85	1031.46	1033.08	1034.69	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B3.2.2. *Type R thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
5.00	1018.52	1020.14	1021.76	1023.38	1025.00	1026.61	1028.23	1029.85	1031.46	1033.08	1034.69	**5.00**
5.10	1034.69	1036.30	1037.92	1039.53	1041.14	1042.75	1044.36	1045.97	1047.58	1049.19	1050.80	**5.10**
5.20	1050.80	1052.40	1054.01	1055.61	1057.22	1058.83	1060.43	1062.03	1063.64	1065.24	1066.84	**5.20**
5.30	1066.84	1068.44	1070.04	1071.64	1073.24	1074.84	1076.44	1078.04	1079.63	1081.23	1082.83	**5.30**
5.40	1082.83	1084.42	1086.02	1087.61	1089.20	1090.80	1092.39	1093.98	1095.57	1097.16	1098.75	**5.40**
5.50	1098.75	1100.34	1101.93	1103.52	1105.11	1106.69	1108.28	1109.87	1111.45	1113.04	1114.62	**5.50**
5.60	1114.62	1116.21	1117.79	1119.37	1120.95	1122.54	1124.12	1125.70	1127.28	1128.85	1130.43	**5.60**
5.70	1130.43	1132.01	1133.59	1135.17	1136.74	1138.32	1139.89	1141.47	1143.04	1144.62	1146.19	**5.70**
5.80	1146.19	1147.76	1149.33	1150.90	1152.47	1154.04	1155.61	1157.18	1158.75	1160.32	1161.89	**5.80**
5.90	1161.89	1163.45	1165.02	1166.58	1168.15	1169.71	1171.28	1172.84	1174.40	1175.97	1177.53	**5.90**
6.00	1177.53	1179.09	1180.65	1182.21	1183.77	1185.33	1186.89	1188.44	1190.00	1191.56	1193.11	**6.00**
6.10	1193.11	1194.67	1196.23	1197.78	1199.33	1200.89	1202.44	1203.99	1205.54	1207.10	1208.65	**6.10**
6.20	1208.65	1210.20	1211.75	1213.29	1214.84	1216.39	1217.94	1219.49	1221.03	1222.58	1224.12	**6.20**
6.30	1224.12	1225.67	1227.21	1228.76	1230.30	1231.84	1233.38	1234.92	1236.47	1238.01	1239.55	**6.30**
6.40	1239.55	1241.09	1242.62	1244.16	1245.70	1247.24	1248.77	1250.31	1251.85	1253.38	1254.92	**6.40**
6.50	1254.92	1256.45	1257.98	1259.52	1261.05	1262.58	1264.11	1265.64	1267.17	1268.70	1270.23	**6.50**
6.60	1270.23	1271.76	1273.29	1274.82	1276.34	1277.87	1279.40	1280.92	1282.45	1283.97	1285.49	**6.60**
6.70	1285.49	1287.02	1288.54	1290.06	1291.59	1293.11	1294.63	1296.15	1297.67	1299.19	1300.71	**6.70**
6.80	1300.71	1302.22	1303.74	1305.26	1306.78	1308.29	1309.81	1311.32	1312.84	1314.35	1315.87	**6.80**
6.90	1315.87	1317.38	1318.89	1320.40	1321.91	1323.43	1324.94	1326.45	1327.96	1329.46	1330.97	**6.90**
7.00	1330.97	1332.48	1333.99	1335.50	1337.00	1338.51	1340.01	1341.52	1343.02	1344.53	1346.03	**7.00**
7.10	1346.03	1347.53	1349.04	1350.54	1352.04	1353.54	1355.04	1356.54	1358.04	1359.54	1361.04	**7.10**
7.20	1361.04	1362.53	1364.03	1365.53	1367.03	1368.52	1370.02	1371.51	1373.01	1374.50	1375.99	**7.20**
7.30	1375.99	1377.49	1378.98	1380.47	1381.96	1383.45	1384.94	1386.43	1387.92	1389.41	1390.90	**7.30**
7.40	1390.90	1392.39	1393.88	1395.36	1396.85	1398.34	1399.82	1401.31	1402.79	1404.27	1405.76	**7.40**
7.50	1405.76	1407.24	1408.72	1410.21	1411.69	1413.17	1414.65	1416.13	1417.61	1419.09	1420.57	**7.50**
7.60	1420.57	1422.05	1423.52	1425.00	1426.48	1427.95	1429.43	1430.90	1432.38	1433.85	1435.33	**7.60**
7.70	1435.33	1436.80	1438.27	1439.75	1441.22	1442.69	1444.16	1445.63	1447.10	1448.57	1450.04	**7.70**
7.80	1450.04	1451.51	1452.98	1454.45	1455.91	1457.38	1458.85	1460.31	1461.78	1463.24	1464.71	**7.80**
7.90	1464.71	1466.17	1467.64	1469.10	1470.56	1472.02	1473.49	1474.95	1476.41	1477.87	1479.33	**7.90**
8.00	1479.33	1480.79	1482.25	1483.70	1485.16	1486.62	1488.08	1489.53	1490.99	1492.45	1493.90	**8.00**
8.10	1493.90	1495.36	1496.81	1498.26	1499.72	1501.17	1502.62	1504.08	1505.53	1506.98	1508.43	**8.10**
8.20	1508.43	1509.88	1511.33	1512.78	1514.23	1515.68	1517.12	1518.57	1520.02	1521.47	1522.91	**8.20**
8.30	1522.91	1524.36	1525.80	1527.25	1528.69	1530.14	1531.58	1533.02	1534.47	1535.91	1537.35	**8.30**
8.40	1537.35	1538.79	1540.23	1541.67	1543.11	1544.55	1545.99	1547.43	1548.87	1550.31	1551.74	**8.40**
8.50	1551.74	1553.18	1554.62	1556.05	1557.49	1558.93	1560.36	1561.79	1563.23	1564.66	1566.10	**8.50**
8.60	1566.10	1567.53	1568.96	1570.39	1571.82	1573.25	1574.69	1576.12	1577.54	1578.97	1580.40	**8.60**
8.70	1580.40	1581.83	1583.26	1584.69	1586.11	1587.54	1588.97	1590.39	1591.82	1593.24	1594.67	**8.70**
8.80	1594.67	1596.09	1597.52	1598.94	1600.36	1601.79	1603.21	1604.63	1606.05	1607.47	1608.89	**8.80**
8.90	1608.89	1610.31	1611.73	1613.15	1614.57	1615.99	1617.41	1618.82	1620.24	1621.66	1623.07	**8.90**
9.00	1623.07	1624.49	1625.90	1627.32	1628.73	1630.15	1631.56	1632.98	1634.39	1635.80	1637.21	**9.00**
9.10	1637.21	1638.63	1640.04	1641.45	1642.86	1644.27	1645.68	1647.09	1648.50	1649.91	1651.32	**9.10**
9.20	1651.32	1652.72	1654.13	1655.54	1656.94	1658.35	1659.76	1661.16	1662.57	1663.97	1665.38	**9.20**
9.30	1665.38	1666.78	1668.18	1669.59	1670.99	1672.39	1673.79	1675.20	1676.60	1678.00	1679.40	**9.30**
9.40	1679.40	1680.80	1682.20	1683.60	1685.00	1686.39	1687.79	1689.19	1690.59	1691.98	1693.38	**9.40**
9.50	1693.38	1694.78	1696.17	1697.57	1698.96	1700.36	1701.75	1703.15	1704.54	1705.93	1707.32	**9.50**
9.60	1707.32	1708.72	1710.11	1711.50	1712.89	1714.28	1715.67	1717.06	1718.45	1719.84	1721.23	**9.60**
9.70	1721.23	1722.62	1724.01	1725.40	1726.78	1728.17	1729.56	1730.94	1732.33	1733.72	1735.10	**9.70**
9.80	1735.10	1736.49	1737.87	1739.25	1740.64	1742.02	1743.41	1744.79	1746.17	1747.55	1748.93	**9.80**
9.90	1748.93	1750.32	1751.70	1753.08	1754.46	1755.84	1757.22	1758.60	1759.97	1761.35	1762.73	**9.90**
10.00	1762.73	1764.11	1765.49	1766.86	1768.24	1769.62	1770.99	1772.37	1773.74	1775.12	1776.49	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B3.2.2. *Type R thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
10.00	1762.73	1764.11	1765.49	1766.86	1768.24	1769.62	1770.99	1772.37	1773.74	1775.12	1776.49	**10.00**
10.10	1776.49	1777.87	1779.24	1780.61	1781.99	1783.36	1784.73	1786.10	1787.48	1788.85	1790.22	**10.10**
10.20	1790.22	1791.59	1792.96	1794.33	1795.70	1797.07	1798.44	1799.81	1801.17	1802.54	1803.91	**10.20**
10.30	1803.91	1805.28	1806.64	1808.01	1809.38	1810.74	1812.11	1813.47	1814.84	1816.20	1817.57	**10.30**
10.40	1817.57	1818.93	1820.29	1821.66	1823.02	1824.38	1825.74	1827.11	1828.47	1829.83	1831.19	**10.40**
10.50	1831.19	1832.55	1833.91	1835.27	1836.63	1837.99	1839.35	1840.71	1842.06	1843.42	1844.78	**10.50**
10.60	1844.78	1846.14	1847.49	1848.85	1850.21	1851.56	1852.92	1854.27	1855.63	1856.98	1858.34	**10.60**
10.70	1858.34	1859.69	1861.04	1862.40	1863.75	1865.10	1866.46	1867.81	1869.16	1870.51	1871.86	**10.70**
10.80	1871.86	1873.21	1874.56	1875.91	1877.26	1878.61	1879.96	1881.31	1882.66	1884.01	1885.35	**10.80**
10.90	1885.35	1886.70	1888.05	1889.40	1890.74	1892.09	1893.44	1894.78	1896.13	1897.47	1898.82	**10.90**
11.00	1898.82	1900.16	1901.50	1902.85	1904.19	1905.54	1906.88	1908.22	1909.56	1910.91	1912.25	**11.00**
11.10	1912.25	1913.59	1914.93	1916.27	1917.61	1918.95	1920.29	1921.63	1922.97	1924.31	1925.65	**11.10**
11.20	1925.65	1926.99	1928.32	1929.66	1931.00	1932.34	1933.67	1935.01	1936.35	1937.68	1939.02	**11.20**
11.30	1939.02	1940.35	1941.69	1943.02	1944.36	1945.69	1947.02	1948.36	1949.69	1951.02	1952.36	**11.30**
11.40	1952.36	1953.69	1955.02	1956.35	1957.69	1959.02	1960.35	1961.68	1963.01	1964.34	1965.67	**11.40**
11.50	1965.67	1967.00	1968.33	1969.66	1970.99	1972.31	1973.64	1974.97	1976.30	1977.63	1978.95	**11.50**
11.60	1978.95	1980.28	1981.61	1982.93	1984.26	1985.58	1986.91	1988.24	1989.56	1990.89	1992.21	**11.60**
11.70	1992.21	1993.53	1994.86	1996.18	1997.51	1998.83	2000.15	2001.47	2002.80	2004.12	2005.44	**11.70**
11.80	2005.44	2006.76	2008.08	2009.41	2010.73	2012.05	2013.37	2014.69	2016.01	2017.33	2018.65	**11.80**
11.90	2018.65	2019.97	2021.29	2022.60	2023.92	2025.24	2026.56	2027.88	2029.19	2030.51	2031.83	**11.90**
12.00	2031.83	2033.15	2034.46	2035.78	2037.09	2038.41	2039.73	2041.04	2042.36	2043.67	2044.99	**12.00**
12.10	2044.99	2046.30	2047.62	2048.93	2050.24	2051.56	2052.87	2054.18	2055.50	2056.81	2058.12	**12.10**
12.20	2058.12	2059.43	2060.75	2062.06	2063.37	2064.68	2065.99	2067.30	2068.61	2069.92	2071.24	**12.20**
12.30	2071.24	2072.55	2073.86	2075.16	2076.47	2077.78	2079.09	2080.40	2081.71	2083.02	2084.33	**12.30**
12.40	2084.33	2085.64	2086.94	2088.25	2089.56	2090.87	2092.17	2093.48	2094.79	2096.09	2097.40	**12.40**
12.50	2097.40	2098.70	2100.01	2101.32	2102.62	2103.93	2105.23	2106.54	2107.84	2109.15	2110.45	**12.50**
12.60	2110.45	2111.75	2113.06	2114.36	2115.67	2116.97	2118.27	2119.57	2120.88	2122.18	2123.48	**12.60**
12.70	2123.48	2124.78	2126.09	2127.39	2128.69	2129.99	2131.29	2132.59	2133.90	2135.20	2136.50	**12.70**
12.80	2136.50	2137.80	2139.10	2140.40	2141.70	2143.00	2144.30	2145.60	2146.90	2148.19	2149.49	**12.80**
12.90	2149.49	2150.79	2152.09	2153.39	2154.69	2155.98	2157.28	2158.58	2159.88	2161.17	2162.47	**12.90**
13.00	2162.47	2163.77	2165.07	2166.36	2167.66	2168.96	2170.25	2171.55	2172.84	2174.14	2175.43	**13.00**
13.10	2175.43	2176.73	2178.03	2179.32	2180.62	2181.91	2183.21	2184.50	2185.79	2187.09	2188.38	**13.10**
13.20	2188.38	2189.68	2190.97	2192.26	2193.56	2194.85	2196.14	2197.44	2198.73	2200.02	2201.31	**13.20**
13.30	2201.31	2202.61	2203.90	2205.19	2206.48	2207.77	2209.07	2210.36	2211.65	2212.94	2214.23	**13.30**
13.40	2214.23	2215.52	2216.81	2218.10	2219.39	2220.68	2221.98	2223.27	2224.56	2225.85	2227.14	**13.40**
13.50	2227.14	2228.42	2229.71	2231.00	2232.29	2233.58	2234.87	2236.16	2237.45	2238.74	2240.03	**13.50**
13.60	2240.03	2241.31	2242.60	2243.89	2245.18	2246.47	2247.75	2249.04	2250.33	2251.62	2252.90	**13.60**
13.70	2252.90	2254.19	2255.48	2256.76	2258.05	2259.34	2260.62	2261.91	2263.20	2264.48	2265.77	**13.70**
13.80	2265.77	2267.05	2268.34	2269.63	2270.91	2272.20	2273.48	2274.77	2276.05	2277.34	2278.62	**13.80**
13.90	2278.62	2279.91	2281.19	2282.48	2283.76	2285.05	2286.33	2287.61	2288.90	2290.18	2291.47	**13.90**
14.00	2291.47	2292.75	2294.03	2295.32	2296.60	2297.88	2299.17	2300.45	2301.73	2303.02	2304.30	**14.00**
14.10	2304.30	2305.58	2306.86	2308.15	2309.43	2310.71	2311.99	2313.28	2314.56	2315.84	2317.12	**14.10**
14.20	2317.12	2318.40	2319.69	2320.97	2322.25	2323.53	2324.81	2326.09	2327.37	2328.66	2329.94	**14.20**
14.30	2329.94	2331.22	2332.50	2333.78	2335.06	2336.34	2337.62	2338.90	2340.18	2341.46	2342.74	**14.30**
14.40	2342.74	2344.02	2345.30	2346.58	2347.86	2349.14	2350.42	2351.70	2352.98	2354.26	2355.54	**14.40**
14.50	2355.54	2356.82	2358.10	2359.38	2360.66	2361.93	2363.21	2364.49	2365.77	2367.05	2368.33	**14.50**
14.60	2368.33	2369.61	2370.89	2372.16	2373.44	2374.72	2376.00	2377.28	2378.56	2379.83	2381.11	**14.60**
14.70	2381.11	2382.39	2383.67	2384.94	2386.22	2387.50	2388.78	2390.06	2391.33	2392.61	2393.89	**14.70**
14.80	2393.89	2395.16	2396.44	2397.72	2399.00	2400.27	2401.55	2402.83	2404.10	2405.38	2406.66	**14.80**
14.90	2406.66	2407.93	2409.21	2410.49	2411.76	2413.04	2414.32	2415.59	2416.87	2418.15	2419.42	**14.90**
15.00	2419.42	2420.70	2421.98	2423.25	2424.53	2425.80	2427.08	2428.36	2429.63	2430.91	2432.18	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B3.2.2. *Type R thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	2419.42	2420.70	2421.98	2423.25	2424.53	2425.80	2427.08	2428.36	2429.63	2430.91	2432.18	**15.00**
15.10	2432.18	2433.46	2434.73	2436.01	2437.29	2438.56	2439.84	2441.11	2442.39	2443.66	2444.94	**15.10**
15.20	2444.94	2446.21	2447.49	2448.76	2450.04	2451.32	2452.59	2453.87	2455.14	2456.42	2457.69	**15.20**
15.30	2457.69	2458.97	2460.24	2461.52	2462.79	2464.07	2465.34	2466.62	2467.89	2469.16	2470.44	**15.30**
15.40	2470.44	2471.71	2472.99	2474.26	2475.54	2476.81	2478.09	2479.36	2480.64	2481.91	2483.19	**15.40**
15.50	2483.19	2484.46	2485.73	2487.01	2488.28	2489.56	2490.83	2492.11	2493.38	2494.66	2495.93	**15.50**
15.60	2495.93	2497.20	2498.48	2499.75	2501.03	2502.30	2503.57	2504.85	2506.12	2507.40	2508.67	**15.60**
15.70	2508.67	2509.95	2511.22	2512.49	2513.77	2515.04	2516.32	2517.59	2518.86	2520.14	2521.41	**15.70**
15.80	2521.41	2522.69	2523.96	2525.23	2526.51	2527.78	2529.06	2530.33	2531.60	2532.88	2534.15	**15.80**
15.90	2534.15	2535.43	2536.70	2537.97	2539.25	2540.52	2541.80	2543.07	2544.34	2545.62	2546.89	**15.90**
16.00	2546.89	2548.17	2549.44	2550.71	2551.99	2553.26	2554.54	2555.81	2557.08	2558.36	2559.63	**16.00**
16.10	2559.63	2560.91	2562.18	2563.45	2564.73	2566.00	2567.28	2568.55	2569.82	2571.10	2572.37	**16.10**
16.20	2572.37	2573.65	2574.92	2576.20	2577.47	2578.74	2580.02	2581.29	2582.57	2583.84	2585.12	**16.20**
16.30	2585.12	2586.39	2587.66	2588.94	2590.21	2591.49	2592.76	2594.04	2595.31	2596.59	2597.86	**16.30**
16.40	2597.86	2599.13	2600.41	2601.68	2602.96	2604.23	2605.51	2606.78	2608.06	2609.33	2610.61	**16.40**
16.50	2610.61	2611.88	2613.16	2614.43	2615.71	2616.98	2618.26	2619.53	2620.81	2622.08	2623.36	**16.50**
16.60	2623.36	2624.63	2625.91	2627.18	2628.46	2629.73	2631.01	2632.28	2633.56	2634.83	2636.11	**16.60**
16.70	2636.11	2637.38	2638.66	2639.93	2641.21	2642.49	2643.76	2645.04	2646.31	2647.59	2648.87	**16.70**
16.80	2648.87	2650.14	2651.42	2652.69	2653.97	2655.25	2656.52	2657.80	2659.07	2660.35	2661.63	**16.80**
16.90	2661.63	2662.90	2664.18	2665.46	2666.73	2668.01	2669.29	2670.56	2671.84	2673.12	2674.39	**16.90**
17.00	2674.39	2675.67	2676.95	2678.22	2679.50	2680.78	2682.05	2683.33	2684.61	2685.89	2687.16	**17.00**
17.10	2687.16	2688.44	2689.72	2691.00	2692.27	2693.55	2694.83	2696.11	2697.39	2698.66	2699.94	**17.10**
17.20	2699.94	2701.22	2702.50	2703.78	2705.06	2706.33	2707.61	2708.89	2710.17	2711.45	2712.73	**17.20**
17.30	2712.73	2714.01	2715.28	2716.56	2717.84	2719.12	2720.40	2721.68	2722.96	2724.24	2725.52	**17.30**
17.40	2725.52	2726.80	2728.08	2729.36	2730.64	2731.92	2733.20	2734.48	2735.76	2737.04	2738.32	**17.40**
17.50	2738.32	2739.60	2740.88	2742.16	2743.44	2744.72	2746.00	2747.28	2748.56	2749.84	2751.12	**17.50**
17.60	2751.12	2752.41	2753.69	2754.97	2756.25	2757.53	2758.81	2760.09	2761.38	2762.66	2763.94	**17.60**
17.70	2763.94	2765.22	2766.50	2767.79	2769.07	2770.35	2771.63	2772.92	2774.20	2775.48	2776.77	**17.70**
17.80	2776.77	2778.05	2779.33	2780.62	2781.90	2783.18	2784.47	2785.75	2787.03	2788.32	2789.60	**17.80**
17.90	2789.60	2790.88	2792.17	2793.45	2794.74	2796.02	2797.31	2798.59	2799.88	2801.16	2802.45	**17.90**
18.00	2802.45	2803.73	2805.02	2806.30	2807.59	2808.87	2810.16	2811.44	2812.73	2814.02	2815.30	**18.00**
18.10	2815.30	2816.59	2817.88	2819.16	2820.45	2821.74	2823.02	2824.31	2825.60	2826.88	2828.17	**18.10**
18.20	2828.17	2829.46	2830.75	2832.03	2833.32	2834.61	2835.90	2837.19	2838.47	2839.76	2841.05	**18.20**
18.30	2841.05	2842.34	2843.63	2844.92	2846.21	2847.50	2848.79	2850.08	2851.36	2852.65	2853.94	**18.30**
18.40	2853.94	2855.23	2856.52	2857.81	2859.11	2860.40	2861.69	2862.98	2864.27	2865.56	2866.85	**18.40**
18.50	2866.85	2868.14	2869.43	2870.73	2872.02	2873.31	2874.60	2875.89	2877.19	2878.48	2879.77	**18.50**
18.60	2879.77	2881.06	2882.36	2883.65	2884.94	2886.24	2887.53	2888.82	2890.12	2891.41	2892.71	**18.60**
18.70	2892.71	2894.00	2895.30	2896.59	2897.88	2899.18	2900.47	2901.77	2903.07	2904.36	2905.66	**18.70**
18.80	2905.66	2906.95	2908.25	2909.54	2910.84	2912.14	2913.43	2914.73	2916.03	2917.33	2918.62	**18.80**
18.90	2918.62	2919.92	2921.22	2922.52	2923.81	2925.11	2926.41	2927.71	2929.01	2930.31	2931.61	**18.90**
19.00	2931.61	2932.90	2934.20	2935.50	2936.80	2938.10	2939.40	2940.70	2942.00	2943.30	2944.60	**19.00**
19.10	2944.60	2945.91	2947.21	2948.51	2949.81	2951.11	2952.41	2953.72	2955.02	2956.32	2957.62	**19.10**
19.20	2957.62	2958.92	2960.23	2961.53	2962.83	2964.14	2965.44	2966.75	2968.05	2969.35	2970.66	**19.20**
19.30	2970.66	2971.96	2973.27	2974.57	2975.88	2977.18	2978.49	2979.79	2981.10	2982.41	2983.71	**19.30**
19.40	2983.71	2985.02	2986.33	2987.63	2988.94	2990.25	2991.56	2992.86	2994.17	2995.48	2996.79	**19.40**
19.50	2996.79	2998.10	2999.41	3000.71	3002.02	3003.33	3004.64	3005.95	3007.26	3008.57	3009.88	**19.50**
19.60	3009.88	3011.19	3012.51	3013.82	3015.13	3016.44	3017.75	3019.06	3020.38	3021.69	3023.00	**19.60**
19.70	3023.00	3024.31	3025.63	3026.94	3028.25	3029.57	3030.88	3032.20	3033.51	3034.83	3036.14	**19.70**
19.80	3036.14	3037.46	3038.77	3040.09	3041.40	3042.72	3044.04	3045.35	3046.67	3047.99	3049.31	**19.80**
19.90	3049.31	3050.63	3051.95	3053.27	3054.59	3055.91	3057.23	3058.55	3059.87	3061.19	3062.52	**19.90**
20.00	3062.52	3063.84	3065.16	3066.49	3067.81	3069.14	3070.47	3071.79	3073.12	3074.45	3075.78	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B3.2.2. *Type R thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
20.00	3062.52	3063.84	3065.16	3066.49	3067.81	3069.14	3070.47	3071.79	3073.12	3074.45	3075.78	**20.00**
20.10	3075.78	3077.11	3078.44	3079.77	3081.10	3082.43	3083.76	3085.10	3086.43	3087.76	3089.10	**20.10**
20.20	3089.10	3090.44	3091.77	3093.11	3094.45	3095.79	3097.13	3098.47	3099.81	3101.15	3102.50	**20.20**
20.30	3102.50	3103.84	3105.19	3106.53	3107.88	3109.23	3110.58	3111.93	3113.28	3114.63	3115.98	**20.30**
20.40	3115.98	3117.34	3118.69	3120.05	3121.41	3122.77	3124.13	3125.49	3126.85	3128.21	3129.57	**20.40**
20.50	3129.57	3130.94	3132.31	3133.67	3135.04	3136.41	3137.78	3139.15	3140.53	3141.90	3143.28	**20.50**
20.60	3143.28	3144.66	3146.04	3147.42	3148.80	3150.18	3151.57	3152.95	3154.34	3155.73	3157.12	**20.60**
20.70	3157.12	3158.51	3159.90	3161.30	3162.70	3164.09	3165.49	3166.89	3168.30	3169.70	3171.11	**20.70**
20.80	3171.11	3172.52	3173.93	3175.34	3176.75	3178.17	3179.58	3181.00	3182.42	3183.84	3185.27	**20.80**
20.90	3185.27	3186.69	3188.12	3189.55	3190.98	3192.42	3193.85	3195.29	3196.73	3198.17	3199.62	**20.90**
21.00	3199.62	3201.06	3202.51	3203.96	3205.42	3206.87	3208.33	3209.79	3211.25	3212.72	3214.18	**21.00**
21.10	3214.18											**21.10**
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

B4. Supplementary Reference Tables for Type S—Platinum-10% Rhodium Alloy Versus Platinum Thermocouples

B4.1. Tables with Voltage as a Function of Temperature

The reference function for type S thermocouples given in the main text (see table 4.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B4.1.1 and B4.1.2. Table B4.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −50 °C to 1768 °C, and table B4.1.2 presents voltage values at 1 °F intervals from −58 °F to 3214 °F.

TABLE B4.1.1. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−50	−0.236											−50
−40	−0.194	−0.199	−0.203	−0.207	−0.211	−0.215	−0.219	−0.224	−0.228	−0.232	−0.236	−40
−30	−0.150	−0.155	−0.159	−0.164	−0.168	−0.173	−0.177	−0.181	−0.186	−0.190	−0.194	−30
−20	−0.103	−0.108	−0.113	−0.117	−0.122	−0.127	−0.132	−0.136	−0.141	−0.146	−0.150	−20
−10	−0.053	−0.058	−0.063	−0.068	−0.073	−0.078	−0.083	−0.088	−0.093	−0.098	−0.103	−10
0	0.000	−0.005	−0.011	−0.016	−0.021	−0.027	−0.032	−0.037	−0.042	−0.048	−0.053	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B4.1.1. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
	Thermoelectric Voltage in Millivolts											
0	0.000	0.005	0.011	0.016	0.022	0.027	0.033	0.038	0.044	0.050	0.055	0
10	0.055	0.061	0.067	0.072	0.078	0.084	0.090	0.095	0.101	0.107	0.113	10
20	0.113	0.119	0.125	0.131	0.137	0.143	0.149	0.155	0.161	0.167	0.173	20
30	0.173	0.179	0.185	0.191	0.197	0.204	0.210	0.216	0.222	0.229	0.235	30
40	0.235	0.241	0.248	0.254	0.260	0.267	0.273	0.280	0.286	0.292	0.299	40
50	0.299	0.305	0.312	0.319	0.325	0.332	0.338	0.345	0.352	0.358	0.365	50
60	0.365	0.372	0.378	0.385	0.392	0.399	0.405	0.412	0.419	0.426	0.433	60
70	0.433	0.440	0.446	0.453	0.460	0.467	0.474	0.481	0.488	0.495	0.502	70
80	0.502	0.509	0.516	0.523	0.530	0.538	0.545	0.552	0.559	0.566	0.573	80
90	0.573	0.580	0.588	0.595	0.602	0.609	0.617	0.624	0.631	0.639	0.646	90
100	0.646	0.653	0.661	0.668	0.675	0.683	0.690	0.698	0.705	0.713	0.720	100
110	0.720	0.727	0.735	0.743	0.750	0.758	0.765	0.773	0.780	0.788	0.795	110
120	0.795	0.803	0.811	0.818	0.826	0.834	0.841	0.849	0.857	0.865	0.872	120
130	0.872	0.880	0.888	0.896	0.903	0.911	0.919	0.927	0.935	0.942	0.950	130
140	0.950	0.958	0.966	0.974	0.982	0.990	0.998	1.006	1.013	1.021	1.029	140
150	1.029	1.037	1.045	1.053	1.061	1.069	1.077	1.085	1.094	1.102	1.110	150
160	1.110	1.118	1.126	1.134	1.142	1.150	1.158	1.167	1.175	1.183	1.191	160
170	1.191	1.199	1.207	1.216	1.224	1.232	1.240	1.249	1.257	1.265	1.273	170
180	1.273	1.282	1.290	1.298	1.307	1.315	1.323	1.332	1.340	1.348	1.357	180
190	1.357	1.365	1.373	1.382	1.390	1.399	1.407	1.415	1.424	1.432	1.441	190
200	1.441	1.449	1.458	1.466	1.475	1.483	1.492	1.500	1.509	1.517	1.526	200
210	1.526	1.534	1.543	1.551	1.560	1.569	1.577	1.586	1.594	1.603	1.612	210
220	1.612	1.620	1.629	1.638	1.646	1.655	1.663	1.672	1.681	1.690	1.698	220
230	1.698	1.707	1.716	1.724	1.733	1.742	1.751	1.759	1.768	1.777	1.786	230
240	1.786	1.794	1.803	1.812	1.821	1.829	1.838	1.847	1.856	1.865	1.874	240
250	1.874	1.882	1.891	1.900	1.909	1.918	1.927	1.936	1.944	1.953	1.962	250
260	1.962	1.971	1.980	1.989	1.998	2.007	2.016	2.025	2.034	2.043	2.052	260
270	2.052	2.061	2.070	2.078	2.087	2.096	2.105	2.114	2.123	2.132	2.141	270
280	2.141	2.151	2.160	2.169	2.178	2.187	2.196	2.205	2.214	2.223	2.232	280
290	2.232	2.241	2.250	2.259	2.268	2.277	2.287	2.296	2.305	2.314	2.323	290
300	2.323	2.332	2.341	2.350	2.360	2.369	2.378	2.387	2.396	2.405	2.415	300
310	2.415	2.424	2.433	2.442	2.451	2.461	2.470	2.479	2.488	2.497	2.507	310
320	2.507	2.516	2.525	2.534	2.544	2.553	2.562	2.571	2.581	2.590	2.599	320
330	2.599	2.609	2.618	2.627	2.636	2.646	2.655	2.664	2.674	2.683	2.692	330
340	2.692	2.702	2.711	2.720	2.730	2.739	2.748	2.758	2.767	2.776	2.786	340
350	2.786	2.795	2.805	2.814	2.823	2.833	2.842	2.851	2.861	2.870	2.880	350
360	2.880	2.889	2.899	2.908	2.917	2.927	2.936	2.946	2.955	2.965	2.974	360
370	2.974	2.983	2.993	3.002	3.012	3.021	3.031	3.040	3.050	3.059	3.069	370
380	3.069	3.078	3.088	3.097	3.107	3.116	3.126	3.135	3.145	3.154	3.164	380
390	3.164	3.173	3.183	3.192	3.202	3.212	3.221	3.231	3.240	3.250	3.259	390
400	3.259	3.269	3.279	3.288	3.298	3.307	3.317	3.326	3.336	3.346	3.355	400
410	3.355	3.365	3.374	3.384	3.394	3.403	3.413	3.423	3.432	3.442	3.451	410
420	3.451	3.461	3.471	3.480	3.490	3.500	3.509	3.519	3.529	3.538	3.548	420
430	3.548	3.558	3.567	3.577	3.587	3.596	3.606	3.616	3.626	3.635	3.645	430
440	3.645	3.655	3.664	3.674	3.684	3.694	3.703	3.713	3.723	3.732	3.742	440
450	3.742	3.752	3.762	3.771	3.781	3.791	3.801	3.810	3.820	3.830	3.840	450
460	3.840	3.850	3.859	3.869	3.879	3.889	3.898	3.908	3.918	3.928	3.938	460
470	3.938	3.947	3.957	3.967	3.977	3.987	3.997	4.006	4.016	4.026	4.036	470
480	4.036	4.046	4.056	4.065	4.075	4.085	4.095	4.105	4.115	4.125	4.134	480
490	4.134	4.144	4.154	4.164	4.174	4.184	4.194	4.204	4.213	4.223	4.233	490
500	4.233	4.243	4.253	4.263	4.273	4.283	4.293	4.303	4.313	4.323	4.332	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B4.1.1. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
	Thermoelectric Voltage in Millivolts											
500	4.233	4.243	4.253	4.263	4.273	4.283	4.293	4.303	4.313	4.323	4.332	500
510	4.332	4.342	4.352	4.362	4.372	4.382	4.392	4.402	4.412	4.422	4.432	510
520	4.432	4.442	4.452	4.462	4.472	4.482	4.492	4.502	4.512	4.522	4.532	520
530	4.532	4.542	4.552	4.562	4.572	4.582	4.592	4.602	4.612	4.622	4.632	530
540	4.632	4.642	4.652	4.662	4.672	4.682	4.692	4.702	4.712	4.722	4.732	540
550	4.732	4.742	4.752	4.762	4.772	4.782	4.793	4.803	4.813	4.823	4.833	550
560	4.833	4.843	4.853	4.863	4.873	4.883	4.893	4.904	4.914	4.924	4.934	560
570	4.934	4.944	4.954	4.964	4.974	4.984	4.995	5.005	5.015	5.025	5.035	570
580	5.035	5.045	5.055	5.066	5.076	5.086	5.096	5.106	5.116	5.127	5.137	580
590	5.137	5.147	5.157	5.167	5.178	5.188	5.198	5.208	5.218	5.228	5.239	590
600	5.239	5.249	5.259	5.269	5.280	5.290	5.300	5.310	5.320	5.331	5.341	600
610	5.341	5.351	5.361	5.372	5.382	5.392	5.402	5.413	5.423	5.433	5.443	610
620	5.443	5.454	5.464	5.474	5.485	5.495	5.505	5.515	5.526	5.536	5.546	620
630	5.546	5.557	5.567	5.577	5.588	5.598	5.608	5.618	5.629	5.639	5.649	630
640	5.649	5.660	5.670	5.680	5.691	5.701	5.712	5.722	5.732	5.743	5.753	640
650	5.753	5.763	5.774	5.784	5.794	5.805	5.815	5.826	5.836	5.846	5.857	650
660	5.857	5.867	5.878	5.888	5.898	5.909	5.919	5.930	5.940	5.950	5.961	660
670	5.961	5.971	5.982	5.992	6.003	6.013	6.024	6.034	6.044	6.055	6.065	670
680	6.065	6.076	6.086	6.097	6.107	6.118	6.128	6.139	6.149	6.160	6.170	680
690	6.170	6.181	6.191	6.202	6.212	6.223	6.233	6.244	6.254	6.265	6.275	690
700	6.275	6.286	6.296	6.307	6.317	6.328	6.338	6.349	6.360	6.370	6.381	700
710	6.381	6.391	6.402	6.412	6.423	6.434	6.444	6.455	6.465	6.476	6.486	710
720	6.486	6.497	6.508	6.518	6.529	6.539	6.550	6.561	6.571	6.582	6.593	720
730	6.593	6.603	6.614	6.624	6.635	6.646	6.656	6.667	6.678	6.688	6.699	730
740	6.699	6.710	6.720	6.731	6.742	6.752	6.763	6.774	6.784	6.795	6.806	740
750	6.806	6.817	6.827	6.838	6.849	6.859	6.870	6.881	6.892	6.902	6.913	750
760	6.913	6.924	6.934	6.945	6.956	6.967	6.977	6.988	6.999	7.010	7.020	760
770	7.020	7.031	7.042	7.053	7.064	7.074	7.085	7.096	7.107	7.117	7.128	770
780	7.128	7.139	7.150	7.161	7.172	7.182	7.193	7.204	7.215	7.226	7.236	780
790	7.236	7.247	7.258	7.269	7.280	7.291	7.302	7.312	7.323	7.334	7.345	790
800	7.345	7.356	7.367	7.378	7.388	7.399	7.410	7.421	7.432	7.443	7.454	800
810	7.454	7.465	7.476	7.487	7.497	7.508	7.519	7.530	7.541	7.552	7.563	810
820	7.563	7.574	7.585	7.596	7.607	7.618	7.629	7.640	7.651	7.662	7.673	820
830	7.673	7.684	7.695	7.706	7.717	7.728	7.739	7.750	7.761	7.772	7.783	830
840	7.783	7.794	7.805	7.816	7.827	7.838	7.849	7.860	7.871	7.882	7.893	840
850	7.893	7.904	7.915	7.926	7.937	7.948	7.959	7.970	7.981	7.992	8.003	850
860	8.003	8.014	8.026	8.037	8.048	8.059	8.070	8.081	8.092	8.103	8.114	860
870	8.114	8.125	8.137	8.148	8.159	8.170	8.181	8.192	8.203	8.214	8.226	870
880	8.226	8.237	8.248	8.259	8.270	8.281	8.293	8.304	8.315	8.326	8.337	880
890	8.337	8.348	8.360	8.371	8.382	8.393	8.404	8.416	8.427	8.438	8.449	890
900	8.449	8.460	8.472	8.483	8.494	8.505	8.517	8.528	8.539	8.550	8.562	900
910	8.562	8.573	8.584	8.595	8.607	8.618	8.629	8.640	8.652	8.663	8.674	910
920	8.674	8.685	8.697	8.708	8.719	8.731	8.742	8.753	8.765	8.776	8.787	920
930	8.787	8.798	8.810	8.821	8.832	8.844	8.855	8.866	8.878	8.889	8.900	930
940	8.900	8.912	8.923	8.935	8.946	8.957	8.969	8.980	8.991	9.003	9.014	940
950	9.014	9.025	9.037	9.048	9.060	9.071	9.082	9.094	9.105	9.117	9.128	950
960	9.128	9.139	9.151	9.162	9.174	9.185	9.197	9.208	9.219	9.231	9.242	960
970	9.242	9.254	9.265	9.277	9.288	9.300	9.311	9.323	9.334	9.345	9.357	970
980	9.357	9.368	9.380	9.391	9.403	9.414	9.426	9.437	9.449	9.460	9.472	980
990	9.472	9.483	9.495	9.506	9.518	9.529	9.541	9.552	9.564	9.576	9.587	990
1000	9.587	9.599	9.610	9.622	9.633	9.645	9.656	9.668	9.680	9.691	9.703	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B4.1.1. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	9.587	9.599	9.610	9.622	9.633	9.645	9.656	9.668	9.680	9.691	9.703	1000
1010	9.703	9.714	9.726	9.737	9.749	9.761	9.772	9.784	9.795	9.807	9.819	1010
1020	9.819	9.830	9.842	9.853	9.865	9.877	9.888	9.900	9.911	9.923	9.935	1020
1030	9.935	9.946	9.958	9.970	9.981	9.993	10.005	10.016	10.028	10.040	10.051	1030
1040	10.051	10.063	10.075	10.086	10.098	10.110	10.121	10.133	10.145	10.156	10.168	1040
1050	10.168	10.180	10.191	10.203	10.215	10.227	10.238	10.250	10.262	10.273	10.285	1050
1060	10.285	10.297	10.309	10.320	10.332	10.344	10.356	10.367	10.379	10.391	10.403	1060
1070	10.403	10.414	10.426	10.438	10.450	10.461	10.473	10.485	10.497	10.509	10.520	1070
1080	10.520	10.532	10.544	10.556	10.567	10.579	10.591	10.603	10.615	10.626	10.638	1080
1090	10.638	10.650	10.662	10.674	10.686	10.697	10.709	10.721	10.733	10.745	10.757	1090
1100	10.757	10.768	10.780	10.792	10.804	10.816	10.828	10.839	10.851	10.863	10.875	1100
1110	10.875	10.887	10.899	10.911	10.922	10.934	10.946	10.958	10.970	10.982	10.994	1110
1120	10.994	11.006	11.017	11.029	11.041	11.053	11.065	11.077	11.089	11.101	11.113	1120
1130	11.113	11.125	11.136	11.148	11.160	11.172	11.184	11.196	11.208	11.220	11.232	1130
1140	11.232	11.244	11.256	11.268	11.280	11.291	11.303	11.315	11.327	11.339	11.351	1140
1150	11.351	11.363	11.375	11.387	11.399	11.411	11.423	11.435	11.447	11.459	11.471	1150
1160	11.471	11.483	11.495	11.507	11.519	11.531	11.542	11.554	11.566	11.578	11.590	1160
1170	11.590	11.602	11.614	11.626	11.638	11.650	11.662	11.674	11.686	11.698	11.710	1170
1180	11.710	11.722	11.734	11.746	11.758	11.770	11.782	11.794	11.806	11.818	11.830	1180
1190	11.830	11.842	11.854	11.866	11.878	11.890	11.902	11.914	11.926	11.939	11.951	1190
1200	11.951	11.963	11.975	11.987	11.999	12.011	12.023	12.035	12.047	12.059	12.071	1200
1210	12.071	12.083	12.095	12.107	12.119	12.131	12.143	12.155	12.167	12.179	12.191	1210
1220	12.191	12.203	12.216	12.228	12.240	12.252	12.264	12.276	12.288	12.300	12.312	1220
1230	12.312	12.324	12.336	12.348	12.360	12.372	12.384	12.397	12.409	12.421	12.433	1230
1240	12.433	12.445	12.457	12.469	12.481	12.493	12.505	12.517	12.529	12.542	12.554	1240
1250	12.554	12.566	12.578	12.590	12.602	12.614	12.626	12.638	12.650	12.662	12.675	1250
1260	12.675	12.687	12.699	12.711	12.723	12.735	12.747	12.759	12.771	12.783	12.796	1260
1270	12.796	12.808	12.820	12.832	12.844	12.856	12.868	12.880	12.892	12.905	12.917	1270
1280	12.917	12.929	12.941	12.953	12.965	12.977	12.989	13.001	13.014	13.026	13.038	1280
1290	13.038	13.050	13.062	13.074	13.086	13.098	13.111	13.123	13.135	13.147	13.159	1290
1300	13.159	13.171	13.183	13.195	13.208	13.220	13.232	13.244	13.256	13.268	13.280	1300
1310	13.280	13.292	13.305	13.317	13.329	13.341	13.353	13.365	13.377	13.390	13.402	1310
1320	13.402	13.414	13.426	13.438	13.450	13.462	13.474	13.487	13.499	13.511	13.523	1320
1330	13.523	13.535	13.547	13.559	13.572	13.584	13.596	13.608	13.620	13.632	13.644	1330
1340	13.644	13.657	13.669	13.681	13.693	13.705	13.717	13.729	13.742	13.754	13.766	1340
1350	13.766	13.778	13.790	13.802	13.814	13.826	13.839	13.851	13.863	13.875	13.887	1350
1360	13.887	13.899	13.911	13.924	13.936	13.948	13.960	13.972	13.984	13.996	14.009	1360
1370	14.009	14.021	14.033	14.045	14.057	14.069	14.081	14.094	14.106	14.118	14.130	1370
1380	14.130	14.142	14.154	14.166	14.178	14.191	14.203	14.215	14.227	14.239	14.251	1380
1390	14.251	14.263	14.276	14.288	14.300	14.312	14.324	14.336	14.348	14.360	14.373	1390
1400	14.373	14.385	14.397	14.409	14.421	14.433	14.445	14.457	14.470	14.482	14.494	1400
1410	14.494	14.506	14.518	14.530	14.542	14.554	14.567	14.579	14.591	14.603	14.615	1410
1420	14.615	14.627	14.639	14.651	14.664	14.676	14.688	14.700	14.712	14.724	14.736	1420
1430	14.736	14.748	14.760	14.773	14.785	14.797	14.809	14.821	14.833	14.845	14.857	1430
1440	14.857	14.869	14.881	14.894	14.906	14.918	14.930	14.942	14.954	14.966	14.978	1440
1450	14.978	14.990	15.002	15.015	15.027	15.039	15.051	15.063	15.075	15.087	15.099	1450
1460	15.099	15.111	15.123	15.135	15.148	15.160	15.172	15.184	15.196	15.208	15.220	1460
1470	15.220	15.232	15.244	15.256	15.268	15.280	15.292	15.304	15.317	15.329	15.341	1470
1480	15.341	15.353	15.365	15.377	15.389	15.401	15.413	15.425	15.437	15.449	15.461	1480
1490	15.461	15.473	15.485	15.497	15.509	15.521	15.534	15.546	15.558	15.570	15.582	1490
1500	15.582	15.594	15.606	15.618	15.630	15.642	15.654	15.666	15.678	15.690	15.702	1500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B4.1.1. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1500	15.582	15.594	15.606	15.618	15.630	15.642	15.654	15.666	15.678	15.690	15.702	1500
1510	15.702	15.714	15.726	15.738	15.750	15.762	15.774	15.786	15.798	15.810	15.822	1510
1520	15.822	15.834	15.846	15.858	15.870	15.882	15.894	15.906	15.918	15.930	15.942	1520
1530	15.942	15.954	15.966	15.978	15.990	16.002	16.014	16.026	16.038	16.050	16.062	1530
1540	16.062	16.074	16.086	16.098	16.110	16.122	16.134	16.146	16.158	16.170	16.182	1540
1550	16.182	16.194	16.205	16.217	16.229	16.241	16.253	16.265	16.277	16.289	16.301	1550
1560	16.301	16.313	16.325	16.337	16.349	16.361	16.373	16.385	16.396	16.408	16.420	1560
1570	16.420	16.432	16.444	16.456	16.468	16.480	16.492	16.504	16.516	16.527	16.539	1570
1580	16.539	16.551	16.563	16.575	16.587	16.599	16.611	16.623	16.634	16.646	16.658	1580
1590	16.658	16.670	16.682	16.694	16.706	16.718	16.729	16.741	16.753	16.765	16.777	1590
1600	16.777	16.789	16.801	16.812	16.824	16.836	16.848	16.860	16.872	16.883	16.895	1600
1610	16.895	16.907	16.919	16.931	16.943	16.954	16.966	16.978	16.990	17.002	17.013	1610
1620	17.013	17.025	17.037	17.049	17.061	17.072	17.084	17.096	17.108	17.120	17.131	1620
1630	17.131	17.143	17.155	17.167	17.178	17.190	17.202	17.214	17.225	17.237	17.249	1630
1640	17.249	17.261	17.272	17.284	17.296	17.308	17.319	17.331	17.343	17.355	17.366	1640
1650	17.366	17.378	17.390	17.401	17.413	17.425	17.437	17.448	17.460	17.472	17.483	1650
1660	17.483	17.495	17.507	17.518	17.530	17.542	17.553	17.565	17.577	17.588	17.600	1660
1670	17.600	17.612	17.623	17.635	17.647	17.658	17.670	17.682	17.693	17.705	17.717	1670
1680	17.717	17.728	17.740	17.751	17.763	17.775	17.786	17.798	17.809	17.821	17.832	1680
1690	17.832	17.844	17.855	17.867	17.878	17.890	17.901	17.913	17.924	17.936	17.947	1690
1700	17.947	17.959	17.970	17.982	17.993	18.004	18.016	18.027	18.039	18.050	18.061	1700
1710	18.061	18.073	18.084	18.095	18.107	18.118	18.129	18.140	18.152	18.163	18.174	1710
1720	18.174	18.185	18.196	18.208	18.219	18.230	18.241	18.252	18.263	18.274	18.285	1720
1730	18.285	18.297	18.308	18.319	18.330	18.341	18.352	18.362	18.373	18.384	18.395	1730
1740	18.395	18.406	18.417	18.428	18.439	18.449	18.460	18.471	18.482	18.493	18.503	1740
1750	18.503	18.514	18.525	18.535	18.546	18.557	18.567	18.578	18.588	18.599	18.609	1750
1760	18.609	18.620	18.630	18.641	18.651	18.661	18.672	18.682	18.693			1760
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−50	−0.218	−0.220	−0.222	−0.224	−0.227	−0.229	−0.231	−0.233	−0.236			−50
−40	−0.194	−0.197	−0.199	−0.201	−0.204	−0.206	−0.208	−0.211	−0.213	−0.215	−0.218	−40
−30	−0.170	−0.173	−0.175	−0.178	−0.180	−0.182	−0.185	−0.187	−0.190	−0.192	−0.194	−30
−20	−0.145	−0.148	−0.150	−0.153	−0.155	−0.158	−0.160	−0.163	−0.165	−0.168	−0.170	−20
−10	−0.119	−0.122	−0.124	−0.127	−0.129	−0.132	−0.135	−0.137	−0.140	−0.142	−0.145	−10
0	−0.092	−0.095	−0.097	−0.100	−0.103	−0.106	−0.108	−0.111	−0.114	−0.116	−0.119	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.092	−0.089	−0.086	−0.084	−0.081	−0.078	−0.075	−0.073	−0.070	−0.067	−0.064	0
10	−0.064	−0.061	−0.058	−0.056	−0.053	−0.050	−0.047	−0.044	−0.041	−0.038	−0.035	10
20	−0.035	−0.033	−0.030	−0.027	−0.024	−0.021	−0.018	−0.015	−0.012	−0.009	−0.006	20
30	−0.006	−0.003	0.000	0.003	0.006	0.009	0.012	0.015	0.018	0.021	0.024	30
40	0.024	0.027	0.030	0.033	0.037	0.040	0.043	0.046	0.049	0.052	0.055	40
50	0.055	0.058	0.062	0.065	0.068	0.071	0.074	0.077	0.081	0.084	0.087	50
60	0.087	0.090	0.093	0.097	0.100	0.103	0.106	0.110	0.113	0.116	0.119	60
70	0.119	0.123	0.126	0.129	0.133	0.136	0.139	0.143	0.146	0.149	0.153	70
80	0.153	0.156	0.159	0.163	0.166	0.169	0.173	0.176	0.180	0.183	0.186	80
90	0.186	0.190	0.193	0.197	0.200	0.204	0.207	0.210	0.214	0.217	0.221	90
100	0.221	0.224	0.228	0.231	0.235	0.238	0.242	0.245	0.249	0.252	0.256	100
110	0.256	0.260	0.263	0.267	0.270	0.274	0.277	0.281	0.285	0.288	0.292	110
120	0.292	0.295	0.299	0.303	0.306	0.310	0.313	0.317	0.321	0.324	0.328	120
130	0.328	0.332	0.335	0.339	0.343	0.346	0.350	0.354	0.357	0.361	0.365	130
140	0.365	0.369	0.372	0.376	0.380	0.384	0.387	0.391	0.395	0.399	0.402	140
150	0.402	0.406	0.410	0.414	0.417	0.421	0.425	0.429	0.433	0.436	0.440	150
160	0.440	0.444	0.448	0.452	0.456	0.459	0.463	0.467	0.471	0.475	0.479	160
170	0.479	0.483	0.487	0.490	0.494	0.498	0.502	0.506	0.510	0.514	0.518	170
180	0.518	0.522	0.526	0.530	0.534	0.538	0.541	0.545	0.549	0.553	0.557	180
190	0.557	0.561	0.565	0.569	0.573	0.577	0.581	0.585	0.589	0.593	0.597	190
200	0.597	0.601	0.605	0.609	0.613	0.617	0.622	0.626	0.630	0.634	0.638	200
210	0.638	0.642	0.646	0.650	0.654	0.658	0.662	0.666	0.670	0.675	0.679	210
220	0.679	0.683	0.687	0.691	0.695	0.699	0.703	0.708	0.712	0.716	0.720	220
230	0.720	0.724	0.728	0.732	0.737	0.741	0.745	0.749	0.753	0.758	0.762	230
240	0.762	0.766	0.770	0.774	0.779	0.783	0.787	0.791	0.795	0.800	0.804	240
250	0.804	0.808	0.812	0.817	0.821	0.825	0.829	0.834	0.838	0.842	0.847	250
260	0.847	0.851	0.855	0.859	0.864	0.868	0.872	0.877	0.881	0.885	0.889	260
270	0.889	0.894	0.898	0.902	0.907	0.911	0.915	0.920	0.924	0.928	0.933	270
280	0.933	0.937	0.942	0.946	0.950	0.955	0.959	0.963	0.968	0.972	0.977	280
290	0.977	0.981	0.985	0.990	0.994	0.998	1.003	1.007	1.012	1.016	1.021	290
300	1.021	1.025	1.029	1.034	1.038	1.043	1.047	1.052	1.056	1.061	1.065	300
310	1.065	1.069	1.074	1.078	1.083	1.087	1.092	1.096	1.101	1.105	1.110	310
320	1.110	1.114	1.119	1.123	1.128	1.132	1.137	1.141	1.146	1.150	1.155	320
330	1.155	1.159	1.164	1.168	1.173	1.177	1.182	1.186	1.191	1.196	1.200	330
340	1.200	1.205	1.209	1.214	1.218	1.223	1.227	1.232	1.237	1.241	1.246	340
350	1.246	1.250	1.255	1.260	1.264	1.269	1.273	1.278	1.283	1.287	1.292	350
360	1.292	1.296	1.301	1.306	1.310	1.315	1.319	1.324	1.329	1.333	1.338	360
370	1.338	1.343	1.347	1.352	1.357	1.361	1.366	1.371	1.375	1.380	1.385	370
380	1.385	1.389	1.394	1.399	1.403	1.408	1.413	1.417	1.422	1.427	1.431	380
390	1.431	1.436	1.441	1.445	1.450	1.455	1.460	1.464	1.469	1.474	1.478	390
400	1.478	1.483	1.488	1.493	1.497	1.502	1.507	1.512	1.516	1.521	1.526	400
410	1.526	1.531	1.535	1.540	1.545	1.550	1.554	1.559	1.564	1.569	1.573	410
420	1.573	1.578	1.583	1.588	1.592	1.597	1.602	1.607	1.612	1.616	1.621	420
430	1.621	1.626	1.631	1.636	1.640	1.645	1.650	1.655	1.660	1.664	1.669	430
440	1.669	1.674	1.679	1.684	1.689	1.693	1.698	1.703	1.708	1.713	1.718	440
450	1.718	1.722	1.727	1.732	1.737	1.742	1.747	1.752	1.756	1.761	1.766	450
460	1.766	1.771	1.776	1.781	1.786	1.790	1.795	1.800	1.805	1.810	1.815	460
470	1.815	1.820	1.825	1.829	1.834	1.839	1.844	1.849	1.854	1.859	1.864	470
480	1.864	1.869	1.874	1.878	1.883	1.888	1.893	1.898	1.903	1.908	1.913	480
490	1.913	1.918	1.923	1.928	1.933	1.938	1.942	1.947	1.952	1.957	1.962	490
500	1.962	1.967	1.972	1.977	1.982	1.987	1.992	1.997	2.002	2.007	2.012	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	1.962	1.967	1.972	1.977	1.982	1.987	1.992	1.997	2.002	2.007	2.012	500
510	2.012	2.017	2.022	2.027	2.032	2.037	2.042	2.047	2.052	2.057	2.062	510
520	2.062	2.067	2.072	2.076	2.081	2.086	2.091	2.096	2.101	2.106	2.111	520
530	2.111	2.116	2.121	2.126	2.131	2.136	2.141	2.147	2.152	2.157	2.162	530
540	2.162	2.167	2.172	2.177	2.182	2.187	2.192	2.197	2.202	2.207	2.212	540
550	2.212	2.217	2.222	2.227	2.232	2.237	2.242	2.247	2.252	2.257	2.262	550
560	2.262	2.267	2.272	2.277	2.283	2.288	2.293	2.298	2.303	2.308	2.313	560
570	2.313	2.318	2.323	2.328	2.333	2.338	2.343	2.348	2.354	2.359	2.364	570
580	2.364	2.369	2.374	2.379	2.384	2.389	2.394	2.399	2.404	2.410	2.415	580
590	2.415	2.420	2.425	2.430	2.435	2.440	2.445	2.450	2.455	2.461	2.466	590
600	2.466	2.471	2.476	2.481	2.486	2.491	2.496	2.502	2.507	2.512	2.517	600
610	2.517	2.522	2.527	2.532	2.537	2.543	2.548	2.553	2.558	2.563	2.568	610
620	2.568	2.574	2.579	2.584	2.589	2.594	2.599	2.604	2.610	2.615	2.620	620
630	2.620	2.625	2.630	2.635	2.641	2.646	2.651	2.656	2.661	2.666	2.672	630
640	2.672	2.677	2.682	2.687	2.692	2.697	2.703	2.708	2.713	2.718	2.723	640
650	2.723	2.729	2.734	2.739	2.744	2.749	2.755	2.760	2.765	2.770	2.775	650
660	2.775	2.781	2.786	2.791	2.796	2.801	2.807	2.812	2.817	2.822	2.827	660
670	2.827	2.833	2.838	2.843	2.848	2.854	2.859	2.864	2.869	2.874	2.880	670
680	2.880	2.885	2.890	2.895	2.901	2.906	2.911	2.916	2.922	2.927	2.932	680
690	2.932	2.937	2.943	2.948	2.953	2.958	2.964	2.969	2.974	2.979	2.985	690
700	2.985	2.990	2.995	3.000	3.006	3.011	3.016	3.021	3.027	3.032	3.037	700
710	3.037	3.042	3.048	3.053	3.058	3.063	3.069	3.074	3.079	3.085	3.090	710
720	3.090	3.095	3.100	3.106	3.111	3.116	3.122	3.127	3.132	3.137	3.143	720
730	3.143	3.148	3.153	3.159	3.164	3.169	3.174	3.180	3.185	3.190	3.196	730
740	3.196	3.201	3.206	3.212	3.217	3.222	3.227	3.233	3.238	3.243	3.249	740
750	3.249	3.254	3.259	3.265	3.270	3.275	3.281	3.286	3.291	3.297	3.302	750
760	3.302	3.307	3.313	3.318	3.323	3.329	3.334	3.339	3.345	3.350	3.355	760
770	3.355	3.361	3.366	3.371	3.377	3.382	3.387	3.393	3.398	3.403	3.409	770
780	3.409	3.414	3.419	3.425	3.430	3.435	3.441	3.446	3.451	3.457	3.462	780
790	3.462	3.468	3.473	3.478	3.484	3.489	3.494	3.500	3.505	3.510	3.516	790
800	3.516	3.521	3.527	3.532	3.537	3.543	3.548	3.553	3.559	3.564	3.570	800
810	3.570	3.575	3.580	3.586	3.591	3.596	3.602	3.607	3.613	3.618	3.623	810
820	3.623	3.629	3.634	3.640	3.645	3.650	3.656	3.661	3.667	3.672	3.677	820
830	3.677	3.683	3.688	3.694	3.699	3.704	3.710	3.715	3.721	3.726	3.731	830
840	3.731	3.737	3.742	3.748	3.753	3.758	3.764	3.769	3.775	3.780	3.786	840
850	3.786	3.791	3.796	3.802	3.807	3.813	3.818	3.823	3.829	3.834	3.840	850
860	3.840	3.845	3.851	3.856	3.862	3.867	3.872	3.878	3.883	3.889	3.894	860
870	3.894	3.900	3.905	3.910	3.916	3.921	3.927	3.932	3.938	3.943	3.949	870
880	3.949	3.954	3.959	3.965	3.970	3.976	3.981	3.987	3.992	3.998	4.003	880
890	4.003	4.009	4.014	4.020	4.025	4.030	4.036	4.041	4.047	4.052	4.058	890
900	4.058	4.063	4.069	4.074	4.080	4.085	4.091	4.096	4.102	4.107	4.113	900
910	4.113	4.118	4.123	4.129	4.134	4.140	4.145	4.151	4.156	4.162	4.167	910
920	4.167	4.173	4.178	4.184	4.189	4.195	4.200	4.206	4.211	4.217	4.222	920
930	4.222	4.228	4.233	4.239	4.244	4.250	4.255	4.261	4.266	4.272	4.277	930
940	4.277	4.283	4.288	4.294	4.299	4.305	4.310	4.316	4.321	4.327	4.332	940
950	4.332	4.338	4.343	4.349	4.355	4.360	4.366	4.371	4.377	4.382	4.388	950
960	4.388	4.393	4.399	4.404	4.410	4.415	4.421	4.426	4.432	4.437	4.443	960
970	4.443	4.449	4.454	4.460	4.465	4.471	4.476	4.482	4.487	4.493	4.498	970
980	4.498	4.504	4.510	4.515	4.521	4.526	4.532	4.537	4.543	4.548	4.554	980
990	4.554	4.559	4.565	4.571	4.576	4.582	4.587	4.593	4.598	4.604	4.610	990
1000	4.610	4.615	4.621	4.626	4.632	4.637	4.643	4.648	4.654	4.660	4.665	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	4.610	4.615	4.621	4.626	4.632	4.637	4.643	4.648	4.654	4.660	4.665	1000
1010	4.665	4.671	4.676	4.682	4.688	4.693	4.699	4.704	4.710	4.715	4.721	1010
1020	4.721	4.727	4.732	4.738	4.743	4.749	4.755	4.760	4.766	4.771	4.777	1020
1030	4.777	4.782	4.788	4.794	4.799	4.805	4.810	4.816	4.822	4.827	4.833	1030
1040	4.833	4.838	4.844	4.850	4.855	4.861	4.866	4.872	4.878	4.883	4.889	1040
1050	4.889	4.895	4.900	4.906	4.911	4.917	4.923	4.928	4.934	4.939	4.945	1050
1060	4.945	4.951	4.956	4.962	4.968	4.973	4.979	4.984	4.990	4.996	5.001	1060
1070	5.001	5.007	5.013	5.018	5.024	5.030	5.035	5.041	5.046	5.052	5.058	1070
1080	5.058	5.063	5.069	5.075	5.080	5.086	5.092	5.097	5.103	5.109	5.114	1080
1090	5.114	5.120	5.125	5.131	5.137	5.142	5.148	5.154	5.159	5.165	5.171	1090
1100	5.171	5.176	5.182	5.188	5.193	5.199	5.205	5.210	5.216	5.222	5.227	1100
1110	5.227	5.233	5.239	5.244	5.250	5.256	5.261	5.267	5.273	5.278	5.284	1110
1120	5.284	5.290	5.295	5.301	5.307	5.312	5.318	5.324	5.330	5.335	5.341	1120
1130	5.341	5.347	5.352	5.358	5.364	5.369	5.375	5.381	5.386	5.392	5.398	1130
1140	5.398	5.404	5.409	5.415	5.421	5.426	5.432	5.438	5.443	5.449	5.455	1140
1150	5.455	5.461	5.466	5.472	5.478	5.483	5.489	5.495	5.501	5.506	5.512	1150
1160	5.512	5.518	5.523	5.529	5.535	5.541	5.546	5.552	5.558	5.563	5.569	1160
1170	5.569	5.575	5.581	5.586	5.592	5.598	5.604	5.609	5.615	5.621	5.627	1170
1180	5.627	5.632	5.638	5.644	5.649	5.655	5.661	5.667	5.672	5.678	5.684	1180
1190	5.684	5.690	5.695	5.701	5.707	5.713	5.718	5.724	5.730	5.736	5.741	1190
1200	5.741	5.747	5.753	5.759	5.764	5.770	5.776	5.782	5.788	5.793	5.799	1200
1210	5.799	5.805	5.811	5.816	5.822	5.828	5.834	5.839	5.845	5.851	5.857	1210
1220	5.857	5.863	5.868	5.874	5.880	5.886	5.891	5.897	5.903	5.909	5.915	1220
1230	5.915	5.920	5.926	5.932	5.938	5.944	5.949	5.955	5.961	5.967	5.972	1230
1240	5.972	5.978	5.984	5.990	5.996	6.001	6.007	6.013	6.019	6.025	6.030	1240
1250	6.030	6.036	6.042	6.048	6.054	6.060	6.065	6.071	6.077	6.083	6.089	1250
1260	6.089	6.094	6.100	6.106	6.112	6.118	6.124	6.129	6.135	6.141	6.147	1260
1270	6.147	6.153	6.158	6.164	6.170	6.176	6.182	6.188	6.193	6.199	6.205	1270
1280	6.205	6.211	6.217	6.223	6.228	6.234	6.240	6.246	6.252	6.258	6.264	1280
1290	6.264	6.269	6.275	6.281	6.287	6.293	6.299	6.305	6.310	6.316	6.322	1290
1300	6.322	6.328	6.334	6.340	6.346	6.351	6.357	6.363	6.369	6.375	6.381	1300
1310	6.381	6.387	6.392	6.398	6.404	6.410	6.416	6.422	6.428	6.434	6.439	1310
1320	6.439	6.445	6.451	6.457	6.463	6.469	6.475	6.481	6.486	6.492	6.498	1320
1330	6.498	6.504	6.510	6.516	6.522	6.528	6.534	6.539	6.545	6.551	6.557	1330
1340	6.557	6.563	6.569	6.575	6.581	6.587	6.593	6.598	6.604	6.610	6.616	1340
1350	6.616	6.622	6.628	6.634	6.640	6.646	6.652	6.658	6.664	6.669	6.675	1350
1360	6.675	6.681	6.687	6.693	6.699	6.705	6.711	6.717	6.723	6.729	6.735	1360
1370	6.735	6.741	6.746	6.752	6.758	6.764	6.770	6.776	6.782	6.788	6.794	1370
1380	6.794	6.800	6.806	6.812	6.818	6.824	6.830	6.836	6.842	6.847	6.853	1380
1390	6.853	6.859	6.865	6.871	6.877	6.883	6.889	6.895	6.901	6.907	6.913	1390
1400	6.913	6.919	6.925	6.931	6.937	6.943	6.949	6.955	6.961	6.967	6.973	1400
1410	6.973	6.979	6.985	6.991	6.997	7.003	7.008	7.014	7.020	7.026	7.032	1410
1420	7.032	7.038	7.044	7.050	7.056	7.062	7.068	7.074	7.080	7.086	7.092	1420
1430	7.092	7.098	7.104	7.110	7.116	7.122	7.128	7.134	7.140	7.146	7.152	1430
1440	7.152	7.158	7.164	7.170	7.176	7.182	7.188	7.194	7.200	7.206	7.212	1440
1450	7.212	7.218	7.224	7.230	7.236	7.242	7.249	7.255	7.261	7.267	7.273	1450
1460	7.273	7.279	7.285	7.291	7.297	7.303	7.309	7.315	7.321	7.327	7.333	1460
1470	7.333	7.339	7.345	7.351	7.357	7.363	7.369	7.375	7.381	7.387	7.393	1470
1480	7.393	7.399	7.405	7.411	7.418	7.424	7.430	7.436	7.442	7.448	7.454	1480
1490	7.454	7.460	7.466	7.472	7.478	7.484	7.490	7.496	7.502	7.508	7.514	1490
1500	7.514	7.521	7.527	7.533	7.539	7.545	7.551	7.557	7.563	7.569	7.575	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	7.514	7.521	7.527	7.533	7.539	7.545	7.551	7.557	7.563	7.569	7.575	1500
1510	7.575	7.581	7.587	7.593	7.600	7.606	7.612	7.618	7.624	7.630	7.636	1510
1520	7.636	7.642	7.648	7.654	7.660	7.667	7.673	7.679	7.685	7.691	7.697	1520
1530	7.697	7.703	7.709	7.715	7.721	7.728	7.734	7.740	7.746	7.752	7.758	1530
1540	7.758	7.764	7.770	7.776	7.783	7.789	7.795	7.801	7.807	7.813	7.819	1540
1550	7.819	7.825	7.832	7.838	7.844	7.850	7.856	7.862	7.868	7.874	7.881	1550
1560	7.881	7.887	7.893	7.899	7.905	7.911	7.917	7.923	7.930	7.936	7.942	1560
1570	7.942	7.948	7.954	7.960	7.966	7.973	7.979	7.985	7.991	7.997	8.003	1570
1580	8.003	8.010	8.016	8.022	8.028	8.034	8.040	8.047	8.053	8.059	8.065	1580
1590	8.065	8.071	8.077	8.083	8.090	8.096	8.102	8.108	8.114	8.121	8.127	1590
1600	8.127	8.133	8.139	8.145	8.151	8.158	8.164	8.170	8.176	8.182	8.189	1600
1610	8.189	8.195	8.201	8.207	8.213	8.219	8.226	8.232	8.238	8.244	8.250	1610
1620	8.250	8.257	8.263	8.269	8.275	8.281	8.288	8.294	8.300	8.306	8.312	1620
1630	8.312	8.319	8.325	8.331	8.337	8.343	8.350	8.356	8.362	8.368	8.375	1630
1640	8.375	8.381	8.387	8.393	8.399	8.406	8.412	8.418	8.424	8.431	8.437	1640
1650	8.437	8.443	8.449	8.455	8.462	8.468	8.474	8.480	8.487	8.493	8.499	1650
1660	8.499	8.505	8.512	8.518	8.524	8.530	8.537	8.543	8.549	8.555	8.562	1660
1670	8.562	8.568	8.574	8.580	8.587	8.593	8.599	8.605	8.612	8.618	8.624	1670
1680	8.624	8.630	8.637	8.643	8.649	8.655	8.662	8.668	8.674	8.680	8.687	1680
1690	8.687	8.693	8.699	8.706	8.712	8.718	8.724	8.731	8.737	8.743	8.749	1690
1700	8.749	8.756	8.762	8.768	8.775	8.781	8.787	8.793	8.800	8.806	8.812	1700
1710	8.812	8.819	8.825	8.831	8.837	8.844	8.850	8.856	8.863	8.869	8.875	1710
1720	8.875	8.882	8.888	8.894	8.900	8.907	8.913	8.919	8.926	8.932	8.938	1720
1730	8.938	8.945	8.951	8.957	8.964	8.970	8.976	8.983	8.989	8.995	9.001	1730
1740	9.001	9.008	9.014	9.020	9.027	9.033	9.039	9.046	9.052	9.058	9.065	1740
1750	9.065	9.071	9.077	9.084	9.090	9.096	9.103	9.109	9.115	9.122	9.128	1750
1760	9.128	9.134	9.141	9.147	9.153	9.160	9.166	9.172	9.179	9.185	9.192	1760
1770	9.192	9.198	9.204	9.211	9.217	9.223	9.230	9.236	9.242	9.249	9.255	1770
1780	9.255	9.261	9.268	9.274	9.281	9.287	9.293	9.300	9.306	9.312	9.319	1780
1790	9.319	9.325	9.331	9.338	9.344	9.351	9.357	9.363	9.370	9.376	9.382	1790
1800	9.382	9.389	9.395	9.402	9.408	9.414	9.421	9.427	9.434	9.440	9.446	1800
1810	9.446	9.453	9.459	9.465	9.472	9.478	9.485	9.491	9.497	9.504	9.510	1810
1820	9.510	9.517	9.523	9.529	9.536	9.542	9.549	9.555	9.561	9.568	9.574	1820
1830	9.574	9.581	9.587	9.594	9.600	9.606	9.613	9.619	9.626	9.632	9.638	1830
1840	9.638	9.645	9.651	9.658	9.664	9.671	9.677	9.683	9.690	9.696	9.703	1840
1850	9.703	9.709	9.716	9.722	9.728	9.735	9.741	9.748	9.754	9.761	9.767	1850
1860	9.767	9.773	9.780	9.786	9.793	9.799	9.806	9.812	9.819	9.825	9.831	1860
1870	9.831	9.838	9.844	9.851	9.857	9.864	9.870	9.877	9.883	9.889	9.896	1870
1880	9.896	9.902	9.909	9.915	9.922	9.928	9.935	9.941	9.948	9.954	9.961	1880
1890	9.961	9.967	9.973	9.980	9.986	9.993	9.999	10.006	10.012	10.019	10.025	1890
1900	10.025	10.032	10.038	10.045	10.051	10.058	10.064	10.071	10.077	10.084	10.090	1900
1910	10.090	10.097	10.103	10.110	10.116	10.123	10.129	10.136	10.142	10.149	10.155	1910
1920	10.155	10.162	10.168	10.175	10.181	10.188	10.194	10.201	10.207	10.214	10.220	1920
1930	10.220	10.227	10.233	10.240	10.246	10.253	10.259	10.266	10.272	10.279	10.285	1930
1940	10.285	10.292	10.298	10.305	10.311	10.318	10.324	10.331	10.337	10.344	10.350	1940
1950	10.350	10.357	10.363	10.370	10.376	10.383	10.390	10.396	10.403	10.409	10.416	1950
1960	10.416	10.422	10.429	10.435	10.442	10.448	10.455	10.461	10.468	10.475	10.481	1960
1970	10.481	10.488	10.494	10.501	10.507	10.514	10.520	10.527	10.533	10.540	10.547	1970
1980	10.547	10.553	10.560	10.566	10.573	10.579	10.586	10.592	10.599	10.606	10.612	1980
1990	10.612	10.619	10.625	10.632	10.638	10.645	10.651	10.658	10.665	10.671	10.678	1990
2000	10.678	10.684	10.691	10.697	10.704	10.711	10.717	10.724	10.730	10.737	10.743	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	10.678	10.684	10.691	10.697	10.704	10.711	10.717	10.724	10.730	10.737	10.743	2000
2010	10.743	10.750	10.757	10.763	10.770	10.776	10.783	10.789	10.796	10.803	10.809	2010
2020	10.809	10.816	10.822	10.829	10.836	10.842	10.849	10.855	10.862	10.868	10.875	2020
2030	10.875	10.882	10.888	10.895	10.901	10.908	10.915	10.921	10.928	10.934	10.941	2030
2040	10.941	10.948	10.954	10.961	10.967	10.974	10.981	10.987	10.994	11.000	11.007	2040
2050	11.007	11.014	11.020	11.027	11.033	11.040	11.047	11.053	11.060	11.066	11.073	2050
2060	11.073	11.080	11.086	11.093	11.099	11.106	11.113	11.119	11.126	11.132	11.139	2060
2070	11.139	11.146	11.152	11.159	11.166	11.172	11.179	11.185	11.192	11.199	11.205	2070
2080	11.205	11.212	11.219	11.225	11.232	11.238	11.245	11.252	11.258	11.265	11.272	2080
2090	11.272	11.278	11.285	11.291	11.298	11.305	11.311	11.318	11.325	11.331	11.338	2090
2100	11.338	11.345	11.351	11.358	11.364	11.371	11.378	11.384	11.391	11.398	11.404	2100
2110	11.404	11.411	11.418	11.424	11.431	11.437	11.444	11.451	11.457	11.464	11.471	2110
2120	11.471	11.477	11.484	11.491	11.497	11.504	11.511	11.517	11.524	11.531	11.537	2120
2130	11.537	11.544	11.550	11.557	11.564	11.570	11.577	11.584	11.590	11.597	11.604	2130
2140	11.604	11.610	11.617	11.624	11.630	11.637	11.644	11.650	11.657	11.664	11.670	2140
2150	11.670	11.677	11.684	11.690	11.697	11.704	11.710	11.717	11.724	11.730	11.737	2150
2160	11.737	11.744	11.750	11.757	11.764	11.770	11.777	11.784	11.790	11.797	11.804	2160
2170	11.804	11.810	11.817	11.824	11.830	11.837	11.844	11.850	11.857	11.864	11.870	2170
2180	11.870	11.877	11.884	11.890	11.897	11.904	11.910	11.917	11.924	11.931	11.937	2180
2190	11.937	11.944	11.951	11.957	11.964	11.971	11.977	11.984	11.991	11.997	12.004	2190
2200	12.004	12.011	12.017	12.024	12.031	12.037	12.044	12.051	12.058	12.064	12.071	2200
2210	12.071	12.078	12.084	12.091	12.098	12.104	12.111	12.118	12.124	12.131	12.138	2210
2220	12.138	12.145	12.151	12.158	12.165	12.171	12.178	12.185	12.191	12.198	12.205	2220
2230	12.205	12.211	12.218	12.225	12.232	12.238	12.245	12.252	12.258	12.265	12.272	2230
2240	12.272	12.278	12.285	12.292	12.299	12.305	12.312	12.319	12.325	12.332	12.339	2240
2250	12.339	12.346	12.352	12.359	12.366	12.372	12.379	12.386	12.392	12.399	12.406	2250
2260	12.406	12.413	12.419	12.426	12.433	12.439	12.446	12.453	12.460	12.466	12.473	2260
2270	12.473	12.480	12.486	12.493	12.500	12.507	12.513	12.520	12.527	12.533	12.540	2270
2280	12.540	12.547	12.554	12.560	12.567	12.574	12.580	12.587	12.594	12.601	12.607	2280
2290	12.607	12.614	12.621	12.627	12.634	12.641	12.648	12.654	12.661	12.668	12.675	2290
2300	12.675	12.681	12.688	12.695	12.701	12.708	12.715	12.722	12.728	12.735	12.742	2300
2310	12.742	12.748	12.755	12.762	12.769	12.775	12.782	12.789	12.796	12.802	12.809	2310
2320	12.809	12.816	12.822	12.829	12.836	12.843	12.849	12.856	12.863	12.870	12.876	2320
2330	12.876	12.883	12.890	12.896	12.903	12.910	12.917	12.923	12.930	12.937	12.944	2330
2340	12.944	12.950	12.957	12.964	12.971	12.977	12.984	12.991	12.997	13.004	13.011	2340
2350	13.011	13.018	13.024	13.031	13.038	13.045	13.051	13.058	13.065	13.072	13.078	2350
2360	13.078	13.085	13.092	13.098	13.105	13.112	13.119	13.125	13.132	13.139	13.146	2360
2370	13.146	13.152	13.159	13.166	13.173	13.179	13.186	13.193	13.199	13.206	13.213	2370
2380	13.213	13.220	13.226	13.233	13.240	13.247	13.253	13.260	13.267	13.274	13.280	2380
2390	13.280	13.287	13.294	13.301	13.307	13.314	13.321	13.328	13.334	13.341	13.348	2390
2400	13.348	13.354	13.361	13.368	13.375	13.381	13.388	13.395	13.402	13.408	13.415	2400
2410	13.415	13.422	13.429	13.435	13.442	13.449	13.456	13.462	13.469	13.476	13.483	2410
2420	13.483	13.489	13.496	13.503	13.510	13.516	13.523	13.530	13.537	13.543	13.550	2420
2430	13.550	13.557	13.563	13.570	13.577	13.584	13.590	13.597	13.604	13.611	13.617	2430
2440	13.617	13.624	13.631	13.638	13.644	13.651	13.658	13.665	13.671	13.678	13.685	2440
2450	13.685	13.692	13.698	13.705	13.712	13.719	13.725	13.732	13.739	13.746	13.752	2450
2460	13.752	13.759	13.766	13.773	13.779	13.786	13.793	13.800	13.806	13.813	13.820	2460
2470	13.820	13.826	13.833	13.840	13.847	13.853	13.860	13.867	13.874	13.880	13.887	2470
2480	13.887	13.894	13.901	13.907	13.914	13.921	13.928	13.934	13.941	13.948	13.955	2480
2490	13.955	13.961	13.968	13.975	13.982	13.988	13.995	14.002	14.009	14.015	14.022	2490
2500	14.022	14.029	14.036	14.042	14.049	14.056	14.063	14.069	14.076	14.083	14.089	2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2500	14.022	14.029	14.036	14.042	14.049	14.056	14.063	14.069	14.076	14.083	14.089	2500
2510	14.089	14.096	14.103	14.110	14.116	14.123	14.130	14.137	14.143	14.150	14.157	2510
2520	14.157	14.164	14.170	14.177	14.184	14.191	14.197	14.204	14.211	14.218	14.224	2520
2530	14.224	14.231	14.238	14.245	14.251	14.258	14.265	14.272	14.278	14.285	14.292	2530
2540	14.292	14.298	14.305	14.312	14.319	14.325	14.332	14.339	14.346	14.352	14.359	2540
2550	14.359	14.366	14.373	14.379	14.386	14.393	14.400	14.406	14.413	14.420	14.426	2550
2560	14.426	14.433	14.440	14.447	14.453	14.460	14.467	14.474	14.480	14.487	14.494	2560
2570	14.494	14.501	14.507	14.514	14.521	14.528	14.534	14.541	14.548	14.554	14.561	2570
2580	14.561	14.568	14.575	14.581	14.588	14.595	14.602	14.608	14.615	14.622	14.629	2580
2590	14.629	14.635	14.642	14.649	14.655	14.662	14.669	14.676	14.682	14.689	14.696	2590
2600	14.696	14.703	14.709	14.716	14.723	14.729	14.736	14.743	14.750	14.756	14.763	2600
2610	14.763	14.770	14.777	14.783	14.790	14.797	14.803	14.810	14.817	14.824	14.830	2610
2620	14.830	14.837	14.844	14.851	14.857	14.864	14.871	14.877	14.884	14.891	14.898	2620
2630	14.898	14.904	14.911	14.918	14.925	14.931	14.938	14.945	14.951	14.958	14.965	2630
2640	14.965	14.972	14.978	14.985	14.992	14.998	15.005	15.012	15.019	15.025	15.032	2640
2650	15.032	15.039	15.045	15.052	15.059	15.066	15.072	15.079	15.086	15.092	15.099	2650
2660	15.099	15.106	15.113	15.119	15.126	15.133	15.139	15.146	15.153	15.160	15.166	2660
2670	15.166	15.173	15.180	15.186	15.193	15.200	15.207	15.213	15.220	15.227	15.233	2670
2680	15.233	15.240	15.247	15.254	15.260	15.267	15.274	15.280	15.287	15.294	15.300	2680
2690	15.300	15.307	15.314	15.321	15.327	15.334	15.341	15.347	15.354	15.361	15.367	2690
2700	15.367	15.374	15.381	15.388	15.394	15.401	15.408	15.414	15.421	15.428	15.434	2700
2710	15.434	15.441	15.448	15.455	15.461	15.468	15.475	15.481	15.488	15.495	15.501	2710
2720	15.501	15.508	15.515	15.521	15.528	15.535	15.542	15.548	15.555	15.562	15.568	2720
2730	15.568	15.575	15.582	15.588	15.595	15.602	15.608	15.615	15.622	15.628	15.635	2730
2740	15.635	15.642	15.649	15.655	15.662	15.669	15.675	15.682	15.689	15.695	15.702	2740
2750	15.702	15.709	15.715	15.722	15.729	15.735	15.742	15.749	15.755	15.762	15.769	2750
2760	15.769	15.775	15.782	15.789	15.795	15.802	15.809	15.815	15.822	15.829	15.835	2760
2770	15.835	15.842	15.849	15.855	15.862	15.869	15.875	15.882	15.889	15.895	15.902	2770
2780	15.902	15.909	15.915	15.922	15.929	15.935	15.942	15.949	15.955	15.962	15.969	2780
2790	15.969	15.975	15.982	15.989	15.995	16.002	16.009	16.015	16.022	16.029	16.035	2790
2800	16.035	16.042	16.049	16.055	16.062	16.069	16.075	16.082	16.089	16.095	16.102	2800
2810	16.102	16.108	16.115	16.122	16.128	16.135	16.142	16.148	16.155	16.162	16.168	2810
2820	16.168	16.175	16.182	16.188	16.195	16.202	16.208	16.215	16.221	16.228	16.235	2820
2830	16.235	16.241	16.248	16.255	16.261	16.268	16.275	16.281	16.288	16.294	16.301	2830
2840	16.301	16.308	16.314	16.321	16.328	16.334	16.341	16.347	16.354	16.361	16.367	2840
2850	16.367	16.374	16.381	16.387	16.394	16.400	16.407	16.414	16.420	16.427	16.434	2850
2860	16.434	16.440	16.447	16.453	16.460	16.467	16.473	16.480	16.486	16.493	16.500	2860
2870	16.500	16.506	16.513	16.520	16.526	16.533	16.539	16.546	16.553	16.559	16.566	2870
2880	16.566	16.572	16.579	16.586	16.592	16.599	16.605	16.612	16.619	16.625	16.632	2880
2890	16.632	16.638	16.645	16.652	16.658	16.665	16.671	16.678	16.685	16.691	16.698	2890
2900	16.698	16.704	16.711	16.718	16.724	16.731	16.737	16.744	16.751	16.757	16.764	2900
2910	16.764	16.770	16.777	16.783	16.790	16.797	16.803	16.810	16.816	16.823	16.829	2910
2920	16.829	16.836	16.843	16.849	16.856	16.862	16.869	16.876	16.882	16.889	16.895	2920
2930	16.895	16.902	16.908	16.915	16.922	16.928	16.935	16.941	16.948	16.954	16.961	2930
2940	16.961	16.967	16.974	16.981	16.987	16.994	17.000	17.007	17.013	17.020	17.026	2940
2950	17.026	17.033	17.040	17.046	17.053	17.059	17.066	17.072	17.079	17.085	17.092	2950
2960	17.092	17.099	17.105	17.112	17.118	17.125	17.131	17.138	17.144	17.151	17.157	2960
2970	17.157	17.164	17.171	17.177	17.184	17.190	17.197	17.203	17.210	17.216	17.223	2970
2980	17.223	17.229	17.236	17.242	17.249	17.255	17.262	17.268	17.275	17.282	17.288	2980
2990	17.288	17.295	17.301	17.308	17.314	17.321	17.327	17.334	17.340	17.347	17.353	2990
3000	17.353	17.360	17.366	17.373	17.379	17.386	17.392	17.399	17.405	17.412	17.418	3000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B4.1.2. *Type S thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	17.353	17.360	17.366	17.373	17.379	17.386	17.392	17.399	17.405	17.412	17.418	**3000**
3010	17.418	17.425	17.431	17.438	17.444	17.451	17.457	17.464	17.470	17.477	17.483	**3010**
3020	17.483	17.490	17.496	17.503	17.509	17.516	17.522	17.529	17.535	17.542	17.548	**3020**
3030	17.548	17.555	17.561	17.568	17.574	17.581	17.587	17.594	17.600	17.607	17.613	**3030**
3040	17.613	17.620	17.626	17.633	17.639	17.645	17.652	17.658	17.665	17.671	17.678	**3040**
3050	17.678	17.684	17.691	17.697	17.704	17.710	17.717	17.723	17.729	17.736	17.742	**3050**
3060	17.742	17.749	17.755	17.762	17.768	17.775	17.781	17.787	17.794	17.800	17.807	**3060**
3070	17.807	17.813	17.819	17.826	17.832	17.839	17.845	17.852	17.858	17.864	17.871	**3070**
3080	17.871	17.877	17.884	17.890	17.896	17.903	17.909	17.915	17.922	17.928	17.935	**3080**
3090	17.935	17.941	17.947	17.954	17.960	17.966	17.973	17.979	17.985	17.992	17.998	**3090**
3100	17.998	18.004	18.011	18.017	18.023	18.030	18.036	18.042	18.049	18.055	18.061	**3100**
3110	18.061	18.068	18.074	18.080	18.086	18.093	18.099	18.105	18.112	18.118	18.124	**3110**
3120	18.124	18.130	18.137	18.143	18.149	18.155	18.162	18.168	18.174	18.180	18.187	**3120**
3130	18.187	18.193	18.199	18.205	18.211	18.218	18.224	18.230	18.236	18.242	18.248	**3130**
3140	18.248	18.255	18.261	18.267	18.273	18.279	18.285	18.292	18.298	18.304	18.310	**3140**
3150	18.310	18.316	18.322	18.328	18.334	18.341	18.347	18.353	18.359	18.365	18.371	**3150**
3160	18.371	18.377	18.383	18.389	18.395	18.401	18.407	18.413	18.419	18.425	18.431	**3160**
3170	18.431	18.437	18.443	18.449	18.455	18.461	18.467	18.473	18.479	18.485	18.491	**3170**
3180	18.491	18.497	18.503	18.509	18.515	18.521	18.527	18.533	18.539	18.545	18.551	**3180**
3190	18.551	18.557	18.562	18.568	18.574	18.580	18.586	18.592	18.598	18.603	18.609	**3190**
3200	18.609	18.615	18.621	18.627	18.633	18.638	18.644	18.650	18.656	18.661	18.667	**3200**
3210	18.667	18.673	18.679	18.684	18.690							**3210**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

B4.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B4.2.1 and B4.2.2 was obtained by iteration of the reference function for type S thermocouples given in the main text (see table 4.3.1). Table B4.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −0.23 mV to 18.69 mV, and table B4.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B4.2.1. *Type S thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
−0.20	−41.32	−43.70	−46.13	−48.60								**−0.20**
−0.10	−19.42	−21.48	−23.56	−25.67	−27.81	−29.98	−32.18	−34.41	−36.67	−38.97	−41.32	**−0.10**
0.00	0.00	−1.86	−3.73	−5.63	−7.54	−9.47	−11.41	−13.38	−15.37	−17.38	−19.42	**0.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B4.2.1. *Type S thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
0.00	0.00	1.84	3.67	5.48	7.28	9.07	10.84	12.59	14.34	16.07	17.79	0.00
0.10	17.79	19.50	21.20	22.89	24.57	26.23	27.89	29.54	31.17	32.80	34.42	0.10
0.20	34.42	36.03	37.63	39.23	40.81	42.39	43.96	45.52	47.08	48.62	50.17	0.20
0.30	50.17	51.70	53.23	54.75	56.26	57.77	59.27	60.76	62.25	63.73	65.21	0.30
0.40	65.21	66.68	68.15	69.61	71.07	72.52	73.96	75.40	76.84	78.27	79.69	0.40
0.50	79.69	81.11	82.53	83.94	85.35	86.75	88.15	89.54	90.94	92.32	93.70	0.50
0.60	93.70	95.08	96.46	97.83	99.19	100.56	101.92	103.27	104.62	105.97	107.32	0.60
0.70	107.32	108.66	110.00	111.33	112.67	114.00	115.32	116.64	117.96	119.28	120.59	0.70
0.80	120.59	121.90	123.21	124.52	125.82	127.12	128.42	129.71	131.00	132.29	133.58	0.80
0.90	133.58	134.86	136.14	137.42	138.70	139.97	141.24	142.51	143.78	145.04	146.30	0.90
1.00	146.30	147.56	148.82	150.07	151.33	152.58	153.83	155.07	156.32	157.56	158.80	1.00
1.10	158.80	160.04	161.27	162.51	163.74	164.97	166.20	167.43	168.65	169.87	171.10	1.10
1.20	171.10	172.32	173.53	174.75	175.96	177.18	178.39	179.60	180.80	182.01	183.21	1.20
1.30	183.21	184.42	185.62	186.82	188.01	189.21	190.40	191.60	192.79	193.98	195.17	1.30
1.40	195.17	196.35	197.54	198.72	199.91	201.09	202.27	203.45	204.63	205.80	206.98	1.40
1.50	206.98	208.15	209.32	210.49	211.66	212.83	214.00	215.16	216.33	217.49	218.65	1.50
1.60	218.65	219.81	220.97	222.13	223.29	224.44	225.60	226.75	227.90	229.05	230.20	1.60
1.70	230.20	231.35	232.50	233.65	234.79	235.94	237.08	238.23	239.37	240.51	241.65	1.70
1.80	241.65	242.79	243.92	245.06	246.20	247.33	248.46	249.60	250.73	251.86	252.99	1.80
1.90	252.99	254.12	255.24	256.37	257.50	258.62	259.75	260.87	261.99	263.11	264.23	1.90
2.00	264.23	265.35	266.47	267.59	268.71	269.82	270.94	272.05	273.17	274.28	275.39	2.00
2.10	275.39	276.50	277.62	278.73	279.83	280.94	282.05	283.16	284.26	285.37	286.47	2.10
2.20	286.47	287.58	288.68	289.78	290.88	291.98	293.08	294.18	295.28	296.38	297.47	2.20
2.30	297.47	298.57	299.67	300.76	301.86	302.95	304.04	305.13	306.23	307.32	308.41	2.30
2.40	308.41	309.50	310.59	311.67	312.76	313.85	314.94	316.02	317.11	318.19	319.27	2.40
2.50	319.27	320.36	321.44	322.52	323.60	324.68	325.76	326.84	327.92	329.00	330.08	2.50
2.60	330.08	331.16	332.23	333.31	334.38	335.46	336.53	337.61	338.68	339.75	340.83	2.60
2.70	340.83	341.90	342.97	344.04	345.11	346.18	347.25	348.32	349.38	350.45	351.52	2.70
2.80	351.52	352.58	353.65	354.72	355.78	356.84	357.91	358.97	360.03	361.10	362.16	2.80
2.90	362.16	363.22	364.28	365.34	366.40	367.46	368.52	369.58	370.63	371.69	372.75	2.90
3.00	372.75	373.80	374.86	375.92	376.97	378.03	379.08	380.13	381.19	382.24	383.29	3.00
3.10	383.29	384.34	385.39	386.45	387.50	388.55	389.60	390.64	391.69	392.74	393.79	3.10
3.20	393.79	394.84	395.88	396.93	397.98	399.02	400.07	401.11	402.16	403.20	404.24	3.20
3.30	404.24	405.29	406.33	407.37	408.41	409.46	410.50	411.54	412.58	413.62	414.66	3.30
3.40	414.66	415.70	416.74	417.77	418.81	419.85	420.89	421.92	422.96	424.00	425.03	3.40
3.50	425.03	426.07	427.10	428.14	429.17	430.20	431.24	432.27	433.30	434.34	435.37	3.50
3.60	435.37	436.40	437.43	438.46	439.49	440.52	441.55	442.58	443.61	444.64	445.67	3.60
3.70	445.67	446.69	447.72	448.75	449.78	450.80	451.83	452.85	453.88	454.90	455.93	3.70
3.80	455.93	456.95	457.98	459.00	460.02	461.05	462.07	463.09	464.11	465.13	466.16	3.80
3.90	466.16	467.18	468.20	469.22	470.24	471.26	472.28	473.29	474.31	475.33	476.35	3.90
4.00	476.35	477.37	478.38	479.40	480.42	481.43	482.45	483.46	484.48	485.49	486.51	4.00
4.10	486.51	487.52	488.54	489.55	490.56	491.58	492.59	493.60	494.61	495.62	496.64	4.10
4.20	496.64	497.65	498.66	499.67	500.68	501.69	502.70	503.71	504.71	505.72	506.73	4.20
4.30	506.73	507.74	508.75	509.75	510.76	511.77	512.77	513.78	514.78	515.79	516.79	4.30
4.40	516.79	517.80	518.80	519.81	520.81	521.81	522.82	523.82	524.82	525.82	526.83	4.40
4.50	526.83	527.83	528.83	529.83	530.83	531.83	532.83	533.83	534.83	535.83	536.83	4.50
4.60	536.83	537.83	538.82	539.82	540.82	541.82	542.81	543.81	544.81	545.80	546.80	4.60
4.70	546.80	547.79	548.79	549.78	550.78	551.77	552.77	553.76	554.75	555.75	556.74	4.70
4.80	556.74	557.73	558.72	559.72	560.71	561.70	562.69	563.68	564.67	565.66	566.65	4.80
4.90	566.65	567.64	568.63	569.62	570.61	571.60	572.58	573.57	574.56	575.55	576.53	4.90
5.00	576.53	577.52	578.51	579.49	580.48	581.46	582.45	583.43	584.42	585.40	586.38	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B4.2.1. *Type S thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	576.53	577.52	578.51	579.49	580.48	581.46	582.45	583.43	584.42	585.40	586.38	5.00
5.10	586.38	587.37	588.35	589.33	590.32	591.30	592.28	593.26	594.25	595.23	596.21	5.10
5.20	596.21	597.19	598.17	599.15	600.13	601.11	602.09	603.07	604.04	605.02	606.00	5.20
5.30	606.00	606.98	607.96	608.93	609.91	610.89	611.86	612.84	613.82	614.79	615.77	5.30
5.40	615.77	616.74	617.72	618.69	619.66	620.64	621.61	622.58	623.56	624.53	625.50	5.40
5.50	625.50	626.47	627.45	628.42	629.39	630.36	631.33	632.30	633.27	634.24	635.21	5.50
5.60	635.21	636.18	637.15	638.11	639.08	640.05	641.02	641.99	642.95	643.92	644.89	5.60
5.70	644.89	645.85	646.82	647.78	648.75	649.71	650.68	651.64	652.61	653.57	654.54	5.70
5.80	654.54	655.50	656.46	657.42	658.39	659.35	660.31	661.27	662.23	663.19	664.16	5.80
5.90	664.16	665.12	666.08	667.04	668.00	668.95	669.91	670.87	671.83	672.79	673.75	5.90
6.00	673.75	674.70	675.66	676.62	677.58	678.53	679.49	680.44	681.40	682.36	683.31	6.00
6.10	683.31	684.26	685.22	686.17	687.13	688.08	689.03	689.99	690.94	691.89	692.84	6.10
6.20	692.84	693.80	694.75	695.70	696.65	697.60	698.55	699.50	700.45	701.40	702.35	6.20
6.30	702.35	703.30	704.25	705.20	706.14	707.09	708.04	708.99	709.93	710.88	711.83	6.30
6.40	711.83	712.77	713.72	714.67	715.61	716.56	717.50	718.45	719.39	720.33	721.28	6.40
6.50	721.28	722.22	723.16	724.11	725.05	725.99	726.93	727.87	728.82	729.76	730.70	6.50
6.60	730.70	731.64	732.58	733.52	734.46	735.40	736.34	737.28	738.21	739.15	740.09	6.60
6.70	740.09	741.03	741.96	742.90	743.84	744.78	745.71	746.65	747.58	748.52	749.45	6.70
6.80	749.45	750.39	751.32	752.26	753.19	754.13	755.06	755.99	756.93	757.86	758.79	6.80
6.90	758.79	759.72	760.65	761.59	762.52	763.45	764.38	765.31	766.24	767.17	768.10	6.90
7.00	768.10	769.03	769.96	770.89	771.81	772.74	773.67	774.60	775.53	776.45	777.38	7.00
7.10	777.38	778.31	779.23	780.16	781.08	782.01	782.93	783.86	784.78	785.71	786.63	7.10
7.20	786.63	787.56	788.48	789.40	790.33	791.25	792.17	793.09	794.02	794.94	795.86	7.20
7.30	795.86	796.78	797.70	798.62	799.54	800.46	801.38	802.30	803.22	804.14	805.06	7.30
7.40	805.06	805.98	806.89	807.81	808.73	809.65	810.56	811.48	812.40	813.31	814.23	7.40
7.50	814.23	815.15	816.06	816.98	817.89	818.81	819.72	820.63	821.55	822.46	823.37	7.50
7.60	823.37	824.29	825.20	826.11	827.03	827.94	828.85	829.76	830.67	831.58	832.49	7.60
7.70	832.49	833.40	834.31	835.22	836.13	837.04	837.95	838.86	839.77	840.68	841.59	7.70
7.80	841.59	842.49	843.40	844.31	845.22	846.12	847.03	847.93	848.84	849.75	850.65	7.80
7.90	850.65	851.56	852.46	853.37	854.27	855.18	856.08	856.98	857.89	858.79	859.69	7.90
8.00	859.69	860.60	861.50	862.40	863.30	864.20	865.11	866.01	866.91	867.81	868.71	8.00
8.10	868.71	869.61	870.51	871.41	872.31	873.21	874.11	875.00	875.90	876.80	877.70	8.10
8.20	877.70	878.60	879.49	880.39	881.29	882.18	883.08	883.98	884.87	885.77	886.66	8.20
8.30	886.66	887.56	888.45	889.35	890.24	891.14	892.03	892.93	893.82	894.71	895.61	8.30
8.40	895.61	896.50	897.39	898.28	899.18	900.07	900.96	901.85	902.74	903.63	904.52	8.40
8.50	904.52	905.41	906.30	907.19	908.08	908.97	909.86	910.75	911.64	912.53	913.42	8.50
8.60	913.42	914.30	915.19	916.08	916.97	917.85	918.74	919.63	920.51	921.40	922.29	8.60
8.70	922.29	923.17	924.06	924.94	925.83	926.71	927.60	928.48	929.37	930.25	931.13	8.70
8.80	931.13	932.02	932.90	933.78	934.67	935.55	936.43	937.31	938.20	939.08	939.96	8.80
8.90	939.96	940.84	941.72	942.60	943.48	944.36	945.24	946.12	947.00	947.88	948.76	8.90
9.00	948.76	949.64	950.52	951.40	952.27	953.15	954.03	954.91	955.79	956.66	957.54	9.00
9.10	957.54	958.42	959.29	960.17	961.05	961.92	962.80	963.67	964.55	965.42	966.30	9.10
9.20	966.30	967.17	968.05	968.92	969.80	970.67	971.54	972.42	973.29	974.16	975.03	9.20
9.30	975.03	975.91	976.78	977.65	978.52	979.39	980.27	981.14	982.01	982.88	983.75	9.30
9.40	983.75	984.62	985.49	986.36	987.23	988.10	988.97	989.84	990.71	991.58	992.44	9.40
9.50	992.44	993.31	994.18	995.05	995.92	996.78	997.65	998.52	999.38	1000.25	1001.12	9.50
9.60	1001.12	1001.98	1002.85	1003.72	1004.58	1005.45	1006.31	1007.18	1008.04	1008.91	1009.77	9.60
9.70	1009.77	1010.64	1011.50	1012.36	1013.23	1014.09	1014.95	1015.82	1016.68	1017.54	1018.40	9.70
9.80	1018.40	1019.27	1020.13	1020.99	1021.85	1022.71	1023.57	1024.43	1025.30	1026.16	1027.02	9.80
9.90	1027.02	1027.88	1028.74	1029.60	1030.46	1031.32	1032.17	1033.03	1033.89	1034.75	1035.61	9.90
10.00	1035.61	1036.47	1037.33	1038.18	1039.04	1039.90	1040.75	1041.61	1042.47	1043.33	1044.18	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B4.2.1. *Type S thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	1035.61	1036.47	1037.33	1038.18	1039.04	1039.90	1040.75	1041.61	1042.47	1043.33	1044.18	**10.00**
10.10	1044.18	1045.04	1045.89	1046.75	1047.60	1048.46	1049.32	1050.17	1051.02	1051.88	1052.73	**10.10**
10.20	1052.73	1053.59	1054.44	1055.30	1056.15	1057.00	1057.86	1058.71	1059.56	1060.41	1061.27	**10.20**
10.30	1061.27	1062.12	1062.97	1063.82	1064.67	1065.52	1066.38	1067.23	1068.08	1068.93	1069.78	**10.30**
10.40	1069.78	1070.63	1071.48	1072.33	1073.18	1074.03	1074.88	1075.73	1076.58	1077.43	1078.28	**10.40**
10.50	1078.28	1079.12	1079.97	1080.82	1081.67	1082.52	1083.37	1084.21	1085.06	1085.91	1086.76	**10.50**
10.60	1086.76	1087.60	1088.45	1089.30	1090.14	1090.99	1091.84	1092.68	1093.53	1094.37	1095.22	**10.60**
10.70	1095.22	1096.07	1096.91	1097.76	1098.60	1099.45	1100.29	1101.14	1101.98	1102.83	1103.67	**10.70**
10.80	1103.67	1104.51	1105.36	1106.20	1107.05	1107.89	1108.73	1109.58	1110.42	1111.26	1112.11	**10.80**
10.90	1112.11	1112.95	1113.79	1114.63	1115.48	1116.32	1117.16	1118.00	1118.84	1119.69	1120.53	**10.90**
11.00	1120.53	1121.37	1122.21	1123.05	1123.89	1124.73	1125.57	1126.42	1127.26	1128.10	1128.94	**11.00**
11.10	1128.94	1129.78	1130.62	1131.46	1132.30	1133.14	1133.98	1134.82	1135.65	1136.49	1137.33	**11.10**
11.20	1137.33	1138.17	1139.01	1139.85	1140.69	1141.53	1142.36	1143.20	1144.04	1144.88	1145.72	**11.20**
11.30	1145.72	1146.55	1147.39	1148.23	1149.07	1149.90	1150.74	1151.58	1152.42	1153.25	1154.09	**11.30**
11.40	1154.09	1154.93	1155.76	1156.60	1157.44	1158.27	1159.11	1159.94	1160.78	1161.62	1162.45	**11.40**
11.50	1162.45	1163.29	1164.12	1164.96	1165.79	1166.63	1167.46	1168.30	1169.13	1169.97	1170.80	**11.50**
11.60	1170.80	1171.64	1172.47	1173.31	1174.14	1174.97	1175.81	1176.64	1177.48	1178.31	1179.14	**11.60**
11.70	1179.14	1179.98	1180.81	1181.64	1182.48	1183.31	1184.14	1184.98	1185.81	1186.64	1187.47	**11.70**
11.80	1187.47	1188.31	1189.14	1189.97	1190.80	1191.64	1192.47	1193.30	1194.13	1194.96	1195.80	**11.80**
11.90	1195.80	1196.63	1197.46	1198.29	1199.12	1199.95	1200.79	1201.62	1202.45	1203.28	1204.11	**11.90**
12.00	1204.11	1204.94	1205.77	1206.60	1207.43	1208.26	1209.09	1209.92	1210.76	1211.59	1212.42	**12.00**
12.10	1212.42	1213.25	1214.08	1214.91	1215.74	1216.57	1217.40	1218.23	1219.05	1219.88	1220.71	**12.10**
12.20	1220.71	1221.54	1222.37	1223.20	1224.03	1224.86	1225.69	1226.52	1227.35	1228.18	1229.00	**12.20**
12.30	1229.00	1229.83	1230.66	1231.49	1232.32	1233.15	1233.98	1234.80	1235.63	1236.46	1237.29	**12.30**
12.40	1237.29	1238.12	1238.94	1239.77	1240.60	1241.43	1242.26	1243.08	1243.91	1244.74	1245.57	**12.40**
12.50	1245.57	1246.39	1247.22	1248.05	1248.88	1249.70	1250.53	1251.36	1252.18	1253.01	1253.84	**12.50**
12.60	1253.84	1254.67	1255.49	1256.32	1257.15	1257.97	1258.80	1259.63	1260.45	1261.28	1262.11	**12.60**
12.70	1262.11	1262.93	1263.76	1264.58	1265.41	1266.24	1267.06	1267.89	1268.72	1269.54	1270.37	**12.70**
12.80	1270.37	1271.19	1272.02	1272.84	1273.67	1274.50	1275.32	1276.15	1276.97	1277.80	1278.62	**12.80**
12.90	1278.62	1279.45	1280.28	1281.10	1281.93	1282.75	1283.58	1284.40	1285.23	1286.05	1286.88	**12.90**
13.00	1286.88	1287.70	1288.53	1289.35	1290.18	1291.00	1291.83	1292.65	1293.48	1294.30	1295.13	**13.00**
13.10	1295.13	1295.95	1296.78	1297.60	1298.43	1299.25	1300.08	1300.90	1301.73	1302.55	1303.38	**13.10**
13.20	1303.38	1304.20	1305.02	1305.85	1306.67	1307.50	1308.32	1309.15	1309.97	1310.80	1311.62	**13.20**
13.30	1311.62	1312.44	1313.27	1314.09	1314.92	1315.74	1316.57	1317.39	1318.21	1319.04	1319.86	**13.30**
13.40	1319.86	1320.69	1321.51	1322.33	1323.16	1323.98	1324.81	1325.63	1326.45	1327.28	1328.10	**13.40**
13.50	1328.10	1328.93	1329.75	1330.57	1331.40	1332.22	1333.05	1333.87	1334.69	1335.52	1336.34	**13.50**
13.60	1336.34	1337.17	1337.99	1338.81	1339.64	1340.46	1341.28	1342.11	1342.93	1343.76	1344.58	**13.60**
13.70	1344.58	1345.40	1346.23	1347.05	1347.87	1348.70	1349.52	1350.35	1351.17	1351.99	1352.82	**13.70**
13.80	1352.82	1353.64	1354.46	1355.29	1356.11	1356.94	1357.76	1358.58	1359.41	1360.23	1361.06	**13.80**
13.90	1361.06	1361.88	1362.70	1363.53	1364.35	1365.17	1366.00	1366.82	1367.65	1368.47	1369.29	**13.90**
14.00	1369.29	1370.12	1370.94	1371.77	1372.59	1373.41	1374.24	1375.06	1375.88	1376.71	1377.53	**14.00**
14.10	1377.53	1378.36	1379.18	1380.00	1380.83	1381.65	1382.48	1383.30	1384.12	1384.95	1385.77	**14.10**
14.20	1385.77	1386.60	1387.42	1388.25	1389.07	1389.89	1390.72	1391.54	1392.37	1393.19	1394.02	**14.20**
14.30	1394.02	1394.84	1395.66	1396.49	1397.31	1398.14	1398.96	1399.79	1400.61	1401.43	1402.26	**14.30**
14.40	1402.26	1403.08	1403.91	1404.73	1405.56	1406.38	1407.21	1408.03	1408.86	1409.68	1410.51	**14.40**
14.50	1410.51	1411.33	1412.16	1412.98	1413.81	1414.63	1415.46	1416.28	1417.11	1417.93	1418.76	**14.50**
14.60	1418.76	1419.58	1420.41	1421.23	1422.06	1422.88	1423.71	1424.53	1425.36	1426.18	1427.01	**14.60**
14.70	1427.01	1427.84	1428.66	1429.49	1430.31	1431.14	1431.96	1432.79	1433.62	1434.44	1435.27	**14.70**
14.80	1435.27	1436.09	1436.92	1437.75	1438.57	1439.40	1440.22	1441.05	1441.88	1442.70	1443.53	**14.80**
14.90	1443.53	1444.36	1445.18	1446.01	1446.84	1447.66	1448.49	1449.32	1450.14	1450.97	1451.80	**14.90**
15.00	1451.80	1452.62	1453.45	1454.28	1455.10	1455.93	1456.76	1457.59	1458.41	1459.24	1460.07	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B4.2.1. *Type S thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
15.00	1451.80	1452.62	1453.45	1454.28	1455.10	1455.93	1456.76	1457.59	1458.41	1459.24	1460.07	**15.00**
15.10	1460.07	1460.90	1461.72	1462.55	1463.38	1464.21	1465.03	1465.86	1466.69	1467.52	1468.35	**15.10**
15.20	1468.35	1469.17	1470.00	1470.83	1471.66	1472.49	1473.32	1474.14	1474.97	1475.80	1476.63	**15.20**
15.30	1476.63	1477.46	1478.29	1479.12	1479.94	1480.77	1481.60	1482.43	1483.26	1484.09	1484.92	**15.30**
15.40	1484.92	1485.75	1486.58	1487.41	1488.24	1489.07	1489.90	1490.73	1491.56	1492.39	1493.22	**15.40**
15.50	1493.22	1494.05	1494.88	1495.71	1496.54	1497.37	1498.20	1499.03	1499.86	1500.69	1501.52	**15.50**
15.60	1501.52	1502.35	1503.19	1504.02	1504.85	1505.68	1506.51	1507.34	1508.17	1509.00	1509.84	**15.60**
15.70	1509.84	1510.67	1511.50	1512.33	1513.16	1514.00	1514.83	1515.66	1516.49	1517.33	1518.16	**15.70**
15.80	1518.16	1518.99	1519.82	1520.66	1521.49	1522.32	1523.16	1523.99	1524.82	1525.66	1526.49	**15.80**
15.90	1526.49	1527.32	1528.16	1528.99	1529.82	1530.66	1531.49	1532.33	1533.16	1533.99	1534.83	**15.90**
16.00	1534.83	1535.66	1536.50	1537.33	1538.17	1539.00	1539.84	1540.67	1541.51	1542.34	1543.18	**16.00**
16.10	1543.18	1544.02	1544.85	1545.69	1546.52	1547.36	1548.20	1549.03	1549.87	1550.70	1551.54	**16.10**
16.20	1551.54	1552.38	1553.21	1554.05	1554.89	1555.73	1556.56	1557.40	1558.24	1559.07	1559.91	**16.20**
16.30	1559.91	1560.75	1561.59	1562.43	1563.26	1564.10	1564.94	1565.78	1566.62	1567.46	1568.30	**16.30**
16.40	1568.30	1569.13	1569.97	1570.81	1571.65	1572.49	1573.33	1574.17	1575.01	1575.85	1576.69	**16.40**
16.50	1576.69	1577.53	1578.37	1579.21	1580.05	1580.89	1581.73	1582.58	1583.42	1584.26	1585.10	**16.50**
16.60	1585.10	1585.94	1586.78	1587.62	1588.47	1589.31	1590.15	1590.99	1591.83	1592.68	1593.52	**16.60**
16.70	1593.52	1594.36	1595.21	1596.05	1596.89	1597.74	1598.58	1599.42	1600.27	1601.11	1601.95	**16.70**
16.80	1601.95	1602.80	1603.64	1604.49	1605.33	1606.18	1607.02	1607.87	1608.71	1609.56	1610.40	**16.80**
16.90	1610.40	1611.25	1612.09	1612.94	1613.79	1614.63	1615.48	1616.33	1617.17	1618.02	1618.87	**16.90**
17.00	1618.87	1619.71	1620.56	1621.41	1622.26	1623.10	1623.95	1624.80	1625.65	1626.50	1627.34	**17.00**
17.10	1627.34	1628.19	1629.04	1629.89	1630.74	1631.59	1632.44	1633.29	1634.14	1634.99	1635.84	**17.10**
17.20	1635.84	1636.69	1637.54	1638.39	1639.24	1640.09	1640.94	1641.79	1642.65	1643.50	1644.35	**17.20**
17.30	1644.35	1645.20	1646.05	1646.91	1647.76	1648.61	1649.46	1650.32	1651.17	1652.02	1652.88	**17.30**
17.40	1652.88	1653.73	1654.59	1655.44	1656.29	1657.15	1658.00	1658.86	1659.71	1660.57	1661.42	**17.40**
17.50	1661.42	1662.28	1663.13	1663.99	1664.85	1665.70	1666.56	1667.42	1668.27	1669.13	1669.99	**17.50**
17.60	1669.99	1670.84	1671.70	1672.56	1673.42	1674.28	1675.14	1676.00	1676.86	1677.72	1678.58	**17.60**
17.70	1678.58	1679.44	1680.30	1681.16	1682.02	1682.88	1683.75	1684.61	1685.47	1686.34	1687.20	**17.70**
17.80	1687.20	1688.07	1688.93	1689.80	1690.67	1691.53	1692.40	1693.27	1694.14	1695.01	1695.88	**17.80**
17.90	1695.88	1696.75	1697.62	1698.49	1699.36	1700.24	1701.11	1701.98	1702.86	1703.73	1704.61	**17.90**
18.00	1704.61	1705.49	1706.37	1707.25	1708.13	1709.01	1709.89	1710.77	1711.65	1712.54	1713.42	**18.00**
18.10	1713.42	1714.31	1715.19	1716.08	1716.97	1717.86	1718.75	1719.64	1720.53	1721.42	1722.32	**18.10**
18.20	1722.32	1723.21	1724.11	1725.00	1725.90	1726.80	1727.70	1728.60	1729.51	1730.41	1731.32	**18.20**
18.30	1731.32	1732.22	1733.13	1734.04	1734.95	1735.86	1736.77	1737.69	1738.60	1739.52	1740.44	**18.30**
18.40	1740.44	1741.35	1742.28	1743.20	1744.12	1745.05	1745.97	1746.90	1747.83	1748.76	1749.70	**18.40**
18.50	1749.70	1750.63	1751.57	1752.50	1753.44	1754.38	1755.33	1756.27	1757.22	1758.17	1759.12	**18.50**
18.60	1759.12	1760.07	1761.02	1761.98	1762.94	1763.90	1764.86	1765.82	1766.79	1767.76		**18.60**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B4.2.2. *Type S thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
						Temperatures in Degrees Fahrenheit						
−0.20	−42.37	−46.66	−51.03	−55.48								**−0.20**
−0.10	−2.95	−6.66	−10.41	−14.21	−18.06	−21.96	−25.92	−29.93	−34.01	−38.15	−42.37	**−0.10**
0.00	32.00	28.65	25.28	21.87	18.43	14.96	11.45	7.91	4.33	0.71	−2.95	**0.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B4.2.2. *Type S thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	35.32	38.61	41.87	45.11	48.32	51.51	54.67	57.81	60.93	64.03	0.00
0.10	64.03	67.11	70.16	73.20	76.22	79.22	82.20	85.17	88.11	91.04	93.96	0.10
0.20	93.96	96.86	99.74	102.61	105.46	108.30	111.13	113.94	116.74	119.52	122.30	0.20
0.30	122.30	125.06	127.81	130.54	133.27	135.98	138.68	141.37	144.05	146.72	149.38	0.30
0.40	149.38	152.03	154.67	157.30	159.92	162.53	165.13	167.72	170.31	172.88	175.45	0.40
0.50	175.45	178.00	180.55	183.09	185.63	188.15	190.67	193.18	195.68	198.18	200.67	0.50
0.60	200.67	203.15	205.62	208.09	210.55	213.00	215.45	217.89	220.32	222.75	225.17	0.60
0.70	225.17	227.59	230.00	232.40	234.80	237.19	239.58	241.96	244.33	246.70	249.07	0.70
0.80	249.07	251.43	253.78	256.13	258.48	260.81	263.15	265.48	267.80	270.12	272.44	0.80
0.90	272.44	274.75	277.05	279.35	281.65	283.94	286.23	288.52	290.80	293.07	295.34	0.90
1.00	295.34	297.61	299.87	302.13	304.39	306.64	308.89	311.13	313.37	315.61	317.84	1.00
1.10	317.84	320.07	322.29	324.52	326.73	328.95	331.16	333.37	335.57	337.77	339.97	1.10
1.20	339.97	342.17	344.36	346.55	348.73	350.92	353.10	355.27	357.45	359.62	361.78	1.20
1.30	361.78	363.95	366.11	368.27	370.42	372.58	374.73	376.87	379.02	381.16	383.30	1.30
1.40	383.30	385.44	387.57	389.70	391.83	393.96	396.08	398.21	400.33	402.44	404.56	1.40
1.50	404.56	406.67	408.78	410.88	412.99	415.09	417.19	419.29	421.39	423.48	425.57	1.50
1.60	425.57	427.66	429.75	431.83	433.92	436.00	438.07	440.15	442.23	444.30	446.37	1.60
1.70	446.37	448.44	450.50	452.57	454.63	456.69	458.75	460.81	462.86	464.91	466.97	1.70
1.80	466.97	469.01	471.06	473.11	475.15	477.19	479.23	481.27	483.31	485.34	487.38	1.80
1.90	487.38	489.41	491.44	493.47	495.50	497.52	499.54	501.57	503.59	505.60	507.62	1.90
2.00	507.62	509.64	511.65	513.66	515.67	517.68	519.69	521.70	523.70	525.71	527.71	2.00
2.10	527.71	529.71	531.71	533.71	535.70	537.70	539.69	541.68	543.67	545.66	547.65	2.10
2.20	547.65	549.64	551.62	553.60	555.59	557.57	559.55	561.53	563.50	565.48	567.45	2.20
2.30	567.45	569.43	571.40	573.37	575.34	577.31	579.28	581.24	583.21	585.17	587.13	2.30
2.40	587.13	589.09	591.05	593.01	594.97	596.93	598.88	600.84	602.79	604.74	606.69	2.40
2.50	606.69	608.64	610.59	612.54	614.49	616.43	618.38	620.32	622.26	624.20	626.14	2.50
2.60	626.14	628.08	630.02	631.96	633.89	635.83	637.76	639.69	641.63	643.56	645.49	2.60
2.70	645.49	647.42	649.34	651.27	653.20	655.12	657.05	658.97	660.89	662.81	664.73	2.70
2.80	664.73	666.65	668.57	670.49	672.40	674.32	676.23	678.15	680.06	681.97	683.88	2.80
2.90	683.88	685.79	687.70	689.61	691.52	693.43	695.33	697.24	699.14	701.04	702.95	2.90
3.00	702.95	704.85	706.75	708.65	710.55	712.45	714.34	716.24	718.13	720.03	721.92	3.00
3.10	721.92	723.82	725.71	727.60	729.49	731.38	733.27	735.16	737.05	738.93	740.82	3.10
3.20	740.82	742.71	744.59	746.47	748.36	750.24	752.12	754.00	755.88	757.76	759.64	3.20
3.30	759.64	761.52	763.39	765.27	767.15	769.02	770.90	772.77	774.64	776.51	778.38	3.30
3.40	778.38	780.25	782.12	783.99	785.86	787.73	789.60	791.46	793.33	795.19	797.06	3.40
3.50	797.06	798.92	800.78	802.65	804.51	806.37	808.23	810.09	811.95	813.80	815.66	3.50
3.60	815.66	817.52	819.37	821.23	823.08	824.94	826.79	828.64	830.50	832.35	834.20	3.60
3.70	834.20	836.05	837.90	839.75	841.60	843.44	845.29	847.14	848.98	850.83	852.67	3.70
3.80	852.67	854.51	856.36	858.20	860.04	861.88	863.72	865.56	867.40	869.24	871.08	3.80
3.90	871.08	872.92	874.75	876.59	878.43	880.26	882.10	883.93	885.76	887.60	889.43	3.90
4.00	889.43	891.26	893.09	894.92	896.75	898.58	900.41	902.24	904.06	905.89	907.72	4.00
4.10	907.72	909.54	911.37	913.19	915.01	916.84	918.66	920.48	922.30	924.12	925.94	4.10
4.20	925.94	927.76	929.58	931.40	933.22	935.04	936.85	938.67	940.49	942.30	944.11	4.20
4.30	944.11	945.93	947.74	949.55	951.37	953.18	954.99	956.80	958.61	960.42	962.23	4.30
4.40	962.23	964.04	965.84	967.65	969.46	971.26	973.07	974.88	976.68	978.48	980.29	4.40
4.50	980.29	982.09	983.89	985.69	987.49	989.29	991.09	992.89	994.69	996.49	998.29	4.50
4.60	998.29	1000.09	1001.88	1003.68	1005.48	1007.27	1009.06	1010.86	1012.65	1014.44	1016.24	4.60
4.70	1016.24	1018.03	1019.82	1021.61	1023.40	1025.19	1026.98	1028.77	1030.56	1032.34	1034.13	4.70
4.80	1034.13	1035.92	1037.70	1039.49	1041.27	1043.06	1044.84	1046.62	1048.41	1050.19	1051.97	4.80
4.90	1051.97	1053.75	1055.53	1057.31	1059.09	1060.87	1062.65	1064.43	1066.21	1067.98	1069.76	4.90
5.00	1069.76	1071.53	1073.31	1075.08	1076.86	1078.63	1080.40	1082.18	1083.95	1085.72	1087.49	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B4.2.2. *Type S thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	1069.76	1071.53	1073.31	1075.08	1076.86	1078.63	1080.40	1082.18	1083.95	1085.72	1087.49	**5.00**
5.10	1087.49	1089.26	1091.03	1092.80	1094.57	1096.34	1098.11	1099.87	1101.64	1103.41	1105.17	**5.10**
5.20	1105.17	1106.94	1108.70	1110.47	1112.23	1113.99	1115.76	1117.52	1119.28	1121.04	1122.80	**5.20**
5.30	1122.80	1124.56	1126.32	1128.08	1129.84	1131.60	1133.35	1135.11	1136.87	1138.62	1140.38	**5.30**
5.40	1140.38	1142.13	1143.89	1145.64	1147.39	1149.15	1150.90	1152.65	1154.40	1156.15	1157.90	**5.40**
5.50	1157.90	1159.65	1161.40	1163.15	1164.90	1166.64	1168.39	1170.14	1171.88	1173.63	1175.37	**5.50**
5.60	1175.37	1177.12	1178.86	1180.61	1182.35	1184.09	1185.83	1187.57	1189.31	1191.06	1192.79	**5.60**
5.70	1192.79	1194.53	1196.27	1198.01	1199.75	1201.49	1203.22	1204.96	1206.69	1208.43	1210.16	**5.70**
5.80	1210.16	1211.90	1213.63	1215.36	1217.10	1218.83	1220.56	1222.29	1224.02	1225.75	1227.48	**5.80**
5.90	1227.48	1229.21	1230.94	1232.66	1234.39	1236.12	1237.84	1239.57	1241.30	1243.02	1244.74	**5.90**
6.00	1244.74	1246.47	1248.19	1249.91	1251.64	1253.36	1255.08	1256.80	1258.52	1260.24	1261.96	**6.00**
6.10	1261.96	1263.68	1265.39	1267.11	1268.83	1270.55	1272.26	1273.98	1275.69	1277.41	1279.12	**6.10**
6.20	1279.12	1280.83	1282.55	1284.26	1285.97	1287.68	1289.39	1291.10	1292.81	1294.52	1296.23	**6.20**
6.30	1296.23	1297.94	1299.65	1301.35	1303.06	1304.77	1306.47	1308.18	1309.88	1311.59	1313.29	**6.30**
6.40	1313.29	1314.99	1316.70	1318.40	1320.10	1321.80	1323.50	1325.20	1326.90	1328.60	1330.30	**6.40**
6.50	1330.30	1332.00	1333.69	1335.39	1337.09	1338.78	1340.48	1342.17	1343.87	1345.56	1347.26	**6.50**
6.60	1347.26	1348.95	1350.64	1352.33	1354.02	1355.71	1357.41	1359.10	1360.78	1362.47	1364.16	**6.60**
6.70	1364.16	1365.85	1367.54	1369.22	1370.91	1372.60	1374.28	1375.97	1377.65	1379.33	1381.02	**6.70**
6.80	1381.02	1382.70	1384.38	1386.06	1387.75	1389.43	1391.11	1392.79	1394.47	1396.14	1397.82	**6.80**
6.90	1397.82	1399.50	1401.18	1402.85	1404.53	1406.21	1407.88	1409.56	1411.23	1412.90	1414.58	**6.90**
7.00	1414.58	1416.25	1417.92	1419.60	1421.27	1422.94	1424.61	1426.28	1427.95	1429.62	1431.28	**7.00**
7.10	1431.28	1432.95	1434.62	1436.29	1437.95	1439.62	1441.28	1442.95	1444.61	1446.28	1447.94	**7.10**
7.20	1447.94	1449.60	1451.26	1452.93	1454.59	1456.25	1457.91	1459.57	1461.23	1462.89	1464.55	**7.20**
7.30	1464.55	1466.20	1467.86	1469.52	1471.17	1472.83	1474.49	1476.14	1477.80	1479.45	1481.10	**7.30**
7.40	1481.10	1482.76	1484.41	1486.06	1487.71	1489.36	1491.02	1492.67	1494.31	1495.96	1497.61	**7.40**
7.50	1497.61	1499.26	1500.91	1502.56	1504.20	1505.85	1507.50	1509.14	1510.79	1512.43	1514.07	**7.50**
7.60	1514.07	1515.72	1517.36	1519.00	1520.65	1522.29	1523.93	1525.57	1527.21	1528.85	1530.49	**7.60**
7.70	1530.49	1532.13	1533.76	1535.40	1537.04	1538.68	1540.31	1541.95	1543.58	1545.22	1546.85	**7.70**
7.80	1546.85	1548.49	1550.12	1551.75	1553.39	1555.02	1556.65	1558.28	1559.91	1561.54	1563.17	**7.80**
7.90	1563.17	1564.80	1566.43	1568.06	1569.69	1571.32	1572.94	1574.57	1576.20	1577.82	1579.45	**7.90**
8.00	1579.45	1581.07	1582.70	1584.32	1585.94	1587.57	1589.19	1590.81	1592.43	1594.05	1595.68	**8.00**
8.10	1595.68	1597.30	1598.92	1600.53	1602.15	1603.77	1605.39	1607.01	1608.62	1610.24	1611.86	**8.10**
8.20	1611.86	1613.47	1615.09	1616.70	1618.32	1619.93	1621.55	1623.16	1624.77	1626.38	1628.00	**8.20**
8.30	1628.00	1629.61	1631.22	1632.83	1634.44	1636.05	1637.66	1639.27	1640.88	1642.48	1644.09	**8.30**
8.40	1644.09	1645.70	1647.30	1648.91	1650.52	1652.12	1653.73	1655.33	1656.93	1658.54	1660.14	**8.40**
8.50	1660.14	1661.74	1663.35	1664.95	1666.55	1668.15	1669.75	1671.35	1672.95	1674.55	1676.15	**8.50**
8.60	1676.15	1677.75	1679.35	1680.94	1682.54	1684.14	1685.73	1687.33	1688.93	1690.52	1692.12	**8.60**
8.70	1692.12	1693.71	1695.30	1696.90	1698.49	1700.08	1701.68	1703.27	1704.86	1706.45	1708.04	**8.70**
8.80	1708.04	1709.63	1711.22	1712.81	1714.40	1715.99	1717.58	1719.16	1720.75	1722.34	1723.92	**8.80**
8.90	1723.92	1725.51	1727.10	1728.68	1730.27	1731.85	1733.44	1735.02	1736.60	1738.19	1739.77	**8.90**
9.00	1739.77	1741.35	1742.93	1744.51	1746.09	1747.68	1749.26	1750.83	1752.41	1753.99	1755.57	**9.00**
9.10	1755.57	1757.15	1758.73	1760.31	1761.88	1763.46	1765.04	1766.61	1768.19	1769.76	1771.34	**9.10**
9.20	1771.34	1772.91	1774.48	1776.06	1777.63	1779.20	1780.78	1782.35	1783.92	1785.49	1787.06	**9.20**
9.30	1787.06	1788.63	1790.20	1791.77	1793.34	1794.91	1796.48	1798.05	1799.62	1801.18	1802.75	**9.30**
9.40	1802.75	1804.32	1805.88	1807.45	1809.01	1810.58	1812.14	1813.71	1815.27	1816.84	1818.40	**9.40**
9.50	1818.40	1819.96	1821.53	1823.09	1824.65	1826.21	1827.77	1829.33	1830.89	1832.45	1834.01	**9.50**
9.60	1834.01	1835.57	1837.13	1838.69	1840.25	1841.80	1843.36	1844.92	1846.48	1848.03	1849.59	**9.60**
9.70	1849.59	1851.14	1852.70	1854.25	1855.81	1857.36	1858.92	1860.47	1862.02	1863.57	1865.13	**9.70**
9.80	1865.13	1866.68	1868.23	1869.78	1871.33	1872.88	1874.43	1875.98	1877.53	1879.08	1880.63	**9.80**
9.90	1880.63	1882.18	1883.73	1885.27	1886.82	1888.37	1889.91	1891.46	1893.01	1894.55	1896.10	**9.90**
10.00	1896.10	1897.64	1899.19	1900.73	1902.27	1903.82	1905.36	1906.90	1908.44	1909.99	1911.53	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B4.2.2. *Type S thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	1896.10	1897.64	1899.19	1900.73	1902.27	1903.82	1905.36	1906.90	1908.44	1909.99	1911.53	10.00
10.10	1911.53	1913.07	1914.61	1916.15	1917.69	1919.23	1920.77	1922.31	1923.84	1925.38	1926.92	10.10
10.20	1926.92	1928.46	1930.00	1931.53	1933.07	1934.60	1936.14	1937.68	1939.21	1940.74	1942.28	10.20
10.30	1942.28	1943.81	1945.35	1946.88	1948.41	1949.94	1951.48	1953.01	1954.54	1956.07	1957.60	10.30
10.40	1957.60	1959.13	1960.66	1962.19	1963.72	1965.25	1966.78	1968.31	1969.84	1971.37	1972.90	10.40
10.50	1972.90	1974.42	1975.95	1977.48	1979.00	1980.53	1982.06	1983.58	1985.11	1986.63	1988.16	10.50
10.60	1988.16	1989.68	1991.21	1992.73	1994.26	1995.78	1997.30	1998.83	2000.35	2001.87	2003.40	10.60
10.70	2003.40	2004.92	2006.44	2007.96	2009.48	2011.00	2012.53	2014.05	2015.57	2017.09	2018.61	10.70
10.80	2018.61	2020.13	2021.65	2023.16	2024.68	2026.20	2027.72	2029.24	2030.76	2032.27	2033.79	10.80
10.90	2033.79	2035.31	2036.82	2038.34	2039.86	2041.37	2042.89	2044.40	2045.92	2047.44	2048.95	10.90
11.00	2048.95	2050.46	2051.98	2053.49	2055.01	2056.52	2058.03	2059.55	2061.06	2062.57	2064.09	11.00
11.10	2064.09	2065.60	2067.11	2068.62	2070.13	2071.65	2073.16	2074.67	2076.18	2077.69	2079.20	11.10
11.20	2079.20	2080.71	2082.22	2083.73	2085.24	2086.75	2088.26	2089.77	2091.27	2092.78	2094.29	11.20
11.30	2094.29	2095.80	2097.31	2098.81	2100.32	2101.83	2103.34	2104.84	2106.35	2107.86	2109.36	11.30
11.40	2109.36	2110.87	2112.37	2113.88	2115.38	2116.89	2118.39	2119.90	2121.40	2122.91	2124.41	11.40
11.50	2124.41	2125.92	2127.42	2128.92	2130.43	2131.93	2133.43	2134.94	2136.44	2137.94	2139.44	11.50
11.60	2139.44	2140.95	2142.45	2143.95	2145.45	2146.95	2148.45	2149.95	2151.46	2152.96	2154.46	11.60
11.70	2154.46	2155.96	2157.46	2158.96	2160.46	2161.96	2163.46	2164.96	2166.46	2167.95	2169.45	11.70
11.80	2169.45	2170.95	2172.45	2173.95	2175.45	2176.95	2178.44	2179.94	2181.44	2182.94	2184.43	11.80
11.90	2184.43	2185.93	2187.43	2188.92	2190.42	2191.92	2193.41	2194.91	2196.41	2197.90	2199.40	11.90
12.00	2199.40	2200.89	2202.39	2203.88	2205.38	2206.87	2208.37	2209.86	2211.36	2212.85	2214.35	12.00
12.10	2214.35	2215.84	2217.34	2218.83	2220.32	2221.82	2223.31	2224.81	2226.30	2227.79	2229.28	12.10
12.20	2229.28	2230.78	2232.27	2233.76	2235.26	2236.75	2238.24	2239.73	2241.22	2242.72	2244.21	12.20
12.30	2244.21	2245.70	2247.19	2248.68	2250.17	2251.67	2253.16	2254.65	2256.14	2257.63	2259.12	12.30
12.40	2259.12	2260.61	2262.10	2263.59	2265.08	2266.57	2268.06	2269.55	2271.04	2272.53	2274.02	12.40
12.50	2274.02	2275.51	2277.00	2278.49	2279.98	2281.47	2282.95	2284.44	2285.93	2287.42	2288.91	12.50
12.60	2288.91	2290.40	2291.89	2293.37	2294.86	2296.35	2297.84	2299.33	2300.81	2302.30	2303.79	12.60
12.70	2303.79	2305.28	2306.76	2308.25	2309.74	2311.23	2312.71	2314.20	2315.69	2317.17	2318.66	12.70
12.80	2318.66	2320.15	2321.63	2323.12	2324.61	2326.09	2327.58	2329.07	2330.55	2332.04	2333.52	12.80
12.90	2333.52	2335.01	2336.50	2337.98	2339.47	2340.95	2342.44	2343.92	2345.41	2346.90	2348.38	12.90
13.00	2348.38	2349.87	2351.35	2352.84	2354.32	2355.81	2357.29	2358.78	2360.26	2361.75	2363.23	13.00
13.10	2363.23	2364.72	2366.20	2367.68	2369.17	2370.65	2372.14	2373.62	2375.11	2376.59	2378.08	13.10
13.20	2378.08	2379.56	2381.04	2382.53	2384.01	2385.50	2386.98	2388.46	2389.95	2391.43	2392.92	13.20
13.30	2392.92	2394.40	2395.88	2397.37	2398.85	2400.33	2401.82	2403.30	2404.78	2406.27	2407.75	13.30
13.40	2407.75	2409.23	2410.72	2412.20	2413.68	2415.17	2416.65	2418.13	2419.62	2421.10	2422.58	13.40
13.50	2422.58	2424.07	2425.55	2427.03	2428.52	2430.00	2431.48	2432.97	2434.45	2435.93	2437.41	13.50
13.60	2437.41	2438.90	2440.38	2441.86	2443.35	2444.83	2446.31	2447.79	2449.28	2450.76	2452.24	13.60
13.70	2452.24	2453.73	2455.21	2456.69	2458.17	2459.66	2461.14	2462.62	2464.11	2465.59	2467.07	13.70
13.80	2467.07	2468.55	2470.04	2471.52	2473.00	2474.49	2475.97	2477.45	2478.93	2480.42	2481.90	13.80
13.90	2481.90	2483.38	2484.87	2486.35	2487.83	2489.31	2490.80	2492.28	2493.76	2495.25	2496.73	13.90
14.00	2496.73	2498.21	2499.69	2501.18	2502.66	2504.14	2505.63	2507.11	2508.59	2510.08	2511.56	14.00
14.10	2511.56	2513.04	2514.52	2516.01	2517.49	2518.97	2520.46	2521.94	2523.42	2524.91	2526.39	14.10
14.20	2526.39	2527.87	2529.36	2530.84	2532.33	2533.81	2535.29	2536.78	2538.26	2539.74	2541.23	14.20
14.30	2541.23	2542.71	2544.19	2545.68	2547.16	2548.65	2550.13	2551.61	2553.10	2554.58	2556.07	14.30
14.40	2556.07	2557.55	2559.04	2560.52	2562.00	2563.49	2564.97	2566.46	2567.94	2569.43	2570.91	14.40
14.50	2570.91	2572.40	2573.88	2575.37	2576.85	2578.34	2579.82	2581.31	2582.79	2584.28	2585.76	14.50
14.60	2585.76	2587.25	2588.73	2590.22	2591.70	2593.19	2594.67	2596.16	2597.65	2599.13	2600.62	14.60
14.70	2600.62	2602.10	2603.59	2605.08	2606.56	2608.05	2609.53	2611.02	2612.51	2613.99	2615.48	14.70
14.80	2615.48	2616.97	2618.45	2619.94	2621.43	2622.92	2624.40	2625.89	2627.38	2628.86	2630.35	14.80
14.90	2630.35	2631.84	2633.33	2634.82	2636.30	2637.79	2639.28	2640.77	2642.26	2643.74	2645.23	14.90
15.00	2645.23	2646.72	2648.21	2649.70	2651.19	2652.68	2654.17	2655.65	2657.14	2658.63	2660.12	15.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B4.2.2. *Type S thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	2645.23	2646.72	2648.21	2649.70	2651.19	2652.68	2654.17	2655.65	2657.14	2658.63	2660.12	**15.00**
15.10	2660.12	2661.61	2663.10	2664.59	2666.08	2667.57	2669.06	2670.55	2672.04	2673.53	2675.02	**15.10**
15.20	2675.02	2676.51	2678.00	2679.49	2680.98	2682.48	2683.97	2685.46	2686.95	2688.44	2689.93	**15.20**
15.30	2689.93	2691.42	2692.92	2694.41	2695.90	2697.39	2698.89	2700.38	2701.87	2703.36	2704.86	**15.30**
15.40	2704.86	2706.35	2707.84	2709.34	2710.83	2712.32	2713.82	2715.31	2716.80	2718.30	2719.79	**15.40**
15.50	2719.79	2721.29	2722.78	2724.28	2725.77	2727.26	2728.76	2730.26	2731.75	2733.25	2734.74	**15.50**
15.60	2734.74	2736.24	2737.73	2739.23	2740.73	2742.22	2743.72	2745.21	2746.71	2748.21	2749.71	**15.60**
15.70	2749.71	2751.20	2752.70	2754.20	2755.70	2757.19	2758.69	2760.19	2761.69	2763.19	2764.68	**15.70**
15.80	2764.68	2766.18	2767.68	2769.18	2770.68	2772.18	2773.68	2775.18	2776.68	2778.18	2779.68	**15.80**
15.90	2779.68	2781.18	2782.68	2784.18	2785.68	2787.18	2788.69	2790.19	2791.69	2793.19	2794.69	**15.90**
16.00	2794.69	2796.20	2797.70	2799.20	2800.70	2802.21	2803.71	2805.21	2806.72	2808.22	2809.72	**16.00**
16.10	2809.72	2811.23	2812.73	2814.24	2815.74	2817.25	2818.75	2820.26	2821.76	2823.27	2824.77	**16.10**
16.20	2824.77	2826.28	2827.79	2829.29	2830.80	2832.31	2833.81	2835.32	2836.83	2838.33	2839.84	**16.20**
16.30	2839.84	2841.35	2842.86	2844.37	2845.88	2847.38	2848.89	2850.40	2851.91	2853.42	2854.93	**16.30**
16.40	2854.93	2856.44	2857.95	2859.46	2860.97	2862.49	2864.00	2865.51	2867.02	2868.53	2870.04	**16.40**
16.50	2870.04	2871.56	2873.07	2874.58	2876.09	2877.61	2879.12	2880.64	2882.15	2883.66	2885.18	**16.50**
16.60	2885.18	2886.69	2888.21	2889.72	2891.24	2892.75	2894.27	2895.79	2897.30	2898.82	2900.34	**16.60**
16.70	2900.34	2901.85	2903.37	2904.89	2906.41	2907.92	2909.44	2910.96	2912.48	2914.00	2915.52	**16.70**
16.80	2915.52	2917.04	2918.56	2920.08	2921.60	2923.12	2924.64	2926.16	2927.68	2929.20	2930.73	**16.80**
16.90	2930.73	2932.25	2933.77	2935.29	2936.82	2938.34	2939.86	2941.39	2942.91	2944.43	2945.96	**16.90**
17.00	2945.96	2947.48	2949.01	2950.53	2952.06	2953.59	2955.11	2956.64	2958.17	2959.69	2961.22	**17.00**
17.10	2961.22	2962.75	2964.28	2965.80	2967.33	2968.86	2970.39	2971.92	2973.45	2974.98	2976.51	**17.10**
17.20	2976.51	2978.04	2979.57	2981.10	2982.63	2984.17	2985.70	2987.23	2988.76	2990.30	2991.83	**17.20**
17.30	2991.83	2993.36	2994.90	2996.43	2997.97	2999.50	3001.04	3002.57	3004.11	3005.64	3007.18	**17.30**
17.40	3007.18	3008.72	3010.25	3011.79	3013.33	3014.87	3016.40	3017.94	3019.48	3021.02	3022.56	**17.40**
17.50	3022.56	3024.10	3025.64	3027.18	3028.72	3030.26	3031.81	3033.35	3034.89	3036.43	3037.98	**17.50**
17.60	3037.98	3039.52	3041.06	3042.61	3044.15	3045.70	3047.25	3048.79	3050.34	3051.89	3053.44	**17.60**
17.70	3053.44	3054.99	3056.54	3058.09	3059.64	3061.19	3062.74	3064.30	3065.85	3067.41	3068.96	**17.70**
17.80	3068.96	3070.52	3072.08	3073.64	3075.20	3076.76	3078.32	3079.88	3081.45	3083.01	3084.58	**17.80**
17.90	3084.58	3086.14	3087.71	3089.28	3090.85	3092.42	3094.00	3095.57	3097.15	3098.72	3100.30	**17.90**
18.00	3100.30	3101.88	3103.46	3105.04	3106.63	3108.21	3109.80	3111.38	3112.97	3114.56	3116.16	**18.00**
18.10	3116.16	3117.75	3119.34	3120.94	3122.54	3124.14	3125.74	3127.35	3128.95	3130.56	3132.17	**18.10**
18.20	3132.17	3133.78	3135.39	3137.01	3138.62	3140.24	3141.86	3143.49	3145.11	3146.74	3148.37	**18.20**
18.30	3148.37	3150.00	3151.63	3153.27	3154.91	3156.55	3158.19	3159.83	3161.48	3163.13	3164.78	**18.30**
18.40	3164.78	3166.44	3168.10	3169.76	3171.42	3173.08	3174.75	3176.42	3178.10	3179.77	3181.45	**18.40**
18.50	3181.45	3183.13	3184.82	3186.51	3188.20	3189.89	3191.59	3193.29	3194.99	3196.70	3198.41	**18.50**
18.60	3198.41	3200.13	3201.84	3203.56	3205.29	3207.01	3208.75	3210.48	3212.22	3213.96		**18.60**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

B5. Supplementary Reference Tables for Type E—Nickel-Chromium Alloy Versus Copper-Nickel Alloy Thermocouples

B5.1. Tables with Voltage as a Function of Temperature

The reference function for type E thermocouples given in the main text (see table 5.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B5.1.1 and B5.1.2. Table B5.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 1000 °C, and table B5.1.2 presents voltage values at 1 °F intervals from −454 °F to 1832 °F.

TABLE B5.1.1. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−9.835											−270
−260	−9.797	−9.802	−9.808	−9.813	−9.817	−9.821	−9.825	−9.828	−9.831	−9.833	−9.835	−260
−250	−9.718	−9.728	−9.737	−9.746	−9.754	−9.762	−9.770	−9.777	−9.784	−9.790	−9.797	−250
−240	−9.604	−9.617	−9.630	−9.642	−9.654	−9.666	−9.677	−9.688	−9.698	−9.709	−9.718	−240
−230	−9.455	−9.471	−9.487	−9.503	−9.519	−9.534	−9.548	−9.563	−9.577	−9.591	−9.604	−230
−220	−9.274	−9.293	−9.313	−9.331	−9.350	−9.368	−9.386	−9.404	−9.421	−9.438	−9.455	−220
−210	−9.063	−9.085	−9.107	−9.129	−9.151	−9.172	−9.193	−9.214	−9.234	−9.254	−9.274	−210
−200	−8.825	−8.850	−8.874	−8.899	−8.923	−8.947	−8.971	−8.994	−9.017	−9.040	−9.063	−200
−190	−8.561	−8.588	−8.616	−8.643	−8.669	−8.696	−8.722	−8.748	−8.774	−8.799	−8.825	−190
−180	−8.273	−8.303	−8.333	−8.362	−8.391	−8.420	−8.449	−8.477	−8.505	−8.533	−8.561	−180
−170	−7.963	−7.995	−8.027	−8.059	−8.090	−8.121	−8.152	−8.183	−8.213	−8.243	−8.273	−170
−160	−7.632	−7.666	−7.700	−7.733	−7.767	−7.800	−7.833	−7.866	−7.899	−7.931	−7.963	−160
−150	−7.279	−7.315	−7.351	−7.387	−7.423	−7.458	−7.493	−7.528	−7.563	−7.597	−7.632	−150
−140	−6.907	−6.945	−6.983	−7.021	−7.058	−7.096	−7.133	−7.170	−7.206	−7.243	−7.279	−140
−130	−6.516	−6.556	−6.596	−6.636	−6.675	−6.714	−6.753	−6.792	−6.831	−6.869	−6.907	−130
−120	−6.107	−6.149	−6.191	−6.232	−6.273	−6.314	−6.355	−6.396	−6.436	−6.476	−6.516	−120
−110	−5.681	−5.724	−5.767	−5.810	−5.853	−5.896	−5.939	−5.981	−6.023	−6.065	−6.107	−110
−100	−5.237	−5.282	−5.327	−5.372	−5.417	−5.461	−5.505	−5.549	−5.593	−5.637	−5.681	−100
−90	−4.777	−4.824	−4.871	−4.917	−4.963	−5.009	−5.055	−5.101	−5.147	−5.192	−5.237	−90
−80	−4.302	−4.350	−4.398	−4.446	−4.494	−4.542	−4.589	−4.636	−4.684	−4.731	−4.777	−80
−70	−3.811	−3.861	−3.911	−3.960	−4.009	−4.058	−4.107	−4.156	−4.205	−4.254	−4.302	−70
−60	−3.306	−3.357	−3.408	−3.459	−3.510	−3.561	−3.611	−3.661	−3.711	−3.761	−3.811	−60
−50	−2.787	−2.840	−2.892	−2.944	−2.996	−3.048	−3.100	−3.152	−3.204	−3.255	−3.306	−50
−40	−2.255	−2.309	−2.362	−2.416	−2.469	−2.523	−2.576	−2.629	−2.682	−2.735	−2.787	−40
−30	−1.709	−1.765	−1.820	−1.874	−1.929	−1.984	−2.038	−2.093	−2.147	−2.201	−2.255	−30
−20	−1.152	−1.208	−1.264	−1.320	−1.376	−1.432	−1.488	−1.543	−1.599	−1.654	−1.709	−20
−10	−0.582	−0.639	−0.697	−0.754	−0.811	−0.868	−0.925	−0.982	−1.039	−1.095	−1.152	−10
0	0.000	−0.059	−0.117	−0.176	−0.234	−0.292	−0.350	−0.408	−0.466	−0.524	−0.582	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B5.1.1. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.059	0.118	0.176	0.235	0.294	0.354	0.413	0.472	0.532	0.591	0
10	0.591	0.651	0.711	0.770	0.830	0.890	0.950	1.010	1.071	1.131	1.192	10
20	1.192	1.252	1.313	1.373	1.434	1.495	1.556	1.617	1.678	1.740	1.801	20
30	1.801	1.862	1.924	1.986	2.047	2.109	2.171	2.233	2.295	2.357	2.420	30
40	2.420	2.482	2.545	2.607	2.670	2.733	2.795	2.858	2.921	2.984	3.048	40
50	3.048	3.111	3.174	3.238	3.301	3.365	3.429	3.492	3.556	3.620	3.685	50
60	3.685	3.749	3.813	3.877	3.942	4.006	4.071	4.136	4.200	4.265	4.330	60
70	4.330	4.395	4.460	4.526	4.591	4.656	4.722	4.788	4.853	4.919	4.985	70
80	4.985	5.051	5.117	5.183	5.249	5.315	5.382	5.448	5.514	5.581	5.648	80
90	5.648	5.714	5.781	5.848	5.915	5.982	6.049	6.117	6.184	6.251	6.319	90
100	6.319	6.386	6.454	6.522	6.590	6.658	6.725	6.794	6.862	6.930	6.998	100
110	6.998	7.066	7.135	7.203	7.272	7.341	7.409	7.478	7.547	7.616	7.685	110
120	7.685	7.754	7.823	7.892	7.962	8.031	8.101	8.170	8.240	8.309	8.379	120
130	8.379	8.449	8.519	8.589	8.659	8.729	8.799	8.869	8.940	9.010	9.081	130
140	9.081	9.151	9.222	9.292	9.363	9.434	9.505	9.576	9.647	9.718	9.789	140
150	9.789	9.860	9.931	10.003	10.074	10.145	10.217	10.288	10.360	10.432	10.503	150
160	10.503	10.575	10.647	10.719	10.791	10.863	10.935	11.007	11.080	11.152	11.224	160
170	11.224	11.297	11.369	11.442	11.514	11.587	11.660	11.733	11.805	11.878	11.951	170
180	11.951	12.024	12.097	12.170	12.243	12.317	12.390	12.463	12.537	12.610	12.684	180
190	12.684	12.757	12.831	12.904	12.978	13.052	13.126	13.199	13.273	13.347	13.421	190
200	13.421	13.495	13.569	13.644	13.718	13.792	13.866	13.941	14.015	14.090	14.164	200
210	14.164	14.239	14.313	14.388	14.463	14.537	14.612	14.687	14.762	14.837	14.912	210
220	14.912	14.987	15.062	15.137	15.212	15.287	15.362	15.438	15.513	15.588	15.664	220
230	15.664	15.739	15.815	15.890	15.966	16.041	16.117	16.193	16.269	16.344	16.420	230
240	16.420	16.496	16.572	16.648	16.724	16.800	16.876	16.952	17.028	17.104	17.181	240
250	17.181	17.257	17.333	17.409	17.486	17.562	17.639	17.715	17.792	17.868	17.945	250
260	17.945	18.021	18.098	18.175	18.252	18.328	18.405	18.482	18.559	18.636	18.713	260
270	18.713	18.790	18.867	18.944	19.021	19.098	19.175	19.252	19.330	19.407	19.484	270
280	19.484	19.561	19.639	19.716	19.794	19.871	19.948	20.026	20.103	20.181	20.259	280
290	20.259	20.336	20.414	20.492	20.569	20.647	20.725	20.803	20.880	20.958	21.036	290
300	21.036	21.114	21.192	21.270	21.348	21.426	21.504	21.582	21.660	21.739	21.817	300
310	21.817	21.895	21.973	22.051	22.130	22.208	22.286	22.365	22.443	22.522	22.600	310
320	22.600	22.678	22.757	22.835	22.914	22.993	23.071	23.150	23.228	23.307	23.386	320
330	23.386	23.464	23.543	23.622	23.701	23.780	23.858	23.937	24.016	24.095	24.174	330
340	24.174	24.253	24.332	24.411	24.490	24.569	24.648	24.727	24.806	24.885	24.964	340
350	24.964	25.044	25.123	25.202	25.281	25.360	25.440	25.519	25.598	25.678	25.757	350
360	25.757	25.836	25.916	25.995	26.075	26.154	26.233	26.313	26.392	26.472	26.552	360
370	26.552	26.631	26.711	26.790	26.870	26.950	27.029	27.109	27.189	27.268	27.348	370
380	27.348	27.428	27.507	27.587	27.667	27.747	27.827	27.907	27.986	28.066	28.146	380
390	28.146	28.226	28.306	28.386	28.466	28.546	28.626	28.706	28.786	28.866	28.946	390
400	28.946	29.026	29.106	29.186	29.266	29.346	29.427	29.507	29.587	29.667	29.747	400
410	29.747	29.827	29.908	29.988	30.068	30.148	30.229	30.309	30.389	30.470	30.550	410
420	30.550	30.630	30.711	30.791	30.871	30.952	31.032	31.112	31.193	31.273	31.354	420
430	31.354	31.434	31.515	31.595	31.676	31.756	31.837	31.917	31.998	32.078	32.159	430
440	32.159	32.239	32.320	32.400	32.481	32.562	32.642	32.723	32.803	32.884	32.965	440
450	32.965	33.045	33.126	33.207	33.287	33.368	33.449	33.529	33.610	33.691	33.772	450
460	33.772	33.852	33.933	34.014	34.095	34.175	34.256	34.337	34.418	34.498	34.579	460
470	34.579	34.660	34.741	34.822	34.902	34.983	35.064	35.145	35.226	35.307	35.387	470
480	35.387	35.468	35.549	35.630	35.711	35.792	35.873	35.954	36.034	36.115	36.196	480
490	36.196	36.277	36.358	36.439	36.520	36.601	36.682	36.763	36.843	36.924	37.005	490
500	37.005	37.086	37.167	37.248	37.329	37.410	37.491	37.572	37.653	37.734	37.815	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B5.1.1. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	37.005	37.086	37.167	37.248	37.329	37.410	37.491	37.572	37.653	37.734	37.815	500
510	37.815	37.896	37.977	38.058	38.139	38.220	38.300	38.381	38.462	38.543	38.624	510
520	38.624	38.705	38.786	38.867	38.948	39.029	39.110	39.191	39.272	39.353	39.434	520
530	39.434	39.515	39.596	39.677	39.758	39.839	39.920	40.001	40.082	40.163	40.243	530
540	40.243	40.324	40.405	40.486	40.567	40.648	40.729	40.810	40.891	40.972	41.053	540
550	41.053	41.134	41.215	41.296	41.377	41.457	41.538	41.619	41.700	41.781	41.862	550
560	41.862	41.943	42.024	42.105	42.185	42.266	42.347	42.428	42.509	42.590	42.671	560
570	42.671	42.751	42.832	42.913	42.994	43.075	43.156	43.236	43.317	43.398	43.479	570
580	43.479	43.560	43.640	43.721	43.802	43.883	43.963	44.044	44.125	44.206	44.286	580
590	44.286	44.367	44.448	44.529	44.609	44.690	44.771	44.851	44.932	45.013	45.093	590
600	45.093	45.174	45.255	45.335	45.416	45.497	45.577	45.658	45.738	45.819	45.900	600
610	45.900	45.980	46.061	46.141	46.222	46.302	46.383	46.463	46.544	46.624	46.705	610
620	46.705	46.785	46.866	46.946	47.027	47.107	47.188	47.268	47.349	47.429	47.509	620
630	47.509	47.590	47.670	47.751	47.831	47.911	47.992	48.072	48.152	48.233	48.313	630
640	48.313	48.393	48.474	48.554	48.634	48.715	48.795	48.875	48.955	49.035	49.116	640
650	49.116	49.196	49.276	49.356	49.436	49.517	49.597	49.677	49.757	49.837	49.917	650
660	49.917	49.997	50.077	50.157	50.238	50.318	50.398	50.478	50.558	50.638	50.718	660
670	50.718	50.798	50.878	50.958	51.038	51.118	51.197	51.277	51.357	51.437	51.517	670
680	51.517	51.597	51.677	51.757	51.837	51.916	51.996	52.076	52.156	52.236	52.315	680
690	52.315	52.395	52.475	52.555	52.634	52.714	52.794	52.873	52.953	53.033	53.112	690
700	53.112	53.192	53.272	53.351	53.431	53.510	53.590	53.670	53.749	53.829	53.908	700
710	53.908	53.988	54.067	54.147	54.226	54.306	54.385	54.465	54.544	54.624	54.703	710
720	54.703	54.782	54.862	54.941	55.021	55.100	55.179	55.259	55.338	55.417	55.497	720
730	55.497	55.576	55.655	55.734	55.814	55.893	55.972	56.051	56.131	56.210	56.289	730
740	56.289	56.368	56.447	56.526	56.606	56.685	56.764	56.843	56.922	57.001	57.080	740
750	57.080	57.159	57.238	57.317	57.396	57.475	57.554	57.633	57.712	57.791	57.870	750
760	57.870	57.949	58.028	58.107	58.186	58.265	58.343	58.422	58.501	58.580	58.659	760
770	58.659	58.738	58.816	58.895	58.974	59.053	59.131	59.210	59.289	59.367	59.446	770
780	59.446	59.525	59.604	59.682	59.761	59.839	59.918	59.997	60.075	60.154	60.232	780
790	60.232	60.311	60.390	60.468	60.547	60.625	60.704	60.782	60.860	60.939	61.017	790
800	61.017	61.096	61.174	61.253	61.331	61.409	61.488	61.566	61.644	61.723	61.801	800
810	61.801	61.879	61.958	62.036	62.114	62.192	62.271	62.349	62.427	62.505	62.583	810
820	62.583	62.662	62.740	62.818	62.896	62.974	63.052	63.130	63.208	63.286	63.364	820
830	63.364	63.442	63.520	63.598	63.676	63.754	63.832	63.910	63.988	64.066	64.144	830
840	64.144	64.222	64.300	64.377	64.455	64.533	64.611	64.689	64.766	64.844	64.922	840
850	64.922	65.000	65.077	65.155	65.233	65.310	65.388	65.465	65.543	65.621	65.698	850
860	65.698	65.776	65.853	65.931	66.008	66.086	66.163	66.241	66.318	66.396	66.473	860
870	66.473	66.550	66.628	66.705	66.782	66.860	66.937	67.014	67.092	67.169	67.246	870
880	67.246	67.323	67.400	67.478	67.555	67.632	67.709	67.786	67.863	67.940	68.017	880
890	68.017	68.094	68.171	68.248	68.325	68.402	68.479	68.556	68.633	68.710	68.787	890
900	68.787	68.863	68.940	69.017	69.094	69.171	69.247	69.324	69.401	69.477	69.554	900
910	69.554	69.631	69.707	69.784	69.860	69.937	70.013	70.090	70.166	70.243	70.319	910
920	70.319	70.396	70.472	70.548	70.625	70.701	70.777	70.854	70.930	71.006	71.082	920
930	71.082	71.159	71.235	71.311	71.387	71.463	71.539	71.615	71.692	71.768	71.844	930
940	71.844	71.920	71.996	72.072	72.147	72.223	72.299	72.375	72.451	72.527	72.603	940
950	72.603	72.678	72.754	72.830	72.906	72.981	73.057	73.133	73.208	73.284	73.360	950
960	73.360	73.435	73.511	73.586	73.662	73.738	73.813	73.889	73.964	74.040	74.115	960
970	74.115	74.190	74.266	74.341	74.417	74.492	74.567	74.643	74.718	74.793	74.869	970
980	74.869	74.944	75.019	75.095	75.170	75.245	75.320	75.395	75.471	75.546	75.621	980
990	75.621	75.696	75.771	75.847	75.922	75.997	76.072	76.147	76.223	76.298	76.373	990
1000	76.373											1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B5.1.2. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−9.830	−9.832	−9.833	−9.834	−9.835							−450
−440	−9.809	−9.812	−9.814	−9.817	−9.819	−9.821	−9.823	−9.825	−9.827	−9.829	−9.830	−440
−430	−9.775	−9.779	−9.782	−9.786	−9.790	−9.793	−9.797	−9.800	−9.803	−9.806	−9.809	−430
−420	−9.729	−9.734	−9.739	−9.744	−9.749	−9.753	−9.758	−9.762	−9.766	−9.771	−9.775	−420
−410	−9.672	−9.678	−9.684	−9.690	−9.696	−9.702	−9.707	−9.713	−9.718	−9.724	−9.729	−410
−400	−9.604	−9.611	−9.618	−9.625	−9.632	−9.639	−9.646	−9.653	−9.659	−9.666	−9.672	−400
−390	−9.525	−9.534	−9.542	−9.550	−9.558	−9.566	−9.574	−9.581	−9.589	−9.597	−9.604	−390
−380	−9.436	−9.446	−9.455	−9.464	−9.473	−9.482	−9.491	−9.500	−9.508	−9.517	−9.525	−380
−370	−9.338	−9.348	−9.358	−9.368	−9.378	−9.388	−9.398	−9.408	−9.417	−9.427	−9.436	−370
−360	−9.229	−9.241	−9.252	−9.263	−9.274	−9.285	−9.295	−9.306	−9.317	−9.327	−9.338	−360
−350	−9.112	−9.124	−9.136	−9.148	−9.160	−9.172	−9.184	−9.195	−9.207	−9.218	−9.229	−350
−340	−8.986	−8.999	−9.012	−9.025	−9.038	−9.050	−9.063	−9.075	−9.088	−9.100	−9.112	−340
−330	−8.852	−8.866	−8.880	−8.893	−8.907	−8.920	−8.934	−8.947	−8.960	−8.973	−8.986	−330
−320	−8.710	−8.725	−8.739	−8.754	−8.768	−8.782	−8.797	−8.811	−8.825	−8.839	−8.852	−320
−310	−8.561	−8.576	−8.591	−8.607	−8.622	−8.637	−8.652	−8.666	−8.681	−8.696	−8.710	−310
−300	−8.404	−8.420	−8.436	−8.452	−8.468	−8.483	−8.499	−8.515	−8.530	−8.546	−8.561	−300
−290	−8.240	−8.257	−8.273	−8.290	−8.307	−8.323	−8.339	−8.356	−8.372	−8.388	−8.404	−290
−280	−8.069	−8.087	−8.104	−8.121	−8.138	−8.155	−8.173	−8.189	−8.206	−8.223	−8.240	−280
−270	−7.891	−7.910	−7.928	−7.945	−7.963	−7.981	−7.999	−8.017	−8.034	−8.052	−8.069	−270
−260	−7.707	−7.726	−7.745	−7.763	−7.782	−7.800	−7.819	−7.837	−7.855	−7.873	−7.891	−260
−250	−7.516	−7.536	−7.555	−7.574	−7.593	−7.613	−7.632	−7.651	−7.670	−7.688	−7.707	−250
−240	−7.319	−7.339	−7.359	−7.379	−7.399	−7.419	−7.438	−7.458	−7.478	−7.497	−7.516	−240
−230	−7.116	−7.137	−7.157	−7.178	−7.198	−7.219	−7.239	−7.259	−7.279	−7.299	−7.319	−230
−220	−6.907	−6.928	−6.950	−6.971	−6.992	−7.013	−7.033	−7.054	−7.075	−7.096	−7.116	−220
−210	−6.692	−6.714	−6.736	−6.757	−6.779	−6.801	−6.822	−6.843	−6.865	−6.886	−6.907	−210
−200	−6.472	−6.494	−6.516	−6.539	−6.561	−6.583	−6.605	−6.627	−6.649	−6.671	−6.692	−200
−190	−6.246	−6.269	−6.291	−6.314	−6.337	−6.359	−6.382	−6.405	−6.427	−6.449	−6.472	−190
−180	−6.014	−6.037	−6.061	−6.084	−6.107	−6.130	−6.154	−6.177	−6.200	−6.223	−6.246	−180
−170	−5.777	−5.801	−5.825	−5.849	−5.872	−5.896	−5.920	−5.943	−5.967	−5.991	−6.014	−170
−160	−5.535	−5.559	−5.584	−5.608	−5.632	−5.656	−5.681	−5.705	−5.729	−5.753	−5.777	−160
−150	−5.287	−5.312	−5.337	−5.362	−5.387	−5.412	−5.436	−5.461	−5.486	−5.510	−5.535	−150
−140	−5.035	−5.060	−5.086	−5.111	−5.136	−5.162	−5.187	−5.212	−5.237	−5.262	−5.287	−140
−130	−4.777	−4.803	−4.829	−4.855	−4.881	−4.907	−4.932	−4.958	−4.984	−5.009	−5.035	−130
−120	−4.515	−4.542	−4.568	−4.594	−4.621	−4.647	−4.673	−4.699	−4.725	−4.751	−4.777	−120
−110	−4.248	−4.275	−4.302	−4.329	−4.355	−4.382	−4.409	−4.436	−4.462	−4.489	−4.515	−110
−100	−3.976	−4.004	−4.031	−4.058	−4.086	−4.113	−4.140	−4.167	−4.194	−4.221	−4.248	−100
−90	−3.700	−3.728	−3.756	−3.784	−3.811	−3.839	−3.867	−3.894	−3.922	−3.949	−3.976	−90
−80	−3.420	−3.448	−3.476	−3.504	−3.532	−3.561	−3.589	−3.617	−3.645	−3.672	−3.700	−80
−70	−3.135	−3.163	−3.192	−3.221	−3.249	−3.278	−3.306	−3.335	−3.363	−3.391	−3.420	−70
−60	−2.846	−2.875	−2.904	−2.933	−2.962	−2.991	−3.020	−3.048	−3.077	−3.106	−3.135	−60
−50	−2.552	−2.582	−2.611	−2.641	−2.670	−2.699	−2.729	−2.758	−2.787	−2.816	−2.846	−50
−40	−2.255	−2.285	−2.315	−2.344	−2.374	−2.404	−2.434	−2.463	−2.493	−2.523	−2.552	−40
−30	−1.953	−1.984	−2.014	−2.044	−2.074	−2.105	−2.135	−2.165	−2.195	−2.225	−2.255	−30
−20	−1.648	−1.679	−1.709	−1.740	−1.771	−1.801	−1.832	−1.862	−1.893	−1.923	−1.953	−20
−10	−1.339	−1.370	−1.401	−1.432	−1.463	−1.494	−1.525	−1.556	−1.587	−1.617	−1.648	−10
0	−1.026	−1.057	−1.089	−1.120	−1.152	−1.183	−1.214	−1.245	−1.277	−1.308	−1.339	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B5.1.2. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−1.026	−0.994	−0.963	−0.931	−0.900	−0.868	−0.836	−0.805	−0.773	−0.741	−0.709	0
10	−0.709	−0.677	−0.645	−0.614	−0.582	−0.550	−0.517	−0.485	−0.453	−0.421	−0.389	10
20	−0.389	−0.357	−0.324	−0.292	−0.260	−0.227	−0.195	−0.163	−0.130	−0.098	−0.065	20
30	−0.065	−0.033	0.000	0.033	0.065	0.098	0.131	0.163	0.196	0.229	0.262	30
40	0.262	0.294	0.327	0.360	0.393	0.426	0.459	0.492	0.525	0.558	0.591	40
50	0.591	0.624	0.657	0.691	0.724	0.757	0.790	0.824	0.857	0.890	0.924	50
60	0.924	0.957	0.990	1.024	1.057	1.091	1.124	1.158	1.192	1.225	1.259	60
70	1.259	1.292	1.326	1.360	1.394	1.427	1.461	1.495	1.529	1.563	1.597	70
80	1.597	1.631	1.665	1.699	1.733	1.767	1.801	1.835	1.869	1.904	1.938	80
90	1.938	1.972	2.006	2.041	2.075	2.109	2.144	2.178	2.212	2.247	2.281	90
100	2.281	2.316	2.351	2.385	2.420	2.454	2.489	2.524	2.558	2.593	2.628	100
110	2.628	2.663	2.698	2.733	2.767	2.802	2.837	2.872	2.907	2.942	2.977	110
120	2.977	3.012	3.048	3.083	3.118	3.153	3.188	3.224	3.259	3.294	3.330	120
130	3.330	3.365	3.400	3.436	3.471	3.507	3.542	3.578	3.613	3.649	3.685	130
140	3.685	3.720	3.756	3.792	3.827	3.863	3.899	3.935	3.970	4.006	4.042	140
150	4.042	4.078	4.114	4.150	4.186	4.222	4.258	4.294	4.330	4.366	4.403	150
160	4.403	4.439	4.475	4.511	4.547	4.584	4.620	4.656	4.693	4.729	4.766	160
170	4.766	4.802	4.839	4.875	4.912	4.948	4.985	5.021	5.058	5.095	5.131	170
180	5.131	5.168	5.205	5.242	5.278	5.315	5.352	5.389	5.426	5.463	5.500	180
190	5.500	5.537	5.574	5.611	5.648	5.685	5.722	5.759	5.796	5.833	5.871	190
200	5.871	5.908	5.945	5.982	6.020	6.057	6.094	6.132	6.169	6.207	6.244	200
210	6.244	6.281	6.319	6.356	6.394	6.432	6.469	6.507	6.544	6.582	6.620	210
220	6.620	6.658	6.695	6.733	6.771	6.809	6.847	6.884	6.922	6.960	6.998	220
230	6.998	7.036	7.074	7.112	7.150	7.188	7.226	7.264	7.302	7.341	7.379	230
240	7.379	7.417	7.455	7.493	7.532	7.570	7.608	7.647	7.685	7.723	7.762	240
250	7.762	7.800	7.839	7.877	7.916	7.954	7.993	8.031	8.070	8.108	8.147	250
260	8.147	8.186	8.224	8.263	8.302	8.340	8.379	8.418	8.457	8.496	8.535	260
270	8.535	8.573	8.612	8.651	8.690	8.729	8.768	8.807	8.846	8.885	8.924	270
280	8.924	8.963	9.002	9.041	9.081	9.120	9.159	9.198	9.237	9.277	9.316	280
290	9.316	9.355	9.395	9.434	9.473	9.513	9.552	9.591	9.631	9.670	9.710	290
300	9.710	9.749	9.789	9.828	9.868	9.907	9.947	9.987	10.026	10.066	10.106	300
310	10.106	10.145	10.185	10.225	10.265	10.304	10.344	10.384	10.424	10.464	10.503	310
320	10.503	10.543	10.583	10.623	10.663	10.703	10.743	10.783	10.823	10.863	10.903	320
330	10.903	10.943	10.983	11.024	11.064	11.104	11.144	11.184	11.224	11.265	11.305	330
340	11.305	11.345	11.385	11.426	11.466	11.506	11.547	11.587	11.627	11.668	11.708	340
350	11.708	11.749	11.789	11.830	11.870	11.911	11.951	11.992	12.032	12.073	12.113	350
360	12.113	12.154	12.195	12.235	12.276	12.317	12.357	12.398	12.439	12.480	12.520	360
370	12.520	12.561	12.602	12.643	12.684	12.724	12.765	12.806	12.847	12.888	12.929	370
380	12.929	12.970	13.011	13.052	13.093	13.134	13.175	13.216	13.257	13.298	13.339	380
390	13.339	13.380	13.421	13.462	13.504	13.545	13.586	13.627	13.668	13.710	13.751	390
400	13.751	13.792	13.833	13.875	13.916	13.957	13.999	14.040	14.081	14.123	14.164	400
410	14.164	14.205	14.247	14.288	14.330	14.371	14.413	14.454	14.496	14.537	14.579	410
420	14.579	14.620	14.662	14.704	14.745	14.787	14.828	14.870	14.912	14.953	14.995	420
430	14.995	15.037	15.078	15.120	15.162	15.204	15.245	15.287	15.329	15.371	15.413	430
440	15.413	15.454	15.496	15.538	15.580	15.622	15.664	15.706	15.748	15.790	15.831	440
450	15.831	15.873	15.915	15.957	15.999	16.041	16.083	16.125	16.168	16.210	16.252	450
460	16.252	16.294	16.336	16.378	16.420	16.462	16.504	16.547	16.589	16.631	16.673	460
470	16.673	16.715	16.758	16.800	16.842	16.884	16.927	16.969	17.011	17.054	17.096	470
480	17.096	17.138	17.181	17.223	17.265	17.308	17.350	17.392	17.435	17.477	17.520	480
490	17.520	17.562	17.605	17.647	17.690	17.732	17.775	17.817	17.860	17.902	17.945	490
500	17.945	17.987	18.030	18.073	18.115	18.158	18.200	18.243	18.286	18.328	18.371	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B5.1.2. ***Type E thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued***

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	17.945	17.987	18.030	18.073	18.115	18.158	18.200	18.243	18.286	18.328	18.371	500
510	18.371	18.414	18.456	18.499	18.542	18.585	18.627	18.670	18.713	18.756	18.798	510
520	18.798	18.841	18.884	18.927	18.969	19.012	19.055	19.098	19.141	19.184	19.227	520
530	19.227	19.269	19.312	19.355	19.398	19.441	19.484	19.527	19.570	19.613	19.656	530
540	19.656	19.699	19.742	19.785	19.828	19.871	19.914	19.957	20.000	20.043	20.086	540
550	20.086	20.129	20.172	20.216	20.259	20.302	20.345	20.388	20.431	20.474	20.517	550
560	20.517	20.561	20.604	20.647	20.690	20.733	20.777	20.820	20.863	20.906	20.950	560
570	20.950	20.993	21.036	21.080	21.123	21.166	21.209	21.253	21.296	21.339	21.383	570
580	21.383	21.426	21.470	21.513	21.556	21.600	21.643	21.686	21.730	21.773	21.817	580
590	21.817	21.860	21.904	21.947	21.991	22.034	22.078	22.121	22.165	22.208	22.252	590
600	22.252	22.295	22.339	22.382	22.426	22.469	22.513	22.556	22.600	22.644	22.687	600
610	22.687	22.731	22.774	22.818	22.862	22.905	22.949	22.993	23.036	23.080	23.124	610
620	23.124	23.167	23.211	23.255	23.298	23.342	23.386	23.429	23.473	23.517	23.561	620
630	23.561	23.604	23.648	23.692	23.736	23.780	23.823	23.867	23.911	23.955	23.999	630
640	23.999	24.042	24.086	24.130	24.174	24.218	24.262	24.305	24.349	24.393	24.437	640
650	24.437	24.481	24.525	24.569	24.613	24.657	24.701	24.745	24.789	24.832	24.876	650
660	24.876	24.920	24.964	25.008	25.052	25.096	25.140	25.184	25.228	25.272	25.316	660
670	25.316	25.360	25.404	25.448	25.493	25.537	25.581	25.625	25.669	25.713	25.757	670
680	25.757	25.801	25.845	25.889	25.933	25.977	26.022	26.066	26.110	26.154	26.198	680
690	26.198	26.242	26.286	26.331	26.375	26.419	26.463	26.507	26.552	26.596	26.640	690
700	26.640	26.684	26.728	26.773	26.817	26.861	26.905	26.950	26.994	27.038	27.082	700
710	27.082	27.127	27.171	27.215	27.259	27.304	27.348	27.392	27.437	27.481	27.525	710
720	27.525	27.570	27.614	27.658	27.703	27.747	27.791	27.836	27.880	27.924	27.969	720
730	27.969	28.013	28.057	28.102	28.146	28.191	28.235	28.279	28.324	28.368	28.413	730
740	28.413	28.457	28.501	28.546	28.590	28.635	28.679	28.724	28.768	28.813	28.857	740
750	28.857	28.901	28.946	28.990	29.035	29.079	29.124	29.168	29.213	29.257	29.302	750
760	29.302	29.346	29.391	29.435	29.480	29.525	29.569	29.614	29.658	29.703	29.747	760
770	29.747	29.792	29.836	29.881	29.925	29.970	30.015	30.059	30.104	30.148	30.193	770
780	30.193	30.238	30.282	30.327	30.371	30.416	30.461	30.505	30.550	30.595	30.639	780
790	30.639	30.684	30.728	30.773	30.818	30.862	30.907	30.952	30.996	31.041	31.086	790
800	31.086	31.130	31.175	31.220	31.264	31.309	31.354	31.398	31.443	31.488	31.533	800
810	31.533	31.577	31.622	31.667	31.711	31.756	31.801	31.846	31.890	31.935	31.980	810
820	31.980	32.025	32.069	32.114	32.159	32.204	32.248	32.293	32.338	32.383	32.427	820
830	32.427	32.472	32.517	32.562	32.606	32.651	32.696	32.741	32.786	32.830	32.875	830
840	32.875	32.920	32.965	33.010	33.054	33.099	33.144	33.189	33.234	33.278	33.323	840
850	33.323	33.368	33.413	33.458	33.503	33.547	33.592	33.637	33.682	33.727	33.772	850
860	33.772	33.816	33.861	33.906	33.951	33.996	34.041	34.086	34.130	34.175	34.220	860
870	34.220	34.265	34.310	34.355	34.400	34.445	34.489	34.534	34.579	34.624	34.669	870
880	34.669	34.714	34.759	34.804	34.849	34.893	34.938	34.983	35.028	35.073	35.118	880
890	35.118	35.163	35.208	35.253	35.298	35.343	35.387	35.432	35.477	35.522	35.567	890
900	35.567	35.612	35.657	35.702	35.747	35.792	35.837	35.882	35.927	35.972	36.016	900
910	36.016	36.061	36.106	36.151	36.196	36.241	36.286	36.331	36.376	36.421	36.466	910
920	36.466	36.511	36.556	36.601	36.646	36.691	36.736	36.781	36.826	36.870	36.915	920
930	36.915	36.960	37.005	37.050	37.095	37.140	37.185	37.230	37.275	37.320	37.365	930
940	37.365	37.410	37.455	37.500	37.545	37.590	37.635	37.680	37.725	37.770	37.815	940
950	37.815	37.860	37.905	37.950	37.995	38.040	38.085	38.130	38.175	38.220	38.265	950
960	38.265	38.309	38.354	38.399	38.444	38.489	38.534	38.579	38.624	38.669	38.714	960
970	38.714	38.759	38.804	38.849	38.894	38.939	38.984	39.029	39.074	39.119	39.164	970
980	39.164	39.209	39.254	39.299	39.344	39.389	39.434	39.479	39.524	39.569	39.614	980
990	39.614	39.659	39.704	39.749	39.794	39.839	39.884	39.929	39.974	40.019	40.064	990
1000	40.064	40.109	40.154	40.199	40.243	40.288	40.333	40.378	40.423	40.468	40.513	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B5.1.2. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	40.064	40.109	40.154	40.199	40.243	40.288	40.333	40.378	40.423	40.468	40.513	1000
1010	40.513	40.558	40.603	40.648	40.693	40.738	40.783	40.828	40.873	40.918	40.963	1010
1020	40.963	41.008	41.053	41.098	41.143	41.188	41.233	41.278	41.323	41.368	41.412	1020
1030	41.412	41.457	41.502	41.547	41.592	41.637	41.682	41.727	41.772	41.817	41.862	1030
1040	41.862	41.907	41.952	41.997	42.042	42.087	42.132	42.176	42.221	42.266	42.311	1040
1050	42.311	42.356	42.401	42.446	42.491	42.536	42.581	42.626	42.671	42.715	42.760	1050
1060	42.760	42.805	42.850	42.895	42.940	42.985	43.030	43.075	43.120	43.165	43.209	1060
1070	43.209	43.254	43.299	43.344	43.389	43.434	43.479	43.524	43.569	43.613	43.658	1070
1080	43.658	43.703	43.748	43.793	43.838	43.883	43.928	43.972	44.017	44.062	44.107	1080
1090	44.107	44.152	44.197	44.242	44.286	44.331	44.376	44.421	44.466	44.511	44.555	1090
1100	44.555	44.600	44.645	44.690	44.735	44.780	44.824	44.869	44.914	44.959	45.004	1100
1110	45.004	45.049	45.093	45.138	45.183	45.228	45.273	45.317	45.362	45.407	45.452	1110
1120	45.452	45.497	45.541	45.586	45.631	45.676	45.720	45.765	45.810	45.855	45.900	1120
1130	45.900	45.944	45.989	46.034	46.079	46.123	46.168	46.213	46.258	46.302	46.347	1130
1140	46.347	46.392	46.437	46.481	46.526	46.571	46.616	46.660	46.705	46.750	46.794	1140
1150	46.794	46.839	46.884	46.929	46.973	47.018	47.063	47.107	47.152	47.197	47.241	1150
1160	47.241	47.286	47.331	47.375	47.420	47.465	47.509	47.554	47.599	47.643	47.688	1160
1170	47.688	47.733	47.777	47.822	47.867	47.911	47.956	48.001	48.045	48.090	48.135	1170
1180	48.135	48.179	48.224	48.268	48.313	48.358	48.402	48.447	48.492	48.536	48.581	1180
1190	48.581	48.625	48.670	48.715	48.759	48.804	48.848	48.893	48.937	48.982	49.027	1190
1200	49.027	49.071	49.116	49.160	49.205	49.249	49.294	49.338	49.383	49.428	49.472	1200
1210	49.472	49.517	49.561	49.606	49.650	49.695	49.739	49.784	49.828	49.873	49.917	1210
1220	49.917	49.962	50.006	50.051	50.095	50.140	50.184	50.229	50.273	50.318	50.362	1220
1230	50.362	50.407	50.451	50.495	50.540	50.584	50.629	50.673	50.718	50.762	50.807	1230
1240	50.807	50.851	50.895	50.940	50.984	51.029	51.073	51.118	51.162	51.206	51.251	1240
1250	51.251	51.295	51.340	51.384	51.428	51.473	51.517	51.561	51.606	51.650	51.695	1250
1260	51.695	51.739	51.783	51.828	51.872	51.916	51.961	52.005	52.049	52.094	52.138	1260
1270	52.138	52.182	52.227	52.271	52.315	52.360	52.404	52.448	52.493	52.537	52.581	1270
1280	52.581	52.625	52.670	52.714	52.758	52.803	52.847	52.891	52.935	52.980	53.024	1280
1290	53.024	53.068	53.112	53.157	53.201	53.245	53.289	53.334	53.378	53.422	53.466	1290
1300	53.466	53.510	53.555	53.599	53.643	53.687	53.732	53.776	53.820	53.864	53.908	1300
1310	53.908	53.952	53.997	54.041	54.085	54.129	54.173	54.218	54.262	54.306	54.350	1310
1320	54.350	54.394	54.438	54.482	54.527	54.571	54.615	54.659	54.703	54.747	54.791	1320
1330	54.791	54.835	54.879	54.924	54.968	55.012	55.056	55.100	55.144	55.188	55.232	1330
1340	55.232	55.276	55.320	55.364	55.408	55.453	55.497	55.541	55.585	55.629	55.673	1340
1350	55.673	55.717	55.761	55.805	55.849	55.893	55.937	55.981	56.025	56.069	56.113	1350
1360	56.113	56.157	56.201	56.245	56.289	56.333	56.377	56.421	56.465	56.509	56.553	1360
1370	56.553	56.597	56.641	56.685	56.729	56.773	56.816	56.860	56.904	56.948	56.992	1370
1380	56.992	57.036	57.080	57.124	57.168	57.212	57.256	57.300	57.344	57.387	57.431	1380
1390	57.431	57.475	57.519	57.563	57.607	57.651	57.695	57.738	57.782	57.826	57.870	1390
1400	57.870	57.914	57.958	58.002	58.045	58.089	58.133	58.177	58.221	58.265	58.308	1400
1410	58.308	58.352	58.396	58.440	58.484	58.527	58.571	58.615	58.659	58.702	58.746	1410
1420	58.746	58.790	58.834	58.878	58.921	58.965	59.009	59.053	59.096	59.140	59.184	1420
1430	59.184	59.228	59.271	59.315	59.359	59.402	59.446	59.490	59.534	59.577	59.621	1430
1440	59.621	59.665	59.708	59.752	59.796	59.839	59.883	59.927	59.970	60.014	60.058	1440
1450	60.058	60.101	60.145	60.189	60.232	60.276	60.320	60.363	60.407	60.451	60.494	1450
1460	60.494	60.538	60.581	60.625	60.669	60.712	60.756	60.799	60.843	60.887	60.930	1460
1470	60.930	60.974	61.017	61.061	61.105	61.148	61.192	61.235	61.279	61.322	61.366	1470
1480	61.366	61.409	61.453	61.496	61.540	61.583	61.627	61.671	61.714	61.758	61.801	1480
1490	61.801	61.845	61.888	61.932	61.975	62.018	62.062	62.105	62.149	62.192	62.236	1490
1500	62.236	62.279	62.323	62.366	62.410	62.453	62.496	62.540	62.583	62.627	62.670	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B5.1.2. *Type E thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	62.236	62.279	62.323	62.366	62.410	62.453	62.496	62.540	62.583	62.627	62.670	1500
1510	62.670	62.714	62.757	62.800	62.844	62.887	62.931	62.974	63.017	63.061	63.104	1510
1520	63.104	63.148	63.191	63.234	63.278	63.321	63.364	63.408	63.451	63.494	63.538	1520
1530	63.538	63.581	63.624	63.668	63.711	63.754	63.798	63.841	63.884	63.927	63.971	1530
1540	63.971	64.014	64.057	64.101	64.144	64.187	64.230	64.274	64.317	64.360	64.403	1540
1550	64.403	64.447	64.490	64.533	64.576	64.619	64.663	64.706	64.749	64.792	64.835	1550
1560	64.835	64.879	64.922	64.965	65.008	65.051	65.094	65.138	65.181	65.224	65.267	1560
1570	65.267	65.310	65.353	65.396	65.440	65.483	65.526	65.569	65.612	65.655	65.698	1570
1580	65.698	65.741	65.784	65.827	65.871	65.914	65.957	66.000	66.043	66.086	66.129	1580
1590	66.129	66.172	66.215	66.258	66.301	66.344	66.387	66.430	66.473	66.516	66.559	1590
1600	66.559	66.602	66.645	66.688	66.731	66.774	66.817	66.860	66.903	66.946	66.989	1600
1610	66.989	67.031	67.074	67.117	67.160	67.203	67.246	67.289	67.332	67.375	67.418	1610
1620	67.418	67.460	67.503	67.546	67.589	67.632	67.675	67.718	67.760	67.803	67.846	1620
1630	67.846	67.889	67.932	67.974	68.017	68.060	68.103	68.146	68.188	68.231	68.274	1630
1640	68.274	68.317	68.359	68.402	68.445	68.488	68.530	68.573	68.616	68.659	68.701	1640
1650	68.701	68.744	68.787	68.829	68.872	68.915	68.957	69.000	69.043	69.085	69.128	1650
1660	69.128	69.171	69.213	69.256	69.298	69.341	69.384	69.426	69.469	69.511	69.554	1660
1670	69.554	69.597	69.639	69.682	69.724	69.767	69.809	69.852	69.894	69.937	69.979	1670
1680	69.979	70.022	70.064	70.107	70.149	70.192	70.234	70.277	70.319	70.362	70.404	1680
1690	70.404	70.447	70.489	70.531	70.574	70.616	70.659	70.701	70.744	70.786	70.828	1690
1700	70.828	70.871	70.913	70.955	70.998	71.040	71.082	71.125	71.167	71.209	71.252	1700
1710	71.252	71.294	71.336	71.379	71.421	71.463	71.506	71.548	71.590	71.632	71.675	1710
1720	71.675	71.717	71.759	71.801	71.844	71.886	71.928	71.970	72.012	72.055	72.097	1720
1730	72.097	72.139	72.181	72.223	72.266	72.308	72.350	72.392	72.434	72.476	72.518	1730
1740	72.518	72.561	72.603	72.645	72.687	72.729	72.771	72.813	72.855	72.897	72.939	1740
1750	72.939	72.981	73.023	73.066	73.108	73.150	73.192	73.234	73.276	73.318	73.360	1750
1760	73.360	73.402	73.444	73.486	73.528	73.570	73.612	73.654	73.696	73.738	73.780	1760
1770	73.780	73.821	73.863	73.905	73.947	73.989	74.031	74.073	74.115	74.157	74.199	1770
1780	74.199	74.241	74.283	74.324	74.366	74.408	74.450	74.492	74.534	74.576	74.618	1780
1790	74.618	74.659	74.701	74.743	74.785	74.827	74.869	74.910	74.952	74.994	75.036	1790
1800	75.036	75.078	75.120	75.161	75.203	75.245	75.287	75.329	75.370	75.412	75.454	1800
1810	75.454	75.496	75.538	75.579	75.621	75.663	75.705	75.746	75.788	75.830	75.872	1810
1820	75.872	75.913	75.955	75.997	76.039	76.081	76.122	76.164	76.206	76.248	76.289	1820
1830	76.289	76.331	76.373									1830
°F	0	1	2	3	4	5	6	7	8	9	10	°F

B5.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B5.2.1 and B5.2.2 was obtained by iteration of the reference function for type E thermocouples given in the main text (see table 5.3.1). Table B5.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −9.83 mV to 76.37 mV, and table B5.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−9.80	−260.59	−262.47	−264.70	−267.68								−9.80
−9.70	−248.16	−249.14	−250.17	−251.23	−252.34	−253.50	−254.73	−256.03	−257.42	−258.93	−260.59	−9.70
−9.60	−239.70	−240.46	−241.24	−242.03	−242.84	−243.67	−244.51	−245.39	−246.28	−247.21	−248.16	−9.60
−9.50	−232.80	−233.44	−234.09	−234.76	−235.43	−236.11	−236.80	−237.51	−238.23	−238.96	−239.70	−9.50
−9.40	−226.78	−227.35	−227.93	−228.51	−229.10	−229.70	−230.30	−230.91	−231.53	−232.16	−232.80	−9.40
−9.30	−221.35	−221.87	−222.39	−222.93	−223.46	−224.00	−224.55	−225.10	−225.65	−226.21	−226.78	−9.30
−9.20	−216.34	−216.83	−217.32	−217.81	−218.30	−218.80	−219.30	−219.81	−220.32	−220.83	−221.35	−9.20
−9.10	−211.67	−212.12	−212.58	−213.04	−213.50	−213.97	−214.44	−214.91	−215.39	−215.86	−216.34	−9.10
−9.00	−207.25	−207.68	−208.12	−208.55	−208.99	−209.43	−209.87	−210.32	−210.77	−211.22	−211.67	−9.00
−8.90	−203.05	−203.46	−203.87	−204.29	−204.71	−205.13	−205.55	−205.97	−206.39	−206.82	−207.25	−8.90
−8.80	−199.03	−199.42	−199.82	−200.22	−200.62	−201.02	−201.42	−201.82	−202.23	−202.64	−203.05	−8.80
−8.70	−195.16	−195.54	−195.92	−196.30	−196.69	−197.07	−197.46	−197.85	−198.24	−198.63	−199.03	−8.70
−8.60	−191.43	−191.79	−192.16	−192.53	−192.90	−193.28	−193.65	−194.03	−194.40	−194.78	−195.16	−8.60
−8.50	−187.81	−188.17	−188.53	−188.88	−189.24	−189.60	−189.97	−190.33	−190.69	−191.06	−191.43	−8.50
−8.40	−184.30	−184.65	−185.00	−185.35	−185.70	−186.05	−186.40	−186.75	−187.10	−187.46	−187.81	−8.40
−8.30	−180.89	−181.23	−181.57	−181.91	−182.25	−182.59	−182.93	−183.27	−183.61	−183.96	−184.30	−8.30
−8.20	−177.57	−177.90	−178.23	−178.56	−178.89	−179.22	−179.55	−179.89	−180.22	−180.56	−180.89	−8.20
−8.10	−174.32	−174.64	−174.96	−175.29	−175.61	−175.93	−176.26	−176.58	−176.91	−177.24	−177.57	−8.10
−8.00	−171.15	−171.46	−171.78	−172.09	−172.41	−172.73	−173.04	−173.36	−173.68	−174.00	−174.32	−8.00
−7.90	−168.04	−168.35	−168.66	−168.97	−169.28	−169.59	−169.90	−170.21	−170.52	−170.83	−171.15	−7.90
−7.80	−165.00	−165.30	−165.60	−165.90	−166.21	−166.51	−166.82	−167.12	−167.43	−167.73	−168.04	−7.80
−7.70	−162.01	−162.31	−162.60	−162.90	−163.20	−163.50	−163.80	−164.10	−164.40	−164.70	−165.00	−7.70
−7.60	−159.08	−159.37	−159.66	−159.95	−160.24	−160.54	−160.83	−161.13	−161.42	−161.71	−162.01	−7.60
−7.50	−156.20	−156.48	−156.77	−157.06	−157.34	−157.63	−157.92	−158.21	−158.50	−158.79	−159.08	−7.50
−7.40	−153.36	−153.64	−153.92	−154.21	−154.49	−154.77	−155.06	−155.34	−155.63	−155.91	−156.20	−7.40
−7.30	−150.57	−150.85	−151.13	−151.40	−151.68	−151.96	−152.24	−152.52	−152.80	−153.08	−153.36	−7.30
−7.20	−147.82	−148.10	−148.37	−148.64	−148.92	−149.19	−149.47	−149.74	−150.02	−150.29	−150.57	−7.20
−7.10	−145.11	−145.38	−145.65	−145.92	−146.19	−146.46	−146.73	−147.01	−147.28	−147.55	−147.82	−7.10
−7.00	−142.44	−142.71	−142.97	−143.24	−143.51	−143.77	−144.04	−144.31	−144.58	−144.85	−145.11	−7.00
−6.90	−139.81	−140.07	−140.33	−140.60	−140.86	−141.12	−141.39	−141.65	−141.91	−142.18	−142.44	−6.90
−6.80	−137.21	−137.47	−137.72	−137.98	−138.24	−138.50	−138.76	−139.02	−139.29	−139.55	−139.81	−6.80
−6.70	−134.64	−134.89	−135.15	−135.41	−135.66	−135.92	−136.18	−136.43	−136.69	−136.95	−137.21	−6.70
−6.60	−132.10	−132.35	−132.60	−132.86	−133.11	−133.36	−133.62	−133.87	−134.13	−134.38	−134.64	−6.60
−6.50	−129.59	−129.84	−130.09	−130.34	−130.59	−130.84	−131.09	−131.34	−131.60	−131.85	−132.10	−6.50
−6.40	−127.11	−127.36	−127.60	−127.85	−128.10	−128.35	−128.60	−128.84	−129.09	−129.34	−129.59	−6.40
−6.30	−124.66	−124.90	−125.14	−125.39	−125.63	−125.88	−126.13	−126.37	−126.62	−126.86	−127.11	−6.30
−6.20	−122.23	−122.47	−122.71	−122.95	−123.20	−123.44	−123.68	−123.93	−124.17	−124.41	−124.66	−6.20
−6.10	−119.83	−120.06	−120.30	−120.54	−120.78	−121.02	−121.26	−121.51	−121.75	−121.99	−122.23	−6.10
−6.00	−117.45	−117.68	−117.92	−118.16	−118.40	−118.63	−118.87	−119.11	−119.35	−119.59	−119.83	−6.00
−5.90	−115.09	−115.33	−115.56	−115.79	−116.03	−116.27	−116.50	−116.74	−116.97	−117.21	−117.45	−5.90
−5.80	−112.76	−112.99	−113.22	−113.45	−113.69	−113.92	−114.15	−114.39	−114.62	−114.86	−115.09	−5.80
−5.70	−110.44	−110.67	−110.91	−111.14	−111.37	−111.60	−111.83	−112.06	−112.29	−112.52	−112.76	−5.70
−5.60	−108.15	−108.38	−108.61	−108.84	−109.07	−109.30	−109.53	−109.75	−109.98	−110.21	−110.44	−5.60
−5.50	−105.88	−106.11	−106.33	−106.56	−106.79	−107.01	−107.24	−107.47	−107.70	−107.92	−108.15	−5.50
−5.40	−103.63	−103.85	−104.08	−104.30	−104.53	−104.75	−104.98	−105.20	−105.43	−105.65	−105.88	−5.40
−5.30	−101.39	−101.62	−101.84	−102.06	−102.29	−102.51	−102.73	−102.96	−103.18	−103.40	−103.63	−5.30
−5.20	−99.18	−99.40	−99.62	−99.84	−100.06	−100.28	−100.51	−100.73	−100.95	−101.17	−101.39	−5.20
−5.10	−96.98	−97.20	−97.42	−97.64	−97.86	−98.08	−98.30	−98.52	−98.74	−98.96	−99.18	−5.10
−5.00	−94.80	−95.02	−95.23	−95.45	−95.67	−95.89	−96.11	−96.32	−96.54	−96.76	−96.98	−5.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−5.00	−94.80	−95.02	−95.23	−95.45	−95.67	−95.89	−96.11	−96.32	−96.54	−96.76	−96.98	−5.00
−4.90	−92.63	−92.85	−93.06	−93.28	−93.50	−93.71	−93.93	−94.15	−94.36	−94.58	−94.80	−4.90
−4.80	−90.48	−90.70	−90.91	−91.13	−91.34	−91.56	−91.77	−91.99	−92.20	−92.42	−92.63	−4.80
−4.70	−88.35	−88.56	−88.78	−88.99	−89.20	−89.41	−89.63	−89.84	−90.06	−90.27	−90.48	−4.70
−4.60	−86.23	−86.44	−86.65	−86.87	−87.08	−87.29	−87.50	−87.71	−87.93	−88.14	−88.35	−4.60
−4.50	−84.13	−84.34	−84.55	−84.76	−84.97	−85.18	−85.39	−85.60	−85.81	−86.02	−86.23	−4.50
−4.40	−82.04	−82.25	−82.45	−82.66	−82.87	−83.08	−83.29	−83.50	−83.71	−83.92	−84.13	−4.40
−4.30	−79.96	−80.17	−80.37	−80.58	−80.79	−81.00	−81.20	−81.41	−81.62	−81.83	−82.04	−4.30
−4.20	−77.90	−78.10	−78.31	−78.52	−78.72	−78.93	−79.13	−79.34	−79.55	−79.75	−79.96	−4.20
−4.10	−75.85	−76.05	−76.26	−76.46	−76.67	−76.87	−77.08	−77.28	−77.49	−77.69	−77.90	−4.10
−4.00	−73.81	−74.01	−74.22	−74.42	−74.62	−74.83	−75.03	−75.24	−75.44	−75.64	−75.85	−4.00
−3.90	−71.79	−71.99	−72.19	−72.39	−72.59	−72.80	−73.00	−73.20	−73.40	−73.61	−73.81	−3.90
−3.80	−69.77	−69.97	−70.17	−70.38	−70.58	−70.78	−70.98	−71.18	−71.38	−71.58	−71.79	−3.80
−3.70	−67.77	−67.97	−68.17	−68.37	−68.57	−68.77	−68.97	−69.17	−69.37	−69.57	−69.77	−3.70
−3.60	−65.78	−65.98	−66.18	−66.38	−66.58	−66.78	−66.97	−67.17	−67.37	−67.57	−67.77	−3.60
−3.50	−63.80	−64.00	−64.20	−64.40	−64.59	−64.79	−64.99	−65.19	−65.39	−65.58	−65.78	−3.50
−3.40	−61.84	−62.03	−62.23	−62.42	−62.62	−62.82	−63.01	−63.21	−63.41	−63.61	−63.80	−3.40
−3.30	−59.88	−60.07	−60.27	−60.46	−60.66	−60.86	−61.05	−61.25	−61.44	−61.64	−61.84	−3.30
−3.20	−57.93	−58.13	−58.32	−58.51	−58.71	−58.90	−59.10	−59.29	−59.49	−59.68	−59.88	−3.20
−3.10	−55.99	−56.19	−56.38	−56.57	−56.77	−56.96	−57.16	−57.35	−57.54	−57.74	−57.93	−3.10
−3.00	−54.07	−54.26	−54.45	−54.65	−54.84	−55.03	−55.22	−55.42	−55.61	−55.80	−55.99	−3.00
−2.90	−52.15	−52.34	−52.53	−52.73	−52.92	−53.11	−53.30	−53.49	−53.68	−53.88	−54.07	−2.90
−2.80	−50.24	−50.43	−50.62	−50.81	−51.01	−51.20	−51.39	−51.58	−51.77	−51.96	−52.15	−2.80
−2.70	−48.34	−48.53	−48.72	−48.91	−49.10	−49.29	−49.48	−49.67	−49.86	−50.05	−50.24	−2.70
−2.60	−46.46	−46.64	−46.83	−47.02	−47.21	−47.40	−47.59	−47.78	−47.97	−48.16	−48.34	−2.60
−2.50	−44.57	−44.76	−44.95	−45.14	−45.33	−45.51	−45.70	−45.89	−46.08	−46.27	−46.46	−2.50
−2.40	−42.70	−42.89	−43.08	−43.26	−43.45	−43.64	−43.82	−44.01	−44.20	−44.39	−44.57	−2.40
−2.30	−40.84	−41.03	−41.21	−41.40	−41.58	−41.77	−41.96	−42.14	−42.33	−42.52	−42.70	−2.30
−2.20	−38.98	−39.17	−39.35	−39.54	−39.73	−39.91	−40.10	−40.28	−40.47	−40.65	−40.84	−2.20
−2.10	−37.14	−37.32	−37.51	−37.69	−37.88	−38.06	−38.24	−38.43	−38.61	−38.80	−38.98	−2.10
−2.00	−35.30	−35.48	−35.67	−35.85	−36.03	−36.22	−36.40	−36.58	−36.77	−36.95	−37.14	−2.00
−1.90	−33.47	−33.65	−33.83	−34.02	−34.20	−34.38	−34.56	−34.75	−34.93	−35.11	−35.30	−1.90
−1.80	−31.64	−31.83	−32.01	−32.19	−32.37	−32.55	−32.74	−32.92	−33.10	−33.28	−33.47	−1.80
−1.70	−29.83	−30.01	−30.19	−30.37	−30.55	−30.74	−30.92	−31.10	−31.28	−31.46	−31.64	−1.70
−1.60	−28.02	−28.20	−28.38	−28.56	−28.74	−28.92	−29.10	−29.28	−29.47	−29.65	−29.83	−1.60
−1.50	−26.22	−26.40	−26.58	−26.76	−26.94	−27.12	−27.30	−27.48	−27.66	−27.84	−28.02	−1.50
−1.40	−24.43	−24.60	−24.78	−24.96	−25.14	−25.32	−25.50	−25.68	−25.86	−26.04	−26.22	−1.40
−1.30	−22.64	−22.82	−23.00	−23.17	−23.35	−23.53	−23.71	−23.89	−24.07	−24.25	−24.43	−1.30
−1.20	−20.86	−21.04	−21.21	−21.39	−21.57	−21.75	−21.93	−22.10	−22.28	−22.46	−22.64	−1.20
−1.10	−19.09	−19.26	−19.44	−19.62	−19.79	−19.97	−20.15	−20.33	−20.50	−20.68	−20.86	−1.10
−1.00	−17.32	−17.50	−17.67	−17.85	−18.03	−18.20	−18.38	−18.56	−18.73	−18.91	−19.09	−1.00
−0.90	−15.56	−15.74	−15.91	−16.09	−16.26	−16.44	−16.62	−16.79	−16.97	−17.14	−17.32	−0.90
−0.80	−13.81	−13.98	−14.16	−14.33	−14.51	−14.68	−14.86	−15.03	−15.21	−15.38	−15.56	−0.80
−0.70	−12.06	−12.24	−12.41	−12.58	−12.76	−12.93	−13.11	−13.28	−13.46	−13.63	−13.81	−0.70
−0.60	−10.32	−10.49	−10.67	−10.84	−11.02	−11.19	−11.36	−11.54	−11.71	−11.89	−12.06	−0.60
−0.50	−8.59	−8.76	−8.93	−9.11	−9.28	−9.45	−9.63	−9.80	−9.97	−10.15	−10.32	−0.50
−0.40	−6.86	−7.03	−7.20	−7.38	−7.55	−7.72	−7.89	−8.07	−8.24	−8.41	−8.59	−0.40
−0.30	−5.14	−5.31	−5.48	−5.65	−5.82	−6.00	−6.17	−6.34	−6.51	−6.69	−6.86	−0.30
−0.20	−3.42	−3.59	−3.76	−3.93	−4.10	−4.28	−4.45	−4.62	−4.79	−4.96	−5.14	−0.20
−0.10	−1.71	−1.88	−2.05	−2.22	−2.39	−2.56	−2.73	−2.90	−3.08	−3.25	−3.42	−0.10
0.00	0.00	−0.17	−0.34	−0.51	−0.68	−0.85	−1.02	−1.19	−1.37	−1.54	−1.71	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
0.00	0.00	0.17	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	**0.00**
0.10	1.70	1.87	2.04	2.21	2.38	2.55	2.72	2.89	3.06	3.23	3.40	**0.10**
0.20	3.40	3.57	3.74	3.91	4.08	4.25	4.42	4.59	4.76	4.92	5.09	**0.20**
0.30	5.09	5.26	5.43	5.60	5.77	5.94	6.11	6.28	6.45	6.61	6.78	**0.30**
0.40	6.78	6.95	7.12	7.29	7.46	7.63	7.79	7.96	8.13	8.30	8.47	**0.40**
0.50	8.47	8.64	8.80	8.97	9.14	9.31	9.48	9.64	9.81	9.98	10.15	**0.50**
0.60	10.15	10.32	10.48	10.65	10.82	10.99	11.15	11.32	11.49	11.66	11.82	**0.60**
0.70	11.82	11.99	12.16	12.33	12.49	12.66	12.83	12.99	13.16	13.33	13.50	**0.70**
0.80	13.50	13.66	13.83	14.00	14.16	14.33	14.50	14.66	14.83	15.00	15.16	**0.80**
0.90	15.16	15.33	15.50	15.66	15.83	16.00	16.16	16.33	16.49	16.66	16.83	**0.90**
1.00	16.83	16.99	17.16	17.32	17.49	17.66	17.82	17.99	18.15	18.32	18.49	**1.00**
1.10	18.49	18.65	18.82	18.98	19.15	19.31	19.48	19.64	19.81	19.98	20.14	**1.10**
1.20	20.14	20.31	20.47	20.64	20.80	20.97	21.13	21.30	21.46	21.63	21.79	**1.20**
1.30	21.79	21.96	22.12	22.29	22.45	22.61	22.78	22.94	23.11	23.27	23.44	**1.30**
1.40	23.44	23.60	23.77	23.93	24.10	24.26	24.42	24.59	24.75	24.92	25.08	**1.40**
1.50	25.08	25.24	25.41	25.57	25.74	25.90	26.06	26.23	26.39	26.55	26.72	**1.50**
1.60	26.72	26.88	27.05	27.21	27.37	27.54	27.70	27.86	28.03	28.19	28.35	**1.60**
1.70	28.35	28.52	28.68	28.84	29.01	29.17	29.33	29.49	29.66	29.82	29.98	**1.70**
1.80	29.98	30.15	30.31	30.47	30.63	30.80	30.96	31.12	31.28	31.45	31.61	**1.80**
1.90	31.61	31.77	31.93	32.10	32.26	32.42	32.58	32.75	32.91	33.07	33.23	**1.90**
2.00	33.23	33.39	33.56	33.72	33.88	34.04	34.20	34.37	34.53	34.69	34.85	**2.00**
2.10	34.85	35.01	35.17	35.34	35.50	35.66	35.82	35.98	36.14	36.30	36.47	**2.10**
2.20	36.47	36.63	36.79	36.95	37.11	37.27	37.43	37.59	37.75	37.92	38.08	**2.20**
2.30	38.08	38.24	38.40	38.56	38.72	38.88	39.04	39.20	39.36	39.52	39.68	**2.30**
2.40	39.68	39.84	40.00	40.16	40.32	40.49	40.65	40.81	40.97	41.13	41.29	**2.40**
2.50	41.29	41.45	41.61	41.77	41.93	42.09	42.25	42.41	42.57	42.73	42.89	**2.50**
2.60	42.89	43.05	43.21	43.36	43.52	43.68	43.84	44.00	44.16	44.32	44.48	**2.60**
2.70	44.48	44.64	44.80	44.96	45.12	45.28	45.44	45.60	45.76	45.91	46.07	**2.70**
2.80	46.07	46.23	46.39	46.55	46.71	46.87	47.03	47.19	47.34	47.50	47.66	**2.80**
2.90	47.66	47.82	47.98	48.14	48.30	48.45	48.61	48.77	48.93	49.09	49.25	**2.90**
3.00	49.25	49.41	49.56	49.72	49.88	50.04	50.20	50.35	50.51	50.67	50.83	**3.00**
3.10	50.83	50.99	51.14	51.30	51.46	51.62	51.78	51.93	52.09	52.25	52.41	**3.10**
3.20	52.41	52.56	52.72	52.88	53.04	53.19	53.35	53.51	53.67	53.82	53.98	**3.20**
3.30	53.98	54.14	54.29	54.45	54.61	54.77	54.92	55.08	55.24	55.39	55.55	**3.30**
3.40	55.55	55.71	55.86	56.02	56.18	56.33	56.49	56.65	56.80	56.96	57.12	**3.40**
3.50	57.12	57.27	57.43	57.59	57.74	57.90	58.06	58.21	58.37	58.53	58.68	**3.50**
3.60	58.68	58.84	58.99	59.15	59.31	59.46	59.62	59.77	59.93	60.09	60.24	**3.60**
3.70	60.24	60.40	60.55	60.71	60.86	61.02	61.18	61.33	61.49	61.64	61.80	**3.70**
3.80	61.80	61.95	62.11	62.27	62.42	62.58	62.73	62.89	63.04	63.20	63.35	**3.80**
3.90	63.35	63.51	63.66	63.82	63.97	64.13	64.28	64.44	64.59	64.75	64.90	**3.90**
4.00	64.90	65.06	65.21	65.37	65.52	65.68	65.83	65.99	66.14	66.30	66.45	**4.00**
4.10	66.45	66.60	66.76	66.91	67.07	67.22	67.38	67.53	67.68	67.84	67.99	**4.10**
4.20	67.99	68.15	68.30	68.46	68.61	68.76	68.92	69.07	69.23	69.38	69.53	**4.20**
4.30	69.53	69.69	69.84	70.00	70.15	70.30	70.46	70.61	70.76	70.92	71.07	**4.30**
4.40	71.07	71.23	71.38	71.53	71.69	71.84	71.99	72.15	72.30	72.45	72.61	**4.40**
4.50	72.61	72.76	72.91	73.07	73.22	73.37	73.52	73.68	73.83	73.98	74.14	**4.50**
4.60	74.14	74.29	74.44	74.60	74.75	74.90	75.05	75.21	75.36	75.51	75.67	**4.60**
4.70	75.67	75.82	75.97	76.12	76.28	76.43	76.58	76.73	76.89	77.04	77.19	**4.70**
4.80	77.19	77.34	77.49	77.65	77.80	77.95	78.10	78.26	78.41	78.56	78.71	**4.80**
4.90	78.71	78.86	79.02	79.17	79.32	79.47	79.62	79.78	79.93	80.08	80.23	**4.90**
5.00	80.23	80.38	80.53	80.69	80.84	80.99	81.14	81.29	81.44	81.60	81.75	**5.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
5.00	80.23	80.38	80.53	80.69	80.84	80.99	81.14	81.29	81.44	81.60	81.75	**5.00**
5.10	81.75	81.90	82.05	82.20	82.35	82.50	82.66	82.81	82.96	83.11	83.26	**5.10**
5.20	83.26	83.41	83.56	83.71	83.86	84.02	84.17	84.32	84.47	84.62	84.77	**5.20**
5.30	84.77	84.92	85.07	85.22	85.37	85.52	85.68	85.83	85.98	86.13	86.28	**5.30**
5.40	86.28	86.43	86.58	86.73	86.88	87.03	87.18	87.33	87.48	87.63	87.78	**5.40**
5.50	87.78	87.93	88.08	88.23	88.38	88.53	88.68	88.83	88.98	89.13	89.28	**5.50**
5.60	89.28	89.43	89.58	89.73	89.88	90.03	90.18	90.33	90.48	90.63	90.78	**5.60**
5.70	90.78	90.93	91.08	91.23	91.38	91.53	91.68	91.83	91.98	92.13	92.28	**5.70**
5.80	92.28	92.43	92.58	92.73	92.88	93.03	93.18	93.32	93.47	93.62	93.77	**5.80**
5.90	93.77	93.92	94.07	94.22	94.37	94.52	94.67	94.82	94.97	95.11	95.26	**5.90**
6.00	95.26	95.41	95.56	95.71	95.86	96.01	96.16	96.31	96.45	96.60	96.75	**6.00**
6.10	96.75	96.90	97.05	97.20	97.35	97.49	97.64	97.79	97.94	98.09	98.24	**6.10**
6.20	98.24	98.39	98.53	98.68	98.83	98.98	99.13	99.28	99.42	99.57	99.72	**6.20**
6.30	99.72	99.87	100.02	100.16	100.31	100.46	100.61	100.76	100.90	101.05	101.20	**6.30**
6.40	101.20	101.35	101.50	101.64	101.79	101.94	102.09	102.23	102.38	102.53	102.68	**6.40**
6.50	102.68	102.82	102.97	103.12	103.27	103.42	103.56	103.71	103.86	104.01	104.15	**6.50**
6.60	104.15	104.30	104.45	104.59	104.74	104.89	105.04	105.18	105.33	105.48	105.62	**6.60**
6.70	105.62	105.77	105.92	106.07	106.21	106.36	106.51	106.65	106.80	106.95	107.10	**6.70**
6.80	107.10	107.24	107.39	107.54	107.68	107.83	107.98	108.12	108.27	108.42	108.56	**6.80**
6.90	108.56	108.71	108.86	109.00	109.15	109.30	109.44	109.59	109.73	109.88	110.03	**6.90**
7.00	110.03	110.17	110.32	110.47	110.61	110.76	110.91	111.05	111.20	111.34	111.49	**7.00**
7.10	111.49	111.64	111.78	111.93	112.07	112.22	112.37	112.51	112.66	112.80	112.95	**7.10**
7.20	112.95	113.10	113.24	113.39	113.53	113.68	113.83	113.97	114.12	114.26	114.41	**7.20**
7.30	114.41	114.55	114.70	114.85	114.99	115.14	115.28	115.43	115.57	115.72	115.86	**7.30**
7.40	115.86	116.01	116.16	116.30	116.45	116.59	116.74	116.88	117.03	117.17	117.32	**7.40**
7.50	117.32	117.46	117.61	117.75	117.90	118.04	118.19	118.33	118.48	118.62	118.77	**7.50**
7.60	118.77	118.91	119.06	119.20	119.35	119.49	119.64	119.78	119.93	120.07	120.22	**7.60**
7.70	120.22	120.36	120.51	120.65	120.80	120.94	121.09	121.23	121.37	121.52	121.66	**7.70**
7.80	121.66	121.81	121.95	122.10	122.24	122.39	122.53	122.68	122.82	122.96	123.11	**7.80**
7.90	123.11	123.25	123.40	123.54	123.69	123.83	123.97	124.12	124.26	124.41	124.55	**7.90**
8.00	124.55	124.69	124.84	124.98	125.13	125.27	125.41	125.56	125.70	125.85	125.99	**8.00**
8.10	125.99	126.13	126.28	126.42	126.57	126.71	126.85	127.00	127.14	127.28	127.43	**8.10**
8.20	127.43	127.57	127.72	127.86	128.00	128.15	128.29	128.43	128.58	128.72	128.86	**8.20**
8.30	128.86	129.01	129.15	129.29	129.44	129.58	129.72	129.87	130.01	130.15	130.30	**8.30**
8.40	130.30	130.44	130.58	130.73	130.87	131.01	131.16	131.30	131.44	131.59	131.73	**8.40**
8.50	131.73	131.87	132.01	132.16	132.30	132.44	132.59	132.73	132.87	133.02	133.16	**8.50**
8.60	133.16	133.30	133.44	133.59	133.73	133.87	134.01	134.16	134.30	134.44	134.59	**8.60**
8.70	134.59	134.73	134.87	135.01	135.16	135.30	135.44	135.58	135.73	135.87	136.01	**8.70**
8.80	136.01	136.15	136.30	136.44	136.58	136.72	136.86	137.01	137.15	137.29	137.43	**8.80**
8.90	137.43	137.58	137.72	137.86	138.00	138.14	138.29	138.43	138.57	138.71	138.86	**8.90**
9.00	138.86	139.00	139.14	139.28	139.42	139.57	139.71	139.85	139.99	140.13	140.27	**9.00**
9.10	140.27	140.42	140.56	140.70	140.84	140.98	141.13	141.27	141.41	141.55	141.69	**9.10**
9.20	141.69	141.83	141.98	142.12	142.26	142.40	142.54	142.68	142.82	142.97	143.11	**9.20**
9.30	143.11	143.25	143.39	143.53	143.67	143.81	143.96	144.10	144.24	144.38	144.52	**9.30**
9.40	144.52	144.66	144.80	144.95	145.09	145.23	145.37	145.51	145.65	145.79	145.93	**9.40**
9.50	145.93	146.07	146.22	146.36	146.50	146.64	146.78	146.92	147.06	147.20	147.34	**9.50**
9.60	147.34	147.48	147.62	147.77	147.91	148.05	148.19	148.33	148.47	148.61	148.75	**9.60**
9.70	148.75	148.89	149.03	149.17	149.31	149.45	149.59	149.74	149.88	150.02	150.16	**9.70**
9.80	150.16	150.30	150.44	150.58	150.72	150.86	151.00	151.14	151.28	151.42	151.56	**9.80**
9.90	151.56	151.70	151.84	151.98	152.12	152.26	152.40	152.54	152.68	152.82	152.96	**9.90**
10.00	152.96	153.10	153.24	153.38	153.52	153.66	153.80	153.95	154.09	154.23	154.37	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	152.96	153.10	153.24	153.38	153.52	153.66	153.80	153.95	154.09	154.23	154.37	**10.00**
10.10	154.37	154.51	154.65	154.79	154.92	155.06	155.20	155.34	155.48	155.62	155.76	**10.10**
10.20	155.76	155.90	156.04	156.18	156.32	156.46	156.60	156.74	156.88	157.02	157.16	**10.20**
10.30	157.16	157.30	157.44	157.58	157.72	157.86	158.00	158.14	158.28	158.42	158.56	**10.30**
10.40	158.56	158.70	158.84	158.98	159.12	159.25	159.39	159.53	159.67	159.81	159.95	**10.40**
10.50	159.95	160.09	160.23	160.37	160.51	160.65	160.79	160.93	161.07	161.20	161.34	**10.50**
10.60	161.34	161.48	161.62	161.76	161.90	162.04	162.18	162.32	162.46	162.60	162.73	**10.60**
10.70	162.73	162.87	163.01	163.15	163.29	163.43	163.57	163.71	163.85	163.98	164.12	**10.70**
10.80	164.12	164.26	164.40	164.54	164.68	164.82	164.96	165.09	165.23	165.37	165.51	**10.80**
10.90	165.51	165.65	165.79	165.93	166.07	166.20	166.34	166.48	166.62	166.76	166.90	**10.90**
11.00	166.90	167.03	167.17	167.31	167.45	167.59	167.73	167.87	168.00	168.14	168.28	**11.00**
11.10	168.28	168.42	168.56	168.70	168.83	168.97	169.11	169.25	169.39	169.52	169.66	**11.10**
11.20	169.66	169.80	169.94	170.08	170.22	170.35	170.49	170.63	170.77	170.91	171.04	**11.20**
11.30	171.04	171.18	171.32	171.46	171.60	171.73	171.87	172.01	172.15	172.29	172.42	**11.30**
11.40	172.42	172.56	172.70	172.84	172.97	173.11	173.25	173.39	173.53	173.66	173.80	**11.40**
11.50	173.80	173.94	174.08	174.21	174.35	174.49	174.63	174.77	174.90	175.04	175.18	**11.50**
11.60	175.18	175.32	175.45	175.59	175.73	175.87	176.00	176.14	176.28	176.42	176.55	**11.60**
11.70	176.55	176.69	176.83	176.97	177.10	177.24	177.38	177.51	177.65	177.79	177.93	**11.70**
11.80	177.93	178.06	178.20	178.34	178.48	178.61	178.75	178.89	179.02	179.16	179.30	**11.80**
11.90	179.30	179.44	179.57	179.71	179.85	179.98	180.12	180.26	180.40	180.53	180.67	**11.90**
12.00	180.67	180.81	180.94	181.08	181.22	181.35	181.49	181.63	181.76	181.90	182.04	**12.00**
12.10	182.04	182.17	182.31	182.45	182.59	182.72	182.86	183.00	183.13	183.27	183.41	**12.10**
12.20	183.41	183.54	183.68	183.82	183.95	184.09	184.23	184.36	184.50	184.64	184.77	**12.20**
12.30	184.77	184.91	185.05	185.18	185.32	185.45	185.59	185.73	185.86	186.00	186.14	**12.30**
12.40	186.14	186.27	186.41	186.55	186.68	186.82	186.96	187.09	187.23	187.36	187.50	**12.40**
12.50	187.50	187.64	187.77	187.91	188.05	188.18	188.32	188.45	188.59	188.73	188.86	**12.50**
12.60	188.86	189.00	189.13	189.27	189.41	189.54	189.68	189.82	189.95	190.09	190.22	**12.60**
12.70	190.22	190.36	190.50	190.63	190.77	190.90	191.04	191.18	191.31	191.45	191.58	**12.70**
12.80	191.58	191.72	191.85	191.99	192.13	192.26	192.40	192.53	192.67	192.81	192.94	**12.80**
12.90	192.94	193.08	193.21	193.35	193.48	193.62	193.76	193.89	194.03	194.16	194.30	**12.90**
13.00	194.30	194.43	194.57	194.70	194.84	194.98	195.11	195.25	195.38	195.52	195.65	**13.00**
13.10	195.65	195.79	195.92	196.06	196.20	196.33	196.47	196.60	196.74	196.87	197.01	**13.10**
13.20	197.01	197.14	197.28	197.41	197.55	197.68	197.82	197.95	198.09	198.23	198.36	**13.20**
13.30	198.36	198.50	198.63	198.77	198.90	199.04	199.17	199.31	199.44	199.58	199.71	**13.30**
13.40	199.71	199.85	199.98	200.12	200.25	200.39	200.52	200.66	200.79	200.93	201.06	**13.40**
13.50	201.06	201.20	201.33	201.47	201.60	201.74	201.87	202.01	202.14	202.28	202.41	**13.50**
13.60	202.41	202.55	202.68	202.82	202.95	203.09	203.22	203.36	203.49	203.63	203.76	**13.60**
13.70	203.76	203.89	204.03	204.16	204.30	204.43	204.57	204.70	204.84	204.97	205.11	**13.70**
13.80	205.11	205.24	205.38	205.51	205.65	205.78	205.91	206.05	206.18	206.32	206.45	**13.80**
13.90	206.45	206.59	206.72	206.86	206.99	207.12	207.26	207.39	207.53	207.66	207.80	**13.90**
14.00	207.80	207.93	208.07	208.20	208.33	208.47	208.60	208.74	208.87	209.01	209.14	**14.00**
14.10	209.14	209.27	209.41	209.54	209.68	209.81	209.95	210.08	210.21	210.35	210.48	**14.10**
14.20	210.48	210.62	210.75	210.88	211.02	211.15	211.29	211.42	211.55	211.69	211.82	**14.20**
14.30	211.82	211.96	212.09	212.22	212.36	212.49	212.63	212.76	212.89	213.03	213.16	**14.30**
14.40	213.16	213.30	213.43	213.56	213.70	213.83	213.97	214.10	214.23	214.37	214.50	**14.40**
14.50	214.50	214.64	214.77	214.90	215.04	215.17	215.30	215.44	215.57	215.71	215.84	**14.50**
14.60	215.84	215.97	216.11	216.24	216.37	216.51	216.64	216.77	216.91	217.04	217.18	**14.60**
14.70	217.18	217.31	217.44	217.58	217.71	217.84	217.98	218.11	218.24	218.38	218.51	**14.70**
14.80	218.51	218.64	218.78	218.91	219.04	219.18	219.31	219.44	219.58	219.71	219.84	**14.80**
14.90	219.84	219.98	220.11	220.24	220.38	220.51	220.64	220.78	220.91	221.04	221.18	**14.90**
15.00	221.18	221.31	221.44	221.58	221.71	221.84	221.98	222.11	222.24	222.38	222.51	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
15.00	221.18	221.31	221.44	221.58	221.71	221.84	221.98	222.11	222.24	222.38	222.51	**15.00**
15.10	222.51	222.64	222.78	222.91	223.04	223.18	223.31	223.44	223.57	223.71	223.84	**15.10**
15.20	223.84	223.97	224.11	224.24	224.37	224.51	224.64	224.77	224.91	225.04	225.17	**15.20**
15.30	225.17	225.30	225.44	225.57	225.70	225.84	225.97	226.10	226.23	226.37	226.50	**15.30**
15.40	226.50	226.63	226.77	226.90	227.03	227.16	227.30	227.43	227.56	227.70	227.83	**15.40**
15.50	227.83	227.96	228.09	228.23	228.36	228.49	228.62	228.76	228.89	229.02	229.15	**15.50**
15.60	229.15	229.29	229.42	229.55	229.69	229.82	229.95	230.08	230.22	230.35	230.48	**15.60**
15.70	230.48	230.61	230.75	230.88	231.01	231.14	231.28	231.41	231.54	231.67	231.81	**15.70**
15.80	231.81	231.94	232.07	232.20	232.34	232.47	232.60	232.73	232.86	233.00	233.13	**15.80**
15.90	233.13	233.26	233.39	233.53	233.66	233.79	233.92	234.06	234.19	234.32	234.45	**15.90**
16.00	234.45	234.58	234.72	234.85	234.98	235.11	235.25	235.38	235.51	235.64	235.77	**16.00**
16.10	235.77	235.91	236.04	236.17	236.30	236.44	236.57	236.70	236.83	236.96	237.10	**16.10**
16.20	237.10	237.23	237.36	237.49	237.62	237.76	237.89	238.02	238.15	238.28	238.42	**16.20**
16.30	238.42	238.55	238.68	238.81	238.94	239.08	239.21	239.34	239.47	239.60	239.73	**16.30**
16.40	239.73	239.87	240.00	240.13	240.26	240.39	240.53	240.66	240.79	240.92	241.05	**16.40**
16.50	241.05	241.18	241.32	241.45	241.58	241.71	241.84	241.98	242.11	242.24	242.37	**16.50**
16.60	242.37	242.50	242.63	242.77	242.90	243.03	243.16	243.29	243.42	243.55	243.69	**16.60**
16.70	243.69	243.82	243.95	244.08	244.21	244.34	244.48	244.61	244.74	244.87	245.00	**16.70**
16.80	245.00	245.13	245.26	245.40	245.53	245.66	245.79	245.92	246.05	246.19	246.32	**16.80**
16.90	246.32	246.45	246.58	246.71	246.84	246.97	247.10	247.24	247.37	247.50	247.63	**16.90**
17.00	247.63	247.76	247.89	248.02	248.16	248.29	248.42	248.55	248.68	248.81	248.94	**17.00**
17.10	248.94	249.07	249.21	249.34	249.47	249.60	249.73	249.86	249.99	250.12	250.25	**17.10**
17.20	250.25	250.39	250.52	250.65	250.78	250.91	251.04	251.17	251.30	251.43	251.57	**17.20**
17.30	251.57	251.70	251.83	251.96	252.09	252.22	252.35	252.48	252.61	252.75	252.88	**17.30**
17.40	252.88	253.01	253.14	253.27	253.40	253.53	253.66	253.79	253.92	254.05	254.19	**17.40**
17.50	254.19	254.32	254.45	254.58	254.71	254.84	254.97	255.10	255.23	255.36	255.49	**17.50**
17.60	255.49	255.62	255.76	255.89	256.02	256.15	256.28	256.41	256.54	256.67	256.80	**17.60**
17.70	256.80	256.93	257.06	257.19	257.32	257.46	257.59	257.72	257.85	257.98	258.11	**17.70**
17.80	258.11	258.24	258.37	258.50	258.63	258.76	258.89	259.02	259.15	259.28	259.41	**17.80**
17.90	259.41	259.55	259.68	259.81	259.94	260.07	260.20	260.33	260.46	260.59	260.72	**17.90**
18.00	260.72	260.85	260.98	261.11	261.24	261.37	261.50	261.63	261.76	261.89	262.02	**18.00**
18.10	262.02	262.15	262.29	262.42	262.55	262.68	262.81	262.94	263.07	263.20	263.33	**18.10**
18.20	263.33	263.46	263.59	263.72	263.85	263.98	264.11	264.24	264.37	264.50	264.63	**18.20**
18.30	264.63	264.76	264.89	265.02	265.15	265.28	265.41	265.54	265.67	265.80	265.93	**18.30**
18.40	265.93	266.06	266.19	266.32	266.45	266.58	266.71	266.84	266.97	267.10	267.23	**18.40**
18.50	267.23	267.36	267.49	267.62	267.75	267.88	268.01	268.14	268.27	268.40	268.53	**18.50**
18.60	268.53	268.66	268.79	268.92	269.05	269.18	269.31	269.44	269.57	269.70	269.83	**18.60**
18.70	269.83	269.96	270.09	270.22	270.35	270.48	270.61	270.74	270.87	271.00	271.13	**18.70**
18.80	271.13	271.26	271.39	271.52	271.65	271.78	271.91	272.04	272.17	272.30	272.43	**18.80**
18.90	272.43	272.56	272.69	272.82	272.95	273.08	273.21	273.34	273.47	273.60	273.73	**18.90**
19.00	273.73	273.86	273.99	274.12	274.25	274.38	274.51	274.64	274.77	274.90	275.03	**19.00**
19.10	275.03	275.16	275.29	275.41	275.54	275.67	275.80	275.93	276.06	276.19	276.32	**19.10**
19.20	276.32	276.45	276.58	276.71	276.84	276.97	277.10	277.23	277.36	277.49	277.62	**19.20**
19.30	277.62	277.75	277.88	278.01	278.14	278.26	278.39	278.52	278.65	278.78	278.91	**19.30**
19.40	278.91	279.04	279.17	279.30	279.43	279.56	279.69	279.82	279.95	280.08	280.21	**19.40**
19.50	280.21	280.34	280.46	280.59	280.72	280.85	280.98	281.11	281.24	281.37	281.50	**19.50**
19.60	281.50	281.63	281.76	281.89	282.02	282.15	282.27	282.40	282.53	282.66	282.79	**19.60**
19.70	282.79	282.92	283.05	283.18	283.31	283.44	283.57	283.70	283.83	283.95	284.08	**19.70**
19.80	284.08	284.21	284.34	284.47	284.60	284.73	284.86	284.99	285.12	285.25	285.37	**19.80**
19.90	285.37	285.50	285.63	285.76	285.89	286.02	286.15	286.28	286.41	286.54	286.67	**19.90**
20.00	286.67	286.79	286.92	287.05	287.18	287.31	287.44	287.57	287.70	287.83	287.96	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
20.00	286.67	286.79	286.92	287.05	287.18	287.31	287.44	287.57	287.70	287.83	287.96	**20.00**
20.10	287.96	288.08	288.21	288.34	288.47	288.60	288.73	288.86	288.99	289.12	289.24	**20.10**
20.20	289.24	289.37	289.50	289.63	289.76	289.89	290.02	290.15	290.28	290.40	290.53	**20.20**
20.30	290.53	290.66	290.79	290.92	291.05	291.18	291.31	291.43	291.56	291.69	291.82	**20.30**
20.40	291.82	291.95	292.08	292.21	292.34	292.46	292.59	292.72	292.85	292.98	293.11	**20.40**
20.50	293.11	293.24	293.37	293.49	293.62	293.75	293.88	294.01	294.14	294.27	294.39	**20.50**
20.60	294.39	294.52	294.65	294.78	294.91	295.04	295.17	295.29	295.42	295.55	295.68	**20.60**
20.70	295.68	295.81	295.94	296.07	296.19	296.32	296.45	296.58	296.71	296.84	296.97	**20.70**
20.80	296.97	297.09	297.22	297.35	297.48	297.61	297.74	297.87	297.99	298.12	298.25	**20.80**
20.90	298.25	298.38	298.51	298.64	298.76	298.89	299.02	299.15	299.28	299.41	299.53	**20.90**
21.00	299.53	299.66	299.79	299.92	300.05	300.18	300.30	300.43	300.56	300.69	300.82	**21.00**
21.10	300.82	300.95	301.07	301.20	301.33	301.46	301.59	301.72	301.84	301.97	302.10	**21.10**
21.20	302.10	302.23	302.36	302.49	302.61	302.74	302.87	303.00	303.13	303.26	303.38	**21.20**
21.30	303.38	303.51	303.64	303.77	303.90	304.02	304.15	304.28	304.41	304.54	304.67	**21.30**
21.40	304.67	304.79	304.92	305.05	305.18	305.31	305.43	305.56	305.69	305.82	305.95	**21.40**
21.50	305.95	306.07	306.20	306.33	306.46	306.59	306.71	306.84	306.97	307.10	307.23	**21.50**
21.60	307.23	307.35	307.48	307.61	307.74	307.87	307.99	308.12	308.25	308.38	308.51	**21.60**
21.70	308.51	308.63	308.76	308.89	309.02	309.15	309.27	309.40	309.53	309.66	309.79	**21.70**
21.80	309.79	309.91	310.04	310.17	310.30	310.43	310.55	310.68	310.81	310.94	311.06	**21.80**
21.90	311.06	311.19	311.32	311.45	311.58	311.70	311.83	311.96	312.09	312.22	312.34	**21.90**
22.00	312.34	312.47	312.60	312.73	312.85	312.98	313.11	313.24	313.37	313.49	313.62	**22.00**
22.10	313.62	313.75	313.88	314.00	314.13	314.26	314.39	314.51	314.64	314.77	314.90	**22.10**
22.20	314.90	315.03	315.15	315.28	315.41	315.54	315.66	315.79	315.92	316.05	316.17	**22.20**
22.30	316.17	316.30	316.43	316.56	316.68	316.81	316.94	317.07	317.20	317.32	317.45	**22.30**
22.40	317.45	317.58	317.71	317.83	317.96	318.09	318.22	318.34	318.47	318.60	318.73	**22.40**
22.50	318.73	318.85	318.98	319.11	319.24	319.36	319.49	319.62	319.75	319.87	320.00	**22.50**
22.60	320.00	320.13	320.26	320.38	320.51	320.64	320.77	320.89	321.02	321.15	321.28	**22.60**
22.70	321.28	321.40	321.53	321.66	321.78	321.91	322.04	322.17	322.29	322.42	322.55	**22.70**
22.80	322.55	322.68	322.80	322.93	323.06	323.19	323.31	323.44	323.57	323.70	323.82	**22.80**
22.90	323.82	323.95	324.08	324.20	324.33	324.46	324.59	324.71	324.84	324.97	325.10	**22.90**
23.00	325.10	325.22	325.35	325.48	325.60	325.73	325.86	325.99	326.11	326.24	326.37	**23.00**
23.10	326.37	326.49	326.62	326.75	326.88	327.00	327.13	327.26	327.38	327.51	327.64	**23.10**
23.20	327.64	327.77	327.89	328.02	328.15	328.28	328.40	328.53	328.66	328.78	328.91	**23.20**
23.30	328.91	329.04	329.16	329.29	329.42	329.55	329.67	329.80	329.93	330.05	330.18	**23.30**
23.40	330.18	330.31	330.44	330.56	330.69	330.82	330.94	331.07	331.20	331.32	331.45	**23.40**
23.50	331.45	331.58	331.71	331.83	331.96	332.09	332.21	332.34	332.47	332.59	332.72	**23.50**
23.60	332.72	332.85	332.98	333.10	333.23	333.36	333.48	333.61	333.74	333.86	333.99	**23.60**
23.70	333.99	334.12	334.24	334.37	334.50	334.63	334.75	334.88	335.01	335.13	335.26	**23.70**
23.80	335.26	335.39	335.51	335.64	335.77	335.89	336.02	336.15	336.27	336.40	336.53	**23.80**
23.90	336.53	336.66	336.78	336.91	337.04	337.16	337.29	337.42	337.54	337.67	337.80	**23.90**
24.00	337.80	337.92	338.05	338.18	338.30	338.43	338.56	338.68	338.81	338.94	339.06	**24.00**
24.10	339.06	339.19	339.32	339.44	339.57	339.70	339.82	339.95	340.08	340.20	340.33	**24.10**
24.20	340.33	340.46	340.58	340.71	340.84	340.96	341.09	341.22	341.34	341.47	341.60	**24.20**
24.30	341.60	341.72	341.85	341.98	342.10	342.23	342.36	342.48	342.61	342.74	342.86	**24.30**
24.40	342.86	342.99	343.12	343.24	343.37	343.50	343.62	343.75	343.88	344.00	344.13	**24.40**
24.50	344.13	344.26	344.38	344.51	344.63	344.76	344.89	345.01	345.14	345.27	345.39	**24.50**
24.60	345.39	345.52	345.65	345.77	345.90	346.03	346.15	346.28	346.41	346.53	346.66	**24.60**
24.70	346.66	346.79	346.91	347.04	347.16	347.29	347.42	347.54	347.67	347.80	347.92	**24.70**
24.80	347.92	348.05	348.18	348.30	348.43	348.55	348.68	348.81	348.93	349.06	349.19	**24.80**
24.90	349.19	349.31	349.44	349.57	349.69	349.82	349.94	350.07	350.20	350.32	350.45	**24.90**
25.00	350.45	350.58	350.70	350.83	350.96	351.08	351.21	351.33	351.46	351.59	351.71	**25.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
25.00	350.45	350.58	350.70	350.83	350.96	351.08	351.21	351.33	351.46	351.59	351.71	**25.00**
25.10	351.71	351.84	351.97	352.09	352.22	352.34	352.47	352.60	352.72	352.85	352.98	**25.10**
25.20	352.98	353.10	353.23	353.35	353.48	353.61	353.73	353.86	353.99	354.11	354.24	**25.20**
25.30	354.24	354.36	354.49	354.62	354.74	354.87	354.99	355.12	355.25	355.37	355.50	**25.30**
25.40	355.50	355.63	355.75	355.88	356.00	356.13	356.26	356.38	356.51	356.63	356.76	**25.40**
25.50	356.76	356.89	357.01	357.14	357.27	357.39	357.52	357.64	357.77	357.90	358.02	**25.50**
25.60	358.02	358.15	358.27	358.40	358.53	358.65	358.78	358.90	359.03	359.16	359.28	**25.60**
25.70	359.28	359.41	359.53	359.66	359.79	359.91	360.04	360.16	360.29	360.42	360.54	**25.70**
25.80	360.54	360.67	360.79	360.92	361.05	361.17	361.30	361.42	361.55	361.68	361.80	**25.80**
25.90	361.80	361.93	362.05	362.18	362.31	362.43	362.56	362.68	362.81	362.94	363.06	**25.90**
26.00	363.06	363.19	363.31	363.44	363.56	363.69	363.82	363.94	364.07	364.19	364.32	**26.00**
26.10	364.32	364.45	364.57	364.70	364.82	364.95	365.08	365.20	365.33	365.45	365.58	**26.10**
26.20	365.58	365.70	365.83	365.96	366.08	366.21	366.33	366.46	366.59	366.71	366.84	**26.20**
26.30	366.84	366.96	367.09	367.21	367.34	367.47	367.59	367.72	367.84	367.97	368.09	**26.30**
26.40	368.09	368.22	368.35	368.47	368.60	368.72	368.85	368.97	369.10	369.23	369.35	**26.40**
26.50	369.35	369.48	369.60	369.73	369.85	369.98	370.11	370.23	370.36	370.48	370.61	**26.50**
26.60	370.61	370.73	370.86	370.99	371.11	371.24	371.36	371.49	371.61	371.74	371.87	**26.60**
26.70	371.87	371.99	372.12	372.24	372.37	372.49	372.62	372.75	372.87	373.00	373.12	**26.70**
26.80	373.12	373.25	373.37	373.50	373.62	373.75	373.88	374.00	374.13	374.25	374.38	**26.80**
26.90	374.38	374.50	374.63	374.75	374.88	375.01	375.13	375.26	375.38	375.51	375.63	**26.90**
27.00	375.63	375.76	375.88	376.01	376.14	376.26	376.39	376.51	376.64	376.76	376.89	**27.00**
27.10	376.89	377.01	377.14	377.27	377.39	377.52	377.64	377.77	377.89	378.02	378.14	**27.10**
27.20	378.14	378.27	378.39	378.52	378.65	378.77	378.90	379.02	379.15	379.27	379.40	**27.20**
27.30	379.40	379.52	379.65	379.77	379.90	380.03	380.15	380.28	380.40	380.53	380.65	**27.30**
27.40	380.65	380.78	380.90	381.03	381.15	381.28	381.40	381.53	381.66	381.78	381.91	**27.40**
27.50	381.91	382.03	382.16	382.28	382.41	382.53	382.66	382.78	382.91	383.03	383.16	**27.50**
27.60	383.16	383.28	383.41	383.54	383.66	383.79	383.91	384.04	384.16	384.29	384.41	**27.60**
27.70	384.41	384.54	384.66	384.79	384.91	385.04	385.16	385.29	385.42	385.54	385.67	**27.70**
27.80	385.67	385.79	385.92	386.04	386.17	386.29	386.42	386.54	386.67	386.79	386.92	**27.80**
27.90	386.92	387.04	387.17	387.29	387.42	387.54	387.67	387.79	387.92	388.05	388.17	**27.90**
28.00	388.17	388.30	388.42	388.55	388.67	388.80	388.92	389.05	389.17	389.30	389.42	**28.00**
28.10	389.42	389.55	389.67	389.80	389.92	390.05	390.17	390.30	390.42	390.55	390.67	**28.10**
28.20	390.67	390.80	390.92	391.05	391.17	391.30	391.42	391.55	391.67	391.80	391.92	**28.20**
28.30	391.92	392.05	392.18	392.30	392.43	392.55	392.68	392.80	392.93	393.05	393.18	**28.30**
28.40	393.18	393.30	393.43	393.55	393.68	393.80	393.93	394.05	394.18	394.30	394.43	**28.40**
28.50	394.43	394.55	394.68	394.80	394.93	395.05	395.18	395.30	395.43	395.55	395.68	**28.50**
28.60	395.68	395.80	395.93	396.05	396.18	396.30	396.43	396.55	396.68	396.80	396.93	**28.60**
28.70	396.93	397.05	397.18	397.30	397.43	397.55	397.68	397.80	397.93	398.05	398.18	**28.70**
28.80	398.18	398.30	398.43	398.55	398.68	398.80	398.93	399.05	399.18	399.30	399.43	**28.80**
28.90	399.43	399.55	399.68	399.80	399.93	400.05	400.18	400.30	400.43	400.55	400.67	**28.90**
29.00	400.67	400.80	400.92	401.05	401.17	401.30	401.42	401.55	401.67	401.80	401.92	**29.00**
29.10	401.92	402.05	402.17	402.30	402.42	402.55	402.67	402.80	402.92	403.05	403.17	**29.10**
29.20	403.17	403.30	403.42	403.55	403.67	403.80	403.92	404.05	404.17	404.30	404.42	**29.20**
29.30	404.42	404.55	404.67	404.80	404.92	405.04	405.17	405.29	405.42	405.54	405.67	**29.30**
29.40	405.67	405.79	405.92	406.04	406.17	406.29	406.42	406.54	406.67	406.79	406.92	**29.40**
29.50	406.92	407.04	407.17	407.29	407.42	407.54	407.66	407.79	407.91	408.04	408.16	**29.50**
29.60	408.16	408.29	408.41	408.54	408.66	408.79	408.91	409.04	409.16	409.29	409.41	**29.60**
29.70	409.41	409.54	409.66	409.78	409.91	410.03	410.16	410.28	410.41	410.53	410.66	**29.70**
29.80	410.66	410.78	410.91	411.03	411.16	411.28	411.41	411.53	411.66	411.78	411.90	**29.80**
29.90	411.90	412.03	412.15	412.28	412.40	412.53	412.65	412.78	412.90	413.03	413.15	**29.90**
30.00	413.15	413.28	413.40	413.52	413.65	413.77	413.90	414.02	414.15	414.27	414.40	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. ***Type E thermocouples*** *--- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
30.00	413.15	413.28	413.40	413.52	413.65	413.77	413.90	414.02	414.15	414.27	414.40	**30.00**
30.10	414.40	414.52	414.65	414.77	414.90	415.02	415.14	415.27	415.39	415.52	415.64	**30.10**
30.20	415.64	415.77	415.89	416.02	416.14	416.27	416.39	416.51	416.64	416.76	416.89	**30.20**
30.30	416.89	417.01	417.14	417.26	417.39	417.51	417.64	417.76	417.88	418.01	418.13	**30.30**
30.40	418.13	418.26	418.38	418.51	418.63	418.76	418.88	419.01	419.13	419.25	419.38	**30.40**
30.50	419.38	419.50	419.63	419.75	419.88	420.00	420.13	420.25	420.37	420.50	420.62	**30.50**
30.60	420.62	420.75	420.87	421.00	421.12	421.25	421.37	421.50	421.62	421.74	421.87	**30.60**
30.70	421.87	421.99	422.12	422.24	422.37	422.49	422.62	422.74	422.86	422.99	423.11	**30.70**
30.80	423.11	423.24	423.36	423.49	423.61	423.74	423.86	423.98	424.11	424.23	424.36	**30.80**
30.90	424.36	424.48	424.61	424.73	424.85	424.98	425.10	425.23	425.35	425.48	425.60	**30.90**
31.00	425.60	425.73	425.85	425.97	426.10	426.22	426.35	426.47	426.60	426.72	426.84	**31.00**
31.10	426.84	426.97	427.09	427.22	427.34	427.47	427.59	427.72	427.84	427.96	428.09	**31.10**
31.20	428.09	428.21	428.34	428.46	428.59	428.71	428.83	428.96	429.08	429.21	429.33	**31.20**
31.30	429.33	429.46	429.58	429.70	429.83	429.95	430.08	430.20	430.33	430.45	430.57	**31.30**
31.40	430.57	430.70	430.82	430.95	431.07	431.20	431.32	431.44	431.57	431.69	431.82	**31.40**
31.50	431.82	431.94	432.07	432.19	432.31	432.44	432.56	432.69	432.81	432.94	433.06	**31.50**
31.60	433.06	433.18	433.31	433.43	433.56	433.68	433.81	433.93	434.05	434.18	434.30	**31.60**
31.70	434.30	434.43	434.55	434.68	434.80	434.92	435.05	435.17	435.30	435.42	435.54	**31.70**
31.80	435.54	435.67	435.79	435.92	436.04	436.17	436.29	436.41	436.54	436.66	436.79	**31.80**
31.90	436.79	436.91	437.04	437.16	437.28	437.41	437.53	437.66	437.78	437.90	438.03	**31.90**
32.00	438.03	438.15	438.28	438.40	438.53	438.65	438.77	438.90	439.02	439.15	439.27	**32.00**
32.10	439.27	439.39	439.52	439.64	439.77	439.89	440.02	440.14	440.26	440.39	440.51	**32.10**
32.20	440.51	440.64	440.76	440.88	441.01	441.13	441.26	441.38	441.51	441.63	441.75	**32.20**
32.30	441.75	441.88	442.00	442.13	442.25	442.37	442.50	442.62	442.75	442.87	442.99	**32.30**
32.40	442.99	443.12	443.24	443.37	443.49	443.61	443.74	443.86	443.99	444.11	444.24	**32.40**
32.50	444.24	444.36	444.48	444.61	444.73	444.86	444.98	445.10	445.23	445.35	445.48	**32.50**
32.60	445.48	445.60	445.72	445.85	445.97	446.10	446.22	446.34	446.47	446.59	446.72	**32.60**
32.70	446.72	446.84	446.96	447.09	447.21	447.34	447.46	447.58	447.71	447.83	447.96	**32.70**
32.80	447.96	448.08	448.20	448.33	448.45	448.58	448.70	448.83	448.95	449.07	449.20	**32.80**
32.90	449.20	449.32	449.45	449.57	449.69	449.82	449.94	450.07	450.19	450.31	450.44	**32.90**
33.00	450.44	450.56	450.69	450.81	450.93	451.06	451.18	451.31	451.43	451.55	451.68	**33.00**
33.10	451.68	451.80	451.92	452.05	452.17	452.30	452.42	452.54	452.67	452.79	452.92	**33.10**
33.20	452.92	453.04	453.16	453.29	453.41	453.54	453.66	453.78	453.91	454.03	454.16	**33.20**
33.30	454.16	454.28	454.40	454.53	454.65	454.78	454.90	455.02	455.15	455.27	455.40	**33.30**
33.40	455.40	455.52	455.64	455.77	455.89	456.02	456.14	456.26	456.39	456.51	456.63	**33.40**
33.50	456.63	456.76	456.88	457.01	457.13	457.25	457.38	457.50	457.63	457.75	457.87	**33.50**
33.60	457.87	458.00	458.12	458.25	458.37	458.49	458.62	458.74	458.87	458.99	459.11	**33.60**
33.70	459.11	459.24	459.36	459.48	459.61	459.73	459.86	459.98	460.10	460.23	460.35	**33.70**
33.80	460.35	460.48	460.60	460.72	460.85	460.97	461.09	461.22	461.34	461.47	461.59	**33.80**
33.90	461.59	461.71	461.84	461.96	462.09	462.21	462.33	462.46	462.58	462.71	462.83	**33.90**
34.00	462.83	462.95	463.08	463.20	463.32	463.45	463.57	463.70	463.82	463.94	464.07	**34.00**
34.10	464.07	464.19	464.31	464.44	464.56	464.69	464.81	464.93	465.06	465.18	465.31	**34.10**
34.20	465.31	465.43	465.55	465.68	465.80	465.92	466.05	466.17	466.30	466.42	466.54	**34.20**
34.30	466.54	466.67	466.79	466.92	467.04	467.16	467.29	467.41	467.53	467.66	467.78	**34.30**
34.40	467.78	467.91	468.03	468.15	468.28	468.40	468.52	468.65	468.77	468.90	469.02	**34.40**
34.50	469.02	469.14	469.27	469.39	469.51	469.64	469.76	469.89	470.01	470.13	470.26	**34.50**
34.60	470.26	470.38	470.50	470.63	470.75	470.88	471.00	471.12	471.25	471.37	471.49	**34.60**
34.70	471.49	471.62	471.74	471.87	471.99	472.11	472.24	472.36	472.48	472.61	472.73	**34.70**
34.80	472.73	472.86	472.98	473.10	473.23	473.35	473.47	473.60	473.72	473.85	473.97	**34.80**
34.90	473.97	474.09	474.22	474.34	474.46	474.59	474.71	474.84	474.96	475.08	475.21	**34.90**
35.00	475.21	475.33	475.45	475.58	475.70	475.83	475.95	476.07	476.20	476.32	476.44	**35.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
35.00	475.21	475.33	475.45	475.58	475.70	475.83	475.95	476.07	476.20	476.32	476.44	**35.00**
35.10	476.44	476.57	476.69	476.82	476.94	477.06	477.19	477.31	477.43	477.56	477.68	**35.10**
35.20	477.68	477.80	477.93	478.05	478.18	478.30	478.42	478.55	478.67	478.79	478.92	**35.20**
35.30	478.92	479.04	479.17	479.29	479.41	479.54	479.66	479.78	479.91	480.03	480.16	**35.30**
35.40	480.16	480.28	480.40	480.53	480.65	480.77	480.90	481.02	481.14	481.27	481.39	**35.40**
35.50	481.39	481.52	481.64	481.76	481.89	482.01	482.13	482.26	482.38	482.50	482.63	**35.50**
35.60	482.63	482.75	482.88	483.00	483.12	483.25	483.37	483.49	483.62	483.74	483.87	**35.60**
35.70	483.87	483.99	484.11	484.24	484.36	484.48	484.61	484.73	484.85	484.98	485.10	**35.70**
35.80	485.10	485.23	485.35	485.47	485.60	485.72	485.84	485.97	486.09	486.21	486.34	**35.80**
35.90	486.34	486.46	486.59	486.71	486.83	486.96	487.08	487.20	487.33	487.45	487.57	**35.90**
36.00	487.57	487.70	487.82	487.95	488.07	488.19	488.32	488.44	488.56	488.69	488.81	**36.00**
36.10	488.81	488.93	489.06	489.18	489.31	489.43	489.55	489.68	489.80	489.92	490.05	**36.10**
36.20	490.05	490.17	490.29	490.42	490.54	490.66	490.79	490.91	491.04	491.16	491.28	**36.20**
36.30	491.28	491.41	491.53	491.65	491.78	491.90	492.02	492.15	492.27	492.40	492.52	**36.30**
36.40	492.52	492.64	492.77	492.89	493.01	493.14	493.26	493.38	493.51	493.63	493.75	**36.40**
36.50	493.75	493.88	494.00	494.13	494.25	494.37	494.50	494.62	494.74	494.87	494.99	**36.50**
36.60	494.99	495.11	495.24	495.36	495.49	495.61	495.73	495.86	495.98	496.10	496.23	**36.60**
36.70	496.23	496.35	496.47	496.60	496.72	496.84	496.97	497.09	497.22	497.34	497.46	**36.70**
36.80	497.46	497.59	497.71	497.83	497.96	498.08	498.20	498.33	498.45	498.57	498.70	**36.80**
36.90	498.70	498.82	498.95	499.07	499.19	499.32	499.44	499.56	499.69	499.81	499.93	**36.90**
37.00	499.93	500.06	500.18	500.30	500.43	500.55	500.68	500.80	500.92	501.05	501.17	**37.00**
37.10	501.17	501.29	501.42	501.54	501.66	501.79	501.91	502.03	502.16	502.28	502.41	**37.10**
37.20	502.41	502.53	502.65	502.78	502.90	503.02	503.15	503.27	503.39	503.52	503.64	**37.20**
37.30	503.64	503.76	503.89	504.01	504.13	504.26	504.38	504.51	504.63	504.75	504.88	**37.30**
37.40	504.88	505.00	505.12	505.25	505.37	505.49	505.62	505.74	505.86	505.99	506.11	**37.40**
37.50	506.11	506.24	506.36	506.48	506.61	506.73	506.85	506.98	507.10	507.22	507.35	**37.50**
37.60	507.35	507.47	507.59	507.72	507.84	507.96	508.09	508.21	508.34	508.46	508.58	**37.60**
37.70	508.58	508.71	508.83	508.95	509.08	509.20	509.32	509.45	509.57	509.69	509.82	**37.70**
37.80	509.82	509.94	510.06	510.19	510.31	510.44	510.56	510.68	510.81	510.93	511.05	**37.80**
37.90	511.05	511.18	511.30	511.42	511.55	511.67	511.79	511.92	512.04	512.16	512.29	**37.90**
38.00	512.29	512.41	512.54	512.66	512.78	512.91	513.03	513.15	513.28	513.40	513.52	**38.00**
38.10	513.52	513.65	513.77	513.89	514.02	514.14	514.26	514.39	514.51	514.64	514.76	**38.10**
38.20	514.76	514.88	515.01	515.13	515.25	515.38	515.50	515.62	515.75	515.87	515.99	**38.20**
38.30	515.99	516.12	516.24	516.36	516.49	516.61	516.73	516.86	516.98	517.11	517.23	**38.30**
38.40	517.23	517.35	517.48	517.60	517.72	517.85	517.97	518.09	518.22	518.34	518.46	**38.40**
38.50	518.46	518.59	518.71	518.83	518.96	519.08	519.21	519.33	519.45	519.58	519.70	**38.50**
38.60	519.70	519.82	519.95	520.07	520.19	520.32	520.44	520.56	520.69	520.81	520.93	**38.60**
38.70	520.93	521.06	521.18	521.31	521.43	521.55	521.68	521.80	521.92	522.05	522.17	**38.70**
38.80	522.17	522.29	522.42	522.54	522.66	522.79	522.91	523.03	523.16	523.28	523.40	**38.80**
38.90	523.40	523.53	523.65	523.78	523.90	524.02	524.15	524.27	524.39	524.52	524.64	**38.90**
39.00	524.64	524.76	524.89	525.01	525.13	525.26	525.38	525.50	525.63	525.75	525.88	**39.00**
39.10	525.88	526.00	526.12	526.25	526.37	526.49	526.62	526.74	526.86	526.99	527.11	**39.10**
39.20	527.11	527.23	527.36	527.48	527.60	527.73	527.85	527.97	528.10	528.22	528.35	**39.20**
39.30	528.35	528.47	528.59	528.72	528.84	528.96	529.09	529.21	529.33	529.46	529.58	**39.30**
39.40	529.58	529.70	529.83	529.95	530.07	530.20	530.32	530.45	530.57	530.69	530.82	**39.40**
39.50	530.82	530.94	531.06	531.19	531.31	531.43	531.56	531.68	531.80	531.93	532.05	**39.50**
39.60	532.05	532.17	532.30	532.42	532.55	532.67	532.79	532.92	533.04	533.16	533.29	**39.60**
39.70	533.29	533.41	533.53	533.66	533.78	533.90	534.03	534.15	534.27	534.40	534.52	**39.70**
39.80	534.52	534.65	534.77	534.89	535.02	535.14	535.26	535.39	535.51	535.63	535.76	**39.80**
39.90	535.76	535.88	536.00	536.13	536.25	536.37	536.50	536.62	536.75	536.87	536.99	**39.90**
40.00	536.99	537.12	537.24	537.36	537.49	537.61	537.73	537.86	537.98	538.10	538.23	**40.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
40.00	536.99	537.12	537.24	537.36	537.49	537.61	537.73	537.86	537.98	538.10	538.23	**40.00**
40.10	538.23	538.35	538.47	538.60	538.72	538.85	538.97	539.09	539.22	539.34	539.46	**40.10**
40.20	539.46	539.59	539.71	539.83	539.96	540.08	540.20	540.33	540.45	540.57	540.70	**40.20**
40.30	540.70	540.82	540.95	541.07	541.19	541.32	541.44	541.56	541.69	541.81	541.93	**40.30**
40.40	541.93	542.06	542.18	542.30	542.43	542.55	542.67	542.80	542.92	543.05	543.17	**40.40**
40.50	543.17	543.29	543.42	543.54	543.66	543.79	543.91	544.03	544.16	544.28	544.40	**40.50**
40.60	544.40	544.53	544.65	544.78	544.90	545.02	545.15	545.27	545.39	545.52	545.64	**40.60**
40.70	545.64	545.76	545.89	546.01	546.13	546.26	546.38	546.51	546.63	546.75	546.88	**40.70**
40.80	546.88	547.00	547.12	547.25	547.37	547.49	547.62	547.74	547.86	547.99	548.11	**40.80**
40.90	548.11	548.23	548.36	548.48	548.61	548.73	548.85	548.98	549.10	549.22	549.35	**40.90**
41.00	549.35	549.47	549.59	549.72	549.84	549.96	550.09	550.21	550.34	550.46	550.58	**41.00**
41.10	550.58	550.71	550.83	550.95	551.08	551.20	551.32	551.45	551.57	551.70	551.82	**41.10**
41.20	551.82	551.94	552.07	552.19	552.31	552.44	552.56	552.68	552.81	552.93	553.05	**41.20**
41.30	553.05	553.18	553.30	553.43	553.55	553.67	553.80	553.92	554.04	554.17	554.29	**41.30**
41.40	554.29	554.41	554.54	554.66	554.78	554.91	555.03	555.16	555.28	555.40	555.53	**41.40**
41.50	555.53	555.65	555.77	555.90	556.02	556.14	556.27	556.39	556.52	556.64	556.76	**41.50**
41.60	556.76	556.89	557.01	557.13	557.26	557.38	557.50	557.63	557.75	557.87	558.00	**41.60**
41.70	558.00	558.12	558.25	558.37	558.49	558.62	558.74	558.86	558.99	559.11	559.23	**41.70**
41.80	559.23	559.36	559.48	559.61	559.73	559.85	559.98	560.10	560.22	560.35	560.47	**41.80**
41.90	560.47	560.59	560.72	560.84	560.97	561.09	561.21	561.34	561.46	561.58	561.71	**41.90**
42.00	561.71	561.83	561.95	562.08	562.20	562.33	562.45	562.57	562.70	562.82	562.94	**42.00**
42.10	562.94	563.07	563.19	563.31	563.44	563.56	563.69	563.81	563.93	564.06	564.18	**42.10**
42.20	564.18	564.30	564.43	564.55	564.67	564.80	564.92	565.05	565.17	565.29	565.42	**42.20**
42.30	565.42	565.54	565.66	565.79	565.91	566.04	566.16	566.28	566.41	566.53	566.65	**42.30**
42.40	566.65	566.78	566.90	567.02	567.15	567.27	567.40	567.52	567.64	567.77	567.89	**42.40**
42.50	567.89	568.01	568.14	568.26	568.38	568.51	568.63	568.76	568.88	569.00	569.13	**42.50**
42.60	569.13	569.25	569.37	569.50	569.62	569.75	569.87	569.99	570.12	570.24	570.36	**42.60**
42.70	570.36	570.49	570.61	570.73	570.86	570.98	571.11	571.23	571.35	571.48	571.60	**42.70**
42.80	571.60	571.72	571.85	571.97	572.10	572.22	572.34	572.47	572.59	572.71	572.84	**42.80**
42.90	572.84	572.96	573.09	573.21	573.33	573.46	573.58	573.70	573.83	573.95	574.08	**42.90**
43.00	574.08	574.20	574.32	574.45	574.57	574.69	574.82	574.94	575.06	575.19	575.31	**43.00**
43.10	575.31	575.44	575.56	575.68	575.81	575.93	576.05	576.18	576.30	576.43	576.55	**43.10**
43.20	576.55	576.67	576.80	576.92	577.04	577.17	577.29	577.42	577.54	577.66	577.79	**43.20**
43.30	577.79	577.91	578.03	578.16	578.28	578.41	578.53	578.65	578.78	578.90	579.02	**43.30**
43.40	579.02	579.15	579.27	579.40	579.52	579.64	579.77	579.89	580.02	580.14	580.26	**43.40**
43.50	580.26	580.39	580.51	580.63	580.76	580.88	581.01	581.13	581.25	581.38	581.50	**43.50**
43.60	581.50	581.62	581.75	581.87	582.00	582.12	582.24	582.37	582.49	582.61	582.74	**43.60**
43.70	582.74	582.86	582.99	583.11	583.23	583.36	583.48	583.61	583.73	583.85	583.98	**43.70**
43.80	583.98	584.10	584.22	584.35	584.47	584.60	584.72	584.84	584.97	585.09	585.21	**43.80**
43.90	585.21	585.34	585.46	585.59	585.71	585.83	585.96	586.08	586.21	586.33	586.45	**43.90**
44.00	586.45	586.58	586.70	586.82	586.95	587.07	587.20	587.32	587.44	587.57	587.69	**44.00**
44.10	587.69	587.82	587.94	588.06	588.19	588.31	588.43	588.56	588.68	588.81	588.93	**44.10**
44.20	588.93	589.05	589.18	589.30	589.43	589.55	589.67	589.80	589.92	590.04	590.17	**44.20**
44.30	590.17	590.29	590.42	590.54	590.66	590.79	590.91	591.04	591.16	591.28	591.41	**44.30**
44.40	591.41	591.53	591.66	591.78	591.90	592.03	592.15	592.27	592.40	592.52	592.65	**44.40**
44.50	592.65	592.77	592.89	593.02	593.14	593.27	593.39	593.51	593.64	593.76	593.89	**44.50**
44.60	593.89	594.01	594.13	594.26	594.38	594.50	594.63	594.75	594.88	595.00	595.12	**44.60**
44.70	595.12	595.25	595.37	595.50	595.62	595.74	595.87	595.99	596.12	596.24	596.36	**44.70**
44.80	596.36	596.49	596.61	596.74	596.86	596.98	597.11	597.23	597.36	597.48	597.60	**44.80**
44.90	597.60	597.73	597.85	597.97	598.10	598.22	598.35	598.47	598.59	598.72	598.84	**44.90**
45.00	598.84	598.97	599.09	599.21	599.34	599.46	599.59	599.71	599.83	599.96	600.08	**45.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
45.00	598.84	598.97	599.09	599.21	599.34	599.46	599.59	599.71	599.83	599.96	600.08	**45.00**
45.10	600.08	600.21	600.33	600.45	600.58	600.70	600.83	600.95	601.07	601.20	601.32	**45.10**
45.20	601.32	601.45	601.57	601.69	601.82	601.94	602.07	602.19	602.31	602.44	602.56	**45.20**
45.30	602.56	602.69	602.81	602.93	603.06	603.18	603.31	603.43	603.55	603.68	603.80	**45.30**
45.40	603.80	603.93	604.05	604.17	604.30	604.42	604.55	604.67	604.79	604.92	605.04	**45.40**
45.50	605.04	605.17	605.29	605.41	605.54	605.66	605.79	605.91	606.03	606.16	606.28	**45.50**
45.60	606.28	606.41	606.53	606.66	606.78	606.90	607.03	607.15	607.28	607.40	607.52	**45.60**
45.70	607.52	607.65	607.77	607.90	608.02	608.14	608.27	608.39	608.52	608.64	608.76	**45.70**
45.80	608.76	608.89	609.01	609.14	609.26	609.38	609.51	609.63	609.76	609.88	610.01	**45.80**
45.90	610.01	610.13	610.25	610.38	610.50	610.63	610.75	610.87	611.00	611.12	611.25	**45.90**
46.00	611.25	611.37	611.49	611.62	611.74	611.87	611.99	612.12	612.24	612.36	612.49	**46.00**
46.10	612.49	612.61	612.74	612.86	612.98	613.11	613.23	613.36	613.48	613.60	613.73	**46.10**
46.20	613.73	613.85	613.98	614.10	614.23	614.35	614.47	614.60	614.72	614.85	614.97	**46.20**
46.30	614.97	615.09	615.22	615.34	615.47	615.59	615.72	615.84	615.96	616.09	616.21	**46.30**
46.40	616.21	616.34	616.46	616.58	616.71	616.83	616.96	617.08	617.21	617.33	617.45	**46.40**
46.50	617.45	617.58	617.70	617.83	617.95	618.07	618.20	618.32	618.45	618.57	618.70	**46.50**
46.60	618.70	618.82	618.94	619.07	619.19	619.32	619.44	619.57	619.69	619.81	619.94	**46.60**
46.70	619.94	620.06	620.19	620.31	620.44	620.56	620.68	620.81	620.93	621.06	621.18	**46.70**
46.80	621.18	621.30	621.43	621.55	621.68	621.80	621.93	622.05	622.17	622.30	622.42	**46.80**
46.90	622.42	622.55	622.67	622.80	622.92	623.04	623.17	623.29	623.42	623.54	623.67	**46.90**
47.00	623.67	623.79	623.91	624.04	624.16	624.29	624.41	624.54	624.66	624.78	624.91	**47.00**
47.10	624.91	625.03	625.16	625.28	625.41	625.53	625.65	625.78	625.90	626.03	626.15	**47.10**
47.20	626.15	626.28	626.40	626.52	626.65	626.77	626.90	627.02	627.15	627.27	627.39	**47.20**
47.30	627.39	627.52	627.64	627.77	627.89	628.02	628.14	628.27	628.39	628.51	628.64	**47.30**
47.40	628.64	628.76	628.89	629.01	629.14	629.26	629.38	629.51	629.63	629.76	629.88	**47.40**
47.50	629.88	630.01	630.13	630.25	630.38	630.50	630.63	630.75	630.88	631.00	631.13	**47.50**
47.60	631.13	631.25	631.37	631.50	631.62	631.75	631.87	632.00	632.12	632.25	632.37	**47.60**
47.70	632.37	632.49	632.62	632.74	632.87	632.99	633.12	633.24	633.36	633.49	633.61	**47.70**
47.80	633.61	633.74	633.86	633.99	634.11	634.24	634.36	634.48	634.61	634.73	634.86	**47.80**
47.90	634.86	634.98	635.11	635.23	635.36	635.48	635.60	635.73	635.85	635.98	636.10	**47.90**
48.00	636.10	636.23	636.35	636.48	636.60	636.72	636.85	636.97	637.10	637.22	637.35	**48.00**
48.10	637.35	637.47	637.60	637.72	637.85	637.97	638.09	638.22	638.34	638.47	638.59	**48.10**
48.20	638.59	638.72	638.84	638.97	639.09	639.21	639.34	639.46	639.59	639.71	639.84	**48.20**
48.30	639.84	639.96	640.09	640.21	640.34	640.46	640.58	640.71	640.83	640.96	641.08	**48.30**
48.40	641.08	641.21	641.33	641.46	641.58	641.71	641.83	641.95	642.08	642.20	642.33	**48.40**
48.50	642.33	642.45	642.58	642.70	642.83	642.95	643.08	643.20	643.32	643.45	643.57	**48.50**
48.60	643.57	643.70	643.82	643.95	644.07	644.20	644.32	644.45	644.57	644.69	644.82	**48.60**
48.70	644.82	644.94	645.07	645.19	645.32	645.44	645.57	645.69	645.82	645.94	646.07	**48.70**
48.80	646.07	646.19	646.31	646.44	646.56	646.69	646.81	646.94	647.06	647.19	647.31	**48.80**
48.90	647.31	647.44	647.56	647.69	647.81	647.93	648.06	648.18	648.31	648.43	648.56	**48.90**
49.00	648.56	648.68	648.81	648.93	649.06	649.18	649.31	649.43	649.56	649.68	649.80	**49.00**
49.10	649.80	649.93	650.05	650.18	650.30	650.43	650.55	650.68	650.80	650.93	651.05	**49.10**
49.20	651.05	651.18	651.30	651.43	651.55	651.67	651.80	651.92	652.05	652.17	652.30	**49.20**
49.30	652.30	652.42	652.55	652.67	652.80	652.92	653.05	653.17	653.30	653.42	653.55	**49.30**
49.40	653.55	653.67	653.80	653.92	654.04	654.17	654.29	654.42	654.54	654.67	654.79	**49.40**
49.50	654.79	654.92	655.04	655.17	655.29	655.42	655.54	655.67	655.79	655.92	656.04	**49.50**
49.60	656.04	656.17	656.29	656.42	656.54	656.66	656.79	656.91	657.04	657.16	657.29	**49.60**
49.70	657.29	657.41	657.54	657.66	657.79	657.91	658.04	658.16	658.29	658.41	658.54	**49.70**
49.80	658.54	658.66	658.79	658.91	659.04	659.16	659.29	659.41	659.54	659.66	659.78	**49.80**
49.90	659.78	659.91	660.03	660.16	660.28	660.41	660.53	660.66	660.78	660.91	661.03	**49.90**
50.00	661.03	661.16	661.28	661.41	661.53	661.66	661.78	661.91	662.03	662.16	662.28	**50.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
50.00	661.03	661.16	661.28	661.41	661.53	661.66	661.78	661.91	662.03	662.16	662.28	**50.00**
50.10	662.28	662.41	662.53	662.66	662.78	662.91	663.03	663.16	663.28	663.41	663.53	**50.10**
50.20	663.53	663.66	663.78	663.91	664.03	664.16	664.28	664.41	664.53	664.66	664.78	**50.20**
50.30	664.78	664.91	665.03	665.15	665.28	665.40	665.53	665.65	665.78	665.90	666.03	**50.30**
50.40	666.03	666.15	666.28	666.40	666.53	666.65	666.78	666.90	667.03	667.15	667.28	**50.40**
50.50	667.28	667.40	667.53	667.65	667.78	667.90	668.03	668.15	668.28	668.40	668.53	**50.50**
50.60	668.53	668.65	668.78	668.90	669.03	669.15	669.28	669.40	669.53	669.65	669.78	**50.60**
50.70	669.78	669.90	670.03	670.15	670.28	670.40	670.53	670.65	670.78	670.90	671.03	**50.70**
50.80	671.03	671.15	671.28	671.40	671.53	671.65	671.78	671.90	672.03	672.15	672.28	**50.80**
50.90	672.28	672.40	672.53	672.65	672.78	672.90	673.03	673.15	673.28	673.40	673.53	**50.90**
51.00	673.53	673.65	673.78	673.91	674.03	674.16	674.28	674.41	674.53	674.66	674.78	**51.00**
51.10	674.78	674.91	675.03	675.16	675.28	675.41	675.53	675.66	675.78	675.91	676.03	**51.10**
51.20	676.03	676.16	676.28	676.41	676.53	676.66	676.78	676.91	677.03	677.16	677.28	**51.20**
51.30	677.28	677.41	677.53	677.66	677.78	677.91	678.03	678.16	678.28	678.41	678.53	**51.30**
51.40	678.53	678.66	678.78	678.91	679.04	679.16	679.29	679.41	679.54	679.66	679.79	**51.40**
51.50	679.79	679.91	680.04	680.16	680.29	680.41	680.54	680.66	680.79	680.91	681.04	**51.50**
51.60	681.04	681.16	681.29	681.41	681.54	681.66	681.79	681.91	682.04	682.17	682.29	**51.60**
51.70	682.29	682.42	682.54	682.67	682.79	682.92	683.04	683.17	683.29	683.42	683.54	**51.70**
51.80	683.54	683.67	683.79	683.92	684.04	684.17	684.29	684.42	684.54	684.67	684.80	**51.80**
51.90	684.80	684.92	685.05	685.17	685.30	685.42	685.55	685.67	685.80	685.92	686.05	**51.90**
52.00	686.05	686.17	686.30	686.42	686.55	686.67	686.80	686.93	687.05	687.18	687.30	**52.00**
52.10	687.30	687.43	687.55	687.68	687.80	687.93	688.05	688.18	688.30	688.43	688.55	**52.10**
52.20	688.55	688.68	688.81	688.93	689.06	689.18	689.31	689.43	689.56	689.68	689.81	**52.20**
52.30	689.81	689.93	690.06	690.18	690.31	690.43	690.56	690.69	690.81	690.94	691.06	**52.30**
52.40	691.06	691.19	691.31	691.44	691.56	691.69	691.81	691.94	692.06	692.19	692.32	**52.40**
52.50	692.32	692.44	692.57	692.69	692.82	692.94	693.07	693.19	693.32	693.44	693.57	**52.50**
52.60	693.57	693.70	693.82	693.95	694.07	694.20	694.32	694.45	694.57	694.70	694.82	**52.60**
52.70	694.82	694.95	695.08	695.20	695.33	695.45	695.58	695.70	695.83	695.95	696.08	**52.70**
52.80	696.08	696.20	696.33	696.46	696.58	696.71	696.83	696.96	697.08	697.21	697.33	**52.80**
52.90	697.33	697.46	697.58	697.71	697.84	697.96	698.09	698.21	698.34	698.46	698.59	**52.90**
53.00	698.59	698.71	698.84	698.97	699.09	699.22	699.34	699.47	699.59	699.72	699.84	**53.00**
53.10	699.84	699.97	700.10	700.22	700.35	700.47	700.60	700.72	700.85	700.97	701.10	**53.10**
53.20	701.10	701.23	701.35	701.48	701.60	701.73	701.85	701.98	702.10	702.23	702.36	**53.20**
53.30	702.36	702.48	702.61	702.73	702.86	702.98	703.11	703.24	703.36	703.49	703.61	**53.30**
53.40	703.61	703.74	703.86	703.99	704.11	704.24	704.37	704.49	704.62	704.74	704.87	**53.40**
53.50	704.87	704.99	705.12	705.25	705.37	705.50	705.62	705.75	705.87	706.00	706.12	**53.50**
53.60	706.12	706.25	706.38	706.50	706.63	706.75	706.88	707.00	707.13	707.26	707.38	**53.60**
53.70	707.38	707.51	707.63	707.76	707.88	708.01	708.14	708.26	708.39	708.51	708.64	**53.70**
53.80	708.64	708.76	708.89	709.02	709.14	709.27	709.39	709.52	709.64	709.77	709.90	**53.80**
53.90	709.90	710.02	710.15	710.27	710.40	710.52	710.65	710.78	710.90	711.03	711.15	**53.90**
54.00	711.15	711.28	711.40	711.53	711.66	711.78	711.91	712.03	712.16	712.28	712.41	**54.00**
54.10	712.41	712.54	712.66	712.79	712.91	713.04	713.17	713.29	713.42	713.54	713.67	**54.10**
54.20	713.67	713.79	713.92	714.05	714.17	714.30	714.42	714.55	714.68	714.80	714.93	**54.20**
54.30	714.93	715.05	715.18	715.30	715.43	715.56	715.68	715.81	715.93	716.06	716.19	**54.30**
54.40	716.19	716.31	716.44	716.56	716.69	716.81	716.94	717.07	717.19	717.32	717.44	**54.40**
54.50	717.44	717.57	717.70	717.82	717.95	718.07	718.20	718.32	718.45	718.58	718.70	**54.50**
54.60	718.70	718.83	718.95	719.08	719.21	719.33	719.46	719.58	719.71	719.84	719.96	**54.60**
54.70	719.96	720.09	720.21	720.34	720.47	720.59	720.72	720.84	720.97	721.10	721.22	**54.70**
54.80	721.22	721.35	721.47	721.60	721.72	721.85	721.98	722.10	722.23	722.35	722.48	**54.80**
54.90	722.48	722.61	722.73	722.86	722.98	723.11	723.24	723.36	723.49	723.61	723.74	**54.90**
55.00	723.74	723.87	723.99	724.12	724.24	724.37	724.50	724.62	724.75	724.87	725.00	**55.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
55.00	723.74	723.87	723.99	724.12	724.24	724.37	724.50	724.62	724.75	724.87	725.00	**55.00**
55.10	725.00	725.13	725.25	725.38	725.50	725.63	725.76	725.88	726.01	726.13	726.26	**55.10**
55.20	726.26	726.39	726.51	726.64	726.77	726.89	727.02	727.14	727.27	727.40	727.52	**55.20**
55.30	727.52	727.65	727.77	727.90	728.03	728.15	728.28	728.40	728.53	728.66	728.78	**55.30**
55.40	728.78	728.91	729.03	729.16	729.29	729.41	729.54	729.66	729.79	729.92	730.04	**55.40**
55.50	730.04	730.17	730.30	730.42	730.55	730.67	730.80	730.93	731.05	731.18	731.30	**55.50**
55.60	731.30	731.43	731.56	731.68	731.81	731.94	732.06	732.19	732.31	732.44	732.57	**55.60**
55.70	732.57	732.69	732.82	732.94	733.07	733.20	733.32	733.45	733.58	733.70	733.83	**55.70**
55.80	733.83	733.95	734.08	734.21	734.33	734.46	734.58	734.71	734.84	734.96	735.09	**55.80**
55.90	735.09	735.22	735.34	735.47	735.59	735.72	735.85	735.97	736.10	736.23	736.35	**55.90**
56.00	736.35	736.48	736.60	736.73	736.86	736.98	737.11	737.24	737.36	737.49	737.61	**56.00**
56.10	737.61	737.74	737.87	737.99	738.12	738.25	738.37	738.50	738.62	738.75	738.88	**56.10**
56.20	738.88	739.00	739.13	739.26	739.38	739.51	739.63	739.76	739.89	740.01	740.14	**56.20**
56.30	740.14	740.27	740.39	740.52	740.65	740.77	740.90	741.02	741.15	741.28	741.40	**56.30**
56.40	741.40	741.53	741.66	741.78	741.91	742.03	742.16	742.29	742.41	742.54	742.67	**56.40**
56.50	742.67	742.79	742.92	743.05	743.17	743.30	743.42	743.55	743.68	743.80	743.93	**56.50**
56.60	743.93	744.06	744.18	744.31	744.44	744.56	744.69	744.81	744.94	745.07	745.19	**56.60**
56.70	745.19	745.32	745.45	745.57	745.70	745.83	745.95	746.08	746.21	746.33	746.46	**56.70**
56.80	746.46	746.58	746.71	746.84	746.96	747.09	747.22	747.34	747.47	747.60	747.72	**56.80**
56.90	747.72	747.85	747.98	748.10	748.23	748.35	748.48	748.61	748.73	748.86	748.99	**56.90**
57.00	748.99	749.11	749.24	749.37	749.49	749.62	749.75	749.87	750.00	750.13	750.25	**57.00**
57.10	750.25	750.38	750.51	750.63	750.76	750.88	751.01	751.14	751.26	751.39	751.52	**57.10**
57.20	751.52	751.64	751.77	751.90	752.02	752.15	752.28	752.40	752.53	752.66	752.78	**57.20**
57.30	752.78	752.91	753.04	753.16	753.29	753.42	753.54	753.67	753.80	753.92	754.05	**57.30**
57.40	754.05	754.17	754.30	754.43	754.55	754.68	754.81	754.93	755.06	755.19	755.31	**57.40**
57.50	755.31	755.44	755.57	755.69	755.82	755.95	756.07	756.20	756.33	756.45	756.58	**57.50**
57.60	756.58	756.71	756.83	756.96	757.09	757.21	757.34	757.47	757.59	757.72	757.85	**57.60**
57.70	757.85	757.97	758.10	758.23	758.35	758.48	758.61	758.73	758.86	758.99	759.11	**57.70**
57.80	759.11	759.24	759.37	759.49	759.62	759.75	759.87	760.00	760.13	760.25	760.38	**57.80**
57.90	760.38	760.51	760.63	760.76	760.89	761.01	761.14	761.27	761.39	761.52	761.65	**57.90**
58.00	761.65	761.77	761.90	762.03	762.15	762.28	762.41	762.53	762.66	762.79	762.91	**58.00**
58.10	762.91	763.04	763.17	763.29	763.42	763.55	763.68	763.80	763.93	764.06	764.18	**58.10**
58.20	764.18	764.31	764.44	764.56	764.69	764.82	764.94	765.07	765.20	765.32	765.45	**58.20**
58.30	765.45	765.58	765.70	765.83	765.96	766.08	766.21	766.34	766.46	766.59	766.72	**58.30**
58.40	766.72	766.85	766.97	767.10	767.23	767.35	767.48	767.61	767.73	767.86	767.99	**58.40**
58.50	767.99	768.11	768.24	768.37	768.49	768.62	768.75	768.87	769.00	769.13	769.26	**58.50**
58.60	769.26	769.38	769.51	769.64	769.76	769.89	770.02	770.14	770.27	770.40	770.52	**58.60**
58.70	770.52	770.65	770.78	770.90	771.03	771.16	771.29	771.41	771.54	771.67	771.79	**58.70**
58.80	771.79	771.92	772.05	772.17	772.30	772.43	772.55	772.68	772.81	772.94	773.06	**58.80**
58.90	773.06	773.19	773.32	773.44	773.57	773.70	773.82	773.95	774.08	774.21	774.33	**58.90**
59.00	774.33	774.46	774.59	774.71	774.84	774.97	775.09	775.22	775.35	775.47	775.60	**59.00**
59.10	775.60	775.73	775.86	775.98	776.11	776.24	776.36	776.49	776.62	776.75	776.87	**59.10**
59.20	776.87	777.00	777.13	777.25	777.38	777.51	777.63	777.76	777.89	778.02	778.14	**59.20**
59.30	778.14	778.27	778.40	778.52	778.65	778.78	778.90	779.03	779.16	779.29	779.41	**59.30**
59.40	779.41	779.54	779.67	779.79	779.92	780.05	780.18	780.30	780.43	780.56	780.68	**59.40**
59.50	780.68	780.81	780.94	781.07	781.19	781.32	781.45	781.57	781.70	781.83	781.96	**59.50**
59.60	781.96	782.08	782.21	782.34	782.46	782.59	782.72	782.85	782.97	783.10	783.23	**59.60**
59.70	783.23	783.35	783.48	783.61	783.74	783.86	783.99	784.12	784.24	784.37	784.50	**59.70**
59.80	784.50	784.63	784.75	784.88	785.01	785.13	785.26	785.39	785.52	785.64	785.77	**59.80**
59.90	785.77	785.90	786.02	786.15	786.28	786.41	786.53	786.66	786.79	786.92	787.04	**59.90**
60.00	787.04	787.17	787.30	787.42	787.55	787.68	787.81	787.93	788.06	788.19	788.31	**60.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
60.00	787.04	787.17	787.30	787.42	787.55	787.68	787.81	787.93	788.06	788.19	788.31	60.00
60.10	788.31	788.44	788.57	788.70	788.82	788.95	789.08	789.21	789.33	789.46	789.59	60.10
60.20	789.59	789.71	789.84	789.97	790.10	790.22	790.35	790.48	790.61	790.73	790.86	60.20
60.30	790.86	790.99	791.12	791.24	791.37	791.50	791.62	791.75	791.88	792.01	792.13	60.30
60.40	792.13	792.26	792.39	792.52	792.64	792.77	792.90	793.03	793.15	793.28	793.41	60.40
60.50	793.41	793.53	793.66	793.79	793.92	794.04	794.17	794.30	794.43	794.55	794.68	60.50
60.60	794.68	794.81	794.94	795.06	795.19	795.32	795.45	795.57	795.70	795.83	795.95	60.60
60.70	795.95	796.08	796.21	796.34	796.46	796.59	796.72	796.85	796.97	797.10	797.23	60.70
60.80	797.23	797.36	797.48	797.61	797.74	797.87	797.99	798.12	798.25	798.38	798.50	60.80
60.90	798.50	798.63	798.76	798.89	799.01	799.14	799.27	799.40	799.52	799.65	799.78	60.90
61.00	799.78	799.91	800.03	800.16	800.29	800.42	800.54	800.67	800.80	800.93	801.05	61.00
61.10	801.05	801.18	801.31	801.44	801.56	801.69	801.82	801.95	802.07	802.20	802.33	61.10
61.20	802.33	802.46	802.58	802.71	802.84	802.97	803.09	803.22	803.35	803.48	803.60	61.20
61.30	803.60	803.73	803.86	803.99	804.11	804.24	804.37	804.50	804.63	804.75	804.88	61.30
61.40	804.88	805.01	805.14	805.26	805.39	805.52	805.65	805.77	805.90	806.03	806.16	61.40
61.50	806.16	806.28	806.41	806.54	806.67	806.79	806.92	807.05	807.18	807.31	807.43	61.50
61.60	807.43	807.56	807.69	807.82	807.94	808.07	808.20	808.33	808.45	808.58	808.71	61.60
61.70	808.71	808.84	808.97	809.09	809.22	809.35	809.48	809.60	809.73	809.86	809.99	61.70
61.80	809.99	810.11	810.24	810.37	810.50	810.63	810.75	810.88	811.01	811.14	811.26	61.80
61.90	811.26	811.39	811.52	811.65	811.78	811.90	812.03	812.16	812.29	812.41	812.54	61.90
62.00	812.54	812.67	812.80	812.93	813.05	813.18	813.31	813.44	813.56	813.69	813.82	62.00
62.10	813.82	813.95	814.08	814.20	814.33	814.46	814.59	814.71	814.84	814.97	815.10	62.10
62.20	815.10	815.23	815.35	815.48	815.61	815.74	815.86	815.99	816.12	816.25	816.38	62.20
62.30	816.38	816.50	816.63	816.76	816.89	817.02	817.14	817.27	817.40	817.53	817.65	62.30
62.40	817.65	817.78	817.91	818.04	818.17	818.29	818.42	818.55	818.68	818.81	818.93	62.40
62.50	818.93	819.06	819.19	819.32	819.45	819.57	819.70	819.83	819.96	820.09	820.21	62.50
62.60	820.21	820.34	820.47	820.60	820.72	820.85	820.98	821.11	821.24	821.36	821.49	62.60
62.70	821.49	821.62	821.75	821.88	822.00	822.13	822.26	822.39	822.52	822.64	822.77	62.70
62.80	822.77	822.90	823.03	823.16	823.28	823.41	823.54	823.67	823.80	823.92	824.05	62.80
62.90	824.05	824.18	824.31	824.44	824.56	824.69	824.82	824.95	825.08	825.20	825.33	62.90
63.00	825.33	825.46	825.59	825.72	825.85	825.97	826.10	826.23	826.36	826.49	826.61	63.00
63.10	826.61	826.74	826.87	827.00	827.13	827.25	827.38	827.51	827.64	827.77	827.89	63.10
63.20	827.89	828.02	828.15	828.28	828.41	828.54	828.66	828.79	828.92	829.05	829.18	63.20
63.30	829.18	829.30	829.43	829.56	829.69	829.82	829.95	830.07	830.20	830.33	830.46	63.30
63.40	830.46	830.59	830.71	830.84	830.97	831.10	831.23	831.36	831.48	831.61	831.74	63.40
63.50	831.74	831.87	832.00	832.12	832.25	832.38	832.51	832.64	832.77	832.89	833.02	63.50
63.60	833.02	833.15	833.28	833.41	833.53	833.66	833.79	833.92	834.05	834.18	834.30	63.60
63.70	834.30	834.43	834.56	834.69	834.82	834.95	835.07	835.20	835.33	835.46	835.59	63.70
63.80	835.59	835.72	835.84	835.97	836.10	836.23	836.36	836.49	836.61	836.74	836.87	63.80
63.90	836.87	837.00	837.13	837.26	837.38	837.51	837.64	837.77	837.90	838.03	838.15	63.90
64.00	838.15	838.28	838.41	838.54	838.67	838.80	838.92	839.05	839.18	839.31	839.44	64.00
64.10	839.44	839.57	839.69	839.82	839.95	840.08	840.21	840.34	840.47	840.59	840.72	64.10
64.20	840.72	840.85	840.98	841.11	841.24	841.36	841.49	841.62	841.75	841.88	842.01	64.20
64.30	842.01	842.13	842.26	842.39	842.52	842.65	842.78	842.91	843.03	843.16	843.29	64.30
64.40	843.29	843.42	843.55	843.68	843.81	843.93	844.06	844.19	844.32	844.45	844.58	64.40
64.50	844.58	844.70	844.83	844.96	845.09	845.22	845.35	845.48	845.60	845.73	845.86	64.50
64.60	845.86	845.99	846.12	846.25	846.38	846.50	846.63	846.76	846.89	847.02	847.15	64.60
64.70	847.15	847.28	847.40	847.53	847.66	847.79	847.92	848.05	848.18	848.30	848.43	64.70
64.80	848.43	848.56	848.69	848.82	848.95	849.08	849.21	849.33	849.46	849.59	849.72	64.80
64.90	849.72	849.85	849.98	850.11	850.23	850.36	850.49	850.62	850.75	850.88	851.01	64.90
65.00	851.01	851.14	851.26	851.39	851.52	851.65	851.78	851.91	852.04	852.16	852.29	65.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
65.00	851.01	851.14	851.26	851.39	851.52	851.65	851.78	851.91	852.04	852.16	852.29	**65.00**
65.10	852.29	852.42	852.55	852.68	852.81	852.94	853.07	853.19	853.32	853.45	853.58	**65.10**
65.20	853.58	853.71	853.84	853.97	854.10	854.22	854.35	854.48	854.61	854.74	854.87	**65.20**
65.30	854.87	855.00	855.13	855.25	855.38	855.51	855.64	855.77	855.90	856.03	856.16	**65.30**
65.40	856.16	856.29	856.41	856.54	856.67	856.80	856.93	857.06	857.19	857.32	857.45	**65.40**
65.50	857.45	857.57	857.70	857.83	857.96	858.09	858.22	858.35	858.48	858.61	858.73	**65.50**
65.60	858.73	858.86	858.99	859.12	859.25	859.38	859.51	859.64	859.77	859.89	860.02	**65.60**
65.70	860.02	860.15	860.28	860.41	860.54	860.67	860.80	860.93	861.05	861.18	861.31	**65.70**
65.80	861.31	861.44	861.57	861.70	861.83	861.96	862.09	862.22	862.34	862.47	862.60	**65.80**
65.90	862.60	862.73	862.86	862.99	863.12	863.25	863.38	863.51	863.63	863.76	863.89	**65.90**
66.00	863.89	864.02	864.15	864.28	864.41	864.54	864.67	864.80	864.92	865.05	865.18	**66.00**
66.10	865.18	865.31	865.44	865.57	865.70	865.83	865.96	866.09	866.22	866.34	866.47	**66.10**
66.20	866.47	866.60	866.73	866.86	866.99	867.12	867.25	867.38	867.51	867.64	867.77	**66.20**
66.30	867.77	867.89	868.02	868.15	868.28	868.41	868.54	868.67	868.80	868.93	869.06	**66.30**
66.40	869.06	869.19	869.32	869.44	869.57	869.70	869.83	869.96	870.09	870.22	870.35	**66.40**
66.50	870.35	870.48	870.61	870.74	870.87	871.00	871.12	871.25	871.38	871.51	871.64	**66.50**
66.60	871.64	871.77	871.90	872.03	872.16	872.29	872.42	872.55	872.68	872.80	872.93	**66.60**
66.70	872.93	873.06	873.19	873.32	873.45	873.58	873.71	873.84	873.97	874.10	874.23	**66.70**
66.80	874.23	874.36	874.49	874.62	874.74	874.87	875.00	875.13	875.26	875.39	875.52	**66.80**
66.90	875.52	875.65	875.78	875.91	876.04	876.17	876.30	876.43	876.56	876.69	876.81	**66.90**
67.00	876.81	876.94	877.07	877.20	877.33	877.46	877.59	877.72	877.85	877.98	878.11	**67.00**
67.10	878.11	878.24	878.37	878.50	878.63	878.76	878.89	879.02	879.14	879.27	879.40	**67.10**
67.20	879.40	879.53	879.66	879.79	879.92	880.05	880.18	880.31	880.44	880.57	880.70	**67.20**
67.30	880.70	880.83	880.96	881.09	881.22	881.35	881.48	881.61	881.74	881.86	881.99	**67.30**
67.40	881.99	882.12	882.25	882.38	882.51	882.64	882.77	882.90	883.03	883.16	883.29	**67.40**
67.50	883.29	883.42	883.55	883.68	883.81	883.94	884.07	884.20	884.33	884.46	884.59	**67.50**
67.60	884.59	884.72	884.85	884.98	885.11	885.23	885.36	885.49	885.62	885.75	885.88	**67.60**
67.70	885.88	886.01	886.14	886.27	886.40	886.53	886.66	886.79	886.92	887.05	887.18	**67.70**
67.80	887.18	887.31	887.44	887.57	887.70	887.83	887.96	888.09	888.22	888.35	888.48	**67.80**
67.90	888.48	888.61	888.74	888.87	889.00	889.13	889.26	889.39	889.52	889.65	889.78	**67.90**
68.00	889.78	889.91	890.04	890.17	890.30	890.42	890.55	890.68	890.81	890.94	891.07	**68.00**
68.10	891.07	891.20	891.33	891.46	891.59	891.72	891.85	891.98	892.11	892.24	892.37	**68.10**
68.20	892.37	892.50	892.63	892.76	892.89	893.02	893.15	893.28	893.41	893.54	893.67	**68.20**
68.30	893.67	893.80	893.93	894.06	894.19	894.32	894.45	894.58	894.71	894.84	894.97	**68.30**
68.40	894.97	895.10	895.23	895.36	895.49	895.62	895.75	895.88	896.01	896.14	896.27	**68.40**
68.50	896.27	896.40	896.53	896.66	896.79	896.92	897.05	897.18	897.31	897.44	897.57	**68.50**
68.60	897.57	897.70	897.83	897.96	898.09	898.22	898.35	898.48	898.61	898.74	898.87	**68.60**
68.70	898.87	899.00	899.13	899.26	899.39	899.52	899.65	899.78	899.91	900.04	900.17	**68.70**
68.80	900.17	900.30	900.43	900.57	900.70	900.83	900.96	901.09	901.22	901.35	901.48	**68.80**
68.90	901.48	901.61	901.74	901.87	902.00	902.13	902.26	902.39	902.52	902.65	902.78	**68.90**
69.00	902.78	902.91	903.04	903.17	903.30	903.43	903.56	903.69	903.82	903.95	904.08	**69.00**
69.10	904.08	904.21	904.34	904.47	904.60	904.73	904.86	904.99	905.12	905.25	905.38	**69.10**
69.20	905.38	905.51	905.64	905.78	905.91	906.04	906.17	906.30	906.43	906.56	906.69	**69.20**
69.30	906.69	906.82	906.95	907.08	907.21	907.34	907.47	907.60	907.73	907.86	907.99	**69.30**
69.40	907.99	908.12	908.25	908.38	908.51	908.64	908.77	908.90	909.04	909.17	909.30	**69.40**
69.50	909.30	909.43	909.56	909.69	909.82	909.95	910.08	910.21	910.34	910.47	910.60	**69.50**
69.60	910.60	910.73	910.86	910.99	911.12	911.25	911.38	911.51	911.65	911.78	911.91	**69.60**
69.70	911.91	912.04	912.17	912.30	912.43	912.56	912.69	912.82	912.95	913.08	913.21	**69.70**
69.80	913.21	913.34	913.47	913.60	913.73	913.87	914.00	914.13	914.26	914.39	914.52	**69.80**
69.90	914.52	914.65	914.78	914.91	915.04	915.17	915.30	915.43	915.56	915.69	915.83	**69.90**
70.00	915.83	915.96	916.09	916.22	916.35	916.48	916.61	916.74	916.87	917.00	917.13	**70.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
70.00	915.83	915.96	916.09	916.22	916.35	916.48	916.61	916.74	916.87	917.00	917.13	**70.00**
70.10	917.13	917.26	917.39	917.52	917.66	917.79	917.92	918.05	918.18	918.31	918.44	**70.10**
70.20	918.44	918.57	918.70	918.83	918.96	919.09	919.22	919.36	919.49	919.62	919.75	**70.20**
70.30	919.75	919.88	920.01	920.14	920.27	920.40	920.53	920.66	920.80	920.93	921.06	**70.30**
70.40	921.06	921.19	921.32	921.45	921.58	921.71	921.84	921.97	922.10	922.23	922.37	**70.40**
70.50	922.37	922.50	922.63	922.76	922.89	923.02	923.15	923.28	923.41	923.54	923.68	**70.50**
70.60	923.68	923.81	923.94	924.07	924.20	924.33	924.46	924.59	924.72	924.85	924.99	**70.60**
70.70	924.99	925.12	925.25	925.38	925.51	925.64	925.77	925.90	926.03	926.16	926.30	**70.70**
70.80	926.30	926.43	926.56	926.69	926.82	926.95	927.08	927.21	927.34	927.48	927.61	**70.80**
70.90	927.61	927.74	927.87	928.00	928.13	928.26	928.39	928.52	928.66	928.79	928.92	**70.90**
71.00	928.92	929.05	929.18	929.31	929.44	929.57	929.71	929.84	929.97	930.10	930.23	**71.00**
71.10	930.23	930.36	930.49	930.62	930.75	930.89	931.02	931.15	931.28	931.41	931.54	**71.10**
71.20	931.54	931.67	931.80	931.94	932.07	932.20	932.33	932.46	932.59	932.72	932.86	**71.20**
71.30	932.86	932.99	933.12	933.25	933.38	933.51	933.64	933.77	933.91	934.04	934.17	**71.30**
71.40	934.17	934.30	934.43	934.56	934.69	934.83	934.96	935.09	935.22	935.35	935.48	**71.40**
71.50	935.48	935.61	935.75	935.88	936.01	936.14	936.27	936.40	936.53	936.67	936.80	**71.50**
71.60	936.80	936.93	937.06	937.19	937.32	937.45	937.59	937.72	937.85	937.98	938.11	**71.60**
71.70	938.11	938.24	938.37	938.51	938.64	938.77	938.90	939.03	939.16	939.29	939.43	**71.70**
71.80	939.43	939.56	939.69	939.82	939.95	940.08	940.22	940.35	940.48	940.61	940.74	**71.80**
71.90	940.74	940.87	941.01	941.14	941.27	941.40	941.53	941.66	941.80	941.93	942.06	**71.90**
72.00	942.06	942.19	942.32	942.45	942.58	942.72	942.85	942.98	943.11	943.24	943.37	**72.00**
72.10	943.37	943.51	943.64	943.77	943.90	944.03	944.17	944.30	944.43	944.56	944.69	**72.10**
72.20	944.69	944.82	944.96	945.09	945.22	945.35	945.48	945.61	945.75	945.88	946.01	**72.20**
72.30	946.01	946.14	946.27	946.40	946.54	946.67	946.80	946.93	947.06	947.20	947.33	**72.30**
72.40	947.33	947.46	947.59	947.72	947.85	947.99	948.12	948.25	948.38	948.51	948.65	**72.40**
72.50	948.65	948.78	948.91	949.04	949.17	949.31	949.44	949.57	949.70	949.83	949.96	**72.50**
72.60	949.96	950.10	950.23	950.36	950.49	950.62	950.76	950.89	951.02	951.15	951.28	**72.60**
72.70	951.28	951.42	951.55	951.68	951.81	951.94	952.08	952.21	952.34	952.47	952.60	**72.70**
72.80	952.60	952.74	952.87	953.00	953.13	953.26	953.40	953.53	953.66	953.79	953.92	**72.80**
72.90	953.92	954.06	954.19	954.32	954.45	954.58	954.72	954.85	954.98	955.11	955.25	**72.90**
73.00	955.25	955.38	955.51	955.64	955.77	955.91	956.04	956.17	956.30	956.43	956.57	**73.00**
73.10	956.57	956.70	956.83	956.96	957.09	957.23	957.36	957.49	957.62	957.76	957.89	**73.10**
73.20	957.89	958.02	958.15	958.28	958.42	958.55	958.68	958.81	958.95	959.08	959.21	**73.20**
73.30	959.21	959.34	959.47	959.61	959.74	959.87	960.00	960.14	960.27	960.40	960.53	**73.30**
73.40	960.53	960.66	960.80	960.93	961.06	961.19	961.33	961.46	961.59	961.72	961.86	**73.40**
73.50	961.86	961.99	962.12	962.25	962.38	962.52	962.65	962.78	962.91	963.05	963.18	**73.50**
73.60	963.18	963.31	963.44	963.58	963.71	963.84	963.97	964.11	964.24	964.37	964.50	**73.60**
73.70	964.50	964.63	964.77	964.90	965.03	965.16	965.30	965.43	965.56	965.69	965.83	**73.70**
73.80	965.83	965.96	966.09	966.22	966.36	966.49	966.62	966.75	966.89	967.02	967.15	**73.80**
73.90	967.15	967.28	967.42	967.55	967.68	967.81	967.95	968.08	968.21	968.34	968.48	**73.90**
74.00	968.48	968.61	968.74	968.87	969.01	969.14	969.27	969.40	969.54	969.67	969.80	**74.00**
74.10	969.80	969.93	970.07	970.20	970.33	970.46	970.60	970.73	970.86	970.99	971.13	**74.10**
74.20	971.13	971.26	971.39	971.52	971.66	971.79	971.92	972.06	972.19	972.32	972.45	**74.20**
74.30	972.45	972.59	972.72	972.85	972.98	973.12	973.25	973.38	973.51	973.65	973.78	**74.30**
74.40	973.78	973.91	974.04	974.18	974.31	974.44	974.58	974.71	974.84	974.97	975.11	**74.40**
74.50	975.11	975.24	975.37	975.50	975.64	975.77	975.90	976.04	976.17	976.30	976.43	**74.50**
74.60	976.43	976.57	976.70	976.83	976.96	977.10	977.23	977.36	977.50	977.63	977.76	**74.60**
74.70	977.76	977.89	978.03	978.16	978.29	978.42	978.56	978.69	978.82	978.96	979.09	**74.70**
74.80	979.09	979.22	979.35	979.49	979.62	979.75	979.89	980.02	980.15	980.28	980.42	**74.80**
74.90	980.42	980.55	980.68	980.81	980.95	981.08	981.21	981.35	981.48	981.61	981.74	**74.90**
75.00	981.74	981.88	982.01	982.14	982.28	982.41	982.54	982.67	982.81	982.94	983.07	**75.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.1. *Type E thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
75.00	981.74	981.88	982.01	982.14	982.28	982.41	982.54	982.67	982.81	982.94	983.07	**75.00**
75.10	983.07	983.21	983.34	983.47	983.60	983.74	983.87	984.00	984.14	984.27	984.40	**75.10**
75.20	984.40	984.53	984.67	984.80	984.93	985.07	985.20	985.33	985.47	985.60	985.73	**75.20**
75.30	985.73	985.86	986.00	986.13	986.26	986.40	986.53	986.66	986.79	986.93	987.06	**75.30**
75.40	987.06	987.19	987.33	987.46	987.59	987.72	987.86	987.99	988.12	988.26	988.39	**75.40**
75.50	988.39	988.52	988.66	988.79	988.92	989.05	989.19	989.32	989.45	989.59	989.72	**75.50**
75.60	989.72	989.85	989.99	990.12	990.25	990.38	990.52	990.65	990.78	990.92	991.05	**75.60**
75.70	991.05	991.18	991.32	991.45	991.58	991.71	991.85	991.98	992.11	992.25	992.38	**75.70**
75.80	992.38	992.51	992.65	992.78	992.91	993.04	993.18	993.31	993.44	993.58	993.71	**75.80**
75.90	993.71	993.84	993.98	994.11	994.24	994.37	994.51	994.64	994.77	994.91	995.04	**75.90**
76.00	995.04	995.17	995.31	995.44	995.57	995.70	995.84	995.97	996.10	996.24	996.37	**76.00**
76.10	996.37	996.50	996.64	996.77	996.90	997.04	997.17	997.30	997.43	997.57	997.70	**76.10**
76.20	997.70	997.83	997.97	998.10	998.23	998.37	998.50	998.63	998.76	998.90	999.03	**76.20**
76.30	999.03	999.16	999.30	999.43	999.56	999.70	999.83	999.96				**76.30**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. ***Type E thermocouples*** *--- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−9.80	−437.06	−440.45	−444.47	−449.83								−9.80
−9.70	−414.69	−416.46	−418.30	−420.21	−422.21	−424.30	−426.51	−428.85	−431.35	−434.07	−437.06	−9.70
−9.60	−399.47	−400.83	−402.23	−403.65	−405.11	−406.60	−408.13	−409.70	−411.31	−412.97	−414.69	−9.60
−9.50	−387.03	−388.19	−389.37	−390.56	−391.77	−393.00	−394.25	−395.52	−396.81	−398.13	−399.47	−9.50
−9.40	−376.20	−377.23	−378.27	−379.32	−380.38	−381.46	−382.55	−383.65	−384.76	−385.89	−387.03	−9.40
−9.30	−366.42	−367.36	−368.31	−369.27	−370.23	−371.20	−372.18	−373.17	−374.17	−375.18	−376.20	−9.30
−9.20	−357.42	−358.29	−359.17	−360.05	−360.94	−361.84	−362.74	−363.65	−364.57	−365.49	−366.42	−9.20
−9.10	−349.00	−349.82	−350.64	−351.47	−352.31	−353.15	−353.99	−354.84	−355.69	−356.55	−357.42	−9.10
−9.00	−341.05	−341.83	−342.61	−343.39	−344.18	−344.97	−345.77	−346.57	−347.38	−348.19	−349.00	−9.00
−8.90	−333.49	−334.23	−334.97	−335.72	−336.47	−337.23	−337.98	−338.75	−339.51	−340.28	−341.05	−8.90
−8.80	−326.25	−326.96	−327.67	−328.39	−329.11	−329.83	−330.56	−331.28	−332.02	−332.75	−333.49	−8.80
−8.70	−319.29	−319.97	−320.66	−321.35	−322.04	−322.73	−323.43	−324.13	−324.83	−325.54	−326.25	−8.70
−8.60	−312.57	−313.23	−313.89	−314.56	−315.23	−315.90	−316.57	−317.25	−317.92	−318.60	−319.29	−8.60
−8.50	−306.06	−306.70	−307.35	−307.99	−308.64	−309.29	−309.94	−310.59	−311.25	−311.91	−312.57	−8.50
−8.40	−299.75	−300.37	−301.00	−301.62	−302.25	−302.88	−303.51	−304.15	−304.78	−305.42	−306.06	−8.40
−8.30	−293.61	−294.21	−294.82	−295.43	−296.04	−296.66	−297.27	−297.89	−298.51	−299.13	−299.75	−8.30
−8.20	−287.62	−288.21	−288.81	−289.40	−290.00	−290.59	−291.19	−291.79	−292.40	−293.00	−293.61	−8.20
−8.10	−281.78	−282.36	−282.93	−283.52	−284.10	−284.68	−285.27	−285.85	−286.44	−287.03	−287.62	−8.10
−8.00	−276.07	−276.63	−277.20	−277.77	−278.33	−278.91	−279.48	−280.05	−280.62	−281.20	−281.78	−8.00
−7.90	−270.47	−271.03	−271.58	−272.14	−272.70	−273.25	−273.81	−274.38	−274.94	−275.50	−276.07	−7.90
−7.80	−264.99	−265.54	−266.08	−266.63	−267.17	−267.72	−268.27	−268.82	−269.37	−269.92	−270.47	−7.80
−7.70	−259.62	−260.15	−260.69	−261.22	−261.76	−262.29	−262.83	−263.37	−263.91	−264.45	−264.99	−7.70
−7.60	−254.34	−254.86	−255.39	−255.91	−256.44	−256.97	−257.50	−258.03	−258.56	−259.09	−259.62	−7.60
−7.50	−249.15	−249.67	−250.18	−250.70	−251.22	−251.74	−252.25	−252.77	−253.30	−253.82	−254.34	−7.50
−7.40	−244.05	−244.56	−245.06	−245.57	−246.08	−246.59	−247.10	−247.61	−248.13	−248.64	−249.15	−7.40
−7.30	−239.03	−239.53	−240.03	−240.53	−241.03	−241.53	−242.03	−242.54	−243.04	−243.54	−244.05	−7.30
−7.20	−234.08	−234.57	−235.06	−235.56	−236.05	−236.55	−237.04	−237.54	−238.03	−238.53	−239.03	−7.20
−7.10	−229.21	−229.69	−230.18	−230.66	−231.15	−231.63	−232.12	−232.61	−233.10	−233.59	−234.08	−7.10
−7.00	−224.40	−224.88	−225.35	−225.83	−226.31	−226.79	−227.27	−227.76	−228.24	−228.72	−229.21	−7.00
−6.90	−219.65	−220.13	−220.60	−221.07	−221.54	−222.02	−222.49	−222.97	−223.44	−223.92	−224.40	−6.90
−6.80	−214.97	−215.44	−215.90	−216.37	−216.84	−217.31	−217.77	−218.24	−218.71	−219.18	−219.65	−6.80
−6.70	−210.35	−210.81	−211.27	−211.73	−212.19	−212.65	−213.12	−213.58	−214.04	−214.51	−214.97	−6.70
−6.60	−205.78	−206.23	−206.69	−207.14	−207.60	−208.06	−208.51	−208.97	−209.43	−209.89	−210.35	−6.60
−6.50	−201.26	−201.71	−202.16	−202.61	−203.06	−203.51	−203.97	−204.42	−204.87	−205.33	−205.78	−6.50
−6.40	−196.80	−197.24	−197.69	−198.13	−198.58	−199.02	−199.47	−199.92	−200.37	−200.81	−201.26	−6.40
−6.30	−192.38	−192.82	−193.26	−193.70	−194.14	−194.58	−195.03	−195.47	−195.91	−196.35	−196.80	−6.30
−6.20	−188.01	−188.45	−188.88	−189.32	−189.75	−190.19	−190.63	−191.07	−191.50	−191.94	−192.38	−6.20
−6.10	−183.69	−184.12	−184.55	−184.98	−185.41	−185.84	−186.28	−186.71	−187.14	−187.58	−188.01	−6.10
−6.00	−179.40	−179.83	−180.26	−180.68	−181.11	−181.54	−181.97	−182.40	−182.83	−183.26	−183.69	−6.00
−5.90	−175.16	−175.59	−176.01	−176.43	−176.85	−177.28	−177.70	−178.13	−178.55	−178.98	−179.40	−5.90
−5.80	−170.96	−171.38	−171.80	−172.22	−172.64	−173.06	−173.48	−173.90	−174.32	−174.74	−175.16	−5.80
−5.70	−166.80	−167.21	−167.63	−168.04	−168.46	−168.88	−169.29	−169.71	−170.13	−170.54	−170.96	−5.70
−5.60	−162.67	−163.09	−163.50	−163.91	−164.32	−164.73	−165.15	−165.56	−165.97	−166.39	−166.80	−5.60
−5.50	−158.59	−158.99	−159.40	−159.81	−160.22	−160.63	−161.03	−161.44	−161.85	−162.26	−162.67	−5.50
−5.40	−154.53	−154.93	−155.34	−155.74	−156.15	−156.55	−156.96	−157.37	−157.77	−158.18	−158.59	−5.40
−5.30	−150.51	−150.91	−151.31	−151.71	−152.11	−152.52	−152.92	−153.32	−153.72	−154.13	−154.53	−5.30
−5.20	−146.52	−146.92	−147.32	−147.71	−148.11	−148.51	−148.91	−149.31	−149.71	−150.11	−150.51	−5.20
−5.10	−142.56	−142.96	−143.35	−143.75	−144.14	−144.54	−144.93	−145.33	−145.73	−146.12	−146.52	−5.10
−5.00	−138.64	−139.03	−139.42	−139.81	−140.20	−140.60	−140.99	−141.38	−141.78	−142.17	−142.56	−5.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−5.00	−138.64	−139.03	−139.42	−139.81	−140.20	−140.60	−140.99	−141.38	−141.78	−142.17	−142.56	−5.00
−4.90	−134.74	−135.13	−135.52	−135.91	−136.29	−136.68	−137.07	−137.46	−137.85	−138.25	−138.64	−4.90
−4.80	−130.87	−131.26	−131.64	−132.03	−132.41	−132.80	−133.19	−133.58	−133.96	−134.35	−134.74	−4.80
−4.70	−127.03	−127.41	−127.80	−128.18	−128.56	−128.95	−129.33	−129.72	−130.10	−130.49	−130.87	−4.70
−4.60	−123.22	−123.60	−123.98	−124.36	−124.74	−125.12	−125.50	−125.88	−126.27	−126.65	−127.03	−4.60
−4.50	−119.43	−119.81	−120.18	−120.56	−120.94	−121.32	−121.70	−122.08	−122.46	−122.84	−123.22	−4.50
−4.40	−115.67	−116.04	−116.42	−116.79	−117.17	−117.54	−117.92	−118.30	−118.67	−119.05	−119.43	−4.40
−4.30	−111.93	−112.30	−112.67	−113.05	−113.42	−113.79	−114.17	−114.54	−114.92	−115.29	−115.67	−4.30
−4.20	−108.22	−108.59	−108.96	−109.33	−109.70	−110.07	−110.44	−110.81	−111.18	−111.56	−111.93	−4.20
−4.10	−104.53	−104.89	−105.26	−105.63	−106.00	−106.37	−106.74	−107.11	−107.48	−107.85	−108.22	−4.10
−4.00	−100.86	−101.22	−101.59	−101.96	−102.32	−102.69	−103.06	−103.42	−103.79	−104.16	−104.53	−4.00
−3.90	−97.21	−97.58	−97.94	−98.31	−98.67	−99.03	−99.40	−99.76	−100.13	−100.49	−100.86	−3.90
−3.80	−93.59	−93.95	−94.31	−94.68	−95.04	−95.40	−95.76	−96.13	−96.49	−96.85	−97.21	−3.80
−3.70	−89.99	−90.35	−90.71	−91.07	−91.43	−91.79	−92.15	−92.51	−92.87	−93.23	−93.59	−3.70
−3.60	−86.41	−86.76	−87.12	−87.48	−87.84	−88.20	−88.55	−88.91	−89.27	−89.63	−89.99	−3.60
−3.50	−82.85	−83.20	−83.56	−83.91	−84.27	−84.62	−84.98	−85.34	−85.69	−86.05	−86.41	−3.50
−3.40	−79.30	−79.66	−80.01	−80.36	−80.72	−81.07	−81.43	−81.78	−82.14	−82.49	−82.85	−3.40
−3.30	−75.78	−76.13	−76.48	−76.84	−77.19	−77.54	−77.89	−78.25	−78.60	−78.95	−79.30	−3.30
−3.20	−72.28	−72.63	−72.98	−73.33	−73.68	−74.03	−74.38	−74.73	−75.08	−75.43	−75.78	−3.20
−3.10	−68.79	−69.14	−69.49	−69.83	−70.18	−70.53	−70.88	−71.23	−71.58	−71.93	−72.28	−3.10
−3.00	−65.32	−65.67	−66.01	−66.36	−66.71	−67.05	−67.40	−67.75	−68.10	−68.44	−68.79	−3.00
−2.90	−61.87	−62.22	−62.56	−62.91	−63.25	−63.60	−63.94	−64.29	−64.63	−64.98	−65.32	−2.90
−2.80	−58.44	−58.78	−59.12	−59.47	−59.81	−60.15	−60.50	−60.84	−61.18	−61.53	−61.87	−2.80
−2.70	−55.02	−55.36	−55.70	−56.04	−56.39	−56.73	−57.07	−57.41	−57.75	−58.10	−58.44	−2.70
−2.60	−51.62	−51.96	−52.30	−52.64	−52.98	−53.32	−53.66	−54.00	−54.34	−54.68	−55.02	−2.60
−2.50	−48.23	−48.57	−48.91	−49.25	−49.59	−49.93	−50.26	−50.60	−50.94	−51.28	−51.62	−2.50
−2.40	−44.87	−45.20	−45.54	−45.87	−46.21	−46.55	−46.88	−47.22	−47.56	−47.90	−48.23	−2.40
−2.30	−41.51	−41.85	−42.18	−42.52	−42.85	−43.19	−43.52	−43.86	−44.19	−44.53	−44.87	−2.30
−2.20	−38.17	−38.50	−38.84	−39.17	−39.51	−39.84	−40.17	−40.51	−40.84	−41.18	−41.51	−2.20
−2.10	−34.85	−35.18	−35.51	−35.84	−36.18	−36.51	−36.84	−37.17	−37.51	−37.84	−38.17	−2.10
−2.00	−31.54	−31.87	−32.20	−32.53	−32.86	−33.19	−33.52	−33.85	−34.18	−34.52	−34.85	−2.00
−1.90	−28.24	−28.57	−28.90	−29.23	−29.56	−29.89	−30.22	−30.55	−30.88	−31.21	−31.54	−1.90
−1.80	−24.96	−25.29	−25.61	−25.94	−26.27	−26.60	−26.93	−27.26	−27.58	−27.91	−28.24	−1.80
−1.70	−21.69	−22.02	−22.34	−22.67	−23.00	−23.32	−23.65	−23.98	−24.30	−24.63	−24.96	−1.70
−1.60	−18.44	−18.76	−19.09	−19.41	−19.74	−20.06	−20.39	−20.71	−21.04	−21.36	−21.69	−1.60
−1.50	−15.19	−15.52	−15.84	−16.17	−16.49	−16.81	−17.14	−17.46	−17.79	−18.11	−18.44	−1.50
−1.40	−11.97	−12.29	−12.61	−12.93	−13.26	−13.58	−13.90	−14.22	−14.55	−14.87	−15.19	−1.40
−1.30	−8.75	−9.07	−9.39	−9.71	−10.03	−10.36	−10.68	−11.00	−11.32	−11.64	−11.97	−1.30
−1.20	−5.55	−5.87	−6.19	−6.51	−6.83	−7.15	−7.47	−7.79	−8.11	−8.43	−8.75	−1.20
−1.10	−2.35	−2.67	−2.99	−3.31	−3.63	−3.95	−4.27	−4.59	−4.91	−5.23	−5.55	−1.10
−1.00	0.82	0.51	0.19	−0.13	−0.45	−0.76	−1.08	−1.40	−1.72	−2.04	−2.35	−1.00
−0.90	3.99	3.68	3.36	3.04	2.73	2.41	2.09	1.78	1.46	1.14	0.82	−0.90
−0.80	7.15	6.83	6.52	6.20	5.89	5.57	5.26	4.94	4.62	4.31	3.99	−0.80
−0.70	10.29	9.98	9.66	9.35	9.03	8.72	8.41	8.09	7.78	7.46	7.15	−0.70
−0.60	13.42	13.11	12.80	12.48	12.17	11.86	11.54	11.23	10.92	10.60	10.29	−0.60
−0.50	16.54	16.23	15.92	15.61	15.30	14.99	14.67	14.36	14.05	13.74	13.42	−0.50
−0.40	19.66	19.34	19.03	18.72	18.41	18.10	17.79	17.48	17.17	16.86	16.54	−0.40
−0.30	22.76	22.45	22.14	21.83	21.52	21.21	20.90	20.59	20.28	19.97	19.66	−0.30
−0.20	25.85	25.54	25.23	24.92	24.61	24.30	23.99	23.68	23.37	23.07	22.76	−0.20
−0.10	28.93	28.62	28.31	28.00	27.70	27.39	27.08	26.77	26.46	26.15	25.85	−0.10
0.00	32.00	31.69	31.39	31.08	30.77	30.46	30.16	29.85	29.54	29.24	28.93	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	32.31	32.61	32.92	33.23	33.53	33.84	34.15	34.45	34.76	35.06	**0.00**
0.10	35.06	35.37	35.68	35.98	36.29	36.59	36.90	37.20	37.51	37.82	38.12	**0.10**
0.20	38.12	38.43	38.73	39.04	39.34	39.65	39.95	40.26	40.56	40.86	41.17	**0.20**
0.30	41.17	41.47	41.78	42.08	42.39	42.69	42.99	43.30	43.60	43.91	44.21	**0.30**
0.40	44.21	44.51	44.82	45.12	45.42	45.73	46.03	46.33	46.64	46.94	47.24	**0.40**
0.50	47.24	47.54	47.85	48.15	48.45	48.75	49.06	49.36	49.66	49.96	50.27	**0.50**
0.60	50.27	50.57	50.87	51.17	51.47	51.78	52.08	52.38	52.68	52.98	53.28	**0.60**
0.70	53.28	53.58	53.89	54.19	54.49	54.79	55.09	55.39	55.69	55.99	56.29	**0.70**
0.80	56.29	56.59	56.89	57.19	57.49	57.79	58.09	58.39	58.69	58.99	59.29	**0.80**
0.90	59.29	59.59	59.89	60.19	60.49	60.79	61.09	61.39	61.69	61.99	62.29	**0.90**
1.00	62.29	62.59	62.89	63.18	63.48	63.78	64.08	64.38	64.68	64.98	65.27	**1.00**
1.10	65.27	65.57	65.87	66.17	66.47	66.76	67.06	67.36	67.66	67.96	68.25	**1.10**
1.20	68.25	68.55	68.85	69.14	69.44	69.74	70.04	70.33	70.63	70.93	71.22	**1.20**
1.30	71.22	71.52	71.82	72.11	72.41	72.71	73.00	73.30	73.60	73.89	74.19	**1.30**
1.40	74.19	74.48	74.78	75.08	75.37	75.67	75.96	76.26	76.55	76.85	77.14	**1.40**
1.50	77.14	77.44	77.73	78.03	78.32	78.62	78.91	79.21	79.50	79.80	80.09	**1.50**
1.60	80.09	80.39	80.68	80.98	81.27	81.57	81.86	82.15	82.45	82.74	83.04	**1.60**
1.70	83.04	83.33	83.62	83.92	84.21	84.50	84.80	85.09	85.38	85.68	85.97	**1.70**
1.80	85.97	86.26	86.56	86.85	87.14	87.43	87.73	88.02	88.31	88.61	88.90	**1.80**
1.90	88.90	89.19	89.48	89.77	90.07	90.36	90.65	90.94	91.23	91.53	91.82	**1.90**
2.00	91.82	92.11	92.40	92.69	92.98	93.28	93.57	93.86	94.15	94.44	94.73	**2.00**
2.10	94.73	95.02	95.31	95.60	95.89	96.19	96.48	96.77	97.06	97.35	97.64	**2.10**
2.20	97.64	97.93	98.22	98.51	98.80	99.09	99.38	99.67	99.96	100.25	100.54	**2.20**
2.30	100.54	100.83	101.12	101.41	101.70	101.98	102.27	102.56	102.85	103.14	103.43	**2.30**
2.40	103.43	103.72	104.01	104.30	104.58	104.87	105.16	105.45	105.74	106.03	106.32	**2.40**
2.50	106.32	106.60	106.89	107.18	107.47	107.76	108.04	108.33	108.62	108.91	109.19	**2.50**
2.60	109.19	109.48	109.77	110.06	110.34	110.63	110.92	111.21	111.49	111.78	112.07	**2.60**
2.70	112.07	112.35	112.64	112.93	113.21	113.50	113.79	114.07	114.36	114.65	114.93	**2.70**
2.80	114.93	115.22	115.50	115.79	116.08	116.36	116.65	116.93	117.22	117.51	117.79	**2.80**
2.90	117.79	118.08	118.36	118.65	118.93	119.22	119.50	119.79	120.07	120.36	120.64	**2.90**
3.00	120.64	120.93	121.21	121.50	121.78	122.07	122.35	122.64	122.92	123.21	123.49	**3.00**
3.10	123.49	123.77	124.06	124.34	124.63	124.91	125.20	125.48	125.76	126.05	126.33	**3.10**
3.20	126.33	126.61	126.90	127.18	127.46	127.75	128.03	128.31	128.60	128.88	129.16	**3.20**
3.30	129.16	129.45	129.73	130.01	130.30	130.58	130.86	131.14	131.43	131.71	131.99	**3.30**
3.40	131.99	132.27	132.56	132.84	133.12	133.40	133.68	133.97	134.25	134.53	134.81	**3.40**
3.50	134.81	135.09	135.38	135.66	135.94	136.22	136.50	136.78	137.06	137.35	137.63	**3.50**
3.60	137.63	137.91	138.19	138.47	138.75	139.03	139.31	139.59	139.87	140.15	140.43	**3.60**
3.70	140.43	140.72	141.00	141.28	141.56	141.84	142.12	142.40	142.68	142.96	143.24	**3.70**
3.80	143.24	143.52	143.80	144.08	144.36	144.64	144.92	145.20	145.48	145.75	146.03	**3.80**
3.90	146.03	146.31	146.59	146.87	147.15	147.43	147.71	147.99	148.27	148.55	148.82	**3.90**
4.00	148.82	149.10	149.38	149.66	149.94	150.22	150.50	150.77	151.05	151.33	151.61	**4.00**
4.10	151.61	151.89	152.17	152.44	152.72	153.00	153.28	153.56	153.83	154.11	154.39	**4.10**
4.20	154.39	154.67	154.94	155.22	155.50	155.78	156.05	156.33	156.61	156.88	157.16	**4.20**
4.30	157.16	157.44	157.72	157.99	158.27	158.55	158.82	159.10	159.38	159.65	159.93	**4.30**
4.40	159.93	160.21	160.48	160.76	161.03	161.31	161.59	161.86	162.14	162.41	162.69	**4.40**
4.50	162.69	162.97	163.24	163.52	163.79	164.07	164.34	164.62	164.90	165.17	165.45	**4.50**
4.60	165.45	165.72	166.00	166.27	166.55	166.82	167.10	167.37	167.65	167.92	168.20	**4.60**
4.70	168.20	168.47	168.75	169.02	169.30	169.57	169.84	170.12	170.39	170.67	170.94	**4.70**
4.80	170.94	171.22	171.49	171.76	172.04	172.31	172.59	172.86	173.13	173.41	173.68	**4.80**
4.90	173.68	173.96	174.23	174.50	174.78	175.05	175.32	175.60	175.87	176.14	176.42	**4.90**
5.00	176.42	176.69	176.96	177.24	177.51	177.78	178.05	178.33	178.60	178.87	179.15	**5.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	176.42	176.69	176.96	177.24	177.51	177.78	178.05	178.33	178.60	178.87	179.15	**5.00**
5.10	179.15	179.42	179.69	179.96	180.24	180.51	180.78	181.05	181.32	181.60	181.87	**5.10**
5.20	181.87	182.14	182.41	182.68	182.96	183.23	183.50	183.77	184.04	184.32	184.59	**5.20**
5.30	184.59	184.86	185.13	185.40	185.67	185.94	186.22	186.49	186.76	187.03	187.30	**5.30**
5.40	187.30	187.57	187.84	188.11	188.38	188.66	188.93	189.20	189.47	189.74	190.01	**5.40**
5.50	190.01	190.28	190.55	190.82	191.09	191.36	191.63	191.90	192.17	192.44	192.71	**5.50**
5.60	192.71	192.98	193.25	193.52	193.79	194.06	194.33	194.60	194.87	195.14	195.41	**5.60**
5.70	195.41	195.68	195.95	196.22	196.49	196.76	197.03	197.30	197.56	197.83	198.10	**5.70**
5.80	198.10	198.37	198.64	198.91	199.18	199.45	199.72	199.98	200.25	200.52	200.79	**5.80**
5.90	200.79	201.06	201.33	201.60	201.86	202.13	202.40	202.67	202.94	203.21	203.47	**5.90**
6.00	203.47	203.74	204.01	204.28	204.55	204.81	205.08	205.35	205.62	205.88	206.15	**6.00**
6.10	206.15	206.42	206.69	206.96	207.22	207.49	207.76	208.02	208.29	208.56	208.83	**6.10**
6.20	208.83	209.09	209.36	209.63	209.89	210.16	210.43	210.70	210.96	211.23	211.50	**6.20**
6.30	211.50	211.76	212.03	212.30	212.56	212.83	213.09	213.36	213.63	213.89	214.16	**6.30**
6.40	214.16	214.43	214.69	214.96	215.22	215.49	215.76	216.02	216.29	216.55	216.82	**6.40**
6.50	216.82	217.08	217.35	217.62	217.88	218.15	218.41	218.68	218.94	219.21	219.47	**6.50**
6.60	219.47	219.74	220.00	220.27	220.54	220.80	221.07	221.33	221.60	221.86	222.12	**6.60**
6.70	222.12	222.39	222.65	222.92	223.18	223.45	223.71	223.98	224.24	224.51	224.77	**6.70**
6.80	224.77	225.04	225.30	225.56	225.83	226.09	226.36	226.62	226.88	227.15	227.41	**6.80**
6.90	227.41	227.68	227.94	228.20	228.47	228.73	229.00	229.26	229.52	229.79	230.05	**6.90**
7.00	230.05	230.31	230.58	230.84	231.10	231.37	231.63	231.89	232.16	232.42	232.68	**7.00**
7.10	232.68	232.95	233.21	233.47	233.73	234.00	234.26	234.52	234.79	235.05	235.31	**7.10**
7.20	235.31	235.57	235.84	236.10	236.36	236.62	236.89	237.15	237.41	237.67	237.94	**7.20**
7.30	237.94	238.20	238.46	238.72	238.98	239.25	239.51	239.77	240.03	240.29	240.56	**7.30**
7.40	240.56	240.82	241.08	241.34	241.60	241.86	242.13	242.39	242.65	242.91	243.17	**7.40**
7.50	243.17	243.43	243.69	243.96	244.22	244.48	244.74	245.00	245.26	245.52	245.78	**7.50**
7.60	245.78	246.04	246.31	246.57	246.83	247.09	247.35	247.61	247.87	248.13	248.39	**7.60**
7.70	248.39	248.65	248.91	249.17	249.43	249.69	249.95	250.21	250.47	250.74	251.00	**7.70**
7.80	251.00	251.26	251.52	251.78	252.04	252.30	252.56	252.82	253.08	253.34	253.59	**7.80**
7.90	253.59	253.85	254.11	254.37	254.63	254.89	255.15	255.41	255.67	255.93	256.19	**7.90**
8.00	256.19	256.45	256.71	256.97	257.23	257.49	257.75	258.01	258.26	258.52	258.78	**8.00**
8.10	258.78	259.04	259.30	259.56	259.82	260.08	260.34	260.59	260.85	261.11	261.37	**8.10**
8.20	261.37	261.63	261.89	262.15	262.40	262.66	262.92	263.18	263.44	263.70	263.95	**8.20**
8.30	263.95	264.21	264.47	264.73	264.99	265.25	265.50	265.76	266.02	266.28	266.54	**8.30**
8.40	266.54	266.79	267.05	267.31	267.57	267.82	268.08	268.34	268.60	268.85	269.11	**8.40**
8.50	269.11	269.37	269.63	269.88	270.14	270.40	270.66	270.91	271.17	271.43	271.68	**8.50**
8.60	271.68	271.94	272.20	272.46	272.71	272.97	273.23	273.48	273.74	274.00	274.25	**8.60**
8.70	274.25	274.51	274.77	275.02	275.28	275.54	275.79	276.05	276.31	276.56	276.82	**8.70**
8.80	276.82	277.08	277.33	277.59	277.84	278.10	278.36	278.61	278.87	279.13	279.38	**8.80**
8.90	279.38	279.64	279.89	280.15	280.41	280.66	280.92	281.17	281.43	281.68	281.94	**8.90**
9.00	281.94	282.20	282.45	282.71	282.96	283.22	283.47	283.73	283.98	284.24	284.49	**9.00**
9.10	284.49	284.75	285.01	285.26	285.52	285.77	286.03	286.28	286.54	286.79	287.05	**9.10**
9.20	287.05	287.30	287.56	287.81	288.07	288.32	288.58	288.83	289.08	289.34	289.59	**9.20**
9.30	289.59	289.85	290.10	290.36	290.61	290.87	291.12	291.38	291.63	291.88	292.14	**9.30**
9.40	292.14	292.39	292.65	292.90	293.16	293.41	293.66	293.92	294.17	294.43	294.68	**9.40**
9.50	294.68	294.93	295.19	295.44	295.70	295.95	296.20	296.46	296.71	296.96	297.22	**9.50**
9.60	297.22	297.47	297.72	297.98	298.23	298.48	298.74	298.99	299.25	299.50	299.75	**9.60**
9.70	299.75	300.01	300.26	300.51	300.76	301.02	301.27	301.52	301.78	302.03	302.28	**9.70**
9.80	302.28	302.54	302.79	303.04	303.29	303.55	303.80	304.05	304.31	304.56	304.81	**9.80**
9.90	304.81	305.06	305.32	305.57	305.82	306.07	306.33	306.58	306.83	307.08	307.34	**9.90**
10.00	307.34	307.59	307.84	308.09	308.34	308.60	308.85	309.10	309.35	309.61	309.86	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	307.34	307.59	307.84	308.09	308.34	308.60	308.85	309.10	309.35	309.61	309.86	**10.00**
10.10	309.86	310.11	310.36	310.61	310.86	311.12	311.37	311.62	311.87	312.12	312.38	**10.10**
10.20	312.38	312.63	312.88	313.13	313.38	313.63	313.89	314.14	314.39	314.64	314.89	**10.20**
10.30	314.89	315.14	315.39	315.64	315.90	316.15	316.40	316.65	316.90	317.15	317.40	**10.30**
10.40	317.40	317.65	317.91	318.16	318.41	318.66	318.91	319.16	319.41	319.66	319.91	**10.40**
10.50	319.91	320.16	320.41	320.66	320.92	321.17	321.42	321.67	321.92	322.17	322.42	**10.50**
10.60	322.42	322.67	322.92	323.17	323.42	323.67	323.92	324.17	324.42	324.67	324.92	**10.60**
10.70	324.92	325.17	325.42	325.67	325.92	326.17	326.42	326.67	326.92	327.17	327.42	**10.70**
10.80	327.42	327.67	327.92	328.17	328.42	328.67	328.92	329.17	329.42	329.67	329.92	**10.80**
10.90	329.92	330.17	330.42	330.67	330.92	331.17	331.42	331.67	331.91	332.16	332.41	**10.90**
11.00	332.41	332.66	332.91	333.16	333.41	333.66	333.91	334.16	334.41	334.66	334.90	**11.00**
11.10	334.90	335.15	335.40	335.65	335.90	336.15	336.40	336.65	336.90	337.14	337.39	**11.10**
11.20	337.39	337.64	337.89	338.14	338.39	338.64	338.89	339.13	339.38	339.63	339.88	**11.20**
11.30	339.88	340.13	340.38	340.62	340.87	341.12	341.37	341.62	341.87	342.11	342.36	**11.30**
11.40	342.36	342.61	342.86	343.11	343.35	343.60	343.85	344.10	344.35	344.59	344.84	**11.40**
11.50	344.84	345.09	345.34	345.59	345.83	346.08	346.33	346.58	346.83	347.07	347.32	**11.50**
11.60	347.32	347.57	347.82	348.06	348.31	348.56	348.81	349.05	349.30	349.55	349.80	**11.60**
11.70	349.80	350.04	350.29	350.54	350.78	351.03	351.28	351.53	351.77	352.02	352.27	**11.70**
11.80	352.27	352.51	352.76	353.01	353.26	353.50	353.75	354.00	354.24	354.49	354.74	**11.80**
11.90	354.74	354.98	355.23	355.48	355.72	355.97	356.22	356.46	356.71	356.96	357.20	**11.90**
12.00	357.20	357.45	357.70	357.94	358.19	358.44	358.68	358.93	359.18	359.42	359.67	**12.00**
12.10	359.67	359.91	360.16	360.41	360.65	360.90	361.15	361.39	361.64	361.88	362.13	**12.10**
12.20	362.13	362.38	362.62	362.87	363.11	363.36	363.61	363.85	364.10	364.34	364.59	**12.20**
12.30	364.59	364.84	365.08	365.33	365.57	365.82	366.06	366.31	366.56	366.80	367.05	**12.30**
12.40	367.05	367.29	367.54	367.78	368.03	368.27	368.52	368.76	369.01	369.26	369.50	**12.40**
12.50	369.50	369.75	369.99	370.24	370.48	370.73	370.97	371.22	371.46	371.71	371.95	**12.50**
12.60	371.95	372.20	372.44	372.69	372.93	373.18	373.42	373.67	373.91	374.16	374.40	**12.60**
12.70	374.40	374.65	374.89	375.14	375.38	375.63	375.87	376.12	376.36	376.60	376.85	**12.70**
12.80	376.85	377.09	377.34	377.58	377.83	378.07	378.32	378.56	378.81	379.05	379.29	**12.80**
12.90	379.29	379.54	379.78	380.03	380.27	380.52	380.76	381.00	381.25	381.49	381.74	**12.90**
13.00	381.74	381.98	382.22	382.47	382.71	382.96	383.20	383.44	383.69	383.93	384.18	**13.00**
13.10	384.18	384.42	384.66	384.91	385.15	385.40	385.64	385.88	386.13	386.37	386.61	**13.10**
13.20	386.61	386.86	387.10	387.34	387.59	387.83	388.08	388.32	388.56	388.81	389.05	**13.20**
13.30	389.05	389.29	389.54	389.78	390.02	390.27	390.51	390.75	391.00	391.24	391.48	**13.30**
13.40	391.48	391.73	391.97	392.21	392.45	392.70	392.94	393.18	393.43	393.67	393.91	**13.40**
13.50	393.91	394.16	394.40	394.64	394.88	395.13	395.37	395.61	395.86	396.10	396.34	**13.50**
13.60	396.34	396.58	396.83	397.07	397.31	397.56	397.80	398.04	398.28	398.53	398.77	**13.60**
13.70	398.77	399.01	399.25	399.50	399.74	399.98	400.22	400.47	400.71	400.95	401.19	**13.70**
13.80	401.19	401.43	401.68	401.92	402.16	402.40	402.65	402.89	403.13	403.37	403.61	**13.80**
13.90	403.61	403.86	404.10	404.34	404.58	404.82	405.07	405.31	405.55	405.79	406.03	**13.90**
14.00	406.03	406.28	406.52	406.76	407.00	407.24	407.49	407.73	407.97	408.21	408.45	**14.00**
14.10	408.45	408.69	408.94	409.18	409.42	409.66	409.90	410.14	410.38	410.63	410.87	**14.10**
14.20	410.87	411.11	411.35	411.59	411.83	412.07	412.32	412.56	412.80	413.04	413.28	**14.20**
14.30	413.28	413.52	413.76	414.00	414.25	414.49	414.73	414.97	415.21	415.45	415.69	**14.30**
14.40	415.69	415.93	416.17	416.42	416.66	416.90	417.14	417.38	417.62	417.86	418.10	**14.40**
14.50	418.10	418.34	418.58	418.82	419.07	419.31	419.55	419.79	420.03	420.27	420.51	**14.50**
14.60	420.51	420.75	420.99	421.23	421.47	421.71	421.95	422.19	422.43	422.67	422.92	**14.60**
14.70	422.92	423.16	423.40	423.64	423.88	424.12	424.36	424.60	424.84	425.08	425.32	**14.70**
14.80	425.32	425.56	425.80	426.04	426.28	426.52	426.76	427.00	427.24	427.48	427.72	**14.80**
14.90	427.72	427.96	428.20	428.44	428.68	428.92	429.16	429.40	429.64	429.88	430.12	**14.90**
15.00	430.12	430.36	430.60	430.84	431.08	431.32	431.56	431.80	432.04	432.28	432.52	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	430.12	430.36	430.60	430.84	431.08	431.32	431.56	431.80	432.04	432.28	432.52	**15.00**
15.10	432.52	432.76	433.00	433.24	433.48	433.72	433.96	434.20	434.43	434.67	434.91	**15.10**
15.20	434.91	435.15	435.39	435.63	435.87	436.11	436.35	436.59	436.83	437.07	437.31	**15.20**
15.30	437.31	437.55	437.79	438.03	438.26	438.50	438.74	438.98	439.22	439.46	439.70	**15.30**
15.40	439.70	439.94	440.18	440.42	440.66	440.90	441.13	441.37	441.61	441.85	442.09	**15.40**
15.50	442.09	442.33	442.57	442.81	443.05	443.28	443.52	443.76	444.00	444.24	444.48	**15.50**
15.60	444.48	444.72	444.96	445.19	445.43	445.67	445.91	446.15	446.39	446.63	446.87	**15.60**
15.70	446.87	447.10	447.34	447.58	447.82	448.06	448.30	448.53	448.77	449.01	449.25	**15.70**
15.80	449.25	449.49	449.73	449.97	450.20	450.44	450.68	450.92	451.16	451.39	451.63	**15.80**
15.90	451.63	451.87	452.11	452.35	452.59	452.82	453.06	453.30	453.54	453.78	454.01	**15.90**
16.00	454.01	454.25	454.49	454.73	454.97	455.20	455.44	455.68	455.92	456.16	456.39	**16.00**
16.10	456.39	456.63	456.87	457.11	457.35	457.58	457.82	458.06	458.30	458.53	458.77	**16.10**
16.20	458.77	459.01	459.25	459.48	459.72	459.96	460.20	460.44	460.67	460.91	461.15	**16.20**
16.30	461.15	461.39	461.62	461.86	462.10	462.34	462.57	462.81	463.05	463.29	463.52	**16.30**
16.40	463.52	463.76	464.00	464.23	464.47	464.71	464.95	465.18	465.42	465.66	465.90	**16.40**
16.50	465.90	466.13	466.37	466.61	466.84	467.08	467.32	467.56	467.79	468.03	468.27	**16.50**
16.60	468.27	468.50	468.74	468.98	469.21	469.45	469.69	469.93	470.16	470.40	470.64	**16.60**
16.70	470.64	470.87	471.11	471.35	471.58	471.82	472.06	472.29	472.53	472.77	473.00	**16.70**
16.80	473.00	473.24	473.48	473.71	473.95	474.19	474.42	474.66	474.90	475.13	475.37	**16.80**
16.90	475.37	475.61	475.84	476.08	476.32	476.55	476.79	477.03	477.26	477.50	477.73	**16.90**
17.00	477.73	477.97	478.21	478.44	478.68	478.92	479.15	479.39	479.62	479.86	480.10	**17.00**
17.10	480.10	480.33	480.57	480.81	481.04	481.28	481.51	481.75	481.99	482.22	482.46	**17.10**
17.20	482.46	482.69	482.93	483.17	483.40	483.64	483.87	484.11	484.35	484.58	484.82	**17.20**
17.30	484.82	485.05	485.29	485.53	485.76	486.00	486.23	486.47	486.71	486.94	487.18	**17.30**
17.40	487.18	487.41	487.65	487.88	488.12	488.36	488.59	488.83	489.06	489.30	489.53	**17.40**
17.50	489.53	489.77	490.01	490.24	490.48	490.71	490.95	491.18	491.42	491.65	491.89	**17.50**
17.60	491.89	492.12	492.36	492.60	492.83	493.07	493.30	493.54	493.77	494.01	494.24	**17.60**
17.70	494.24	494.48	494.71	494.95	495.18	495.42	495.65	495.89	496.13	496.36	496.60	**17.70**
17.80	496.60	496.83	497.07	497.30	497.54	497.77	498.01	498.24	498.48	498.71	498.95	**17.80**
17.90	498.95	499.18	499.42	499.65	499.89	500.12	500.36	500.59	500.83	501.06	501.30	**17.90**
18.00	501.30	501.53	501.77	502.00	502.24	502.47	502.70	502.94	503.17	503.41	503.64	**18.00**
18.10	503.64	503.88	504.11	504.35	504.58	504.82	505.05	505.29	505.52	505.76	505.99	**18.10**
18.20	505.99	506.22	506.46	506.69	506.93	507.16	507.40	507.63	507.87	508.10	508.34	**18.20**
18.30	508.34	508.57	508.80	509.04	509.27	509.51	509.74	509.98	510.21	510.44	510.68	**18.30**
18.40	510.68	510.91	511.15	511.38	511.62	511.85	512.08	512.32	512.55	512.79	513.02	**18.40**
18.50	513.02	513.26	513.49	513.72	513.96	514.19	514.43	514.66	514.89	515.13	515.36	**18.50**
18.60	515.36	515.60	515.83	516.06	516.30	516.53	516.77	517.00	517.23	517.47	517.70	**18.60**
18.70	517.70	517.94	518.17	518.40	518.64	518.87	519.11	519.34	519.57	519.81	520.04	**18.70**
18.80	520.04	520.27	520.51	520.74	520.98	521.21	521.44	521.68	521.91	522.14	522.38	**18.80**
18.90	522.38	522.61	522.84	523.08	523.31	523.55	523.78	524.01	524.25	524.48	524.71	**18.90**
19.00	524.71	524.95	525.18	525.41	525.65	525.88	526.11	526.35	526.58	526.81	527.05	**19.00**
19.10	527.05	527.28	527.51	527.75	527.98	528.21	528.45	528.68	528.91	529.15	529.38	**19.10**
19.20	529.38	529.61	529.85	530.08	530.31	530.55	530.78	531.01	531.25	531.48	531.71	**19.20**
19.30	531.71	531.94	532.18	532.41	532.64	532.88	533.11	533.34	533.58	533.81	534.04	**19.30**
19.40	534.04	534.27	534.51	534.74	534.97	535.21	535.44	535.67	535.91	536.14	536.37	**19.40**
19.50	536.37	536.60	536.84	537.07	537.30	537.54	537.77	538.00	538.23	538.47	538.70	**19.50**
19.60	538.70	538.93	539.16	539.40	539.63	539.86	540.09	540.33	540.56	540.79	541.03	**19.60**
19.70	541.03	541.26	541.49	541.72	541.96	542.19	542.42	542.65	542.89	543.12	543.35	**19.70**
19.80	543.35	543.58	543.82	544.05	544.28	544.51	544.75	544.98	545.21	545.44	545.67	**19.80**
19.90	545.67	545.91	546.14	546.37	546.60	546.84	547.07	547.30	547.53	547.77	548.00	**19.90**
20.00	548.00	548.23	548.46	548.69	548.93	549.16	549.39	549.62	549.86	550.09	550.32	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
20.00	548.00	548.23	548.46	548.69	548.93	549.16	549.39	549.62	549.86	550.09	550.32	20.00
20.10	550.32	550.55	550.78	551.02	551.25	551.48	551.71	551.94	552.18	552.41	552.64	20.10
20.20	552.64	552.87	553.10	553.34	553.57	553.80	554.03	554.26	554.50	554.73	554.96	20.20
20.30	554.96	555.19	555.42	555.66	555.89	556.12	556.35	556.58	556.81	557.05	557.28	20.30
20.40	557.28	557.51	557.74	557.97	558.20	558.44	558.67	558.90	559.13	559.36	559.59	20.40
20.50	559.59	559.83	560.06	560.29	560.52	560.75	560.98	561.22	561.45	561.68	561.91	20.50
20.60	561.91	562.14	562.37	562.61	562.84	563.07	563.30	563.53	563.76	563.99	564.23	20.60
20.70	564.23	564.46	564.69	564.92	565.15	565.38	565.61	565.84	566.08	566.31	566.54	20.70
20.80	566.54	566.77	567.00	567.23	567.46	567.70	567.93	568.16	568.39	568.62	568.85	20.80
20.90	568.85	569.08	569.31	569.54	569.78	570.01	570.24	570.47	570.70	570.93	571.16	20.90
21.00	571.16	571.39	571.62	571.86	572.09	572.32	572.55	572.78	573.01	573.24	573.47	21.00
21.10	573.47	573.70	573.93	574.17	574.40	574.63	574.86	575.09	575.32	575.55	575.78	21.10
21.20	575.78	576.01	576.24	576.47	576.71	576.94	577.17	577.40	577.63	577.86	578.09	21.20
21.30	578.09	578.32	578.55	578.78	579.01	579.24	579.47	579.71	579.94	580.17	580.40	21.30
21.40	580.40	580.63	580.86	581.09	581.32	581.55	581.78	582.01	582.24	582.47	582.70	21.40
21.50	582.70	582.93	583.16	583.39	583.63	583.86	584.09	584.32	584.55	584.78	585.01	21.50
21.60	585.01	585.24	585.47	585.70	585.93	586.16	586.39	586.62	586.85	587.08	587.31	21.60
21.70	587.31	587.54	587.77	588.00	588.23	588.46	588.69	588.92	589.15	589.38	589.61	21.70
21.80	589.61	589.85	590.08	590.31	590.54	590.77	591.00	591.23	591.46	591.69	591.92	21.80
21.90	591.92	592.15	592.38	592.61	592.84	593.07	593.30	593.53	593.76	593.99	594.22	21.90
22.00	594.22	594.45	594.68	594.91	595.14	595.37	595.60	595.83	596.06	596.29	596.52	22.00
22.10	596.52	596.75	596.98	597.21	597.44	597.67	597.90	598.13	598.36	598.59	598.82	22.10
22.20	598.82	599.05	599.28	599.51	599.74	599.96	600.19	600.42	600.65	600.88	601.11	22.20
22.30	601.11	601.34	601.57	601.80	602.03	602.26	602.49	602.72	602.95	603.18	603.41	22.30
22.40	603.41	603.64	603.87	604.10	604.33	604.56	604.79	605.02	605.25	605.48	605.71	22.40
22.50	605.71	605.94	606.17	606.39	606.62	606.85	607.08	607.31	607.54	607.77	608.00	22.50
22.60	608.00	608.23	608.46	608.69	608.92	609.15	609.38	609.61	609.84	610.07	610.30	22.60
22.70	610.30	610.52	610.75	610.98	611.21	611.44	611.67	611.90	612.13	612.36	612.59	22.70
22.80	612.59	612.82	613.05	613.28	613.51	613.73	613.96	614.19	614.42	614.65	614.88	22.80
22.90	614.88	615.11	615.34	615.57	615.80	616.03	616.25	616.48	616.71	616.94	617.17	22.90
23.00	617.17	617.40	617.63	617.86	618.09	618.32	618.55	618.77	619.00	619.23	619.46	23.00
23.10	619.46	619.69	619.92	620.15	620.38	620.61	620.84	621.06	621.29	621.52	621.75	23.10
23.20	621.75	621.98	622.21	622.44	622.67	622.90	623.12	623.35	623.58	623.81	624.04	23.20
23.30	624.04	624.27	624.50	624.73	624.95	625.18	625.41	625.64	625.87	626.10	626.33	23.30
23.40	626.33	626.56	626.78	627.01	627.24	627.47	627.70	627.93	628.16	628.38	628.61	23.40
23.50	628.61	628.84	629.07	629.30	629.53	629.76	629.98	630.21	630.44	630.67	630.90	23.50
23.60	630.90	631.13	631.36	631.58	631.81	632.04	632.27	632.50	632.73	632.96	633.18	23.60
23.70	633.18	633.41	633.64	633.87	634.10	634.33	634.55	634.78	635.01	635.24	635.47	23.70
23.80	635.47	635.70	635.92	636.15	636.38	636.61	636.84	637.07	637.29	637.52	637.75	23.80
23.90	637.75	637.98	638.21	638.44	638.66	638.89	639.12	639.35	639.58	639.80	640.03	23.90
24.00	640.03	640.26	640.49	640.72	640.95	641.17	641.40	641.63	641.86	642.09	642.31	24.00
24.10	642.31	642.54	642.77	643.00	643.23	643.45	643.68	643.91	644.14	644.37	644.59	24.10
24.20	644.59	644.82	645.05	645.28	645.51	645.73	645.96	646.19	646.42	646.65	646.87	24.20
24.30	646.87	647.10	647.33	647.56	647.79	648.01	648.24	648.47	648.70	648.93	649.15	24.30
24.40	649.15	649.38	649.61	649.84	650.06	650.29	650.52	650.75	650.98	651.20	651.43	24.40
24.50	651.43	651.66	651.89	652.11	652.34	652.57	652.80	653.03	653.25	653.48	653.71	24.50
24.60	653.71	653.94	654.16	654.39	654.62	654.85	655.08	655.30	655.53	655.76	655.99	24.60
24.70	655.99	656.21	656.44	656.67	656.90	657.12	657.35	657.58	657.81	658.03	658.26	24.70
24.80	658.26	658.49	658.72	658.94	659.17	659.40	659.63	659.85	660.08	660.31	660.54	24.80
24.90	660.54	660.76	660.99	661.22	661.45	661.67	661.90	662.13	662.36	662.58	662.81	24.90
25.00	662.81	663.04	663.27	663.49	663.72	663.95	664.17	664.40	664.63	664.86	665.08	25.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
25.00	662.81	663.04	663.27	663.49	663.72	663.95	664.17	664.40	664.63	664.86	665.08	**25.00**
25.10	665.08	665.31	665.54	665.77	665.99	666.22	666.45	666.67	666.90	667.13	667.36	**25.10**
25.20	667.36	667.58	667.81	668.04	668.27	668.49	668.72	668.95	669.17	669.40	669.63	**25.20**
25.30	669.63	669.86	670.08	670.31	670.54	670.76	670.99	671.22	671.45	671.67	671.90	**25.30**
25.40	671.90	672.13	672.35	672.58	672.81	673.03	673.26	673.49	673.72	673.94	674.17	**25.40**
25.50	674.17	674.40	674.62	674.85	675.08	675.30	675.53	675.76	675.99	676.21	676.44	**25.50**
25.60	676.44	676.67	676.89	677.12	677.35	677.57	677.80	678.03	678.25	678.48	678.71	**25.60**
25.70	678.71	678.93	679.16	679.39	679.62	679.84	680.07	680.30	680.52	680.75	680.98	**25.70**
25.80	680.98	681.20	681.43	681.66	681.88	682.11	682.34	682.56	682.79	683.02	683.24	**25.80**
25.90	683.24	683.47	683.70	683.92	684.15	684.38	684.60	684.83	685.06	685.28	685.51	**25.90**
26.00	685.51	685.74	685.96	686.19	686.42	686.64	686.87	687.10	687.32	687.55	687.78	**26.00**
26.10	687.78	688.00	688.23	688.46	688.68	688.91	689.14	689.36	689.59	689.82	690.04	**26.10**
26.20	690.04	690.27	690.49	690.72	690.95	691.17	691.40	691.63	691.85	692.08	692.31	**26.20**
26.30	692.31	692.53	692.76	692.99	693.21	693.44	693.66	693.89	694.12	694.34	694.57	**26.30**
26.40	694.57	694.80	695.02	695.25	695.48	695.70	695.93	696.15	696.38	696.61	696.83	**26.40**
26.50	696.83	697.06	697.29	697.51	697.74	697.97	698.19	698.42	698.64	698.87	699.10	**26.50**
26.60	699.10	699.32	699.55	699.78	700.00	700.23	700.45	700.68	700.91	701.13	701.36	**26.60**
26.70	701.36	701.58	701.81	702.04	702.26	702.49	702.72	702.94	703.17	703.39	703.62	**26.70**
26.80	703.62	703.85	704.07	704.30	704.52	704.75	704.98	705.20	705.43	705.65	705.88	**26.80**
26.90	705.88	706.11	706.33	706.56	706.78	707.01	707.24	707.46	707.69	707.91	708.14	**26.90**
27.00	708.14	708.37	708.59	708.82	709.04	709.27	709.50	709.72	709.95	710.17	710.40	**27.00**
27.10	710.40	710.63	710.85	711.08	711.30	711.53	711.76	711.98	712.21	712.43	712.66	**27.10**
27.20	712.66	712.88	713.11	713.34	713.56	713.79	714.01	714.24	714.47	714.69	714.92	**27.20**
27.30	714.92	715.14	715.37	715.59	715.82	716.05	716.27	716.50	716.72	716.95	717.17	**27.30**
27.40	717.17	717.40	717.63	717.85	718.08	718.30	718.53	718.75	718.98	719.21	719.43	**27.40**
27.50	719.43	719.66	719.88	720.11	720.33	720.56	720.78	721.01	721.24	721.46	721.69	**27.50**
27.60	721.69	721.91	722.14	722.36	722.59	722.82	723.04	723.27	723.49	723.72	723.94	**27.60**
27.70	723.94	724.17	724.39	724.62	724.85	725.07	725.30	725.52	725.75	725.97	726.20	**27.70**
27.80	726.20	726.42	726.65	726.87	727.10	727.33	727.55	727.78	728.00	728.23	728.45	**27.80**
27.90	728.45	728.68	728.90	729.13	729.35	729.58	729.80	730.03	730.26	730.48	730.71	**27.90**
28.00	730.71	730.93	731.16	731.38	731.61	731.83	732.06	732.28	732.51	732.73	732.96	**28.00**
28.10	732.96	733.19	733.41	733.64	733.86	734.09	734.31	734.54	734.76	734.99	735.21	**28.10**
28.20	735.21	735.44	735.66	735.89	736.11	736.34	736.56	736.79	737.01	737.24	737.46	**28.20**
28.30	737.46	737.69	737.92	738.14	738.37	738.59	738.82	739.04	739.27	739.49	739.72	**28.30**
28.40	739.72	739.94	740.17	740.39	740.62	740.84	741.07	741.29	741.52	741.74	741.97	**28.40**
28.50	741.97	742.19	742.42	742.64	742.87	743.09	743.32	743.54	743.77	743.99	744.22	**28.50**
28.60	744.22	744.44	744.67	744.89	745.12	745.34	745.57	745.79	746.02	746.24	746.47	**28.60**
28.70	746.47	746.69	746.92	747.14	747.37	747.59	747.82	748.04	748.27	748.49	748.72	**28.70**
28.80	748.72	748.94	749.17	749.39	749.62	749.84	750.07	750.29	750.52	750.74	750.97	**28.80**
28.90	750.97	751.19	751.42	751.64	751.87	752.09	752.32	752.54	752.77	752.99	753.21	**28.90**
29.00	753.21	753.44	753.66	753.89	754.11	754.34	754.56	754.79	755.01	755.24	755.46	**29.00**
29.10	755.46	755.69	755.91	756.14	756.36	756.59	756.81	757.04	757.26	757.49	757.71	**29.10**
29.20	757.71	757.93	758.16	758.38	758.61	758.83	759.06	759.28	759.51	759.73	759.96	**29.20**
29.30	759.96	760.18	760.41	760.63	760.86	761.08	761.30	761.53	761.75	761.98	762.20	**29.30**
29.40	762.20	762.43	762.65	762.88	763.10	763.33	763.55	763.78	764.00	764.22	764.45	**29.40**
29.50	764.45	764.67	764.90	765.12	765.35	765.57	765.80	766.02	766.25	766.47	766.69	**29.50**
29.60	766.69	766.92	767.14	767.37	767.59	767.82	768.04	768.27	768.49	768.72	768.94	**29.60**
29.70	768.94	769.16	769.39	769.61	769.84	770.06	770.29	770.51	770.74	770.96	771.18	**29.70**
29.80	771.18	771.41	771.63	771.86	772.08	772.31	772.53	772.75	772.98	773.20	773.43	**29.80**
29.90	773.43	773.65	773.88	774.10	774.33	774.55	774.77	775.00	775.22	775.45	775.67	**29.90**
30.00	775.67	775.90	776.12	776.34	776.57	776.79	777.02	777.24	777.47	777.69	777.91	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
30.00	775.67	775.90	776.12	776.34	776.57	776.79	777.02	777.24	777.47	777.69	777.91	**30.00**
30.10	777.91	778.14	778.36	778.59	778.81	779.04	779.26	779.48	779.71	779.93	780.16	**30.10**
30.20	780.16	780.38	780.61	780.83	781.05	781.28	781.50	781.73	781.95	782.18	782.40	**30.20**
30.30	782.40	782.62	782.85	783.07	783.30	783.52	783.74	783.97	784.19	784.42	784.64	**30.30**
30.40	784.64	784.87	785.09	785.31	785.54	785.76	785.99	786.21	786.43	786.66	786.88	**30.40**
30.50	786.88	787.11	787.33	787.55	787.78	788.00	788.23	788.45	788.67	788.90	789.12	**30.50**
30.60	789.12	789.35	789.57	789.80	790.02	790.24	790.47	790.69	790.92	791.14	791.36	**30.60**
30.70	791.36	791.59	791.81	792.04	792.26	792.48	792.71	792.93	793.16	793.38	793.60	**30.70**
30.80	793.60	793.83	794.05	794.28	794.50	794.72	794.95	795.17	795.40	795.62	795.84	**30.80**
30.90	795.84	796.07	796.29	796.51	796.74	796.96	797.19	797.41	797.63	797.86	798.08	**30.90**
31.00	798.08	798.31	798.53	798.75	798.98	799.20	799.43	799.65	799.87	800.10	800.32	**31.00**
31.10	800.32	800.54	800.77	800.99	801.22	801.44	801.66	801.89	802.11	802.34	802.56	**31.10**
31.20	802.56	802.78	803.01	803.23	803.45	803.68	803.90	804.13	804.35	804.57	804.80	**31.20**
31.30	804.80	805.02	805.24	805.47	805.69	805.92	806.14	806.36	806.59	806.81	807.03	**31.30**
31.40	807.03	807.26	807.48	807.71	807.93	808.15	808.38	808.60	808.82	809.05	809.27	**31.40**
31.50	809.27	809.50	809.72	809.94	810.17	810.39	810.61	810.84	811.06	811.28	811.51	**31.50**
31.60	811.51	811.73	811.96	812.18	812.40	812.63	812.85	813.07	813.30	813.52	813.74	**31.60**
31.70	813.74	813.97	814.19	814.42	814.64	814.86	815.09	815.31	815.53	815.76	815.98	**31.70**
31.80	815.98	816.20	816.43	816.65	816.88	817.10	817.32	817.55	817.77	817.99	818.22	**31.80**
31.90	818.22	818.44	818.66	818.89	819.11	819.33	819.56	819.78	820.00	820.23	820.45	**31.90**
32.00	820.45	820.68	820.90	821.12	821.35	821.57	821.79	822.02	822.24	822.46	822.69	**32.00**
32.10	822.69	822.91	823.13	823.36	823.58	823.80	824.03	824.25	824.47	824.70	824.92	**32.10**
32.20	824.92	825.15	825.37	825.59	825.82	826.04	826.26	826.49	826.71	826.93	827.16	**32.20**
32.30	827.16	827.38	827.60	827.83	828.05	828.27	828.50	828.72	828.94	829.17	829.39	**32.30**
32.40	829.39	829.61	829.84	830.06	830.28	830.51	830.73	830.95	831.18	831.40	831.62	**32.40**
32.50	831.62	831.85	832.07	832.29	832.52	832.74	832.96	833.19	833.41	833.63	833.86	**32.50**
32.60	833.86	834.08	834.30	834.53	834.75	834.97	835.20	835.42	835.64	835.87	836.09	**32.60**
32.70	836.09	836.31	836.54	836.76	836.98	837.21	837.43	837.65	837.88	838.10	838.32	**32.70**
32.80	838.32	838.55	838.77	838.99	839.22	839.44	839.66	839.89	840.11	840.33	840.55	**32.80**
32.90	840.55	840.78	841.00	841.22	841.45	841.67	841.89	842.12	842.34	842.56	842.79	**32.90**
33.00	842.79	843.01	843.23	843.46	843.68	843.90	844.13	844.35	844.57	844.80	845.02	**33.00**
33.10	845.02	845.24	845.46	845.69	845.91	846.13	846.36	846.58	846.80	847.03	847.25	**33.10**
33.20	847.25	847.47	847.70	847.92	848.14	848.37	848.59	848.81	849.04	849.26	849.48	**33.20**
33.30	849.48	849.70	849.93	850.15	850.37	850.60	850.82	851.04	851.27	851.49	851.71	**33.30**
33.40	851.71	851.94	852.16	852.38	852.60	852.83	853.05	853.27	853.50	853.72	853.94	**33.40**
33.50	853.94	854.17	854.39	854.61	854.84	855.06	855.28	855.50	855.73	855.95	856.17	**33.50**
33.60	856.17	856.40	856.62	856.84	857.07	857.29	857.51	857.73	857.96	858.18	858.40	**33.60**
33.70	858.40	858.63	858.85	859.07	859.30	859.52	859.74	859.96	860.19	860.41	860.63	**33.70**
33.80	860.63	860.86	861.08	861.30	861.52	861.75	861.97	862.19	862.42	862.64	862.86	**33.80**
33.90	862.86	863.09	863.31	863.53	863.75	863.98	864.20	864.42	864.65	864.87	865.09	**33.90**
34.00	865.09	865.31	865.54	865.76	865.98	866.21	866.43	866.65	866.88	867.10	867.32	**34.00**
34.10	867.32	867.54	867.77	867.99	868.21	868.44	868.66	868.88	869.10	869.33	869.55	**34.10**
34.20	869.55	869.77	870.00	870.22	870.44	870.66	870.89	871.11	871.33	871.56	871.78	**34.20**
34.30	871.78	872.00	872.22	872.45	872.67	872.89	873.12	873.34	873.56	873.78	874.01	**34.30**
34.40	874.01	874.23	874.45	874.68	874.90	875.12	875.34	875.57	875.79	876.01	876.24	**34.40**
34.50	876.24	876.46	876.68	876.90	877.13	877.35	877.57	877.79	878.02	878.24	878.46	**34.50**
34.60	878.46	878.69	878.91	879.13	879.35	879.58	879.80	880.02	880.25	880.47	880.69	**34.60**
34.70	880.69	880.91	881.14	881.36	881.58	881.80	882.03	882.25	882.47	882.70	882.92	**34.70**
34.80	882.92	883.14	883.36	883.59	883.81	884.03	884.25	884.48	884.70	884.92	885.15	**34.80**
34.90	885.15	885.37	885.59	885.81	886.04	886.26	886.48	886.70	886.93	887.15	887.37	**34.90**
35.00	887.37	887.60	887.82	888.04	888.26	888.49	888.71	888.93	889.15	889.38	889.60	**35.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. ***Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued***

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
35.00	887.37	887.60	887.82	888.04	888.26	888.49	888.71	888.93	889.15	889.38	889.60	**35.00**
35.10	889.60	889.82	890.04	890.27	890.49	890.71	890.94	891.16	891.38	891.60	891.83	**35.10**
35.20	891.83	892.05	892.27	892.49	892.72	892.94	893.16	893.38	893.61	893.83	894.05	**35.20**
35.30	894.05	894.28	894.50	894.72	894.94	895.17	895.39	895.61	895.83	896.06	896.28	**35.30**
35.40	896.28	896.50	896.72	896.95	897.17	897.39	897.61	897.84	898.06	898.28	898.51	**35.40**
35.50	898.51	898.73	898.95	899.17	899.40	899.62	899.84	900.06	900.29	900.51	900.73	**35.50**
35.60	900.73	900.95	901.18	901.40	901.62	901.84	902.07	902.29	902.51	902.73	902.96	**35.60**
35.70	902.96	903.18	903.40	903.62	903.85	904.07	904.29	904.52	904.74	904.96	905.18	**35.70**
35.80	905.18	905.41	905.63	905.85	906.07	906.30	906.52	906.74	906.96	907.19	907.41	**35.80**
35.90	907.41	907.63	907.85	908.08	908.30	908.52	908.74	908.97	909.19	909.41	909.63	**35.90**
36.00	909.63	909.86	910.08	910.30	910.52	910.75	910.97	911.19	911.41	911.64	911.86	**36.00**
36.10	911.86	912.08	912.30	912.53	912.75	912.97	913.19	913.42	913.64	913.86	914.08	**36.10**
36.20	914.08	914.31	914.53	914.75	914.97	915.20	915.42	915.64	915.86	916.09	916.31	**36.20**
36.30	916.31	916.53	916.75	916.98	917.20	917.42	917.64	917.87	918.09	918.31	918.53	**36.30**
36.40	918.53	918.76	918.98	919.20	919.42	919.65	919.87	920.09	920.31	920.54	920.76	**36.40**
36.50	920.76	920.98	921.20	921.43	921.65	921.87	922.09	922.32	922.54	922.76	922.98	**36.50**
36.60	922.98	923.21	923.43	923.65	923.87	924.10	924.32	924.54	924.76	924.99	925.21	**36.60**
36.70	925.21	925.43	925.65	925.88	926.10	926.32	926.54	926.77	926.99	927.21	927.43	**36.70**
36.80	927.43	927.65	927.88	928.10	928.32	928.54	928.77	928.99	929.21	929.43	929.66	**36.80**
36.90	929.66	929.88	930.10	930.32	930.55	930.77	930.99	931.21	931.44	931.66	931.88	**36.90**
37.00	931.88	932.10	932.33	932.55	932.77	932.99	933.22	933.44	933.66	933.88	934.11	**37.00**
37.10	934.11	934.33	934.55	934.77	934.99	935.22	935.44	935.66	935.88	936.11	936.33	**37.10**
37.20	936.33	936.55	936.77	937.00	937.22	937.44	937.66	937.89	938.11	938.33	938.55	**37.20**
37.30	938.55	938.78	939.00	939.22	939.44	939.66	939.89	940.11	940.33	940.55	940.78	**37.30**
37.40	940.78	941.00	941.22	941.44	941.67	941.89	942.11	942.33	942.56	942.78	943.00	**37.40**
37.50	943.00	943.22	943.45	943.67	943.89	944.11	944.33	944.56	944.78	945.00	945.22	**37.50**
37.60	945.22	945.45	945.67	945.89	946.11	946.34	946.56	946.78	947.00	947.23	947.45	**37.60**
37.70	947.45	947.67	947.89	948.12	948.34	948.56	948.78	949.00	949.23	949.45	949.67	**37.70**
37.80	949.67	949.89	950.12	950.34	950.56	950.78	951.01	951.23	951.45	951.67	951.90	**37.80**
37.90	951.90	952.12	952.34	952.56	952.78	953.01	953.23	953.45	953.67	953.90	954.12	**37.90**
38.00	954.12	954.34	954.56	954.79	955.01	955.23	955.45	955.68	955.90	956.12	956.34	**38.00**
38.10	956.34	956.56	956.79	957.01	957.23	957.45	957.68	957.90	958.12	958.34	958.57	**38.10**
38.20	958.57	958.79	959.01	959.23	959.45	959.68	959.90	960.12	960.34	960.57	960.79	**38.20**
38.30	960.79	961.01	961.23	961.46	961.68	961.90	962.12	962.35	962.57	962.79	963.01	**38.30**
38.40	963.01	963.23	963.46	963.68	963.90	964.12	964.35	964.57	964.79	965.01	965.24	**38.40**
38.50	965.24	965.46	965.68	965.90	966.12	966.35	966.57	966.79	967.01	967.24	967.46	**38.50**
38.60	967.46	967.68	967.90	968.13	968.35	968.57	968.79	969.02	969.24	969.46	969.68	**38.60**
38.70	969.68	969.90	970.13	970.35	970.57	970.79	971.02	971.24	971.46	971.68	971.91	**38.70**
38.80	971.91	972.13	972.35	972.57	972.79	973.02	973.24	973.46	973.68	973.91	974.13	**38.80**
38.90	974.13	974.35	974.57	974.80	975.02	975.24	975.46	975.69	975.91	976.13	976.35	**38.90**
39.00	976.35	976.57	976.80	977.02	977.24	977.46	977.69	977.91	978.13	978.35	978.58	**39.00**
39.10	978.58	978.80	979.02	979.24	979.46	979.69	979.91	980.13	980.35	980.58	980.80	**39.10**
39.20	980.80	981.02	981.24	981.47	981.69	981.91	982.13	982.35	982.58	982.80	983.02	**39.20**
39.30	983.02	983.24	983.47	983.69	983.91	984.13	984.36	984.58	984.80	985.02	985.25	**39.30**
39.40	985.25	985.47	985.69	985.91	986.13	986.36	986.58	986.80	987.02	987.25	987.47	**39.40**
39.50	987.47	987.69	987.91	988.14	988.36	988.58	988.80	989.02	989.25	989.47	989.69	**39.50**
39.60	989.69	989.91	990.14	990.36	990.58	990.80	991.03	991.25	991.47	991.69	991.92	**39.60**
39.70	991.92	992.14	992.36	992.58	992.80	993.03	993.25	993.47	993.69	993.92	994.14	**39.70**
39.80	994.14	994.36	994.58	994.81	995.03	995.25	995.47	995.70	995.92	996.14	996.36	**39.80**
39.90	996.36	996.58	996.81	997.03	997.25	997.47	997.70	997.92	998.14	998.36	998.59	**39.90**
40.00	998.59	998.81	999.03	999.25	999.48	999.70	999.92	1000.14	1000.36	1000.59	1000.81	**40.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
40.00	998.59	998.81	999.03	999.25	999.48	999.70	999.92	1000.14	1000.36	1000.59	1000.81	40.00
40.10	1000.81	1001.03	1001.25	1001.48	1001.70	1001.92	1002.14	1002.37	1002.59	1002.81	1003.03	40.10
40.20	1003.03	1003.26	1003.48	1003.70	1003.92	1004.14	1004.37	1004.59	1004.81	1005.03	1005.26	40.20
40.30	1005.26	1005.48	1005.70	1005.92	1006.15	1006.37	1006.59	1006.81	1007.04	1007.26	1007.48	40.30
40.40	1007.48	1007.70	1007.93	1008.15	1008.37	1008.59	1008.81	1009.04	1009.26	1009.48	1009.70	40.40
40.50	1009.70	1009.93	1010.15	1010.37	1010.59	1010.82	1011.04	1011.26	1011.48	1011.71	1011.93	40.50
40.60	1011.93	1012.15	1012.37	1012.60	1012.82	1013.04	1013.26	1013.49	1013.71	1013.93	1014.15	40.60
40.70	1014.15	1014.37	1014.60	1014.82	1015.04	1015.26	1015.49	1015.71	1015.93	1016.15	1016.38	40.70
40.80	1016.38	1016.60	1016.82	1017.04	1017.27	1017.49	1017.71	1017.93	1018.16	1018.38	1018.60	40.80
40.90	1018.60	1018.82	1019.05	1019.27	1019.49	1019.71	1019.94	1020.16	1020.38	1020.60	1020.82	40.90
41.00	1020.82	1021.05	1021.27	1021.49	1021.71	1021.94	1022.16	1022.38	1022.60	1022.83	1023.05	41.00
41.10	1023.05	1023.27	1023.49	1023.72	1023.94	1024.16	1024.38	1024.61	1024.83	1025.05	1025.27	41.10
41.20	1025.27	1025.50	1025.72	1025.94	1026.16	1026.39	1026.61	1026.83	1027.05	1027.28	1027.50	41.20
41.30	1027.50	1027.72	1027.94	1028.17	1028.39	1028.61	1028.83	1029.06	1029.28	1029.50	1029.72	41.30
41.40	1029.72	1029.95	1030.17	1030.39	1030.61	1030.84	1031.06	1031.28	1031.50	1031.72	1031.95	41.40
41.50	1031.95	1032.17	1032.39	1032.61	1032.84	1033.06	1033.28	1033.50	1033.73	1033.95	1034.17	41.50
41.60	1034.17	1034.39	1034.62	1034.84	1035.06	1035.28	1035.51	1035.73	1035.95	1036.17	1036.40	41.60
41.70	1036.40	1036.62	1036.84	1037.06	1037.29	1037.51	1037.73	1037.95	1038.18	1038.40	1038.62	41.70
41.80	1038.62	1038.84	1039.07	1039.29	1039.51	1039.74	1039.96	1040.18	1040.40	1040.63	1040.85	41.80
41.90	1040.85	1041.07	1041.29	1041.52	1041.74	1041.96	1042.18	1042.41	1042.63	1042.85	1043.07	41.90
42.00	1043.07	1043.30	1043.52	1043.74	1043.96	1044.19	1044.41	1044.63	1044.85	1045.08	1045.30	42.00
42.10	1045.30	1045.52	1045.74	1045.97	1046.19	1046.41	1046.63	1046.86	1047.08	1047.30	1047.52	42.10
42.20	1047.52	1047.75	1047.97	1048.19	1048.41	1048.64	1048.86	1049.08	1049.30	1049.53	1049.75	42.20
42.30	1049.75	1049.97	1050.20	1050.42	1050.64	1050.86	1051.09	1051.31	1051.53	1051.75	1051.98	42.30
42.40	1051.98	1052.20	1052.42	1052.64	1052.87	1053.09	1053.31	1053.53	1053.76	1053.98	1054.20	42.40
42.50	1054.20	1054.42	1054.65	1054.87	1055.09	1055.32	1055.54	1055.76	1055.98	1056.21	1056.43	42.50
42.60	1056.43	1056.65	1056.87	1057.10	1057.32	1057.54	1057.76	1057.99	1058.21	1058.43	1058.65	42.60
42.70	1058.65	1058.88	1059.10	1059.32	1059.55	1059.77	1059.99	1060.21	1060.44	1060.66	1060.88	42.70
42.80	1060.88	1061.10	1061.33	1061.55	1061.77	1061.99	1062.22	1062.44	1062.66	1062.89	1063.11	42.80
42.90	1063.11	1063.33	1063.55	1063.78	1064.00	1064.22	1064.44	1064.67	1064.89	1065.11	1065.34	42.90
43.00	1065.34	1065.56	1065.78	1066.00	1066.23	1066.45	1066.67	1066.89	1067.12	1067.34	1067.56	43.00
43.10	1067.56	1067.79	1068.01	1068.23	1068.45	1068.68	1068.90	1069.12	1069.34	1069.57	1069.79	43.10
43.20	1069.79	1070.01	1070.24	1070.46	1070.68	1070.90	1071.13	1071.35	1071.57	1071.79	1072.02	43.20
43.30	1072.02	1072.24	1072.46	1072.69	1072.91	1073.13	1073.35	1073.58	1073.80	1074.02	1074.24	43.30
43.40	1074.24	1074.47	1074.69	1074.91	1075.14	1075.36	1075.58	1075.80	1076.03	1076.25	1076.47	43.40
43.50	1076.47	1076.70	1076.92	1077.14	1077.36	1077.59	1077.81	1078.03	1078.26	1078.48	1078.70	43.50
43.60	1078.70	1078.92	1079.15	1079.37	1079.59	1079.81	1080.04	1080.26	1080.48	1080.71	1080.93	43.60
43.70	1080.93	1081.15	1081.37	1081.60	1081.82	1082.04	1082.27	1082.49	1082.71	1082.93	1083.16	43.70
43.80	1083.16	1083.38	1083.60	1083.83	1084.05	1084.27	1084.49	1084.72	1084.94	1085.16	1085.39	43.80
43.90	1085.39	1085.61	1085.83	1086.05	1086.28	1086.50	1086.72	1086.95	1087.17	1087.39	1087.62	43.90
44.00	1087.62	1087.84	1088.06	1088.28	1088.51	1088.73	1088.95	1089.18	1089.40	1089.62	1089.84	44.00
44.10	1089.84	1090.07	1090.29	1090.51	1090.74	1090.96	1091.18	1091.40	1091.63	1091.85	1092.07	44.10
44.20	1092.07	1092.30	1092.52	1092.74	1092.97	1093.19	1093.41	1093.63	1093.86	1094.08	1094.30	44.20
44.30	1094.30	1094.53	1094.75	1094.97	1095.20	1095.42	1095.64	1095.86	1096.09	1096.31	1096.53	44.30
44.40	1096.53	1096.76	1096.98	1097.20	1097.43	1097.65	1097.87	1098.09	1098.32	1098.54	1098.76	44.40
44.50	1098.76	1098.99	1099.21	1099.43	1099.66	1099.88	1100.10	1100.32	1100.55	1100.77	1100.99	44.50
44.60	1100.99	1101.22	1101.44	1101.66	1101.89	1102.11	1102.33	1102.55	1102.78	1103.00	1103.22	44.60
44.70	1103.22	1103.45	1103.67	1103.89	1104.12	1104.34	1104.56	1104.79	1105.01	1105.23	1105.45	44.70
44.80	1105.45	1105.68	1105.90	1106.12	1106.35	1106.57	1106.79	1107.02	1107.24	1107.46	1107.69	44.80
44.90	1107.69	1107.91	1108.13	1108.35	1108.58	1108.80	1109.02	1109.25	1109.47	1109.69	1109.92	44.90
45.00	1109.92	1110.14	1110.36	1110.59	1110.81	1111.03	1111.26	1111.48	1111.70	1111.93	1112.15	45.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B5.2.2. ***Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued***

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
45.00	1109.92	1110.14	1110.36	1110.59	1110.81	1111.03	1111.26	1111.48	1111.70	1111.93	1112.15	**45.00**
45.10	1112.15	1112.37	1112.59	1112.82	1113.04	1113.26	1113.49	1113.71	1113.93	1114.16	1114.38	**45.10**
45.20	1114.38	1114.60	1114.83	1115.05	1115.27	1115.50	1115.72	1115.94	1116.17	1116.39	1116.61	**45.20**
45.30	1116.61	1116.84	1117.06	1117.28	1117.50	1117.73	1117.95	1118.17	1118.40	1118.62	1118.84	**45.30**
45.40	1118.84	1119.07	1119.29	1119.51	1119.74	1119.96	1120.18	1120.41	1120.63	1120.85	1121.08	**45.40**
45.50	1121.08	1121.30	1121.52	1121.75	1121.97	1122.19	1122.42	1122.64	1122.86	1123.09	1123.31	**45.50**
45.60	1123.31	1123.53	1123.76	1123.98	1124.20	1124.43	1124.65	1124.87	1125.10	1125.32	1125.54	**45.60**
45.70	1125.54	1125.77	1125.99	1126.21	1126.44	1126.66	1126.88	1127.11	1127.33	1127.55	1127.78	**45.70**
45.80	1127.78	1128.00	1128.22	1128.45	1128.67	1128.89	1129.12	1129.34	1129.56	1129.79	1130.01	**45.80**
45.90	1130.01	1130.23	1130.46	1130.68	1130.90	1131.13	1131.35	1131.57	1131.80	1132.02	1132.24	**45.90**
46.00	1132.24	1132.47	1132.69	1132.91	1133.14	1133.36	1133.58	1133.81	1134.03	1134.25	1134.48	**46.00**
46.10	1134.48	1134.70	1134.92	1135.15	1135.37	1135.59	1135.82	1136.04	1136.27	1136.49	1136.71	**46.10**
46.20	1136.71	1136.94	1137.16	1137.38	1137.61	1137.83	1138.05	1138.28	1138.50	1138.72	1138.95	**46.20**
46.30	1138.95	1139.17	1139.39	1139.62	1139.84	1140.06	1140.29	1140.51	1140.73	1140.96	1141.18	**46.30**
46.40	1141.18	1141.41	1141.63	1141.85	1142.08	1142.30	1142.52	1142.75	1142.97	1143.19	1143.42	**46.40**
46.50	1143.42	1143.64	1143.86	1144.09	1144.31	1144.53	1144.76	1144.98	1145.21	1145.43	1145.65	**46.50**
46.60	1145.65	1145.88	1146.10	1146.32	1146.55	1146.77	1146.99	1147.22	1147.44	1147.67	1147.89	**46.60**
46.70	1147.89	1148.11	1148.34	1148.56	1148.78	1149.01	1149.23	1149.45	1149.68	1149.90	1150.12	**46.70**
46.80	1150.12	1150.35	1150.57	1150.80	1151.02	1151.24	1151.47	1151.69	1151.91	1152.14	1152.36	**46.80**
46.90	1152.36	1152.59	1152.81	1153.03	1153.26	1153.48	1153.70	1153.93	1154.15	1154.37	1154.60	**46.90**
47.00	1154.60	1154.82	1155.05	1155.27	1155.49	1155.72	1155.94	1156.16	1156.39	1156.61	1156.84	**47.00**
47.10	1156.84	1157.06	1157.28	1157.51	1157.73	1157.95	1158.18	1158.40	1158.63	1158.85	1159.07	**47.10**
47.20	1159.07	1159.30	1159.52	1159.74	1159.97	1160.19	1160.42	1160.64	1160.86	1161.09	1161.31	**47.20**
47.30	1161.31	1161.53	1161.76	1161.98	1162.21	1162.43	1162.65	1162.88	1163.10	1163.33	1163.55	**47.30**
47.40	1163.55	1163.77	1164.00	1164.22	1164.44	1164.67	1164.89	1165.12	1165.34	1165.56	1165.79	**47.40**
47.50	1165.79	1166.01	1166.24	1166.46	1166.68	1166.91	1167.13	1167.35	1167.58	1167.80	1168.03	**47.50**
47.60	1168.03	1168.25	1168.47	1168.70	1168.92	1169.15	1169.37	1169.59	1169.82	1170.04	1170.27	**47.60**
47.70	1170.27	1170.49	1170.71	1170.94	1171.16	1171.38	1171.61	1171.83	1172.06	1172.28	1172.50	**47.70**
47.80	1172.50	1172.73	1172.95	1173.18	1173.40	1173.62	1173.85	1174.07	1174.30	1174.52	1174.74	**47.80**
47.90	1174.74	1174.97	1175.19	1175.42	1175.64	1175.86	1176.09	1176.31	1176.54	1176.76	1176.98	**47.90**
48.00	1176.98	1177.21	1177.43	1177.66	1177.88	1178.10	1178.33	1178.55	1178.78	1179.00	1179.22	**48.00**
48.10	1179.22	1179.45	1179.67	1179.90	1180.12	1180.35	1180.57	1180.79	1181.02	1181.24	1181.47	**48.10**
48.20	1181.47	1181.69	1181.91	1182.14	1182.36	1182.59	1182.81	1183.03	1183.26	1183.48	1183.71	**48.20**
48.30	1183.71	1183.93	1184.16	1184.38	1184.60	1184.83	1185.05	1185.28	1185.50	1185.72	1185.95	**48.30**
48.40	1185.95	1186.17	1186.40	1186.62	1186.84	1187.07	1187.29	1187.52	1187.74	1187.97	1188.19	**48.40**
48.50	1188.19	1188.41	1188.64	1188.86	1189.09	1189.31	1189.54	1189.76	1189.98	1190.21	1190.43	**48.50**
48.60	1190.43	1190.66	1190.88	1191.10	1191.33	1191.55	1191.78	1192.00	1192.23	1192.45	1192.67	**48.60**
48.70	1192.67	1192.90	1193.12	1193.35	1193.57	1193.80	1194.02	1194.24	1194.47	1194.69	1194.92	**48.70**
48.80	1194.92	1195.14	1195.37	1195.59	1195.81	1196.04	1196.26	1196.49	1196.71	1196.94	1197.16	**48.80**
48.90	1197.16	1197.39	1197.61	1197.83	1198.06	1198.28	1198.51	1198.73	1198.96	1199.18	1199.40	**48.90**
49.00	1199.40	1199.63	1199.85	1200.08	1200.30	1200.53	1200.75	1200.98	1201.20	1201.42	1201.65	**49.00**
49.10	1201.65	1201.87	1202.10	1202.32	1202.55	1202.77	1202.99	1203.22	1203.44	1203.67	1203.89	**49.10**
49.20	1203.89	1204.12	1204.34	1204.57	1204.79	1205.01	1205.24	1205.46	1205.69	1205.91	1206.14	**49.20**
49.30	1206.14	1206.36	1206.59	1206.81	1207.04	1207.26	1207.48	1207.71	1207.93	1208.16	1208.38	**49.30**
49.40	1208.38	1208.61	1208.83	1209.06	1209.28	1209.50	1209.73	1209.95	1210.18	1210.40	1210.63	**49.40**
49.50	1210.63	1210.85	1211.08	1211.30	1211.53	1211.75	1211.98	1212.20	1212.42	1212.65	1212.87	**49.50**
49.60	1212.87	1213.10	1213.32	1213.55	1213.77	1214.00	1214.22	1214.45	1214.67	1214.89	1215.12	**49.60**
49.70	1215.12	1215.34	1215.57	1215.79	1216.02	1216.24	1216.47	1216.69	1216.92	1217.14	1217.37	**49.70**
49.80	1217.37	1217.59	1217.82	1218.04	1218.26	1218.49	1218.71	1218.94	1219.16	1219.39	1219.61	**49.80**
49.90	1219.61	1219.84	1220.06	1220.29	1220.51	1220.74	1220.96	1221.19	1221.41	1221.64	1221.86	**49.90**
50.00	1221.86	1222.08	1222.31	1222.53	1222.76	1222.98	1223.21	1223.43	1223.66	1223.88	1224.11	**50.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. ***Type E thermocouples*** *--- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
50.00	1221.86	1222.08	1222.31	1222.53	1222.76	1222.98	1223.21	1223.43	1223.66	1223.88	1224.11	**50.00**
50.10	1224.11	1224.33	1224.56	1224.78	1225.01	1225.23	1225.46	1225.68	1225.91	1226.13	1226.36	**50.10**
50.20	1226.36	1226.58	1226.81	1227.03	1227.26	1227.48	1227.70	1227.93	1228.15	1228.38	1228.60	**50.20**
50.30	1228.60	1228.83	1229.05	1229.28	1229.50	1229.73	1229.95	1230.18	1230.40	1230.63	1230.85	**50.30**
50.40	1230.85	1231.08	1231.30	1231.53	1231.75	1231.98	1232.20	1232.43	1232.65	1232.88	1233.10	**50.40**
50.50	1233.10	1233.33	1233.55	1233.78	1234.00	1234.23	1234.45	1234.68	1234.90	1235.13	1235.35	**50.50**
50.60	1235.35	1235.58	1235.80	1236.03	1236.25	1236.48	1236.70	1236.93	1237.15	1237.38	1237.60	**50.60**
50.70	1237.60	1237.83	1238.05	1238.28	1238.50	1238.73	1238.95	1239.18	1239.40	1239.63	1239.85	**50.70**
50.80	1239.85	1240.08	1240.30	1240.53	1240.75	1240.98	1241.20	1241.43	1241.65	1241.88	1242.10	**50.80**
50.90	1242.10	1242.33	1242.55	1242.78	1243.00	1243.23	1243.45	1243.68	1243.90	1244.13	1244.35	**50.90**
51.00	1244.35	1244.58	1244.80	1245.03	1245.25	1245.48	1245.70	1245.93	1246.16	1246.38	1246.61	**51.00**
51.10	1246.61	1246.83	1247.06	1247.28	1247.51	1247.73	1247.96	1248.18	1248.41	1248.63	1248.86	**51.10**
51.20	1248.86	1249.08	1249.31	1249.53	1249.76	1249.98	1250.21	1250.43	1250.66	1250.88	1251.11	**51.20**
51.30	1251.11	1251.33	1251.56	1251.79	1252.01	1252.24	1252.46	1252.69	1252.91	1253.14	1253.36	**51.30**
51.40	1253.36	1253.59	1253.81	1254.04	1254.26	1254.49	1254.71	1254.94	1255.16	1255.39	1255.62	**51.40**
51.50	1255.62	1255.84	1256.07	1256.29	1256.52	1256.74	1256.97	1257.19	1257.42	1257.64	1257.87	**51.50**
51.60	1257.87	1258.09	1258.32	1258.54	1258.77	1259.00	1259.22	1259.45	1259.67	1259.90	1260.12	**51.60**
51.70	1260.12	1260.35	1260.57	1260.80	1261.02	1261.25	1261.48	1261.70	1261.93	1262.15	1262.38	**51.70**
51.80	1262.38	1262.60	1262.83	1263.05	1263.28	1263.50	1263.73	1263.96	1264.18	1264.41	1264.63	**51.80**
51.90	1264.63	1264.86	1265.08	1265.31	1265.53	1265.76	1265.98	1266.21	1266.44	1266.66	1266.89	**51.90**
52.00	1266.89	1267.11	1267.34	1267.56	1267.79	1268.01	1268.24	1268.47	1268.69	1268.92	1269.14	**52.00**
52.10	1269.14	1269.37	1269.59	1269.82	1270.04	1270.27	1270.50	1270.72	1270.95	1271.17	1271.40	**52.10**
52.20	1271.40	1271.62	1271.85	1272.08	1272.30	1272.53	1272.75	1272.98	1273.20	1273.43	1273.65	**52.20**
52.30	1273.65	1273.88	1274.11	1274.33	1274.56	1274.78	1275.01	1275.23	1275.46	1275.69	1275.91	**52.30**
52.40	1275.91	1276.14	1276.36	1276.59	1276.81	1277.04	1277.27	1277.49	1277.72	1277.94	1278.17	**52.40**
52.50	1278.17	1278.39	1278.62	1278.85	1279.07	1279.30	1279.52	1279.75	1279.97	1280.20	1280.43	**52.50**
52.60	1280.43	1280.65	1280.88	1281.10	1281.33	1281.55	1281.78	1282.01	1282.23	1282.46	1282.68	**52.60**
52.70	1282.68	1282.91	1283.14	1283.36	1283.59	1283.81	1284.04	1284.26	1284.49	1284.72	1284.94	**52.70**
52.80	1284.94	1285.17	1285.39	1285.62	1285.85	1286.07	1286.30	1286.52	1286.75	1286.98	1287.20	**52.80**
52.90	1287.20	1287.43	1287.65	1287.88	1288.10	1288.33	1288.56	1288.78	1289.01	1289.23	1289.46	**52.90**
53.00	1289.46	1289.69	1289.91	1290.14	1290.36	1290.59	1290.82	1291.04	1291.27	1291.49	1291.72	**53.00**
53.10	1291.72	1291.95	1292.17	1292.40	1292.62	1292.85	1293.08	1293.30	1293.53	1293.75	1293.98	**53.10**
53.20	1293.98	1294.21	1294.43	1294.66	1294.88	1295.11	1295.34	1295.56	1295.79	1296.01	1296.24	**53.20**
53.30	1296.24	1296.47	1296.69	1296.92	1297.14	1297.37	1297.60	1297.82	1298.05	1298.28	1298.50	**53.30**
53.40	1298.50	1298.73	1298.95	1299.18	1299.41	1299.63	1299.86	1300.08	1300.31	1300.54	1300.76	**53.40**
53.50	1300.76	1300.99	1301.21	1301.44	1301.67	1301.89	1302.12	1302.35	1302.57	1302.80	1303.02	**53.50**
53.60	1303.02	1303.25	1303.48	1303.70	1303.93	1304.16	1304.38	1304.61	1304.83	1305.06	1305.29	**53.60**
53.70	1305.29	1305.51	1305.74	1305.97	1306.19	1306.42	1306.64	1306.87	1307.10	1307.32	1307.55	**53.70**
53.80	1307.55	1307.78	1308.00	1308.23	1308.45	1308.68	1308.91	1309.13	1309.36	1309.59	1309.81	**53.80**
53.90	1309.81	1310.04	1310.26	1310.49	1310.72	1310.94	1311.17	1311.40	1311.62	1311.85	1312.08	**53.90**
54.00	1312.08	1312.30	1312.53	1312.75	1312.98	1313.21	1313.43	1313.66	1313.89	1314.11	1314.34	**54.00**
54.10	1314.34	1314.57	1314.79	1315.02	1315.24	1315.47	1315.70	1315.92	1316.15	1316.38	1316.60	**54.10**
54.20	1316.60	1316.83	1317.06	1317.28	1317.51	1317.74	1317.96	1318.19	1318.42	1318.64	1318.87	**54.20**
54.30	1318.87	1319.09	1319.32	1319.55	1319.77	1320.00	1320.23	1320.45	1320.68	1320.91	1321.13	**54.30**
54.40	1321.13	1321.36	1321.59	1321.81	1322.04	1322.27	1322.49	1322.72	1322.95	1323.17	1323.40	**54.40**
54.50	1323.40	1323.63	1323.85	1324.08	1324.31	1324.53	1324.76	1324.98	1325.21	1325.44	1325.66	**54.50**
54.60	1325.66	1325.89	1326.12	1326.34	1326.57	1326.80	1327.02	1327.25	1327.48	1327.70	1327.93	**54.60**
54.70	1327.93	1328.16	1328.38	1328.61	1328.84	1329.06	1329.29	1329.52	1329.74	1329.97	1330.20	**54.70**
54.80	1330.20	1330.42	1330.65	1330.88	1331.10	1331.33	1331.56	1331.78	1332.01	1332.24	1332.47	**54.80**
54.90	1332.47	1332.69	1332.92	1333.15	1333.37	1333.60	1333.83	1334.05	1334.28	1334.51	1334.73	**54.90**
55.00	1334.73	1334.96	1335.19	1335.41	1335.64	1335.87	1336.09	1336.32	1336.55	1336.77	1337.00	**55.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
55.00	1334.73	1334.96	1335.19	1335.41	1335.64	1335.87	1336.09	1336.32	1336.55	1336.77	1337.00	**55.00**
55.10	1337.00	1337.23	1337.45	1337.68	1337.91	1338.14	1338.36	1338.59	1338.82	1339.04	1339.27	**55.10**
55.20	1339.27	1339.50	1339.72	1339.95	1340.18	1340.40	1340.63	1340.86	1341.08	1341.31	1341.54	**55.20**
55.30	1341.54	1341.77	1341.99	1342.22	1342.45	1342.67	1342.90	1343.13	1343.35	1343.58	1343.81	**55.30**
55.40	1343.81	1344.03	1344.26	1344.49	1344.72	1344.94	1345.17	1345.40	1345.62	1345.85	1346.08	**55.40**
55.50	1346.08	1346.30	1346.53	1346.76	1346.99	1347.21	1347.44	1347.67	1347.89	1348.12	1348.35	**55.50**
55.60	1348.35	1348.57	1348.80	1349.03	1349.26	1349.48	1349.71	1349.94	1350.16	1350.39	1350.62	**55.60**
55.70	1350.62	1350.85	1351.07	1351.30	1351.53	1351.75	1351.98	1352.21	1352.44	1352.66	1352.89	**55.70**
55.80	1352.89	1353.12	1353.34	1353.57	1353.80	1354.03	1354.25	1354.48	1354.71	1354.93	1355.16	**55.80**
55.90	1355.16	1355.39	1355.62	1355.84	1356.07	1356.30	1356.52	1356.75	1356.98	1357.21	1357.43	**55.90**
56.00	1357.43	1357.66	1357.89	1358.11	1358.34	1358.57	1358.80	1359.02	1359.25	1359.48	1359.71	**56.00**
56.10	1359.71	1359.93	1360.16	1360.39	1360.61	1360.84	1361.07	1361.30	1361.52	1361.75	1361.98	**56.10**
56.20	1361.98	1362.21	1362.43	1362.66	1362.89	1363.12	1363.34	1363.57	1363.80	1364.02	1364.25	**56.20**
56.30	1364.25	1364.48	1364.71	1364.93	1365.16	1365.39	1365.62	1365.84	1366.07	1366.30	1366.53	**56.30**
56.40	1366.53	1366.75	1366.98	1367.21	1367.44	1367.66	1367.89	1368.12	1368.34	1368.57	1368.80	**56.40**
56.50	1368.80	1369.03	1369.25	1369.48	1369.71	1369.94	1370.16	1370.39	1370.62	1370.85	1371.07	**56.50**
56.60	1371.07	1371.30	1371.53	1371.76	1371.98	1372.21	1372.44	1372.67	1372.89	1373.12	1373.35	**56.60**
56.70	1373.35	1373.58	1373.80	1374.03	1374.26	1374.49	1374.71	1374.94	1375.17	1375.40	1375.62	**56.70**
56.80	1375.62	1375.85	1376.08	1376.31	1376.54	1376.76	1376.99	1377.22	1377.45	1377.67	1377.90	**56.80**
56.90	1377.90	1378.13	1378.36	1378.58	1378.81	1379.04	1379.27	1379.49	1379.72	1379.95	1380.18	**56.90**
57.00	1380.18	1380.40	1380.63	1380.86	1381.09	1381.32	1381.54	1381.77	1382.00	1382.23	1382.45	**57.00**
57.10	1382.45	1382.68	1382.91	1383.14	1383.36	1383.59	1383.82	1384.05	1384.28	1384.50	1384.73	**57.10**
57.20	1384.73	1384.96	1385.19	1385.41	1385.64	1385.87	1386.10	1386.33	1386.55	1386.78	1387.01	**57.20**
57.30	1387.01	1387.24	1387.46	1387.69	1387.92	1388.15	1388.38	1388.60	1388.83	1389.06	1389.29	**57.30**
57.40	1389.29	1389.51	1389.74	1389.97	1390.20	1390.43	1390.65	1390.88	1391.11	1391.34	1391.57	**57.40**
57.50	1391.57	1391.79	1392.02	1392.25	1392.48	1392.71	1392.93	1393.16	1393.39	1393.62	1393.84	**57.50**
57.60	1393.84	1394.07	1394.30	1394.53	1394.76	1394.98	1395.21	1395.44	1395.67	1395.90	1396.12	**57.60**
57.70	1396.12	1396.35	1396.58	1396.81	1397.04	1397.26	1397.49	1397.72	1397.95	1398.18	1398.40	**57.70**
57.80	1398.40	1398.63	1398.86	1399.09	1399.32	1399.54	1399.77	1400.00	1400.23	1400.46	1400.68	**57.80**
57.90	1400.68	1400.91	1401.14	1401.37	1401.60	1401.82	1402.05	1402.28	1402.51	1402.74	1402.97	**57.90**
58.00	1402.97	1403.19	1403.42	1403.65	1403.88	1404.11	1404.33	1404.56	1404.79	1405.02	1405.25	**58.00**
58.10	1405.25	1405.47	1405.70	1405.93	1406.16	1406.39	1406.62	1406.84	1407.07	1407.30	1407.53	**58.10**
58.20	1407.53	1407.76	1407.98	1408.21	1408.44	1408.67	1408.90	1409.13	1409.35	1409.58	1409.81	**58.20**
58.30	1409.81	1410.04	1410.27	1410.49	1410.72	1410.95	1411.18	1411.41	1411.64	1411.86	1412.09	**58.30**
58.40	1412.09	1412.32	1412.55	1412.78	1413.01	1413.23	1413.46	1413.69	1413.92	1414.15	1414.38	**58.40**
58.50	1414.38	1414.60	1414.83	1415.06	1415.29	1415.52	1415.75	1415.97	1416.20	1416.43	1416.66	**58.50**
58.60	1416.66	1416.89	1417.12	1417.34	1417.57	1417.80	1418.03	1418.26	1418.49	1418.71	1418.94	**58.60**
58.70	1418.94	1419.17	1419.40	1419.63	1419.86	1420.09	1420.31	1420.54	1420.77	1421.00	1421.23	**58.70**
58.80	1421.23	1421.46	1421.68	1421.91	1422.14	1422.37	1422.60	1422.83	1423.06	1423.28	1423.51	**58.80**
58.90	1423.51	1423.74	1423.97	1424.20	1424.43	1424.66	1424.88	1425.11	1425.34	1425.57	1425.80	**58.90**
59.00	1425.80	1426.03	1426.25	1426.48	1426.71	1426.94	1427.17	1427.40	1427.63	1427.85	1428.08	**59.00**
59.10	1428.08	1428.31	1428.54	1428.77	1429.00	1429.23	1429.46	1429.68	1429.91	1430.14	1430.37	**59.10**
59.20	1430.37	1430.60	1430.83	1431.06	1431.28	1431.51	1431.74	1431.97	1432.20	1432.43	1432.66	**59.20**
59.30	1432.66	1432.89	1433.11	1433.34	1433.57	1433.80	1434.03	1434.26	1434.49	1434.71	1434.94	**59.30**
59.40	1434.94	1435.17	1435.40	1435.63	1435.86	1436.09	1436.32	1436.54	1436.77	1437.00	1437.23	**59.40**
59.50	1437.23	1437.46	1437.69	1437.92	1438.15	1438.38	1438.60	1438.83	1439.06	1439.29	1439.52	**59.50**
59.60	1439.52	1439.75	1439.98	1440.21	1440.43	1440.66	1440.89	1441.12	1441.35	1441.58	1441.81	**59.60**
59.70	1441.81	1442.04	1442.27	1442.49	1442.72	1442.95	1443.18	1443.41	1443.64	1443.87	1444.10	**59.70**
59.80	1444.10	1444.33	1444.55	1444.78	1445.01	1445.24	1445.47	1445.70	1445.93	1446.16	1446.39	**59.80**
59.90	1446.39	1446.62	1446.84	1447.07	1447.30	1447.53	1447.76	1447.99	1448.22	1448.45	1448.68	**59.90**
60.00	1448.68	1448.91	1449.13	1449.36	1449.59	1449.82	1450.05	1450.28	1450.51	1450.74	1450.97	**60.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
60.00	1448.68	1448.91	1449.13	1449.36	1449.59	1449.82	1450.05	1450.28	1450.51	1450.74	1450.97	**60.00**
60.10	1450.97	1451.20	1451.42	1451.65	1451.88	1452.11	1452.34	1452.57	1452.80	1453.03	1453.26	**60.10**
60.20	1453.26	1453.49	1453.72	1453.94	1454.17	1454.40	1454.63	1454.86	1455.09	1455.32	1455.55	**60.20**
60.30	1455.55	1455.78	1456.01	1456.24	1456.47	1456.69	1456.92	1457.15	1457.38	1457.61	1457.84	**60.30**
60.40	1457.84	1458.07	1458.30	1458.53	1458.76	1458.99	1459.22	1459.45	1459.67	1459.90	1460.13	**60.40**
60.50	1460.13	1460.36	1460.59	1460.82	1461.05	1461.28	1461.51	1461.74	1461.97	1462.20	1462.43	**60.50**
60.60	1462.43	1462.65	1462.88	1463.11	1463.34	1463.57	1463.80	1464.03	1464.26	1464.49	1464.72	**60.60**
60.70	1464.72	1464.95	1465.18	1465.41	1465.64	1465.87	1466.09	1466.32	1466.55	1466.78	1467.01	**60.70**
60.80	1467.01	1467.24	1467.47	1467.70	1467.93	1468.16	1468.39	1468.62	1468.85	1469.08	1469.31	**60.80**
60.90	1469.31	1469.54	1469.77	1470.00	1470.22	1470.45	1470.68	1470.91	1471.14	1471.37	1471.60	**60.90**
61.00	1471.60	1471.83	1472.06	1472.29	1472.52	1472.75	1472.98	1473.21	1473.44	1473.67	1473.90	**61.00**
61.10	1473.90	1474.13	1474.36	1474.59	1474.81	1475.04	1475.27	1475.50	1475.73	1475.96	1476.19	**61.10**
61.20	1476.19	1476.42	1476.65	1476.88	1477.11	1477.34	1477.57	1477.80	1478.03	1478.26	1478.49	**61.20**
61.30	1478.49	1478.72	1478.95	1479.18	1479.41	1479.64	1479.87	1480.10	1480.33	1480.56	1480.78	**61.30**
61.40	1480.78	1481.01	1481.24	1481.47	1481.70	1481.93	1482.16	1482.39	1482.62	1482.85	1483.08	**61.40**
61.50	1483.08	1483.31	1483.54	1483.77	1484.00	1484.23	1484.46	1484.69	1484.92	1485.15	1485.38	**61.50**
61.60	1485.38	1485.61	1485.84	1486.07	1486.30	1486.53	1486.76	1486.99	1487.22	1487.45	1487.68	**61.60**
61.70	1487.68	1487.91	1488.14	1488.37	1488.60	1488.83	1489.06	1489.29	1489.52	1489.75	1489.98	**61.70**
61.80	1489.98	1490.21	1490.44	1490.67	1490.90	1491.13	1491.36	1491.59	1491.82	1492.05	1492.28	**61.80**
61.90	1492.28	1492.51	1492.74	1492.97	1493.20	1493.43	1493.66	1493.89	1494.12	1494.35	1494.58	**61.90**
62.00	1494.58	1494.81	1495.04	1495.27	1495.50	1495.73	1495.96	1496.19	1496.42	1496.65	1496.88	**62.00**
62.10	1496.88	1497.11	1497.34	1497.57	1497.80	1498.03	1498.26	1498.49	1498.72	1498.95	1499.18	**62.10**
62.20	1499.18	1499.41	1499.64	1499.87	1500.10	1500.33	1500.56	1500.79	1501.02	1501.25	1501.48	**62.20**
62.30	1501.48	1501.71	1501.94	1502.17	1502.40	1502.63	1502.86	1503.09	1503.32	1503.55	1503.78	**62.30**
62.40	1503.78	1504.01	1504.24	1504.47	1504.70	1504.93	1505.16	1505.39	1505.62	1505.85	1506.08	**62.40**
62.50	1506.08	1506.31	1506.54	1506.77	1507.00	1507.23	1507.46	1507.69	1507.92	1508.15	1508.38	**62.50**
62.60	1508.38	1508.61	1508.84	1509.07	1509.30	1509.53	1509.77	1510.00	1510.23	1510.46	1510.69	**62.60**
62.70	1510.69	1510.92	1511.15	1511.38	1511.61	1511.84	1512.07	1512.30	1512.53	1512.76	1512.99	**62.70**
62.80	1512.99	1513.22	1513.45	1513.68	1513.91	1514.14	1514.37	1514.60	1514.83	1515.06	1515.29	**62.80**
62.90	1515.29	1515.53	1515.76	1515.99	1516.22	1516.45	1516.68	1516.91	1517.14	1517.37	1517.60	**62.90**
63.00	1517.60	1517.83	1518.06	1518.29	1518.52	1518.75	1518.98	1519.21	1519.44	1519.67	1519.90	**63.00**
63.10	1519.90	1520.14	1520.37	1520.60	1520.83	1521.06	1521.29	1521.52	1521.75	1521.98	1522.21	**63.10**
63.20	1522.21	1522.44	1522.67	1522.90	1523.13	1523.36	1523.59	1523.83	1524.06	1524.29	1524.52	**63.20**
63.30	1524.52	1524.75	1524.98	1525.21	1525.44	1525.67	1525.90	1526.13	1526.36	1526.59	1526.82	**63.30**
63.40	1526.82	1527.05	1527.29	1527.52	1527.75	1527.98	1528.21	1528.44	1528.67	1528.90	1529.13	**63.40**
63.50	1529.13	1529.36	1529.59	1529.82	1530.05	1530.29	1530.52	1530.75	1530.98	1531.21	1531.44	**63.50**
63.60	1531.44	1531.67	1531.90	1532.13	1532.36	1532.59	1532.82	1533.06	1533.29	1533.52	1533.75	**63.60**
63.70	1533.75	1533.98	1534.21	1534.44	1534.67	1534.90	1535.13	1535.36	1535.60	1535.83	1536.06	**63.70**
63.80	1536.06	1536.29	1536.52	1536.75	1536.98	1537.21	1537.44	1537.67	1537.90	1538.14	1538.37	**63.80**
63.90	1538.37	1538.60	1538.83	1539.06	1539.29	1539.52	1539.75	1539.98	1540.22	1540.45	1540.68	**63.90**
64.00	1540.68	1540.91	1541.14	1541.37	1541.60	1541.83	1542.06	1542.29	1542.53	1542.76	1542.99	**64.00**
64.10	1542.99	1543.22	1543.45	1543.68	1543.91	1544.14	1544.37	1544.61	1544.84	1545.07	1545.30	**64.10**
64.20	1545.30	1545.53	1545.76	1545.99	1546.22	1546.46	1546.69	1546.92	1547.15	1547.38	1547.61	**64.20**
64.30	1547.61	1547.84	1548.07	1548.31	1548.54	1548.77	1549.00	1549.23	1549.46	1549.69	1549.92	**64.30**
64.40	1549.92	1550.16	1550.39	1550.62	1550.85	1551.08	1551.31	1551.54	1551.77	1552.01	1552.24	**64.40**
64.50	1552.24	1552.47	1552.70	1552.93	1553.16	1553.39	1553.63	1553.86	1554.09	1554.32	1554.55	**64.50**
64.60	1554.55	1554.78	1555.01	1555.24	1555.48	1555.71	1555.94	1556.17	1556.40	1556.63	1556.87	**64.60**
64.70	1556.87	1557.10	1557.33	1557.56	1557.79	1558.02	1558.25	1558.49	1558.72	1558.95	1559.18	**64.70**
64.80	1559.18	1559.41	1559.64	1559.87	1560.11	1560.34	1560.57	1560.80	1561.03	1561.26	1561.50	**64.80**
64.90	1561.50	1561.73	1561.96	1562.19	1562.42	1562.65	1562.89	1563.12	1563.35	1563.58	1563.81	**64.90**
65.00	1563.81	1564.04	1564.27	1564.51	1564.74	1564.97	1565.20	1565.43	1565.66	1565.90	1566.13	**65.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
65.00	1563.81	1564.04	1564.27	1564.51	1564.74	1564.97	1565.20	1565.43	1565.66	1565.90	1566.13	**65.00**
65.10	1566.13	1566.36	1566.59	1566.82	1567.06	1567.29	1567.52	1567.75	1567.98	1568.21	1568.45	**65.10**
65.20	1568.45	1568.68	1568.91	1569.14	1569.37	1569.60	1569.84	1570.07	1570.30	1570.53	1570.76	**65.20**
65.30	1570.76	1571.00	1571.23	1571.46	1571.69	1571.92	1572.15	1572.39	1572.62	1572.85	1573.08	**65.30**
65.40	1573.08	1573.31	1573.55	1573.78	1574.01	1574.24	1574.47	1574.71	1574.94	1575.17	1575.40	**65.40**
65.50	1575.40	1575.63	1575.87	1576.10	1576.33	1576.56	1576.79	1577.03	1577.26	1577.49	1577.72	**65.50**
65.60	1577.72	1577.95	1578.19	1578.42	1578.65	1578.88	1579.11	1579.35	1579.58	1579.81	1580.04	**65.60**
65.70	1580.04	1580.27	1580.51	1580.74	1580.97	1581.20	1581.43	1581.67	1581.90	1582.13	1582.36	**65.70**
65.80	1582.36	1582.59	1582.83	1583.06	1583.29	1583.52	1583.76	1583.99	1584.22	1584.45	1584.68	**65.80**
65.90	1584.68	1584.92	1585.15	1585.38	1585.61	1585.85	1586.08	1586.31	1586.54	1586.77	1587.01	**65.90**
66.00	1587.01	1587.24	1587.47	1587.70	1587.94	1588.17	1588.40	1588.63	1588.86	1589.10	1589.33	**66.00**
66.10	1589.33	1589.56	1589.79	1590.03	1590.26	1590.49	1590.72	1590.96	1591.19	1591.42	1591.65	**66.10**
66.20	1591.65	1591.89	1592.12	1592.35	1592.58	1592.82	1593.05	1593.28	1593.51	1593.75	1593.98	**66.20**
66.30	1593.98	1594.21	1594.44	1594.67	1594.91	1595.14	1595.37	1595.60	1595.84	1596.07	1596.30	**66.30**
66.40	1596.30	1596.54	1596.77	1597.00	1597.23	1597.47	1597.70	1597.93	1598.16	1598.40	1598.63	**66.40**
66.50	1598.63	1598.86	1599.09	1599.33	1599.56	1599.79	1600.02	1600.26	1600.49	1600.72	1600.95	**66.50**
66.60	1600.95	1601.19	1601.42	1601.65	1601.89	1602.12	1602.35	1602.58	1602.82	1603.05	1603.28	**66.60**
66.70	1603.28	1603.51	1603.75	1603.98	1604.21	1604.45	1604.68	1604.91	1605.14	1605.38	1605.61	**66.70**
66.80	1605.61	1605.84	1606.07	1606.31	1606.54	1606.77	1607.01	1607.24	1607.47	1607.70	1607.94	**66.80**
66.90	1607.94	1608.17	1608.40	1608.64	1608.87	1609.10	1609.33	1609.57	1609.80	1610.03	1610.27	**66.90**
67.00	1610.27	1610.50	1610.73	1610.97	1611.20	1611.43	1611.66	1611.90	1612.13	1612.36	1612.60	**67.00**
67.10	1612.60	1612.83	1613.06	1613.30	1613.53	1613.76	1613.99	1614.23	1614.46	1614.69	1614.93	**67.10**
67.20	1614.93	1615.16	1615.39	1615.63	1615.86	1616.09	1616.33	1616.56	1616.79	1617.02	1617.26	**67.20**
67.30	1617.26	1617.49	1617.72	1617.96	1618.19	1618.42	1618.66	1618.89	1619.12	1619.36	1619.59	**67.30**
67.40	1619.59	1619.82	1620.06	1620.29	1620.52	1620.76	1620.99	1621.22	1621.46	1621.69	1621.92	**67.40**
67.50	1621.92	1622.16	1622.39	1622.62	1622.86	1623.09	1623.32	1623.56	1623.79	1624.02	1624.26	**67.50**
67.60	1624.26	1624.49	1624.72	1624.96	1625.19	1625.42	1625.66	1625.89	1626.12	1626.36	1626.59	**67.60**
67.70	1626.59	1626.82	1627.06	1627.29	1627.52	1627.76	1627.99	1628.22	1628.46	1628.69	1628.92	**67.70**
67.80	1628.92	1629.16	1629.39	1629.63	1629.86	1630.09	1630.33	1630.56	1630.79	1631.03	1631.26	**67.80**
67.90	1631.26	1631.49	1631.73	1631.96	1632.19	1632.43	1632.66	1632.90	1633.13	1633.36	1633.60	**67.90**
68.00	1633.60	1633.83	1634.06	1634.30	1634.53	1634.76	1635.00	1635.23	1635.47	1635.70	1635.93	**68.00**
68.10	1635.93	1636.17	1636.40	1636.63	1636.87	1637.10	1637.34	1637.57	1637.80	1638.04	1638.27	**68.10**
68.20	1638.27	1638.51	1638.74	1638.97	1639.21	1639.44	1639.67	1639.91	1640.14	1640.38	1640.61	**68.20**
68.30	1640.61	1640.84	1641.08	1641.31	1641.55	1641.78	1642.01	1642.25	1642.48	1642.72	1642.95	**68.30**
68.40	1642.95	1643.18	1643.42	1643.65	1643.89	1644.12	1644.35	1644.59	1644.82	1645.06	1645.29	**68.40**
68.50	1645.29	1645.52	1645.76	1645.99	1646.23	1646.46	1646.69	1646.93	1647.16	1647.40	1647.63	**68.50**
68.60	1647.63	1647.86	1648.10	1648.33	1648.57	1648.80	1649.04	1649.27	1649.50	1649.74	1649.97	**68.60**
68.70	1649.97	1650.21	1650.44	1650.67	1650.91	1651.14	1651.38	1651.61	1651.85	1652.08	1652.31	**68.70**
68.80	1652.31	1652.55	1652.78	1653.02	1653.25	1653.49	1653.72	1653.95	1654.19	1654.42	1654.66	**68.80**
68.90	1654.66	1654.89	1655.13	1655.36	1655.59	1655.83	1656.06	1656.30	1656.53	1656.77	1657.00	**68.90**
69.00	1657.00	1657.24	1657.47	1657.70	1657.94	1658.17	1658.41	1658.64	1658.88	1659.11	1659.35	**69.00**
69.10	1659.35	1659.58	1659.82	1660.05	1660.28	1660.52	1660.75	1660.99	1661.22	1661.46	1661.69	**69.10**
69.20	1661.69	1661.93	1662.16	1662.40	1662.63	1662.86	1663.10	1663.33	1663.57	1663.80	1664.04	**69.20**
69.30	1664.04	1664.27	1664.51	1664.74	1664.98	1665.21	1665.45	1665.68	1665.92	1666.15	1666.39	**69.30**
69.40	1666.39	1666.62	1666.85	1667.09	1667.32	1667.56	1667.79	1668.03	1668.26	1668.50	1668.73	**69.40**
69.50	1668.73	1668.97	1669.20	1669.44	1669.67	1669.91	1670.14	1670.38	1670.61	1670.85	1671.08	**69.50**
69.60	1671.08	1671.32	1671.55	1671.79	1672.02	1672.26	1672.49	1672.73	1672.96	1673.20	1673.43	**69.60**
69.70	1673.43	1673.67	1673.90	1674.14	1674.37	1674.61	1674.84	1675.08	1675.31	1675.55	1675.78	**69.70**
69.80	1675.78	1676.02	1676.25	1676.49	1676.72	1676.96	1677.19	1677.43	1677.66	1677.90	1678.13	**69.80**
69.90	1678.13	1678.37	1678.60	1678.84	1679.07	1679.31	1679.54	1679.78	1680.01	1680.25	1680.49	**69.90**
70.00	1680.49	1680.72	1680.96	1681.19	1681.43	1681.66	1681.90	1682.13	1682.37	1682.60	1682.84	**70.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
70.00	1680.49	1680.72	1680.96	1681.19	1681.43	1681.66	1681.90	1682.13	1682.37	1682.60	1682.84	**70.00**
70.10	1682.84	1683.07	1683.31	1683.54	1683.78	1684.02	1684.25	1684.49	1684.72	1684.96	1685.19	**70.10**
70.20	1685.19	1685.43	1685.66	1685.90	1686.13	1686.37	1686.60	1686.84	1687.08	1687.31	1687.55	**70.20**
70.30	1687.55	1687.78	1688.02	1688.25	1688.49	1688.72	1688.96	1689.20	1689.43	1689.67	1689.90	**70.30**
70.40	1689.90	1690.14	1690.37	1690.61	1690.84	1691.08	1691.32	1691.55	1691.79	1692.02	1692.26	**70.40**
70.50	1692.26	1692.49	1692.73	1692.97	1693.20	1693.44	1693.67	1693.91	1694.14	1694.38	1694.62	**70.50**
70.60	1694.62	1694.85	1695.09	1695.32	1695.56	1695.79	1696.03	1696.27	1696.50	1696.74	1696.97	**70.60**
70.70	1696.97	1697.21	1697.45	1697.68	1697.92	1698.15	1698.39	1698.62	1698.86	1699.10	1699.33	**70.70**
70.80	1699.33	1699.57	1699.80	1700.04	1700.28	1700.51	1700.75	1700.98	1701.22	1701.46	1701.69	**70.80**
70.90	1701.69	1701.93	1702.16	1702.40	1702.64	1702.87	1703.11	1703.34	1703.58	1703.82	1704.05	**70.90**
71.00	1704.05	1704.29	1704.52	1704.76	1705.00	1705.23	1705.47	1705.71	1705.94	1706.18	1706.41	**71.00**
71.10	1706.41	1706.65	1706.89	1707.12	1707.36	1707.60	1707.83	1708.07	1708.30	1708.54	1708.78	**71.10**
71.20	1708.78	1709.01	1709.25	1709.49	1709.72	1709.96	1710.19	1710.43	1710.67	1710.90	1711.14	**71.20**
71.30	1711.14	1711.38	1711.61	1711.85	1712.08	1712.32	1712.56	1712.79	1713.03	1713.27	1713.50	**71.30**
71.40	1713.50	1713.74	1713.98	1714.21	1714.45	1714.69	1714.92	1715.16	1715.40	1715.63	1715.87	**71.40**
71.50	1715.87	1716.10	1716.34	1716.58	1716.81	1717.05	1717.29	1717.52	1717.76	1718.00	1718.23	**71.50**
71.60	1718.23	1718.47	1718.71	1718.94	1719.18	1719.42	1719.65	1719.89	1720.13	1720.36	1720.60	**71.60**
71.70	1720.60	1720.84	1721.07	1721.31	1721.55	1721.78	1722.02	1722.26	1722.49	1722.73	1722.97	**71.70**
71.80	1722.97	1723.20	1723.44	1723.68	1723.91	1724.15	1724.39	1724.63	1724.86	1725.10	1725.34	**71.80**
71.90	1725.34	1725.57	1725.81	1726.05	1726.28	1726.52	1726.76	1726.99	1727.23	1727.47	1727.70	**71.90**
72.00	1727.70	1727.94	1728.18	1728.42	1728.65	1728.89	1729.13	1729.36	1729.60	1729.84	1730.07	**72.00**
72.10	1730.07	1730.31	1730.55	1730.79	1731.02	1731.26	1731.50	1731.73	1731.97	1732.21	1732.45	**72.10**
72.20	1732.45	1732.68	1732.92	1733.16	1733.39	1733.63	1733.87	1734.11	1734.34	1734.58	1734.82	**72.20**
72.30	1734.82	1735.05	1735.29	1735.53	1735.77	1736.00	1736.24	1736.48	1736.72	1736.95	1737.19	**72.30**
72.40	1737.19	1737.43	1737.66	1737.90	1738.14	1738.38	1738.61	1738.85	1739.09	1739.33	1739.56	**72.40**
72.50	1739.56	1739.80	1740.04	1740.27	1740.51	1740.75	1740.99	1741.22	1741.46	1741.70	1741.94	**72.50**
72.60	1741.94	1742.17	1742.41	1742.65	1742.89	1743.12	1743.36	1743.60	1743.84	1744.07	1744.31	**72.60**
72.70	1744.31	1744.55	1744.79	1745.02	1745.26	1745.50	1745.74	1745.97	1746.21	1746.45	1746.69	**72.70**
72.80	1746.69	1746.93	1747.16	1747.40	1747.64	1747.88	1748.11	1748.35	1748.59	1748.83	1749.06	**72.80**
72.90	1749.06	1749.30	1749.54	1749.78	1750.01	1750.25	1750.49	1750.73	1750.97	1751.20	1751.44	**72.90**
73.00	1751.44	1751.68	1751.92	1752.15	1752.39	1752.63	1752.87	1753.11	1753.34	1753.58	1753.82	**73.00**
73.10	1753.82	1754.06	1754.30	1754.53	1754.77	1755.01	1755.25	1755.48	1755.72	1755.96	1756.20	**73.10**
73.20	1756.20	1756.44	1756.67	1756.91	1757.15	1757.39	1757.63	1757.86	1758.10	1758.34	1758.58	**73.20**
73.30	1758.58	1758.82	1759.05	1759.29	1759.53	1759.77	1760.01	1760.24	1760.48	1760.72	1760.96	**73.30**
73.40	1760.96	1761.20	1761.43	1761.67	1761.91	1762.15	1762.39	1762.63	1762.86	1763.10	1763.34	**73.40**
73.50	1763.34	1763.58	1763.82	1764.05	1764.29	1764.53	1764.77	1765.01	1765.25	1765.48	1765.72	**73.50**
73.60	1765.72	1765.96	1766.20	1766.44	1766.67	1766.91	1767.15	1767.39	1767.63	1767.87	1768.10	**73.60**
73.70	1768.10	1768.34	1768.58	1768.82	1769.06	1769.30	1769.53	1769.77	1770.01	1770.25	1770.49	**73.70**
73.80	1770.49	1770.73	1770.96	1771.20	1771.44	1771.68	1771.92	1772.16	1772.40	1772.63	1772.87	**73.80**
73.90	1772.87	1773.11	1773.35	1773.59	1773.83	1774.06	1774.30	1774.54	1774.78	1775.02	1775.26	**73.90**
74.00	1775.26	1775.50	1775.73	1775.97	1776.21	1776.45	1776.69	1776.93	1777.17	1777.40	1777.64	**74.00**
74.10	1777.64	1777.88	1778.12	1778.36	1778.60	1778.84	1779.07	1779.31	1779.55	1779.79	1780.03	**74.10**
74.20	1780.03	1780.27	1780.51	1780.74	1780.98	1781.22	1781.46	1781.70	1781.94	1782.18	1782.42	**74.20**
74.30	1782.42	1782.65	1782.89	1783.13	1783.37	1783.61	1783.85	1784.09	1784.33	1784.56	1784.80	**74.30**
74.40	1784.80	1785.04	1785.28	1785.52	1785.76	1786.00	1786.24	1786.47	1786.71	1786.95	1787.19	**74.40**
74.50	1787.19	1787.43	1787.67	1787.91	1788.15	1788.39	1788.62	1788.86	1789.10	1789.34	1789.58	**74.50**
74.60	1789.58	1789.82	1790.06	1790.30	1790.54	1790.77	1791.01	1791.25	1791.49	1791.73	1791.97	**74.60**
74.70	1791.97	1792.21	1792.45	1792.69	1792.92	1793.16	1793.40	1793.64	1793.88	1794.12	1794.36	**74.70**
74.80	1794.36	1794.60	1794.84	1795.08	1795.31	1795.55	1795.79	1796.03	1796.27	1796.51	1796.75	**74.80**
74.90	1796.75	1796.99	1797.23	1797.47	1797.71	1797.94	1798.18	1798.42	1798.66	1798.90	1799.14	**74.90**
75.00	1799.14	1799.38	1799.62	1799.86	1800.10	1800.34	1800.57	1800.81	1801.05	1801.29	1801.53	**75.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B5.2.2. *Type E thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
75.00	1799.14	1799.38	1799.62	1799.86	1800.10	1800.34	1800.57	1800.81	1801.05	1801.29	1801.53	**75.00**
75.10	1801.53	1801.77	1802.01	1802.25	1802.49	1802.73	1802.97	1803.21	1803.44	1803.68	1803.92	**75.10**
75.20	1803.92	1804.16	1804.40	1804.64	1804.88	1805.12	1805.36	1805.60	1805.84	1806.08	1806.32	**75.20**
75.30	1806.32	1806.55	1806.79	1807.03	1807.27	1807.51	1807.75	1807.99	1808.23	1808.47	1808.71	**75.30**
75.40	1808.71	1808.95	1809.19	1809.43	1809.67	1809.90	1810.14	1810.38	1810.62	1810.86	1811.10	**75.40**
75.50	1811.10	1811.34	1811.58	1811.82	1812.06	1812.30	1812.54	1812.78	1813.02	1813.26	1813.49	**75.50**
75.60	1813.49	1813.73	1813.97	1814.21	1814.45	1814.69	1814.93	1815.17	1815.41	1815.65	1815.89	**75.60**
75.70	1815.89	1816.13	1816.37	1816.61	1816.85	1817.09	1817.32	1817.56	1817.80	1818.04	1818.28	**75.70**
75.80	1818.28	1818.52	1818.76	1819.00	1819.24	1819.48	1819.72	1819.96	1820.20	1820.44	1820.68	**75.80**
75.90	1820.68	1820.92	1821.16	1821.40	1821.63	1821.87	1822.11	1822.35	1822.59	1822.83	1823.07	**75.90**
76.00	1823.07	1823.31	1823.55	1823.79	1824.03	1824.27	1824.51	1824.75	1824.99	1825.23	1825.47	**76.00**
76.10	1825.47	1825.71	1825.94	1826.18	1826.42	1826.66	1826.90	1827.14	1827.38	1827.62	1827.86	**76.10**
76.20	1827.86	1828.10	1828.34	1828.58	1828.82	1829.06	1829.30	1829.54	1829.78	1830.02	1830.26	**76.20**
76.30	1830.26	1830.50	1830.73	1830.97	1831.21	1831.45	1831.69	1831.93				**76.30**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

B6. Supplementary Reference Tables for Type J—Iron Versus Copper-Nickel Alloy (SAMA) Thermocouples

B6.1. Tables with Voltage as a Function of Temperature

The reference function for type J thermocouples given in the main text (see table 6.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B6.1.1 and B6.1.2. Table B6.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −210 °C to 1200 °C, and table B6.1.2 presents voltage values at 1 °F intervals from −346 °F to 2192 °F. As discussed in chapter 6 of the text, **the values presented for type J thermocouples above 760 °C (1400 °F) are NOT suitable for precise temperature measurements and the thermocouple should NOT be considered to be a standardized type above 760 °C.**

TABLE B6.1.1. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−210	−8.095											−210
−200	−7.890	−7.912	−7.934	−7.955	−7.976	−7.996	−8.017	−8.037	−8.057	−8.076	−8.095	−200
−190	−7.659	−7.683	−7.707	−7.731	−7.755	−7.778	−7.801	−7.824	−7.846	−7.868	−7.890	−190
−180	−7.403	−7.429	−7.456	−7.482	−7.508	−7.534	−7.559	−7.585	−7.610	−7.634	−7.659	−180
−170	−7.123	−7.152	−7.181	−7.209	−7.237	−7.265	−7.293	−7.321	−7.348	−7.376	−7.403	−170
−160	−6.821	−6.853	−6.883	−6.914	−6.944	−6.975	−7.005	−7.035	−7.064	−7.094	−7.123	−160
−150	−6.500	−6.533	−6.566	−6.598	−6.631	−6.663	−6.695	−6.727	−6.759	−6.790	−6.821	−150
−140	−6.159	−6.194	−6.229	−6.263	−6.298	−6.332	−6.366	−6.400	−6.433	−6.467	−6.500	−140
−130	−5.801	−5.838	−5.874	−5.910	−5.946	−5.982	−6.018	−6.054	−6.089	−6.124	−6.159	−130
−120	−5.426	−5.465	−5.503	−5.541	−5.578	−5.616	−5.653	−5.690	−5.727	−5.764	−5.801	−120
−110	−5.037	−5.076	−5.116	−5.155	−5.194	−5.233	−5.272	−5.311	−5.350	−5.388	−5.426	−110
−100	−4.633	−4.674	−4.714	−4.755	−4.796	−4.836	−4.877	−4.917	−4.957	−4.997	−5.037	−100
−90	−4.215	−4.257	−4.300	−4.342	−4.384	−4.425	−4.467	−4.509	−4.550	−4.591	−4.633	−90
−80	−3.786	−3.829	−3.872	−3.916	−3.959	−4.002	−4.045	−4.088	−4.130	−4.173	−4.215	−80
−70	−3.344	−3.389	−3.434	−3.478	−3.522	−3.566	−3.610	−3.654	−3.698	−3.742	−3.786	−70
−60	−2.893	−2.938	−2.984	−3.029	−3.075	−3.120	−3.165	−3.210	−3.255	−3.300	−3.344	−60
−50	−2.431	−2.478	−2.524	−2.571	−2.617	−2.663	−2.709	−2.755	−2.801	−2.847	−2.893	−50
−40	−1.961	−2.008	−2.055	−2.103	−2.150	−2.197	−2.244	−2.291	−2.338	−2.385	−2.431	−40
−30	−1.482	−1.530	−1.578	−1.626	−1.674	−1.722	−1.770	−1.818	−1.865	−1.913	−1.961	−30
−20	−0.995	−1.044	−1.093	−1.142	−1.190	−1.239	−1.288	−1.336	−1.385	−1.433	−1.482	−20
−10	−0.501	−0.550	−0.600	−0.650	−0.699	−0.749	−0.798	−0.847	−0.896	−0.946	−0.995	−10
0	0.000	−0.050	−0.101	−0.151	−0.201	−0.251	−0.301	−0.351	−0.401	−0.451	−0.501	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B6.1.1. ***Type J thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued***

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.050	0.101	0.151	0.202	0.253	0.303	0.354	0.405	0.456	0.507	0
10	0.507	0.558	0.609	0.660	0.711	0.762	0.814	0.865	0.916	0.968	1.019	10
20	1.019	1.071	1.122	1.174	1.226	1.277	1.329	1.381	1.433	1.485	1.537	20
30	1.537	1.589	1.641	1.693	1.745	1.797	1.849	1.902	1.954	2.006	2.059	30
40	2.059	2.111	2.164	2.216	2.269	2.322	2.374	2.427	2.480	2.532	2.585	40
50	2.585	2.638	2.691	2.744	2.797	2.850	2.903	2.956	3.009	3.062	3.116	50
60	3.116	3.169	3.222	3.275	3.329	3.382	3.436	3.489	3.543	3.596	3.650	60
70	3.650	3.703	3.757	3.810	3.864	3.918	3.971	4.025	4.079	4.133	4.187	70
80	4.187	4.240	4.294	4.348	4.402	4.456	4.510	4.564	4.618	4.672	4.726	80
90	4.726	4.781	4.835	4.889	4.943	4.997	5.052	5.106	5.160	5.215	5.269	90
100	5.269	5.323	5.378	5.432	5.487	5.541	5.595	5.650	5.705	5.759	5.814	100
110	5.814	5.868	5.923	5.977	6.032	6.087	6.141	6.196	6.251	6.306	6.360	110
120	6.360	6.415	6.470	6.525	6.579	6.634	6.689	6.744	6.799	6.854	6.909	120
130	6.909	6.964	7.019	7.074	7.129	7.184	7.239	7.294	7.349	7.404	7.459	130
140	7.459	7.514	7.569	7.624	7.679	7.734	7.789	7.844	7.900	7.955	8.010	140
150	8.010	8.065	8.120	8.175	8.231	8.286	8.341	8.396	8.452	8.507	8.562	150
160	8.562	8.618	8.673	8.728	8.783	8.839	8.894	8.949	9.005	9.060	9.115	160
170	9.115	9.171	9.226	9.282	9.337	9.392	9.448	9.503	9.559	9.614	9.669	170
180	9.669	9.725	9.780	9.836	9.891	9.947	10.002	10.057	10.113	10.168	10.224	180
190	10.224	10.279	10.335	10.390	10.446	10.501	10.557	10.612	10.668	10.723	10.779	190
200	10.779	10.834	10.890	10.945	11.001	11.056	11.112	11.167	11.223	11.278	11.334	200
210	11.334	11.389	11.445	11.501	11.556	11.612	11.667	11.723	11.778	11.834	11.889	210
220	11.889	11.945	12.000	12.056	12.111	12.167	12.222	12.278	12.334	12.389	12.445	220
230	12.445	12.500	12.556	12.611	12.667	12.722	12.778	12.833	12.889	12.944	13.000	230
240	13.000	13.056	13.111	13.167	13.222	13.278	13.333	13.389	13.444	13.500	13.555	240
250	13.555	13.611	13.666	13.722	13.777	13.833	13.888	13.944	13.999	14.055	14.110	250
260	14.110	14.166	14.221	14.277	14.332	14.388	14.443	14.499	14.554	14.609	14.665	260
270	14.665	14.720	14.776	14.831	14.887	14.942	14.998	15.053	15.109	15.164	15.219	270
280	15.219	15.275	15.330	15.386	15.441	15.496	15.552	15.607	15.663	15.718	15.773	280
290	15.773	15.829	15.884	15.940	15.995	16.050	16.106	16.161	16.216	16.272	16.327	290
300	16.327	16.383	16.438	16.493	16.549	16.604	16.659	16.715	16.770	16.825	16.881	300
310	16.881	16.936	16.991	17.046	17.102	17.157	17.212	17.268	17.323	17.378	17.434	310
320	17.434	17.489	17.544	17.599	17.655	17.710	17.765	17.820	17.876	17.931	17.986	320
330	17.986	18.041	18.097	18.152	18.207	18.262	18.318	18.373	18.428	18.483	18.538	330
340	18.538	18.594	18.649	18.704	18.759	18.814	18.870	18.925	18.980	19.035	19.090	340
350	19.090	19.146	19.201	19.256	19.311	19.366	19.422	19.477	19.532	19.587	19.642	350
360	19.642	19.697	19.753	19.808	19.863	19.918	19.973	20.028	20.083	20.139	20.194	360
370	20.194	20.249	20.304	20.359	20.414	20.469	20.525	20.580	20.635	20.690	20.745	370
380	20.745	20.800	20.855	20.911	20.966	21.021	21.076	21.131	21.186	21.241	21.297	380
390	21.297	21.352	21.407	21.462	21.517	21.572	21.627	21.683	21.738	21.793	21.848	390
400	21.848	21.903	21.958	22.014	22.069	22.124	22.179	22.234	22.289	22.345	22.400	400
410	22.400	22.455	22.510	22.565	22.620	22.676	22.731	22.786	22.841	22.896	22.952	410
420	22.952	23.007	23.062	23.117	23.172	23.228	23.283	23.338	23.393	23.449	23.504	420
430	23.504	23.559	23.614	23.670	23.725	23.780	23.835	23.891	23.946	24.001	24.057	430
440	24.057	24.112	24.167	24.223	24.278	24.333	24.389	24.444	24.499	24.555	24.610	440
450	24.610	24.665	24.721	24.776	24.832	24.887	24.943	24.998	25.053	25.109	25.164	450
460	25.164	25.220	25.275	25.331	25.386	25.442	25.497	25.553	25.608	25.664	25.720	460
470	25.720	25.775	25.831	25.886	25.942	25.998	26.053	26.109	26.165	26.220	26.276	470
480	26.276	26.332	26.387	26.443	26.499	26.555	26.610	26.666	26.722	26.778	26.834	480
490	26.834	26.889	26.945	27.001	27.057	27.113	27.169	27.225	27.281	27.337	27.393	490
500	27.393	27.449	27.505	27.561	27.617	27.673	27.729	27.785	27.841	27.897	27.953	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B6.1.1. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	27.393	27.449	27.505	27.561	27.617	27.673	27.729	27.785	27.841	27.897	27.953	500
510	27.953	28.010	28.066	28.122	28.178	28.234	28.291	28.347	28.403	28.460	28.516	510
520	28.516	28.572	28.629	28.685	28.741	28.798	28.854	28.911	28.967	29.024	29.080	520
530	29.080	29.137	29.194	29.250	29.307	29.363	29.420	29.477	29.534	29.590	29.647	530
540	29.647	29.704	29.761	29.818	29.874	29.931	29.988	30.045	30.102	30.159	30.216	540
550	30.216	30.273	30.330	30.387	30.444	30.502	30.559	30.616	30.673	30.730	30.788	550
560	30.788	30.845	30.902	30.960	31.017	31.074	31.132	31.189	31.247	31.304	31.362	560
570	31.362	31.419	31.477	31.535	31.592	31.650	31.708	31.766	31.823	31.881	31.939	570
580	31.939	31.997	32.055	32.113	32.171	32.229	32.287	32.345	32.403	32.461	32.519	580
590	32.519	32.577	32.636	32.694	32.752	32.810	32.869	32.927	32.985	33.044	33.102	590
600	33.102	33.161	33.219	33.278	33.337	33.395	33.454	33.513	33.571	33.630	33.689	600
610	33.689	33.748	33.807	33.866	33.925	33.984	34.043	34.102	34.161	34.220	34.279	610
620	34.279	34.338	34.397	34.457	34.516	34.575	34.635	34.694	34.754	34.813	34.873	620
630	34.873	34.932	34.992	35.051	35.111	35.171	35.230	35.290	35.350	35.410	35.470	630
640	35.470	35.530	35.590	35.650	35.710	35.770	35.830	35.890	35.950	36.010	36.071	640
650	36.071	36.131	36.191	36.252	36.312	36.373	36.433	36.494	36.554	36.615	36.675	650
660	36.675	36.736	36.797	36.858	36.918	36.979	37.040	37.101	37.162	37.223	37.284	660
670	37.284	37.345	37.406	37.467	37.528	37.590	37.651	37.712	37.773	37.835	37.896	670
680	37.896	37.958	38.019	38.081	38.142	38.204	38.265	38.327	38.389	38.450	38.512	680
690	38.512	38.574	38.636	38.698	38.760	38.822	38.884	38.946	39.008	39.070	39.132	690
700	39.132	39.194	39.256	39.318	39.381	39.443	39.505	39.568	39.630	39.693	39.755	700
710	39.755	39.818	39.880	39.943	40.005	40.068	40.131	40.193	40.256	40.319	40.382	710
720	40.382	40.445	40.508	40.570	40.633	40.696	40.759	40.822	40.886	40.949	41.012	720
730	41.012	41.075	41.138	41.201	41.265	41.328	41.391	41.455	41.518	41.581	41.645	730
740	41.645	41.708	41.772	41.835	41.899	41.962	42.026	42.090	42.153	42.217	42.281	740
750	42.281	42.344	42.408	42.472	42.536	42.599	42.663	42.727	42.791	42.855	42.919	750
760	42.919	42.983	43.047	43.111	43.175	43.239	43.303	43.367	43.431	43.495	43.559	760
770	43.559	43.624	43.688	43.752	43.817	43.881	43.945	44.010	44.074	44.139	44.203	770
780	44.203	44.267	44.332	44.396	44.461	44.525	44.590	44.655	44.719	44.784	44.848	780
790	44.848	44.913	44.977	45.042	45.107	45.171	45.236	45.301	45.365	45.430	45.494	790
800	45.494	45.559	45.624	45.688	45.753	45.818	45.882	45.947	46.011	46.076	46.141	800
810	46.141	46.205	46.270	46.334	46.399	46.464	46.528	46.593	46.657	46.722	46.786	810
820	46.786	46.851	46.915	46.980	47.044	47.109	47.173	47.238	47.302	47.367	47.431	820
830	47.431	47.495	47.560	47.624	47.688	47.753	47.817	47.881	47.946	48.010	48.074	830
840	48.074	48.138	48.202	48.267	48.331	48.395	48.459	48.523	48.587	48.651	48.715	840
850	48.715	48.779	48.843	48.907	48.971	49.034	49.098	49.162	49.226	49.290	49.353	850
860	49.353	49.417	49.481	49.544	49.608	49.672	49.735	49.799	49.862	49.926	49.989	860
870	49.989	50.052	50.116	50.179	50.243	50.306	50.369	50.432	50.495	50.559	50.622	870
880	50.622	50.685	50.748	50.811	50.874	50.937	51.000	51.063	51.126	51.188	51.251	880
890	51.251	51.314	51.377	51.439	51.502	51.565	51.627	51.690	51.752	51.815	51.877	890
900	51.877	51.940	52.002	52.064	52.127	52.189	52.251	52.314	52.376	52.438	52.500	900
910	52.500	52.562	52.624	52.686	52.748	52.810	52.872	52.934	52.996	53.057	53.119	910
920	53.119	53.181	53.243	53.304	53.366	53.427	53.489	53.550	53.612	53.673	53.735	920
930	53.735	53.796	53.857	53.919	53.980	54.041	54.102	54.164	54.225	54.286	54.347	930
940	54.347	54.408	54.469	54.530	54.591	54.652	54.713	54.773	54.834	54.895	54.956	940
950	54.956	55.016	55.077	55.138	55.198	55.259	55.319	55.380	55.440	55.501	55.561	950
960	55.561	55.622	55.682	55.742	55.803	55.863	55.923	55.983	56.043	56.104	56.164	960
970	56.164	56.224	56.284	56.344	56.404	56.464	56.524	56.584	56.643	56.703	56.763	970
980	56.763	56.823	56.883	56.942	57.002	57.062	57.121	57.181	57.240	57.300	57.360	980
990	57.360	57.419	57.479	57.538	57.597	57.657	57.716	57.776	57.835	57.894	57.953	990
1000	57.953	58.013	58.072	58.131	58.190	58.249	58.309	58.368	58.427	58.486	58.545	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B6.1.1. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	57.953	58.013	58.072	58.131	58.190	58.249	58.309	58.368	58.427	58.486	58.545	1000
1010	58.545	58.604	58.663	58.722	58.781	58.840	58.899	58.957	59.016	59.075	59.134	1010
1020	59.134	59.193	59.252	59.310	59.369	59.428	59.487	59.545	59.604	59.663	59.721	1020
1030	59.721	59.780	59.838	59.897	59.956	60.014	60.073	60.131	60.190	60.248	60.307	1030
1040	60.307	60.365	60.423	60.482	60.540	60.599	60.657	60.715	60.774	60.832	60.890	1040
1050	60.890	60.949	61.007	61.065	61.123	61.182	61.240	61.298	61.356	61.415	61.473	1050
1060	61.473	61.531	61.589	61.647	61.705	61.763	61.822	61.880	61.938	61.996	62.054	1060
1070	62.054	62.112	62.170	62.228	62.286	62.344	62.402	62.460	62.518	62.576	62.634	1070
1080	62.634	62.692	62.750	62.808	62.866	62.924	62.982	63.040	63.098	63.156	63.214	1080
1090	63.214	63.271	63.329	63.387	63.445	63.503	63.561	63.619	63.677	63.734	63.792	1090
1100	63.792	63.850	63.908	63.966	64.024	64.081	64.139	64.197	64.255	64.313	64.370	1100
1110	64.370	64.428	64.486	64.544	64.602	64.659	64.717	64.775	64.833	64.890	64.948	1110
1120	64.948	65.006	65.064	65.121	65.179	65.237	65.295	65.352	65.410	65.468	65.525	1120
1130	65.525	65.583	65.641	65.699	65.756	65.814	65.872	65.929	65.987	66.045	66.102	1130
1140	66.102	66.160	66.218	66.275	66.333	66.391	66.448	66.506	66.564	66.621	66.679	1140
1150	66.679	66.737	66.794	66.852	66.910	66.967	67.025	67.082	67.140	67.198	67.255	1150
1160	67.255	67.313	67.370	67.428	67.486	67.543	67.601	67.658	67.716	67.773	67.831	1160
1170	67.831	67.888	67.946	68.003	68.061	68.119	68.176	68.234	68.291	68.348	68.406	1170
1180	68.406	68.463	68.521	68.578	68.636	68.693	68.751	68.808	68.865	68.923	68.980	1180
1190	68.980	69.037	69.095	69.152	69.209	69.267	69.324	69.381	69.439	69.496	69.553	1190
1200	69.553											1200
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B6.1.2. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
						Thermoelectric Voltage in Millivolts						
−340	−8.030	−8.041	−8.052	−8.063	−8.074	−8.085	−8.095					−340
−330	−7.915	−7.927	−7.938	−7.950	−7.962	−7.973	−7.985	−7.996	−8.008	−8.019	−8.030	−330
−320	−7.791	−7.804	−7.816	−7.829	−7.841	−7.854	−7.866	−7.878	−7.890	−7.903	−7.915	−320
−310	−7.659	−7.672	−7.686	−7.699	−7.713	−7.726	−7.739	−7.752	−7.765	−7.778	−7.791	−310
−300	−7.519	−7.534	−7.548	−7.562	−7.576	−7.590	−7.604	−7.618	−7.632	−7.645	−7.659	−300
−290	−7.373	−7.388	−7.403	−7.417	−7.432	−7.447	−7.462	−7.476	−7.491	−7.505	−7.519	−290
−280	−7.219	−7.234	−7.250	−7.265	−7.281	−7.296	−7.312	−7.327	−7.342	−7.357	−7.373	−280
−270	−7.058	−7.074	−7.090	−7.107	−7.123	−7.139	−7.155	−7.171	−7.187	−7.203	−7.219	−270
−260	−6.890	−6.907	−6.924	−6.941	−6.958	−6.975	−6.991	−7.008	−7.025	−7.041	−7.058	−260
−250	−6.716	−6.734	−6.752	−6.769	−6.787	−6.804	−6.821	−6.839	−6.856	−6.873	−6.890	−250
−240	−6.536	−6.555	−6.573	−6.591	−6.609	−6.627	−6.645	−6.663	−6.681	−6.699	−6.716	−240
−230	−6.351	−6.370	−6.388	−6.407	−6.426	−6.444	−6.463	−6.481	−6.500	−6.518	−6.536	−230
−220	−6.159	−6.179	−6.198	−6.217	−6.236	−6.256	−6.275	−6.294	−6.313	−6.332	−6.351	−220
−210	−5.962	−5.982	−6.002	−6.022	−6.042	−6.061	−6.081	−6.101	−6.120	−6.140	−6.159	−210
−200	−5.760	−5.781	−5.801	−5.821	−5.842	−5.862	−5.882	−5.902	−5.922	−5.942	−5.962	−200
−190	−5.553	−5.574	−5.595	−5.616	−5.637	−5.657	−5.678	−5.699	−5.719	−5.740	−5.760	−190
−180	−5.341	−5.363	−5.384	−5.405	−5.426	−5.448	−5.469	−5.490	−5.511	−5.532	−5.553	−180
−170	−5.125	−5.146	−5.168	−5.190	−5.212	−5.233	−5.255	−5.277	−5.298	−5.320	−5.341	−170
−160	−4.903	−4.926	−4.948	−4.970	−4.992	−5.015	−5.037	−5.059	−5.081	−5.103	−5.125	−160
−150	−4.678	−4.701	−4.724	−4.746	−4.769	−4.791	−4.814	−4.836	−4.859	−4.881	−4.903	−150
−140	−4.449	−4.472	−4.495	−4.518	−4.541	−4.564	−4.587	−4.610	−4.633	−4.655	−4.678	−140
−130	−4.215	−4.239	−4.262	−4.286	−4.309	−4.332	−4.356	−4.379	−4.402	−4.425	−4.449	−130
−120	−3.978	−4.002	−4.026	−4.050	−4.073	−4.097	−4.121	−4.144	−4.168	−4.192	−4.215	−120
−110	−3.737	−3.761	−3.786	−3.810	−3.834	−3.858	−3.882	−3.906	−3.930	−3.954	−3.978	−110
−100	−3.493	−3.517	−3.542	−3.566	−3.591	−3.615	−3.640	−3.664	−3.688	−3.713	−3.737	−100
−90	−3.245	−3.270	−3.295	−3.320	−3.344	−3.369	−3.394	−3.419	−3.443	−3.468	−3.493	−90
−80	−2.994	−3.019	−3.044	−3.070	−3.095	−3.120	−3.145	−3.170	−3.195	−3.220	−3.245	−80
−70	−2.740	−2.766	−2.791	−2.817	−2.842	−2.867	−2.893	−2.918	−2.943	−2.969	−2.994	−70
−60	−2.483	−2.509	−2.535	−2.560	−2.586	−2.612	−2.638	−2.663	−2.689	−2.714	−2.740	−60
−50	−2.223	−2.249	−2.275	−2.301	−2.327	−2.353	−2.379	−2.405	−2.431	−2.457	−2.483	−50
−40	−1.961	−1.987	−2.013	−2.040	−2.066	−2.092	−2.118	−2.145	−2.171	−2.197	−2.223	−40
−30	−1.695	−1.722	−1.749	−1.775	−1.802	−1.828	−1.855	−1.881	−1.908	−1.934	−1.961	−30
−20	−1.428	−1.455	−1.482	−1.508	−1.535	−1.562	−1.589	−1.615	−1.642	−1.669	−1.695	−20
−10	−1.158	−1.185	−1.212	−1.239	−1.266	−1.293	−1.320	−1.347	−1.374	−1.401	−1.428	−10
0	−0.886	−0.913	−0.940	−0.967	−0.995	−1.022	−1.049	−1.076	−1.104	−1.131	−1.158	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B6.1.2. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.886	−0.858	−0.831	−0.803	−0.776	−0.749	−0.721	−0.694	−0.666	−0.639	−0.611	0
10	−0.611	−0.583	−0.556	−0.528	−0.501	−0.473	−0.445	−0.418	−0.390	−0.362	−0.334	10
20	−0.334	−0.307	−0.279	−0.251	−0.223	−0.195	−0.168	−0.140	−0.112	−0.084	−0.056	20
30	−0.056	−0.028	0.000	0.028	0.056	0.084	0.112	0.140	0.168	0.196	0.225	30
40	0.225	0.253	0.281	0.309	0.337	0.365	0.394	0.422	0.450	0.478	0.507	40
50	0.507	0.535	0.563	0.592	0.620	0.649	0.677	0.705	0.734	0.762	0.791	50
60	0.791	0.819	0.848	0.876	0.905	0.933	0.962	0.991	1.019	1.048	1.076	60
70	1.076	1.105	1.134	1.162	1.191	1.220	1.249	1.277	1.306	1.335	1.364	70
80	1.364	1.392	1.421	1.450	1.479	1.508	1.537	1.566	1.594	1.623	1.652	80
90	1.652	1.681	1.710	1.739	1.768	1.797	1.826	1.855	1.884	1.913	1.942	90
100	1.942	1.972	2.001	2.030	2.059	2.088	2.117	2.146	2.175	2.205	2.234	100
110	2.234	2.263	2.292	2.322	2.351	2.380	2.409	2.439	2.468	2.497	2.527	110
120	2.527	2.556	2.585	2.615	2.644	2.673	2.703	2.732	2.762	2.791	2.821	120
130	2.821	2.850	2.880	2.909	2.938	2.968	2.997	3.027	3.057	3.086	3.116	130
140	3.116	3.145	3.175	3.204	3.234	3.264	3.293	3.323	3.353	3.382	3.412	140
150	3.412	3.442	3.471	3.501	3.531	3.560	3.590	3.620	3.650	3.679	3.709	150
160	3.709	3.739	3.769	3.798	3.828	3.858	3.888	3.918	3.948	3.977	4.007	160
170	4.007	4.037	4.067	4.097	4.127	4.157	4.187	4.217	4.246	4.276	4.306	170
180	4.306	4.336	4.366	4.396	4.426	4.456	4.486	4.516	4.546	4.576	4.606	180
190	4.606	4.636	4.666	4.696	4.726	4.757	4.787	4.817	4.847	4.877	4.907	190
200	4.907	4.937	4.967	4.997	5.028	5.058	5.088	5.118	5.148	5.178	5.209	200
210	5.209	5.239	5.269	5.299	5.329	5.360	5.390	5.420	5.450	5.480	5.511	210
220	5.511	5.541	5.571	5.602	5.632	5.662	5.692	5.723	5.753	5.783	5.814	220
230	5.814	5.844	5.874	5.905	5.935	5.965	5.996	6.026	6.056	6.087	6.117	230
240	6.117	6.147	6.178	6.208	6.239	6.269	6.299	6.330	6.360	6.391	6.421	240
250	6.421	6.452	6.482	6.512	6.543	6.573	6.604	6.634	6.665	6.695	6.726	250
260	6.726	6.756	6.787	6.817	6.848	6.878	6.909	6.939	6.970	7.000	7.031	260
270	7.031	7.061	7.092	7.122	7.153	7.184	7.214	7.245	7.275	7.306	7.336	270
280	7.336	7.367	7.398	7.428	7.459	7.489	7.520	7.550	7.581	7.612	7.642	280
290	7.642	7.673	7.704	7.734	7.765	7.795	7.826	7.857	7.887	7.918	7.949	290
300	7.949	7.979	8.010	8.041	8.071	8.102	8.133	8.163	8.194	8.225	8.255	300
310	8.255	8.286	8.317	8.347	8.378	8.409	8.439	8.470	8.501	8.532	8.562	310
320	8.562	8.593	8.624	8.654	8.685	8.716	8.747	8.777	8.808	8.839	8.869	320
330	8.869	8.900	8.931	8.962	8.992	9.023	9.054	9.085	9.115	9.146	9.177	330
340	9.177	9.208	9.238	9.269	9.300	9.331	9.362	9.392	9.423	9.454	9.485	340
350	9.485	9.515	9.546	9.577	9.608	9.639	9.669	9.700	9.731	9.762	9.793	350
360	9.793	9.823	9.854	9.885	9.916	9.947	9.977	10.008	10.039	10.070	10.101	360
370	10.101	10.131	10.162	10.193	10.224	10.255	10.285	10.316	10.347	10.378	10.409	370
380	10.409	10.440	10.470	10.501	10.532	10.563	10.594	10.625	10.655	10.686	10.717	380
390	10.717	10.748	10.779	10.810	10.840	10.871	10.902	10.933	10.964	10.995	11.025	390
400	11.025	11.056	11.087	11.118	11.149	11.180	11.211	11.241	11.272	11.303	11.334	400
410	11.334	11.365	11.396	11.426	11.457	11.488	11.519	11.550	11.581	11.612	11.642	410
420	11.642	11.673	11.704	11.735	11.766	11.797	11.828	11.858	11.889	11.920	11.951	420
430	11.951	11.982	12.013	12.044	12.074	12.105	12.136	12.167	12.198	12.229	12.260	430
440	12.260	12.290	12.321	12.352	12.383	12.414	12.445	12.476	12.506	12.537	12.568	440
450	12.568	12.599	12.630	12.661	12.691	12.722	12.753	12.784	12.815	12.846	12.877	450
460	12.877	12.907	12.938	12.969	13.000	13.031	13.062	13.093	13.123	13.154	13.185	460
470	13.185	13.216	13.247	13.278	13.308	13.339	13.370	13.401	13.432	13.463	13.494	470
480	13.494	13.524	13.555	13.586	13.617	13.648	13.679	13.709	13.740	13.771	13.802	480
490	13.802	13.833	13.864	13.894	13.925	13.956	13.987	14.018	14.049	14.079	14.110	490
500	14.110	14.141	14.172	14.203	14.233	14.264	14.295	14.326	14.357	14.388	14.418	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B6.1.2. ***Type J thermocouples*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	14.110	14.141	14.172	14.203	14.233	14.264	14.295	14.326	14.357	14.388	14.418	500
510	14.418	14.449	14.480	14.511	14.542	14.573	14.603	14.634	14.665	14.696	14.727	510
520	14.727	14.757	14.788	14.819	14.850	14.881	14.911	14.942	14.973	15.004	15.035	520
530	15.035	15.065	15.096	15.127	15.158	15.189	15.219	15.250	15.281	15.312	15.343	530
540	15.343	15.373	15.404	15.435	15.466	15.496	15.527	15.558	15.589	15.620	15.650	540
550	15.650	15.681	15.712	15.743	15.773	15.804	15.835	15.866	15.897	15.927	15.958	550
560	15.958	15.989	16.020	16.050	16.081	16.112	16.143	16.173	16.204	16.235	16.266	560
570	16.266	16.296	16.327	16.358	16.389	16.419	16.450	16.481	16.512	16.542	16.573	570
580	16.573	16.604	16.635	16.665	16.696	16.727	16.758	16.788	16.819	16.850	16.881	580
590	16.881	16.911	16.942	16.973	17.003	17.034	17.065	17.096	17.126	17.157	17.188	590
600	17.188	17.219	17.249	17.280	17.311	17.341	17.372	17.403	17.434	17.464	17.495	600
610	17.495	17.526	17.556	17.587	17.618	17.649	17.679	17.710	17.741	17.771	17.802	610
620	17.802	17.833	17.863	17.894	17.925	17.955	17.986	18.017	18.048	18.078	18.109	620
630	18.109	18.140	18.170	18.201	18.232	18.262	18.293	18.324	18.354	18.385	18.416	630
640	18.416	18.446	18.477	18.508	18.538	18.569	18.600	18.630	18.661	18.692	18.722	640
650	18.722	18.753	18.784	18.814	18.845	18.876	18.906	18.937	18.968	18.998	19.029	650
660	19.029	19.060	19.090	19.121	19.152	19.182	19.213	19.244	19.274	19.305	19.336	660
670	19.336	19.366	19.397	19.428	19.458	19.489	19.520	19.550	19.581	19.612	19.642	670
680	19.642	19.673	19.704	19.734	19.765	19.795	19.826	19.857	19.887	19.918	19.949	680
690	19.949	19.979	20.010	20.041	20.071	20.102	20.132	20.163	20.194	20.224	20.255	690
700	20.255	20.286	20.316	20.347	20.378	20.408	20.439	20.469	20.500	20.531	20.561	700
710	20.561	20.592	20.623	20.653	20.684	20.715	20.745	20.776	20.806	20.837	20.868	710
720	20.868	20.898	20.929	20.960	20.990	21.021	21.052	21.082	21.113	21.143	21.174	720
730	21.174	21.205	21.235	21.266	21.297	21.327	21.358	21.389	21.419	21.450	21.480	730
740	21.480	21.511	21.542	21.572	21.603	21.634	21.664	21.695	21.726	21.756	21.787	740
750	21.787	21.817	21.848	21.879	21.909	21.940	21.971	22.001	22.032	22.063	22.093	750
760	22.093	22.124	22.154	22.185	22.216	22.246	22.277	22.308	22.338	22.369	22.400	760
770	22.400	22.430	22.461	22.492	22.522	22.553	22.584	22.614	22.645	22.676	22.706	770
780	22.706	22.737	22.768	22.798	22.829	22.860	22.890	22.921	22.952	22.982	23.013	780
790	23.013	23.044	23.074	23.105	23.136	23.166	23.197	23.228	23.258	23.289	23.320	790
800	23.320	23.350	23.381	23.412	23.442	23.473	23.504	23.535	23.565	23.596	23.627	800
810	23.627	23.657	23.688	23.719	23.749	23.780	23.811	23.842	23.872	23.903	23.934	810
820	23.934	23.964	23.995	24.026	24.057	24.087	24.118	24.149	24.180	24.210	24.241	820
830	24.241	24.272	24.303	24.333	24.364	24.395	24.426	24.456	24.487	24.518	24.549	830
840	24.549	24.579	24.610	24.641	24.672	24.702	24.733	24.764	24.795	24.826	24.856	840
850	24.856	24.887	24.918	24.949	24.979	25.010	25.041	25.072	25.103	25.134	25.164	850
860	25.164	25.195	25.226	25.257	25.288	25.318	25.349	25.380	25.411	25.442	25.473	860
870	25.473	25.504	25.534	25.565	25.596	25.627	25.658	25.689	25.720	25.750	25.781	870
880	25.781	25.812	25.843	25.874	25.905	25.936	25.967	25.998	26.028	26.059	26.090	880
890	26.090	26.121	26.152	26.183	26.214	26.245	26.276	26.307	26.338	26.369	26.400	890
900	26.400	26.431	26.462	26.493	26.524	26.555	26.586	26.617	26.648	26.679	26.710	900
910	26.710	26.741	26.772	26.803	26.834	26.865	26.896	26.927	26.958	26.989	27.020	910
920	27.020	27.051	27.082	27.113	27.144	27.175	27.206	27.237	27.268	27.299	27.330	920
930	27.330	27.362	27.393	27.424	27.455	27.486	27.517	27.548	27.579	27.610	27.642	930
940	27.642	27.673	27.704	27.735	27.766	27.797	27.829	27.860	27.891	27.922	27.953	940
950	27.953	27.985	28.016	28.047	28.078	28.109	28.141	28.172	28.203	28.234	28.266	950
960	28.266	28.297	28.328	28.359	28.391	28.422	28.453	28.485	28.516	28.547	28.579	960
970	28.579	28.610	28.641	28.672	28.704	28.735	28.767	28.798	28.829	28.861	28.892	970
980	28.892	28.923	28.955	28.986	29.018	29.049	29.080	29.112	29.143	29.175	29.206	980
990	29.206	29.238	29.269	29.301	29.332	29.363	29.395	29.426	29.458	29.489	29.521	990
1000	29.521	29.552	29.584	29.616	29.647	29.679	29.710	29.742	29.773	29.805	29.836	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B6.1.2. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	29.521	29.552	29.584	29.616	29.647	29.679	29.710	29.742	29.773	29.805	29.836	1000
1010	29.836	29.868	29.900	29.931	29.963	29.995	30.026	30.058	30.089	30.121	30.153	1010
1020	30.153	30.184	30.216	30.248	30.279	30.311	30.343	30.375	30.406	30.438	30.470	1020
1030	30.470	30.502	30.533	30.565	30.597	30.629	30.660	30.692	30.724	30.756	30.788	1030
1040	30.788	30.819	30.851	30.883	30.915	30.947	30.979	31.011	31.043	31.074	31.106	1040
1050	31.106	31.138	31.170	31.202	31.234	31.266	31.298	31.330	31.362	31.394	31.426	1050
1060	31.426	31.458	31.490	31.522	31.554	31.586	31.618	31.650	31.682	31.714	31.746	1060
1070	31.746	31.778	31.811	31.843	31.875	31.907	31.939	31.971	32.003	32.035	32.068	1070
1080	32.068	32.100	32.132	32.164	32.196	32.229	32.261	32.293	32.325	32.358	32.390	1080
1090	32.390	32.422	32.455	32.487	32.519	32.551	32.584	32.616	32.648	32.681	32.713	1090
1100	32.713	32.746	32.778	32.810	32.843	32.875	32.908	32.940	32.973	33.005	33.037	1100
1110	33.037	33.070	33.102	33.135	33.167	33.200	33.232	33.265	33.298	33.330	33.363	1110
1120	33.363	33.395	33.428	33.460	33.493	33.526	33.558	33.591	33.624	33.656	33.689	1120
1130	33.689	33.722	33.754	33.787	33.820	33.853	33.885	33.918	33.951	33.984	34.016	1130
1140	34.016	34.049	34.082	34.115	34.148	34.180	34.213	34.246	34.279	34.312	34.345	1140
1150	34.345	34.378	34.411	34.444	34.476	34.509	34.542	34.575	34.608	34.641	34.674	1150
1160	34.674	34.707	34.740	34.773	34.806	34.840	34.873	34.906	34.939	34.972	35.005	1160
1170	35.005	35.038	35.071	35.104	35.138	35.171	35.204	35.237	35.270	35.304	35.337	1170
1180	35.337	35.370	35.403	35.437	35.470	35.503	35.536	35.570	35.603	35.636	35.670	1180
1190	35.670	35.703	35.736	35.770	35.803	35.837	35.870	35.903	35.937	35.970	36.004	1190
1200	36.004	36.037	36.071	36.104	36.138	36.171	36.205	36.238	36.272	36.305	36.339	1200
1210	36.339	36.373	36.406	36.440	36.473	36.507	36.541	36.574	36.608	36.642	36.675	1210
1220	36.675	36.709	36.743	36.777	36.810	36.844	36.878	36.912	36.945	36.979	37.013	1220
1230	37.013	37.047	37.081	37.114	37.148	37.182	37.216	37.250	37.284	37.318	37.352	1230
1240	37.352	37.386	37.420	37.454	37.488	37.522	37.556	37.590	37.624	37.658	37.692	1240
1250	37.692	37.726	37.760	37.794	37.828	37.862	37.896	37.930	37.964	37.999	38.033	1250
1260	38.033	38.067	38.101	38.135	38.169	38.204	38.238	38.272	38.306	38.341	38.375	1260
1270	38.375	38.409	38.444	38.478	38.512	38.546	38.581	38.615	38.650	38.684	38.718	1270
1280	38.718	38.753	38.787	38.822	38.856	38.890	38.925	38.959	38.994	39.028	39.063	1280
1290	39.063	39.097	39.132	39.166	39.201	39.235	39.270	39.305	39.339	39.374	39.408	1290
1300	39.408	39.443	39.478	39.512	39.547	39.582	39.616	39.651	39.686	39.720	39.755	1300
1310	39.755	39.790	39.825	39.859	39.894	39.929	39.964	39.998	40.033	40.068	40.103	1310
1320	40.103	40.138	40.173	40.207	40.242	40.277	40.312	40.347	40.382	40.417	40.452	1320
1330	40.452	40.487	40.522	40.556	40.591	40.626	40.661	40.696	40.731	40.766	40.801	1330
1340	40.801	40.836	40.872	40.907	40.942	40.977	41.012	41.047	41.082	41.117	41.152	1340
1350	41.152	41.187	41.222	41.258	41.293	41.328	41.363	41.398	41.433	41.469	41.504	1350
1360	41.504	41.539	41.574	41.610	41.645	41.680	41.715	41.751	41.786	41.821	41.856	1360
1370	41.856	41.892	41.927	41.962	41.998	42.033	42.068	42.104	42.139	42.174	42.210	1370
1380	42.210	42.245	42.281	42.316	42.351	42.387	42.422	42.458	42.493	42.528	42.564	1380
1390	42.564	42.599	42.635	42.670	42.706	42.741	42.777	42.812	42.848	42.883	42.919	1390
1400	42.919	42.954	42.990	43.025	43.061	43.096	43.132	43.167	43.203	43.239	43.274	1400
1410	43.274	43.310	43.346	43.381	43.417	43.452	43.488	43.524	43.559	43.595	43.631	1410
1420	43.631	43.667	43.702	43.738	43.774	43.809	43.845	43.881	43.917	43.953	43.988	1420
1430	43.988	44.024	44.060	44.096	44.131	44.167	44.203	44.239	44.275	44.310	44.346	1430
1440	44.346	44.382	44.418	44.454	44.490	44.525	44.561	44.597	44.633	44.669	44.705	1440
1450	44.705	44.741	44.777	44.812	44.848	44.884	44.920	44.956	44.992	45.028	45.064	1450
1460	45.064	45.099	45.135	45.171	45.207	45.243	45.279	45.315	45.351	45.387	45.423	1460
1470	45.423	45.458	45.494	45.530	45.566	45.602	45.638	45.674	45.710	45.746	45.782	1470
1480	45.782	45.818	45.853	45.889	45.925	45.961	45.997	46.033	46.069	46.105	46.141	1480
1490	46.141	46.177	46.212	46.248	46.284	46.320	46.356	46.392	46.428	46.464	46.500	1490
1500	46.500	46.535	46.571	46.607	46.643	46.679	46.715	46.751	46.786	46.822	46.858	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B6.1.2. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	46.500	46.535	46.571	46.607	46.643	46.679	46.715	46.751	46.786	46.822	46.858	1500
1510	46.858	46.894	46.930	46.966	47.001	47.037	47.073	47.109	47.145	47.181	47.216	1510
1520	47.216	47.252	47.288	47.324	47.359	47.395	47.431	47.467	47.503	47.538	47.574	1520
1530	47.574	47.610	47.646	47.681	47.717	47.753	47.788	47.824	47.860	47.896	47.931	1530
1540	47.931	47.967	48.003	48.038	48.074	48.110	48.145	48.181	48.217	48.252	48.288	1540
1550	48.288	48.324	48.359	48.395	48.430	48.466	48.502	48.537	48.573	48.608	48.644	1550
1560	48.644	48.679	48.715	48.750	48.786	48.822	48.857	48.893	48.928	48.964	48.999	1560
1570	48.999	49.034	49.070	49.105	49.141	49.176	49.212	49.247	49.283	49.318	49.353	1570
1580	49.353	49.389	49.424	49.460	49.495	49.530	49.566	49.601	49.636	49.672	49.707	1580
1590	49.707	49.742	49.778	49.813	49.848	49.883	49.919	49.954	49.989	50.024	50.060	1590
1600	50.060	50.095	50.130	50.165	50.200	50.235	50.271	50.306	50.341	50.376	50.411	1600
1610	50.411	50.446	50.481	50.517	50.552	50.587	50.622	50.657	50.692	50.727	50.762	1610
1620	50.762	50.797	50.832	50.867	50.902	50.937	50.972	51.007	51.042	51.077	51.112	1620
1630	51.112	51.147	51.181	51.216	51.251	51.286	51.321	51.356	51.391	51.425	51.460	1630
1640	51.460	51.495	51.530	51.565	51.599	51.634	51.669	51.704	51.738	51.773	51.808	1640
1650	51.808	51.843	51.877	51.912	51.947	51.981	52.016	52.051	52.085	52.120	52.154	1650
1660	52.154	52.189	52.224	52.258	52.293	52.327	52.362	52.396	52.431	52.465	52.500	1660
1670	52.500	52.534	52.569	52.603	52.638	52.672	52.707	52.741	52.776	52.810	52.844	1670
1680	52.844	52.879	52.913	52.947	52.982	53.016	53.050	53.085	53.119	53.153	53.188	1680
1690	53.188	53.222	53.256	53.290	53.325	53.359	53.393	53.427	53.462	53.496	53.530	1690
1700	53.530	53.564	53.598	53.632	53.667	53.701	53.735	53.769	53.803	53.837	53.871	1700
1710	53.871	53.905	53.939	53.973	54.007	54.041	54.075	54.109	54.143	54.177	54.211	1710
1720	54.211	54.245	54.279	54.313	54.347	54.381	54.415	54.449	54.483	54.516	54.550	1720
1730	54.550	54.584	54.618	54.652	54.686	54.719	54.753	54.787	54.821	54.855	54.888	1730
1740	54.888	54.922	54.956	54.990	55.023	55.057	55.091	55.124	55.158	55.192	55.225	1740
1750	55.225	55.259	55.293	55.326	55.360	55.393	55.427	55.461	55.494	55.528	55.561	1750
1760	55.561	55.595	55.628	55.662	55.695	55.729	55.762	55.796	55.829	55.863	55.896	1760
1770	55.896	55.930	55.963	55.997	56.030	56.063	56.097	56.130	56.164	56.197	56.230	1770
1780	56.230	56.264	56.297	56.330	56.364	56.397	56.430	56.464	56.497	56.530	56.564	1780
1790	56.564	56.597	56.630	56.663	56.697	56.730	56.763	56.796	56.829	56.863	56.896	1790
1800	56.896	56.929	56.962	56.995	57.028	57.062	57.095	57.128	57.161	57.194	57.227	1800
1810	57.227	57.260	57.293	57.326	57.360	57.393	57.426	57.459	57.492	57.525	57.558	1810
1820	57.558	57.591	57.624	57.657	57.690	57.723	57.756	57.789	57.822	57.855	57.888	1820
1830	57.888	57.920	57.953	57.986	58.019	58.052	58.085	58.118	58.151	58.184	58.217	1830
1840	58.217	58.249	58.282	58.315	58.348	58.381	58.414	58.446	58.479	58.512	58.545	1840
1850	58.545	58.578	58.610	58.643	58.676	58.709	58.741	58.774	58.807	58.840	58.872	1850
1860	58.872	58.905	58.938	58.971	59.003	59.036	59.069	59.101	59.134	59.167	59.199	1860
1870	59.199	59.232	59.265	59.297	59.330	59.363	59.395	59.428	59.460	59.493	59.526	1870
1880	59.526	59.558	59.591	59.623	59.656	59.689	59.721	59.754	59.786	59.819	59.851	1880
1890	59.851	59.884	59.916	59.949	59.982	60.014	60.047	60.079	60.112	60.144	60.177	1890
1900	60.177	60.209	60.242	60.274	60.307	60.339	60.371	60.404	60.436	60.469	60.501	1900
1910	60.501	60.534	60.566	60.599	60.631	60.663	60.696	60.728	60.761	60.793	60.826	1910
1920	60.826	60.858	60.890	60.923	60.955	60.987	61.020	61.052	61.085	61.117	61.149	1920
1930	61.149	61.182	61.214	61.246	61.279	61.311	61.343	61.376	61.408	61.440	61.473	1930
1940	61.473	61.505	61.537	61.570	61.602	61.634	61.667	61.699	61.731	61.763	61.796	1940
1950	61.796	61.828	61.860	61.893	61.925	61.957	61.989	62.022	62.054	62.086	62.118	1950
1960	62.118	62.151	62.183	62.215	62.247	62.280	62.312	62.344	62.376	62.409	62.441	1960
1970	62.441	62.473	62.505	62.537	62.570	62.602	62.634	62.666	62.699	62.731	62.763	1970
1980	62.763	62.795	62.827	62.860	62.892	62.924	62.956	62.988	63.020	63.053	63.085	1980
1990	63.085	63.117	63.149	63.181	63.214	63.246	63.278	63.310	63.342	63.374	63.406	1990
2000	63.406	63.439	63.471	63.503	63.535	63.567	63.599	63.632	63.664	63.696	63.728	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B6.1.2. *Type J thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	63.406	63.439	63.471	63.503	63.535	63.567	63.599	63.632	63.664	63.696	63.728	**2000**
2010	63.728	63.760	63.792	63.824	63.856	63.889	63.921	63.953	63.985	64.017	64.049	**2010**
2020	64.049	64.081	64.113	64.146	64.178	64.210	64.242	64.274	64.306	64.338	64.370	**2020**
2030	64.370	64.402	64.435	64.467	64.499	64.531	64.563	64.595	64.627	64.659	64.691	**2030**
2040	64.691	64.723	64.756	64.788	64.820	64.852	64.884	64.916	64.948	64.980	65.012	**2040**
2050	65.012	65.044	65.076	65.109	65.141	65.173	65.205	65.237	65.269	65.301	65.333	**2050**
2060	65.333	65.365	65.397	65.429	65.461	65.493	65.525	65.557	65.590	65.622	65.654	**2060**
2070	65.654	65.686	65.718	65.750	65.782	65.814	65.846	65.878	65.910	65.942	65.974	**2070**
2080	65.974	66.006	66.038	66.070	66.102	66.134	66.166	66.199	66.231	66.263	66.295	**2080**
2090	66.295	66.327	66.359	66.391	66.423	66.455	66.487	66.519	66.551	66.583	66.615	**2090**
2100	66.615	66.647	66.679	66.711	66.743	66.775	66.807	66.839	66.871	66.903	66.935	**2100**
2110	66.935	66.967	66.999	67.031	67.063	67.095	67.127	67.159	67.191	67.223	67.255	**2110**
2120	67.255	67.287	67.319	67.351	67.383	67.415	67.447	67.479	67.511	67.543	67.575	**2120**
2130	67.575	67.607	67.639	67.671	67.703	67.735	67.767	67.799	67.831	67.863	67.895	**2130**
2140	67.895	67.927	67.959	67.991	68.023	68.055	68.087	68.119	68.150	68.182	68.214	**2140**
2150	68.214	68.246	68.278	68.310	68.342	68.374	68.406	68.438	68.470	68.502	68.534	**2150**
2160	68.534	68.566	68.597	68.629	68.661	68.693	68.725	68.757	68.789	68.821	68.853	**2160**
2170	68.853	68.884	68.916	68.948	68.980	69.012	69.044	69.076	69.108	69.139	69.171	**2170**
2180	69.171	69.203	69.235	69.267	69.299	69.330	69.362	69.394	69.426	69.458	69.490	**2180**
2190	69.490	69.521	69.553									**2190**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

B6.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B6.2.1 and B6.2.2 was obtained by iteration of the reference function for type J thermocouples given in the main text (see table 6.3.1). Table B6.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −8.09 mV to 69.55 mV, and table B6.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range. As discussed in chapter 6 of the text, **the values presented for type J thermocouples above 760 °C (1400 °F) are NOT suitable for precise temperature measurements and the thermocouple should NOT be considered to be a standardized type above 760 °C.**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−8.00	−205.18	−205.67	−206.16	−206.66	−207.16	−207.66	−208.17	−208.68	−209.20	−209.72		−8.00
−7.90	−200.44	−200.90	−201.36	−201.83	−202.30	−202.77	−203.25	−203.72	−204.21	−204.69	−205.18	−7.90
−7.80	−195.96	−196.40	−196.84	−197.28	−197.72	−198.17	−198.62	−199.07	−199.52	−199.98	−200.44	−7.80
−7.70	−191.70	−192.11	−192.53	−192.95	−193.38	−193.80	−194.23	−194.66	−195.09	−195.52	−195.96	−7.70
−7.60	−187.62	−188.02	−188.42	−188.82	−189.23	−189.63	−190.04	−190.45	−190.87	−191.28	−191.70	−7.60
−7.50	−183.69	−184.08	−184.47	−184.85	−185.24	−185.64	−186.03	−186.42	−186.82	−187.22	−187.62	−7.50
−7.40	−179.91	−180.28	−180.65	−181.03	−181.41	−181.78	−182.16	−182.54	−182.93	−183.31	−183.69	−7.40
−7.30	−176.24	−176.60	−176.96	−177.33	−177.69	−178.06	−178.43	−178.79	−179.16	−179.53	−179.91	−7.30
−7.20	−172.68	−173.03	−173.38	−173.74	−174.09	−174.45	−174.80	−175.16	−175.52	−175.88	−176.24	−7.20
−7.10	−169.22	−169.56	−169.90	−170.25	−170.59	−170.94	−171.28	−171.63	−171.98	−172.33	−172.68	−7.10
−7.00	−165.84	−166.17	−166.51	−166.84	−167.18	−167.52	−167.86	−168.20	−168.54	−168.88	−169.22	−7.00
−6.90	−162.54	−162.87	−163.20	−163.52	−163.85	−164.18	−164.51	−164.84	−165.17	−165.51	−165.84	−6.90
−6.80	−159.31	−159.63	−159.95	−160.28	−160.60	−160.92	−161.24	−161.57	−161.89	−162.22	−162.54	−6.80
−6.70	−156.15	−156.47	−156.78	−157.09	−157.41	−157.73	−158.04	−158.36	−158.68	−159.00	−159.31	−6.70
−6.60	−153.05	−153.36	−153.67	−153.98	−154.29	−154.59	−154.91	−155.22	−155.53	−155.84	−156.15	−6.60
−6.50	−150.01	−150.31	−150.61	−150.91	−151.22	−151.52	−151.83	−152.13	−152.44	−152.74	−153.05	−6.50
−6.40	−147.01	−147.31	−147.61	−147.91	−148.20	−148.50	−148.80	−149.10	−149.40	−149.71	−150.01	−6.40
−6.30	−144.07	−144.36	−144.65	−144.95	−145.24	−145.54	−145.83	−146.13	−146.42	−146.72	−147.01	−6.30
−6.20	−141.17	−141.46	−141.75	−142.04	−142.32	−142.61	−142.90	−143.19	−143.49	−143.78	−144.07	−6.20
−6.10	−138.31	−138.60	−138.88	−139.17	−139.45	−139.74	−140.02	−140.31	−140.60	−140.88	−141.17	−6.10
−6.00	−135.50	−135.78	−136.06	−136.34	−136.62	−136.90	−137.18	−137.46	−137.75	−138.03	−138.31	−6.00
−5.90	−132.72	−132.99	−133.27	−133.55	−133.82	−134.10	−134.38	−134.66	−134.94	−135.22	−135.50	−5.90
−5.80	−129.97	−130.24	−130.52	−130.79	−131.06	−131.34	−131.61	−131.89	−132.16	−132.44	−132.72	−5.80
−5.70	−127.26	−127.53	−127.80	−128.07	−128.34	−128.61	−128.88	−129.15	−129.43	−129.70	−129.97	−5.70
−5.60	−124.58	−124.85	−125.11	−125.38	−125.65	−125.92	−126.18	−126.45	−126.72	−126.99	−127.26	−5.60
−5.50	−121.93	−122.19	−122.46	−122.72	−122.99	−123.25	−123.52	−123.78	−124.05	−124.31	−124.58	−5.50
−5.40	−119.31	−119.57	−119.83	−120.09	−120.35	−120.62	−120.88	−121.14	−121.40	−121.67	−121.93	−5.40
−5.30	−116.71	−116.97	−117.23	−117.49	−117.75	−118.01	−118.27	−118.53	−118.79	−119.05	−119.31	−5.30
−5.20	−114.14	−114.40	−114.66	−114.91	−115.17	−115.43	−115.68	−115.94	−116.20	−116.46	−116.71	−5.20
−5.10	−111.60	−111.85	−112.11	−112.36	−112.62	−112.87	−113.12	−113.38	−113.63	−113.89	−114.14	−5.10
−5.00	−109.08	−109.33	−109.58	−109.83	−110.09	−110.34	−110.59	−110.84	−111.09	−111.35	−111.60	−5.00
−4.90	−106.58	−106.83	−107.08	−107.33	−107.58	−107.83	−108.08	−108.33	−108.58	−108.83	−109.08	−4.90
−4.80	−104.10	−104.35	−104.60	−104.84	−105.09	−105.34	−105.59	−105.84	−106.08	−106.33	−106.58	−4.80
−4.70	−101.65	−101.89	−102.14	−102.38	−102.63	−102.87	−103.12	−103.36	−103.61	−103.86	−104.10	−4.70
−4.60	−99.21	−99.45	−99.70	−99.94	−100.18	−100.43	−100.67	−100.91	−101.16	−101.40	−101.65	−4.60
−4.50	−96.79	−97.03	−97.27	−97.51	−97.76	−98.00	−98.24	−98.48	−98.72	−98.97	−99.21	−4.50
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
−4.50	−96.79	−97.03	−97.27	−97.51	−97.76	−98.00	−98.24	−98.48	−98.72	−98.97	−99.21	−4.50
−4.40	−94.39	−94.63	−94.87	−95.11	−95.35	−95.59	−95.83	−96.07	−96.31	−96.55	−96.79	−4.40
−4.30	−92.01	−92.25	−92.48	−92.72	−92.96	−93.20	−93.44	−93.67	−93.91	−94.15	−94.39	−4.30
−4.20	−89.64	−89.88	−90.11	−90.35	−90.59	−90.82	−91.06	−91.30	−91.53	−91.77	−92.01	−4.20
−4.10	−87.29	−87.53	−87.76	−87.99	−88.23	−88.46	−88.70	−88.93	−89.17	−89.41	−89.64	−4.10
−4.00	−84.96	−85.19	−85.42	−85.66	−85.89	−86.12	−86.36	−86.59	−86.82	−87.06	−87.29	−4.00
−3.90	−82.64	−82.87	−83.10	−83.33	−83.56	−83.80	−84.03	−84.26	−84.49	−84.72	−84.96	−3.90
−3.80	−80.33	−80.56	−80.79	−81.02	−81.25	−81.48	−81.71	−81.94	−82.18	−82.41	−82.64	−3.80
−3.70	−78.04	−78.27	−78.50	−78.73	−78.96	−79.18	−79.41	−79.64	−79.87	−80.10	−80.33	−3.70
−3.60	−75.76	−75.99	−76.22	−76.44	−76.67	−76.90	−77.13	−77.36	−77.58	−77.81	−78.04	−3.60
−3.50	−73.50	−73.72	−73.95	−74.18	−74.40	−74.63	−74.86	−75.08	−75.31	−75.54	−75.76	−3.50
−3.40	−71.25	−71.47	−71.69	−71.92	−72.14	−72.37	−72.60	−72.82	−73.05	−73.27	−73.50	−3.40
−3.30	−69.01	−69.23	−69.45	−69.68	−69.90	−70.12	−70.35	−70.57	−70.80	−71.02	−71.25	−3.30
−3.20	−66.78	−67.00	−67.22	−67.44	−67.67	−67.89	−68.11	−68.34	−68.56	−68.78	−69.01	−3.20
−3.10	−64.56	−64.78	−65.00	−65.22	−65.44	−65.67	−65.89	−66.11	−66.33	−66.55	−66.78	−3.10
−3.00	−62.35	−62.57	−62.79	−63.01	−63.23	−63.45	−63.68	−63.90	−64.12	−64.34	−64.56	−3.00
−2.90	−60.16	−60.38	−60.60	−60.82	−61.03	−61.25	−61.47	−61.69	−61.91	−62.13	−62.35	−2.90
−2.80	−57.97	−58.19	−58.41	−58.63	−58.85	−59.06	−59.28	−59.50	−59.72	−59.94	−60.16	−2.80
−2.70	−55.80	−56.01	−56.23	−56.45	−56.67	−56.88	−57.10	−57.32	−57.54	−57.75	−57.97	−2.70
−2.60	−53.63	−53.85	−54.06	−54.28	−54.50	−54.71	−54.93	−55.15	−55.36	−55.58	−55.80	−2.60
−2.50	−51.48	−51.69	−51.91	−52.12	−52.34	−52.55	−52.77	−52.98	−53.20	−53.42	−53.63	−2.50
−2.40	−49.33	−49.54	−49.76	−49.97	−50.19	−50.40	−50.62	−50.83	−51.05	−51.26	−51.48	−2.40
−2.30	−47.19	−47.41	−47.62	−47.83	−48.05	−48.26	−48.47	−48.69	−48.90	−49.12	−49.33	−2.30
−2.20	−45.06	−45.28	−45.49	−45.70	−45.91	−46.13	−46.34	−46.55	−46.77	−46.98	−47.19	−2.20
−2.10	−42.94	−43.15	−43.37	−43.58	−43.79	−44.00	−44.21	−44.43	−44.64	−44.85	−45.06	−2.10
−2.00	−40.83	−41.04	−41.25	−41.46	−41.67	−41.88	−42.10	−42.31	−42.52	−42.73	−42.94	−2.00
−1.90	−38.72	−38.93	−39.14	−39.36	−39.57	−39.78	−39.99	−40.20	−40.41	−40.62	−40.83	−1.90
−1.80	−36.63	−36.84	−37.05	−37.26	−37.47	−37.68	−37.88	−38.09	−38.30	−38.51	−38.72	−1.80
−1.70	−34.54	−34.75	−34.96	−35.16	−35.37	−35.58	−35.79	−36.00	−36.21	−36.42	−36.63	−1.70
−1.60	−32.46	−32.66	−32.87	−33.08	−33.29	−33.50	−33.70	−33.91	−34.12	−34.33	−34.54	−1.60
−1.50	−30.38	−30.59	−30.80	−31.00	−31.21	−31.42	−31.63	−31.83	−32.04	−32.25	−32.46	−1.50
−1.40	−28.31	−28.52	−28.73	−28.93	−29.14	−29.35	−29.55	−29.76	−29.97	−30.17	−30.38	−1.40
−1.30	−26.25	−26.46	−26.66	−26.87	−27.08	−27.28	−27.49	−27.69	−27.90	−28.11	−28.31	−1.30
−1.20	−24.20	−24.40	−24.61	−24.81	−25.02	−25.22	−25.43	−25.64	−25.84	−26.05	−26.25	−1.20
−1.10	−22.15	−22.35	−22.56	−22.76	−22.97	−23.17	−23.38	−23.58	−23.79	−23.99	−24.20	−1.10
−1.00	−20.11	−20.31	−20.52	−20.72	−20.92	−21.13	−21.33	−21.54	−21.74	−21.94	−22.15	−1.00
−0.90	−18.07	−18.28	−18.48	−18.68	−18.89	−19.09	−19.29	−19.50	−19.70	−19.90	−20.11	−0.90
−0.80	−16.04	−16.24	−16.45	−16.65	−16.85	−17.06	−17.26	−17.46	−17.67	−17.87	−18.07	−0.80
−0.70	−14.02	−14.22	−14.42	−14.62	−14.83	−15.03	−15.23	−15.43	−15.64	−15.84	−16.04	−0.70
−0.60	−12.00	−12.20	−12.40	−12.60	−12.81	−13.01	−13.21	−13.41	−13.61	−13.82	−14.02	−0.60
−0.50	−9.99	−10.19	−10.39	−10.59	−10.79	−10.99	−11.19	−11.39	−11.60	−11.80	−12.00	−0.50
−0.40	−7.98	−8.18	−8.38	−8.58	−8.78	−8.98	−9.18	−9.38	−9.58	−9.79	−9.99	−0.40
−0.30	−5.98	−6.18	−6.38	−6.58	−6.78	−6.98	−7.18	−7.38	−7.58	−7.78	−7.98	−0.30
−0.20	−3.98	−4.18	−4.38	−4.58	−4.78	−4.98	−5.18	−5.38	−5.58	−5.78	−5.98	−0.20
−0.10	−1.99	−2.19	−2.39	−2.58	−2.78	−2.98	−3.18	−3.38	−3.58	−3.78	−3.98	−0.10
0.00	0.00	−0.20	−0.40	−0.60	−0.79	−0.99	−1.19	−1.39	−1.59	−1.79	−1.99	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
0.00	0.00	0.20	0.40	0.60	0.79	0.99	1.19	1.39	1.59	1.78	1.98	**0.00**
0.10	1.98	2.18	2.38	2.58	2.77	2.97	3.17	3.37	3.57	3.76	3.96	**0.10**
0.20	3.96	4.16	4.36	4.55	4.75	4.95	5.14	5.34	5.54	5.74	5.93	**0.20**
0.30	5.93	6.13	6.33	6.52	6.72	6.92	7.12	7.31	7.51	7.71	7.90	**0.30**
0.40	7.90	8.10	8.30	8.49	8.69	8.89	9.08	9.28	9.47	9.67	9.87	**0.40**
0.50	9.87	10.06	10.26	10.46	10.65	10.85	11.04	11.24	11.44	11.63	11.83	**0.50**
0.60	11.83	12.02	12.22	12.41	12.61	12.81	13.00	13.20	13.39	13.59	13.78	**0.60**
0.70	13.78	13.98	14.17	14.37	14.56	14.76	14.96	15.15	15.35	15.54	15.74	**0.70**
0.80	15.74	15.93	16.13	16.32	16.52	16.71	16.91	17.10	17.29	17.49	17.68	**0.80**
0.90	17.68	17.88	18.07	18.27	18.46	18.66	18.85	19.05	19.24	19.43	19.63	**0.90**
1.00	19.63	19.82	20.02	20.21	20.40	20.60	20.79	20.99	21.18	21.37	21.57	**1.00**
1.10	21.57	21.76	21.96	22.15	22.34	22.54	22.73	22.92	23.12	23.31	23.51	**1.10**
1.20	23.51	23.70	23.89	24.09	24.28	24.47	24.67	24.86	25.05	25.25	25.44	**1.20**
1.30	25.44	25.63	25.82	26.02	26.21	26.40	26.60	26.79	26.98	27.18	27.37	**1.30**
1.40	27.37	27.56	27.75	27.95	28.14	28.33	28.52	28.72	28.91	29.10	29.29	**1.40**
1.50	29.29	29.49	29.68	29.87	30.06	30.26	30.45	30.64	30.83	31.03	31.22	**1.50**
1.60	31.22	31.41	31.60	31.79	31.99	32.18	32.37	32.56	32.75	32.95	33.14	**1.60**
1.70	33.14	33.33	33.52	33.71	33.90	34.10	34.29	34.48	34.67	34.86	35.05	**1.70**
1.80	35.05	35.25	35.44	35.63	35.82	36.01	36.20	36.39	36.58	36.78	36.97	**1.80**
1.90	36.97	37.16	37.35	37.54	37.73	37.92	38.11	38.30	38.50	38.69	38.88	**1.90**
2.00	38.88	39.07	39.26	39.45	39.64	39.83	40.02	40.21	40.40	40.59	40.78	**2.00**
2.10	40.78	40.98	41.17	41.36	41.55	41.74	41.93	42.12	42.31	42.50	42.69	**2.10**
2.20	42.69	42.88	43.07	43.26	43.45	43.64	43.83	44.02	44.21	44.40	44.59	**2.20**
2.30	44.59	44.78	44.97	45.16	45.35	45.54	45.73	45.92	46.11	46.30	46.49	**2.30**
2.40	46.49	46.68	46.87	47.06	47.25	47.44	47.63	47.82	48.01	48.20	48.38	**2.40**
2.50	48.38	48.57	48.76	48.95	49.14	49.33	49.52	49.71	49.90	50.09	50.28	**2.50**
2.60	50.28	50.47	50.66	50.85	51.03	51.22	51.41	51.60	51.79	51.98	52.17	**2.60**
2.70	52.17	52.36	52.55	52.74	52.92	53.11	53.30	53.49	53.68	53.87	54.06	**2.70**
2.80	54.06	54.25	54.43	54.62	54.81	55.00	55.19	55.38	55.56	55.75	55.94	**2.80**
2.90	55.94	56.13	56.32	56.51	56.70	56.88	57.07	57.26	57.45	57.64	57.82	**2.90**
3.00	57.82	58.01	58.20	58.39	58.58	58.77	58.95	59.14	59.33	59.52	59.71	**3.00**
3.10	59.71	59.89	60.08	60.27	60.46	60.64	60.83	61.02	61.21	61.40	61.58	**3.10**
3.20	61.58	61.77	61.96	62.15	62.33	62.52	62.71	62.90	63.08	63.27	63.46	**3.20**
3.30	63.46	63.65	63.83	64.02	64.21	64.40	64.58	64.77	64.96	65.15	65.33	**3.30**
3.40	65.33	65.52	65.71	65.90	66.08	66.27	66.46	66.64	66.83	67.02	67.21	**3.40**
3.50	67.21	67.39	67.58	67.77	67.95	68.14	68.33	68.51	68.70	68.89	69.07	**3.50**
3.60	69.07	69.26	69.45	69.64	69.82	70.01	70.20	70.38	70.57	70.76	70.94	**3.60**
3.70	70.94	71.13	71.32	71.50	71.69	71.87	72.06	72.25	72.43	72.62	72.81	**3.70**
3.80	72.81	72.99	73.18	73.37	73.55	73.74	73.93	74.11	74.30	74.48	74.67	**3.80**
3.90	74.67	74.86	75.04	75.23	75.42	75.60	75.79	75.97	76.16	76.35	76.53	**3.90**
4.00	76.53	76.72	76.90	77.09	77.28	77.46	77.65	77.83	78.02	78.21	78.39	**4.00**
4.10	78.39	78.58	78.76	78.95	79.13	79.32	79.51	79.69	79.88	80.06	80.25	**4.10**
4.20	80.25	80.43	80.62	80.81	80.99	81.18	81.36	81.55	81.73	81.92	82.10	**4.20**
4.30	82.10	82.29	82.48	82.66	82.85	83.03	83.22	83.40	83.59	83.77	83.96	**4.30**
4.40	83.96	84.14	84.33	84.51	84.70	84.89	85.07	85.26	85.44	85.63	85.81	**4.40**
4.50	85.81	86.00	86.18	86.37	86.55	86.74	86.92	87.11	87.29	87.48	87.66	**4.50**
4.60	87.66	87.85	88.03	88.22	88.40	88.59	88.77	88.96	89.14	89.33	89.51	**4.60**
4.70	89.51	89.70	89.88	90.07	90.25	90.43	90.62	90.80	90.99	91.17	91.36	**4.70**
4.80	91.36	91.54	91.73	91.91	92.10	92.28	92.47	92.65	92.83	93.02	93.20	**4.80**
4.90	93.20	93.39	93.57	93.76	93.94	94.13	94.31	94.49	94.68	94.86	95.05	**4.90**
5.00	95.05	95.23	95.42	95.60	95.79	95.97	96.15	96.34	96.52	96.71	96.89	**5.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	95.05	95.23	95.42	95.60	95.79	95.97	96.15	96.34	96.52	96.71	96.89	5.00
5.10	96.89	97.07	97.26	97.44	97.63	97.81	98.00	98.18	98.36	98.55	98.73	5.10
5.20	98.73	98.92	99.10	99.28	99.47	99.65	99.84	100.02	100.20	100.39	100.57	5.20
5.30	100.57	100.76	100.94	101.12	101.31	101.49	101.67	101.86	102.04	102.23	102.41	5.30
5.40	102.41	102.59	102.78	102.96	103.15	103.33	103.51	103.70	103.88	104.06	104.25	5.40
5.50	104.25	104.43	104.61	104.80	104.98	105.17	105.35	105.53	105.72	105.90	106.08	5.50
5.60	106.08	106.27	106.45	106.63	106.82	107.00	107.18	107.37	107.55	107.73	107.92	5.60
5.70	107.92	108.10	108.28	108.47	108.65	108.83	109.02	109.20	109.38	109.57	109.75	5.70
5.80	109.75	109.93	110.12	110.30	110.48	110.67	110.85	111.03	111.22	111.40	111.58	5.80
5.90	111.58	111.77	111.95	112.13	112.31	112.50	112.68	112.86	113.05	113.23	113.41	5.90
6.00	113.41	113.60	113.78	113.96	114.15	114.33	114.51	114.69	114.88	115.06	115.24	6.00
6.10	115.24	115.43	115.61	115.79	115.97	116.16	116.34	116.52	116.71	116.89	117.07	6.10
6.20	117.07	117.25	117.44	117.62	117.80	117.99	118.17	118.35	118.53	118.72	118.90	6.20
6.30	118.90	119.08	119.26	119.45	119.63	119.81	119.99	120.18	120.36	120.54	120.72	6.30
6.40	120.72	120.91	121.09	121.27	121.46	121.64	121.82	122.00	122.19	122.37	122.55	6.40
6.50	122.55	122.73	122.91	123.10	123.28	123.46	123.64	123.83	124.01	124.19	124.37	6.50
6.60	124.37	124.56	124.74	124.92	125.10	125.29	125.47	125.65	125.83	126.02	126.20	6.60
6.70	126.20	126.38	126.56	126.74	126.93	127.11	127.29	127.47	127.66	127.84	128.02	6.70
6.80	128.02	128.20	128.38	128.57	128.75	128.93	129.11	129.29	129.48	129.66	129.84	6.80
6.90	129.84	130.02	130.21	130.39	130.57	130.75	130.93	131.12	131.30	131.48	131.66	6.90
7.00	131.66	131.84	132.03	132.21	132.39	132.57	132.75	132.94	133.12	133.30	133.48	7.00
7.10	133.48	133.66	133.84	134.03	134.21	134.39	134.57	134.75	134.94	135.12	135.30	7.10
7.20	135.30	135.48	135.66	135.84	136.03	136.21	136.39	136.57	136.75	136.94	137.12	7.20
7.30	137.12	137.30	137.48	137.66	137.84	138.03	138.21	138.39	138.57	138.75	138.93	7.30
7.40	138.93	139.12	139.30	139.48	139.66	139.84	140.02	140.21	140.39	140.57	140.75	7.40
7.50	140.75	140.93	141.11	141.30	141.48	141.66	141.84	142.02	142.20	142.38	142.57	7.50
7.60	142.57	142.75	142.93	143.11	143.29	143.47	143.65	143.84	144.02	144.20	144.38	7.60
7.70	144.38	144.56	144.74	144.92	145.11	145.29	145.47	145.65	145.83	146.01	146.19	7.70
7.80	146.19	146.38	146.56	146.74	146.92	147.10	147.28	147.46	147.65	147.83	148.01	7.80
7.90	148.01	148.19	148.37	148.55	148.73	148.91	149.10	149.28	149.46	149.64	149.82	7.90
8.00	149.82	150.00	150.18	150.36	150.55	150.73	150.91	151.09	151.27	151.45	151.63	8.00
8.10	151.63	151.81	151.99	152.18	152.36	152.54	152.72	152.90	153.08	153.26	153.44	8.10
8.20	153.44	153.62	153.81	153.99	154.17	154.35	154.53	154.71	154.89	155.07	155.25	8.20
8.30	155.25	155.44	155.62	155.80	155.98	156.16	156.34	156.52	156.70	156.88	157.06	8.30
8.40	157.06	157.25	157.43	157.61	157.79	157.97	158.15	158.33	158.51	158.69	158.87	8.40
8.50	158.87	159.06	159.24	159.42	159.60	159.78	159.96	160.14	160.32	160.50	160.68	8.50
8.60	160.68	160.86	161.05	161.23	161.41	161.59	161.77	161.95	162.13	162.31	162.49	8.60
8.70	162.49	162.67	162.85	163.03	163.22	163.40	163.58	163.76	163.94	164.12	164.30	8.70
8.80	164.30	164.48	164.66	164.84	165.02	165.20	165.38	165.57	165.75	165.93	166.11	8.80
8.90	166.11	166.29	166.47	166.65	166.83	167.01	167.19	167.37	167.55	167.73	167.91	8.90
9.00	167.91	168.10	168.28	168.46	168.64	168.82	169.00	169.18	169.36	169.54	169.72	9.00
9.10	169.72	169.90	170.08	170.26	170.44	170.62	170.81	170.99	171.17	171.35	171.53	9.10
9.20	171.53	171.71	171.89	172.07	172.25	172.43	172.61	172.79	172.97	173.15	173.33	9.20
9.30	173.33	173.51	173.69	173.88	174.06	174.24	174.42	174.60	174.78	174.96	175.14	9.30
9.40	175.14	175.32	175.50	175.68	175.86	176.04	176.22	176.40	176.58	176.76	176.94	9.40
9.50	176.94	177.12	177.30	177.49	177.67	177.85	178.03	178.21	178.39	178.57	178.75	9.50
9.60	178.75	178.93	179.11	179.29	179.47	179.65	179.83	180.01	180.19	180.37	180.55	9.60
9.70	180.55	180.73	180.91	181.09	181.27	181.45	181.64	181.82	182.00	182.18	182.36	9.70
9.80	182.36	182.54	182.72	182.90	183.08	183.26	183.44	183.62	183.80	183.98	184.16	9.80
9.90	184.16	184.34	184.52	184.70	184.88	185.06	185.24	185.42	185.60	185.78	185.96	9.90
10.00	185.96	186.14	186.32	186.51	186.69	186.87	187.05	187.23	187.41	187.59	187.77	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	185.96	186.14	186.32	186.51	186.69	186.87	187.05	187.23	187.41	187.59	187.77	10.00
10.10	187.77	187.95	188.13	188.31	188.49	188.67	188.85	189.03	189.21	189.39	189.57	10.10
10.20	189.57	189.75	189.93	190.11	190.29	190.47	190.65	190.83	191.01	191.19	191.37	10.20
10.30	191.37	191.55	191.73	191.91	192.09	192.27	192.45	192.63	192.81	192.99	193.18	10.30
10.40	193.18	193.36	193.54	193.72	193.90	194.08	194.26	194.44	194.62	194.80	194.98	10.40
10.50	194.98	195.16	195.34	195.52	195.70	195.88	196.06	196.24	196.42	196.60	196.78	10.50
10.60	196.78	196.96	197.14	197.32	197.50	197.68	197.86	198.04	198.22	198.40	198.58	10.60
10.70	198.58	198.76	198.94	199.12	199.30	199.48	199.66	199.84	200.02	200.20	200.38	10.70
10.80	200.38	200.56	200.74	200.92	201.10	201.28	201.46	201.64	201.82	202.00	202.18	10.80
10.90	202.18	202.36	202.54	202.72	202.90	203.09	203.27	203.45	203.63	203.81	203.99	10.90
11.00	203.99	204.17	204.35	204.53	204.71	204.89	205.07	205.25	205.43	205.61	205.79	11.00
11.10	205.79	205.97	206.15	206.33	206.51	206.69	206.87	207.05	207.23	207.41	207.59	11.10
11.20	207.59	207.77	207.95	208.13	208.31	208.49	208.67	208.85	209.03	209.21	209.39	11.20
11.30	209.39	209.57	209.75	209.93	210.11	210.29	210.47	210.65	210.83	211.01	211.19	11.30
11.40	211.19	211.37	211.55	211.73	211.91	212.09	212.27	212.45	212.63	212.81	212.99	11.40
11.50	212.99	213.17	213.35	213.53	213.71	213.89	214.07	214.25	214.43	214.61	214.79	11.50
11.60	214.79	214.97	215.15	215.33	215.51	215.69	215.87	216.05	216.23	216.41	216.59	11.60
11.70	216.59	216.77	216.95	217.13	217.31	217.49	217.67	217.85	218.03	218.21	218.39	11.70
11.80	218.39	218.57	218.75	218.93	219.11	219.29	219.47	219.65	219.83	220.01	220.19	11.80
11.90	220.19	220.37	220.55	220.73	220.91	221.09	221.27	221.45	221.63	221.81	221.99	11.90
12.00	221.99	222.17	222.35	222.53	222.71	222.89	223.07	223.25	223.43	223.61	223.79	12.00
12.10	223.79	223.97	224.15	224.33	224.51	224.69	224.87	225.05	225.23	225.41	225.59	12.10
12.20	225.59	225.78	225.96	226.14	226.32	226.50	226.68	226.86	227.04	227.22	227.40	12.20
12.30	227.40	227.58	227.76	227.94	228.12	228.30	228.48	228.66	228.84	229.02	229.20	12.30
12.40	229.20	229.38	229.56	229.74	229.92	230.10	230.28	230.46	230.64	230.82	231.00	12.40
12.50	231.00	231.18	231.36	231.54	231.72	231.90	232.08	232.26	232.44	232.62	232.80	12.50
12.60	232.80	232.98	233.16	233.34	233.52	233.70	233.88	234.06	234.24	234.42	234.60	12.60
12.70	234.60	234.78	234.96	235.14	235.32	235.50	235.68	235.86	236.04	236.22	236.40	12.70
12.80	236.40	236.58	236.76	236.94	237.12	237.30	237.48	237.66	237.84	238.02	238.20	12.80
12.90	238.20	238.38	238.56	238.74	238.92	239.10	239.28	239.46	239.64	239.82	240.00	12.90
13.00	240.00	240.18	240.36	240.54	240.72	240.90	241.08	241.26	241.44	241.62	241.80	13.00
13.10	241.80	241.98	242.16	242.34	242.52	242.70	242.88	243.06	243.24	243.42	243.60	13.10
13.20	243.60	243.78	243.96	244.14	244.32	244.50	244.68	244.86	245.04	245.22	245.40	13.20
13.30	245.40	245.58	245.76	245.94	246.12	246.30	246.48	246.66	246.84	247.02	247.20	13.30
13.40	247.20	247.38	247.56	247.74	247.92	248.11	248.29	248.47	248.65	248.83	249.01	13.40
13.50	249.01	249.19	249.37	249.55	249.73	249.91	250.09	250.27	250.45	250.63	250.81	13.50
13.60	250.81	250.99	251.17	251.35	251.53	251.71	251.89	252.07	252.25	252.43	252.61	13.60
13.70	252.61	252.79	252.97	253.15	253.33	253.51	253.69	253.87	254.05	254.23	254.41	13.70
13.80	254.41	254.59	254.77	254.95	255.13	255.31	255.49	255.67	255.85	256.03	256.21	13.80
13.90	256.21	256.39	256.57	256.75	256.93	257.11	257.29	257.47	257.65	257.83	258.01	13.90
14.00	258.01	258.19	258.37	258.55	258.73	258.92	259.10	259.28	259.46	259.64	259.82	14.00
14.10	259.82	260.00	260.18	260.36	260.54	260.72	260.90	261.08	261.26	261.44	261.62	14.10
14.20	261.62	261.80	261.98	262.16	262.34	262.52	262.70	262.88	263.06	263.24	263.42	14.20
14.30	263.42	263.60	263.78	263.96	264.14	264.32	264.50	264.68	264.86	265.04	265.22	14.30
14.40	265.22	265.40	265.58	265.76	265.94	266.12	266.31	266.49	266.67	266.85	267.03	14.40
14.50	267.03	267.21	267.39	267.57	267.75	267.93	268.11	268.29	268.47	268.65	268.83	14.50
14.60	268.83	269.01	269.19	269.37	269.55	269.73	269.91	270.09	270.27	270.45	270.63	14.60
14.70	270.63	270.81	270.99	271.17	271.35	271.53	271.71	271.89	272.07	272.26	272.44	14.70
14.80	272.44	272.62	272.80	272.98	273.16	273.34	273.52	273.70	273.88	274.06	274.24	14.80
14.90	274.24	274.42	274.60	274.78	274.96	275.14	275.32	275.50	275.68	275.86	276.04	14.90
15.00	276.04	276.22	276.40	276.58	276.76	276.94	277.12	277.31	277.49	277.67	277.85	15.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
15.00	276.04	276.22	276.40	276.58	276.76	276.94	277.12	277.31	277.49	277.67	277.85	**15.00**
15.10	277.85	278.03	278.21	278.39	278.57	278.75	278.93	279.11	279.29	279.47	279.65	**15.10**
15.20	279.65	279.83	280.01	280.19	280.37	280.55	280.73	280.91	281.09	281.27	281.45	**15.20**
15.30	281.45	281.64	281.82	282.00	282.18	282.36	282.54	282.72	282.90	283.08	283.26	**15.30**
15.40	283.26	283.44	283.62	283.80	283.98	284.16	284.34	284.52	284.70	284.88	285.06	**15.40**
15.50	285.06	285.24	285.42	285.61	285.79	285.97	286.15	286.33	286.51	286.69	286.87	**15.50**
15.60	286.87	287.05	287.23	287.41	287.59	287.77	287.95	288.13	288.31	288.49	288.67	**15.60**
15.70	288.67	288.85	289.03	289.22	289.40	289.58	289.76	289.94	290.12	290.30	290.48	**15.70**
15.80	290.48	290.66	290.84	291.02	291.20	291.38	291.56	291.74	291.92	292.10	292.28	**15.80**
15.90	292.28	292.46	292.65	292.83	293.01	293.19	293.37	293.55	293.73	293.91	294.09	**15.90**
16.00	294.09	294.27	294.45	294.63	294.81	294.99	295.17	295.35	295.53	295.72	295.90	**16.00**
16.10	295.90	296.08	296.26	296.44	296.62	296.80	296.98	297.16	297.34	297.52	297.70	**16.10**
16.20	297.70	297.88	298.06	298.24	298.42	298.61	298.79	298.97	299.15	299.33	299.51	**16.20**
16.30	299.51	299.69	299.87	300.05	300.23	300.41	300.59	300.77	300.95	301.13	301.32	**16.30**
16.40	301.32	301.50	301.68	301.86	302.04	302.22	302.40	302.58	302.76	302.94	303.12	**16.40**
16.50	303.12	303.30	303.48	303.66	303.84	304.03	304.21	304.39	304.57	304.75	304.93	**16.50**
16.60	304.93	305.11	305.29	305.47	305.65	305.83	306.01	306.19	306.37	306.56	306.74	**16.60**
16.70	306.74	306.92	307.10	307.28	307.46	307.64	307.82	308.00	308.18	308.36	308.54	**16.70**
16.80	308.54	308.72	308.91	309.09	309.27	309.45	309.63	309.81	309.99	310.17	310.35	**16.80**
16.90	310.35	310.53	310.71	310.89	311.07	311.26	311.44	311.62	311.80	311.98	312.16	**16.90**
17.00	312.16	312.34	312.52	312.70	312.88	313.06	313.24	313.42	313.61	313.79	313.97	**17.00**
17.10	313.97	314.15	314.33	314.51	314.69	314.87	315.05	315.23	315.41	315.59	315.78	**17.10**
17.20	315.78	315.96	316.14	316.32	316.50	316.68	316.86	317.04	317.22	317.40	317.58	**17.20**
17.30	317.58	317.77	317.95	318.13	318.31	318.49	318.67	318.85	319.03	319.21	319.39	**17.30**
17.40	319.39	319.57	319.75	319.94	320.12	320.30	320.48	320.66	320.84	321.02	321.20	**17.40**
17.50	321.20	321.38	321.56	321.74	321.93	322.11	322.29	322.47	322.65	322.83	323.01	**17.50**
17.60	323.01	323.19	323.37	323.55	323.74	323.92	324.10	324.28	324.46	324.64	324.82	**17.60**
17.70	324.82	325.00	325.18	325.36	325.54	325.73	325.91	326.09	326.27	326.45	326.63	**17.70**
17.80	326.63	326.81	326.99	327.17	327.35	327.54	327.72	327.90	328.08	328.26	328.44	**17.80**
17.90	328.44	328.62	328.80	328.98	329.16	329.35	329.53	329.71	329.89	330.07	330.25	**17.90**
18.00	330.25	330.43	330.61	330.79	330.97	331.16	331.34	331.52	331.70	331.88	332.06	**18.00**
18.10	332.06	332.24	332.42	332.60	332.78	332.97	333.15	333.33	333.51	333.69	333.87	**18.10**
18.20	333.87	334.05	334.23	334.41	334.60	334.78	334.96	335.14	335.32	335.50	335.68	**18.20**
18.30	335.68	335.86	336.04	336.22	336.41	336.59	336.77	336.95	337.13	337.31	337.49	**18.30**
18.40	337.49	337.67	337.85	338.04	338.22	338.40	338.58	338.76	338.94	339.12	339.30	**18.40**
18.50	339.30	339.48	339.67	339.85	340.03	340.21	340.39	340.57	340.75	340.93	341.11	**18.50**
18.60	341.11	341.30	341.48	341.66	341.84	342.02	342.20	342.38	342.56	342.74	342.93	**18.60**
18.70	342.93	343.11	343.29	343.47	343.65	343.83	344.01	344.19	344.38	344.56	344.74	**18.70**
18.80	344.74	344.92	345.10	345.28	345.46	345.64	345.82	346.01	346.19	346.37	346.55	**18.80**
18.90	346.55	346.73	346.91	347.09	347.27	347.45	347.64	347.82	348.00	348.18	348.36	**18.90**
19.00	348.36	348.54	348.72	348.90	349.09	349.27	349.45	349.63	349.81	349.99	350.17	**19.00**
19.10	350.17	350.35	350.54	350.72	350.90	351.08	351.26	351.44	351.62	351.80	351.98	**19.10**
19.20	351.98	352.17	352.35	352.53	352.71	352.89	353.07	353.25	353.43	353.62	353.80	**19.20**
19.30	353.80	353.98	354.16	354.34	354.52	354.70	354.88	355.07	355.25	355.43	355.61	**19.30**
19.40	355.61	355.79	355.97	356.15	356.33	356.52	356.70	356.88	357.06	357.24	357.42	**19.40**
19.50	357.42	357.60	357.78	357.97	358.15	358.33	358.51	358.69	358.87	359.05	359.23	**19.50**
19.60	359.23	359.42	359.60	359.78	359.96	360.14	360.32	360.50	360.69	360.87	361.05	**19.60**
19.70	361.05	361.23	361.41	361.59	361.77	361.95	362.14	362.32	362.50	362.68	362.86	**19.70**
19.80	362.86	363.04	363.22	363.40	363.59	363.77	363.95	364.13	364.31	364.49	364.67	**19.80**
19.90	364.67	364.85	365.04	365.22	365.40	365.58	365.76	365.94	366.12	366.31	366.49	**19.90**
20.00	366.49	366.67	366.85	367.03	367.21	367.39	367.57	367.76	367.94	368.12	368.30	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
20.00	366.49	366.67	366.85	367.03	367.21	367.39	367.57	367.76	367.94	368.12	368.30	**20.00**
20.10	368.30	368.48	368.66	368.84	369.03	369.21	369.39	369.57	369.75	369.93	370.11	**20.10**
20.20	370.11	370.29	370.48	370.66	370.84	371.02	371.20	371.38	371.56	371.74	371.93	**20.20**
20.30	371.93	372.11	372.29	372.47	372.65	372.83	373.01	373.20	373.38	373.56	373.74	**20.30**
20.40	373.74	373.92	374.10	374.28	374.47	374.65	374.83	375.01	375.19	375.37	375.55	**20.40**
20.50	375.55	375.73	375.92	376.10	376.28	376.46	376.64	376.82	377.00	377.19	377.37	**20.50**
20.60	377.37	377.55	377.73	377.91	378.09	378.27	378.45	378.64	378.82	379.00	379.18	**20.60**
20.70	379.18	379.36	379.54	379.72	379.91	380.09	380.27	380.45	380.63	380.81	380.99	**20.70**
20.80	380.99	381.18	381.36	381.54	381.72	381.90	382.08	382.26	382.44	382.63	382.81	**20.80**
20.90	382.81	382.99	383.17	383.35	383.53	383.71	383.90	384.08	384.26	384.44	384.62	**20.90**
21.00	384.62	384.80	384.98	385.16	385.35	385.53	385.71	385.89	386.07	386.25	386.43	**21.00**
21.10	386.43	386.62	386.80	386.98	387.16	387.34	387.52	387.70	387.89	388.07	388.25	**21.10**
21.20	388.25	388.43	388.61	388.79	388.97	389.15	389.34	389.52	389.70	389.88	390.06	**21.20**
21.30	390.06	390.24	390.42	390.61	390.79	390.97	391.15	391.33	391.51	391.69	391.88	**21.30**
21.40	391.88	392.06	392.24	392.42	392.60	392.78	392.96	393.14	393.33	393.51	393.69	**21.40**
21.50	393.69	393.87	394.05	394.23	394.41	394.60	394.78	394.96	395.14	395.32	395.50	**21.50**
21.60	395.50	395.68	395.86	396.05	396.23	396.41	396.59	396.77	396.95	397.13	397.32	**21.60**
21.70	397.32	397.50	397.68	397.86	398.04	398.22	398.40	398.58	398.77	398.95	399.13	**21.70**
21.80	399.13	399.31	399.49	399.67	399.85	400.04	400.22	400.40	400.58	400.76	400.94	**21.80**
21.90	400.94	401.12	401.30	401.49	401.67	401.85	402.03	402.21	402.39	402.57	402.75	**21.90**
22.00	402.75	402.94	403.12	403.30	403.48	403.66	403.84	404.02	404.21	404.39	404.57	**22.00**
22.10	404.57	404.75	404.93	405.11	405.29	405.47	405.66	405.84	406.02	406.20	406.38	**22.10**
22.20	406.38	406.56	406.74	406.92	407.11	407.29	407.47	407.65	407.83	408.01	408.19	**22.20**
22.30	408.19	408.37	408.56	408.74	408.92	409.10	409.28	409.46	409.64	409.82	410.01	**22.30**
22.40	410.01	410.19	410.37	410.55	410.73	410.91	411.09	411.27	411.46	411.64	411.82	**22.40**
22.50	411.82	412.00	412.18	412.36	412.54	412.72	412.91	413.09	413.27	413.45	413.63	**22.50**
22.60	413.63	413.81	413.99	414.17	414.36	414.54	414.72	414.90	415.08	415.26	415.44	**22.60**
22.70	415.44	415.62	415.80	415.99	416.17	416.35	416.53	416.71	416.89	417.07	417.25	**22.70**
22.80	417.25	417.44	417.62	417.80	417.98	418.16	418.34	418.52	418.70	418.88	419.07	**22.80**
22.90	419.07	419.25	419.43	419.61	419.79	419.97	420.15	420.33	420.52	420.70	420.88	**22.90**
23.00	420.88	421.06	421.24	421.42	421.60	421.78	421.96	422.15	422.33	422.51	422.69	**23.00**
23.10	422.69	422.87	423.05	423.23	423.41	423.59	423.78	423.96	424.14	424.32	424.50	**23.10**
23.20	424.50	424.68	424.86	425.04	425.22	425.40	425.59	425.77	425.95	426.13	426.31	**23.20**
23.30	426.31	426.49	426.67	426.85	427.03	427.22	427.40	427.58	427.76	427.94	428.12	**23.30**
23.40	428.12	428.30	428.48	428.66	428.84	429.03	429.21	429.39	429.57	429.75	429.93	**23.40**
23.50	429.93	430.11	430.29	430.47	430.65	430.84	431.02	431.20	431.38	431.56	431.74	**23.50**
23.60	431.74	431.92	432.10	432.28	432.46	432.65	432.83	433.01	433.19	433.37	433.55	**23.60**
23.70	433.55	433.73	433.91	434.09	434.27	434.45	434.64	434.82	435.00	435.18	435.36	**23.70**
23.80	435.36	435.54	435.72	435.90	436.08	436.26	436.44	436.63	436.81	436.99	437.17	**23.80**
23.90	437.17	437.35	437.53	437.71	437.89	438.07	438.25	438.43	438.61	438.80	438.98	**23.90**
24.00	438.98	439.16	439.34	439.52	439.70	439.88	440.06	440.24	440.42	440.60	440.78	**24.00**
24.10	440.78	440.96	441.15	441.33	441.51	441.69	441.87	442.05	442.23	442.41	442.59	**24.10**
24.20	442.59	442.77	442.95	443.13	443.31	443.50	443.68	443.86	444.04	444.22	444.40	**24.20**
24.30	444.40	444.58	444.76	444.94	445.12	445.30	445.48	445.66	445.84	446.03	446.21	**24.30**
24.40	446.21	446.39	446.57	446.75	446.93	447.11	447.29	447.47	447.65	447.83	448.01	**24.40**
24.50	448.01	448.19	448.37	448.55	448.73	448.92	449.10	449.28	449.46	449.64	449.82	**24.50**
24.60	449.82	450.00	450.18	450.36	450.54	450.72	450.90	451.08	451.26	451.44	451.62	**24.60**
24.70	451.62	451.80	451.98	452.16	452.35	452.53	452.71	452.89	453.07	453.25	453.43	**24.70**
24.80	453.43	453.61	453.79	453.97	454.15	454.33	454.51	454.69	454.87	455.05	455.23	**24.80**
24.90	455.23	455.41	455.59	455.77	455.95	456.13	456.32	456.50	456.68	456.86	457.04	**24.90**
25.00	457.04	457.22	457.40	457.58	457.76	457.94	458.12	458.30	458.48	458.66	458.84	**25.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
25.00	457.04	457.22	457.40	457.58	457.76	457.94	458.12	458.30	458.48	458.66	458.84	**25.00**
25.10	458.84	459.02	459.20	459.38	459.56	459.74	459.92	460.10	460.28	460.46	460.64	**25.10**
25.20	460.64	460.82	461.00	461.18	461.36	461.54	461.72	461.90	462.08	462.26	462.44	**25.20**
25.30	462.44	462.63	462.81	462.99	463.17	463.35	463.53	463.71	463.89	464.07	464.25	**25.30**
25.40	464.25	464.43	464.61	464.79	464.97	465.15	465.33	465.51	465.69	465.87	466.05	**25.40**
25.50	466.05	466.23	466.41	466.59	466.77	466.95	467.13	467.31	467.49	467.67	467.85	**25.50**
25.60	467.85	468.03	468.21	468.39	468.57	468.75	468.93	469.11	469.29	469.47	469.65	**25.60**
25.70	469.65	469.83	470.01	470.19	470.37	470.55	470.73	470.91	471.09	471.27	471.45	**25.70**
25.80	471.45	471.63	471.81	471.99	472.17	472.35	472.53	472.71	472.89	473.07	473.25	**25.80**
25.90	473.25	473.43	473.61	473.78	473.96	474.14	474.32	474.50	474.68	474.86	475.04	**25.90**
26.00	475.04	475.22	475.40	475.58	475.76	475.94	476.12	476.30	476.48	476.66	476.84	**26.00**
26.10	476.84	477.02	477.20	477.38	477.56	477.74	477.92	478.10	478.28	478.46	478.64	**26.10**
26.20	478.64	478.82	479.00	479.18	479.36	479.53	479.71	479.89	480.07	480.25	480.43	**26.20**
26.30	480.43	480.61	480.79	480.97	481.15	481.33	481.51	481.69	481.87	482.05	482.23	**26.30**
26.40	482.23	482.41	482.59	482.77	482.95	483.12	483.30	483.48	483.66	483.84	484.02	**26.40**
26.50	484.02	484.20	484.38	484.56	484.74	484.92	485.10	485.28	485.46	485.64	485.81	**26.50**
26.60	485.81	485.99	486.17	486.35	486.53	486.71	486.89	487.07	487.25	487.43	487.61	**26.60**
26.70	487.61	487.79	487.97	488.15	488.32	488.50	488.68	488.86	489.04	489.22	489.40	**26.70**
26.80	489.40	489.58	489.76	489.94	490.12	490.29	490.47	490.65	490.83	491.01	491.19	**26.80**
26.90	491.19	491.37	491.55	491.73	491.91	492.09	492.26	492.44	492.62	492.80	492.98	**26.90**
27.00	492.98	493.16	493.34	493.52	493.70	493.87	494.05	494.23	494.41	494.59	494.77	**27.00**
27.10	494.77	494.95	495.13	495.31	495.48	495.66	495.84	496.02	496.20	496.38	496.56	**27.10**
27.20	496.56	496.74	496.92	497.09	497.27	497.45	497.63	497.81	497.99	498.17	498.35	**27.20**
27.30	498.35	498.52	498.70	498.88	499.06	499.24	499.42	499.60	499.77	499.95	500.13	**27.30**
27.40	500.13	500.31	500.49	500.67	500.85	501.02	501.20	501.38	501.56	501.74	501.92	**27.40**
27.50	501.92	502.10	502.27	502.45	502.63	502.81	502.99	503.17	503.34	503.52	503.70	**27.50**
27.60	503.70	503.88	504.06	504.24	504.42	504.59	504.77	504.95	505.13	505.31	505.49	**27.60**
27.70	505.49	505.66	505.84	506.02	506.20	506.38	506.56	506.73	506.91	507.09	507.27	**27.70**
27.80	507.27	507.45	507.62	507.80	507.98	508.16	508.34	508.52	508.69	508.87	509.05	**27.80**
27.90	509.05	509.23	509.41	509.58	509.76	509.94	510.12	510.30	510.47	510.65	510.83	**27.90**
28.00	510.83	511.01	511.19	511.36	511.54	511.72	511.90	512.08	512.25	512.43	512.61	**28.00**
28.10	512.61	512.79	512.97	513.14	513.32	513.50	513.68	513.86	514.03	514.21	514.39	**28.10**
28.20	514.39	514.57	514.74	514.92	515.10	515.28	515.46	515.63	515.81	515.99	516.17	**28.20**
28.30	516.17	516.34	516.52	516.70	516.88	517.05	517.23	517.41	517.59	517.77	517.94	**28.30**
28.40	517.94	518.12	518.30	518.48	518.65	518.83	519.01	519.19	519.36	519.54	519.72	**28.40**
28.50	519.72	519.90	520.07	520.25	520.43	520.61	520.78	520.96	521.14	521.32	521.49	**28.50**
28.60	521.49	521.67	521.85	522.02	522.20	522.38	522.56	522.73	522.91	523.09	523.27	**28.60**
28.70	523.27	523.44	523.62	523.80	523.97	524.15	524.33	524.51	524.68	524.86	525.04	**28.70**
28.80	525.04	525.21	525.39	525.57	525.75	525.92	526.10	526.28	526.45	526.63	526.81	**28.80**
28.90	526.81	526.99	527.16	527.34	527.52	527.69	527.87	528.05	528.22	528.40	528.58	**28.90**
29.00	528.58	528.75	528.93	529.11	529.29	529.46	529.64	529.82	529.99	530.17	530.35	**29.00**
29.10	530.35	530.52	530.70	530.88	531.05	531.23	531.41	531.58	531.76	531.94	532.11	**29.10**
29.20	532.11	532.29	532.47	532.64	532.82	533.00	533.17	533.35	533.53	533.70	533.88	**29.20**
29.30	533.88	534.06	534.23	534.41	534.59	534.76	534.94	535.12	535.29	535.47	535.64	**29.30**
29.40	535.64	535.82	536.00	536.17	536.35	536.53	536.70	536.88	537.06	537.23	537.41	**29.40**
29.50	537.41	537.58	537.76	537.94	538.11	538.29	538.47	538.64	538.82	538.99	539.17	**29.50**
29.60	539.17	539.35	539.52	539.70	539.88	540.05	540.23	540.40	540.58	540.76	540.93	**29.60**
29.70	540.93	541.11	541.28	541.46	541.64	541.81	541.99	542.16	542.34	542.52	542.69	**29.70**
29.80	542.69	542.87	543.04	543.22	543.40	543.57	543.75	543.92	544.10	544.27	544.45	**29.80**
29.90	544.45	544.63	544.80	544.98	545.15	545.33	545.50	545.68	545.86	546.03	546.21	**29.90**
30.00	546.21	546.38	546.56	546.73	546.91	547.09	547.26	547.44	547.61	547.79	547.96	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
30.00	546.21	546.38	546.56	546.73	546.91	547.09	547.26	547.44	547.61	547.79	547.96	**30.00**
30.10	547.96	548.14	548.31	548.49	548.66	548.84	549.02	549.19	549.37	549.54	549.72	**30.10**
30.20	549.72	549.89	550.07	550.24	550.42	550.59	550.77	550.94	551.12	551.30	551.47	**30.20**
30.30	551.47	551.65	551.82	552.00	552.17	552.35	552.52	552.70	552.87	553.05	553.22	**30.30**
30.40	553.22	553.40	553.57	553.75	553.92	554.10	554.27	554.45	554.62	554.80	554.97	**30.40**
30.50	554.97	555.15	555.32	555.50	555.67	555.85	556.02	556.20	556.37	556.55	556.72	**30.50**
30.60	556.72	556.90	557.07	557.25	557.42	557.60	557.77	557.95	558.12	558.29	558.47	**30.60**
30.70	558.47	558.64	558.82	558.99	559.17	559.34	559.52	559.69	559.87	560.04	560.22	**30.70**
30.80	560.22	560.39	560.56	560.74	560.91	561.09	561.26	561.44	561.61	561.79	561.96	**30.80**
30.90	561.96	562.13	562.31	562.48	562.66	562.83	563.01	563.18	563.35	563.53	563.70	**30.90**
31.00	563.70	563.88	564.05	564.23	564.40	564.57	564.75	564.92	565.10	565.27	565.45	**31.00**
31.10	565.45	565.62	565.79	565.97	566.14	566.32	566.49	566.66	566.84	567.01	567.19	**31.10**
31.20	567.19	567.36	567.53	567.71	567.88	568.06	568.23	568.40	568.58	568.75	568.92	**31.20**
31.30	568.92	569.10	569.27	569.45	569.62	569.79	569.97	570.14	570.31	570.49	570.66	**31.30**
31.40	570.66	570.84	571.01	571.18	571.36	571.53	571.70	571.88	572.05	572.22	572.40	**31.40**
31.50	572.40	572.57	572.74	572.92	573.09	573.26	573.44	573.61	573.79	573.96	574.13	**31.50**
31.60	574.13	574.31	574.48	574.65	574.83	575.00	575.17	575.35	575.52	575.69	575.86	**31.60**
31.70	575.86	576.04	576.21	576.38	576.56	576.73	576.90	577.08	577.25	577.42	577.60	**31.70**
31.80	577.60	577.77	577.94	578.12	578.29	578.46	578.63	578.81	578.98	579.15	579.33	**31.80**
31.90	579.33	579.50	579.67	579.84	580.02	580.19	580.36	580.54	580.71	580.88	581.05	**31.90**
32.00	581.05	581.23	581.40	581.57	581.74	581.92	582.09	582.26	582.44	582.61	582.78	**32.00**
32.10	582.78	582.95	583.13	583.30	583.47	583.64	583.82	583.99	584.16	584.33	584.51	**32.10**
32.20	584.51	584.68	584.85	585.02	585.20	585.37	585.54	585.71	585.88	586.06	586.23	**32.20**
32.30	586.23	586.40	586.57	586.75	586.92	587.09	587.26	587.43	587.61	587.78	587.95	**32.30**
32.40	587.95	588.12	588.30	588.47	588.64	588.81	588.98	589.16	589.33	589.50	589.67	**32.40**
32.50	589.67	589.84	590.02	590.19	590.36	590.53	590.70	590.87	591.05	591.22	591.39	**32.50**
32.60	591.39	591.56	591.73	591.91	592.08	592.25	592.42	592.59	592.76	592.94	593.11	**32.60**
32.70	593.11	593.28	593.45	593.62	593.79	593.96	594.14	594.31	594.48	594.65	594.82	**32.70**
32.80	594.82	594.99	595.17	595.34	595.51	595.68	595.85	596.02	596.19	596.36	596.54	**32.80**
32.90	596.54	596.71	596.88	597.05	597.22	597.39	597.56	597.73	597.91	598.08	598.25	**32.90**
33.00	598.25	598.42	598.59	598.76	598.93	599.10	599.27	599.45	599.62	599.79	599.96	**33.00**
33.10	599.96	600.13	600.30	600.47	600.64	600.81	600.98	601.16	601.33	601.50	601.67	**33.10**
33.20	601.67	601.84	602.01	602.18	602.35	602.52	602.69	602.86	603.03	603.20	603.37	**33.20**
33.30	603.37	603.55	603.72	603.89	604.06	604.23	604.40	604.57	604.74	604.91	605.08	**33.30**
33.40	605.08	605.25	605.42	605.59	605.76	605.93	606.10	606.27	606.44	606.61	606.78	**33.40**
33.50	606.78	606.95	607.12	607.30	607.47	607.64	607.81	607.98	608.15	608.32	608.49	**33.50**
33.60	608.49	608.66	608.83	609.00	609.17	609.34	609.51	609.68	609.85	610.02	610.19	**33.60**
33.70	610.19	610.36	610.53	610.70	610.87	611.04	611.21	611.38	611.55	611.72	611.89	**33.70**
33.80	611.89	612.06	612.23	612.40	612.56	612.73	612.90	613.07	613.24	613.41	613.58	**33.80**
33.90	613.58	613.75	613.92	614.09	614.26	614.43	614.60	614.77	614.94	615.11	615.28	**33.90**
34.00	615.28	615.45	615.62	615.79	615.96	616.13	616.29	616.46	616.63	616.80	616.97	**34.00**
34.10	616.97	617.14	617.31	617.48	617.65	617.82	617.99	618.16	618.33	618.49	618.66	**34.10**
34.20	618.66	618.83	619.00	619.17	619.34	619.51	619.68	619.85	620.02	620.19	620.35	**34.20**
34.30	620.35	620.52	620.69	620.86	621.03	621.20	621.37	621.54	621.71	621.87	622.04	**34.30**
34.40	622.04	622.21	622.38	622.55	622.72	622.89	623.06	623.22	623.39	623.56	623.73	**34.40**
34.50	623.73	623.90	624.07	624.24	624.40	624.57	624.74	624.91	625.08	625.25	625.41	**34.50**
34.60	625.41	625.58	625.75	625.92	626.09	626.26	626.43	626.59	626.76	626.93	627.10	**34.60**
34.70	627.10	627.27	627.43	627.60	627.77	627.94	628.11	628.28	628.44	628.61	628.78	**34.70**
34.80	628.78	628.95	629.12	629.28	629.45	629.62	629.79	629.96	630.12	630.29	630.46	**34.80**
34.90	630.46	630.63	630.80	630.96	631.13	631.30	631.47	631.64	631.80	631.97	632.14	**34.90**
35.00	632.14	632.31	632.47	632.64	632.81	632.98	633.14	633.31	633.48	633.65	633.81	**35.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
35.00	632.14	632.31	632.47	632.64	632.81	632.98	633.14	633.31	633.48	633.65	633.81	**35.00**
35.10	633.81	633.98	634.15	634.32	634.49	634.65	634.82	634.99	635.15	635.32	635.49	**35.10**
35.20	635.49	635.66	635.82	635.99	636.16	636.33	636.49	636.66	636.83	637.00	637.16	**35.20**
35.30	637.16	637.33	637.50	637.66	637.83	638.00	638.17	638.33	638.50	638.67	638.83	**35.30**
35.40	638.83	639.00	639.17	639.34	639.50	639.67	639.84	640.00	640.17	640.34	640.50	**35.40**
35.50	640.50	640.67	640.84	641.00	641.17	641.34	641.50	641.67	641.84	642.01	642.17	**35.50**
35.60	642.17	642.34	642.51	642.67	642.84	643.01	643.17	643.34	643.50	643.67	643.84	**35.60**
35.70	643.84	644.00	644.17	644.34	644.50	644.67	644.84	645.00	645.17	645.34	645.50	**35.70**
35.80	645.50	645.67	645.84	646.00	646.17	646.33	646.50	646.67	646.83	647.00	647.17	**35.80**
35.90	647.17	647.33	647.50	647.66	647.83	648.00	648.16	648.33	648.49	648.66	648.83	**35.90**
36.00	648.83	648.99	649.16	649.32	649.49	649.66	649.82	649.99	650.15	650.32	650.49	**36.00**
36.10	650.49	650.65	650.82	650.98	651.15	651.31	651.48	651.65	651.81	651.98	652.14	**36.10**
36.20	652.14	652.31	652.47	652.64	652.81	652.97	653.14	653.30	653.47	653.63	653.80	**36.20**
36.30	653.80	653.96	654.13	654.30	654.46	654.63	654.79	654.96	655.12	655.29	655.45	**36.30**
36.40	655.45	655.62	655.78	655.95	656.11	656.28	656.44	656.61	656.78	656.94	657.11	**36.40**
36.50	657.11	657.27	657.44	657.60	657.77	657.93	658.10	658.26	658.43	658.59	658.76	**36.50**
36.60	658.76	658.92	659.09	659.25	659.42	659.58	659.75	659.91	660.08	660.24	660.41	**36.60**
36.70	660.41	660.57	660.74	660.90	661.06	661.23	661.39	661.56	661.72	661.89	662.05	**36.70**
36.80	662.05	662.22	662.38	662.55	662.71	662.88	663.04	663.20	663.37	663.53	663.70	**36.80**
36.90	663.70	663.86	664.03	664.19	664.36	664.52	664.69	664.85	665.01	665.18	665.34	**36.90**
37.00	665.34	665.51	665.67	665.84	666.00	666.16	666.33	666.49	666.66	666.82	666.98	**37.00**
37.10	666.98	667.15	667.31	667.48	667.64	667.81	667.97	668.13	668.30	668.46	668.63	**37.10**
37.20	668.63	668.79	668.95	669.12	669.28	669.44	669.61	669.77	669.94	670.10	670.26	**37.20**
37.30	670.26	670.43	670.59	670.76	670.92	671.08	671.25	671.41	671.57	671.74	671.90	**37.30**
37.40	671.90	672.07	672.23	672.39	672.56	672.72	672.88	673.05	673.21	673.37	673.54	**37.40**
37.50	673.54	673.70	673.86	674.03	674.19	674.35	674.52	674.68	674.84	675.01	675.17	**37.50**
37.60	675.17	675.33	675.50	675.66	675.82	675.99	676.15	676.31	676.48	676.64	676.80	**37.60**
37.70	676.80	676.97	677.13	677.29	677.46	677.62	677.78	677.95	678.11	678.27	678.43	**37.70**
37.80	678.43	678.60	678.76	678.92	679.09	679.25	679.41	679.57	679.74	679.90	680.06	**37.80**
37.90	680.06	680.23	680.39	680.55	680.71	680.88	681.04	681.20	681.37	681.53	681.69	**37.90**
38.00	681.69	681.85	682.02	682.18	682.34	682.50	682.67	682.83	682.99	683.15	683.32	**38.00**
38.10	683.32	683.48	683.64	683.80	683.97	684.13	684.29	684.45	684.62	684.78	684.94	**38.10**
38.20	684.94	685.10	685.27	685.43	685.59	685.75	685.91	686.08	686.24	686.40	686.56	**38.20**
38.30	686.56	686.73	686.89	687.05	687.21	687.37	687.54	687.70	687.86	688.02	688.18	**38.30**
38.40	688.18	688.35	688.51	688.67	688.83	688.99	689.16	689.32	689.48	689.64	689.80	**38.40**
38.50	689.80	689.97	690.13	690.29	690.45	690.61	690.77	690.94	691.10	691.26	691.42	**38.50**
38.60	691.42	691.58	691.74	691.91	692.07	692.23	692.39	692.55	692.71	692.88	693.04	**38.60**
38.70	693.04	693.20	693.36	693.52	693.68	693.85	694.01	694.17	694.33	694.49	694.65	**38.70**
38.80	694.65	694.81	694.98	695.14	695.30	695.46	695.62	695.78	695.94	696.10	696.27	**38.80**
38.90	696.27	696.43	696.59	696.75	696.91	697.07	697.23	697.39	697.56	697.72	697.88	**38.90**
39.00	697.88	698.04	698.20	698.36	698.52	698.68	698.84	699.00	699.17	699.33	699.49	**39.00**
39.10	699.49	699.65	699.81	699.97	700.13	700.29	700.45	700.61	700.77	700.94	701.10	**39.10**
39.20	701.10	701.26	701.42	701.58	701.74	701.90	702.06	702.22	702.38	702.54	702.70	**39.20**
39.30	702.70	702.86	703.03	703.19	703.35	703.51	703.67	703.83	703.99	704.15	704.31	**39.30**
39.40	704.31	704.47	704.63	704.79	704.95	705.11	705.27	705.43	705.59	705.75	705.91	**39.40**
39.50	705.91	706.07	706.23	706.39	706.56	706.72	706.88	707.04	707.20	707.36	707.52	**39.50**
39.60	707.52	707.68	707.84	708.00	708.16	708.32	708.48	708.64	708.80	708.96	709.12	**39.60**
39.70	709.12	709.28	709.44	709.60	709.76	709.92	710.08	710.24	710.40	710.56	710.72	**39.70**
39.80	710.72	710.88	711.04	711.20	711.36	711.52	711.68	711.84	712.00	712.16	712.32	**39.80**
39.90	712.32	712.48	712.64	712.80	712.96	713.12	713.28	713.43	713.59	713.75	713.91	**39.90**
40.00	713.91	714.07	714.23	714.39	714.55	714.71	714.87	715.03	715.19	715.35	715.51	**40.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
40.00	713.91	714.07	714.23	714.39	714.55	714.71	714.87	715.03	715.19	715.35	715.51	**40.00**
40.10	715.51	715.67	715.83	715.99	716.15	716.31	716.47	716.63	716.79	716.94	717.10	**40.10**
40.20	717.10	717.26	717.42	717.58	717.74	717.90	718.06	718.22	718.38	718.54	718.70	**40.20**
40.30	718.70	718.86	719.02	719.18	719.33	719.49	719.65	719.81	719.97	720.13	720.29	**40.30**
40.40	720.29	720.45	720.61	720.77	720.93	721.08	721.24	721.40	721.56	721.72	721.88	**40.40**
40.50	721.88	722.04	722.20	722.36	722.52	722.67	722.83	722.99	723.15	723.31	723.47	**40.50**
40.60	723.47	723.63	723.79	723.95	724.10	724.26	724.42	724.58	724.74	724.90	725.06	**40.60**
40.70	725.06	725.22	725.37	725.53	725.69	725.85	726.01	726.17	726.33	726.48	726.64	**40.70**
40.80	726.64	726.80	726.96	727.12	727.28	727.44	727.59	727.75	727.91	728.07	728.23	**40.80**
40.90	728.23	728.39	728.55	728.70	728.86	729.02	729.18	729.34	729.50	729.65	729.81	**40.90**
41.00	729.81	729.97	730.13	730.29	730.45	730.60	730.76	730.92	731.08	731.24	731.40	**41.00**
41.10	731.40	731.55	731.71	731.87	732.03	732.19	732.35	732.50	732.66	732.82	732.98	**41.10**
41.20	732.98	733.14	733.29	733.45	733.61	733.77	733.93	734.08	734.24	734.40	734.56	**41.20**
41.30	734.56	734.72	734.87	735.03	735.19	735.35	735.51	735.66	735.82	735.98	736.14	**41.30**
41.40	736.14	736.30	736.45	736.61	736.77	736.93	737.09	737.24	737.40	737.56	737.72	**41.40**
41.50	737.72	737.87	738.03	738.19	738.35	738.51	738.66	738.82	738.98	739.14	739.29	**41.50**
41.60	739.29	739.45	739.61	739.77	739.92	740.08	740.24	740.40	740.55	740.71	740.87	**41.60**
41.70	740.87	741.03	741.19	741.34	741.50	741.66	741.82	741.97	742.13	742.29	742.45	**41.70**
41.80	742.45	742.60	742.76	742.92	743.08	743.23	743.39	743.55	743.70	743.86	744.02	**41.80**
41.90	744.02	744.18	744.33	744.49	744.65	744.81	744.96	745.12	745.28	745.44	745.59	**41.90**
42.00	745.59	745.75	745.91	746.06	746.22	746.38	746.54	746.69	746.85	747.01	747.16	**42.00**
42.10	747.16	747.32	747.48	747.64	747.79	747.95	748.11	748.26	748.42	748.58	748.74	**42.10**
42.20	748.74	748.89	749.05	749.21	749.36	749.52	749.68	749.83	749.99	750.15	750.31	**42.20**
42.30	750.31	750.46	750.62	750.78	750.93	751.09	751.25	751.40	751.56	751.72	751.88	**42.30**
42.40	751.88	752.03	752.19	752.35	752.50	752.66	752.82	752.97	753.13	753.29	753.44	**42.40**
42.50	753.44	753.60	753.76	753.91	754.07	754.23	754.38	754.54	754.70	754.85	755.01	**42.50**
42.60	755.01	755.17	755.32	755.48	755.64	755.79	755.95	756.11	756.26	756.42	756.58	**42.60**
42.70	756.58	756.73	756.89	757.05	757.20	757.36	757.52	757.67	757.83	757.99	758.14	**42.70**
42.80	758.14	758.30	758.46	758.61	758.77	758.93	759.08	759.24	759.40	759.55	759.71	**42.80**
42.90	759.71	759.86	760.02	760.18	760.33	760.49	760.65	760.80	760.96	761.12	761.27	**42.90**
43.00	761.27	761.43	761.59	761.74	761.90	762.05	762.21	762.37	762.52	762.68	762.84	**43.00**
43.10	762.84	762.99	763.15	763.30	763.46	763.62	763.77	763.93	764.08	764.24	764.40	**43.10**
43.20	764.40	764.55	764.71	764.86	765.02	765.18	765.33	765.49	765.64	765.80	765.96	**43.20**
43.30	765.96	766.11	766.27	766.42	766.58	766.74	766.89	767.05	767.20	767.36	767.52	**43.30**
43.40	767.52	767.67	767.83	767.98	768.14	768.29	768.45	768.61	768.76	768.92	769.07	**43.40**
43.50	769.07	769.23	769.39	769.54	769.70	769.85	770.01	770.16	770.32	770.47	770.63	**43.50**
43.60	770.63	770.79	770.94	771.10	771.25	771.41	771.56	771.72	771.88	772.03	772.19	**43.60**
43.70	772.19	772.34	772.50	772.65	772.81	772.96	773.12	773.27	773.43	773.59	773.74	**43.70**
43.80	773.74	773.90	774.05	774.21	774.36	774.52	774.67	774.83	774.98	775.14	775.30	**43.80**
43.90	775.30	775.45	775.61	775.76	775.92	776.07	776.23	776.38	776.54	776.69	776.85	**43.90**
44.00	776.85	777.00	777.16	777.31	777.47	777.63	777.78	777.94	778.09	778.25	778.40	**44.00**
44.10	778.40	778.56	778.71	778.87	779.02	779.18	779.33	779.49	779.64	779.80	779.95	**44.10**
44.20	779.95	780.11	780.26	780.42	780.57	780.73	780.88	781.04	781.19	781.35	781.50	**44.20**
44.30	781.50	781.66	781.81	781.97	782.12	782.28	782.43	782.59	782.75	782.90	783.06	**44.30**
44.40	783.06	783.21	783.37	783.52	783.68	783.83	783.99	784.14	784.30	784.45	784.61	**44.40**
44.50	784.61	784.76	784.92	785.07	785.23	785.38	785.54	785.69	785.84	786.00	786.15	**44.50**
44.60	786.15	786.31	786.46	786.62	786.77	786.93	787.08	787.24	787.39	787.55	787.70	**44.60**
44.70	787.70	787.86	788.01	788.17	788.32	788.48	788.63	788.79	788.94	789.10	789.25	**44.70**
44.80	789.25	789.41	789.56	789.72	789.87	790.03	790.18	790.34	790.49	790.65	790.80	**44.80**
44.90	790.80	790.96	791.11	791.27	791.42	791.58	791.73	791.88	792.04	792.19	792.35	**44.90**
45.00	792.35	792.50	792.66	792.81	792.97	793.12	793.28	793.43	793.59	793.74	793.90	**45.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
45.00	792.35	792.50	792.66	792.81	792.97	793.12	793.28	793.43	793.59	793.74	793.90	**45.00**
45.10	793.90	794.05	794.21	794.36	794.52	794.67	794.83	794.98	795.14	795.29	795.44	**45.10**
45.20	795.44	795.60	795.75	795.91	796.06	796.22	796.37	796.53	796.68	796.84	796.99	**45.20**
45.30	796.99	797.15	797.30	797.46	797.61	797.77	797.92	798.08	798.23	798.38	798.54	**45.30**
45.40	798.54	798.69	798.85	799.00	799.16	799.31	799.47	799.62	799.78	799.93	800.09	**45.40**
45.50	800.09	800.24	800.40	800.55	800.71	800.86	801.02	801.17	801.32	801.48	801.63	**45.50**
45.60	801.63	801.79	801.94	802.10	802.25	802.41	802.56	802.72	802.87	803.03	803.18	**45.60**
45.70	803.18	803.34	803.49	803.65	803.80	803.95	804.11	804.26	804.42	804.57	804.73	**45.70**
45.80	804.73	804.88	805.04	805.19	805.35	805.50	805.66	805.81	805.97	806.12	806.28	**45.80**
45.90	806.28	806.43	806.59	806.74	806.89	807.05	807.20	807.36	807.51	807.67	807.82	**45.90**
46.00	807.82	807.98	808.13	808.29	808.44	808.60	808.75	808.91	809.06	809.22	809.37	**46.00**
46.10	809.37	809.53	809.68	809.83	809.99	810.14	810.30	810.45	810.61	810.76	810.92	**46.10**
46.20	810.92	811.07	811.23	811.38	811.54	811.69	811.85	812.00	812.16	812.31	812.47	**46.20**
46.30	812.47	812.62	812.78	812.93	813.09	813.24	813.40	813.55	813.70	813.86	814.01	**46.30**
46.40	814.01	814.17	814.32	814.48	814.63	814.79	814.94	815.10	815.25	815.41	815.56	**46.40**
46.50	815.56	815.72	815.87	816.03	816.18	816.34	816.49	816.65	816.80	816.96	817.11	**46.50**
46.60	817.11	817.27	817.42	817.58	817.73	817.89	818.04	818.20	818.35	818.51	818.66	**46.60**
46.70	818.66	818.82	818.97	819.13	819.28	819.44	819.59	819.75	819.90	820.06	820.21	**46.70**
46.80	820.21	820.37	820.52	820.68	820.83	820.99	821.14	821.30	821.45	821.61	821.76	**46.80**
46.90	821.76	821.92	822.07	822.23	822.38	822.54	822.69	822.85	823.00	823.16	823.31	**46.90**
47.00	823.31	823.47	823.62	823.78	823.93	824.09	824.24	824.40	824.55	824.71	824.86	**47.00**
47.10	824.86	825.02	825.17	825.33	825.48	825.64	825.79	825.95	826.10	826.26	826.41	**47.10**
47.20	826.41	826.57	826.72	826.88	827.03	827.19	827.34	827.50	827.65	827.81	827.97	**47.20**
47.30	827.97	828.12	828.28	828.43	828.59	828.74	828.90	829.05	829.21	829.36	829.52	**47.30**
47.40	829.52	829.67	829.83	829.98	830.14	830.29	830.45	830.61	830.76	830.92	831.07	**47.40**
47.50	831.07	831.23	831.38	831.54	831.69	831.85	832.00	832.16	832.31	832.47	832.62	**47.50**
47.60	832.62	832.78	832.94	833.09	833.25	833.40	833.56	833.71	833.87	834.02	834.18	**47.60**
47.70	834.18	834.33	834.49	834.65	834.80	834.96	835.11	835.27	835.42	835.58	835.73	**47.70**
47.80	835.73	835.89	836.05	836.20	836.36	836.51	836.67	836.82	836.98	837.13	837.29	**47.80**
47.90	837.29	837.45	837.60	837.76	837.91	838.07	838.22	838.38	838.54	838.69	838.85	**47.90**
48.00	838.85	839.00	839.16	839.31	839.47	839.63	839.78	839.94	840.09	840.25	840.40	**48.00**
48.10	840.40	840.56	840.72	840.87	841.03	841.18	841.34	841.50	841.65	841.81	841.96	**48.10**
48.20	841.96	842.12	842.27	842.43	842.59	842.74	842.90	843.05	843.21	843.37	843.52	**48.20**
48.30	843.52	843.68	843.83	843.99	844.15	844.30	844.46	844.61	844.77	844.93	845.08	**48.30**
48.40	845.08	845.24	845.39	845.55	845.71	845.86	846.02	846.17	846.33	846.49	846.64	**48.40**
48.50	846.64	846.80	846.95	847.11	847.27	847.42	847.58	847.74	847.89	848.05	848.20	**48.50**
48.60	848.20	848.36	848.52	848.67	848.83	848.99	849.14	849.30	849.45	849.61	849.77	**48.60**
48.70	849.77	849.92	850.08	850.24	850.39	850.55	850.70	850.86	851.02	851.17	851.33	**48.70**
48.80	851.33	851.49	851.64	851.80	851.96	852.11	852.27	852.43	852.58	852.74	852.89	**48.80**
48.90	852.89	853.05	853.21	853.36	853.52	853.68	853.83	853.99	854.15	854.30	854.46	**48.90**
49.00	854.46	854.62	854.77	854.93	855.09	855.24	855.40	855.56	855.71	855.87	856.03	**49.00**
49.10	856.03	856.18	856.34	856.50	856.65	856.81	856.97	857.12	857.28	857.44	857.59	**49.10**
49.20	857.59	857.75	857.91	858.06	858.22	858.38	858.53	858.69	858.85	859.01	859.16	**49.20**
49.30	859.16	859.32	859.48	859.63	859.79	859.95	860.10	860.26	860.42	860.57	860.73	**49.30**
49.40	860.73	860.89	861.05	861.20	861.36	861.52	861.67	861.83	861.99	862.15	862.30	**49.40**
49.50	862.30	862.46	862.62	862.77	862.93	863.09	863.25	863.40	863.56	863.72	863.87	**49.50**
49.60	863.87	864.03	864.19	864.35	864.50	864.66	864.82	864.97	865.13	865.29	865.45	**49.60**
49.70	865.45	865.60	865.76	865.92	866.08	866.23	866.39	866.55	866.71	866.86	867.02	**49.70**
49.80	867.02	867.18	867.34	867.49	867.65	867.81	867.97	868.12	868.28	868.44	868.60	**49.80**
49.90	868.60	868.75	868.91	869.07	869.23	869.38	869.54	869.70	869.86	870.01	870.17	**49.90**
50.00	870.17	870.33	870.49	870.65	870.80	870.96	871.12	871.28	871.43	871.59	871.75	**50.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
50.00	870.17	870.33	870.49	870.65	870.80	870.96	871.12	871.28	871.43	871.59	871.75	**50.00**
50.10	871.75	871.91	872.07	872.22	872.38	872.54	872.70	872.85	873.01	873.17	873.33	**50.10**
50.20	873.33	873.49	873.64	873.80	873.96	874.12	874.28	874.43	874.59	874.75	874.91	**50.20**
50.30	874.91	875.07	875.22	875.38	875.54	875.70	875.86	876.02	876.17	876.33	876.49	**50.30**
50.40	876.49	876.65	876.81	876.96	877.12	877.28	877.44	877.60	877.76	877.91	878.07	**50.40**
50.50	878.07	878.23	878.39	878.55	878.71	878.86	879.02	879.18	879.34	879.50	879.66	**50.50**
50.60	879.66	879.81	879.97	880.13	880.29	880.45	880.61	880.76	880.92	881.08	881.24	**50.60**
50.70	881.24	881.40	881.56	881.72	881.87	882.03	882.19	882.35	882.51	882.67	882.83	**50.70**
50.80	882.83	882.99	883.14	883.30	883.46	883.62	883.78	883.94	884.10	884.26	884.41	**50.80**
50.90	884.41	884.57	884.73	884.89	885.05	885.21	885.37	885.53	885.69	885.84	886.00	**50.90**
51.00	886.00	886.16	886.32	886.48	886.64	886.80	886.96	887.12	887.28	887.43	887.59	**51.00**
51.10	887.59	887.75	887.91	888.07	888.23	888.39	888.55	888.71	888.87	889.03	889.18	**51.10**
51.20	889.18	889.34	889.50	889.66	889.82	889.98	890.14	890.30	890.46	890.62	890.78	**51.20**
51.30	890.78	890.94	891.10	891.26	891.42	891.57	891.73	891.89	892.05	892.21	892.37	**51.30**
51.40	892.37	892.53	892.69	892.85	893.01	893.17	893.33	893.49	893.65	893.81	893.97	**51.40**
51.50	893.97	894.13	894.29	894.45	894.61	894.77	894.93	895.09	895.25	895.40	895.56	**51.50**
51.60	895.56	895.72	895.88	896.04	896.20	896.36	896.52	896.68	896.84	897.00	897.16	**51.60**
51.70	897.16	897.32	897.48	897.64	897.80	897.96	898.12	898.28	898.44	898.60	898.76	**51.70**
51.80	898.76	898.92	899.08	899.24	899.40	899.56	899.72	899.88	900.04	900.20	900.36	**51.80**
51.90	900.36	900.52	900.68	900.84	901.00	901.16	901.33	901.49	901.65	901.81	901.97	**51.90**
52.00	901.97	902.13	902.29	902.45	902.61	902.77	902.93	903.09	903.25	903.41	903.57	**52.00**
52.10	903.57	903.73	903.89	904.05	904.21	904.37	904.53	904.69	904.85	905.02	905.18	**52.10**
52.20	905.18	905.34	905.50	905.66	905.82	905.98	906.14	906.30	906.46	906.62	906.78	**52.20**
52.30	906.78	906.94	907.10	907.27	907.43	907.59	907.75	907.91	908.07	908.23	908.39	**52.30**
52.40	908.39	908.55	908.71	908.87	909.03	909.20	909.36	909.52	909.68	909.84	910.00	**52.40**
52.50	910.00	910.16	910.32	910.48	910.65	910.81	910.97	911.13	911.29	911.45	911.61	**52.50**
52.60	911.61	911.77	911.93	912.10	912.26	912.42	912.58	912.74	912.90	913.06	913.23	**52.60**
52.70	913.23	913.39	913.55	913.71	913.87	914.03	914.19	914.35	914.52	914.68	914.84	**52.70**
52.80	914.84	915.00	915.16	915.32	915.49	915.65	915.81	915.97	916.13	916.29	916.45	**52.80**
52.90	916.45	916.62	916.78	916.94	917.10	917.26	917.43	917.59	917.75	917.91	918.07	**52.90**
53.00	918.07	918.23	918.40	918.56	918.72	918.88	919.04	919.21	919.37	919.53	919.69	**53.00**
53.10	919.69	919.85	920.01	920.18	920.34	920.50	920.66	920.82	920.99	921.15	921.31	**53.10**
53.20	921.31	921.47	921.64	921.80	921.96	922.12	922.28	922.45	922.61	922.77	922.93	**53.20**
53.30	922.93	923.09	923.26	923.42	923.58	923.74	923.91	924.07	924.23	924.39	924.56	**53.30**
53.40	924.56	924.72	924.88	925.04	925.21	925.37	925.53	925.69	925.86	926.02	926.18	**53.40**
53.50	926.18	926.34	926.51	926.67	926.83	926.99	927.16	927.32	927.48	927.64	927.81	**53.50**
53.60	927.81	927.97	928.13	928.29	928.46	928.62	928.78	928.95	929.11	929.27	929.43	**53.60**
53.70	929.43	929.60	929.76	929.92	930.09	930.25	930.41	930.57	930.74	930.90	931.06	**53.70**
53.80	931.06	931.23	931.39	931.55	931.72	931.88	932.04	932.20	932.37	932.53	932.69	**53.80**
53.90	932.69	932.86	933.02	933.18	933.35	933.51	933.67	933.84	934.00	934.16	934.33	**53.90**
54.00	934.33	934.49	934.65	934.82	934.98	935.14	935.31	935.47	935.63	935.80	935.96	**54.00**
54.10	935.96	936.12	936.29	936.45	936.61	936.78	936.94	937.10	937.27	937.43	937.59	**54.10**
54.20	937.59	937.76	937.92	938.09	938.25	938.41	938.58	938.74	938.90	939.07	939.23	**54.20**
54.30	939.23	939.39	939.56	939.72	939.89	940.05	940.21	940.38	940.54	940.71	940.87	**54.30**
54.40	940.87	941.03	941.20	941.36	941.52	941.69	941.85	942.02	942.18	942.34	942.51	**54.40**
54.50	942.51	942.67	942.84	943.00	943.16	943.33	943.49	943.66	943.82	943.99	944.15	**54.50**
54.60	944.15	944.31	944.48	944.64	944.81	944.97	945.13	945.30	945.46	945.63	945.79	**54.60**
54.70	945.79	945.96	946.12	946.29	946.45	946.61	946.78	946.94	947.11	947.27	947.44	**54.70**
54.80	947.44	947.60	947.77	947.93	948.09	948.26	948.42	948.59	948.75	948.92	949.08	**54.80**
54.90	949.08	949.25	949.41	949.58	949.74	949.90	950.07	950.23	950.40	950.56	950.73	**54.90**
55.00	950.73	950.89	951.06	951.22	951.39	951.55	951.72	951.88	952.05	952.21	952.38	**55.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
55.00	950.73	950.89	951.06	951.22	951.39	951.55	951.72	951.88	952.05	952.21	952.38	**55.00**
55.10	952.38	952.54	952.71	952.87	953.04	953.20	953.37	953.53	953.70	953.86	954.03	**55.10**
55.20	954.03	954.19	954.36	954.52	954.69	954.85	955.02	955.18	955.35	955.51	955.68	**55.20**
55.30	955.68	955.84	956.01	956.17	956.34	956.50	956.67	956.83	957.00	957.17	957.33	**55.30**
55.40	957.33	957.50	957.66	957.83	957.99	958.16	958.32	958.49	958.65	958.82	958.99	**55.40**
55.50	958.99	959.15	959.32	959.48	959.65	959.81	959.98	960.14	960.31	960.48	960.64	**55.50**
55.60	960.64	960.81	960.97	961.14	961.30	961.47	961.63	961.80	961.97	962.13	962.30	**55.60**
55.70	962.30	962.46	962.63	962.80	962.96	963.13	963.29	963.46	963.62	963.79	963.96	**55.70**
55.80	963.96	964.12	964.29	964.45	964.62	964.79	964.95	965.12	965.28	965.45	965.62	**55.80**
55.90	965.62	965.78	965.95	966.11	966.28	966.45	966.61	966.78	966.95	967.11	967.28	**55.90**
56.00	967.28	967.44	967.61	967.78	967.94	968.11	968.28	968.44	968.61	968.77	968.94	**56.00**
56.10	968.94	969.11	969.27	969.44	969.61	969.77	969.94	970.11	970.27	970.44	970.60	**56.10**
56.20	970.60	970.77	970.94	971.10	971.27	971.44	971.60	971.77	971.94	972.10	972.27	**56.20**
56.30	972.27	972.44	972.60	972.77	972.94	973.10	973.27	973.44	973.60	973.77	973.94	**56.30**
56.40	973.94	974.10	974.27	974.44	974.60	974.77	974.94	975.10	975.27	975.44	975.61	**56.40**
56.50	975.61	975.77	975.94	976.11	976.27	976.44	976.61	976.77	976.94	977.11	977.28	**56.50**
56.60	977.28	977.44	977.61	977.78	977.94	978.11	978.28	978.44	978.61	978.78	978.95	**56.60**
56.70	978.95	979.11	979.28	979.45	979.61	979.78	979.95	980.12	980.28	980.45	980.62	**56.70**
56.80	980.62	980.79	980.95	981.12	981.29	981.46	981.62	981.79	981.96	982.12	982.29	**56.80**
56.90	982.29	982.46	982.63	982.79	982.96	983.13	983.30	983.46	983.63	983.80	983.97	**56.90**
57.00	983.97	984.13	984.30	984.47	984.64	984.81	984.97	985.14	985.31	985.48	985.64	**57.00**
57.10	985.64	985.81	985.98	986.15	986.31	986.48	986.65	986.82	986.99	987.15	987.32	**57.10**
57.20	987.32	987.49	987.66	987.82	987.99	988.16	988.33	988.50	988.66	988.83	989.00	**57.20**
57.30	989.00	989.17	989.34	989.50	989.67	989.84	990.01	990.18	990.34	990.51	990.68	**57.30**
57.40	990.68	990.85	991.02	991.18	991.35	991.52	991.69	991.86	992.02	992.19	992.36	**57.40**
57.50	992.36	992.53	992.70	992.87	993.03	993.20	993.37	993.54	993.71	993.88	994.04	**57.50**
57.60	994.04	994.21	994.38	994.55	994.72	994.89	995.05	995.22	995.39	995.56	995.73	**57.60**
57.70	995.73	995.90	996.06	996.23	996.40	996.57	996.74	996.91	997.08	997.24	997.41	**57.70**
57.80	997.41	997.58	997.75	997.92	998.09	998.26	998.42	998.59	998.76	998.93	999.10	**57.80**
57.90	999.10	999.27	999.44	999.60	999.77	999.94	1000.11	1000.28	1000.45	1000.62	1000.79	**57.90**
58.00	1000.79	1000.96	1001.12	1001.29	1001.46	1001.63	1001.80	1001.97	1002.14	1002.31	1002.47	**58.00**
58.10	1002.47	1002.64	1002.81	1002.98	1003.15	1003.32	1003.49	1003.66	1003.83	1004.00	1004.16	**58.10**
58.20	1004.16	1004.33	1004.50	1004.67	1004.84	1005.01	1005.18	1005.35	1005.52	1005.69	1005.86	**58.20**
58.30	1005.86	1006.02	1006.19	1006.36	1006.53	1006.70	1006.87	1007.04	1007.21	1007.38	1007.55	**58.30**
58.40	1007.55	1007.72	1007.89	1008.06	1008.22	1008.39	1008.56	1008.73	1008.90	1009.07	1009.24	**58.40**
58.50	1009.24	1009.41	1009.58	1009.75	1009.92	1010.09	1010.26	1010.43	1010.60	1010.77	1010.93	**58.50**
58.60	1010.93	1011.10	1011.27	1011.44	1011.61	1011.78	1011.95	1012.12	1012.29	1012.46	1012.63	**58.60**
58.70	1012.63	1012.80	1012.97	1013.14	1013.31	1013.48	1013.65	1013.82	1013.99	1014.16	1014.33	**58.70**
58.80	1014.33	1014.50	1014.67	1014.84	1015.01	1015.17	1015.34	1015.51	1015.68	1015.85	1016.02	**58.80**
58.90	1016.02	1016.19	1016.36	1016.53	1016.70	1016.87	1017.04	1017.21	1017.38	1017.55	1017.72	**58.90**
59.00	1017.72	1017.89	1018.06	1018.23	1018.40	1018.57	1018.74	1018.91	1019.08	1019.25	1019.42	**59.00**
59.10	1019.42	1019.59	1019.76	1019.93	1020.10	1020.27	1020.44	1020.61	1020.78	1020.95	1021.12	**59.10**
59.20	1021.12	1021.29	1021.46	1021.63	1021.80	1021.97	1022.14	1022.31	1022.48	1022.65	1022.82	**59.20**
59.30	1022.82	1022.99	1023.16	1023.33	1023.50	1023.67	1023.84	1024.02	1024.19	1024.36	1024.53	**59.30**
59.40	1024.53	1024.70	1024.87	1025.04	1025.21	1025.38	1025.55	1025.72	1025.89	1026.06	1026.23	**59.40**
59.50	1026.23	1026.40	1026.57	1026.74	1026.91	1027.08	1027.25	1027.42	1027.59	1027.76	1027.93	**59.50**
59.60	1027.93	1028.10	1028.27	1028.44	1028.62	1028.79	1028.96	1029.13	1029.30	1029.47	1029.64	**59.60**
59.70	1029.64	1029.81	1029.98	1030.15	1030.32	1030.49	1030.66	1030.83	1031.00	1031.17	1031.34	**59.70**
59.80	1031.34	1031.52	1031.69	1031.86	1032.03	1032.20	1032.37	1032.54	1032.71	1032.88	1033.05	**59.80**
59.90	1033.05	1033.22	1033.39	1033.56	1033.73	1033.91	1034.08	1034.25	1034.42	1034.59	1034.76	**59.90**
60.00	1034.76	1034.93	1035.10	1035.27	1035.44	1035.61	1035.78	1035.96	1036.13	1036.30	1036.47	**60.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
60.00	1034.76	1034.93	1035.10	1035.27	1035.44	1035.61	1035.78	1035.96	1036.13	1036.30	1036.47	**60.00**
60.10	1036.47	1036.64	1036.81	1036.98	1037.15	1037.32	1037.49	1037.66	1037.84	1038.01	1038.18	**60.10**
60.20	1038.18	1038.35	1038.52	1038.69	1038.86	1039.03	1039.20	1039.37	1039.55	1039.72	1039.89	**60.20**
60.30	1039.89	1040.06	1040.23	1040.40	1040.57	1040.74	1040.91	1041.09	1041.26	1041.43	1041.60	**60.30**
60.40	1041.60	1041.77	1041.94	1042.11	1042.28	1042.46	1042.63	1042.80	1042.97	1043.14	1043.31	**60.40**
60.50	1043.31	1043.48	1043.65	1043.82	1044.00	1044.17	1044.34	1044.51	1044.68	1044.85	1045.02	**60.50**
60.60	1045.02	1045.20	1045.37	1045.54	1045.71	1045.88	1046.05	1046.22	1046.39	1046.57	1046.74	**60.60**
60.70	1046.74	1046.91	1047.08	1047.25	1047.42	1047.59	1047.77	1047.94	1048.11	1048.28	1048.45	**60.70**
60.80	1048.45	1048.62	1048.79	1048.97	1049.14	1049.31	1049.48	1049.65	1049.82	1049.99	1050.17	**60.80**
60.90	1050.17	1050.34	1050.51	1050.68	1050.85	1051.02	1051.20	1051.37	1051.54	1051.71	1051.88	**60.90**
61.00	1051.88	1052.05	1052.23	1052.40	1052.57	1052.74	1052.91	1053.08	1053.25	1053.43	1053.60	**61.00**
61.10	1053.60	1053.77	1053.94	1054.11	1054.28	1054.46	1054.63	1054.80	1054.97	1055.14	1055.31	**61.10**
61.20	1055.31	1055.49	1055.66	1055.83	1056.00	1056.17	1056.35	1056.52	1056.69	1056.86	1057.03	**61.20**
61.30	1057.03	1057.20	1057.38	1057.55	1057.72	1057.89	1058.06	1058.24	1058.41	1058.58	1058.75	**61.30**
61.40	1058.75	1058.92	1059.09	1059.27	1059.44	1059.61	1059.78	1059.95	1060.13	1060.30	1060.47	**61.40**
61.50	1060.47	1060.64	1060.81	1060.99	1061.16	1061.33	1061.50	1061.67	1061.84	1062.02	1062.19	**61.50**
61.60	1062.19	1062.36	1062.53	1062.70	1062.88	1063.05	1063.22	1063.39	1063.56	1063.74	1063.91	**61.60**
61.70	1063.91	1064.08	1064.25	1064.42	1064.60	1064.77	1064.94	1065.11	1065.29	1065.46	1065.63	**61.70**
61.80	1065.63	1065.80	1065.97	1066.15	1066.32	1066.49	1066.66	1066.83	1067.01	1067.18	1067.35	**61.80**
61.90	1067.35	1067.52	1067.69	1067.87	1068.04	1068.21	1068.38	1068.56	1068.73	1068.90	1069.07	**61.90**
62.00	1069.07	1069.24	1069.42	1069.59	1069.76	1069.93	1070.11	1070.28	1070.45	1070.62	1070.79	**62.00**
62.10	1070.79	1070.97	1071.14	1071.31	1071.48	1071.66	1071.83	1072.00	1072.17	1072.34	1072.52	**62.10**
62.20	1072.52	1072.69	1072.86	1073.03	1073.21	1073.38	1073.55	1073.72	1073.89	1074.07	1074.24	**62.20**
62.30	1074.24	1074.41	1074.58	1074.76	1074.93	1075.10	1075.27	1075.45	1075.62	1075.79	1075.96	**62.30**
62.40	1075.96	1076.14	1076.31	1076.48	1076.65	1076.83	1077.00	1077.17	1077.34	1077.51	1077.69	**62.40**
62.50	1077.69	1077.86	1078.03	1078.20	1078.38	1078.55	1078.72	1078.89	1079.07	1079.24	1079.41	**62.50**
62.60	1079.41	1079.58	1079.76	1079.93	1080.10	1080.27	1080.45	1080.62	1080.79	1080.96	1081.14	**62.60**
62.70	1081.14	1081.31	1081.48	1081.65	1081.83	1082.00	1082.17	1082.34	1082.52	1082.69	1082.86	**62.70**
62.80	1082.86	1083.03	1083.21	1083.38	1083.55	1083.72	1083.90	1084.07	1084.24	1084.41	1084.59	**62.80**
62.90	1084.59	1084.76	1084.93	1085.11	1085.28	1085.45	1085.62	1085.80	1085.97	1086.14	1086.31	**62.90**
63.00	1086.31	1086.49	1086.66	1086.83	1087.00	1087.18	1087.35	1087.52	1087.69	1087.87	1088.04	**63.00**
63.10	1088.04	1088.21	1088.39	1088.56	1088.73	1088.90	1089.08	1089.25	1089.42	1089.59	1089.77	**63.10**
63.20	1089.77	1089.94	1090.11	1090.28	1090.46	1090.63	1090.80	1090.98	1091.15	1091.32	1091.49	**63.20**
63.30	1091.49	1091.67	1091.84	1092.01	1092.18	1092.36	1092.53	1092.70	1092.88	1093.05	1093.22	**63.30**
63.40	1093.22	1093.39	1093.57	1093.74	1093.91	1094.09	1094.26	1094.43	1094.60	1094.78	1094.95	**63.40**
63.50	1094.95	1095.12	1095.29	1095.47	1095.64	1095.81	1095.99	1096.16	1096.33	1096.50	1096.68	**63.50**
63.60	1096.68	1096.85	1097.02	1097.20	1097.37	1097.54	1097.71	1097.89	1098.06	1098.23	1098.41	**63.60**
63.70	1098.41	1098.58	1098.75	1098.92	1099.10	1099.27	1099.44	1099.62	1099.79	1099.96	1100.13	**63.70**
63.80	1100.13	1100.31	1100.48	1100.65	1100.83	1101.00	1101.17	1101.34	1101.52	1101.69	1101.86	**63.80**
63.90	1101.86	1102.04	1102.21	1102.38	1102.56	1102.73	1102.90	1103.07	1103.25	1103.42	1103.59	**63.90**
64.00	1103.59	1103.77	1103.94	1104.11	1104.28	1104.46	1104.63	1104.80	1104.98	1105.15	1105.32	**64.00**
64.10	1105.32	1105.50	1105.67	1105.84	1106.01	1106.19	1106.36	1106.53	1106.71	1106.88	1107.05	**64.10**
64.20	1107.05	1107.23	1107.40	1107.57	1107.74	1107.92	1108.09	1108.26	1108.44	1108.61	1108.78	**64.20**
64.30	1108.78	1108.96	1109.13	1109.30	1109.47	1109.65	1109.82	1109.99	1110.17	1110.34	1110.51	**64.30**
64.40	1110.51	1110.69	1110.86	1111.03	1111.20	1111.38	1111.55	1111.72	1111.90	1112.07	1112.24	**64.40**
64.50	1112.24	1112.42	1112.59	1112.76	1112.94	1113.11	1113.28	1113.45	1113.63	1113.80	1113.97	**64.50**
64.60	1113.97	1114.15	1114.32	1114.49	1114.67	1114.84	1115.01	1115.19	1115.36	1115.53	1115.70	**64.60**
64.70	1115.70	1115.88	1116.05	1116.22	1116.40	1116.57	1116.74	1116.92	1117.09	1117.26	1117.44	**64.70**
64.80	1117.44	1117.61	1117.78	1117.96	1118.13	1118.30	1118.47	1118.65	1118.82	1118.99	1119.17	**64.80**
64.90	1119.17	1119.34	1119.51	1119.69	1119.86	1120.03	1120.21	1120.38	1120.55	1120.73	1120.90	**64.90**
65.00	1120.90	1121.07	1121.25	1121.42	1121.59	1121.76	1121.94	1122.11	1122.28	1122.46	1122.63	**65.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.1. *Type J thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
65.00	1120.90	1121.07	1121.25	1121.42	1121.59	1121.76	1121.94	1122.11	1122.28	1122.46	1122.63	**65.00**
65.10	1122.63	1122.80	1122.98	1123.15	1123.32	1123.50	1123.67	1123.84	1124.02	1124.19	1124.36	**65.10**
65.20	1124.36	1124.54	1124.71	1124.88	1125.06	1125.23	1125.40	1125.57	1125.75	1125.92	1126.09	**65.20**
65.30	1126.09	1126.27	1126.44	1126.61	1126.79	1126.96	1127.13	1127.31	1127.48	1127.65	1127.83	**65.30**
65.40	1127.83	1128.00	1128.17	1128.35	1128.52	1128.69	1128.87	1129.04	1129.21	1129.39	1129.56	**65.40**
65.50	1129.56	1129.73	1129.91	1130.08	1130.25	1130.43	1130.60	1130.77	1130.95	1131.12	1131.29	**65.50**
65.60	1131.29	1131.47	1131.64	1131.81	1131.99	1132.16	1132.33	1132.51	1132.68	1132.85	1133.02	**65.60**
65.70	1133.02	1133.20	1133.37	1133.54	1133.72	1133.89	1134.06	1134.24	1134.41	1134.58	1134.76	**65.70**
65.80	1134.76	1134.93	1135.10	1135.28	1135.45	1135.62	1135.80	1135.97	1136.14	1136.32	1136.49	**65.80**
65.90	1136.49	1136.66	1136.84	1137.01	1137.18	1137.36	1137.53	1137.70	1137.88	1138.05	1138.22	**65.90**
66.00	1138.22	1138.40	1138.57	1138.74	1138.92	1139.09	1139.26	1139.44	1139.61	1139.78	1139.96	**66.00**
66.10	1139.96	1140.13	1140.31	1140.48	1140.65	1140.83	1141.00	1141.17	1141.35	1141.52	1141.69	**66.10**
66.20	1141.69	1141.87	1142.04	1142.21	1142.39	1142.56	1142.73	1142.91	1143.08	1143.25	1143.43	**66.20**
66.30	1143.43	1143.60	1143.77	1143.95	1144.12	1144.29	1144.47	1144.64	1144.81	1144.99	1145.16	**66.30**
66.40	1145.16	1145.33	1145.51	1145.68	1145.85	1146.03	1146.20	1146.37	1146.55	1146.72	1146.89	**66.40**
66.50	1146.89	1147.07	1147.24	1147.42	1147.59	1147.76	1147.94	1148.11	1148.28	1148.46	1148.63	**66.50**
66.60	1148.63	1148.80	1148.98	1149.15	1149.32	1149.50	1149.67	1149.84	1150.02	1150.19	1150.36	**66.60**
66.70	1150.36	1150.54	1150.71	1150.88	1151.06	1151.23	1151.41	1151.58	1151.75	1151.93	1152.10	**66.70**
66.80	1152.10	1152.27	1152.45	1152.62	1152.79	1152.97	1153.14	1153.31	1153.49	1153.66	1153.83	**66.80**
66.90	1153.83	1154.01	1154.18	1154.35	1154.53	1154.70	1154.88	1155.05	1155.22	1155.40	1155.57	**66.90**
67.00	1155.57	1155.74	1155.92	1156.09	1156.26	1156.44	1156.61	1156.78	1156.96	1157.13	1157.31	**67.00**
67.10	1157.31	1157.48	1157.65	1157.83	1158.00	1158.17	1158.35	1158.52	1158.69	1158.87	1159.04	**67.10**
67.20	1159.04	1159.21	1159.39	1159.56	1159.74	1159.91	1160.08	1160.26	1160.43	1160.60	1160.78	**67.20**
67.30	1160.78	1160.95	1161.12	1161.30	1161.47	1161.65	1161.82	1161.99	1162.17	1162.34	1162.51	**67.30**
67.40	1162.51	1162.69	1162.86	1163.04	1163.21	1163.38	1163.56	1163.73	1163.90	1164.08	1164.25	**67.40**
67.50	1164.25	1164.42	1164.60	1164.77	1164.95	1165.12	1165.29	1165.47	1165.64	1165.81	1165.99	**67.50**
67.60	1165.99	1166.16	1166.34	1166.51	1166.68	1166.86	1167.03	1167.20	1167.38	1167.55	1167.73	**67.60**
67.70	1167.73	1167.90	1168.07	1168.25	1168.42	1168.59	1168.77	1168.94	1169.12	1169.29	1169.46	**67.70**
67.80	1169.46	1169.64	1169.81	1169.98	1170.16	1170.33	1170.51	1170.68	1170.85	1171.03	1171.20	**67.80**
67.90	1171.20	1171.37	1171.55	1171.72	1171.90	1172.07	1172.24	1172.42	1172.59	1172.77	1172.94	**67.90**
68.00	1172.94	1173.11	1173.29	1173.46	1173.63	1173.81	1173.98	1174.16	1174.33	1174.50	1174.68	**68.00**
68.10	1174.68	1174.85	1175.03	1175.20	1175.37	1175.55	1175.72	1175.90	1176.07	1176.24	1176.42	**68.10**
68.20	1176.42	1176.59	1176.77	1176.94	1177.11	1177.29	1177.46	1177.63	1177.81	1177.98	1178.16	**68.20**
68.30	1178.16	1178.33	1178.50	1178.68	1178.85	1179.03	1179.20	1179.37	1179.55	1179.72	1179.90	**68.30**
68.40	1179.90	1180.07	1180.24	1180.42	1180.59	1180.77	1180.94	1181.11	1181.29	1181.46	1181.64	**68.40**
68.50	1181.64	1181.81	1181.99	1182.16	1182.33	1182.51	1182.68	1182.86	1183.03	1183.20	1183.38	**68.50**
68.60	1183.38	1183.55	1183.73	1183.90	1184.07	1184.25	1184.42	1184.60	1184.77	1184.95	1185.12	**68.60**
68.70	1185.12	1185.29	1185.47	1185.64	1185.82	1185.99	1186.16	1186.34	1186.51	1186.69	1186.86	**68.70**
68.80	1186.86	1187.04	1187.21	1187.38	1187.56	1187.73	1187.91	1188.08	1188.26	1188.43	1188.60	**68.80**
68.90	1188.60	1188.78	1188.95	1189.13	1189.30	1189.48	1189.65	1189.82	1190.00	1190.17	1190.35	**68.90**
69.00	1190.35	1190.52	1190.70	1190.87	1191.04	1191.22	1191.39	1191.57	1191.74	1191.92	1192.09	**69.00**
69.10	1192.09	1192.26	1192.44	1192.61	1192.79	1192.96	1193.14	1193.31	1193.49	1193.66	1193.83	**69.10**
69.20	1193.83	1194.01	1194.18	1194.36	1194.53	1194.71	1194.88	1195.06	1195.23	1195.40	1195.58	**69.20**
69.30	1195.58	1195.75	1195.93	1196.10	1196.28	1196.45	1196.63	1196.80	1196.98	1197.15	1197.32	**69.30**
69.40	1197.32	1197.50	1197.67	1197.85	1198.02	1198.20	1198.37	1198.55	1198.72	1198.90	1199.07	**69.40**
69.50	1199.07	1199.25	1199.42	1199.60	1199.77	1199.94						**69.50**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−8.00	−337.32	−338.20	−339.09	−339.99	−340.89	−341.80	−342.71	−343.63	−344.56	−345.49		−8.00
−7.90	−328.79	−329.62	−330.45	−331.29	−332.14	−332.99	−333.84	−334.70	−335.57	−336.44	−337.32	−7.90
−7.80	−320.72	−321.51	−322.30	−323.10	−323.90	−324.70	−325.51	−326.32	−327.14	−327.96	−328.79	−7.80
−7.70	−313.05	−313.80	−314.56	−315.32	−316.08	−316.84	−317.61	−318.38	−319.16	−319.94	−320.72	−7.70
−7.60	−305.71	−306.43	−307.15	−307.88	−308.61	−309.34	−310.08	−310.82	−311.56	−312.30	−313.05	−7.60
−7.50	−298.65	−299.34	−300.04	−300.74	−301.44	−302.15	−302.85	−303.56	−304.27	−304.99	−305.71	−7.50
−7.40	−291.83	−292.50	−293.18	−293.85	−294.53	−295.21	−295.89	−296.58	−297.27	−297.96	−298.65	−7.40
−7.30	−285.23	−285.88	−286.54	−287.19	−287.85	−288.51	−289.17	−289.83	−290.50	−291.16	−291.83	−7.30
−7.20	−278.83	−279.46	−280.09	−280.73	−281.37	−282.01	−282.65	−283.29	−283.94	−284.58	−285.23	−7.20
−7.10	−272.59	−273.21	−273.83	−274.44	−275.07	−275.69	−276.31	−276.94	−277.57	−278.20	−278.83	−7.10
−7.00	−266.51	−267.11	−267.72	−268.32	−268.93	−269.53	−270.14	−270.75	−271.36	−271.98	−272.59	−7.00
−6.90	−260.57	−261.16	−261.75	−262.34	−262.93	−263.53	−264.12	−264.72	−265.31	−265.91	−266.51	−6.90
−6.80	−254.77	−255.34	−255.92	−256.50	−257.07	−257.65	−258.24	−258.82	−259.40	−259.99	−260.57	−6.80
−6.70	−249.07	−249.64	−250.20	−250.77	−251.34	−251.91	−252.48	−253.05	−253.62	−254.19	−254.77	−6.70
−6.60	−243.49	−244.05	−244.60	−245.16	−245.71	−246.27	−246.83	−247.39	−247.95	−248.51	−249.07	−6.60
−6.50	−238.01	−238.56	−239.10	−239.65	−240.19	−240.74	−241.29	−241.84	−242.39	−242.94	−243.49	−6.50
−6.40	−232.62	−233.16	−233.70	−234.23	−234.77	−235.31	−235.85	−236.39	−236.93	−237.47	−238.01	−6.40
−6.30	−227.32	−227.85	−228.38	−228.91	−229.43	−229.96	−230.49	−231.03	−231.56	−232.09	−232.62	−6.30
−6.20	−222.11	−222.62	−223.14	−223.66	−224.18	−224.71	−225.23	−225.75	−226.27	−226.80	−227.32	−6.20
−6.10	−216.96	−217.47	−217.99	−218.50	−219.01	−219.53	−220.04	−220.55	−221.07	−221.59	−222.11	−6.10
−6.00	−211.89	−212.40	−212.90	−213.41	−213.91	−214.42	−214.93	−215.43	−215.94	−216.45	−216.96	−6.00
−5.90	−206.89	−207.39	−207.88	−208.38	−208.88	−209.38	−209.88	−210.38	−210.89	−211.39	−211.89	−5.90
−5.80	−201.95	−202.44	−202.93	−203.42	−203.92	−204.41	−204.90	−205.40	−205.89	−206.39	−206.89	−5.80
−5.70	−197.07	−197.55	−198.04	−198.53	−199.01	−199.50	−199.99	−200.48	−200.97	−201.46	−201.95	−5.70
−5.60	−192.24	−192.72	−193.20	−193.68	−194.17	−194.65	−195.13	−195.61	−196.10	−196.58	−197.07	−5.60
−5.50	−187.47	−187.95	−188.42	−188.90	−189.38	−189.85	−190.33	−190.81	−191.29	−191.76	−192.24	−5.50
−5.40	−182.75	−183.22	−183.69	−184.17	−184.64	−185.11	−185.58	−186.05	−186.53	−187.00	−187.47	−5.40
−5.30	−178.08	−178.55	−179.01	−179.48	−179.95	−180.41	−180.88	−181.35	−181.82	−182.29	−182.75	−5.30
−5.20	−173.46	−173.92	−174.38	−174.84	−175.30	−175.77	−176.23	−176.69	−177.16	−177.62	−178.08	−5.20
−5.10	−168.88	−169.34	−169.79	−170.25	−170.71	−171.17	−171.62	−172.08	−172.54	−173.00	−173.46	−5.10
−5.00	−164.34	−164.79	−165.25	−165.70	−166.15	−166.61	−167.06	−167.52	−167.97	−168.43	−168.88	−5.00
−4.90	−159.85	−160.29	−160.74	−161.19	−161.64	−162.09	−162.54	−162.99	−163.44	−163.89	−164.34	−4.90
−4.80	−155.39	−155.83	−156.28	−156.72	−157.17	−157.61	−158.06	−158.50	−158.95	−159.40	−159.85	−4.80
−4.70	−150.96	−151.40	−151.85	−152.29	−152.73	−153.17	−153.61	−154.06	−154.50	−154.94	−155.39	−4.70
−4.60	−146.58	−147.01	−147.45	−147.89	−148.33	−148.77	−149.21	−149.64	−150.08	−150.52	−150.96	−4.60
−4.50	−142.22	−142.66	−143.09	−143.53	−143.96	−144.40	−144.83	−145.27	−145.70	−146.14	−146.58	−4.50
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B6.2.2. ***Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued***

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−4.50	−142.22	−142.66	−143.09	−143.53	−143.96	−144.40	−144.83	−145.27	−145.70	−146.14	−146.58	**−4.50**
−4.40	−137.90	−138.33	−138.76	−139.20	−139.63	−140.06	−140.49	−140.92	−141.36	−141.79	−142.22	**−4.40**
−4.30	−133.61	−134.04	−134.47	−134.90	−135.33	−135.75	−136.18	−136.61	−137.04	−137.47	−137.90	**−4.30**
−4.20	−129.36	−129.78	−130.20	−130.63	−131.06	−131.48	−131.91	−132.33	−132.76	−133.19	−133.61	**−4.20**
−4.10	−125.12	−125.55	−125.97	−126.39	−126.81	−127.24	−127.66	−128.08	−128.51	−128.93	−129.36	**−4.10**
−4.00	−120.92	−121.34	−121.76	−122.18	−122.60	−123.02	−123.44	−123.86	−124.28	−124.70	−125.12	**−4.00**
−3.90	−116.75	−117.16	−117.58	−118.00	−118.41	−118.83	−119.25	−119.67	−120.09	−120.50	−120.92	**−3.90**
−3.80	−112.60	−113.01	−113.43	−113.84	−114.25	−114.67	−115.08	−115.50	−115.92	−116.33	−116.75	**−3.80**
−3.70	−108.47	−108.88	−109.30	−109.71	−110.12	−110.53	−110.94	−111.36	−111.77	−112.18	−112.60	**−3.70**
−3.60	−104.37	−104.78	−105.19	−105.60	−106.01	−106.42	−106.83	−107.24	−107.65	−108.06	−108.47	**−3.60**
−3.50	−100.30	−100.70	−101.11	−101.52	−101.92	−102.33	−102.74	−103.15	−103.56	−103.96	−104.37	**−3.50**
−3.40	−96.24	−96.65	−97.05	−97.46	−97.86	−98.27	−98.67	−99.08	−99.48	−99.89	−100.30	**−3.40**
−3.30	−92.21	−92.61	−93.01	−93.42	−93.82	−94.22	−94.63	−95.03	−95.43	−95.84	−96.24	**−3.30**
−3.20	−88.20	−88.60	−89.00	−89.40	−89.80	−90.20	−90.60	−91.00	−91.41	−91.81	−92.21	**−3.20**
−3.10	−84.21	−84.61	−85.00	−85.40	−85.80	−86.20	−86.60	−87.00	−87.40	−87.80	−88.20	**−3.10**
−3.00	−80.24	−80.63	−81.03	−81.43	−81.82	−82.22	−82.62	−83.01	−83.41	−83.81	−84.21	**−3.00**
−2.90	−76.28	−76.68	−77.07	−77.47	−77.86	−78.26	−78.65	−79.05	−79.44	−79.84	−80.24	**−2.90**
−2.80	−72.35	−72.74	−73.14	−73.53	−73.92	−74.32	−74.71	−75.10	−75.50	−75.89	−76.28	**−2.80**
−2.70	−68.44	−68.83	−69.22	−69.61	−70.00	−70.39	−70.78	−71.17	−71.57	−71.96	−72.35	**−2.70**
−2.60	−64.54	−64.93	−65.32	−65.71	−66.09	−66.48	−66.87	−67.26	−67.65	−68.05	−68.44	**−2.60**
−2.50	−60.66	−61.04	−61.43	−61.82	−62.21	−62.60	−62.98	−63.37	−63.76	−64.15	−64.54	**−2.50**
−2.40	−56.79	−57.18	−57.56	−57.95	−58.34	−58.72	−59.11	−59.50	−59.88	−60.27	−60.66	**−2.40**
−2.30	−52.95	−53.33	−53.71	−54.10	−54.48	−54.87	−55.25	−55.64	−56.02	−56.41	−56.79	**−2.30**
−2.20	−49.11	−49.50	−49.88	−50.26	−50.64	−51.03	−51.41	−51.79	−52.18	−52.56	−52.95	**−2.20**
−2.10	−45.30	−45.68	−46.06	−46.44	−46.82	−47.20	−47.58	−47.97	−48.35	−48.73	−49.11	**−2.10**
−2.00	−41.49	−41.87	−42.25	−42.63	−43.01	−43.39	−43.77	−44.15	−44.53	−44.91	−45.30	**−2.00**
−1.90	−37.70	−38.08	−38.46	−38.84	−39.22	−39.60	−39.98	−40.35	−40.73	−41.11	−41.49	**−1.90**
−1.80	−33.93	−34.31	−34.68	−35.06	−35.44	−35.82	−36.19	−36.57	−36.95	−37.33	−37.70	**−1.80**
−1.70	−30.17	−30.54	−30.92	−31.30	−31.67	−32.05	−32.42	−32.80	−33.18	−33.55	−33.93	**−1.70**
−1.60	−26.42	−26.80	−27.17	−27.54	−27.92	−28.29	−28.67	−29.04	−29.42	−29.79	−30.17	**−1.60**
−1.50	−22.69	−23.06	−23.43	−23.81	−24.18	−24.55	−24.93	−25.30	−25.67	−26.05	−26.42	**−1.50**
−1.40	−18.96	−19.34	−19.71	−20.08	−20.45	−20.82	−21.20	−21.57	−21.94	−22.31	−22.69	**−1.40**
−1.30	−15.25	−15.62	−16.00	−16.37	−16.74	−17.11	−17.48	−17.85	−18.22	−18.59	−18.96	**−1.30**
−1.20	−11.56	−11.93	−12.29	−12.66	−13.03	−13.40	−13.77	−14.14	−14.51	−14.88	−15.25	**−1.20**
−1.10	−7.87	−8.24	−8.61	−8.97	−9.34	−9.71	−10.08	−10.45	−10.82	−11.19	−11.56	**−1.10**
−1.00	−4.19	−4.56	−4.93	−5.30	−5.66	−6.03	−6.40	−6.77	−7.13	−7.50	−7.87	**−1.00**
−0.90	−0.53	−0.90	−1.26	−1.63	−1.99	−2.36	−2.73	−3.09	−3.46	−3.83	−4.19	**−0.90**
−0.80	3.12	2.76	2.39	2.03	1.66	1.30	0.93	0.57	0.20	−0.16	−0.53	**−0.80**
−0.70	6.77	6.40	6.04	5.68	5.31	4.95	4.58	4.22	3.85	3.49	3.12	**−0.70**
−0.60	10.40	10.04	9.68	9.31	8.95	8.59	8.22	7.86	7.50	7.13	6.77	**−0.60**
−0.50	14.02	13.66	13.30	12.94	12.58	12.21	11.85	11.49	11.13	10.76	10.40	**−0.50**
−0.40	17.64	17.28	16.92	16.55	16.19	15.83	15.47	15.11	14.75	14.39	14.02	**−0.40**
−0.30	21.24	20.88	20.52	20.16	19.80	19.44	19.08	18.72	18.36	18.00	17.64	**−0.30**
−0.20	24.84	24.48	24.12	23.76	23.40	23.04	22.68	22.32	21.96	21.60	21.24	**−0.20**
−0.10	28.42	28.06	27.71	27.35	26.99	26.63	26.27	25.91	25.55	25.20	24.84	**−0.10**
0.00	32.00	31.64	31.29	30.93	30.57	30.21	29.85	29.50	29.14	28.78	28.42	**0.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	32.36	32.71	33.07	33.43	33.79	34.14	34.50	34.86	35.21	35.57	0.00
0.10	35.57	35.92	36.28	36.64	36.99	37.35	37.71	38.06	38.42	38.77	39.13	0.10
0.20	39.13	39.48	39.84	40.20	40.55	40.91	41.26	41.62	41.97	42.33	42.68	0.20
0.30	42.68	43.04	43.39	43.74	44.10	44.45	44.81	45.16	45.52	45.87	46.22	0.30
0.40	46.22	46.58	46.93	47.29	47.64	47.99	48.35	48.70	49.05	49.41	49.76	0.40
0.50	49.76	50.11	50.47	50.82	51.17	51.53	51.88	52.23	52.58	52.94	53.29	0.50
0.60	53.29	53.64	53.99	54.35	54.70	55.05	55.40	55.75	56.11	56.46	56.81	0.60
0.70	56.81	57.16	57.51	57.87	58.22	58.57	58.92	59.27	59.62	59.97	60.32	0.70
0.80	60.32	60.68	61.03	61.38	61.73	62.08	62.43	62.78	63.13	63.48	63.83	0.80
0.90	63.83	64.18	64.53	64.88	65.23	65.58	65.93	66.28	66.63	66.98	67.33	0.90
1.00	67.33	67.68	68.03	68.38	68.73	69.08	69.43	69.78	70.13	70.47	70.82	1.00
1.10	70.82	71.17	71.52	71.87	72.22	72.57	72.92	73.26	73.61	73.96	74.31	1.10
1.20	74.31	74.66	75.01	75.35	75.70	76.05	76.40	76.75	77.09	77.44	77.79	1.20
1.30	77.79	78.14	78.48	78.83	79.18	79.53	79.87	80.22	80.57	80.92	81.26	1.30
1.40	81.26	81.61	81.96	82.30	82.65	83.00	83.34	83.69	84.04	84.38	84.73	1.40
1.50	84.73	85.08	85.42	85.77	86.12	86.46	86.81	87.15	87.50	87.85	88.19	1.50
1.60	88.19	88.54	88.88	89.23	89.57	89.92	90.27	90.61	90.96	91.30	91.65	1.60
1.70	91.65	91.99	92.34	92.68	93.03	93.37	93.72	94.06	94.41	94.75	95.10	1.70
1.80	95.10	95.44	95.79	96.13	96.48	96.82	97.16	97.51	97.85	98.20	98.54	1.80
1.90	98.54	98.88	99.23	99.57	99.92	100.26	100.60	100.95	101.29	101.64	101.98	1.90
2.00	101.98	102.32	102.67	103.01	103.35	103.70	104.04	104.38	104.73	105.07	105.41	2.00
2.10	105.41	105.76	106.10	106.44	106.78	107.13	107.47	107.81	108.15	108.50	108.84	2.10
2.20	108.84	109.18	109.52	109.87	110.21	110.55	110.89	111.24	111.58	111.92	112.26	2.20
2.30	112.26	112.60	112.95	113.29	113.63	113.97	114.31	114.66	115.00	115.34	115.68	2.30
2.40	115.68	116.02	116.36	116.70	117.05	117.39	117.73	118.07	118.41	118.75	119.09	2.40
2.50	119.09	119.43	119.77	120.12	120.46	120.80	121.14	121.48	121.82	122.16	122.50	2.50
2.60	122.50	122.84	123.18	123.52	123.86	124.20	124.54	124.88	125.22	125.56	125.90	2.60
2.70	125.90	126.24	126.58	126.92	127.26	127.60	127.94	128.28	128.62	128.96	129.30	2.70
2.80	129.30	129.64	129.98	130.32	130.66	131.00	131.34	131.68	132.02	132.36	132.70	2.80
2.90	132.70	133.03	133.37	133.71	134.05	134.39	134.73	135.07	135.41	135.75	136.08	2.90
3.00	136.08	136.42	136.76	137.10	137.44	137.78	138.12	138.45	138.79	139.13	139.47	3.00
3.10	139.47	139.81	140.15	140.48	140.82	141.16	141.50	141.84	142.18	142.51	142.85	3.10
3.20	142.85	143.19	143.53	143.86	144.20	144.54	144.88	145.22	145.55	145.89	146.23	3.20
3.30	146.23	146.57	146.90	147.24	147.58	147.91	148.25	148.59	148.93	149.26	149.60	3.30
3.40	149.60	149.94	150.27	150.61	150.95	151.29	151.62	151.96	152.30	152.63	152.97	3.40
3.50	152.97	153.31	153.64	153.98	154.32	154.65	154.99	155.33	155.66	156.00	156.33	3.50
3.60	156.33	156.67	157.01	157.34	157.68	158.02	158.35	158.69	159.02	159.36	159.70	3.60
3.70	159.70	160.03	160.37	160.70	161.04	161.37	161.71	162.05	162.38	162.72	163.05	3.70
3.80	163.05	163.39	163.72	164.06	164.40	164.73	165.07	165.40	165.74	166.07	166.41	3.80
3.90	166.41	166.74	167.08	167.41	167.75	168.08	168.42	168.75	169.09	169.42	169.76	3.90
4.00	169.76	170.09	170.43	170.76	171.10	171.43	171.77	172.10	172.44	172.77	173.10	4.00
4.10	173.10	173.44	173.77	174.11	174.44	174.78	175.11	175.45	175.78	176.11	176.45	4.10
4.20	176.45	176.78	177.12	177.45	177.78	178.12	178.45	178.79	179.12	179.45	179.79	4.20
4.30	179.79	180.12	180.46	180.79	181.12	181.46	181.79	182.13	182.46	182.79	183.13	4.30
4.40	183.13	183.46	183.79	184.13	184.46	184.79	185.13	185.46	185.79	186.13	186.46	4.40
4.50	186.46	186.79	187.13	187.46	187.79	188.13	188.46	188.79	189.13	189.46	189.79	4.50
4.60	189.79	190.12	190.46	190.79	191.12	191.46	191.79	192.12	192.45	192.79	193.12	4.60
4.70	193.12	193.45	193.78	194.12	194.45	194.78	195.11	195.45	195.78	196.11	196.44	4.70
4.80	196.44	196.78	197.11	197.44	197.77	198.11	198.44	198.77	199.10	199.43	199.77	4.80
4.90	199.77	200.10	200.43	200.76	201.09	201.43	201.76	202.09	202.42	202.75	203.09	4.90
5.00	203.09	203.42	203.75	204.08	204.41	204.75	205.08	205.41	205.74	206.07	206.40	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	203.09	203.42	203.75	204.08	204.41	204.75	205.08	205.41	205.74	206.07	206.40	**5.00**
5.10	206.40	206.73	207.07	207.40	207.73	208.06	208.39	208.72	209.05	209.39	209.72	**5.10**
5.20	209.72	210.05	210.38	210.71	211.04	211.37	211.70	212.04	212.37	212.70	213.03	**5.20**
5.30	213.03	213.36	213.69	214.02	214.35	214.68	215.01	215.35	215.68	216.01	216.34	**5.30**
5.40	216.34	216.67	217.00	217.33	217.66	217.99	218.32	218.65	218.98	219.31	219.64	**5.40**
5.50	219.64	219.98	220.31	220.64	220.97	221.30	221.63	221.96	222.29	222.62	222.95	**5.50**
5.60	222.95	223.28	223.61	223.94	224.27	224.60	224.93	225.26	225.59	225.92	226.25	**5.60**
5.70	226.25	226.58	226.91	227.24	227.57	227.90	228.23	228.56	228.89	229.22	229.55	**5.70**
5.80	229.55	229.88	230.21	230.54	230.87	231.20	231.53	231.86	232.19	232.52	232.85	**5.80**
5.90	232.85	233.18	233.51	233.84	234.17	234.50	234.83	235.16	235.48	235.81	236.14	**5.90**
6.00	236.14	236.47	236.80	237.13	237.46	237.79	238.12	238.45	238.78	239.11	239.44	**6.00**
6.10	239.44	239.77	240.10	240.42	240.75	241.08	241.41	241.74	242.07	242.40	242.73	**6.10**
6.20	242.73	243.06	243.39	243.72	244.04	244.37	244.70	245.03	245.36	245.69	246.02	**6.20**
6.30	246.02	246.35	246.67	247.00	247.33	247.66	247.99	248.32	248.65	248.98	249.30	**6.30**
6.40	249.30	249.63	249.96	250.29	250.62	250.95	251.28	251.60	251.93	252.26	252.59	**6.40**
6.50	252.59	252.92	253.25	253.58	253.90	254.23	254.56	254.89	255.22	255.55	255.87	**6.50**
6.60	255.87	256.20	256.53	256.86	257.19	257.51	257.84	258.17	258.50	258.83	259.16	**6.60**
6.70	259.16	259.48	259.81	260.14	260.47	260.80	261.12	261.45	261.78	262.11	262.44	**6.70**
6.80	262.44	262.76	263.09	263.42	263.75	264.07	264.40	264.73	265.06	265.39	265.71	**6.80**
6.90	265.71	266.04	266.37	266.70	267.02	267.35	267.68	268.01	268.34	268.66	268.99	**6.90**
7.00	268.99	269.32	269.65	269.97	270.30	270.63	270.96	271.28	271.61	271.94	272.27	**7.00**
7.10	272.27	272.59	272.92	273.25	273.57	273.90	274.23	274.56	274.88	275.21	275.54	**7.10**
7.20	275.54	275.87	276.19	276.52	276.85	277.18	277.50	277.83	278.16	278.48	278.81	**7.20**
7.30	278.81	279.14	279.47	279.79	280.12	280.45	280.77	281.10	281.43	281.75	282.08	**7.30**
7.40	282.08	282.41	282.74	283.06	283.39	283.72	284.04	284.37	284.70	285.02	285.35	**7.40**
7.50	285.35	285.68	286.00	286.33	286.66	286.98	287.31	287.64	287.97	288.29	288.62	**7.50**
7.60	288.62	288.95	289.27	289.60	289.93	290.25	290.58	290.91	291.23	291.56	291.89	**7.60**
7.70	291.89	292.21	292.54	292.86	293.19	293.52	293.84	294.17	294.50	294.82	295.15	**7.70**
7.80	295.15	295.48	295.80	296.13	296.46	296.78	297.11	297.44	297.76	298.09	298.41	**7.80**
7.90	298.41	298.74	299.07	299.39	299.72	300.05	300.37	300.70	301.02	301.35	301.68	**7.90**
8.00	301.68	302.00	302.33	302.66	302.98	303.31	303.63	303.96	304.29	304.61	304.94	**8.00**
8.10	304.94	305.26	305.59	305.92	306.24	306.57	306.89	307.22	307.55	307.87	308.20	**8.10**
8.20	308.20	308.52	308.85	309.18	309.50	309.83	310.15	310.48	310.81	311.13	311.46	**8.20**
8.30	311.46	311.78	312.11	312.44	312.76	313.09	313.41	313.74	314.07	314.39	314.72	**8.30**
8.40	314.72	315.04	315.37	315.69	316.02	316.35	316.67	317.00	317.32	317.65	317.97	**8.40**
8.50	317.97	318.30	318.63	318.95	319.28	319.60	319.93	320.25	320.58	320.90	321.23	**8.50**
8.60	321.23	321.56	321.88	322.21	322.53	322.86	323.18	323.51	323.83	324.16	324.49	**8.60**
8.70	324.49	324.81	325.14	325.46	325.79	326.11	326.44	326.76	327.09	327.41	327.74	**8.70**
8.80	327.74	328.07	328.39	328.72	329.04	329.37	329.69	330.02	330.34	330.67	330.99	**8.80**
8.90	330.99	331.32	331.64	331.97	332.29	332.62	332.95	333.27	333.60	333.92	334.25	**8.90**
9.00	334.25	334.57	334.90	335.22	335.55	335.87	336.20	336.52	336.85	337.17	337.50	**9.00**
9.10	337.50	337.82	338.15	338.47	338.80	339.12	339.45	339.77	340.10	340.42	340.75	**9.10**
9.20	340.75	341.07	341.40	341.72	342.05	342.37	342.70	343.03	343.35	343.68	344.00	**9.20**
9.30	344.00	344.33	344.65	344.98	345.30	345.63	345.95	346.28	346.60	346.92	347.25	**9.30**
9.40	347.25	347.57	347.90	348.22	348.55	348.87	349.20	349.52	349.85	350.17	350.50	**9.40**
9.50	350.50	350.82	351.15	351.47	351.80	352.12	352.45	352.77	353.10	353.42	353.75	**9.50**
9.60	353.75	354.07	354.40	354.72	355.05	355.37	355.70	356.02	356.35	356.67	357.00	**9.60**
9.70	357.00	357.32	357.64	357.97	358.29	358.62	358.94	359.27	359.59	359.92	360.24	**9.70**
9.80	360.24	360.57	360.89	361.22	361.54	361.87	362.19	362.52	362.84	363.16	363.49	**9.80**
9.90	363.49	363.81	364.14	364.46	364.79	365.11	365.44	365.76	366.09	366.41	366.74	**9.90**
10.00	366.74	367.06	367.38	367.71	368.03	368.36	368.68	369.01	369.33	369.66	369.98	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	366.74	367.06	367.38	367.71	368.03	368.36	368.68	369.01	369.33	369.66	369.98	10.00
10.10	369.98	370.31	370.63	370.95	371.28	371.60	371.93	372.25	372.58	372.90	373.23	10.10
10.20	373.23	373.55	373.88	374.20	374.52	374.85	375.17	375.50	375.82	376.15	376.47	10.20
10.30	376.47	376.80	377.12	377.44	377.77	378.09	378.42	378.74	379.07	379.39	379.72	10.30
10.40	379.72	380.04	380.36	380.69	381.01	381.34	381.66	381.99	382.31	382.63	382.96	10.40
10.50	382.96	383.28	383.61	383.93	384.26	384.58	384.91	385.23	385.55	385.88	386.20	10.50
10.60	386.20	386.53	386.85	387.18	387.50	387.82	388.15	388.47	388.80	389.12	389.45	10.60
10.70	389.45	389.77	390.09	390.42	390.74	391.07	391.39	391.72	392.04	392.36	392.69	10.70
10.80	392.69	393.01	393.34	393.66	393.99	394.31	394.63	394.96	395.28	395.61	395.93	10.80
10.90	395.93	396.26	396.58	396.90	397.23	397.55	397.88	398.20	398.53	398.85	399.17	10.90
11.00	399.17	399.50	399.82	400.15	400.47	400.80	401.12	401.44	401.77	402.09	402.42	11.00
11.10	402.42	402.74	403.06	403.39	403.71	404.04	404.36	404.69	405.01	405.33	405.66	11.10
11.20	405.66	405.98	406.31	406.63	406.96	407.28	407.60	407.93	408.25	408.58	408.90	11.20
11.30	408.90	409.22	409.55	409.87	410.20	410.52	410.85	411.17	411.49	411.82	412.14	11.30
11.40	412.14	412.47	412.79	413.11	413.44	413.76	414.09	414.41	414.74	415.06	415.38	11.40
11.50	415.38	415.71	416.03	416.36	416.68	417.00	417.33	417.65	417.98	418.30	418.62	11.50
11.60	418.62	418.95	419.27	419.60	419.92	420.25	420.57	420.89	421.22	421.54	421.87	11.60
11.70	421.87	422.19	422.51	422.84	423.16	423.49	423.81	424.13	424.46	424.78	425.11	11.70
11.80	425.11	425.43	425.76	426.08	426.40	426.73	427.05	427.38	427.70	428.02	428.35	11.80
11.90	428.35	428.67	429.00	429.32	429.64	429.97	430.29	430.62	430.94	431.26	431.59	11.90
12.00	431.59	431.91	432.24	432.56	432.89	433.21	433.53	433.86	434.18	434.51	434.83	12.00
12.10	434.83	435.15	435.48	435.80	436.13	436.45	436.77	437.10	437.42	437.75	438.07	12.10
12.20	438.07	438.40	438.72	439.04	439.37	439.69	440.02	440.34	440.66	440.99	441.31	12.20
12.30	441.31	441.64	441.96	442.28	442.61	442.93	443.26	443.58	443.90	444.23	444.55	12.30
12.40	444.55	444.88	445.20	445.53	445.85	446.17	446.50	446.82	447.15	447.47	447.79	12.40
12.50	447.79	448.12	448.44	448.77	449.09	449.41	449.74	450.06	450.39	450.71	451.04	12.50
12.60	451.04	451.36	451.68	452.01	452.33	452.66	452.98	453.30	453.63	453.95	454.28	12.60
12.70	454.28	454.60	454.92	455.25	455.57	455.90	456.22	456.55	456.87	457.19	457.52	12.70
12.80	457.52	457.84	458.17	458.49	458.81	459.14	459.46	459.79	460.11	460.43	460.76	12.80
12.90	460.76	461.08	461.41	461.73	462.06	462.38	462.70	463.03	463.35	463.68	464.00	12.90
13.00	464.00	464.32	464.65	464.97	465.30	465.62	465.95	466.27	466.59	466.92	467.24	13.00
13.10	467.24	467.57	467.89	468.21	468.54	468.86	469.19	469.51	469.84	470.16	470.48	13.10
13.20	470.48	470.81	471.13	471.46	471.78	472.10	472.43	472.75	473.08	473.40	473.73	13.20
13.30	473.73	474.05	474.37	474.70	475.02	475.35	475.67	476.00	476.32	476.64	476.97	13.30
13.40	476.97	477.29	477.62	477.94	478.26	478.59	478.91	479.24	479.56	479.89	480.21	13.40
13.50	480.21	480.53	480.86	481.18	481.51	481.83	482.16	482.48	482.80	483.13	483.45	13.50
13.60	483.45	483.78	484.10	484.43	484.75	485.07	485.40	485.72	486.05	486.37	486.70	13.60
13.70	486.70	487.02	487.34	487.67	487.99	488.32	488.64	488.97	489.29	489.61	489.94	13.70
13.80	489.94	490.26	490.59	490.91	491.24	491.56	491.88	492.21	492.53	492.86	493.18	13.80
13.90	493.18	493.51	493.83	494.15	494.48	494.80	495.13	495.45	495.78	496.10	496.43	13.90
14.00	496.43	496.75	497.07	497.40	497.72	498.05	498.37	498.70	499.02	499.34	499.67	14.00
14.10	499.67	499.99	500.32	500.64	500.97	501.29	501.62	501.94	502.26	502.59	502.91	14.10
14.20	502.91	503.24	503.56	503.89	504.21	504.54	504.86	505.18	505.51	505.83	506.16	14.20
14.30	506.16	506.48	506.81	507.13	507.46	507.78	508.10	508.43	508.75	509.08	509.40	14.30
14.40	509.40	509.73	510.05	510.38	510.70	511.02	511.35	511.67	512.00	512.32	512.65	14.40
14.50	512.65	512.97	513.30	513.62	513.95	514.27	514.59	514.92	515.24	515.57	515.89	14.50
14.60	515.89	516.22	516.54	516.87	517.19	517.52	517.84	518.16	518.49	518.81	519.14	14.60
14.70	519.14	519.46	519.79	520.11	520.44	520.76	521.09	521.41	521.73	522.06	522.38	14.70
14.80	522.38	522.71	523.03	523.36	523.68	524.01	524.33	524.66	524.98	525.31	525.63	14.80
14.90	525.63	525.95	526.28	526.60	526.93	527.25	527.58	527.90	528.23	528.55	528.88	14.90
15.00	528.88	529.20	529.53	529.85	530.18	530.50	530.82	531.15	531.47	531.80	532.12	15.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	528.88	529.20	529.53	529.85	530.18	530.50	530.82	531.15	531.47	531.80	532.12	**15.00**
15.10	532.12	532.45	532.77	533.10	533.42	533.75	534.07	534.40	534.72	535.05	535.37	**15.10**
15.20	535.37	535.70	536.02	536.34	536.67	536.99	537.32	537.64	537.97	538.29	538.62	**15.20**
15.30	538.62	538.94	539.27	539.59	539.92	540.24	540.57	540.89	541.22	541.54	541.87	**15.30**
15.40	541.87	542.19	542.52	542.84	543.17	543.49	543.82	544.14	544.46	544.79	545.11	**15.40**
15.50	545.11	545.44	545.76	546.09	546.41	546.74	547.06	547.39	547.71	548.04	548.36	**15.50**
15.60	548.36	548.69	549.01	549.34	549.66	549.99	550.31	550.64	550.96	551.29	551.61	**15.60**
15.70	551.61	551.94	552.26	552.59	552.91	553.24	553.56	553.89	554.21	554.54	554.86	**15.70**
15.80	554.86	555.19	555.51	555.84	556.16	556.49	556.81	557.14	557.46	557.79	558.11	**15.80**
15.90	558.11	558.44	558.76	559.09	559.41	559.74	560.06	560.39	560.71	561.04	561.36	**15.90**
16.00	561.36	561.69	562.01	562.34	562.66	562.99	563.31	563.64	563.96	564.29	564.61	**16.00**
16.10	564.61	564.94	565.26	565.59	565.91	566.24	566.56	566.89	567.21	567.54	567.86	**16.10**
16.20	567.86	568.19	568.51	568.84	569.16	569.49	569.81	570.14	570.47	570.79	571.12	**16.20**
16.30	571.12	571.44	571.77	572.09	572.42	572.74	573.07	573.39	573.72	574.04	574.37	**16.30**
16.40	574.37	574.69	575.02	575.34	575.67	575.99	576.32	576.64	576.97	577.29	577.62	**16.40**
16.50	577.62	577.94	578.27	578.60	578.92	579.25	579.57	579.90	580.22	580.55	580.87	**16.50**
16.60	580.87	581.20	581.52	581.85	582.17	582.50	582.82	583.15	583.47	583.80	584.13	**16.60**
16.70	584.13	584.45	584.78	585.10	585.43	585.75	586.08	586.40	586.73	587.05	587.38	**16.70**
16.80	587.38	587.70	588.03	588.35	588.68	589.01	589.33	589.66	589.98	590.31	590.63	**16.80**
16.90	590.63	590.96	591.28	591.61	591.93	592.26	592.58	592.91	593.24	593.56	593.89	**16.90**
17.00	593.89	594.21	594.54	594.86	595.19	595.51	595.84	596.16	596.49	596.82	597.14	**17.00**
17.10	597.14	597.47	597.79	598.12	598.44	598.77	599.09	599.42	599.75	600.07	600.40	**17.10**
17.20	600.40	600.72	601.05	601.37	601.70	602.02	602.35	602.68	603.00	603.33	603.65	**17.20**
17.30	603.65	603.98	604.30	604.63	604.95	605.28	605.61	605.93	606.26	606.58	606.91	**17.30**
17.40	606.91	607.23	607.56	607.88	608.21	608.54	608.86	609.19	609.51	609.84	610.16	**17.40**
17.50	610.16	610.49	610.82	611.14	611.47	611.79	612.12	612.44	612.77	613.09	613.42	**17.50**
17.60	613.42	613.75	614.07	614.40	614.72	615.05	615.37	615.70	616.03	616.35	616.68	**17.60**
17.70	616.68	617.00	617.33	617.65	617.98	618.31	618.63	618.96	619.28	619.61	619.93	**17.70**
17.80	619.93	620.26	620.59	620.91	621.24	621.56	621.89	622.22	622.54	622.87	623.19	**17.80**
17.90	623.19	623.52	623.84	624.17	624.50	624.82	625.15	625.47	625.80	626.12	626.45	**17.90**
18.00	626.45	626.78	627.10	627.43	627.75	628.08	628.41	628.73	629.06	629.38	629.71	**18.00**
18.10	629.71	630.03	630.36	630.69	631.01	631.34	631.66	631.99	632.32	632.64	632.97	**18.10**
18.20	632.97	633.29	633.62	633.95	634.27	634.60	634.92	635.25	635.57	635.90	636.23	**18.20**
18.30	636.23	636.55	636.88	637.20	637.53	637.86	638.18	638.51	638.83	639.16	639.49	**18.30**
18.40	639.49	639.81	640.14	640.46	640.79	641.12	641.44	641.77	642.09	642.42	642.75	**18.40**
18.50	642.75	643.07	643.40	643.72	644.05	644.38	644.70	645.03	645.35	645.68	646.01	**18.50**
18.60	646.01	646.33	646.66	646.98	647.31	647.64	647.96	648.29	648.61	648.94	649.27	**18.60**
18.70	649.27	649.59	649.92	650.24	650.57	650.90	651.22	651.55	651.88	652.20	652.53	**18.70**
18.80	652.53	652.85	653.18	653.51	653.83	654.16	654.48	654.81	655.14	655.46	655.79	**18.80**
18.90	655.79	656.11	656.44	656.77	657.09	657.42	657.74	658.07	658.40	658.72	659.05	**18.90**
19.00	659.05	659.38	659.70	660.03	660.35	660.68	661.01	661.33	661.66	661.98	662.31	**19.00**
19.10	662.31	662.64	662.96	663.29	663.62	663.94	664.27	664.59	664.92	665.25	665.57	**19.10**
19.20	665.57	665.90	666.23	666.55	666.88	667.20	667.53	667.86	668.18	668.51	668.83	**19.20**
19.30	668.83	669.16	669.49	669.81	670.14	670.47	670.79	671.12	671.44	671.77	672.10	**19.30**
19.40	672.10	672.42	672.75	673.08	673.40	673.73	674.05	674.38	674.71	675.03	675.36	**19.40**
19.50	675.36	675.69	676.01	676.34	676.67	676.99	677.32	677.64	677.97	678.30	678.62	**19.50**
19.60	678.62	678.95	679.28	679.60	679.93	680.25	680.58	680.91	681.23	681.56	681.89	**19.60**
19.70	681.89	682.21	682.54	682.86	683.19	683.52	683.84	684.17	684.50	684.82	685.15	**19.70**
19.80	685.15	685.48	685.80	686.13	686.45	686.78	687.11	687.43	687.76	688.09	688.41	**19.80**
19.90	688.41	688.74	689.06	689.39	689.72	690.04	690.37	690.70	691.02	691.35	691.68	**19.90**
20.00	691.68	692.00	692.33	692.65	692.98	693.31	693.63	693.96	694.29	694.61	694.94	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. ***Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued***

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
20.00	691.68	692.00	692.33	692.65	692.98	693.31	693.63	693.96	694.29	694.61	694.94	**20.00**
20.10	694.94	695.27	695.59	695.92	696.25	696.57	696.90	697.22	697.55	697.88	698.20	**20.10**
20.20	698.20	698.53	698.86	699.18	699.51	699.84	700.16	700.49	700.81	701.14	701.47	**20.20**
20.30	701.47	701.79	702.12	702.45	702.77	703.10	703.43	703.75	704.08	704.41	704.73	**20.30**
20.40	704.73	705.06	705.38	705.71	706.04	706.36	706.69	707.02	707.34	707.67	708.00	**20.40**
20.50	708.00	708.32	708.65	708.97	709.30	709.63	709.95	710.28	710.61	710.93	711.26	**20.50**
20.60	711.26	711.59	711.91	712.24	712.57	712.89	713.22	713.54	713.87	714.20	714.52	**20.60**
20.70	714.52	714.85	715.18	715.50	715.83	716.16	716.48	716.81	717.14	717.46	717.79	**20.70**
20.80	717.79	718.12	718.44	718.77	719.09	719.42	719.75	720.07	720.40	720.73	721.05	**20.80**
20.90	721.05	721.38	721.71	722.03	722.36	722.69	723.01	723.34	723.66	723.99	724.32	**20.90**
21.00	724.32	724.64	724.97	725.30	725.62	725.95	726.28	726.60	726.93	727.26	727.58	**21.00**
21.10	727.58	727.91	728.23	728.56	728.89	729.21	729.54	729.87	730.19	730.52	730.85	**21.10**
21.20	730.85	731.17	731.50	731.83	732.15	732.48	732.80	733.13	733.46	733.78	734.11	**21.20**
21.30	734.11	734.44	734.76	735.09	735.42	735.74	736.07	736.40	736.72	737.05	737.38	**21.30**
21.40	737.38	737.70	738.03	738.35	738.68	739.01	739.33	739.66	739.99	740.31	740.64	**21.40**
21.50	740.64	740.97	741.29	741.62	741.94	742.27	742.60	742.92	743.25	743.58	743.90	**21.50**
21.60	743.90	744.23	744.56	744.88	745.21	745.54	745.86	746.19	746.51	746.84	747.17	**21.60**
21.70	747.17	747.49	747.82	748.15	748.47	748.80	749.13	749.45	749.78	750.10	750.43	**21.70**
21.80	750.43	750.76	751.08	751.41	751.74	752.06	752.39	752.72	753.04	753.37	753.69	**21.80**
21.90	753.69	754.02	754.35	754.67	755.00	755.33	755.65	755.98	756.31	756.63	756.96	**21.90**
22.00	756.96	757.28	757.61	757.94	758.26	758.59	758.92	759.24	759.57	759.90	760.22	**22.00**
22.10	760.22	760.55	760.87	761.20	761.53	761.85	762.18	762.51	762.83	763.16	763.48	**22.10**
22.20	763.48	763.81	764.14	764.46	764.79	765.12	765.44	765.77	766.10	766.42	766.75	**22.20**
22.30	766.75	767.07	767.40	767.73	768.05	768.38	768.71	769.03	769.36	769.68	770.01	**22.30**
22.40	770.01	770.34	770.66	770.99	771.32	771.64	771.97	772.29	772.62	772.95	773.27	**22.40**
22.50	773.27	773.60	773.93	774.25	774.58	774.90	775.23	775.56	775.88	776.21	776.53	**22.50**
22.60	776.53	776.86	777.19	777.51	777.84	778.17	778.49	778.82	779.14	779.47	779.80	**22.60**
22.70	779.80	780.12	780.45	780.77	781.10	781.43	781.75	782.08	782.41	782.73	783.06	**22.70**
22.80	783.06	783.38	783.71	784.04	784.36	784.69	785.01	785.34	785.67	785.99	786.32	**22.80**
22.90	786.32	786.64	786.97	787.30	787.62	787.95	788.28	788.60	788.93	789.25	789.58	**22.90**
23.00	789.58	789.91	790.23	790.56	790.88	791.21	791.54	791.86	792.19	792.51	792.84	**23.00**
23.10	792.84	793.17	793.49	793.82	794.14	794.47	794.80	795.12	795.45	795.77	796.10	**23.10**
23.20	796.10	796.43	796.75	797.08	797.40	797.73	798.05	798.38	798.71	799.03	799.36	**23.20**
23.30	799.36	799.68	800.01	800.34	800.66	800.99	801.31	801.64	801.97	802.29	802.62	**23.30**
23.40	802.62	802.94	803.27	803.59	803.92	804.25	804.57	804.90	805.22	805.55	805.88	**23.40**
23.50	805.88	806.20	806.53	806.85	807.18	807.50	807.83	808.16	808.48	808.81	809.13	**23.50**
23.60	809.13	809.46	809.78	810.11	810.44	810.76	811.09	811.41	811.74	812.06	812.39	**23.60**
23.70	812.39	812.72	813.04	813.37	813.69	814.02	814.34	814.67	814.99	815.32	815.65	**23.70**
23.80	815.65	815.97	816.30	816.62	816.95	817.27	817.60	817.93	818.25	818.58	818.90	**23.80**
23.90	818.90	819.23	819.55	819.88	820.20	820.53	820.85	821.18	821.51	821.83	822.16	**23.90**
24.00	822.16	822.48	822.81	823.13	823.46	823.78	824.11	824.44	824.76	825.09	825.41	**24.00**
24.10	825.41	825.74	826.06	826.39	826.71	827.04	827.36	827.69	828.01	828.34	828.67	**24.10**
24.20	828.67	828.99	829.32	829.64	829.97	830.29	830.62	830.94	831.27	831.59	831.92	**24.20**
24.30	831.92	832.24	832.57	832.89	833.22	833.54	833.87	834.19	834.52	834.85	835.17	**24.30**
24.40	835.17	835.50	835.82	836.15	836.47	836.80	837.12	837.45	837.77	838.10	838.42	**24.40**
24.50	838.42	838.75	839.07	839.40	839.72	840.05	840.37	840.70	841.02	841.35	841.67	**24.50**
24.60	841.67	842.00	842.32	842.65	842.97	843.30	843.62	843.95	844.27	844.60	844.92	**24.60**
24.70	844.92	845.25	845.57	845.90	846.22	846.55	846.87	847.20	847.52	847.85	848.17	**24.70**
24.80	848.17	848.50	848.82	849.15	849.47	849.79	850.12	850.44	850.77	851.09	851.42	**24.80**
24.90	851.42	851.74	852.07	852.39	852.72	853.04	853.37	853.69	854.02	854.34	854.67	**24.90**
25.00	854.67	854.99	855.32	855.64	855.96	856.29	856.61	856.94	857.26	857.59	857.91	**25.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. ***Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued***

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
25.00	854.67	854.99	855.32	855.64	855.96	856.29	856.61	856.94	857.26	857.59	857.91	**25.00**
25.10	857.91	858.24	858.56	858.89	859.21	859.53	859.86	860.18	860.51	860.83	861.16	**25.10**
25.20	861.16	861.48	861.81	862.13	862.45	862.78	863.10	863.43	863.75	864.08	864.40	**25.20**
25.30	864.40	864.73	865.05	865.37	865.70	866.02	866.35	866.67	867.00	867.32	867.64	**25.30**
25.40	867.64	867.97	868.29	868.62	868.94	869.26	869.59	869.91	870.24	870.56	870.89	**25.40**
25.50	870.89	871.21	871.53	871.86	872.18	872.51	872.83	873.15	873.48	873.80	874.13	**25.50**
25.60	874.13	874.45	874.77	875.10	875.42	875.75	876.07	876.39	876.72	877.04	877.37	**25.60**
25.70	877.37	877.69	878.01	878.34	878.66	878.99	879.31	879.63	879.96	880.28	880.60	**25.70**
25.80	880.60	880.93	881.25	881.58	881.90	882.22	882.55	882.87	883.19	883.52	883.84	**25.80**
25.90	883.84	884.17	884.49	884.81	885.14	885.46	885.78	886.11	886.43	886.75	887.08	**25.90**
26.00	887.08	887.40	887.73	888.05	888.37	888.70	889.02	889.34	889.67	889.99	890.31	**26.00**
26.10	890.31	890.64	890.96	891.28	891.61	891.93	892.25	892.58	892.90	893.22	893.55	**26.10**
26.20	893.55	893.87	894.19	894.52	894.84	895.16	895.49	895.81	896.13	896.46	896.78	**26.20**
26.30	896.78	897.10	897.42	897.75	898.07	898.39	898.72	899.04	899.36	899.69	900.01	**26.30**
26.40	900.01	900.33	900.66	900.98	901.30	901.62	901.95	902.27	902.59	902.92	903.24	**26.40**
26.50	903.24	903.56	903.88	904.21	904.53	904.85	905.18	905.50	905.82	906.14	906.47	**26.50**
26.60	906.47	906.79	907.11	907.43	907.76	908.08	908.40	908.73	909.05	909.37	909.69	**26.60**
26.70	909.69	910.02	910.34	910.66	910.98	911.31	911.63	911.95	912.27	912.60	912.92	**26.70**
26.80	912.92	913.24	913.56	913.89	914.21	914.53	914.85	915.18	915.50	915.82	916.14	**26.80**
26.90	916.14	916.46	916.79	917.11	917.43	917.75	918.08	918.40	918.72	919.04	919.36	**26.90**
27.00	919.36	919.69	920.01	920.33	920.65	920.97	921.30	921.62	921.94	922.26	922.58	**27.00**
27.10	922.58	922.91	923.23	923.55	923.87	924.19	924.52	924.84	925.16	925.48	925.80	**27.10**
27.20	925.80	926.13	926.45	926.77	927.09	927.41	927.73	928.06	928.38	928.70	929.02	**27.20**
27.30	929.02	929.34	929.66	929.99	930.31	930.63	930.95	931.27	931.59	931.92	932.24	**27.30**
27.40	932.24	932.56	932.88	933.20	933.52	933.84	934.17	934.49	934.81	935.13	935.45	**27.40**
27.50	935.45	935.77	936.09	936.41	936.74	937.06	937.38	937.70	938.02	938.34	938.66	**27.50**
27.60	938.66	938.98	939.31	939.63	939.95	940.27	940.59	940.91	941.23	941.55	941.87	**27.60**
27.70	941.87	942.19	942.52	942.84	943.16	943.48	943.80	944.12	944.44	944.76	945.08	**27.70**
27.80	945.08	945.40	945.72	946.05	946.37	946.69	947.01	947.33	947.65	947.97	948.29	**27.80**
27.90	948.29	948.61	948.93	949.25	949.57	949.89	950.21	950.53	950.85	951.17	951.49	**27.90**
28.00	951.49	951.82	952.14	952.46	952.78	953.10	953.42	953.74	954.06	954.38	954.70	**28.00**
28.10	954.70	955.02	955.34	955.66	955.98	956.30	956.62	956.94	957.26	957.58	957.90	**28.10**
28.20	957.90	958.22	958.54	958.86	959.18	959.50	959.82	960.14	960.46	960.78	961.10	**28.20**
28.30	961.10	961.42	961.74	962.06	962.38	962.70	963.02	963.34	963.66	963.98	964.30	**28.30**
28.40	964.30	964.62	964.94	965.26	965.58	965.90	966.21	966.53	966.85	967.17	967.49	**28.40**
28.50	967.49	967.81	968.13	968.45	968.77	969.09	969.41	969.73	970.05	970.37	970.69	**28.50**
28.60	970.69	971.01	971.32	971.64	971.96	972.28	972.60	972.92	973.24	973.56	973.88	**28.60**
28.70	973.88	974.20	974.52	974.84	975.15	975.47	975.79	976.11	976.43	976.75	977.07	**28.70**
28.80	977.07	977.39	977.71	978.02	978.34	978.66	978.98	979.30	979.62	979.94	980.26	**28.80**
28.90	980.26	980.57	980.89	981.21	981.53	981.85	982.17	982.49	982.80	983.12	983.44	**28.90**
29.00	983.44	983.76	984.08	984.40	984.71	985.03	985.35	985.67	985.99	986.31	986.62	**29.00**
29.10	986.62	986.94	987.26	987.58	987.90	988.21	988.53	988.85	989.17	989.49	989.80	**29.10**
29.20	989.80	990.12	990.44	990.76	991.08	991.39	991.71	992.03	992.35	992.67	992.98	**29.20**
29.30	992.98	993.30	993.62	993.94	994.25	994.57	994.89	995.21	995.53	995.84	996.16	**29.30**
29.40	996.16	996.48	996.80	997.11	997.43	997.75	998.07	998.38	998.70	999.02	999.34	**29.40**
29.50	999.34	999.65	999.97	1000.29	1000.60	1000.92	1001.24	1001.56	1001.87	1002.19	1002.51	**29.50**
29.60	1002.51	1002.82	1003.14	1003.46	1003.78	1004.09	1004.41	1004.73	1005.04	1005.36	1005.68	**29.60**
29.70	1005.68	1005.99	1006.31	1006.63	1006.94	1007.26	1007.58	1007.89	1008.21	1008.53	1008.84	**29.70**
29.80	1008.84	1009.16	1009.48	1009.79	1010.11	1010.43	1010.74	1011.06	1011.38	1011.69	1012.01	**29.80**
29.90	1012.01	1012.33	1012.64	1012.96	1013.28	1013.59	1013.91	1014.22	1014.54	1014.86	1015.17	**29.90**
30.00	1015.17	1015.49	1015.81	1016.12	1016.44	1016.75	1017.07	1017.39	1017.70	1018.02	1018.33	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
30.00	1015.17	1015.49	1015.81	1016.12	1016.44	1016.75	1017.07	1017.39	1017.70	1018.02	1018.33	30.00
30.10	1018.33	1018.65	1018.97	1019.28	1019.60	1019.91	1020.23	1020.54	1020.86	1021.18	1021.49	30.10
30.20	1021.49	1021.81	1022.12	1022.44	1022.75	1023.07	1023.39	1023.70	1024.02	1024.33	1024.65	30.20
30.30	1024.65	1024.96	1025.28	1025.59	1025.91	1026.22	1026.54	1026.85	1027.17	1027.48	1027.80	30.30
30.40	1027.80	1028.12	1028.43	1028.75	1029.06	1029.38	1029.69	1030.01	1030.32	1030.64	1030.95	30.40
30.50	1030.95	1031.27	1031.58	1031.90	1032.21	1032.53	1032.84	1033.15	1033.47	1033.78	1034.10	30.50
30.60	1034.10	1034.41	1034.73	1035.04	1035.36	1035.67	1035.99	1036.30	1036.62	1036.93	1037.24	30.60
30.70	1037.24	1037.56	1037.87	1038.19	1038.50	1038.82	1039.13	1039.45	1039.76	1040.07	1040.39	30.70
30.80	1040.39	1040.70	1041.02	1041.33	1041.64	1041.96	1042.27	1042.59	1042.90	1043.21	1043.53	30.80
30.90	1043.53	1043.84	1044.16	1044.47	1044.78	1045.10	1045.41	1045.72	1046.04	1046.35	1046.67	30.90
31.00	1046.67	1046.98	1047.29	1047.61	1047.92	1048.23	1048.55	1048.86	1049.17	1049.49	1049.80	31.00
31.10	1049.80	1050.11	1050.43	1050.74	1051.05	1051.37	1051.68	1051.99	1052.31	1052.62	1052.93	31.10
31.20	1052.93	1053.25	1053.56	1053.87	1054.19	1054.50	1054.81	1055.13	1055.44	1055.75	1056.06	31.20
31.30	1056.06	1056.38	1056.69	1057.00	1057.32	1057.63	1057.94	1058.25	1058.57	1058.88	1059.19	31.30
31.40	1059.19	1059.50	1059.82	1060.13	1060.44	1060.75	1061.07	1061.38	1061.69	1062.00	1062.32	31.40
31.50	1062.32	1062.63	1062.94	1063.25	1063.56	1063.88	1064.19	1064.50	1064.81	1065.13	1065.44	31.50
31.60	1065.44	1065.75	1066.06	1066.37	1066.69	1067.00	1067.31	1067.62	1067.93	1068.24	1068.56	31.60
31.70	1068.56	1068.87	1069.18	1069.49	1069.80	1070.11	1070.43	1070.74	1071.05	1071.36	1071.67	31.70
31.80	1071.67	1071.98	1072.30	1072.61	1072.92	1073.23	1073.54	1073.85	1074.16	1074.48	1074.79	31.80
31.90	1074.79	1075.10	1075.41	1075.72	1076.03	1076.34	1076.65	1076.96	1077.28	1077.59	1077.90	31.90
32.00	1077.90	1078.21	1078.52	1078.83	1079.14	1079.45	1079.76	1080.07	1080.38	1080.69	1081.00	32.00
32.10	1081.00	1081.32	1081.63	1081.94	1082.25	1082.56	1082.87	1083.18	1083.49	1083.80	1084.11	32.10
32.20	1084.11	1084.42	1084.73	1085.04	1085.35	1085.66	1085.97	1086.28	1086.59	1086.90	1087.21	32.20
32.30	1087.21	1087.52	1087.83	1088.14	1088.45	1088.76	1089.07	1089.38	1089.69	1090.00	1090.31	32.30
32.40	1090.31	1090.62	1090.93	1091.24	1091.55	1091.86	1092.17	1092.48	1092.79	1093.10	1093.41	32.40
32.50	1093.41	1093.72	1094.03	1094.34	1094.65	1094.96	1095.26	1095.57	1095.88	1096.19	1096.50	32.50
32.60	1096.50	1096.81	1097.12	1097.43	1097.74	1098.05	1098.36	1098.67	1098.97	1099.28	1099.59	32.60
32.70	1099.59	1099.90	1100.21	1100.52	1100.83	1101.14	1101.45	1101.75	1102.06	1102.37	1102.68	32.70
32.80	1102.68	1102.99	1103.30	1103.61	1103.91	1104.22	1104.53	1104.84	1105.15	1105.46	1105.77	32.80
32.90	1105.77	1106.07	1106.38	1106.69	1107.00	1107.31	1107.61	1107.92	1108.23	1108.54	1108.85	32.90
33.00	1108.85	1109.15	1109.46	1109.77	1110.08	1110.39	1110.69	1111.00	1111.31	1111.62	1111.93	33.00
33.10	1111.93	1112.23	1112.54	1112.85	1113.16	1113.46	1113.77	1114.08	1114.39	1114.69	1115.00	33.10
33.20	1115.00	1115.31	1115.62	1115.92	1116.23	1116.54	1116.85	1117.15	1117.46	1117.77	1118.07	33.20
33.30	1118.07	1118.38	1118.69	1119.00	1119.30	1119.61	1119.92	1120.22	1120.53	1120.84	1121.14	33.30
33.40	1121.14	1121.45	1121.76	1122.07	1122.37	1122.68	1122.99	1123.29	1123.60	1123.91	1124.21	33.40
33.50	1124.21	1124.52	1124.82	1125.13	1125.44	1125.74	1126.05	1126.36	1126.66	1126.97	1127.28	33.50
33.60	1127.28	1127.58	1127.89	1128.19	1128.50	1128.81	1129.11	1129.42	1129.72	1130.03	1130.34	33.60
33.70	1130.34	1130.64	1130.95	1131.25	1131.56	1131.87	1132.17	1132.48	1132.78	1133.09	1133.39	33.70
33.80	1133.39	1133.70	1134.01	1134.31	1134.62	1134.92	1135.23	1135.53	1135.84	1136.14	1136.45	33.80
33.90	1136.45	1136.75	1137.06	1137.36	1137.67	1137.98	1138.28	1138.59	1138.89	1139.20	1139.50	33.90
34.00	1139.50	1139.81	1140.11	1140.42	1140.72	1141.03	1141.33	1141.64	1141.94	1142.24	1142.55	34.00
34.10	1142.55	1142.85	1143.16	1143.46	1143.77	1144.07	1144.38	1144.68	1144.99	1145.29	1145.60	34.10
34.20	1145.60	1145.90	1146.20	1146.51	1146.81	1147.12	1147.42	1147.73	1148.03	1148.33	1148.64	34.20
34.30	1148.64	1148.94	1149.25	1149.55	1149.85	1150.16	1150.46	1150.77	1151.07	1151.37	1151.68	34.30
34.40	1151.68	1151.98	1152.28	1152.59	1152.89	1153.20	1153.50	1153.80	1154.11	1154.41	1154.71	34.40
34.50	1154.71	1155.02	1155.32	1155.62	1155.93	1156.23	1156.53	1156.84	1157.14	1157.44	1157.75	34.50
34.60	1157.75	1158.05	1158.35	1158.66	1158.96	1159.26	1159.57	1159.87	1160.17	1160.47	1160.78	34.60
34.70	1160.78	1161.08	1161.38	1161.69	1161.99	1162.29	1162.59	1162.90	1163.20	1163.50	1163.80	34.70
34.80	1163.80	1164.11	1164.41	1164.71	1165.01	1165.32	1165.62	1165.92	1166.22	1166.53	1166.83	34.80
34.90	1166.83	1167.13	1167.43	1167.73	1168.04	1168.34	1168.64	1168.94	1169.25	1169.55	1169.85	34.90
35.00	1169.85	1170.15	1170.45	1170.75	1171.06	1171.36	1171.66	1171.96	1172.26	1172.57	1172.87	35.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
35.00	1169.85	1170.15	1170.45	1170.75	1171.06	1171.36	1171.66	1171.96	1172.26	1172.57	1172.87	35.00
35.10	1172.87	1173.17	1173.47	1173.77	1174.07	1174.37	1174.68	1174.98	1175.28	1175.58	1175.88	35.10
35.20	1175.88	1176.18	1176.48	1176.79	1177.09	1177.39	1177.69	1177.99	1178.29	1178.59	1178.89	35.20
35.30	1178.89	1179.19	1179.50	1179.80	1180.10	1180.40	1180.70	1181.00	1181.30	1181.60	1181.90	35.30
35.40	1181.90	1182.20	1182.50	1182.80	1183.10	1183.40	1183.71	1184.01	1184.31	1184.61	1184.91	35.40
35.50	1184.91	1185.21	1185.51	1185.81	1186.11	1186.41	1186.71	1187.01	1187.31	1187.61	1187.91	35.50
35.60	1187.91	1188.21	1188.51	1188.81	1189.11	1189.41	1189.71	1190.01	1190.31	1190.61	1190.91	35.60
35.70	1190.91	1191.21	1191.51	1191.81	1192.11	1192.41	1192.71	1193.01	1193.31	1193.61	1193.90	35.70
35.80	1193.90	1194.20	1194.50	1194.80	1195.10	1195.40	1195.70	1196.00	1196.30	1196.60	1196.90	35.80
35.90	1196.90	1197.20	1197.50	1197.79	1198.09	1198.39	1198.69	1198.99	1199.29	1199.59	1199.89	35.90
36.00	1199.89	1200.19	1200.48	1200.78	1201.08	1201.38	1201.68	1201.98	1202.28	1202.58	1202.87	36.00
36.10	1202.87	1203.17	1203.47	1203.77	1204.07	1204.37	1204.66	1204.96	1205.26	1205.56	1205.86	36.10
36.20	1205.86	1206.16	1206.45	1206.75	1207.05	1207.35	1207.65	1207.94	1208.24	1208.54	1208.84	36.20
36.30	1208.84	1209.14	1209.43	1209.73	1210.03	1210.33	1210.63	1210.92	1211.22	1211.52	1211.82	36.30
36.40	1211.82	1212.11	1212.41	1212.71	1213.01	1213.30	1213.60	1213.90	1214.20	1214.49	1214.79	36.40
36.50	1214.79	1215.09	1215.38	1215.68	1215.98	1216.28	1216.57	1216.87	1217.17	1217.46	1217.76	36.50
36.60	1217.76	1218.06	1218.36	1218.65	1218.95	1219.25	1219.54	1219.84	1220.14	1220.43	1220.73	36.60
36.70	1220.73	1221.03	1221.32	1221.62	1221.92	1222.21	1222.51	1222.81	1223.10	1223.40	1223.69	36.70
36.80	1223.69	1223.99	1224.29	1224.58	1224.88	1225.18	1225.47	1225.77	1226.06	1226.36	1226.66	36.80
36.90	1226.66	1226.95	1227.25	1227.55	1227.84	1228.14	1228.43	1228.73	1229.02	1229.32	1229.62	36.90
37.00	1229.62	1229.91	1230.21	1230.50	1230.80	1231.09	1231.39	1231.69	1231.98	1232.28	1232.57	37.00
37.10	1232.57	1232.87	1233.16	1233.46	1233.75	1234.05	1234.34	1234.64	1234.94	1235.23	1235.53	37.10
37.20	1235.53	1235.82	1236.12	1236.41	1236.71	1237.00	1237.30	1237.59	1237.89	1238.18	1238.48	37.20
37.30	1238.48	1238.77	1239.07	1239.36	1239.65	1239.95	1240.24	1240.54	1240.83	1241.13	1241.42	37.30
37.40	1241.42	1241.72	1242.01	1242.31	1242.60	1242.90	1243.19	1243.48	1243.78	1244.07	1244.37	37.40
37.50	1244.37	1244.66	1244.96	1245.25	1245.54	1245.84	1246.13	1246.43	1246.72	1247.01	1247.31	37.50
37.60	1247.31	1247.60	1247.90	1248.19	1248.48	1248.78	1249.07	1249.36	1249.66	1249.95	1250.25	37.60
37.70	1250.25	1250.54	1250.83	1251.13	1251.42	1251.71	1252.01	1252.30	1252.59	1252.89	1253.18	37.70
37.80	1253.18	1253.47	1253.77	1254.06	1254.35	1254.65	1254.94	1255.23	1255.53	1255.82	1256.11	37.80
37.90	1256.11	1256.41	1256.70	1256.99	1257.29	1257.58	1257.87	1258.16	1258.46	1258.75	1259.04	37.90
38.00	1259.04	1259.34	1259.63	1259.92	1260.21	1260.51	1260.80	1261.09	1261.38	1261.68	1261.97	38.00
38.10	1261.97	1262.26	1262.55	1262.85	1263.14	1263.43	1263.72	1264.02	1264.31	1264.60	1264.89	38.10
38.20	1264.89	1265.19	1265.48	1265.77	1266.06	1266.35	1266.65	1266.94	1267.23	1267.52	1267.81	38.20
38.30	1267.81	1268.11	1268.40	1268.69	1268.98	1269.27	1269.56	1269.86	1270.15	1270.44	1270.73	38.30
38.40	1270.73	1271.02	1271.31	1271.61	1271.90	1272.19	1272.48	1272.77	1273.06	1273.36	1273.65	38.40
38.50	1273.65	1273.94	1274.23	1274.52	1274.81	1275.10	1275.39	1275.69	1275.98	1276.27	1276.56	38.50
38.60	1276.56	1276.85	1277.14	1277.43	1277.72	1278.01	1278.30	1278.60	1278.89	1279.18	1279.47	38.60
38.70	1279.47	1279.76	1280.05	1280.34	1280.63	1280.92	1281.21	1281.50	1281.79	1282.08	1282.37	38.70
38.80	1282.37	1282.67	1282.96	1283.25	1283.54	1283.83	1284.12	1284.41	1284.70	1284.99	1285.28	38.80
38.90	1285.28	1285.57	1285.86	1286.15	1286.44	1286.73	1287.02	1287.31	1287.60	1287.89	1288.18	38.90
39.00	1288.18	1288.47	1288.76	1289.05	1289.34	1289.63	1289.92	1290.21	1290.50	1290.79	1291.08	39.00
39.10	1291.08	1291.37	1291.66	1291.95	1292.24	1292.53	1292.82	1293.11	1293.39	1293.68	1293.97	39.10
39.20	1293.97	1294.26	1294.55	1294.84	1295.13	1295.42	1295.71	1296.00	1296.29	1296.58	1296.87	39.20
39.30	1296.87	1297.16	1297.45	1297.73	1298.02	1298.31	1298.60	1298.89	1299.18	1299.47	1299.76	39.30
39.40	1299.76	1300.05	1300.34	1300.62	1300.91	1301.20	1301.49	1301.78	1302.07	1302.36	1302.64	39.40
39.50	1302.64	1302.93	1303.22	1303.51	1303.80	1304.09	1304.38	1304.66	1304.95	1305.24	1305.53	39.50
39.60	1305.53	1305.82	1306.11	1306.40	1306.68	1306.97	1307.26	1307.55	1307.84	1308.12	1308.41	39.60
39.70	1308.41	1308.70	1308.99	1309.28	1309.57	1309.85	1310.14	1310.43	1310.72	1311.00	1311.29	39.70
39.80	1311.29	1311.58	1311.87	1312.16	1312.44	1312.73	1313.02	1313.31	1313.59	1313.88	1314.17	39.80
39.90	1314.17	1314.46	1314.75	1315.03	1315.32	1315.61	1315.90	1316.18	1316.47	1316.76	1317.05	39.90
40.00	1317.05	1317.33	1317.62	1317.91	1318.19	1318.48	1318.77	1319.06	1319.34	1319.63	1319.92	40.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
40.00	1317.05	1317.33	1317.62	1317.91	1318.19	1318.48	1318.77	1319.06	1319.34	1319.63	1319.92	**40.00**
40.10	1319.92	1320.20	1320.49	1320.78	1321.07	1321.35	1321.64	1321.93	1322.21	1322.50	1322.79	**40.10**
40.20	1322.79	1323.07	1323.36	1323.65	1323.94	1324.22	1324.51	1324.80	1325.08	1325.37	1325.66	**40.20**
40.30	1325.66	1325.94	1326.23	1326.52	1326.80	1327.09	1327.37	1327.66	1327.95	1328.23	1328.52	**40.30**
40.40	1328.52	1328.81	1329.09	1329.38	1329.67	1329.95	1330.24	1330.52	1330.81	1331.10	1331.38	**40.40**
40.50	1331.38	1331.67	1331.96	1332.24	1332.53	1332.81	1333.10	1333.39	1333.67	1333.96	1334.24	**40.50**
40.60	1334.24	1334.53	1334.82	1335.10	1335.39	1335.67	1335.96	1336.25	1336.53	1336.82	1337.10	**40.60**
40.70	1337.10	1337.39	1337.67	1337.96	1338.25	1338.53	1338.82	1339.10	1339.39	1339.67	1339.96	**40.70**
40.80	1339.96	1340.24	1340.53	1340.81	1341.10	1341.39	1341.67	1341.96	1342.24	1342.53	1342.81	**40.80**
40.90	1342.81	1343.10	1343.38	1343.67	1343.95	1344.24	1344.52	1344.81	1345.09	1345.38	1345.66	**40.90**
41.00	1345.66	1345.95	1346.23	1346.52	1346.80	1347.09	1347.37	1347.66	1347.94	1348.23	1348.51	**41.00**
41.10	1348.51	1348.80	1349.08	1349.37	1349.65	1349.94	1350.22	1350.51	1350.79	1351.08	1351.36	**41.10**
41.20	1351.36	1351.65	1351.93	1352.21	1352.50	1352.78	1353.07	1353.35	1353.64	1353.92	1354.21	**41.20**
41.30	1354.21	1354.49	1354.77	1355.06	1355.34	1355.63	1355.91	1356.20	1356.48	1356.76	1357.05	**41.30**
41.40	1357.05	1357.33	1357.62	1357.90	1358.19	1358.47	1358.75	1359.04	1359.32	1359.61	1359.89	**41.40**
41.50	1359.89	1360.17	1360.46	1360.74	1361.03	1361.31	1361.59	1361.88	1362.16	1362.45	1362.73	**41.50**
41.60	1362.73	1363.01	1363.30	1363.58	1363.86	1364.15	1364.43	1364.72	1365.00	1365.28	1365.57	**41.60**
41.70	1365.57	1365.85	1366.13	1366.42	1366.70	1366.98	1367.27	1367.55	1367.83	1368.12	1368.40	**41.70**
41.80	1368.40	1368.68	1368.97	1369.25	1369.54	1369.82	1370.10	1370.39	1370.67	1370.95	1371.23	**41.80**
41.90	1371.23	1371.52	1371.80	1372.08	1372.37	1372.65	1372.93	1373.22	1373.50	1373.78	1374.07	**41.90**
42.00	1374.07	1374.35	1374.63	1374.92	1375.20	1375.48	1375.76	1376.05	1376.33	1376.61	1376.90	**42.00**
42.10	1376.90	1377.18	1377.46	1377.74	1378.03	1378.31	1378.59	1378.88	1379.16	1379.44	1379.72	**42.10**
42.20	1379.72	1380.01	1380.29	1380.57	1380.85	1381.14	1381.42	1381.70	1381.99	1382.27	1382.55	**42.20**
42.30	1382.55	1382.83	1383.12	1383.40	1383.68	1383.96	1384.25	1384.53	1384.81	1385.09	1385.38	**42.30**
42.40	1385.38	1385.66	1385.94	1386.22	1386.50	1386.79	1387.07	1387.35	1387.63	1387.92	1388.20	**42.40**
42.50	1388.20	1388.48	1388.76	1389.04	1389.33	1389.61	1389.89	1390.17	1390.46	1390.74	1391.02	**42.50**
42.60	1391.02	1391.30	1391.58	1391.87	1392.15	1392.43	1392.71	1392.99	1393.28	1393.56	1393.84	**42.60**
42.70	1393.84	1394.12	1394.40	1394.69	1394.97	1395.25	1395.53	1395.81	1396.09	1396.38	1396.66	**42.70**
42.80	1396.66	1396.94	1397.22	1397.50	1397.78	1398.07	1398.35	1398.63	1398.91	1399.19	1399.48	**42.80**
42.90	1399.48	1399.76	1400.04	1400.32	1400.60	1400.88	1401.16	1401.45	1401.73	1402.01	1402.29	**42.90**
43.00	1402.29	1402.57	1402.85	1403.13	1403.42	1403.70	1403.98	1404.26	1404.54	1404.82	1405.10	**43.00**
43.10	1405.10	1405.38	1405.67	1405.95	1406.23	1406.51	1406.79	1407.07	1407.35	1407.63	1407.91	**43.10**
43.20	1407.91	1408.19	1408.48	1408.76	1409.04	1409.32	1409.60	1409.88	1410.16	1410.44	1410.72	**43.20**
43.30	1410.72	1411.00	1411.28	1411.56	1411.84	1412.13	1412.41	1412.69	1412.97	1413.25	1413.53	**43.30**
43.40	1413.53	1413.81	1414.09	1414.37	1414.65	1414.93	1415.21	1415.49	1415.77	1416.05	1416.33	**43.40**
43.50	1416.33	1416.61	1416.89	1417.17	1417.45	1417.73	1418.01	1418.29	1418.57	1418.85	1419.13	**43.50**
43.60	1419.13	1419.41	1419.70	1419.98	1420.26	1420.54	1420.82	1421.10	1421.38	1421.66	1421.94	**43.60**
43.70	1421.94	1422.22	1422.50	1422.78	1423.06	1423.34	1423.62	1423.89	1424.17	1424.45	1424.73	**43.70**
43.80	1424.73	1425.01	1425.29	1425.57	1425.85	1426.13	1426.41	1426.69	1426.97	1427.25	1427.53	**43.80**
43.90	1427.53	1427.81	1428.09	1428.37	1428.65	1428.93	1429.21	1429.49	1429.77	1430.05	1430.33	**43.90**
44.00	1430.33	1430.61	1430.89	1431.17	1431.45	1431.73	1432.00	1432.28	1432.56	1432.84	1433.12	**44.00**
44.10	1433.12	1433.40	1433.68	1433.96	1434.24	1434.52	1434.80	1435.08	1435.36	1435.64	1435.92	**44.10**
44.20	1435.92	1436.20	1436.47	1436.75	1437.03	1437.31	1437.59	1437.87	1438.15	1438.43	1438.71	**44.20**
44.30	1438.71	1438.99	1439.27	1439.55	1439.82	1440.10	1440.38	1440.66	1440.94	1441.22	1441.50	**44.30**
44.40	1441.50	1441.78	1442.06	1442.34	1442.62	1442.89	1443.17	1443.45	1443.73	1444.01	1444.29	**44.40**
44.50	1444.29	1444.57	1444.85	1445.13	1445.41	1445.68	1445.96	1446.24	1446.52	1446.80	1447.08	**44.50**
44.60	1447.08	1447.36	1447.64	1447.92	1448.19	1448.47	1448.75	1449.03	1449.31	1449.59	1449.87	**44.60**
44.70	1449.87	1450.15	1450.42	1450.70	1450.98	1451.26	1451.54	1451.82	1452.10	1452.38	1452.65	**44.70**
44.80	1452.65	1452.93	1453.21	1453.49	1453.77	1454.05	1454.33	1454.61	1454.88	1455.16	1455.44	**44.80**
44.90	1455.44	1455.72	1456.00	1456.28	1456.56	1456.84	1457.11	1457.39	1457.67	1457.95	1458.23	**44.90**
45.00	1458.23	1458.51	1458.79	1459.06	1459.34	1459.62	1459.90	1460.18	1460.46	1460.74	1461.01	**45.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
45.00	1458.23	1458.51	1458.79	1459.06	1459.34	1459.62	1459.90	1460.18	1460.46	1460.74	1461.01	**45.00**
45.10	1461.01	1461.29	1461.57	1461.85	1462.13	1462.41	1462.69	1462.96	1463.24	1463.52	1463.80	**45.10**
45.20	1463.80	1464.08	1464.36	1464.64	1464.91	1465.19	1465.47	1465.75	1466.03	1466.31	1466.59	**45.20**
45.30	1466.59	1466.86	1467.14	1467.42	1467.70	1467.98	1468.26	1468.54	1468.81	1469.09	1469.37	**45.30**
45.40	1469.37	1469.65	1469.93	1470.21	1470.49	1470.76	1471.04	1471.32	1471.60	1471.88	1472.16	**45.40**
45.50	1472.16	1472.43	1472.71	1472.99	1473.27	1473.55	1473.83	1474.11	1474.38	1474.66	1474.94	**45.50**
45.60	1474.94	1475.22	1475.50	1475.78	1476.06	1476.33	1476.61	1476.89	1477.17	1477.45	1477.73	**45.60**
45.70	1477.73	1478.00	1478.28	1478.56	1478.84	1479.12	1479.40	1479.68	1479.95	1480.23	1480.51	**45.70**
45.80	1480.51	1480.79	1481.07	1481.35	1481.63	1481.90	1482.18	1482.46	1482.74	1483.02	1483.30	**45.80**
45.90	1483.30	1483.57	1483.85	1484.13	1484.41	1484.69	1484.97	1485.25	1485.52	1485.80	1486.08	**45.90**
46.00	1486.08	1486.36	1486.64	1486.92	1487.20	1487.47	1487.75	1488.03	1488.31	1488.59	1488.87	**46.00**
46.10	1488.87	1489.15	1489.42	1489.70	1489.98	1490.26	1490.54	1490.82	1491.10	1491.37	1491.65	**46.10**
46.20	1491.65	1491.93	1492.21	1492.49	1492.77	1493.05	1493.32	1493.60	1493.88	1494.16	1494.44	**46.20**
46.30	1494.44	1494.72	1495.00	1495.28	1495.55	1495.83	1496.11	1496.39	1496.67	1496.95	1497.23	**46.30**
46.40	1497.23	1497.50	1497.78	1498.06	1498.34	1498.62	1498.90	1499.18	1499.46	1499.73	1500.01	**46.40**
46.50	1500.01	1500.29	1500.57	1500.85	1501.13	1501.41	1501.69	1501.96	1502.24	1502.52	1502.80	**46.50**
46.60	1502.80	1503.08	1503.36	1503.64	1503.92	1504.20	1504.47	1504.75	1505.03	1505.31	1505.59	**46.60**
46.70	1505.59	1505.87	1506.15	1506.43	1506.71	1506.98	1507.26	1507.54	1507.82	1508.10	1508.38	**46.70**
46.80	1508.38	1508.66	1508.94	1509.22	1509.49	1509.77	1510.05	1510.33	1510.61	1510.89	1511.17	**46.80**
46.90	1511.17	1511.45	1511.73	1512.01	1512.29	1512.56	1512.84	1513.12	1513.40	1513.68	1513.96	**46.90**
47.00	1513.96	1514.24	1514.52	1514.80	1515.08	1515.36	1515.63	1515.91	1516.19	1516.47	1516.75	**47.00**
47.10	1516.75	1517.03	1517.31	1517.59	1517.87	1518.15	1518.43	1518.71	1518.99	1519.26	1519.54	**47.10**
47.20	1519.54	1519.82	1520.10	1520.38	1520.66	1520.94	1521.22	1521.50	1521.78	1522.06	1522.34	**47.20**
47.30	1522.34	1522.62	1522.90	1523.18	1523.46	1523.73	1524.01	1524.29	1524.57	1524.85	1525.13	**47.30**
47.40	1525.13	1525.41	1525.69	1525.97	1526.25	1526.53	1526.81	1527.09	1527.37	1527.65	1527.93	**47.40**
47.50	1527.93	1528.21	1528.49	1528.77	1529.05	1529.33	1529.61	1529.89	1530.17	1530.45	1530.72	**47.50**
47.60	1530.72	1531.00	1531.28	1531.56	1531.84	1532.12	1532.40	1532.68	1532.96	1533.24	1533.52	**47.60**
47.70	1533.52	1533.80	1534.08	1534.36	1534.64	1534.92	1535.20	1535.48	1535.76	1536.04	1536.32	**47.70**
47.80	1536.32	1536.60	1536.88	1537.16	1537.44	1537.72	1538.00	1538.28	1538.56	1538.84	1539.12	**47.80**
47.90	1539.12	1539.40	1539.68	1539.96	1540.24	1540.52	1540.80	1541.08	1541.36	1541.64	1541.92	**47.90**
48.00	1541.92	1542.21	1542.49	1542.77	1543.05	1543.33	1543.61	1543.89	1544.17	1544.45	1544.73	**48.00**
48.10	1544.73	1545.01	1545.29	1545.57	1545.85	1546.13	1546.41	1546.69	1546.97	1547.25	1547.53	**48.10**
48.20	1547.53	1547.81	1548.09	1548.37	1548.66	1548.94	1549.22	1549.50	1549.78	1550.06	1550.34	**48.20**
48.30	1550.34	1550.62	1550.90	1551.18	1551.46	1551.74	1552.02	1552.30	1552.59	1552.87	1553.15	**48.30**
48.40	1553.15	1553.43	1553.71	1553.99	1554.27	1554.55	1554.83	1555.11	1555.39	1555.68	1555.96	**48.40**
48.50	1555.96	1556.24	1556.52	1556.80	1557.08	1557.36	1557.64	1557.92	1558.20	1558.49	1558.77	**48.50**
48.60	1558.77	1559.05	1559.33	1559.61	1559.89	1560.17	1560.45	1560.74	1561.02	1561.30	1561.58	**48.60**
48.70	1561.58	1561.86	1562.14	1562.42	1562.71	1562.99	1563.27	1563.55	1563.83	1564.11	1564.39	**48.70**
48.80	1564.39	1564.68	1564.96	1565.24	1565.52	1565.80	1566.08	1566.37	1566.65	1566.93	1567.21	**48.80**
48.90	1567.21	1567.49	1567.77	1568.06	1568.34	1568.62	1568.90	1569.18	1569.46	1569.75	1570.03	**48.90**
49.00	1570.03	1570.31	1570.59	1570.87	1571.16	1571.44	1571.72	1572.00	1572.28	1572.57	1572.85	**49.00**
49.10	1572.85	1573.13	1573.41	1573.69	1573.98	1574.26	1574.54	1574.82	1575.10	1575.39	1575.67	**49.10**
49.20	1575.67	1575.95	1576.23	1576.52	1576.80	1577.08	1577.36	1577.64	1577.93	1578.21	1578.49	**49.20**
49.30	1578.49	1578.77	1579.06	1579.34	1579.62	1579.90	1580.19	1580.47	1580.75	1581.03	1581.32	**49.30**
49.40	1581.32	1581.60	1581.88	1582.17	1582.45	1582.73	1583.01	1583.30	1583.58	1583.86	1584.14	**49.40**
49.50	1584.14	1584.43	1584.71	1584.99	1585.28	1585.56	1585.84	1586.12	1586.41	1586.69	1586.97	**49.50**
49.60	1586.97	1587.26	1587.54	1587.82	1588.11	1588.39	1588.67	1588.95	1589.24	1589.52	1589.80	**49.60**
49.70	1589.80	1590.09	1590.37	1590.65	1590.94	1591.22	1591.50	1591.79	1592.07	1592.35	1592.64	**49.70**
49.80	1592.64	1592.92	1593.20	1593.49	1593.77	1594.05	1594.34	1594.62	1594.91	1595.19	1595.47	**49.80**
49.90	1595.47	1595.76	1596.04	1596.32	1596.61	1596.89	1597.18	1597.46	1597.74	1598.03	1598.31	**49.90**
50.00	1598.31	1598.59	1598.88	1599.16	1599.45	1599.73	1600.01	1600.30	1600.58	1600.87	1601.15	**50.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
50.00	1598.31	1598.59	1598.88	1599.16	1599.45	1599.73	1600.01	1600.30	1600.58	1600.87	1601.15	**50.00**
50.10	1601.15	1601.43	1601.72	1602.00	1602.29	1602.57	1602.85	1603.14	1603.42	1603.71	1603.99	**50.10**
50.20	1603.99	1604.28	1604.56	1604.84	1605.13	1605.41	1605.70	1605.98	1606.27	1606.55	1606.84	**50.20**
50.30	1606.84	1607.12	1607.40	1607.69	1607.97	1608.26	1608.54	1608.83	1609.11	1609.40	1609.68	**50.30**
50.40	1609.68	1609.97	1610.25	1610.54	1610.82	1611.11	1611.39	1611.67	1611.96	1612.24	1612.53	**50.40**
50.50	1612.53	1612.81	1613.10	1613.38	1613.67	1613.95	1614.24	1614.52	1614.81	1615.09	1615.38	**50.50**
50.60	1615.38	1615.67	1615.95	1616.24	1616.52	1616.81	1617.09	1617.38	1617.66	1617.95	1618.23	**50.60**
50.70	1618.23	1618.52	1618.80	1619.09	1619.37	1619.66	1619.95	1620.23	1620.52	1620.80	1621.09	**50.70**
50.80	1621.09	1621.37	1621.66	1621.95	1622.23	1622.52	1622.80	1623.09	1623.37	1623.66	1623.95	**50.80**
50.90	1623.95	1624.23	1624.52	1624.80	1625.09	1625.38	1625.66	1625.95	1626.23	1626.52	1626.81	**50.90**
51.00	1626.81	1627.09	1627.38	1627.66	1627.95	1628.24	1628.52	1628.81	1629.10	1629.38	1629.67	**51.00**
51.10	1629.67	1629.95	1630.24	1630.53	1630.81	1631.10	1631.39	1631.67	1631.96	1632.25	1632.53	**51.10**
51.20	1632.53	1632.82	1633.11	1633.39	1633.68	1633.97	1634.25	1634.54	1634.83	1635.11	1635.40	**51.20**
51.30	1635.40	1635.69	1635.97	1636.26	1636.55	1636.83	1637.12	1637.41	1637.70	1637.98	1638.27	**51.30**
51.40	1638.27	1638.56	1638.84	1639.13	1639.42	1639.71	1639.99	1640.28	1640.57	1640.85	1641.14	**51.40**
51.50	1641.14	1641.43	1641.72	1642.00	1642.29	1642.58	1642.87	1643.15	1643.44	1643.73	1644.02	**51.50**
51.60	1644.02	1644.30	1644.59	1644.88	1645.17	1645.45	1645.74	1646.03	1646.32	1646.61	1646.89	**51.60**
51.70	1646.89	1647.18	1647.47	1647.76	1648.04	1648.33	1648.62	1648.91	1649.20	1649.48	1649.77	**51.70**
51.80	1649.77	1650.06	1650.35	1650.64	1650.93	1651.21	1651.50	1651.79	1652.08	1652.37	1652.65	**51.80**
51.90	1652.65	1652.94	1653.23	1653.52	1653.81	1654.10	1654.39	1654.67	1654.96	1655.25	1655.54	**51.90**
52.00	1655.54	1655.83	1656.12	1656.41	1656.69	1656.98	1657.27	1657.56	1657.85	1658.14	1658.43	**52.00**
52.10	1658.43	1658.72	1659.00	1659.29	1659.58	1659.87	1660.16	1660.45	1660.74	1661.03	1661.32	**52.10**
52.20	1661.32	1661.61	1661.90	1662.18	1662.47	1662.76	1663.05	1663.34	1663.63	1663.92	1664.21	**52.20**
52.30	1664.21	1664.50	1664.79	1665.08	1665.37	1665.66	1665.95	1666.24	1666.53	1666.81	1667.10	**52.30**
52.40	1667.10	1667.39	1667.68	1667.97	1668.26	1668.55	1668.84	1669.13	1669.42	1669.71	1670.00	**52.40**
52.50	1670.00	1670.29	1670.58	1670.87	1671.16	1671.45	1671.74	1672.03	1672.32	1672.61	1672.90	**52.50**
52.60	1672.90	1673.19	1673.48	1673.77	1674.06	1674.35	1674.64	1674.93	1675.22	1675.51	1675.81	**52.60**
52.70	1675.81	1676.10	1676.39	1676.68	1676.97	1677.26	1677.55	1677.84	1678.13	1678.42	1678.71	**52.70**
52.80	1678.71	1679.00	1679.29	1679.58	1679.87	1680.16	1680.46	1680.75	1681.04	1681.33	1681.62	**52.80**
52.90	1681.62	1681.91	1682.20	1682.49	1682.78	1683.07	1683.37	1683.66	1683.95	1684.24	1684.53	**52.90**
53.00	1684.53	1684.82	1685.11	1685.40	1685.69	1685.99	1686.28	1686.57	1686.86	1687.15	1687.44	**53.00**
53.10	1687.44	1687.73	1688.03	1688.32	1688.61	1688.90	1689.19	1689.48	1689.78	1690.07	1690.36	**53.10**
53.20	1690.36	1690.65	1690.94	1691.24	1691.53	1691.82	1692.11	1692.40	1692.69	1692.99	1693.28	**53.20**
53.30	1693.28	1693.57	1693.86	1694.15	1694.45	1694.74	1695.03	1695.32	1695.62	1695.91	1696.20	**53.30**
53.40	1696.20	1696.49	1696.78	1697.08	1697.37	1697.66	1697.95	1698.25	1698.54	1698.83	1699.12	**53.40**
53.50	1699.12	1699.42	1699.71	1700.00	1700.29	1700.59	1700.88	1701.17	1701.47	1701.76	1702.05	**53.50**
53.60	1702.05	1702.34	1702.64	1702.93	1703.22	1703.52	1703.81	1704.10	1704.39	1704.69	1704.98	**53.60**
53.70	1704.98	1705.27	1705.57	1705.86	1706.15	1706.45	1706.74	1707.03	1707.33	1707.62	1707.91	**53.70**
53.80	1707.91	1708.21	1708.50	1708.79	1709.09	1709.38	1709.67	1709.97	1710.26	1710.55	1710.85	**53.80**
53.90	1710.85	1711.14	1711.44	1711.73	1712.02	1712.32	1712.61	1712.90	1713.20	1713.49	1713.79	**53.90**
54.00	1713.79	1714.08	1714.37	1714.67	1714.96	1715.26	1715.55	1715.84	1716.14	1716.43	1716.73	**54.00**
54.10	1716.73	1717.02	1717.32	1717.61	1717.90	1718.20	1718.49	1718.79	1719.08	1719.38	1719.67	**54.10**
54.20	1719.67	1719.96	1720.26	1720.55	1720.85	1721.14	1721.44	1721.73	1722.03	1722.32	1722.62	**54.20**
54.30	1722.62	1722.91	1723.21	1723.50	1723.79	1724.09	1724.38	1724.68	1724.97	1725.27	1725.56	**54.30**
54.40	1725.56	1725.86	1726.15	1726.45	1726.74	1727.04	1727.33	1727.63	1727.92	1728.22	1728.52	**54.40**
54.50	1728.52	1728.81	1729.11	1729.40	1729.70	1729.99	1730.29	1730.58	1730.88	1731.17	1731.47	**54.50**
54.60	1731.47	1731.76	1732.06	1732.36	1732.65	1732.95	1733.24	1733.54	1733.83	1734.13	1734.43	**54.60**
54.70	1734.43	1734.72	1735.02	1735.31	1735.61	1735.90	1736.20	1736.50	1736.79	1737.09	1737.38	**54.70**
54.80	1737.38	1737.68	1737.98	1738.27	1738.57	1738.87	1739.16	1739.46	1739.75	1740.05	1740.35	**54.80**
54.90	1740.35	1740.64	1740.94	1741.24	1741.53	1741.83	1742.13	1742.42	1742.72	1743.01	1743.31	**54.90**
55.00	1743.31	1743.61	1743.90	1744.20	1744.50	1744.79	1745.09	1745.39	1745.68	1745.98	1746.28	**55.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
55.00	1743.31	1743.61	1743.90	1744.20	1744.50	1744.79	1745.09	1745.39	1745.68	1745.98	1746.28	**55.00**
55.10	1746.28	1746.58	1746.87	1747.17	1747.47	1747.76	1748.06	1748.36	1748.65	1748.95	1749.25	**55.10**
55.20	1749.25	1749.55	1749.84	1750.14	1750.44	1750.73	1751.03	1751.33	1751.63	1751.92	1752.22	**55.20**
55.30	1752.22	1752.52	1752.82	1753.11	1753.41	1753.71	1754.01	1754.30	1754.60	1754.90	1755.20	**55.30**
55.40	1755.20	1755.49	1755.79	1756.09	1756.39	1756.68	1756.98	1757.28	1757.58	1757.88	1758.17	**55.40**
55.50	1758.17	1758.47	1758.77	1759.07	1759.37	1759.66	1759.96	1760.26	1760.56	1760.86	1761.15	**55.50**
55.60	1761.15	1761.45	1761.75	1762.05	1762.35	1762.64	1762.94	1763.24	1763.54	1763.84	1764.14	**55.60**
55.70	1764.14	1764.43	1764.73	1765.03	1765.33	1765.63	1765.93	1766.23	1766.52	1766.82	1767.12	**55.70**
55.80	1767.12	1767.42	1767.72	1768.02	1768.32	1768.62	1768.91	1769.21	1769.51	1769.81	1770.11	**55.80**
55.90	1770.11	1770.41	1770.71	1771.01	1771.31	1771.60	1771.90	1772.20	1772.50	1772.80	1773.10	**55.90**
56.00	1773.10	1773.40	1773.70	1774.00	1774.30	1774.60	1774.90	1775.19	1775.49	1775.79	1776.09	**56.00**
56.10	1776.09	1776.39	1776.69	1776.99	1777.29	1777.59	1777.89	1778.19	1778.49	1778.79	1779.09	**56.10**
56.20	1779.09	1779.39	1779.69	1779.99	1780.29	1780.59	1780.89	1781.19	1781.49	1781.79	1782.09	**56.20**
56.30	1782.09	1782.39	1782.69	1782.99	1783.29	1783.59	1783.89	1784.19	1784.49	1784.79	1785.09	**56.30**
56.40	1785.09	1785.39	1785.69	1785.99	1786.29	1786.59	1786.89	1787.19	1787.49	1787.79	1788.09	**56.40**
56.50	1788.09	1788.39	1788.69	1788.99	1789.29	1789.59	1789.89	1790.19	1790.49	1790.79	1791.10	**56.50**
56.60	1791.10	1791.40	1791.70	1792.00	1792.30	1792.60	1792.90	1793.20	1793.50	1793.80	1794.10	**56.60**
56.70	1794.10	1794.40	1794.71	1795.01	1795.31	1795.61	1795.91	1796.21	1796.51	1796.81	1797.11	**56.70**
56.80	1797.11	1797.41	1797.72	1798.02	1798.32	1798.62	1798.92	1799.22	1799.52	1799.82	1800.13	**56.80**
56.90	1800.13	1800.43	1800.73	1801.03	1801.33	1801.63	1801.93	1802.24	1802.54	1802.84	1803.14	**56.90**
57.00	1803.14	1803.44	1803.74	1804.05	1804.35	1804.65	1804.95	1805.25	1805.55	1805.86	1806.16	**57.00**
57.10	1806.16	1806.46	1806.76	1807.06	1807.37	1807.67	1807.97	1808.27	1808.57	1808.88	1809.18	**57.10**
57.20	1809.18	1809.48	1809.78	1810.08	1810.39	1810.69	1810.99	1811.29	1811.60	1811.90	1812.20	**57.20**
57.30	1812.20	1812.50	1812.80	1813.11	1813.41	1813.71	1814.01	1814.32	1814.62	1814.92	1815.22	**57.30**
57.40	1815.22	1815.53	1815.83	1816.13	1816.43	1816.74	1817.04	1817.34	1817.64	1817.95	1818.25	**57.40**
57.50	1818.25	1818.55	1818.86	1819.16	1819.46	1819.76	1820.07	1820.37	1820.67	1820.98	1821.28	**57.50**
57.60	1821.28	1821.58	1821.88	1822.19	1822.49	1822.79	1823.10	1823.40	1823.70	1824.01	1824.31	**57.60**
57.70	1824.31	1824.61	1824.92	1825.22	1825.52	1825.83	1826.13	1826.43	1826.74	1827.04	1827.34	**57.70**
57.80	1827.34	1827.65	1827.95	1828.25	1828.56	1828.86	1829.16	1829.47	1829.77	1830.07	1830.38	**57.80**
57.90	1830.38	1830.68	1830.99	1831.29	1831.59	1831.90	1832.20	1832.50	1832.81	1833.11	1833.42	**57.90**
58.00	1833.42	1833.72	1834.02	1834.33	1834.63	1834.93	1835.24	1835.54	1835.85	1836.15	1836.45	**58.00**
58.10	1836.45	1836.76	1837.06	1837.37	1837.67	1837.98	1838.28	1838.58	1838.89	1839.19	1839.50	**58.10**
58.20	1839.50	1839.80	1840.10	1840.41	1840.71	1841.02	1841.32	1841.63	1841.93	1842.24	1842.54	**58.20**
58.30	1842.54	1842.84	1843.15	1843.45	1843.76	1844.06	1844.37	1844.67	1844.98	1845.28	1845.59	**58.30**
58.40	1845.59	1845.89	1846.19	1846.50	1846.80	1847.11	1847.41	1847.72	1848.02	1848.33	1848.63	**58.40**
58.50	1848.63	1848.94	1849.24	1849.55	1849.85	1850.16	1850.46	1850.77	1851.07	1851.38	1851.68	**58.50**
58.60	1851.68	1851.99	1852.29	1852.60	1852.90	1853.21	1853.51	1853.82	1854.12	1854.43	1854.73	**58.60**
58.70	1854.73	1855.04	1855.34	1855.65	1855.96	1856.26	1856.57	1856.87	1857.18	1857.48	1857.79	**58.70**
58.80	1857.79	1858.09	1858.40	1858.70	1859.01	1859.31	1859.62	1859.93	1860.23	1860.54	1860.84	**58.80**
58.90	1860.84	1861.15	1861.45	1861.76	1862.07	1862.37	1862.68	1862.98	1863.29	1863.59	1863.90	**58.90**
59.00	1863.90	1864.21	1864.51	1864.82	1865.12	1865.43	1865.74	1866.04	1866.35	1866.65	1866.96	**59.00**
59.10	1866.96	1867.27	1867.57	1867.88	1868.18	1868.49	1868.80	1869.10	1869.41	1869.71	1870.02	**59.10**
59.20	1870.02	1870.33	1870.63	1870.94	1871.24	1871.55	1871.86	1872.16	1872.47	1872.78	1873.08	**59.20**
59.30	1873.08	1873.39	1873.70	1874.00	1874.31	1874.61	1874.92	1875.23	1875.53	1875.84	1876.15	**59.30**
59.40	1876.15	1876.45	1876.76	1877.07	1877.37	1877.68	1877.99	1878.29	1878.60	1878.91	1879.21	**59.40**
59.50	1879.21	1879.52	1879.83	1880.13	1880.44	1880.75	1881.05	1881.36	1881.67	1881.97	1882.28	**59.50**
59.60	1882.28	1882.59	1882.89	1883.20	1883.51	1883.81	1884.12	1884.43	1884.74	1885.04	1885.35	**59.60**
59.70	1885.35	1885.66	1885.96	1886.27	1886.58	1886.88	1887.19	1887.50	1887.81	1888.11	1888.42	**59.70**
59.80	1888.42	1888.73	1889.04	1889.34	1889.65	1889.96	1890.26	1890.57	1890.88	1891.19	1891.49	**59.80**
59.90	1891.49	1891.80	1892.11	1892.42	1892.72	1893.03	1893.34	1893.64	1893.95	1894.26	1894.57	**59.90**
60.00	1894.57	1894.87	1895.18	1895.49	1895.80	1896.10	1896.41	1896.72	1897.03	1897.34	1897.64	**60.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
60.00	1894.57	1894.87	1895.18	1895.49	1895.80	1896.10	1896.41	1896.72	1897.03	1897.34	1897.64	**60.00**
60.10	1897.64	1897.95	1898.26	1898.57	1898.87	1899.18	1899.49	1899.80	1900.10	1900.41	1900.72	**60.10**
60.20	1900.72	1901.03	1901.34	1901.64	1901.95	1902.26	1902.57	1902.87	1903.18	1903.49	1903.80	**60.20**
60.30	1903.80	1904.11	1904.41	1904.72	1905.03	1905.34	1905.65	1905.95	1906.26	1906.57	1906.88	**60.30**
60.40	1906.88	1907.19	1907.49	1907.80	1908.11	1908.42	1908.73	1909.04	1909.34	1909.65	1909.96	**60.40**
60.50	1909.96	1910.27	1910.58	1910.88	1911.19	1911.50	1911.81	1912.12	1912.43	1912.73	1913.04	**60.50**
60.60	1913.04	1913.35	1913.66	1913.97	1914.28	1914.58	1914.89	1915.20	1915.51	1915.82	1916.13	**60.60**
60.70	1916.13	1916.44	1916.74	1917.05	1917.36	1917.67	1917.98	1918.29	1918.60	1918.90	1919.21	**60.70**
60.80	1919.21	1919.52	1919.83	1920.14	1920.45	1920.76	1921.06	1921.37	1921.68	1921.99	1922.30	**60.80**
60.90	1922.30	1922.61	1922.92	1923.23	1923.53	1923.84	1924.15	1924.46	1924.77	1925.08	1925.39	**60.90**
61.00	1925.39	1925.70	1926.01	1926.31	1926.62	1926.93	1927.24	1927.55	1927.86	1928.17	1928.48	**61.00**
61.10	1928.48	1928.79	1929.09	1929.40	1929.71	1930.02	1930.33	1930.64	1930.95	1931.26	1931.57	**61.10**
61.20	1931.57	1931.88	1932.19	1932.49	1932.80	1933.11	1933.42	1933.73	1934.04	1934.35	1934.66	**61.20**
61.30	1934.66	1934.97	1935.28	1935.59	1935.90	1936.20	1936.51	1936.82	1937.13	1937.44	1937.75	**61.30**
61.40	1937.75	1938.06	1938.37	1938.68	1938.99	1939.30	1939.61	1939.92	1940.23	1940.54	1940.84	**61.40**
61.50	1940.84	1941.15	1941.46	1941.77	1942.08	1942.39	1942.70	1943.01	1943.32	1943.63	1943.94	**61.50**
61.60	1943.94	1944.25	1944.56	1944.87	1945.18	1945.49	1945.80	1946.11	1946.42	1946.73	1947.04	**61.60**
61.70	1947.04	1947.35	1947.65	1947.96	1948.27	1948.58	1948.89	1949.20	1949.51	1949.82	1950.13	**61.70**
61.80	1950.13	1950.44	1950.75	1951.06	1951.37	1951.68	1951.99	1952.30	1952.61	1952.92	1953.23	**61.80**
61.90	1953.23	1953.54	1953.85	1954.16	1954.47	1954.78	1955.09	1955.40	1955.71	1956.02	1956.33	**61.90**
62.00	1956.33	1956.64	1956.95	1957.26	1957.57	1957.88	1958.19	1958.50	1958.81	1959.12	1959.43	**62.00**
62.10	1959.43	1959.74	1960.05	1960.36	1960.67	1960.98	1961.29	1961.60	1961.91	1962.22	1962.53	**62.10**
62.20	1962.53	1962.84	1963.15	1963.46	1963.77	1964.08	1964.39	1964.70	1965.01	1965.32	1965.63	**62.20**
62.30	1965.63	1965.94	1966.25	1966.56	1966.87	1967.18	1967.49	1967.80	1968.11	1968.42	1968.73	**62.30**
62.40	1968.73	1969.04	1969.35	1969.66	1969.97	1970.29	1970.60	1970.91	1971.22	1971.53	1971.84	**62.40**
62.50	1971.84	1972.15	1972.46	1972.77	1973.08	1973.39	1973.70	1974.01	1974.32	1974.63	1974.94	**62.50**
62.60	1974.94	1975.25	1975.56	1975.87	1976.18	1976.49	1976.80	1977.11	1977.42	1977.74	1978.05	**62.60**
62.70	1978.05	1978.36	1978.67	1978.98	1979.29	1979.60	1979.91	1980.22	1980.53	1980.84	1981.15	**62.70**
62.80	1981.15	1981.46	1981.77	1982.08	1982.39	1982.70	1983.01	1983.33	1983.64	1983.95	1984.26	**62.80**
62.90	1984.26	1984.57	1984.88	1985.19	1985.50	1985.81	1986.12	1986.43	1986.74	1987.05	1987.36	**62.90**
63.00	1987.36	1987.68	1987.99	1988.30	1988.61	1988.92	1989.23	1989.54	1989.85	1990.16	1990.47	**63.00**
63.10	1990.47	1990.78	1991.09	1991.40	1991.72	1992.03	1992.34	1992.65	1992.96	1993.27	1993.58	**63.10**
63.20	1993.58	1993.89	1994.20	1994.51	1994.82	1995.13	1995.45	1995.76	1996.07	1996.38	1996.69	**63.20**
63.30	1996.69	1997.00	1997.31	1997.62	1997.93	1998.24	1998.55	1998.87	1999.18	1999.49	1999.80	**63.30**
63.40	1999.80	2000.11	2000.42	2000.73	2001.04	2001.35	2001.66	2001.98	2002.29	2002.60	2002.91	**63.40**
63.50	2002.91	2003.22	2003.53	2003.84	2004.15	2004.46	2004.77	2005.09	2005.40	2005.71	2006.02	**63.50**
63.60	2006.02	2006.33	2006.64	2006.95	2007.26	2007.57	2007.89	2008.20	2008.51	2008.82	2009.13	**63.60**
63.70	2009.13	2009.44	2009.75	2010.06	2010.38	2010.69	2011.00	2011.31	2011.62	2011.93	2012.24	**63.70**
63.80	2012.24	2012.55	2012.86	2013.18	2013.49	2013.80	2014.11	2014.42	2014.73	2015.04	2015.35	**63.80**
63.90	2015.35	2015.67	2015.98	2016.29	2016.60	2016.91	2017.22	2017.53	2017.84	2018.16	2018.47	**63.90**
64.00	2018.47	2018.78	2019.09	2019.40	2019.71	2020.02	2020.33	2020.65	2020.96	2021.27	2021.58	**64.00**
64.10	2021.58	2021.89	2022.20	2022.51	2022.83	2023.14	2023.45	2023.76	2024.07	2024.38	2024.69	**64.10**
64.20	2024.69	2025.01	2025.32	2025.63	2025.94	2026.25	2026.56	2026.87	2027.19	2027.50	2027.81	**64.20**
64.30	2027.81	2028.12	2028.43	2028.74	2029.05	2029.37	2029.68	2029.99	2030.30	2030.61	2030.92	**64.30**
64.40	2030.92	2031.23	2031.55	2031.86	2032.17	2032.48	2032.79	2033.10	2033.41	2033.73	2034.04	**64.40**
64.50	2034.04	2034.35	2034.66	2034.97	2035.28	2035.59	2035.91	2036.22	2036.53	2036.84	2037.15	**64.50**
64.60	2037.15	2037.46	2037.78	2038.09	2038.40	2038.71	2039.02	2039.33	2039.65	2039.96	2040.27	**64.60**
64.70	2040.27	2040.58	2040.89	2041.20	2041.51	2041.83	2042.14	2042.45	2042.76	2043.07	2043.38	**64.70**
64.80	2043.38	2043.70	2044.01	2044.32	2044.63	2044.94	2045.25	2045.57	2045.88	2046.19	2046.50	**64.80**
64.90	2046.50	2046.81	2047.12	2047.44	2047.75	2048.06	2048.37	2048.68	2048.99	2049.31	2049.62	**64.90**
65.00	2049.62	2049.93	2050.24	2050.55	2050.86	2051.18	2051.49	2051.80	2052.11	2052.42	2052.73	**65.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B6.2.2. *Type J thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
65.00	2049.62	2049.93	2050.24	2050.55	2050.86	2051.18	2051.49	2051.80	2052.11	2052.42	2052.73	**65.00**
65.10	2052.73	2053.05	2053.36	2053.67	2053.98	2054.29	2054.61	2054.92	2055.23	2055.54	2055.85	**65.10**
65.20	2055.85	2056.16	2056.48	2056.79	2057.10	2057.41	2057.72	2058.03	2058.35	2058.66	2058.97	**65.20**
65.30	2058.97	2059.28	2059.59	2059.91	2060.22	2060.53	2060.84	2061.15	2061.46	2061.78	2062.09	**65.30**
65.40	2062.09	2062.40	2062.71	2063.02	2063.34	2063.65	2063.96	2064.27	2064.58	2064.90	2065.21	**65.40**
65.50	2065.21	2065.52	2065.83	2066.14	2066.45	2066.77	2067.08	2067.39	2067.70	2068.01	2068.33	**65.50**
65.60	2068.33	2068.64	2068.95	2069.26	2069.57	2069.89	2070.20	2070.51	2070.82	2071.13	2071.44	**65.60**
65.70	2071.44	2071.76	2072.07	2072.38	2072.69	2073.00	2073.32	2073.63	2073.94	2074.25	2074.56	**65.70**
65.80	2074.56	2074.88	2075.19	2075.50	2075.81	2076.12	2076.44	2076.75	2077.06	2077.37	2077.68	**65.80**
65.90	2077.68	2078.00	2078.31	2078.62	2078.93	2079.24	2079.56	2079.87	2080.18	2080.49	2080.80	**65.90**
66.00	2080.80	2081.12	2081.43	2081.74	2082.05	2082.36	2082.68	2082.99	2083.30	2083.61	2083.93	**66.00**
66.10	2083.93	2084.24	2084.55	2084.86	2085.17	2085.49	2085.80	2086.11	2086.42	2086.73	2087.05	**66.10**
66.20	2087.05	2087.36	2087.67	2087.98	2088.29	2088.61	2088.92	2089.23	2089.54	2089.85	2090.17	**66.20**
66.30	2090.17	2090.48	2090.79	2091.10	2091.42	2091.73	2092.04	2092.35	2092.66	2092.98	2093.29	**66.30**
66.40	2093.29	2093.60	2093.91	2094.23	2094.54	2094.85	2095.16	2095.47	2095.79	2096.10	2096.41	**66.40**
66.50	2096.41	2096.72	2097.03	2097.35	2097.66	2097.97	2098.28	2098.60	2098.91	2099.22	2099.53	**66.50**
66.60	2099.53	2099.84	2100.16	2100.47	2100.78	2101.09	2101.41	2101.72	2102.03	2102.34	2102.66	**66.60**
66.70	2102.66	2102.97	2103.28	2103.59	2103.90	2104.22	2104.53	2104.84	2105.15	2105.47	2105.78	**66.70**
66.80	2105.78	2106.09	2106.40	2106.72	2107.03	2107.34	2107.65	2107.96	2108.28	2108.59	2108.90	**66.80**
66.90	2108.90	2109.21	2109.53	2109.84	2110.15	2110.46	2110.78	2111.09	2111.40	2111.71	2112.03	**66.90**
67.00	2112.03	2112.34	2112.65	2112.96	2113.28	2113.59	2113.90	2114.21	2114.52	2114.84	2115.15	**67.00**
67.10	2115.15	2115.46	2115.77	2116.09	2116.40	2116.71	2117.02	2117.34	2117.65	2117.96	2118.27	**67.10**
67.20	2118.27	2118.59	2118.90	2119.21	2119.52	2119.84	2120.15	2120.46	2120.77	2121.09	2121.40	**67.20**
67.30	2121.40	2121.71	2122.02	2122.34	2122.65	2122.96	2123.27	2123.59	2123.90	2124.21	2124.53	**67.30**
67.40	2124.53	2124.84	2125.15	2125.46	2125.78	2126.09	2126.40	2126.71	2127.03	2127.34	2127.65	**67.40**
67.50	2127.65	2127.96	2128.28	2128.59	2128.90	2129.21	2129.53	2129.84	2130.15	2130.47	2130.78	**67.50**
67.60	2130.78	2131.09	2131.40	2131.72	2132.03	2132.34	2132.65	2132.97	2133.28	2133.59	2133.91	**67.60**
67.70	2133.91	2134.22	2134.53	2134.84	2135.16	2135.47	2135.78	2136.09	2136.41	2136.72	2137.03	**67.70**
67.80	2137.03	2137.35	2137.66	2137.97	2138.28	2138.60	2138.91	2139.22	2139.54	2139.85	2140.16	**67.80**
67.90	2140.16	2140.47	2140.79	2141.10	2141.41	2141.73	2142.04	2142.35	2142.66	2142.98	2143.29	**67.90**
68.00	2143.29	2143.60	2143.92	2144.23	2144.54	2144.86	2145.17	2145.48	2145.79	2146.11	2146.42	**68.00**
68.10	2146.42	2146.73	2147.05	2147.36	2147.67	2147.99	2148.30	2148.61	2148.92	2149.24	2149.55	**68.10**
68.20	2149.55	2149.86	2150.18	2150.49	2150.80	2151.12	2151.43	2151.74	2152.06	2152.37	2152.68	**68.20**
68.30	2152.68	2153.00	2153.31	2153.62	2153.93	2154.25	2154.56	2154.87	2155.19	2155.50	2155.81	**68.30**
68.40	2155.81	2156.13	2156.44	2156.75	2157.07	2157.38	2157.69	2158.01	2158.32	2158.63	2158.95	**68.40**
68.50	2158.95	2159.26	2159.57	2159.89	2160.20	2160.51	2160.83	2161.14	2161.45	2161.77	2162.08	**68.50**
68.60	2162.08	2162.39	2162.71	2163.02	2163.33	2163.65	2163.96	2164.27	2164.59	2164.90	2165.21	**68.60**
68.70	2165.21	2165.53	2165.84	2166.16	2166.47	2166.78	2167.10	2167.41	2167.72	2168.04	2168.35	**68.70**
68.80	2168.35	2168.66	2168.98	2169.29	2169.60	2169.92	2170.23	2170.55	2170.86	2171.17	2171.49	**68.80**
68.90	2171.49	2171.80	2172.11	2172.43	2172.74	2173.06	2173.37	2173.68	2174.00	2174.31	2174.62	**68.90**
69.00	2174.62	2174.94	2175.25	2175.57	2175.88	2176.19	2176.51	2176.82	2177.13	2177.45	2177.76	**69.00**
69.10	2177.76	2178.08	2178.39	2178.70	2179.02	2179.33	2179.65	2179.96	2180.27	2180.59	2180.90	**69.10**
69.20	2180.90	2181.22	2181.53	2181.84	2182.16	2182.47	2182.79	2183.10	2183.41	2183.73	2184.04	**69.20**
69.30	2184.04	2184.36	2184.67	2184.99	2185.30	2185.61	2185.93	2186.24	2186.56	2186.87	2187.18	**69.30**
69.40	2187.18	2187.50	2187.81	2188.13	2188.44	2188.76	2189.07	2189.38	2189.70	2190.01	2190.33	**69.40**
69.50	2190.33	2190.64	2190.96	2191.27	2191.59	2191.90						**69.50**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

B7. Supplementary Reference Tables for Type K—Nickel-Chromium Alloy Versus Nickel-Aluminum Alloy Thermocouples

B7.1. Tables with Voltage as a Function of Temperature

The reference function for type K thermocouples given in the main text (see table 7.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B7.1.1 and B7.1.2. Table B7.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 1372 °C, and table B7.1.2 presents voltage values at 1 °F intervals from −454 °F to 2501 °F.

TABLE B7.1.1. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−6.458											−270
−260	−6.441	−6.444	−6.446	−6.448	−6.450	−6.452	−6.453	−6.455	−6.456	−6.457	−6.458	−260
−250	−6.404	−6.408	−6.413	−6.417	−6.421	−6.425	−6.429	−6.432	−6.435	−6.438	−6.441	−250
−240	−6.344	−6.351	−6.358	−6.364	−6.370	−6.377	−6.382	−6.388	−6.393	−6.399	−6.404	−240
−230	−6.262	−6.271	−6.280	−6.289	−6.297	−6.306	−6.314	−6.322	−6.329	−6.337	−6.344	−230
−220	−6.158	−6.170	−6.181	−6.192	−6.202	−6.213	−6.223	−6.233	−6.243	−6.252	−6.262	−220
−210	−6.035	−6.048	−6.061	−6.074	−6.087	−6.099	−6.111	−6.123	−6.135	−6.147	−6.158	−210
−200	−5.891	−5.907	−5.922	−5.936	−5.951	−5.965	−5.980	−5.994	−6.007	−6.021	−6.035	−200
−190	−5.730	−5.747	−5.763	−5.780	−5.797	−5.813	−5.829	−5.845	−5.861	−5.876	−5.891	−190
−180	−5.550	−5.569	−5.588	−5.606	−5.624	−5.642	−5.660	−5.678	−5.695	−5.713	−5.730	−180
−170	−5.354	−5.374	−5.395	−5.415	−5.435	−5.454	−5.474	−5.493	−5.512	−5.531	−5.550	−170
−160	−5.141	−5.163	−5.185	−5.207	−5.228	−5.250	−5.271	−5.292	−5.313	−5.333	−5.354	−160
−150	−4.913	−4.936	−4.960	−4.983	−5.006	−5.029	−5.052	−5.074	−5.097	−5.119	−5.141	−150
−140	−4.669	−4.694	−4.719	−4.744	−4.768	−4.793	−4.817	−4.841	−4.865	−4.889	−4.913	−140
−130	−4.411	−4.437	−4.463	−4.490	−4.516	−4.542	−4.567	−4.593	−4.618	−4.644	−4.669	−130
−120	−4.138	−4.166	−4.194	−4.221	−4.249	−4.276	−4.303	−4.330	−4.357	−4.384	−4.411	−120
−110	−3.852	−3.882	−3.911	−3.939	−3.968	−3.997	−4.025	−4.054	−4.082	−4.110	−4.138	−110
−100	−3.554	−3.584	−3.614	−3.645	−3.675	−3.705	−3.734	−3.764	−3.794	−3.823	−3.852	−100
−90	−3.243	−3.274	−3.306	−3.337	−3.368	−3.400	−3.431	−3.462	−3.492	−3.523	−3.554	−90
−80	−2.920	−2.953	−2.986	−3.018	−3.050	−3.083	−3.115	−3.147	−3.179	−3.211	−3.243	−80
−70	−2.587	−2.620	−2.654	−2.688	−2.721	−2.755	−2.788	−2.821	−2.854	−2.887	−2.920	−70
−60	−2.243	−2.278	−2.312	−2.347	−2.382	−2.416	−2.450	−2.485	−2.519	−2.553	−2.587	−60
−50	−1.889	−1.925	−1.961	−1.996	−2.032	−2.067	−2.103	−2.138	−2.173	−2.208	−2.243	−50
−40	−1.527	−1.564	−1.600	−1.637	−1.673	−1.709	−1.745	−1.782	−1.818	−1.854	−1.889	−40
−30	−1.156	−1.194	−1.231	−1.268	−1.305	−1.343	−1.380	−1.417	−1.453	−1.490	−1.527	−30
−20	−0.778	−0.816	−0.854	−0.892	−0.930	−0.968	−1.006	−1.043	−1.081	−1.119	−1.156	−20
−10	−0.392	−0.431	−0.470	−0.508	−0.547	−0.586	−0.624	−0.663	−0.701	−0.739	−0.778	−10
0	0.000	−0.039	−0.079	−0.118	−0.157	−0.197	−0.236	−0.275	−0.314	−0.353	−0.392	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B7.1.1. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.039	0.079	0.119	0.158	0.198	0.238	0.277	0.317	0.357	0.397	0
10	0.397	0.437	0.477	0.517	0.557	0.597	0.637	0.677	0.718	0.758	0.798	10
20	0.798	0.838	0.879	0.919	0.960	1.000	1.041	1.081	1.122	1.163	1.203	20
30	1.203	1.244	1.285	1.326	1.366	1.407	1.448	1.489	1.530	1.571	1.612	30
40	1.612	1.653	1.694	1.735	1.776	1.817	1.858	1.899	1.941	1.982	2.023	40
50	2.023	2.064	2.106	2.147	2.188	2.230	2.271	2.312	2.354	2.395	2.436	50
60	2.436	2.478	2.519	2.561	2.602	2.644	2.685	2.727	2.768	2.810	2.851	60
70	2.851	2.893	2.934	2.976	3.017	3.059	3.100	3.142	3.184	3.225	3.267	70
80	3.267	3.308	3.350	3.391	3.433	3.474	3.516	3.557	3.599	3.640	3.682	80
90	3.682	3.723	3.765	3.806	3.848	3.889	3.931	3.972	4.013	4.055	4.096	90
100	4.096	4.138	4.179	4.220	4.262	4.303	4.344	4.385	4.427	4.468	4.509	100
110	4.509	4.550	4.591	4.633	4.674	4.715	4.756	4.797	4.838	4.879	4.920	110
120	4.920	4.961	5.002	5.043	5.084	5.124	5.165	5.206	5.247	5.288	5.328	120
130	5.328	5.369	5.410	5.450	5.491	5.532	5.572	5.613	5.653	5.694	5.735	130
140	5.735	5.775	5.815	5.856	5.896	5.937	5.977	6.017	6.058	6.098	6.138	140
150	6.138	6.179	6.219	6.259	6.299	6.339	6.380	6.420	6.460	6.500	6.540	150
160	6.540	6.580	6.620	6.660	6.701	6.741	6.781	6.821	6.861	6.901	6.941	160
170	6.941	6.981	7.021	7.060	7.100	7.140	7.180	7.220	7.260	7.300	7.340	170
180	7.340	7.380	7.420	7.460	7.500	7.540	7.579	7.619	7.659	7.699	7.739	180
190	7.739	7.779	7.819	7.859	7.899	7.939	7.979	8.019	8.059	8.099	8.138	190
200	8.138	8.178	8.218	8.258	8.298	8.338	8.378	8.418	8.458	8.499	8.539	200
210	8.539	8.579	8.619	8.659	8.699	8.739	8.779	8.819	8.860	8.900	8.940	210
220	8.940	8.980	9.020	9.061	9.101	9.141	9.181	9.222	9.262	9.302	9.343	220
230	9.343	9.383	9.423	9.464	9.504	9.545	9.585	9.626	9.666	9.707	9.747	230
240	9.747	9.788	9.828	9.869	9.909	9.950	9.991	10.031	10.072	10.113	10.153	240
250	10.153	10.194	10.235	10.276	10.316	10.357	10.398	10.439	10.480	10.520	10.561	250
260	10.561	10.602	10.643	10.684	10.725	10.766	10.807	10.848	10.889	10.930	10.971	260
270	10.971	11.012	11.053	11.094	11.135	11.176	11.217	11.259	11.300	11.341	11.382	270
280	11.382	11.423	11.465	11.506	11.547	11.588	11.630	11.671	11.712	11.753	11.795	280
290	11.795	11.836	11.877	11.919	11.960	12.001	12.043	12.084	12.126	12.167	12.209	290
300	12.209	12.250	12.291	12.333	12.374	12.416	12.457	12.499	12.540	12.582	12.624	300
310	12.624	12.665	12.707	12.748	12.790	12.831	12.873	12.915	12.956	12.998	13.040	310
320	13.040	13.081	13.123	13.165	13.206	13.248	13.290	13.331	13.373	13.415	13.457	320
330	13.457	13.498	13.540	13.582	13.624	13.665	13.707	13.749	13.791	13.833	13.874	330
340	13.874	13.916	13.958	14.000	14.042	14.084	14.126	14.167	14.209	14.251	14.293	340
350	14.293	14.335	14.377	14.419	14.461	14.503	14.545	14.587	14.629	14.671	14.713	350
360	14.713	14.755	14.797	14.839	14.881	14.923	14.965	15.007	15.049	15.091	15.133	360
370	15.133	15.175	15.217	15.259	15.301	15.343	15.385	15.427	15.469	15.511	15.554	370
380	15.554	15.596	15.638	15.680	15.722	15.764	15.806	15.849	15.891	15.933	15.975	360
390	15.975	16.017	16.059	16.102	16.144	16.186	16.228	16.270	16.313	16.355	16.397	390
400	16.397	16.439	16.482	16.524	16.566	16.608	16.651	16.693	16.735	16.778	16.820	400
410	16.820	16.862	16.904	16.947	16.989	17.031	17.074	17.116	17.158	17.201	17.243	410
420	17.243	17.285	17.328	17.370	17.413	17.455	17.497	17.540	17.582	17.624	17.667	420
430	17.667	17.709	17.752	17.794	17.837	17.879	17.921	17.964	18.006	18.049	18.091	430
440	18.091	18.134	18.176	18.218	18.261	18.303	18.346	18.388	18.431	18.473	18.516	440
450	18.516	18.558	18.601	18.643	18.686	18.728	18.771	18.813	18.856	18.898	18.941	450
460	18.941	18.983	19.026	19.068	19.111	19.154	19.196	19.239	19.281	19.324	19.366	460
470	19.366	19.409	19.451	19.494	19.537	19.579	19.622	19.664	19.707	19.750	19.792	470
480	19.792	19.835	19.877	19.920	19.962	20.005	20.048	20.090	20.133	20.175	20.218	480
490	20.218	20.261	20.303	20.346	20.389	20.431	20.474	20.516	20.559	20.602	20.644	490
500	20.644	20.687	20.730	20.772	20.815	20.857	20.900	20.943	20.985	21.028	21.071	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B7.1.1. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	20.644	20.687	20.730	20.772	20.815	20.857	20.900	20.943	20.985	21.028	21.071	500
510	21.071	21.113	21.156	21.199	21.241	21.284	21.326	21.369	21.412	21.454	21.497	510
520	21.497	21.540	21.582	21.625	21.668	21.710	21.753	21.796	21.838	21.881	21.924	520
530	21.924	21.966	22.009	22.052	22.094	22.137	22.179	22.222	22.265	22.307	22.350	530
540	22.350	22.393	22.435	22.478	22.521	22.563	22.606	22.649	22.691	22.734	22.776	540
550	22.776	22.819	22.862	22.904	22.947	22.990	23.032	23.075	23.117	23.160	23.203	550
560	23.203	23.245	23.288	23.331	23.373	23.416	23.458	23.501	23.544	23.586	23.629	560
570	23.629	23.671	23.714	23.757	23.799	23.842	23.884	23.927	23.970	24.012	24.055	570
580	24.055	24.097	24.140	24.182	24.225	24.267	24.310	24.353	24.395	24.438	24.480	580
590	24.480	24.523	24.565	24.608	24.650	24.693	24.735	24.778	24.820	24.863	24.905	590
600	24.905	24.948	24.990	25.033	25.075	25.118	25.160	25.203	25.245	25.288	25.330	600
610	25.330	25.373	25.415	25.458	25.500	25.543	25.585	25.627	25.670	25.712	25.755	610
620	25.755	25.797	25.840	25.882	25.924	25.967	26.009	26.052	26.094	26.136	26.179	620
630	26.179	26.221	26.263	26.306	26.348	26.390	26.433	26.475	26.517	26.560	26.602	630
640	26.602	26.644	26.687	26.729	26.771	26.814	26.856	26.898	26.940	26.983	27.025	640
650	27.025	27.067	27.109	27.152	27.194	27.236	27.278	27.320	27.363	27.405	27.447	650
660	27.447	27.489	27.531	27.574	27.616	27.658	27.700	27.742	27.784	27.826	27.869	660
670	27.869	27.911	27.953	27.995	28.037	28.079	28.121	28.163	28.205	28.247	28.289	670
680	28.289	28.332	28.374	28.416	28.458	28.500	28.542	28.584	28.626	28.668	28.710	680
690	28.710	28.752	28.794	28.835	28.877	28.919	28.961	29.003	29.045	29.087	29.129	690
700	29.129	29.171	29.213	29.255	29.297	29.338	29.380	29.422	29.464	29.506	29.548	700
710	29.548	29.589	29.631	29.673	29.715	29.757	29.798	29.840	29.882	29.924	29.965	710
720	29.965	30.007	30.049	30.090	30.132	30.174	30.216	30.257	30.299	30.341	30.382	720
730	30.382	30.424	30.466	30.507	30.549	30.590	30.632	30.674	30.715	30.757	30.798	730
740	30.798	30.840	30.881	30.923	30.964	31.005	31.047	31.089	31.130	31.172	31.213	740
750	31.213	31.255	31.296	31.338	31.379	31.421	31.462	31.504	31.545	31.586	31.628	750
760	31.628	31.669	31.710	31.752	31.793	31.834	31.876	31.917	31.958	32.000	32.041	760
770	32.041	32.082	32.124	32.165	32.206	32.247	32.289	32.330	32.371	32.412	32.453	770
780	32.453	32.495	32.536	32.577	32.618	32.659	32.700	32.742	32.783	32.824	32.865	780
790	32.865	32.906	32.947	32.988	33.029	33.070	33.111	33.152	33.193	33.234	33.275	790
800	33.275	33.316	33.357	33.398	33.439	33.480	33.521	33.562	33.603	33.644	33.685	800
810	33.685	33.726	33.767	33.808	33.848	33.889	33.930	33.971	34.012	34.053	34.093	810
820	34.093	34.134	34.175	34.216	34.257	34.297	34.338	34.379	34.420	34.460	34.501	820
830	34.501	34.542	34.582	34.623	34.664	34.704	34.745	34.786	34.826	34.867	34.908	830
840	34.908	34.948	34.989	35.029	35.070	35.110	35.151	35.192	35.232	35.273	35.313	840
850	35.313	35.354	35.394	35.435	35.475	35.516	35.556	35.596	35.637	35.677	35.718	850
860	35.718	35.758	35.798	35.839	35.879	35.920	35.960	36.000	36.041	36.081	36.121	860
870	36.121	36.162	36.202	36.242	36.282	36.323	36.363	36.403	36.443	36.484	36.524	870
880	36.524	36.564	36.604	36.644	36.685	36.725	36.765	36.805	36.845	36.885	36.925	880
890	36.925	36.965	37.006	37.046	37.086	37.126	37.166	37.206	37.246	37.286	37.326	890
900	37.326	37.366	37.406	37.446	37.486	37.526	37.566	37.606	37.646	37.686	37.725	900
910	37.725	37.765	37.805	37.845	37.885	37.925	37.965	38.005	38.044	38.084	38.124	910
920	38.124	38.164	38.204	38.243	38.283	38.323	38.363	38.402	38.442	38.482	38.522	920
930	38.522	38.561	38.601	38.641	38.680	38.720	38.760	38.799	38.839	38.878	38.918	930
940	38.918	38.958	38.997	39.037	39.076	39.116	39.155	39.195	39.235	39.274	39.314	940
950	39.314	39.353	39.393	39.432	39.471	39.511	39.550	39.590	39.629	39.669	39.708	950
960	39.708	39.747	39.787	39.826	39.866	39.905	39.944	39.984	40.023	40.062	40.101	960
970	40.101	40.141	40.180	40.219	40.259	40.298	40.337	40.376	40.415	40.455	40.494	970
980	40.494	40.533	40.572	40.611	40.651	40.690	40.729	40.768	40.807	40.846	40.885	980
990	40.885	40.924	40.963	41.002	41.042	41.081	41.120	41.159	41.198	41.237	41.276	990
1000	41.276	41.315	41.354	41.393	41.431	41.470	41.509	41.548	41.587	41.626	41.665	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B7.1.1. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1000	41.276	41.315	41.354	41.393	41.431	41.470	41.509	41.548	41.587	41.626	41.665	1000
1010	41.665	41.704	41.743	41.781	41.820	41.859	41.898	41.937	41.976	42.014	42.053	1010
1020	42.053	42.092	42.131	42.169	42.208	42.247	42.286	42.324	42.363	42.402	42.440	1020
1030	42.440	42.479	42.518	42.556	42.595	42.633	42.672	42.711	42.749	42.788	42.826	1030
1040	42.826	42.865	42.903	42.942	42.980	43.019	43.057	43.096	43.134	43.173	43.211	1040
1050	43.211	43.250	43.288	43.327	43.365	43.403	43.442	43.480	43.518	43.557	43.595	1050
1060	43.595	43.633	43.672	43.710	43.748	43.787	43.825	43.863	43.901	43.940	43.978	1060
1070	43.978	44.016	44.054	44.092	44.130	44.169	44.207	44.245	44.283	44.321	44.359	1070
1080	44.359	44.397	44.435	44.473	44.512	44.550	44.588	44.626	44.664	44.702	44.740	1080
1090	44.740	44.778	44.816	44.853	44.891	44.929	44.967	45.005	45.043	45.081	45.119	1090
1100	45.119	45.157	45.194	45.232	45.270	45.308	45.346	45.383	45.421	45.459	45.497	1100
1110	45.497	45.534	45.572	45.610	45.647	45.685	45.723	45.760	45.798	45.836	45.873	1110
1120	45.873	45.911	45.948	45.986	46.024	46.061	46.099	46.136	46.174	46.211	46.249	1120
1130	46.249	46.286	46.324	46.361	46.398	46.436	46.473	46.511	46.548	46.585	46.623	1130
1140	46.623	46.660	46.697	46.735	46.772	46.809	46.847	46.884	46.921	46.958	46.995	1140
1150	46.995	47.033	47.070	47.107	47.144	47.181	47.218	47.256	47.293	47.330	47.367	1150
1160	47.367	47.404	47.441	47.478	47.515	47.552	47.589	47.626	47.663	47.700	47.737	1160
1170	47.737	47.774	47.811	47.848	47.884	47.921	47.958	47.995	48.032	48.069	48.105	1170
1180	48.105	48.142	48.179	48.216	48.252	48.289	48.326	48.363	48.399	48.436	48.473	1180
1190	48.473	48.509	48.546	48.582	48.619	48.656	48.692	48.729	48.765	48.802	48.838	1190
1200	48.838	48.875	48.911	48.948	48.984	49.021	49.057	49.093	49.130	49.166	49.202	1200
1210	49.202	49.239	49.275	49.311	49.348	49.384	49.420	49.456	49.493	49.529	49.565	1210
1220	49.565	49.601	49.637	49.674	49.710	49.746	49.782	49.818	49.854	49.890	49.926	1220
1230	49.926	49.962	49.998	50.034	50.070	50.106	50.142	50.178	50.214	50.250	50.286	1230
1240	50.286	50.322	50.358	50.393	50.429	50.465	50.501	50.537	50.572	50.608	50.644	1240
1250	50.644	50.680	50.715	50.751	50.787	50.822	50.858	50.894	50.929	50.965	51.000	1250
1260	51.000	51.036	51.071	51.107	51.142	51.178	51.213	51.249	51.284	51.320	51.355	1260
1270	51.355	51.391	51.426	51.461	51.497	51.532	51.567	51.603	51.638	51.673	51.708	1270
1280	51.708	51.744	51.779	51.814	51.849	51.885	51.920	51.955	51.990	52.025	52.060	1280
1290	52.060	52.095	52.130	52.165	52.200	52.235	52.270	52.305	52.340	52.375	52.410	1290
1300	52.410	52.445	52.480	52.515	52.550	52.585	52.620	52.654	52.689	52.724	52.759	1300
1310	52.759	52.794	52.828	52.863	52.898	52.932	52.967	53.002	53.037	53.071	53.106	1310
1320	53.106	53.140	53.175	53.210	53.244	53.279	53.313	53.348	53.382	53.417	53.451	1320
1330	53.451	53.486	53.520	53.555	53.589	53.623	53.658	53.692	53.727	53.761	53.795	1330
1340	53.795	53.830	53.864	53.898	53.932	53.967	54.001	54.035	54.069	54.104	54.138	1340
1350	54.138	54.172	54.206	54.240	54.274	54.308	54.343	54.377	54.411	54.445	54.479	1350
1360	54.479	54.513	54.547	54.581	54.615	54.649	54.683	54.717	54.751	54.785	54.819	1360
1370	54.819	54.852	54.886									1370
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B7.1.2. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−6.456	−6.456	−6.457	−6.457	−6.458							−450
−440	−6.446	−6.448	−6.449	−6.450	−6.451	−6.452	−6.453	−6.454	−6.454	−6.455	−6.456	−440
−430	−6.431	−6.433	−6.435	−6.436	−6.438	−6.440	−6.441	−6.443	−6.444	−6.445	−6.446	−430
−420	−6.409	−6.411	−6.414	−6.416	−6.419	−6.421	−6.423	−6.425	−6.427	−6.429	−6.431	−420
−410	−6.380	−6.383	−6.386	−6.389	−6.392	−6.395	−6.398	−6.401	−6.404	−6.406	−6.409	−410
−400	−6.344	−6.348	−6.352	−6.355	−6.359	−6.363	−6.366	−6.370	−6.373	−6.377	−6.380	−400
−390	−6.301	−6.306	−6.310	−6.315	−6.319	−6.323	−6.328	−6.332	−6.336	−6.340	−6.344	−390
−380	−6.251	−6.257	−6.262	−6.267	−6.272	−6.277	−6.282	−6.287	−6.292	−6.296	−6.301	−380
−370	−6.195	−6.201	−6.207	−6.213	−6.218	−6.224	−6.230	−6.235	−6.241	−6.246	−6.251	−370
−360	−6.133	−6.139	−6.146	−6.152	−6.158	−6.165	−6.171	−6.177	−6.183	−6.189	−6.195	−360
−350	−6.064	−6.071	−6.078	−6.085	−6.092	−6.099	−6.106	−6.113	−6.119	−6.126	−6.133	−350
−340	−5.989	−5.997	−6.004	−6.012	−6.020	−6.027	−6.035	−6.042	−6.049	−6.057	−6.064	−340
−330	−5.908	−5.917	−5.925	−5.933	−5.941	−5.949	−5.957	−5.965	−5.973	−5.981	−5.989	−330
−320	−5.822	−5.831	−5.840	−5.848	−5.857	−5.866	−5.874	−5.883	−5.891	−5.900	−5.908	−320
−310	−5.730	−5.739	−5.749	−5.758	−5.767	−5.776	−5.786	−5.795	−5.804	−5.813	−5.822	−310
−300	−5.632	−5.642	−5.652	−5.662	−5.672	−5.682	−5.691	−5.701	−5.711	−5.720	−5.730	−300
−290	−5.529	−5.540	−5.550	−5.561	−5.571	−5.581	−5.592	−5.602	−5.612	−5.622	−5.632	−290
−280	−5.421	−5.432	−5.443	−5.454	−5.465	−5.476	−5.487	−5.497	−5.508	−5.519	−5.529	−280
−270	−5.308	−5.320	−5.331	−5.343	−5.354	−5.365	−5.377	−5.388	−5.399	−5.410	−5.421	−270
−260	−5.190	−5.202	−5.214	−5.226	−5.238	−5.250	−5.261	−5.273	−5.285	−5.296	−5.308	−260
−250	−5.067	−5.079	−5.092	−5.104	−5.117	−5.129	−5.141	−5.153	−5.166	−5.178	−5.190	−250
−240	−4.939	−4.952	−4.965	−4.978	−4.991	−5.003	−5.016	−5.029	−5.042	−5.054	−5.067	−240
−230	−4.806	−4.820	−4.833	−4.847	−4.860	−4.873	−4.886	−4.900	−4.913	−4.926	−4.939	−230
−220	−4.669	−4.683	−4.697	−4.711	−4.724	−4.738	−4.752	−4.766	−4.779	−4.793	−4.806	−220
−210	−4.527	−4.542	−4.556	−4.570	−4.584	−4.599	−4.613	−4.627	−4.641	−4.655	−4.669	−210
−200	−4.381	−4.396	−4.411	−4.425	−4.440	−4.455	−4.469	−4.484	−4.498	−4.513	−4.527	−200
−190	−4.231	−4.246	−4.261	−4.276	−4.291	−4.306	−4.321	−4.336	−4.351	−4.366	−4.381	−190
−180	−4.076	−4.091	−4.107	−4.123	−4.138	−4.154	−4.169	−4.185	−4.200	−4.215	−4.231	−180
−170	−3.917	−3.933	−3.949	−3.965	−3.981	−3.997	−4.013	−4.029	−4.044	−4.060	−4.076	−170
−160	−3.754	−3.771	−3.787	−3.803	−3.820	−3.836	−3.852	−3.869	−3.885	−3.901	−3.917	−160
−150	−3.587	−3.604	−3.621	−3.638	−3.655	−3.671	−3.688	−3.705	−3.721	−3.738	−3.754	−150
−140	−3.417	−3.434	−3.451	−3.468	−3.486	−3.503	−3.520	−3.537	−3.554	−3.571	−3.587	−140
−130	−3.243	−3.260	−3.278	−3.295	−3.313	−3.330	−3.348	−3.365	−3.382	−3.400	−3.417	−130
−120	−3.065	−3.083	−3.101	−3.119	−3.136	−3.154	−3.172	−3.190	−3.207	−3.225	−3.243	−120
−110	−2.884	−2.902	−2.920	−2.938	−2.957	−2.975	−2.993	−3.011	−3.029	−3.047	−3.065	−110
−100	−2.699	−2.718	−2.736	−2.755	−2.773	−2.792	−2.810	−2.829	−2.847	−2.865	−2.884	−100
−90	−2.511	−2.530	−2.549	−2.568	−2.587	−2.605	−2.624	−2.643	−2.662	−2.680	−2.699	−90
−80	−2.320	−2.339	−2.359	−2.378	−2.397	−2.416	−2.435	−2.454	−2.473	−2.492	−2.511	−80
−70	−2.126	−2.146	−2.165	−2.185	−2.204	−2.223	−2.243	−2.262	−2.282	−2.301	−2.320	−70
−60	−1.929	−1.949	−1.969	−1.988	−2.008	−2.028	−2.048	−2.067	−2.087	−2.106	−2.126	−60
−50	−1.729	−1.749	−1.770	−1.790	−1.810	−1.830	−1.850	−1.869	−1.889	−1.909	−1.929	−50
−40	−1.527	−1.547	−1.568	−1.588	−1.608	−1.628	−1.649	−1.669	−1.689	−1.709	−1.729	−40
−30	−1.322	−1.343	−1.363	−1.384	−1.404	−1.425	−1.445	−1.466	−1.486	−1.507	−1.527	−30
−20	−1.114	−1.135	−1.156	−1.177	−1.198	−1.218	−1.239	−1.260	−1.281	−1.301	−1.322	−20
−10	−0.905	−0.926	−0.947	−0.968	−0.989	−1.010	−1.031	−1.052	−1.073	−1.094	−1.114	−10
0	−0.692	−0.714	−0.735	−0.756	−0.778	−0.799	−0.820	−0.841	−0.862	−0.883	−0.905	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B7.1.2. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.692	−0.671	−0.650	−0.628	−0.607	−0.586	−0.564	−0.543	−0.521	−0.500	−0.478	0
10	−0.478	−0.457	−0.435	−0.413	−0.392	−0.370	−0.349	−0.327	−0.305	−0.284	−0.262	10
20	−0.262	−0.240	−0.218	−0.197	−0.175	−0.153	−0.131	−0.109	−0.088	−0.066	−0.044	20
30	−0.044	−0.022	0.000	0.022	0.044	0.066	0.088	0.110	0.132	0.154	0.176	30
40	0.176	0.198	0.220	0.242	0.264	0.286	0.308	0.330	0.353	0.375	0.397	40
50	0.397	0.419	0.441	0.463	0.486	0.508	0.530	0.552	0.575	0.597	0.619	50
60	0.619	0.642	0.664	0.686	0.709	0.731	0.753	0.776	0.798	0.821	0.843	60
70	0.843	0.865	0.888	0.910	0.933	0.955	0.978	1.000	1.023	1.045	1.068	70
80	1.068	1.090	1.113	1.136	1.158	1.181	1.203	1.226	1.249	1.271	1.294	80
90	1.294	1.316	1.339	1.362	1.384	1.407	1.430	1.453	1.475	1.498	1.521	90
100	1.521	1.543	1.566	1.589	1.612	1.635	1.657	1.680	1.703	1.726	1.749	100
110	1.749	1.771	1.794	1.817	1.840	1.863	1.886	1.909	1.931	1.954	1.977	110
120	1.977	2.000	2.023	2.046	2.069	2.092	2.115	2.138	2.161	2.184	2.207	120
130	2.207	2.230	2.253	2.276	2.298	2.321	2.344	2.367	2.390	2.413	2.436	130
140	2.436	2.459	2.483	2.506	2.529	2.552	2.575	2.598	2.621	2.644	2.667	140
150	2.667	2.690	2.713	2.736	2.759	2.782	2.805	2.828	2.851	2.874	2.897	150
160	2.897	2.920	2.944	2.967	2.990	3.013	3.036	3.059	3.082	3.105	3.128	160
170	3.128	3.151	3.174	3.197	3.220	3.244	3.267	3.290	3.313	3.336	3.359	170
180	3.359	3.382	3.405	3.428	3.451	3.474	3.497	3.520	3.544	3.567	3.590	180
190	3.590	3.613	3.636	3.659	3.682	3.705	3.728	3.751	3.774	3.797	3.820	190
200	3.820	3.843	3.866	3.889	3.912	3.935	3.958	3.981	4.004	4.027	4.050	200
210	4.050	4.073	4.096	4.119	4.142	4.165	4.188	4.211	4.234	4.257	4.280	210
220	4.280	4.303	4.326	4.349	4.372	4.395	4.417	4.440	4.463	4.486	4.509	220
230	4.509	4.532	4.555	4.578	4.601	4.623	4.646	4.669	4.692	4.715	4.738	230
240	4.738	4.760	4.783	4.806	4.829	4.852	4.874	4.897	4.920	4.943	4.965	240
250	4.965	4.988	5.011	5.034	5.056	5.079	5.102	5.124	5.147	5.170	5.192	250
260	5.192	5.215	5.238	5.260	5.283	5.306	5.328	5.351	5.374	5.396	5.419	260
270	5.419	5.441	5.464	5.487	5.509	5.532	5.554	5.577	5.599	5.622	5.644	270
280	5.644	5.667	5.690	5.712	5.735	5.757	5.779	5.802	5.824	5.847	5.869	280
290	5.869	5.892	5.914	5.937	5.959	5.982	6.004	6.026	6.049	6.071	6.094	290
300	6.094	6.116	6.138	6.161	6.183	6.205	6.228	6.250	6.272	6.295	6.317	300
310	6.317	6.339	6.362	6.384	6.406	6.429	6.451	6.473	6.496	6.518	6.540	310
320	6.540	6.562	6.585	6.607	6.629	6.652	6.674	6.696	6.718	6.741	6.763	320
330	6.763	6.785	6.807	6.829	6.852	6.874	6.896	6.918	6.941	6.963	6.985	330
340	6.985	7.007	7.029	7.052	7.074	7.096	7.118	7.140	7.163	7.185	7.207	340
350	7.207	7.229	7.251	7.273	7.296	7.318	7.340	7.362	7.384	7.407	7.429	350
360	7.429	7.451	7.473	7.495	7.517	7.540	7.562	7.584	7.606	7.628	7.650	360
370	7.650	7.673	7.695	7.717	7.739	7.761	7.783	7.806	7.828	7.850	7.872	370
380	7.872	7.894	7.917	7.939	7.961	7.983	8.005	8.027	8.050	8.072	8.094	380
390	8.094	8.116	8.138	8.161	8.183	8.205	8.227	8.250	8.272	8.294	8.316	390
400	8.316	8.338	8.361	8.383	8.405	8.427	8.450	8.472	8.494	8.516	8.539	400
410	8.539	8.561	8.583	8.605	8.628	8.650	8.672	8.694	8.717	8.739	8.761	410
420	8.761	8.784	8.806	8.828	8.851	8.873	8.895	8.918	8.940	8.962	8.985	420
430	8.985	9.007	9.029	9.052	9.074	9.096	9.119	9.141	9.163	9.186	9.208	430
440	9.208	9.231	9.253	9.275	9.298	9.320	9.343	9.365	9.388	9.410	9.432	440
450	9.432	9.455	9.477	9.500	9.522	9.545	9.567	9.590	9.612	9.635	9.657	450
460	9.657	9.680	9.702	9.725	9.747	9.770	9.792	9.815	9.837	9.860	9.882	460
470	9.882	9.905	9.927	9.950	9.973	9.995	10.018	10.040	10.063	10.086	10.108	470
480	10.108	10.131	10.153	10.176	10.199	10.221	10.244	10.267	10.289	10.312	10.334	480
490	10.334	10.357	10.380	10.402	10.425	10.448	10.471	10.493	10.516	10.539	10.561	490
500	10.561	10.584	10.607	10.629	10.652	10.675	10.698	10.720	10.743	10.766	10.789	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B7.1.2. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	10.561	10.584	10.607	10.629	10.652	10.675	10.698	10.720	10.743	10.766	10.789	500
510	10.789	10.811	10.834	10.857	10.880	10.903	10.925	10.948	10.971	10.994	11.017	510
520	11.017	11.039	11.062	11.085	11.108	11.131	11.154	11.176	11.199	11.222	11.245	520
530	11.245	11.268	11.291	11.313	11.336	11.359	11.382	11.405	11.428	11.451	11.474	530
540	11.474	11.497	11.519	11.542	11.565	11.588	11.611	11.634	11.657	11.680	11.703	540
550	11.703	11.726	11.749	11.772	11.795	11.818	11.841	11.864	11.887	11.910	11.933	550
560	11.933	11.956	11.978	12.001	12.024	12.047	12.070	12.093	12.116	12.140	12.163	560
570	12.163	12.186	12.209	12.232	12.255	12.278	12.301	12.324	12.347	12.370	12.393	570
580	12.393	12.416	12.439	12.462	12.485	12.508	12.531	12.554	12.577	12.600	12.624	580
590	12.624	12.647	12.670	12.693	12.716	12.739	12.762	12.785	12.808	12.831	12.855	590
600	12.855	12.878	12.901	12.924	12.947	12.970	12.993	13.016	13.040	13.063	13.086	600
610	13.086	13.109	13.132	13.155	13.179	13.202	13.225	13.248	13.271	13.294	13.318	610
620	13.318	13.341	13.364	13.387	13.410	13.433	13.457	13.480	13.503	13.526	13.549	620
630	13.549	13.573	13.596	13.619	13.642	13.665	13.689	13.712	13.735	13.758	13.782	630
640	13.782	13.805	13.828	13.851	13.874	13.898	13.921	13.944	13.967	13.991	14.014	640
650	14.014	14.037	14.060	14.084	14.107	14.130	14.154	14.177	14.200	14.223	14.247	650
660	14.247	14.270	14.293	14.316	14.340	14.363	14.386	14.410	14.433	14.456	14.479	660
670	14.479	14.503	14.526	14.549	14.573	14.596	14.619	14.643	14.666	14.689	14.713	670
680	14.713	14.736	14.759	14.783	14.806	14.829	14.853	14.876	14.899	14.923	14.946	680
690	14.946	14.969	14.993	15.016	15.039	15.063	15.086	15.109	15.133	15.156	15.179	690
700	15.179	15.203	15.226	15.250	15.273	15.296	15.320	15.343	15.366	15.390	15.413	700
710	15.413	15.437	15.460	15.483	15.507	15.530	15.554	15.577	15.600	15.624	15.647	710
720	15.647	15.671	15.694	15.717	15.741	15.764	15.788	15.811	15.834	15.858	15.881	720
730	15.881	15.905	15.928	15.952	15.975	15.998	16.022	16.045	16.069	16.092	16.116	730
740	16.116	16.139	16.163	16.186	16.209	16.233	16.256	16.280	16.303	16.327	16.350	740
750	16.350	16.374	16.397	16.421	16.444	16.468	16.491	16.514	16.538	16.561	16.585	750
760	16.585	16.608	16.632	16.655	16.679	16.702	16.726	16.749	16.773	16.796	16.820	760
770	16.820	16.843	16.867	16.890	16.914	16.937	16.961	16.984	17.008	17.031	17.055	770
780	17.055	17.078	17.102	17.125	17.149	17.173	17.196	17.220	17.243	17.267	17.290	780
790	17.290	17.314	17.337	17.361	17.384	17.408	17.431	17.455	17.478	17.502	17.526	790
800	17.526	17.549	17.573	17.596	17.620	17.643	17.667	17.690	17.714	17.738	17.761	800
810	17.761	17.785	17.808	17.832	17.855	17.879	17.902	17.926	17.950	17.973	17.997	810
820	17.997	18.020	18.044	18.068	18.091	18.115	18.138	18.162	18.185	18.209	18.233	820
830	18.233	18.256	18.280	18.303	18.327	18.351	18.374	18.398	18.421	18.445	18.469	830
840	18.469	18.492	18.516	18.539	18.563	18.587	18.610	18.634	18.657	18.681	18.705	840
850	18.705	18.728	18.752	18.776	18.799	18.823	18.846	18.870	18.894	18.917	18.941	850
860	18.941	18.965	18.988	19.012	19.035	19.059	19.083	19.106	19.130	19.154	19.177	860
870	19.177	19.201	19.224	19.248	19.272	19.295	19.319	19.343	19.366	19.390	19.414	870
880	19.414	19.437	19.461	19.485	19.508	19.532	19.556	19.579	19.603	19.626	19.650	880
890	19.650	19.674	19.697	19.721	19.745	19.768	19.792	19.816	19.839	19.863	19.887	890
900	19.887	19.910	19.934	19.958	19.981	20.005	20.029	20.052	20.076	20.100	20.123	900
910	20.123	20.147	20.171	20.194	20.218	20.242	20.265	20.289	20.313	20.336	20.360	910
920	20.360	20.384	20.407	20.431	20.455	20.479	20.502	20.526	20.550	20.573	20.597	920
930	20.597	20.621	20.644	20.668	20.692	20.715	20.739	20.763	20.786	20.810	20.834	930
940	20.834	20.857	20.881	20.905	20.929	20.952	20.976	21.000	21.023	21.047	21.071	940
950	21.071	21.094	21.118	21.142	21.165	21.189	21.213	21.236	21.260	21.284	21.308	950
960	21.308	21.331	21.355	21.379	21.402	21.426	21.450	21.473	21.497	21.521	21.544	960
970	21.544	21.568	21.592	21.616	21.639	21.663	21.687	21.710	21.734	21.758	21.781	970
980	21.781	21.805	21.829	21.852	21.876	21.900	21.924	21.947	21.971	21.995	22.018	980
990	22.018	22.042	22.066	22.089	22.113	22.137	22.160	22.184	22.208	22.232	22.255	990
1000	22.255	22.279	22.303	22.326	22.350	22.374	22.397	22.421	22.445	22.468	22.492	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B7.1.2. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	22.255	22.279	22.303	22.326	22.350	22.374	22.397	22.421	22.445	22.468	22.492	1000
1010	22.492	22.516	22.540	22.563	22.587	22.611	22.634	22.658	22.682	22.705	22.729	1010
1020	22.729	22.753	22.776	22.800	22.824	22.847	22.871	22.895	22.919	22.942	22.966	1020
1030	22.966	22.990	23.013	23.037	23.061	23.084	23.108	23.132	23.155	23.179	23.203	1030
1040	23.203	23.226	23.250	23.274	23.297	23.321	23.345	23.368	23.392	23.416	23.439	1040
1050	23.439	23.463	23.487	23.510	23.534	23.558	23.581	23.605	23.629	23.652	23.676	1050
1060	23.676	23.700	23.723	23.747	23.771	23.794	23.818	23.842	23.865	23.889	23.913	1060
1070	23.913	23.936	23.960	23.984	24.007	24.031	24.055	24.078	24.102	24.126	24.149	1070
1080	24.149	24.173	24.197	24.220	24.244	24.267	24.291	24.315	24.338	24.362	24.386	1080
1090	24.386	24.409	24.433	24.457	24.480	24.504	24.527	24.551	24.575	24.598	24.622	1090
1100	24.622	24.646	24.669	24.693	24.717	24.740	24.764	24.787	24.811	24.835	24.858	1100
1110	24.858	24.882	24.905	24.929	24.953	24.976	25.000	25.024	25.047	25.071	25.094	1110
1120	25.094	25.118	25.142	25.165	25.189	25.212	25.236	25.260	25.283	25.307	25.330	1120
1130	25.330	25.354	25.377	25.401	25.425	25.448	25.472	25.495	25.519	25.543	25.566	1130
1140	25.566	25.590	25.613	25.637	25.660	25.684	25.708	25.731	25.755	25.778	25.802	1140
1150	25.802	25.825	25.849	25.873	25.896	25.920	25.943	25.967	25.990	26.014	26.037	1150
1160	26.037	26.061	26.084	26.108	26.132	26.155	26.179	26.202	26.226	26.249	26.273	1160
1170	26.273	26.296	26.320	26.343	26.367	26.390	26.414	26.437	26.461	26.484	26.508	1170
1180	26.508	26.532	26.555	26.579	26.602	26.626	26.649	26.673	26.696	26.720	26.743	1180
1190	26.743	26.767	26.790	26.814	26.837	26.861	26.884	26.907	26.931	26.954	26.978	1190
1200	26.978	27.001	27.025	27.048	27.072	27.095	27.119	27.142	27.166	27.189	27.213	1200
1210	27.213	27.236	27.259	27.283	27.306	27.330	27.353	27.377	27.400	27.424	27.447	1210
1220	27.447	27.471	27.494	27.517	27.541	27.564	27.588	27.611	27.635	27.658	27.681	1220
1230	27.681	27.705	27.728	27.752	27.775	27.798	27.822	27.845	27.869	27.892	27.915	1230
1240	27.915	27.939	27.962	27.986	28.009	28.032	28.056	28.079	28.103	28.126	28.149	1240
1250	28.149	28.173	28.196	28.219	28.243	28.266	28.289	28.313	28.336	28.360	28.383	1250
1260	28.383	28.406	28.430	28.453	28.476	28.500	28.523	28.546	28.570	28.593	28.616	1260
1270	28.616	28.640	28.663	28.686	28.710	28.733	28.756	28.780	28.803	28.826	28.849	1270
1280	28.849	28.873	28.896	28.919	28.943	28.966	28.989	29.013	29.036	29.059	29.082	1280
1290	29.082	29.106	29.129	29.152	29.176	29.199	29.222	29.245	29.269	29.292	29.315	1290
1300	29.315	29.338	29.362	29.385	29.408	29.431	29.455	29.478	29.501	29.524	29.548	1300
1310	29.548	29.571	29.594	29.617	29.640	29.664	29.687	29.710	29.733	29.757	29.780	1310
1320	29.780	29.803	29.826	29.849	29.873	29.896	29.919	29.942	29.965	29.989	30.012	1320
1330	30.012	30.035	30.058	30.081	30.104	30.128	30.151	30.174	30.197	30.220	30.243	1330
1340	30.243	30.267	30.290	30.313	30.336	30.359	30.382	30.405	30.429	30.452	30.475	1340
1350	30.475	30.498	30.521	30.544	30.567	30.590	30.613	30.637	30.660	30.683	30.706	1350
1360	30.706	30.729	30.752	30.775	30.798	30.821	30.844	30.868	30.891	30.914	30.937	1360
1370	30.937	30.960	30.983	31.006	31.029	31.052	31.075	31.098	31.121	31.144	31.167	1370
1380	31.167	31.190	31.213	31.236	31.260	31.283	31.306	31.329	31.352	31.375	31.398	1380
1390	31.398	31.421	31.444	31.467	31.490	31.513	31.536	31.559	31.582	31.605	31.628	1390
1400	31.628	31.651	31.674	31.697	31.720	31.743	31.766	31.789	31.812	31.834	31.857	1400
1410	31.857	31.880	31.903	31.926	31.949	31.972	31.995	32.018	32.041	32.064	32.087	1410
1420	32.087	32.110	32.133	32.156	32.179	32.202	32.224	32.247	32.270	32.293	32.316	1420
1430	32.316	32.339	32.362	32.385	32.408	32.431	32.453	32.476	32.499	32.522	32.545	1430
1440	32.545	32.568	32.591	32.614	32.636	32.659	32.682	32.705	32.728	32.751	32.774	1440
1450	32.774	32.796	32.819	32.842	32.865	32.888	32.911	32.933	32.956	32.979	33.002	1450
1460	33.002	33.025	33.047	33.070	33.093	33.116	33.139	33.161	33.184	33.207	33.230	1460
1470	33.230	33.253	33.275	33.298	33.321	33.344	33.366	33.389	33.412	33.435	33.458	1470
1480	33.458	33.480	33.503	33.526	33.548	33.571	33.594	33.617	33.639	33.662	33.685	1480
1490	33.685	33.708	33.730	33.753	33.776	33.798	33.821	33.844	33.867	33.889	33.912	1490
1500	33.912	33.935	33.957	33.980	34.003	34.025	34.048	34.071	34.093	34.116	34.139	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B7.1.2. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	33.912	33.935	33.957	33.980	34.003	34.025	34.048	34.071	34.093	34.116	34.139	1500
1510	34.139	34.161	34.184	34.207	34.229	34.252	34.275	34.297	34.320	34.343	34.365	1510
1520	34.365	34.388	34.410	34.433	34.456	34.478	34.501	34.524	34.546	34.569	34.591	1520
1530	34.591	34.614	34.637	34.659	34.682	34.704	34.727	34.750	34.772	34.795	34.817	1530
1540	34.817	34.840	34.862	34.885	34.908	34.930	34.953	34.975	34.998	35.020	35.043	1540
1550	35.043	35.065	35.088	35.110	35.133	35.156	35.178	35.201	35.223	35.246	35.268	1550
1560	35.268	35.291	35.313	35.336	35.358	35.381	35.403	35.426	35.448	35.471	35.493	1560
1570	35.493	35.516	35.538	35.560	35.583	35.605	35.628	35.650	35.673	35.695	35.718	1570
1580	35.718	35.740	35.763	35.785	35.807	35.830	35.852	35.875	35.897	35.920	35.942	1580
1590	35.942	35.964	35.987	36.009	36.032	36.054	36.076	36.099	36.121	36.144	36.166	1590
1600	36.166	36.188	36.211	36.233	36.256	36.278	36.300	36.323	36.345	36.367	36.390	1600
1610	36.390	36.412	36.434	36.457	36.479	36.501	36.524	36.546	36.568	36.591	36.613	1610
1620	36.613	36.635	36.658	36.680	36.702	36.725	36.747	36.769	36.792	36.814	36.836	1620
1630	36.836	36.859	36.881	36.903	36.925	36.948	36.970	36.992	37.014	37.037	37.059	1630
1640	37.059	37.081	37.104	37.126	37.148	37.170	37.193	37.215	37.237	37.259	37.281	1640
1650	37.281	37.304	37.326	37.348	37.370	37.393	37.415	37.437	37.459	37.481	37.504	1650
1660	37.504	37.526	37.548	37.570	37.592	37.615	37.637	37.659	37.681	37.703	37.725	1660
1670	37.725	37.748	37.770	37.792	37.814	37.836	37.858	37.881	37.903	37.925	37.947	1670
1680	37.947	37.969	37.991	38.013	38.036	38.058	38.080	38.102	38.124	38.146	38.168	1680
1690	38.168	38.190	38.212	38.235	38.257	38.279	38.301	38.323	38.345	38.367	38.389	1690
1700	38.389	38.411	38.433	38.455	38.477	38.499	38.522	38.544	38.566	38.588	38.610	1700
1710	38.610	38.632	38.654	38.676	38.698	38.720	38.742	38.764	38.786	38.808	38.830	1710
1720	38.830	38.852	38.874	38.896	38.918	38.940	38.962	38.984	39.006	39.028	39.050	1720
1730	39.050	39.072	39.094	39.116	39.138	39.160	39.182	39.204	39.226	39.248	39.270	1730
1740	39.270	39.292	39.314	39.335	39.357	39.379	39.401	39.423	39.445	39.467	39.489	1740
1750	39.489	39.511	39.533	39.555	39.577	39.599	39.620	39.642	39.664	39.686	39.708	1750
1760	39.708	39.730	39.752	39.774	39.796	39.817	39.839	39.861	39.883	39.905	39.927	1760
1770	39.927	39.949	39.970	39.992	40.014	40.036	40.058	40.080	40.101	40.123	40.145	1770
1780	40.145	40.167	40.189	40.211	40.232	40.254	40.276	40.298	40.320	40.341	40.363	1780
1790	40.363	40.385	40.407	40.429	40.450	40.472	40.494	40.516	40.537	40.559	40.581	1790
1800	40.581	40.603	40.624	40.646	40.668	40.690	40.711	40.733	40.755	40.777	40.798	1800
1810	40.798	40.820	40.842	40.864	40.885	40.907	40.929	40.950	40.972	40.994	41.015	1810
1820	41.015	41.037	41.059	41.081	41.102	41.124	41.146	41.167	41.189	41.211	41.232	1820
1830	41.232	41.254	41.276	41.297	41.319	41.341	41.362	41.384	41.405	41.427	41.449	1830
1840	41.449	41.470	41.492	41.514	41.535	41.557	41.578	41.600	41.622	41.643	41.665	1840
1850	41.665	41.686	41.708	41.730	41.751	41.773	41.794	41.816	41.838	41.859	41.881	1850
1860	41.881	41.902	41.924	41.945	41.967	41.988	42.010	42.032	42.053	42.075	42.096	1860
1870	42.096	42.118	42.139	42.161	42.182	42.204	42.225	42.247	42.268	42.290	42.311	1870
1880	42.311	42.333	42.354	42.376	42.397	42.419	42.440	42.462	42.483	42.505	42.526	1880
1890	42.526	42.548	42.569	42.591	42.612	42.633	42.655	42.676	42.698	42.719	42.741	1890
1900	42.741	42.762	42.783	42.805	42.826	42.848	42.869	42.891	42.912	42.933	42.955	1900
1910	42.955	42.976	42.998	43.019	43.040	43.062	43.083	43.104	43.126	43.147	43.169	1910
1920	43.169	43.190	43.211	43.233	43.254	43.275	43.297	43.318	43.339	43.361	43.382	1920
1930	43.382	43.403	43.425	43.446	43.467	43.489	43.510	43.531	43.552	43.574	43.595	1930
1940	43.595	43.616	43.638	43.659	43.680	43.701	43.723	43.744	43.765	43.787	43.808	1940
1950	43.808	43.829	43.850	43.872	43.893	43.914	43.935	43.957	43.978	43.999	44.020	1950
1960	44.020	44.041	44.063	44.084	44.105	44.126	44.147	44.169	44.190	44.211	44.232	1960
1970	44.232	44.253	44.275	44.296	44.317	44.338	44.359	44.380	44.402	44.423	44.444	1970
1980	44.444	44.465	44.486	44.507	44.528	44.550	44.571	44.592	44.613	44.634	44.655	1980
1990	44.655	44.676	44.697	44.719	44.740	44.761	44.782	44.803	44.824	44.845	44.866	1990
2000	44.866	44.887	44.908	44.929	44.950	44.971	44.992	45.014	45.035	45.056	45.077	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B7.1.2. *Type K thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	44.866	44.887	44.908	44.929	44.950	44.971	44.992	45.014	45.035	45.056	45.077	2000
2010	45.077	45.098	45.119	45.140	45.161	45.182	45.203	45.224	45.245	45.266	45.287	2010
2020	45.287	45.308	45.329	45.350	45.371	45.392	45.413	45.434	45.455	45.476	45.497	2020
2030	45.497	45.518	45.539	45.560	45.580	45.601	45.622	45.643	45.664	45.685	45.706	2030
2040	45.706	45.727	45.748	45.769	45.790	45.811	45.832	45.852	45.873	45.894	45.915	2040
2050	45.915	45.936	45.957	45.978	45.999	46.019	46.040	46.061	46.082	46.103	46.124	2050
2060	46.124	46.145	46.165	46.186	46.207	46.228	46.249	46.269	46.290	46.311	46.332	2060
2070	46.332	46.353	46.373	46.394	46.415	46.436	46.457	46.477	46.498	46.519	46.540	2070
2080	46.540	46.560	46.581	46.602	46.623	46.643	46.664	46.685	46.706	46.726	46.747	2080
2090	46.747	46.768	46.789	46.809	46.830	46.851	46.871	46.892	46.913	46.933	46.954	2090
2100	46.954	46.975	46.995	47.016	47.037	47.057	47.078	47.099	47.119	47.140	47.161	2100
2110	47.161	47.181	47.202	47.223	47.243	47.264	47.284	47.305	47.326	47.346	47.367	2110
2120	47.367	47.387	47.408	47.429	47.449	47.470	47.490	47.511	47.531	47.552	47.573	2120
2130	47.573	47.593	47.614	47.634	47.655	47.675	47.696	47.716	47.737	47.757	47.778	2130
2140	47.778	47.798	47.819	47.839	47.860	47.880	47.901	47.921	47.942	47.962	47.983	2140
2150	47.983	48.003	48.024	48.044	48.065	48.085	48.105	48.126	48.146	48.167	48.187	2150
2160	48.187	48.208	48.228	48.248	48.269	48.289	48.310	48.330	48.350	48.371	48.391	2160
2170	48.391	48.411	48.432	48.452	48.473	48.493	48.513	48.534	48.554	48.574	48.595	2170
2180	48.595	48.615	48.635	48.656	48.676	48.696	48.717	48.737	48.757	48.777	48.798	2180
2190	48.798	48.818	48.838	48.859	48.879	48.899	48.919	48.940	48.960	48.980	49.000	2190
2200	49.000	49.021	49.041	49.061	49.081	49.101	49.122	49.142	49.162	49.182	49.202	2200
2210	49.202	49.223	49.243	49.263	49.283	49.303	49.323	49.344	49.364	49.384	49.404	2210
2220	49.404	49.424	49.444	49.465	49.485	49.505	49.525	49.545	49.565	49.585	49.605	2220
2230	49.605	49.625	49.645	49.666	49.686	49.706	49.726	49.746	49.766	49.786	49.806	2230
2240	49.806	49.826	49.846	49.866	49.886	49.906	49.926	49.946	49.966	49.986	50.006	2240
2250	50.006	50.026	50.046	50.066	50.086	50.106	50.126	50.146	50.166	50.186	50.206	2250
2260	50.206	50.226	50.246	50.266	50.286	50.306	50.326	50.346	50.366	50.385	50.405	2260
2270	50.405	50.425	50.445	50.465	50.485	50.505	50.525	50.545	50.564	50.584	50.604	2270
2280	50.604	50.624	50.644	50.664	50.684	50.703	50.723	50.743	50.763	50.783	50.802	2280
2290	50.802	50.822	50.842	50.862	50.882	50.901	50.921	50.941	50.961	50.981	51.000	2290
2300	51.000	51.020	51.040	51.060	51.079	51.099	51.119	51.139	51.158	51.178	51.198	2300
2310	51.198	51.217	51.237	51.257	51.276	51.296	51.316	51.336	51.355	51.375	51.395	2310
2320	51.395	51.414	51.434	51.453	51.473	51.493	51.512	51.532	51.552	51.571	51.591	2320
2330	51.591	51.611	51.630	51.650	51.669	51.689	51.708	51.728	51.748	51.767	51.787	2330
2340	51.787	51.806	51.826	51.845	51.865	51.885	51.904	51.924	51.943	51.963	51.982	2340
2350	51.982	52.002	52.021	52.041	52.060	52.080	52.099	52.119	52.138	52.158	52.177	2350
2360	52.177	52.197	52.216	52.235	52.255	52.274	52.294	52.313	52.333	52.352	52.371	2360
2370	52.371	52.391	52.410	52.430	52.449	52.468	52.488	52.507	52.527	52.546	52.565	2370
2380	52.565	52.585	52.604	52.623	52.643	52.662	52.681	52.701	52.720	52.739	52.759	2380
2390	52.759	52.778	52.797	52.817	52.836	52.855	52.875	52.894	52.913	52.932	52.952	2390
2400	52.952	52.971	52.990	53.010	53.029	53.048	53.067	53.087	53.106	53.125	53.144	2400
2410	53.144	53.163	53.183	53.202	53.221	53.240	53.260	53.279	53.298	53.317	53.336	2410
2420	53.336	53.355	53.375	53.394	53.413	53.432	53.451	53.470	53.490	53.509	53.528	2420
2430	53.528	53.547	53.566	53.585	53.604	53.623	53.643	53.662	53.681	53.700	53.719	2430
2440	53.719	53.738	53.757	53.776	53.795	53.814	53.833	53.852	53.871	53.890	53.910	2440
2450	53.910	53.929	53.948	53.967	53.986	54.005	54.024	54.043	54.062	54.081	54.100	2450
2460	54.100	54.119	54.138	54.157	54.176	54.195	54.214	54.233	54.252	54.271	54.289	2460
2470	54.289	54.308	54.327	54.346	54.365	54.384	54.403	54.422	54.441	54.460	54.479	2470
2480	54.479	54.498	54.517	54.536	54.554	54.573	54.592	54.611	54.630	54.649	54.668	2480
2490	54.668	54.687	54.705	54.724	54.743	54.762	54.781	54.800	54.819	54.837	54.856	2490
2500	54.856	54.875										2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

B7.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B7.2.1 and B7.2.2 was obtained by iteration of the reference function for type K thermocouples given in the main text (see table 7.3.1). Table B7.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −6.45 mV to 54.88 mV, and table B7.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−6.40	−249.27	−251.36	−253.69	−256.37	−259.60	−263.95						**−6.40**
−6.30	−234.33	−235.54	−236.80	−238.11	−239.47	−240.88	−242.37	−243.93	−245.59	−247.36	−249.27	**−6.30**
−6.20	−223.78	−224.74	−225.71	−226.70	−227.71	−228.74	−229.80	−230.89	−232.00	−233.15	−234.33	**−6.20**
−6.10	−215.08	−215.89	−216.72	−217.56	−218.40	−219.26	−220.14	−221.03	−221.93	−222.85	−223.78	**−6.10**
−6.00	−207.46	−208.18	−208.92	−209.66	−210.40	−211.16	−211.93	−212.70	−213.48	−214.28	−215.08	**−6.00**
−5.90	−200.57	−201.23	−201.90	−202.57	−203.25	−203.93	−204.63	−205.32	−206.03	−206.74	−207.46	**−5.90**
−5.80	−194.21	−194.83	−195.45	−196.07	−196.70	−197.33	−197.97	−198.61	−199.26	−199.91	−200.57	**−5.80**
−5.70	−188.27	−188.85	−189.43	−190.02	−190.60	−191.20	−191.79	−192.39	−192.99	−193.60	−194.21	**−5.70**
−5.60	−182.67	−183.22	−183.77	−184.32	−184.88	−185.44	−186.00	−186.56	−187.13	−187.70	−188.27	**−5.60**
−5.50	−177.35	−177.87	−178.40	−178.92	−179.45	−179.98	−180.51	−181.05	−181.59	−182.13	−182.67	**−5.50**
−5.40	−172.27	−172.77	−173.27	−173.77	−174.28	−174.78	−175.29	−175.80	−176.32	−176.83	−177.35	**−5.40**
−5.30	−167.39	−167.87	−168.35	−168.83	−169.32	−169.81	−170.29	−170.79	−171.28	−171.77	−172.27	**−5.30**
−5.20	−162.69	−163.15	−163.62	−164.08	−164.55	−165.02	−165.49	−165.96	−166.44	−166.91	−167.39	**−5.20**
−5.10	−158.14	−158.59	−159.04	−159.49	−159.94	−160.40	−160.85	−161.31	−161.77	−162.23	−162.69	**−5.10**
−5.00	−153.74	−154.18	−154.61	−155.05	−155.49	−155.93	−156.37	−156.81	−157.25	−157.70	−158.14	**−5.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−4.90	−149.46	−149.89	−150.31	−150.73	−151.16	−151.59	−152.02	−152.44	−152.88	−153.31	−153.74	**−4.90**
−4.80	−145.30	−145.71	−146.12	−146.54	−146.95	−147.37	−147.78	−148.20	−148.62	−149.04	−149.46	**−4.80**
−4.70	−141.24	−141.64	−142.04	−142.45	−142.85	−143.26	−143.66	−144.07	−144.48	−144.89	−145.30	**−4.70**
−4.60	−137.27	−137.67	−138.06	−138.45	−138.85	−139.25	−139.64	−140.04	−140.44	−140.84	−141.24	**−4.60**
−4.50	−133.40	−133.78	−134.17	−134.55	−134.94	−135.33	−135.71	−136.10	−136.49	−136.88	−137.27	**−4.50**
−4.40	−129.60	−129.98	−130.35	−130.73	−131.11	−131.49	−131.87	−132.25	−132.63	−133.01	−133.40	**−4.40**
−4.30	−125.88	−126.25	−126.62	−126.99	−127.36	−127.73	−128.10	−128.48	−128.85	−129.22	−129.60	**−4.30**
−4.20	−122.22	−122.59	−122.95	−123.31	−123.68	−124.04	−124.41	−124.77	−125.14	−125.51	−125.88	**−4.20**
−4.10	−118.64	−118.99	−119.35	−119.71	−120.06	−120.42	−120.78	−121.14	−121.50	−121.86	−122.22	**−4.10**
−4.00	−115.11	−115.46	−115.81	−116.16	−116.51	−116.86	−117.22	−117.57	−117.93	−118.28	−118.64	**−4.00**
−3.90	−111.64	−111.98	−112.33	−112.67	−113.02	−113.36	−113.71	−114.06	−114.41	−114.76	−115.11	**−3.90**
−3.80	−108.22	−108.56	−108.90	−109.24	−109.58	−109.92	−110.26	−110.60	−110.95	−111.29	−111.64	**−3.80**
−3.70	−104.85	−105.18	−105.52	−105.85	−106.19	−106.53	−106.86	−107.20	−107.54	−107.88	−108.22	**−3.70**
−3.60	−101.53	−101.86	−102.19	−102.52	−102.85	−103.18	−103.51	−103.85	−104.18	−104.51	−104.85	**−3.60**
−3.50	−98.25	−98.57	−98.90	−99.23	−99.55	−99.88	−100.21	−100.54	−100.87	−101.20	−101.53	**−3.50**
−3.40	−95.01	−95.33	−95.66	−95.98	−96.30	−96.62	−96.95	−97.27	−97.60	−97.92	−98.25	**−3.40**
−3.30	−91.82	−92.13	−92.45	−92.77	−93.09	−93.41	−93.73	−94.05	−94.37	−94.69	−95.01	**−3.30**
−3.20	−88.66	−88.97	−89.29	−89.60	−89.92	−90.23	−90.55	−90.86	−91.18	−91.50	−91.82	**−3.20**
−3.10	−85.53	−85.84	−86.16	−86.47	−86.78	−87.09	−87.40	−87.72	−88.03	−88.34	−88.66	**−3.10**
−3.00	−82.44	−82.75	−83.06	−83.37	−83.68	−83.98	−84.29	−84.60	−84.91	−85.22	−85.53	**−3.00**
−2.90	−79.39	−79.69	−80.00	−80.30	−80.61	−80.91	−81.22	−81.52	−81.83	−82.14	−82.44	**−2.90**
−2.80	−76.36	−76.66	−76.96	−77.27	−77.57	−77.87	−78.17	−78.48	−78.78	−79.08	−79.39	**−2.80**
−2.70	−73.36	−73.66	−73.96	−74.26	−74.56	−74.86	−75.16	−75.46	−75.76	−76.06	−76.36	**−2.70**
−2.60	−70.40	−70.69	−70.99	−71.28	−71.58	−71.88	−72.17	−72.47	−72.77	−73.07	−73.36	**−2.60**
−2.50	−67.45	−67.75	−68.04	−68.33	−68.63	−68.92	−69.22	−69.51	−69.80	−70.10	−70.40	**−2.50**
−2.40	−64.54	−64.83	−65.12	−65.41	−65.70	−65.99	−66.28	−66.58	−66.87	−67.16	−67.45	**−2.40**
−2.30	−61.64	−61.93	−62.22	−62.51	−62.80	−63.09	−63.38	−63.67	−63.96	−64.25	−64.54	**−2.30**
−2.20	−58.77	−59.06	−59.35	−59.63	−59.92	−60.21	−60.49	−60.78	−61.07	−61.36	−61.64	**−2.20**
−2.10	−55.93	−56.21	−56.49	−56.78	−57.06	−57.35	−57.63	−57.92	−58.20	−58.49	−58.77	**−2.10**
−2.00	−53.10	−53.38	−53.67	−53.95	−54.23	−54.51	−54.79	−55.08	−55.36	−55.64	−55.93	**−2.00**
−1.90	−50.30	−50.58	−50.86	−51.14	−51.42	−51.70	−51.98	−52.26	−52.54	−52.82	−53.10	**−1.90**
−1.80	−47.51	−47.79	−48.07	−48.34	−48.62	−48.90	−49.18	−49.46	−49.74	−50.02	−50.30	**−1.80**
−1.70	−44.74	−45.02	−45.30	−45.57	−45.85	−46.13	−46.40	−46.68	−46.96	−47.23	−47.51	**−1.70**
−1.60	−42.00	−42.27	−42.54	−42.82	−43.09	−43.37	−43.64	−43.92	−44.19	−44.47	−44.74	**−1.60**
−1.50	−39.27	−39.54	−39.81	−40.08	−40.36	−40.63	−40.90	−41.18	−41.45	−41.72	−42.00	**−1.50**
−1.40	−36.55	−36.82	−37.09	−37.36	−37.64	−37.91	−38.18	−38.45	−38.72	−38.99	−39.27	**−1.40**
−1.30	−33.85	−34.12	−34.39	−34.66	−34.93	−35.20	−35.47	−35.74	−36.01	−36.28	−36.55	**−1.30**
−1.20	−31.17	−31.44	−31.71	−31.97	−32.24	−32.51	−32.78	−33.05	−33.32	−33.59	−33.85	**−1.20**
−1.10	−28.50	−28.77	−29.04	−29.30	−29.57	−29.84	−30.10	−30.37	−30.64	−30.90	−31.17	**−1.10**
−1.00	−25.85	−26.12	−26.38	−26.65	−26.91	−27.18	−27.44	−27.71	−27.97	−28.24	−28.50	**−1.00**
−0.90	−23.21	−23.48	−23.74	−24.00	−24.27	−24.53	−24.79	−25.06	−25.32	−25.59	−25.85	**−0.90**
−0.80	−20.59	−20.85	−21.11	−21.37	−21.64	−21.90	−22.16	−22.42	−22.69	−22.95	−23.21	**−0.80**
−0.70	−17.98	−18.24	−18.50	−18.76	−19.02	−19.28	−19.54	−19.80	−20.06	−20.33	−20.59	**−0.70**
−0.60	−15.38	−15.63	−15.89	−16.15	−16.41	−16.67	−16.93	−17.19	−17.45	−17.71	−17.98	**−0.60**
−0.50	−12.79	−13.05	−13.30	−13.56	−13.82	−14.08	−14.34	−14.60	−14.86	−15.12	−15.38	**−0.50**
−0.40	−10.21	−10.47	−10.72	−10.98	−11.24	−11.50	−11.75	−12.01	−12.27	−12.53	−12.79	**−0.40**
−0.30	−7.64	−7.90	−8.16	−8.41	−8.67	−8.92	−9.18	−9.44	−9.70	−9.95	−10.21	**−0.30**
−0.20	−5.09	−5.34	−5.60	−5.85	−6.11	−6.36	−6.62	−6.87	−7.13	−7.39	−7.64	**−0.20**
−0.10	−2.54	−2.79	−3.05	−3.30	−3.56	−3.81	−4.07	−4.32	−4.58	−4.83	−5.09	**−0.10**
0.00	0.00	−0.25	−0.51	−0.76	−1.01	−1.27	−1.52	−1.78	−2.03	−2.28	−2.54	**0.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
0.00	0.00	0.25	0.51	0.76	1.01	1.27	1.52	1.77	2.03	2.28	2.53	**0.00**
0.10	2.53	2.78	3.04	3.29	3.54	3.79	4.05	4.30	4.55	4.80	5.05	**0.10**
0.20	5.05	5.31	5.56	5.81	6.06	6.31	6.56	6.82	7.07	7.32	7.57	**0.20**
0.30	7.57	7.82	8.07	8.32	8.57	8.83	9.08	9.33	9.58	9.83	10.08	**0.30**
0.40	10.08	10.33	10.58	10.83	11.08	11.33	11.58	11.83	12.08	12.33	12.58	**0.40**
0.50	12.58	12.83	13.08	13.33	13.58	13.83	14.08	14.33	14.58	14.83	15.08	**0.50**
0.60	15.08	15.32	15.57	15.82	16.07	16.32	16.57	16.82	17.07	17.32	17.56	**0.60**
0.70	17.56	17.81	18.06	18.31	18.56	18.81	19.05	19.30	19.55	19.80	20.05	**0.70**
0.80	20.05	20.29	20.54	20.79	21.04	21.29	21.53	21.78	22.03	22.28	22.52	**0.80**
0.90	22.52	22.77	23.02	23.27	23.51	23.76	24.01	24.25	24.50	24.75	24.99	**0.90**
1.00	24.99	25.24	25.49	25.73	25.98	26.23	26.47	26.72	26.97	27.21	27.46	**1.00**
1.10	27.46	27.71	27.95	28.20	28.44	28.69	28.94	29.18	29.43	29.67	29.92	**1.10**
1.20	29.92	30.17	30.41	30.66	30.90	31.15	31.39	31.64	31.88	32.13	32.37	**1.20**
1.30	32.37	32.62	32.87	33.11	33.36	33.60	33.85	34.09	34.34	34.58	34.83	**1.30**
1.40	34.83	35.07	35.31	35.56	35.80	36.05	36.29	36.54	36.78	37.03	37.27	**1.40**
1.50	37.27	37.52	37.76	38.00	38.25	38.49	38.74	38.98	39.22	39.47	39.71	**1.50**
1.60	39.71	39.96	40.20	40.44	40.69	40.93	41.18	41.42	41.66	41.91	42.15	**1.60**
1.70	42.15	42.39	42.64	42.88	43.12	43.37	43.61	43.85	44.10	44.34	44.58	**1.70**
1.80	44.58	44.83	45.07	45.31	45.56	45.80	46.04	46.28	46.53	46.77	47.01	**1.80**
1.90	47.01	47.26	47.50	47.74	47.98	48.23	48.47	48.71	48.96	49.20	49.44	**1.90**
2.00	49.44	49.68	49.93	50.17	50.41	50.65	50.89	51.14	51.38	51.62	51.86	**2.00**
2.10	51.86	52.11	52.35	52.59	52.83	53.07	53.32	53.56	53.80	54.04	54.29	**2.10**
2.20	54.29	54.53	54.77	55.01	55.25	55.49	55.74	55.98	56.22	56.46	56.70	**2.20**
2.30	56.70	56.95	57.19	57.43	57.67	57.91	58.15	58.39	58.64	58.88	59.12	**2.30**
2.40	59.12	59.36	59.60	59.84	60.09	60.33	60.57	60.81	61.05	61.29	61.53	**2.40**
2.50	61.53	61.77	62.02	62.26	62.50	62.74	62.98	63.22	63.46	63.70	63.95	**2.50**
2.60	63.95	64.19	64.43	64.67	64.91	65.15	65.39	65.63	65.87	66.12	66.36	**2.60**
2.70	66.36	66.60	66.84	67.08	67.32	67.56	67.80	68.04	68.28	68.52	68.77	**2.70**
2.80	68.77	69.01	69.25	69.49	69.73	69.97	70.21	70.45	70.69	70.93	71.17	**2.80**
2.90	71.17	71.41	71.66	71.90	72.14	72.38	72.62	72.86	73.10	73.34	73.58	**2.90**
3.00	73.58	73.82	74.06	74.30	74.54	74.79	75.03	75.27	75.51	75.75	75.99	**3.00**
3.10	75.99	76.23	76.47	76.71	76.95	77.19	77.43	77.67	77.91	78.16	78.40	**3.10**
3.20	78.40	78.64	78.88	79.12	79.36	79.60	79.84	80.08	80.32	80.56	80.80	**3.20**
3.30	80.80	81.04	81.28	81.53	81.77	82.01	82.25	82.49	82.73	82.97	83.21	**3.30**
3.40	83.21	83.45	83.69	83.93	84.17	84.41	84.65	84.90	85.14	85.38	85.62	**3.40**
3.50	85.62	85.86	86.10	86.34	86.58	86.82	87.06	87.30	87.55	87.79	88.03	**3.50**
3.60	88.03	88.27	88.51	88.75	88.99	89.23	89.47	89.71	89.95	90.20	90.44	**3.60**
3.70	90.44	90.68	90.92	91.16	91.40	91.64	91.88	92.12	92.37	92.61	92.85	**3.70**
3.80	92.85	93.09	93.33	93.57	93.81	94.05	94.30	94.54	94.78	95.02	95.26	**3.80**
3.90	95.26	95.50	95.74	95.98	96.23	96.47	96.71	96.95	97.19	97.43	97.67	**3.90**
4.00	97.67	97.92	98.16	98.40	98.64	98.88	99.12	99.37	99.61	99.85	100.09	**4.00**
4.10	100.09	100.33	100.57	100.82	101.06	101.30	101.54	101.78	102.03	102.27	102.51	**4.10**
4.20	102.51	102.75	102.99	103.24	103.48	103.72	103.96	104.20	104.45	104.69	104.93	**4.20**
4.30	104.93	105.17	105.41	105.66	105.90	106.14	106.38	106.63	106.87	107.11	107.35	**4.30**
4.40	107.35	107.60	107.84	108.08	108.32	108.57	108.81	109.05	109.29	109.54	109.78	**4.40**
4.50	109.78	110.02	110.27	110.51	110.75	110.99	111.24	111.48	111.72	111.97	112.21	**4.50**
4.60	112.21	112.45	112.70	112.94	113.18	113.42	113.67	113.91	114.15	114.40	114.64	**4.60**
4.70	114.64	114.88	115.13	115.37	115.61	115.86	116.10	116.35	116.59	116.83	117.08	**4.70**
4.80	117.08	117.32	117.56	117.81	118.05	118.30	118.54	118.78	119.03	119.27	119.51	**4.80**
4.90	119.51	119.76	120.00	120.25	120.49	120.74	120.98	121.22	121.47	121.71	121.96	**4.90**
5.00	121.96	122.20	122.45	122.69	122.93	123.18	123.42	123.67	123.91	124.16	124.40	**5.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. ***Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued***

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	121.96	122.20	122.45	122.69	122.93	123.18	123.42	123.67	123.91	124.16	124.40	**5.00**
5.10	124.40	124.65	124.89	125.14	125.38	125.63	125.87	126.12	126.36	126.61	126.85	**5.10**
5.20	126.85	127.10	127.34	127.59	127.83	128.08	128.32	128.57	128.81	129.06	129.30	**5.20**
5.30	129.30	129.55	129.79	130.04	130.28	130.53	130.78	131.02	131.27	131.51	131.76	**5.30**
5.40	131.76	132.00	132.25	132.50	132.74	132.99	133.23	133.48	133.73	133.97	134.22	**5.40**
5.50	134.22	134.46	134.71	134.96	135.20	135.45	135.70	135.94	136.19	136.43	136.68	**5.50**
5.60	136.68	136.93	137.17	137.42	137.67	137.91	138.16	138.41	138.65	138.90	139.15	**5.60**
5.70	139.15	139.39	139.64	139.89	140.14	140.38	140.63	140.88	141.12	141.37	141.62	**5.70**
5.80	141.62	141.87	142.11	142.36	142.61	142.85	143.10	143.35	143.60	143.84	144.09	**5.80**
5.90	144.09	144.34	144.59	144.83	145.08	145.33	145.58	145.82	146.07	146.32	146.57	**5.90**
6.00	146.57	146.82	147.06	147.31	147.56	147.81	148.06	148.30	148.55	148.80	149.05	**6.00**
6.10	149.05	149.30	149.54	149.79	150.04	150.29	150.54	150.79	151.03	151.28	151.53	**6.10**
6.20	151.53	151.78	152.03	152.28	152.53	152.77	153.02	153.27	153.52	153.77	154.02	**6.20**
6.30	154.02	154.27	154.51	154.76	155.01	155.26	155.51	155.76	156.01	156.26	156.51	**6.30**
6.40	156.51	156.76	157.00	157.25	157.50	157.75	158.00	158.25	158.50	158.75	159.00	**6.40**
6.50	159.00	159.25	159.50	159.75	159.99	160.24	160.49	160.74	160.99	161.24	161.49	**6.50**
6.60	161.49	161.74	161.99	162.24	162.49	162.74	162.99	163.24	163.49	163.74	163.99	**6.60**
6.70	163.99	164.24	164.49	164.74	164.99	165.24	165.49	165.74	165.99	166.24	166.49	**6.70**
6.80	166.49	166.74	166.98	167.23	167.48	167.73	167.98	168.23	168.48	168.73	168.98	**6.80**
6.90	168.98	169.24	169.49	169.74	169.99	170.24	170.49	170.74	170.99	171.24	171.49	**6.90**
7.00	171.49	171.74	171.99	172.24	172.49	172.74	172.99	173.24	173.49	173.74	173.99	**7.00**
7.10	173.99	174.24	174.49	174.74	174.99	175.24	175.49	175.74	175.99	176.24	176.49	**7.10**
7.20	176.49	176.74	176.99	177.24	177.49	177.74	178.00	178.25	178.50	178.75	179.00	**7.20**
7.30	179.00	179.25	179.50	179.75	180.00	180.25	180.50	180.75	181.00	181.25	181.50	**7.30**
7.40	181.50	181.75	182.00	182.25	182.50	182.76	183.01	183.26	183.51	183.76	184.01	**7.40**
7.50	184.01	184.26	184.51	184.76	185.01	185.26	185.51	185.76	186.01	186.26	186.51	**7.50**
7.60	186.51	186.76	187.02	187.27	187.52	187.77	188.02	188.27	188.52	188.77	189.02	**7.80**
7.70	189.02	189.27	189.52	189.77	190.02	190.27	190.52	190.77	191.02	191.27	191.53	**7.70**
7.80	191.53	191.78	192.03	192.28	192.53	192.78	193.03	193.28	193.53	193.78	194.03	**7.80**
7.90	194.03	194.28	194.53	194.78	195.03	195.28	195.53	195.78	196.03	196.28	196.53	**7.90**
8.00	196.53	196.78	197.03	197.29	197.54	197.79	198.04	198.29	198.54	198.79	199.04	**8.00**
8.10	199.04	199.29	199.54	199.79	200.04	200.29	200.54	200.79	201.04	201.29	201.54	**8.10**
8.20	201.54	201.79	202.04	202.29	202.54	202.79	203.04	203.29	203.54	203.79	204.04	**8.20**
8.30	204.04	204.29	204.54	204.79	205.04	205.29	205.54	205.79	206.04	206.29	206.54	**8.30**
8.40	206.54	206.79	207.04	207.29	207.54	207.79	208.04	208.29	208.54	208.79	209.04	**8.40**
8.50	209.04	209.29	209.54	209.79	210.04	210.28	210.53	210.78	211.03	211.28	211.53	**8.50**
8.60	211.53	211.78	212.03	212.28	212.53	212.78	213.03	213.28	213.53	213.78	214.03	**8.60**
8.70	214.03	214.28	214.52	214.77	215.02	215.27	215.52	215.77	216.02	216.27	216.52	**8.70**
8.80	216.52	216.77	217.02	217.27	217.51	217.76	218.01	218.26	218.51	218.76	219.01	**8.80**
8.90	219.01	219.26	219.51	219.75	220.00	220.25	220.50	220.75	221.00	221.25	221.49	**8.90**
9.00	221.49	221.74	221.99	222.24	222.49	222.74	222.99	223.23	223.48	223.73	223.98	**9.00**
9.10	223.98	224.23	224.48	224.72	224.97	225.22	225.47	225.72	225.97	226.21	226.46	**9.10**
9.20	226.46	226.71	226.96	227.21	227.45	227.70	227.95	228.20	228.45	228.69	228.94	**9.20**
9.30	228.94	229.19	229.44	229.69	229.93	230.18	230.43	230.68	230.92	231.17	231.42	**9.30**
9.40	231.42	231.67	231.91	232.16	232.41	232.66	232.90	233.15	233.40	233.65	233.89	**9.40**
9.50	233.89	234.14	234.39	234.64	234.88	235.13	235.38	235.63	235.87	236.12	236.37	**9.50**
9.60	236.37	236.61	236.86	237.11	237.35	237.60	237.85	238.10	238.34	238.59	238.84	**9.60**
9.70	238.84	239.08	239.33	239.58	239.82	240.07	240.32	240.56	240.81	241.06	241.30	**9.70**
9.80	241.30	241.55	241.80	242.04	242.29	242.54	242.78	243.03	243.28	243.52	243.77	**9.80**
9.90	243.77	244.01	244.26	244.51	244.75	245.00	245.25	245.49	245.74	245.98	246.23	**9.90**
10.00	246.23	246.48	246.72	246.97	247.21	247.46	247.71	247.95	248.20	248.44	248.69	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	246.23	246.48	246.72	246.97	247.21	247.46	247.71	247.95	248.20	248.44	248.69	**10.00**
10.10	248.69	248.93	249.18	249.43	249.67	249.92	250.16	250.41	250.65	250.90	251.15	**10.10**
10.20	251.15	251.39	251.64	251.88	252.13	252.37	252.62	252.86	253.11	253.35	253.60	**10.20**
10.30	253.60	253.84	254.09	254.33	254.58	254.83	255.07	255.32	255.56	255.81	256.05	**10.30**
10.40	256.05	256.30	256.54	256.79	257.03	257.28	257.52	257.77	258.01	258.25	258.50	**10.40**
10.50	258.50	258.74	258.99	259.23	259.48	259.72	259.97	260.21	260.46	260.70	260.95	**10.50**
10.60	260.95	261.19	261.43	261.68	261.92	262.17	262.41	262.66	262.90	263.15	263.39	**10.60**
10.70	263.39	263.63	263.88	264.12	264.37	264.61	264.86	265.10	265.34	265.59	265.83	**10.70**
10.80	265.83	266.08	266.32	266.56	266.81	267.05	267.30	267.54	267.78	268.03	268.27	**10.80**
10.90	268.27	268.51	268.76	269.00	269.25	269.49	269.73	269.98	270.22	270.46	270.71	**10.90**
11.00	270.71	270.95	271.19	271.44	271.68	271.93	272.17	272.41	272.66	272.90	273.14	**11.00**
11.10	273.14	273.39	273.63	273.87	274.12	274.36	274.60	274.85	275.09	275.33	275.58	**11.10**
11.20	275.58	275.82	276.06	276.30	276.55	276.79	277.03	277.28	277.52	277.76	278.01	**11.20**
11.30	278.01	278.25	278.49	278.73	278.98	279.22	279.46	279.71	279.95	280.19	280.43	**11.30**
11.40	280.43	280.68	280.92	281.16	281.40	281.65	281.89	282.13	282.38	282.62	282.86	**11.40**
11.50	282.86	283.10	283.35	283.59	283.83	284.07	284.32	284.56	284.80	285.04	285.28	**11.50**
11.60	285.28	285.53	285.77	286.01	286.25	286.50	286.74	286.98	287.22	287.47	287.71	**11.60**
11.70	287.71	287.95	288.19	288.43	288.68	288.92	289.16	289.40	289.64	289.89	290.13	**11.70**
11.80	290.13	290.37	290.61	290.85	291.10	291.34	291.58	291.82	292.06	292.31	292.55	**11.80**
11.90	292.55	292.79	293.03	293.27	293.51	293.76	294.00	294.24	294.48	294.72	294.96	**11.90**
12.00	294.96	295.21	295.45	295.69	295.93	296.17	296.41	296.66	296.90	297.14	297.38	**12.00**
12.10	297.38	297.62	297.86	298.10	298.35	298.59	298.83	299.07	299.31	299.55	299.79	**12.10**
12.20	299.79	300.03	300.28	300.52	300.76	301.00	301.24	301.48	301.72	301.96	302.21	**12.20**
12.30	302.21	302.45	302.69	302.93	303.17	303.41	303.65	303.89	304.13	304.38	304.62	**12.30**
12.40	304.62	304.86	305.10	305.34	305.58	305.82	306.06	306.30	306.54	306.78	307.03	**12.40**
12.50	307.03	307.27	307.51	307.75	307.99	308.23	308.47	308.71	308.95	309.19	309.43	**12.50**
12.60	309.43	309.67	309.91	310.15	310.40	310.64	310.88	311.12	311.36	311.60	311.84	**12.60**
12.70	311.84	312.08	312.32	312.56	312.80	313.04	313.28	313.52	313.76	314.00	314.24	**12.70**
12.80	314.24	314.48	314.72	314.96	315.20	315.45	315.69	315.93	316.17	316.41	316.65	**12.80**
12.90	316.65	316.89	317.13	317.37	317.61	317.85	318.09	318.33	318.57	318.81	319.05	**12.90**
13.00	319.05	319.29	319.53	319.77	320.01	320.25	320.49	320.73	320.97	321.21	321.45	**13.00**
13.10	321.45	321.69	321.93	322.17	322.41	322.65	322.89	323.13	323.37	323.61	323.85	**13.10**
13.20	323.85	324.09	324.33	324.57	324.81	325.05	325.29	325.53	325.77	326.01	326.25	**13.20**
13.30	326.25	326.49	326.73	326.97	327.21	327.45	327.68	327.92	328.16	328.40	328.64	**13.30**
13.40	328.64	328.88	329.12	329.36	329.60	329.84	330.08	330.32	330.56	330.80	331.04	**13.40**
13.50	331.04	331.28	331.52	331.76	332.00	332.24	332.48	332.72	332.95	333.19	333.43	**13.50**
13.60	333.43	333.67	333.91	334.15	334.39	334.63	334.87	335.11	335.35	335.59	335.83	**13.60**
13.70	335.83	336.07	336.31	336.54	336.78	337.02	337.26	337.50	337.74	337.98	338.22	**13.70**
13.80	338.22	338.46	338.70	338.94	339.18	339.41	339.65	339.89	340.13	340.37	340.61	**13.80**
13.90	340.61	340.85	341.09	341.33	341.57	341.81	342.04	342.28	342.52	342.76	343.00	**13.90**
14.00	343.00	343.24	343.48	343.72	343.96	344.19	344.43	344.67	344.91	345.15	345.39	**14.00**
14.10	345.39	345.63	345.87	346.11	346.34	346.58	346.82	347.06	347.30	347.54	347.78	**14.10**
14.20	347.78	348.02	348.25	348.49	348.73	348.97	349.21	349.45	349.69	349.92	350.16	**14.20**
14.30	350.16	350.40	350.64	350.88	351.12	351.36	351.60	351.83	352.07	352.31	352.55	**14.30**
14.40	352.55	352.79	353.03	353.26	353.50	353.74	353.98	354.22	354.46	354.70	354.93	**14.40**
14.50	354.93	355.17	355.41	355.65	355.89	356.13	356.36	356.60	356.84	357.08	357.32	**14.50**
14.60	357.32	357.56	357.79	358.03	358.27	358.51	358.75	358.99	359.22	359.46	359.70	**14.60**
14.70	359.70	359.94	360.18	360.42	360.65	360.89	361.13	361.37	361.61	361.84	362.08	**14.70**
14.80	362.08	362.32	362.56	362.80	363.03	363.27	363.51	363.75	363.99	364.22	364.46	**14.80**
14.90	364.46	364.70	364.94	365.18	365.42	365.65	365.89	366.13	366.37	366.60	366.84	**14.90**
15.00	366.84	367.08	367.32	367.56	367.79	368.03	368.27	368.51	368.75	368.98	369.22	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
15.00	366.84	367.08	367.32	367.56	367.79	368.03	368.27	368.51	368.75	368.98	369.22	**15.00**
15.10	369.22	369.46	369.70	369.94	370.17	370.41	370.65	370.89	371.12	371.36	371.60	**15.10**
15.20	371.60	371.84	372.08	372.31	372.55	372.79	373.03	373.26	373.50	373.74	373.98	**15.20**
15.30	373.98	374.21	374.45	374.69	374.93	375.17	375.40	375.64	375.88	376.12	376.35	**15.30**
15.40	376.35	376.59	376.83	377.07	377.30	377.54	377.78	378.02	378.25	378.49	378.73	**15.40**
15.50	378.73	378.97	379.20	379.44	379.68	379.92	380.15	380.39	380.63	380.87	381.10	**15.50**
15.60	381.10	381.34	381.58	381.81	382.05	382.29	382.53	382.76	383.00	383.24	383.48	**15.60**
15.70	383.48	383.71	383.95	384.19	384.43	384.66	384.90	385.14	385.37	385.61	385.85	**15.70**
15.80	385.85	386.09	386.32	386.56	386.80	387.03	387.27	387.51	387.75	387.98	388.22	**15.80**
15.90	388.22	388.46	388.70	388.93	389.17	389.41	389.64	389.88	390.12	390.35	390.59	**15.90**
16.00	390.59	390.83	391.07	391.30	391.54	391.78	392.01	392.25	392.49	392.72	392.96	**16.00**
16.10	392.96	393.20	393.44	393.67	393.91	394.15	394.38	394.62	394.86	395.09	395.33	**16.10**
16.20	395.33	395.57	395.81	396.04	396.28	396.52	396.75	396.99	397.23	397.46	397.70	**16.20**
16.30	397.70	397.94	398.17	398.41	398.65	398.88	399.12	399.36	399.59	399.83	400.07	**16.30**
16.40	400.07	400.30	400.54	400.78	401.01	401.25	401.49	401.72	401.96	402.20	402.43	**16.40**
16.50	402.43	402.67	402.91	403.14	403.38	403.62	403.85	404.09	404.33	404.56	404.80	**16.50**
16.60	404.80	405.04	405.27	405.51	405.75	405.98	406.22	406.46	406.69	406.93	407.17	**16.60**
16.70	407.17	407.40	407.64	407.88	408.11	408.35	408.59	408.82	409.06	409.29	409.53	**16.70**
16.80	409.53	409.77	410.00	410.24	410.48	410.71	410.95	411.19	411.42	411.66	411.89	**16.80**
16.90	411.89	412.13	412.37	412.60	412.84	413.08	413.31	413.55	413.79	414.02	414.26	**16.90**
17.00	414.26	414.49	414.73	414.97	415.20	415.44	415.68	415.91	416.15	416.38	416.62	**17.00**
17.10	416.62	416.86	417.09	417.33	417.57	417.80	418.04	418.27	418.51	418.75	418.98	**17.10**
17.20	418.98	419.22	419.45	419.69	419.93	420.16	420.40	420.64	420.87	421.11	421.34	**17.20**
17.30	421.34	421.58	421.82	422.05	422.29	422.52	422.76	423.00	423.23	423.47	423.70	**17.30**
17.40	423.70	423.94	424.18	424.41	424.65	424.88	425.12	425.36	425.59	425.83	426.06	**17.40**
17.50	426.06	426.30	426.54	426.77	427.01	427.24	427.48	427.72	427.95	428.19	428.42	**17.50**
17.60	428.42	428.66	428.89	429.13	429.37	429.60	429.84	430.07	430.31	430.55	430.78	**17.60**
17.70	430.78	431.02	431.25	431.49	431.72	431.96	432.20	432.43	432.67	432.90	433.14	**17.70**
17.80	433.14	433.38	433.61	433.85	434.08	434.32	434.55	434.79	435.03	435.26	435.50	**17.80**
17.90	435.50	435.73	435.97	436.20	436.44	436.68	436.91	437.15	437.38	437.62	437.85	**17.90**
18.00	437.85	438.09	438.32	438.56	438.80	439.03	439.27	439.50	439.74	439.97	440.21	**18.00**
18.10	440.21	440.44	440.68	440.92	441.15	441.39	441.62	441.86	442.09	442.33	442.56	**18.10**
18.20	442.56	442.80	443.04	443.27	443.51	443.74	443.98	444.21	444.45	444.68	444.92	**18.20**
18.30	444.92	445.16	445.39	445.63	445.86	446.10	446.33	446.57	446.80	447.04	447.27	**18.30**
18.40	447.27	447.51	447.74	447.98	448.22	448.45	448.69	448.92	449.16	449.39	449.63	**18.40**
18.50	449.63	449.86	450.10	450.33	450.57	450.80	451.04	451.28	451.51	451.75	451.98	**18.50**
18.60	451.98	452.22	452.45	452.69	452.92	453.16	453.39	453.63	453.86	454.10	454.33	**18.60**
18.70	454.33	454.57	454.80	455.04	455.28	455.51	455.75	455.98	456.22	456.45	456.69	**18.70**
18.80	456.69	456.92	457.16	457.39	457.63	457.86	458.10	458.33	458.57	458.80	459.04	**18.80**
18.90	459.04	459.27	459.51	459.74	459.98	460.21	460.45	460.68	460.92	461.15	461.39	**18.90**
19.00	461.39	461.62	461.86	462.09	462.33	462.57	462.80	463.04	463.27	463.51	463.74	**19.00**
19.10	463.74	463.98	464.21	464.45	464.68	464.92	465.15	465.39	465.62	465.86	466.09	**19.10**
19.20	466.09	466.33	466.56	466.80	467.03	467.27	467.50	467.74	467.97	468.21	468.44	**19.20**
19.30	468.44	468.68	468.91	469.15	469.38	469.62	469.85	470.09	470.32	470.56	470.79	**19.30**
19.40	470.79	471.03	471.26	471.50	471.73	471.97	472.20	472.44	472.67	472.91	473.14	**19.40**
19.50	473.14	473.38	473.61	473.84	474.08	474.31	474.55	474.78	475.02	475.25	475.49	**19.50**
19.60	475.49	475.72	475.96	476.19	476.43	476.66	476.90	477.13	477.37	477.60	477.84	**19.60**
19.70	477.84	478.07	478.31	478.54	478.78	479.01	479.25	479.48	479.72	479.95	480.19	**19.70**
19.80	480.19	480.42	480.66	480.89	481.12	481.36	481.59	481.83	482.06	482.30	482.53	**19.80**
19.90	482.53	482.77	483.00	483.24	483.47	483.71	483.94	484.18	484.41	484.65	484.88	**19.90**
20.00	484.88	485.12	485.35	485.59	485.82	486.05	486.29	486.52	486.76	486.99	487.23	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
20.00	484.88	485.12	485.35	485.59	485.82	486.05	486.29	486.52	486.76	486.99	487.23	20.00
20.10	487.23	487.46	487.70	487.93	488.17	488.40	488.64	488.87	489.11	489.34	489.58	20.10
20.20	489.58	489.81	490.04	490.28	490.51	490.75	490.98	491.22	491.45	491.69	491.92	20.20
20.30	491.92	492.16	492.39	492.63	492.86	493.10	493.33	493.56	493.80	494.03	494.27	20.30
20.40	494.27	494.50	494.74	494.97	495.21	495.44	495.68	495.91	496.15	496.38	496.62	20.40
20.50	496.62	496.85	497.08	497.32	497.55	497.79	498.02	498.26	498.49	498.73	498.96	20.50
20.60	498.96	499.20	499.43	499.66	499.90	500.13	500.37	500.60	500.84	501.07	501.31	20.60
20.70	501.31	501.54	501.78	502.01	502.25	502.48	502.71	502.95	503.18	503.42	503.65	20.70
20.80	503.65	503.89	504.12	504.36	504.59	504.83	505.06	505.29	505.53	505.76	506.00	20.80
20.90	506.00	506.23	506.47	506.70	506.94	507.17	507.41	507.64	507.87	508.11	508.34	20.90
21.00	508.34	508.58	508.81	509.05	509.28	509.52	509.75	509.99	510.22	510.45	510.69	21.00
21.10	510.69	510.92	511.16	511.39	511.63	511.86	512.10	512.33	512.56	512.80	513.03	21.10
21.20	513.03	513.27	513.50	513.74	513.97	514.21	514.44	514.68	514.91	515.14	515.38	21.20
21.30	515.38	515.61	515.85	516.08	516.32	516.55	516.79	517.02	517.25	517.49	517.72	21.30
21.40	517.72	517.96	518.19	518.43	518.66	518.90	519.13	519.37	519.60	519.83	520.07	21.40
21.50	520.07	520.30	520.54	520.77	521.01	521.24	521.48	521.71	521.94	522.18	522.41	21.50
21.60	522.41	522.65	522.88	523.12	523.35	523.59	523.82	524.05	524.29	524.52	524.76	21.60
21.70	524.76	524.99	525.23	525.46	525.70	525.93	526.16	526.40	526.63	526.87	527.10	21.70
21.80	527.10	527.34	527.57	527.81	528.04	528.28	528.51	528.74	528.98	529.21	529.45	21.80
21.90	529.45	529.68	529.92	530.15	530.39	530.62	530.85	531.09	531.32	531.56	531.79	21.90
22.00	531.79	532.03	532.26	532.50	532.73	532.96	533.20	533.43	533.67	533.90	534.14	22.00
22.10	534.14	534.37	534.61	534.84	535.08	535.31	535.54	535.78	536.01	536.25	536.48	22.10
22.20	536.48	536.72	536.95	537.19	537.42	537.65	537.89	538.12	538.36	538.59	538.83	22.20
22.30	538.83	539.06	539.30	539.53	539.76	540.00	540.23	540.47	540.70	540.94	541.17	22.30
22.40	541.17	541.41	541.64	541.88	542.11	542.34	542.58	542.81	543.05	543.28	543.52	22.40
22.50	543.52	543.75	543.99	544.22	544.45	544.69	544.92	545.16	545.39	545.63	545.86	22.50
22.60	545.86	546.10	546.33	546.57	546.80	547.03	547.27	547.50	547.74	547.97	548.21	22.60
22.70	548.21	548.44	548.68	548.91	549.15	549.38	549.61	549.85	550.08	550.32	550.55	22.70
22.80	550.55	550.79	551.02	551.26	551.49	551.73	551.96	552.19	552.43	552.66	552.90	22.80
22.90	552.90	553.13	553.37	553.60	553.84	554.07	554.31	554.54	554.78	555.01	555.24	22.90
23.00	555.24	555.48	555.71	555.95	556.18	556.42	556.65	556.89	557.12	557.36	557.59	23.00
23.10	557.59	557.82	558.06	558.29	558.53	558.76	559.00	559.23	559.47	559.70	559.94	23.10
23.20	559.94	560.17	560.41	560.64	560.88	561.11	561.34	561.58	561.81	562.05	562.28	23.20
23.30	562.28	562.52	562.75	562.99	563.22	563.46	563.69	563.93	564.16	564.40	564.63	23.30
23.40	564.63	564.86	565.10	565.33	565.57	565.80	566.04	566.27	566.51	566.74	566.98	23.40
23.50	566.98	567.21	567.45	567.68	567.92	568.15	568.39	568.62	568.85	569.09	569.32	23.50
23.60	569.32	569.56	569.79	570.03	570.26	570.50	570.73	570.97	571.20	571.44	571.67	23.60
23.70	571.67	571.91	572.14	572.38	572.61	572.85	573.08	573.32	573.55	573.78	574.02	23.70
23.80	574.02	574.25	574.49	574.72	574.96	575.19	575.43	575.66	575.90	576.13	576.37	23.80
23.90	576.37	576.60	576.84	577.07	577.31	577.54	577.78	578.01	578.25	578.48	578.72	23.90
24.00	578.72	578.95	579.19	579.42	579.66	579.89	580.13	580.36	580.60	580.83	581.07	24.00
24.10	581.07	581.30	581.53	581.77	582.00	582.24	582.47	582.71	582.94	583.18	583.41	24.10
24.20	583.41	583.65	583.88	584.12	584.35	584.59	584.82	585.06	585.29	585.53	585.76	24.20
24.30	585.76	586.00	586.23	586.47	586.70	586.94	587.17	587.41	587.64	587.88	588.11	24.30
24.40	588.11	588.35	588.58	588.82	589.05	589.29	589.52	589.76	589.99	590.23	590.46	24.40
24.50	590.46	590.70	590.93	591.17	591.41	591.64	591.88	592.11	592.35	592.58	592.82	24.50
24.60	592.82	593.05	593.29	593.52	593.76	593.99	594.23	594.46	594.70	594.93	595.17	24.60
24.70	595.17	595.40	595.64	595.87	596.11	596.34	596.58	596.81	597.05	597.28	597.52	24.70
24.80	597.52	597.75	597.99	598.22	598.46	598.70	598.93	599.17	599.40	599.64	599.87	24.80
24.90	599.87	600.11	600.34	600.58	600.81	601.05	601.28	601.52	601.75	601.99	602.22	24.90
25.00	602.22	602.46	602.69	602.93	603.17	603.40	603.64	603.87	604.11	604.34	604.58	25.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
25.00	602.22	602.46	602.69	602.93	603.17	603.40	603.64	603.87	604.11	604.34	604.58	**25.00**
25.10	604.58	604.81	605.05	605.28	605.52	605.75	605.99	606.23	606.46	606.70	606.93	**25.10**
25.20	606.93	607.17	607.40	607.64	607.87	608.11	608.34	608.58	608.82	609.05	609.29	**25.20**
25.30	609.29	609.52	609.76	609.99	610.23	610.46	610.70	610.93	611.17	611.41	611.64	**25.30**
25.40	611.64	611.88	612.11	612.35	612.58	612.82	613.05	613.29	613.53	613.76	614.00	**25.40**
25.50	614.00	614.23	614.47	614.70	614.94	615.17	615.41	615.65	615.88	616.12	616.35	**25.50**
25.60	616.35	616.59	616.82	617.06	617.30	617.53	617.77	618.00	618.24	618.47	618.71	**25.60**
25.70	618.71	618.95	619.18	619.42	619.65	619.89	620.12	620.36	620.60	620.83	621.07	**25.70**
25.80	621.07	621.30	621.54	621.77	622.01	622.25	622.48	622.72	622.95	623.19	623.43	**25.80**
25.90	623.43	623.66	623.90	624.13	624.37	624.60	624.84	625.08	625.31	625.55	625.78	**25.90**
26.00	625.78	626.02	626.26	626.49	626.73	626.96	627.20	627.44	627.67	627.91	628.14	**26.00**
26.10	628.14	628.38	628.62	628.85	629.09	629.32	629.56	629.80	630.03	630.27	630.50	**26.10**
26.20	630.50	630.74	630.98	631.21	631.45	631.68	631.92	632.16	632.39	632.63	632.86	**26.20**
26.30	632.86	633.10	633.34	633.57	633.81	634.05	634.28	634.52	634.75	634.99	635.23	**26.30**
26.40	635.23	635.46	635.70	635.93	636.17	636.41	636.64	636.88	637.12	637.35	637.59	**26.40**
26.50	637.59	637.82	638.06	638.30	638.53	638.77	639.01	639.24	639.48	639.72	639.95	**26.50**
26.60	639.95	640.19	640.42	640.66	640.90	641.13	641.37	641.61	641.84	642.08	642.32	**26.60**
26.70	642.32	642.55	642.79	643.02	643.26	643.50	643.73	643.97	644.21	644.44	644.68	**26.70**
26.80	644.68	644.92	645.15	645.39	645.63	645.86	646.10	646.34	646.57	646.81	647.05	**26.80**
26.90	647.05	647.28	647.52	647.76	647.99	648.23	648.47	648.70	648.94	649.17	649.41	**26.90**
27.00	649.41	649.65	649.88	650.12	650.36	650.59	650.83	651.07	651.31	651.54	651.78	**27.00**
27.10	651.78	652.02	652.25	652.49	652.73	652.96	653.20	653.44	653.67	653.91	654.15	**27.10**
27.20	654.15	654.38	654.62	654.86	655.09	655.33	655.57	655.80	656.04	656.28	656.51	**27.20**
27.30	656.51	656.75	656.99	657.23	657.46	657.70	657.94	658.17	658.41	658.65	658.88	**27.30**
27.40	658.88	659.12	659.36	659.60	659.83	660.07	660.31	660.54	660.78	661.02	661.25	**27.40**
27.50	661.25	661.49	661.73	661.97	662.20	662.44	662.68	662.91	663.15	663.39	663.63	**27.50**
27.60	663.63	663.86	664.10	664.34	664.57	664.81	665.05	665.29	665.52	665.76	666.00	**27.60**
27.70	666.00	666.24	666.47	666.71	666.95	667.18	667.42	667.66	667.90	668.13	668.37	**27.70**
27.80	668.37	668.61	668.85	669.08	669.32	669.56	669.80	670.03	670.27	670.51	670.75	**27.80**
27.90	670.75	670.98	671.22	671.46	671.69	671.93	672.17	672.41	672.64	672.88	673.12	**27.90**
28.00	673.12	673.36	673.60	673.83	674.07	674.31	674.55	674.78	675.02	675.26	675.50	**28.00**
28.10	675.50	675.73	675.97	676.21	676.45	676.68	676.92	677.16	677.40	677.63	677.87	**28.10**
28.20	677.87	678.11	678.35	678.59	678.82	679.06	679.30	679.54	679.77	680.01	680.25	**28.20**
28.30	680.25	680.49	680.73	680.96	681.20	681.44	681.68	681.92	682.15	682.39	682.63	**28.30**
28.40	682.63	682.87	683.10	683.34	683.58	683.82	684.06	684.29	684.53	684.77	685.01	**28.40**
28.50	685.01	685.25	685.48	685.72	685.96	686.20	686.44	686.68	686.91	687.15	687.39	**28.50**
28.60	687.39	687.63	687.87	688.10	688.34	688.58	688.82	689.06	689.29	689.53	689.77	**28.60**
28.70	689.77	690.01	690.25	690.49	690.72	690.96	691.20	691.44	691.68	691.92	692.15	**28.70**
28.80	692.15	692.39	692.63	692.87	693.11	693.35	693.58	693.82	694.06	694.30	694.54	**28.80**
28.90	694.54	694.78	695.01	695.25	695.49	695.73	695.97	696.21	696.45	696.68	696.92	**28.90**
29.00	696.92	697.16	697.40	697.64	697.88	698.12	698.35	698.59	698.83	699.07	699.31	**29.00**
29.10	699.31	699.55	699.79	700.02	700.26	700.50	700.74	700.98	701.22	701.46	701.70	**29.10**
29.20	701.70	701.93	702.17	702.41	702.65	702.89	703.13	703.37	703.61	703.84	704.08	**29.20**
29.30	704.08	704.32	704.56	704.80	705.04	705.28	705.52	705.76	705.99	706.23	706.47	**29.30**
29.40	706.47	706.71	706.95	707.19	707.43	707.67	707.91	708.15	708.38	708.62	708.86	**29.40**
29.50	708.86	709.10	709.34	709.58	709.82	710.06	710.30	710.54	710.78	711.02	711.25	**29.50**
29.60	711.25	711.49	711.73	711.97	712.21	712.45	712.69	712.93	713.17	713.41	713.65	**29.60**
29.70	713.65	713.89	714.13	714.36	714.60	714.84	715.08	715.32	715.56	715.80	716.04	**29.70**
29.80	716.04	716.28	716.52	716.76	717.00	717.24	717.48	717.72	717.96	718.20	718.44	**29.80**
29.90	718.44	718.67	718.91	719.15	719.39	719.63	719.87	720.11	720.35	720.59	720.83	**29.90**
30.00	720.83	721.07	721.31	721.55	721.79	722.03	722.27	722.51	722.75	722.99	723.23	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
30.00	720.83	721.07	721.31	721.55	721.79	722.03	722.27	722.51	722.75	722.99	723.23	**30.00**
30.10	723.23	723.47	723.71	723.95	724.19	724.43	724.67	724.91	725.15	725.39	725.63	**30.10**
30.20	725.63	725.87	726.11	726.35	726.59	726.83	727.07	727.31	727.55	727.79	728.03	**30.20**
30.30	728.03	728.27	728.51	728.75	728.99	729.23	729.47	729.71	729.95	730.19	730.43	**30.30**
30.40	730.43	730.67	730.91	731.15	731.39	731.63	731.87	732.11	732.35	732.59	732.83	**30.40**
30.50	732.83	733.07	733.31	733.55	733.79	734.03	734.27	734.51	734.75	734.99	735.23	**30.50**
30.60	735.23	735.47	735.71	735.95	736.19	736.43	736.67	736.91	737.15	737.40	737.64	**30.60**
30.70	737.64	737.88	738.12	738.36	738.60	738.84	739.08	739.32	739.56	739.80	740.04	**30.70**
30.80	740.04	740.28	740.52	740.76	741.00	741.24	741.49	741.73	741.97	742.21	742.45	**30.80**
30.90	742.45	742.69	742.93	743.17	743.41	743.65	743.89	744.13	744.37	744.62	744.86	**30.90**
31.00	744.86	745.10	745.34	745.58	745.82	746.06	746.30	746.54	746.78	747.02	747.27	**31.00**
31.10	747.27	747.51	747.75	747.99	748.23	748.47	748.71	748.95	749.19	749.43	749.68	**31.10**
31.20	749.68	749.92	750.16	750.40	750.64	750.88	751.12	751.36	751.60	751.85	752.09	**31.20**
31.30	752.09	752.33	752.57	752.81	753.05	753.29	753.54	753.78	754.02	754.26	754.50	**31.30**
31.40	754.50	754.74	754.98	755.22	755.47	755.71	755.95	756.19	756.43	756.67	756.91	**31.40**
31.50	756.91	757.16	757.40	757.64	757.88	758.12	758.36	758.61	758.85	759.09	759.33	**31.50**
31.60	759.33	759.57	759.81	760.06	760.30	760.54	760.78	761.02	761.26	761.51	761.75	**31.60**
31.70	761.75	761.99	762.23	762.47	762.71	762.96	763.20	763.44	763.68	763.92	764.17	**31.70**
31.80	764.17	764.41	764.65	764.89	765.13	765.38	765.62	765.86	766.10	766.34	766.59	**31.80**
31.90	766.59	766.83	767.07	767.31	767.55	767.80	768.04	768.28	768.52	768.76	769.01	**31.90**
32.00	769.01	769.25	769.49	769.73	769.97	770.22	770.46	770.70	770.94	771.19	771.43	**32.00**
32.10	771.43	771.67	771.91	772.15	772.40	772.64	772.88	773.12	773.37	773.61	773.85	**32.10**
32.20	773.85	774.09	774.34	774.58	774.82	775.06	775.31	775.55	775.79	776.03	776.28	**32.20**
32.30	776.28	776.52	776.76	777.00	777.25	777.49	777.73	777.97	778.22	778.46	778.70	**32.30**
32.40	778.70	778.95	779.19	779.43	779.67	779.92	780.16	780.40	780.64	780.89	781.13	**32.40**
32.50	781.13	781.37	781.62	781.86	782.10	782.34	782.59	782.83	783.07	783.32	783.56	**32.50**
32.60	783.56	783.80	784.05	784.29	784.53	784.77	785.02	785.26	785.50	785.75	785.99	**32.60**
32.70	785.99	786.23	786.48	786.72	786.96	787.21	787.45	787.69	787.93	788.18	788.42	**32.70**
32.80	788.42	788.66	788.91	789.15	789.39	789.64	789.88	790.12	790.37	790.61	790.85	**32.80**
32.90	790.85	791.10	791.34	791.58	791.83	792.07	792.31	792.56	792.80	793.05	793.29	**32.90**
33.00	793.29	793.53	793.78	794.02	794.26	794.51	794.75	794.99	795.24	795.48	795.72	**33.00**
33.10	795.72	795.97	796.21	796.46	796.70	796.94	797.19	797.43	797.67	797.92	798.16	**33.10**
33.20	798.16	798.41	798.65	798.89	799.14	799.38	799.62	799.87	800.11	800.36	800.60	**33.20**
33.30	800.60	800.84	801.09	801.33	801.58	801.82	802.06	802.31	802.55	802.80	803.04	**33.30**
33.40	803.04	803.28	803.53	803.77	804.02	804.26	804.51	804.75	804.99	805.24	805.48	**33.40**
33.50	805.48	805.73	805.97	806.21	806.46	806.70	806.95	807.19	807.44	807.68	807.92	**33.50**
33.60	807.92	808.17	808.41	808.66	808.90	809.15	809.39	809.64	809.88	810.12	810.37	**33.60**
33.70	810.37	810.61	810.86	811.10	811.35	811.59	811.84	812.08	812.33	812.57	812.82	**33.70**
33.80	812.82	813.06	813.30	813.55	813.79	814.04	814.28	814.53	814.77	815.02	815.26	**33.80**
33.90	815.26	815.51	815.75	816.00	816.24	816.49	816.73	816.98	817.22	817.47	817.71	**33.90**
34.00	817.71	817.96	818.20	818.45	818.69	818.94	819.18	819.43	819.67	819.92	820.16	**34.00**
34.10	820.16	820.41	820.65	820.90	821.14	821.39	821.63	821.88	822.12	822.37	822.61	**34.10**
34.20	822.61	822.86	823.10	823.35	823.59	823.84	824.08	824.33	824.57	824.82	825.07	**34.20**
34.30	825.07	825.31	825.56	825.80	826.05	826.29	826.54	826.78	827.03	827.27	827.52	**34.30**
34.40	827.52	827.77	828.01	828.26	828.50	828.75	828.99	829.24	829.48	829.73	829.98	**34.40**
34.50	829.98	830.22	830.47	830.71	830.96	831.20	831.45	831.70	831.94	832.19	832.43	**34.50**
34.60	832.43	832.68	832.92	833.17	833.42	833.66	833.91	834.15	834.40	834.65	834.89	**34.60**
34.70	834.89	835.14	835.38	835.63	835.88	836.12	836.37	836.61	836.86	837.11	837.35	**34.70**
34.80	837.35	837.60	837.84	838.09	838.34	838.58	838.83	839.08	839.32	839.57	839.81	**34.80**
34.90	839.81	840.06	840.31	840.55	840.80	841.05	841.29	841.54	841.78	842.03	842.28	**34.90**
35.00	842.28	842.52	842.77	843.02	843.26	843.51	843.76	844.00	844.25	844.50	844.74	**35.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
35.00	842.28	842.52	842.77	843.02	843.26	843.51	843.76	844.00	844.25	844.50	844.74	**35.00**
35.10	844.74	844.99	845.24	845.48	845.73	845.98	846.22	846.47	846.72	846.96	847.21	**35.10**
35.20	847.21	847.46	847.70	847.95	848.20	848.44	848.69	848.94	849.18	849.43	849.68	**35.20**
35.30	849.68	849.92	850.17	850.42	850.66	850.91	851.16	851.40	851.65	851.90	852.15	**35.30**
35.40	852.15	852.39	852.64	852.89	853.13	853.38	853.63	853.88	854.12	854.37	854.62	**35.40**
35.50	854.62	854.86	855.11	855.36	855.61	855.85	856.10	856.35	856.59	856.84	857.09	**35.50**
35.60	857.09	857.34	857.58	857.83	858.08	858.33	858.57	858.82	859.07	859.32	859.56	**35.60**
35.70	859.56	859.81	860.06	860.31	860.55	860.80	861.05	861.30	861.54	861.79	862.04	**35.70**
35.80	862.04	862.29	862.53	862.78	863.03	863.28	863.52	863.77	864.02	864.27	864.51	**35.80**
35.90	864.51	864.76	865.01	865.26	865.51	865.75	866.00	866.25	866.50	866.75	866.99	**35.90**
36.00	866.99	867.24	867.49	867.74	867.98	868.23	868.48	868.73	868.98	869.23	869.47	**36.00**
36.10	869.47	869.72	869.97	870.22	870.47	870.71	870.96	871.21	871.46	871.71	871.95	**36.10**
36.20	871.95	872.20	872.45	872.70	872.95	873.20	873.44	873.69	873.94	874.19	874.44	**36.20**
36.30	874.44	874.69	874.93	875.18	875.43	875.68	875.93	876.18	876.42	876.67	876.92	**36.30**
36.40	876.92	877.17	877.42	877.67	877.92	878.16	878.41	878.66	878.91	879.16	879.41	**36.40**
36.50	879.41	879.66	879.91	880.15	880.40	880.65	880.90	881.15	881.40	881.65	881.90	**36.50**
36.60	881.90	882.14	882.39	882.64	882.89	883.14	883.39	883.64	883.89	884.14	884.38	**36.60**
36.70	884.38	884.63	884.88	885.13	885.38	885.63	885.88	886.13	886.38	886.63	886.88	**36.70**
36.80	886.88	887.12	887.37	887.62	887.87	888.12	888.37	888.62	888.87	889.12	889.37	**36.80**
36.90	889.37	889.62	889.87	890.12	890.36	890.61	890.86	891.11	891.36	891.61	891.86	**36.90**
37.00	891.86	892.11	892.36	892.61	892.86	893.11	893.36	893.61	893.86	894.11	894.36	**37.00**
37.10	894.36	894.61	894.86	895.11	895.36	895.61	895.85	896.10	896.35	896.60	896.85	**37.10**
37.20	896.85	897.10	897.35	897.60	897.85	898.10	898.35	898.60	898.85	899.10	899.35	**37.20**
37.30	899.35	899.60	899.85	900.10	900.35	900.60	900.85	901.10	901.35	901.60	901.85	**37.30**
37.40	901.85	902.10	902.35	902.60	902.85	903.10	903.35	903.60	903.85	904.10	904.35	**37.40**
37.50	904.35	904.60	904.85	905.10	905.36	905.61	905.86	906.11	906.36	906.61	906.86	**37.50**
37.60	906.86	907.11	907.36	907.61	907.86	908.11	908.36	908.61	908.86	909.11	909.36	**37.60**
37.70	909.36	909.61	909.86	910.11	910.36	910.61	910.87	911.12	911.37	911.62	911.87	**37.70**
37.80	911.87	912.12	912.37	912.62	912.87	913.12	913.37	913.62	913.87	914.13	914.38	**37.80**
37.90	914.38	914.63	914.88	915.13	915.38	915.63	915.88	916.13	916.38	916.63	916.89	**37.90**
38.00	916.89	917.14	917.39	917.64	917.89	918.14	918.39	918.64	918.89	919.15	919.40	**38.00**
38.10	919.40	919.65	919.90	920.15	920.40	920.65	920.90	921.16	921.41	921.66	921.91	**38.10**
38.20	921.91	922.16	922.41	922.66	922.92	923.17	923.42	923.67	923.92	924.17	924.42	**38.20**
38.30	924.42	924.68	924.93	925.18	925.43	925.68	925.93	926.19	926.44	926.69	926.94	**38.30**
38.40	926.94	927.19	927.44	927.70	927.95	928.20	928.45	928.70	928.95	929.21	929.46	**38.40**
38.50	929.46	929.71	929.96	930.21	930.47	930.72	930.97	931.22	931.47	931.73	931.98	**38.50**
38.60	931.98	932.23	932.48	932.73	932.99	933.24	933.49	933.74	933.99	934.25	934.50	**38.60**
38.70	934.50	934.75	935.00	935.25	935.51	935.76	936.01	936.26	936.52	936.77	937.02	**38.70**
38.80	937.02	937.27	937.53	937.78	938.03	938.28	938.53	938.79	939.04	939.29	939.54	**38.80**
38.90	939.54	939.80	940.05	940.30	940.55	940.81	941.06	941.31	941.57	941.82	942.07	**38.90**
39.00	942.07	942.32	942.58	942.83	943.08	943.33	943.59	943.84	944.09	944.34	944.60	**39.00**
39.10	944.60	944.85	945.10	945.36	945.61	945.86	946.11	946.37	946.62	946.87	947.13	**39.10**
39.20	947.13	947.38	947.63	947.89	948.14	948.39	948.64	948.90	949.15	949.40	949.66	**39.20**
39.30	949.66	949.91	950.16	950.42	950.67	950.92	951.18	951.43	951.68	951.94	952.19	**39.30**
39.40	952.19	952.44	952.70	952.95	953.20	953.46	953.71	953.96	954.22	954.47	954.72	**39.40**
39.50	954.72	954.98	955.23	955.48	955.74	955.99	956.24	956.50	956.75	957.01	957.26	**39.50**
39.60	957.26	957.51	957.77	958.02	958.27	958.53	958.78	959.04	959.29	959.54	959.80	**39.60**
39.70	959.80	960.05	960.30	960.56	960.81	961.07	961.32	961.57	961.83	962.08	962.34	**39.70**
39.80	962.34	962.59	962.84	963.10	963.35	963.61	963.86	964.11	964.37	964.62	964.88	**39.80**
39.90	964.88	965.13	965.38	965.64	965.89	966.15	966.40	966.66	966.91	967.16	967.42	**39.90**
40.00	967.42	967.67	967.93	968.18	968.44	968.69	968.94	969.20	969.45	969.71	969.96	**40.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
40.00	967.42	967.67	967.93	968.18	968.44	968.69	968.94	969.20	969.45	969.71	969.96	**40.00**
40.10	969.96	970.22	970.47	970.73	970.98	971.24	971.49	971.74	972.00	972.25	972.51	**40.10**
40.20	972.51	972.76	973.02	973.27	973.53	973.78	974.04	974.29	974.55	974.80	975.06	**40.20**
40.30	975.06	975.31	975.57	975.82	976.08	976.33	976.59	976.84	977.10	977.35	977.61	**40.30**
40.40	977.61	977.86	978.12	978.37	978.63	978.88	979.14	979.39	979.65	979.90	980.16	**40.40**
40.50	980.16	980.41	980.67	980.92	981.18	981.43	981.69	981.94	982.20	982.45	982.71	**40.50**
40.60	982.71	982.96	983.22	983.47	983.73	983.99	984.24	984.50	984.75	985.01	985.26	**40.60**
40.70	985.26	985.52	985.77	986.03	986.29	986.54	986.80	987.05	987.31	987.56	987.82	**40.70**
40.80	987.82	988.07	988.33	988.59	988.84	989.10	989.35	989.61	989.87	990.12	990.38	**40.80**
40.90	990.38	990.63	990.89	991.14	991.40	991.66	991.91	992.17	992.42	992.68	992.94	**40.90**
41.00	992.94	993.19	993.45	993.70	993.96	994.22	994.47	994.73	994.99	995.24	995.50	**41.00**
41.10	995.50	995.75	996.01	996.27	996.52	996.78	997.04	997.29	997.55	997.80	998.06	**41.10**
41.20	998.06	998.32	998.57	998.83	999.09	999.34	999.60	999.86	1000.11	1000.37	1000.63	**41.20**
41.30	1000.63	1000.88	1001.14	1001.40	1001.65	1001.91	1002.17	1002.42	1002.68	1002.94	1003.19	**41.30**
41.40	1003.19	1003.45	1003.71	1003.96	1004.22	1004.48	1004.73	1004.99	1005.25	1005.50	1005.76	**41.40**
41.50	1005.76	1006.02	1006.27	1006.53	1006.79	1007.05	1007.30	1007.56	1007.82	1008.07	1008.33	**41.50**
41.60	1008.33	1008.59	1008.85	1009.10	1009.36	1009.62	1009.87	1010.13	1010.39	1010.65	1010.90	**41.60**
41.70	1010.90	1011.16	1011.42	1011.68	1011.93	1012.19	1012.45	1012.70	1012.96	1013.22	1013.48	**41.70**
41.80	1013.48	1013.73	1013.99	1014.25	1014.51	1014.76	1015.02	1015.28	1015.54	1015.80	1016.05	**41.80**
41.90	1016.05	1016.31	1016.57	1016.83	1017.08	1017.34	1017.60	1017.86	1018.11	1018.37	1018.63	**41.90**
42.00	1018.63	1018.89	1019.15	1019.40	1019.66	1019.92	1020.18	1020.44	1020.69	1020.95	1021.21	**42.00**
42.10	1021.21	1021.47	1021.73	1021.98	1022.24	1022.50	1022.76	1023.02	1023.27	1023.53	1023.79	**42.10**
42.20	1023.79	1024.05	1024.31	1024.57	1024.82	1025.08	1025.34	1025.60	1025.86	1026.12	1026.37	**42.20**
42.30	1026.37	1026.63	1026.89	1027.15	1027.41	1027.67	1027.92	1028.18	1028.44	1028.70	1028.96	**42.30**
42.40	1028.96	1029.22	1029.48	1029.73	1029.99	1030.25	1030.51	1030.77	1031.03	1031.29	1031.55	**42.40**
42.50	1031.55	1031.80	1032.06	1032.32	1032.58	1032.84	1033.10	1033.36	1033.62	1033.88	1034.13	**42.50**
42.60	1034.13	1034.39	1034.65	1034.91	1035.17	1035.43	1035.69	1035.95	1036.21	1036.47	1036.73	**42.60**
42.70	1036.73	1036.98	1037.24	1037.50	1037.76	1038.02	1038.28	1038.54	1038.80	1039.06	1039.32	**42.70**
42.80	1039.32	1039.58	1039.84	1040.10	1040.36	1040.61	1040.87	1041.13	1041.39	1041.65	1041.91	**42.80**
42.90	1041.91	1042.17	1042.43	1042.69	1042.95	1043.21	1043.47	1043.73	1043.99	1044.25	1044.51	**42.90**
43.00	1044.51	1044.77	1045.03	1045.29	1045.55	1045.81	1046.07	1046.33	1046.59	1046.85	1047.11	**43.00**
43.10	1047.11	1047.37	1047.63	1047.89	1048.15	1048.41	1048.67	1048.93	1049.19	1049.45	1049.71	**43.10**
43.20	1049.71	1049.97	1050.23	1050.49	1050.75	1051.01	1051.27	1051.53	1051.79	1052.05	1052.31	**43.20**
43.30	1052.31	1052.57	1052.83	1053.09	1053.35	1053.61	1053.87	1054.13	1054.39	1054.65	1054.91	**43.30**
43.40	1054.91	1055.17	1055.44	1055.70	1055.96	1056.22	1056.48	1056.74	1057.00	1057.26	1057.52	**43.40**
43.50	1057.52	1057.78	1058.04	1058.30	1058.56	1058.82	1059.09	1059.35	1059.61	1059.87	1060.13	**43.50**
43.60	1060.13	1060.39	1060.65	1060.91	1061.17	1061.43	1061.69	1061.96	1062.22	1062.48	1062.74	**43.60**
43.70	1062.74	1063.00	1063.26	1063.52	1063.78	1064.04	1064.31	1064.57	1064.83	1065.09	1065.35	**43.70**
43.80	1065.35	1065.61	1065.87	1066.14	1066.40	1066.66	1066.92	1067.18	1067.44	1067.70	1067.97	**43.80**
43.90	1067.97	1068.23	1068.49	1068.75	1069.01	1069.27	1069.54	1069.80	1070.06	1070.32	1070.58	**43.90**
44.00	1070.58	1070.84	1071.11	1071.37	1071.63	1071.89	1072.15	1072.42	1072.68	1072.94	1073.20	**44.00**
44.10	1073.20	1073.46	1073.72	1073.99	1074.25	1074.51	1074.77	1075.04	1075.30	1075.56	1075.82	**44.10**
44.20	1075.82	1076.08	1076.35	1076.61	1076.87	1077.13	1077.40	1077.66	1077.92	1078.18	1078.44	**44.20**
44.30	1078.44	1078.71	1078.97	1079.23	1079.49	1079.76	1080.02	1080.28	1080.54	1080.81	1081.07	**44.30**
44.40	1081.07	1081.33	1081.59	1081.86	1082.12	1082.38	1082.65	1082.91	1083.17	1083.43	1083.70	**44.40**
44.50	1083.70	1083.96	1084.22	1084.49	1084.75	1085.01	1085.27	1085.54	1085.80	1086.06	1086.33	**44.50**
44.60	1086.33	1086.59	1086.85	1087.12	1087.38	1087.64	1087.90	1088.17	1088.43	1088.69	1088.96	**44.60**
44.70	1088.96	1089.22	1089.48	1089.75	1090.01	1090.27	1090.54	1090.80	1091.06	1091.33	1091.59	**44.70**
44.80	1091.59	1091.85	1092.12	1092.38	1092.64	1092.91	1093.17	1093.44	1093.70	1093.96	1094.23	**44.80**
44.90	1094.23	1094.49	1094.75	1095.02	1095.28	1095.55	1095.81	1096.07	1096.34	1096.60	1096.86	**44.90**
45.00	1096.86	1097.13	1097.39	1097.66	1097.92	1098.18	1098.45	1098.71	1098.98	1099.24	1099.51	**45.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
45.00	1096.86	1097.13	1097.39	1097.66	1097.92	1098.18	1098.45	1098.71	1098.98	1099.24	1099.51	**45.00**
45.10	1099.51	1099.77	1100.03	1100.30	1100.56	1100.83	1101.09	1101.35	1101.62	1101.88	1102.15	**45.10**
45.20	1102.15	1102.41	1102.68	1102.94	1103.21	1103.47	1103.73	1104.00	1104.26	1104.53	1104.79	**45.20**
45.30	1104.79	1105.06	1105.32	1105.59	1105.85	1106.12	1106.38	1106.65	1106.91	1107.17	1107.44	**45.30**
45.40	1107.44	1107.70	1107.97	1108.23	1108.50	1108.76	1109.03	1109.29	1109.56	1109.82	1110.09	**45.40**
45.50	1110.09	1110.35	1110.62	1110.88	1111.15	1111.41	1111.68	1111.95	1112.21	1112.48	1112.74	**45.50**
45.60	1112.74	1113.01	1113.27	1113.54	1113.80	1114.07	1114.33	1114.60	1114.86	1115.13	1115.40	**45.60**
45.70	1115.40	1115.66	1115.93	1116.19	1116.46	1116.72	1116.99	1117.25	1117.52	1117.79	1118.05	**45.70**
45.80	1118.05	1118.32	1118.58	1118.85	1119.11	1119.38	1119.65	1119.91	1120.18	1120.44	1120.71	**45.80**
45.90	1120.71	1120.98	1121.24	1121.51	1121.77	1122.04	1122.31	1122.57	1122.84	1123.11	1123.37	**45.90**
46.00	1123.37	1123.64	1123.90	1124.17	1124.44	1124.70	1124.97	1125.24	1125.50	1125.77	1126.04	**46.00**
46.10	1126.04	1126.30	1126.57	1126.84	1127.10	1127.37	1127.63	1127.90	1128.17	1128.43	1128.70	**46.10**
46.20	1128.70	1128.97	1129.24	1129.50	1129.77	1130.04	1130.30	1130.57	1130.84	1131.10	1131.37	**46.20**
46.30	1131.37	1131.64	1131.90	1132.17	1132.44	1132.71	1132.97	1133.24	1133.51	1133.77	1134.04	**46.30**
46.40	1134.04	1134.31	1134.58	1134.84	1135.11	1135.38	1135.65	1135.91	1136.18	1136.45	1136.72	**46.40**
46.50	1136.72	1136.98	1137.25	1137.52	1137.79	1138.05	1138.32	1138.59	1138.86	1139.12	1139.39	**46.50**
46.60	1139.39	1139.66	1139.93	1140.19	1140.46	1140.73	1141.00	1141.27	1141.53	1141.80	1142.07	**46.60**
46.70	1142.07	1142.34	1142.61	1142.87	1143.14	1143.41	1143.68	1143.95	1144.21	1144.48	1144.75	**46.70**
46.80	1144.75	1145.02	1145.29	1145.56	1145.82	1146.09	1146.36	1146.63	1146.90	1147.17	1147.44	**46.80**
46.90	1147.44	1147.70	1147.97	1148.24	1148.51	1148.78	1149.05	1149.32	1149.58	1149.85	1150.12	**46.90**
47.00	1150.12	1150.39	1150.66	1150.93	1151.20	1151.47	1151.74	1152.00	1152.27	1152.54	1152.81	**47.00**
47.10	1152.81	1153.08	1153.35	1153.62	1153.89	1154.16	1154.43	1154.69	1154.96	1155.23	1155.50	**47.10**
47.20	1155.50	1155.77	1156.04	1156.31	1156.58	1156.85	1157.12	1157.39	1157.66	1157.93	1158.20	**47.20**
47.30	1158.20	1158.47	1158.74	1159.01	1159.28	1159.55	1159.82	1160.09	1160.35	1160.62	1160.89	**47.30**
47.40	1160.89	1161.16	1161.43	1161.70	1161.97	1162.24	1162.51	1162.78	1163.05	1163.32	1163.59	**47.40**
47.50	1163.59	1163.86	1164.13	1164.40	1164.68	1164.95	1165.22	1165.49	1165.76	1166.03	1166.30	**47.50**
47.60	1166.30	1166.57	1166.84	1167.11	1167.38	1167.65	1167.92	1168.19	1168.46	1168.73	1169.00	**47.60**
47.70	1169.00	1169.27	1169.54	1169.81	1170.09	1170.36	1170.63	1170.90	1171.17	1171.44	1171.71	**47.70**
47.80	1171.71	1171.98	1172.25	1172.52	1172.79	1173.07	1173.34	1173.61	1173.88	1174.15	1174.42	**47.80**
47.90	1174.42	1174.69	1174.96	1175.24	1175.51	1175.78	1176.05	1176.32	1176.59	1176.86	1177.14	**47.90**
48.00	1177.14	1177.41	1177.68	1177.95	1178.22	1178.49	1178.77	1179.04	1179.31	1179.58	1179.85	**48.00**
48.10	1179.85	1180.12	1180.40	1180.67	1180.94	1181.21	1181.48	1181.76	1182.03	1182.30	1182.57	**48.10**
48.20	1182.57	1182.84	1183.12	1183.39	1183.66	1183.93	1184.21	1184.48	1184.75	1185.02	1185.29	**48.20**
48.30	1185.29	1185.57	1185.84	1186.11	1186.38	1186.66	1186.93	1187.20	1187.48	1187.75	1188.02	**48.30**
48.40	1188.02	1188.29	1188.57	1188.84	1189.11	1189.38	1189.66	1189.93	1190.20	1190.48	1190.75	**48.40**
48.50	1190.75	1191.02	1191.30	1191.57	1191.84	1192.11	1192.39	1192.66	1192.93	1193.21	1193.48	**48.50**
48.60	1193.48	1193.75	1194.03	1194.30	1194.57	1194.85	1195.12	1195.39	1195.67	1195.94	1196.21	**48.60**
48.70	1196.21	1196.49	1196.76	1197.04	1197.31	1197.58	1197.86	1198.13	1198.40	1198.68	1198.95	**48.70**
48.80	1198.95	1199.23	1199.50	1199.77	1200.05	1200.32	1200.60	1200.87	1201.14	1201.42	1201.69	**48.80**
48.90	1201.69	1201.97	1202.24	1202.52	1202.79	1203.06	1203.34	1203.61	1203.89	1204.16	1204.44	**48.90**
49.00	1204.44	1204.71	1204.99	1205.26	1205.53	1205.81	1206.08	1206.36	1206.63	1206.91	1207.18	**49.00**
49.10	1207.18	1207.46	1207.73	1208.01	1208.28	1208.56	1208.83	1209.11	1209.38	1209.66	1209.93	**49.10**
49.20	1209.93	1210.21	1210.48	1210.76	1211.03	1211.31	1211.58	1211.86	1212.14	1212.41	1212.69	**49.20**
49.30	1212.69	1212.96	1213.24	1213.51	1213.79	1214.06	1214.34	1214.62	1214.89	1215.17	1215.44	**49.30**
49.40	1215.44	1215.72	1215.99	1216.27	1216.55	1216.82	1217.10	1217.37	1217.65	1217.93	1218.20	**49.40**
49.50	1218.20	1218.48	1218.75	1219.03	1219.31	1219.58	1219.86	1220.14	1220.41	1220.69	1220.96	**49.50**
49.60	1220.96	1221.24	1221.52	1221.79	1222.07	1222.35	1222.62	1222.90	1223.18	1223.45	1223.73	**49.60**
49.70	1223.73	1224.01	1224.28	1224.56	1224.84	1225.11	1225.39	1225.67	1225.95	1226.22	1226.50	**49.70**
49.80	1226.50	1226.78	1227.05	1227.33	1227.61	1227.89	1228.16	1228.44	1228.72	1228.99	1229.27	**49.80**
49.90	1229.27	1229.55	1229.83	1230.10	1230.38	1230.66	1230.94	1231.21	1231.49	1231.77	1232.05	**49.90**
50.00	1232.05	1232.33	1232.60	1232.88	1233.16	1233.44	1233.71	1233.99	1234.27	1234.55	1234.83	**50.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.1. *Type K thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
50.00	1232.05	1232.33	1232.60	1232.88	1233.16	1233.44	1233.71	1233.99	1234.27	1234.55	1234.83	**50.00**
50.10	1234.83	1235.10	1235.38	1235.66	1235.94	1236.22	1236.50	1236.77	1237.05	1237.33	1237.61	**50.10**
50.20	1237.61	1237.89	1238.17	1238.44	1238.72	1239.00	1239.28	1239.56	1239.84	1240.12	1240.39	**50.20**
50.30	1240.39	1240.67	1240.95	1241.23	1241.51	1241.79	1242.07	1242.35	1242.63	1242.90	1243.18	**50.30**
50.40	1243.18	1243.46	1243.74	1244.02	1244.30	1244.58	1244.86	1245.14	1245.42	1245.70	1245.98	**50.40**
50.50	1245.98	1246.26	1246.54	1246.81	1247.09	1247.37	1247.65	1247.93	1248.21	1248.49	1248.77	**50.50**
50.60	1248.77	1249.05	1249.33	1249.61	1249.89	1250.17	1250.45	1250.73	1251.01	1251.29	1251.57	**50.60**
50.70	1251.57	1251.85	1252.13	1252.41	1252.69	1252.97	1253.25	1253.53	1253.81	1254.09	1254.37	**50.70**
50.80	1254.37	1254.65	1254.94	1255.22	1255.50	1255.78	1256.06	1256.34	1256.62	1256.90	1257.18	**50.80**
50.90	1257.18	1257.46	1257.74	1258.02	1258.30	1258.59	1258.87	1259.15	1259.43	1259.71	1259.99	**50.90**
51.00	1259.99	1260.27	1260.55	1260.83	1261.12	1261.40	1261.68	1261.96	1262.24	1262.52	1262.80	**51.00**
51.10	1262.80	1263.09	1263.37	1263.65	1263.93	1264.21	1264.49	1264.78	1265.06	1265.34	1265.62	**51.10**
51.20	1265.62	1265.90	1266.18	1266.47	1266.75	1267.03	1267.31	1267.60	1267.88	1268.16	1268.44	**51.20**
51.30	1268.44	1268.72	1269.01	1269.29	1269.57	1269.85	1270.14	1270.42	1270.70	1270.98	1271.27	**51.30**
51.40	1271.27	1271.55	1271.83	1272.11	1272.40	1272.68	1272.96	1273.24	1273.53	1273.81	1274.09	**51.40**
51.50	1274.09	1274.38	1274.66	1274.94	1275.23	1275.51	1275.79	1276.07	1276.36	1276.64	1276.92	**51.50**
51.60	1276.92	1277.21	1277.49	1277.77	1278.06	1278.34	1278.63	1278.91	1279.19	1279.48	1279.76	**51.60**
51.70	1279.76	1280.04	1280.33	1280.61	1280.89	1281.18	1281.46	1281.75	1282.03	1282.31	1282.60	**51.70**
51.80	1282.60	1282.88	1283.17	1283.45	1283.73	1284.02	1284.30	1284.59	1284.87	1285.16	1285.44	**51.80**
51.90	1285.44	1285.72	1286.01	1286.29	1286.58	1286.86	1287.15	1287.43	1287.72	1288.00	1288.29	**51.90**
52.00	1288.29	1288.57	1288.86	1289.14	1289.43	1289.71	1290.00	1290.28	1290.57	1290.85	1291.14	**52.00**
52.10	1291.14	1291.42	1291.71	1291.99	1292.28	1292.56	1292.85	1293.13	1293.42	1293.70	1293.99	**52.10**
52.20	1293.99	1294.27	1294.56	1294.85	1295.13	1295.42	1295.70	1295.99	1296.27	1296.56	1296.85	**52.20**
52.30	1296.85	1297.13	1297.42	1297.70	1297.99	1298.28	1298.56	1298.85	1299.13	1299.42	1299.71	**52.30**
52.40	1299.71	1299.99	1300.28	1300.56	1300.85	1301.14	1301.42	1301.71	1302.00	1302.28	1302.57	**52.40**
52.50	1302.57	1302.86	1303.14	1303.43	1303.72	1304.00	1304.29	1304.58	1304.86	1305.15	1305.44	**52.50**
52.60	1305.44	1305.72	1306.01	1306.30	1306.59	1306.87	1307.16	1307.45	1307.73	1308.02	1308.31	**52.60**
52.70	1308.31	1308.60	1308.88	1309.17	1309.46	1309.75	1310.03	1310.32	1310.61	1310.90	1311.18	**52.70**
52.80	1311.18	1311.47	1311.76	1312.05	1312.34	1312.62	1312.91	1313.20	1313.49	1313.78	1314.06	**52.80**
52.90	1314.06	1314.35	1314.64	1314.93	1315.22	1315.50	1315.79	1316.08	1316.37	1316.66	1316.95	**52.90**
53.00	1316.95	1317.23	1317.52	1317.81	1318.10	1318.39	1318.68	1318.97	1319.26	1319.54	1319.83	**53.00**
53.10	1319.83	1320.12	1320.41	1320.70	1320.99	1321.28	1321.57	1321.86	1322.14	1322.43	1322.72	**53.10**
53.20	1322.72	1323.01	1323.30	1323.59	1323.88	1324.17	1324.46	1324.75	1325.04	1325.33	1325.62	**53.20**
53.30	1325.62	1325.91	1326.20	1326.49	1326.77	1327.06	1327.35	1327.64	1327.93	1328.22	1328.51	**53.30**
53.40	1328.51	1328.80	1329.09	1329.38	1329.67	1329.96	1330.25	1330.54	1330.83	1331.12	1331.41	**53.40**
53.50	1331.41	1331.71	1332.00	1332.29	1332.58	1332.87	1333.16	1333.45	1333.74	1334.03	1334.32	**53.50**
53.60	1334.32	1334.61	1334.90	1335.19	1335.48	1335.77	1336.06	1336.35	1336.65	1336.94	1337.23	**53.60**
53.70	1337.23	1337.52	1337.81	1338.10	1338.39	1338.68	1338.97	1339.27	1339.56	1339.85	1340.14	**53.70**
53.80	1340.14	1340.43	1340.72	1341.01	1341.31	1341.60	1341.89	1342.18	1342.47	1342.76	1343.06	**53.80**
53.90	1343.06	1343.35	1343.64	1343.93	1344.22	1344.51	1344.81	1345.10	1345.39	1345.68	1345.97	**53.90**
54.00	1345.97	1346.27	1346.56	1346.85	1347.14	1347.44	1347.73	1348.02	1348.31	1348.60	1348.90	**54.00**
54.10	1348.90	1349.19	1349.48	1349.77	1350.07	1350.36	1350.65	1350.94	1351.24	1351.53	1351.82	**54.10**
54.20	1351.82	1352.12	1352.41	1352.70	1352.99	1353.29	1353.58	1353.87	1354.17	1354.46	1354.75	**54.20**
54.30	1354.75	1355.05	1355.34	1355.63	1355.93	1356.22	1356.51	1356.81	1357.10	1357.39	1357.69	**54.30**
54.40	1357.69	1357.98	1358.27	1358.57	1358.86	1359.15	1359.45	1359.74	1360.03	1360.33	1360.62	**54.40**
54.50	1360.62	1360.92	1361.21	1361.50	1361.80	1362.09	1362.39	1362.68	1362.97	1363.27	1363.56	**54.50**
54.60	1363.56	1363.86	1364.15	1364.45	1364.74	1365.03	1365.33	1365.62	1365.92	1366.21	1366.51	**54.60**
54.70	1366.51	1366.80	1367.09	1367.39	1367.68	1367.98	1368.27	1368.57	1368.86	1369.16	1369.45	**54.70**
54.80	1369.45	1369.75	1370.04	1370.34	1370.63	1370.93	1371.22	1371.52	1371.81			**54.80**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. ***Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F***

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−6.40	−416.69	−420.45	−424.64	−429.46	−435.27	−443.11						**−6.40**
−6.30	−389.79	−391.98	−394.24	−396.59	−399.04	−401.59	−404.26	−407.07	−410.06	−413.25	−416.69	**−6.30**
−6.20	−370.81	−372.52	−374.27	−376.05	−377.88	−379.74	−381.64	−383.60	−385.60	−387.67	−389.79	**−6.20**
−6.10	−355.15	−356.61	−358.09	−359.60	−361.13	−362.68	−364.25	−365.85	−367.47	−369.13	−370.81	**−6.10**
−6.00	−341.42	−342.73	−344.05	−345.38	−346.73	−348.09	−349.47	−350.86	−352.27	−353.70	−355.15	**−6.00**
−5.90	−329.02	−330.21	−331.41	−332.63	−333.85	−335.08	−336.33	−337.58	−338.85	−340.13	−341.42	**−5.90**
−5.80	−317.58	−318.69	−319.80	−320.92	−322.05	−323.19	−324.34	−325.50	−326.66	−327.83	−329.02	**−5.80**
−5.70	−306.89	−307.93	−308.98	−310.03	−311.09	−312.15	−313.22	−314.30	−315.39	−316.48	−317.58	**−5.70**
−5.60	−296.81	−297.80	−298.79	−299.78	−300.78	−301.78	−302.79	−303.81	−304.83	−305.86	−306.89	**−5.60**
−5.50	−287.24	−288.17	−289.12	−290.06	−291.01	−291.97	−292.93	−293.89	−294.86	−295.83	−296.81	**−5.50**
−5.40	−278.09	−278.98	−279.88	−280.79	−281.70	−282.61	−283.53	−284.45	−285.37	−286.30	−287.24	**−5.40**
−5.30	−269.30	−270.16	−271.03	−271.90	−272.77	−273.65	−274.53	−275.41	−276.30	−277.19	−278.09	**−5.30**
−5.20	−260.84	−261.67	−262.51	−263.35	−264.19	−265.03	−265.88	−266.73	−267.58	−268.44	−269.30	**−5.20**
−5.10	−252.66	−253.47	−254.27	−255.09	−255.90	−256.72	−257.54	−258.36	−259.18	−260.01	−260.84	**−5.10**
−5.00	−244.73	−245.52	−246.30	−247.09	−247.88	−248.67	−249.46	−250.26	−251.06	−251.86	−252.66	**−5.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−5.00	−244.73	−245.52	−246.30	−247.09	−247.88	−248.67	−249.46	−250.26	−251.06	−251.86	−252.66	−5.00
−4.90	−237.03	−237.79	−238.56	−239.32	−240.09	−240.86	−241.63	−242.40	−243.18	−243.95	−244.73	−4.90
−4.80	−229.54	−230.28	−231.02	−231.77	−232.51	−233.26	−234.01	−234.76	−235.52	−236.27	−237.03	−4.80
−4.70	−222.23	−222.95	−223.68	−224.41	−225.13	−225.86	−226.59	−227.33	−228.06	−228.80	−229.54	−4.70
−4.60	−215.09	−215.80	−216.51	−217.22	−217.93	−218.64	−219.36	−220.07	−220.79	−221.51	−222.23	−4.60
−4.50	−208.12	−208.81	−209.50	−210.19	−210.89	−211.59	−212.28	−212.99	−213.69	−214.39	−215.09	−4.50
−4.40	−201.28	−201.96	−202.64	−203.32	−204.00	−204.68	−205.36	−206.05	−206.74	−207.43	−208.12	−4.40
−4.30	−194.58	−195.24	−195.91	−196.58	−197.25	−197.91	−198.59	−199.26	−199.93	−200.60	−201.28	−4.30
−4.20	−188.00	−188.66	−189.31	−189.96	−190.62	−191.28	−191.94	−192.59	−193.26	−193.92	−194.58	−4.20
−4.10	−181.54	−182.19	−182.83	−183.47	−184.12	−184.76	−185.41	−186.05	−186.70	−187.35	−188.00	−4.10
−4.00	−175.19	−175.82	−176.46	−177.09	−177.72	−178.36	−178.99	−179.63	−180.27	−180.90	−181.54	−4.00
−3.90	−168.94	−169.56	−170.19	−170.81	−171.43	−172.06	−172.68	−173.31	−173.94	−174.56	−175.19	−3.90
−3.80	−162.79	−163.40	−164.01	−164.63	−165.24	−165.86	−166.47	−167.09	−167.71	−168.32	−168.94	−3.80
−3.70	−156.73	−157.33	−157.93	−158.54	−159.14	−159.75	−160.35	−160.96	−161.57	−162.18	−162.79	−3.70
−3.60	−150.75	−151.34	−151.93	−152.53	−153.13	−153.73	−154.32	−154.92	−155.52	−156.12	−156.73	−3.60
−3.50	−144.85	−145.43	−146.02	−146.61	−147.20	−147.79	−148.38	−148.97	−149.56	−150.15	−150.75	−3.50
−3.40	−139.02	−139.60	−140.18	−140.76	−141.34	−141.92	−142.51	−143.09	−143.67	−144.26	−144.85	−3.40
−3.30	−133.27	−133.84	−134.41	−134.99	−135.56	−136.14	−136.71	−137.29	−137.86	−138.44	−139.02	−3.30
−3.20	−127.58	−128.15	−128.71	−129.28	−129.85	−130.42	−130.98	−131.55	−132.12	−132.70	−133.27	−3.20
−3.10	−121.96	−122.52	−123.08	−123.64	−124.20	−124.76	−125.33	−125.89	−126.45	−127.02	−127.58	−3.10
−3.00	−116.40	−116.95	−117.51	−118.06	−118.62	−119.17	−119.73	−120.29	−120.84	−121.40	−121.96	−3.00
−2.90	−110.90	−111.44	−111.99	−112.54	−113.09	−113.64	−114.19	−114.74	−115.29	−115.85	−116.40	−2.90
−2.80	−105.45	−105.99	−106.54	−107.08	−107.62	−108.17	−108.71	−109.26	−109.80	−110.35	−110.90	−2.80
−2.70	−100.06	−100.59	−101.13	−101.67	−102.21	−102.75	−103.29	−103.83	−104.37	−104.91	−105.45	−2.70
−2.60	−94.71	−95.24	−95.78	−96.31	−96.84	−97.38	−97.91	−98.45	−98.98	−99.52	−100.06	−2.60
−2.50	−89.42	−89.94	−90.47	−91.00	−91.53	−92.06	−92.59	−93.12	−93.65	−94.18	−94.71	−2.50
−2.40	−84.16	−84.69	−85.21	−85.74	−86.26	−86.78	−87.31	−87.84	−88.36	−88.89	−89.42	−2.40
−2.30	−78.96	−79.48	−80.00	−80.52	−81.04	−81.56	−82.08	−82.60	−83.12	−83.64	−84.16	−2.30
−2.20	−73.79	−74.31	−74.82	−75.34	−75.85	−76.37	−76.89	−77.40	−77.92	−78.44	−78.96	−2.20
−2.10	−68.67	−69.18	−69.69	−70.20	−70.71	−71.23	−71.74	−72.25	−72.77	−73.28	−73.79	−2.10
−2.00	−63.58	−64.09	−64.60	−65.10	−65.61	−66.12	−66.63	−67.14	−67.65	−68.16	−68.67	−2.00
−1.90	−58.53	−59.04	−59.54	−60.04	−60.55	−61.05	−61.56	−62.06	−62.57	−63.08	−63.58	−1.90
−1.80	−53.52	−54.02	−54.52	−55.02	−55.52	−56.02	−56.52	−57.03	−57.53	−58.03	−58.53	−1.80
−1.70	−48.54	−49.04	−49.53	−50.03	−50.53	−51.03	−51.52	−52.02	−52.52	−53.02	−53.52	−1.70
−1.60	−43.59	−44.09	−44.58	−45.07	−45.57	−46.06	−46.56	−47.05	−47.55	−48.04	−48.54	−1.60
−1.50	−38.68	−39.17	−39.66	−40.15	−40.64	−41.13	−41.62	−42.12	−42.61	−43.10	−43.59	−1.50
−1.40	−33.79	−34.28	−34.77	−35.26	−35.74	−36.23	−36.72	−37.21	−37.70	−38.19	−38.68	−1.40
−1.30	−28.94	−29.42	−29.91	−30.39	−30.88	−31.36	−31.85	−32.33	−32.82	−33.31	−33.79	−1.30
−1.20	−24.11	−24.59	−25.07	−25.55	−26.04	−26.52	−27.00	−27.49	−27.97	−28.45	−28.94	−1.20
−1.10	−19.31	−19.79	−20.27	−20.75	−21.23	−21.71	−22.19	−22.67	−23.15	−23.63	−24.11	−1.10
−1.00	−14.53	−15.01	−15.49	−15.96	−16.44	−16.92	−17.40	−17.87	−18.35	−18.83	−19.31	−1.00
−0.90	−9.78	−10.26	−10.73	−11.21	−11.68	−12.16	−12.63	−13.11	−13.58	−14.06	−14.53	−0.90
−0.80	−5.06	−5.53	−6.00	−6.47	−6.95	−7.42	−7.89	−8.36	−8.84	−9.31	−9.78	−0.80
−0.70	−0.36	−0.82	−1.29	−1.76	−2.23	−2.70	−3.17	−3.65	−4.12	−4.59	−5.06	−0.70
−0.60	4.32	3.86	3.39	2.92	2.46	1.99	1.52	1.05	0.58	0.11	−0.36	−0.60
−0.50	8.98	8.52	8.05	7.59	7.12	6.66	6.19	5.72	5.26	4.79	4.32	−0.50
−0.40	13.62	13.16	12.70	12.23	11.77	11.31	10.84	10.38	9.91	9.45	8.98	−0.40
−0.30	18.24	17.78	17.32	16.86	16.40	15.94	15.47	15.01	14.55	14.09	13.62	−0.30
−0.20	22.84	22.39	21.93	21.47	21.01	20.55	20.09	19.63	19.16	18.70	18.24	−0.20
−0.10	27.43	26.97	26.51	26.06	25.60	25.14	24.68	24.22	23.76	23.30	22.84	−0.10
0.00	32.00	31.54	31.09	30.63	30.17	29.72	29.26	28.80	28.35	27.89	27.43	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	32.46	32.91	33.37	33.82	34.28	34.74	35.19	35.65	36.10	36.56	0.00
0.10	36.56	37.01	37.47	37.92	38.37	38.83	39.28	39.74	40.19	40.64	41.10	0.10
0.20	41.10	41.55	42.00	42.46	42.91	43.36	43.82	44.27	44.72	45.17	45.63	0.20
0.30	45.63	46.08	46.53	46.98	47.43	47.89	48.34	48.79	49.24	49.69	50.14	0.30
0.40	50.14	50.59	51.04	51.49	51.94	52.39	52.84	53.29	53.75	54.19	54.64	0.40
0.50	54.64	55.09	55.54	55.99	56.44	56.89	57.34	57.79	58.24	58.69	59.14	0.50
0.60	59.14	59.58	60.03	60.48	60.93	61.38	61.82	62.27	62.72	63.17	63.62	0.60
0.70	63.62	64.06	64.51	64.96	65.40	65.85	66.30	66.74	67.19	67.64	68.08	0.70
0.80	68.08	68.53	68.98	69.42	69.87	70.31	70.76	71.21	71.65	72.10	72.54	0.80
0.90	72.54	72.99	73.43	73.88	74.32	74.77	75.21	75.66	76.10	76.54	76.99	0.90
1.00	76.99	77.43	77.88	78.32	78.77	79.21	79.65	80.10	80.54	80.98	81.43	1.00
1.10	81.43	81.87	82.31	82.76	83.20	83.64	84.08	84.53	84.97	85.41	85.86	1.10
1.20	85.86	86.30	86.74	87.18	87.62	88.07	88.51	88.95	89.39	89.83	90.27	1.20
1.30	90.27	90.72	91.16	91.60	92.04	92.48	92.92	93.36	93.80	94.24	94.69	1.30
1.40	94.69	95.13	95.57	96.01	96.45	96.89	97.33	97.77	98.21	98.65	99.09	1.40
1.50	99.09	99.53	99.97	100.41	100.85	101.29	101.73	102.16	102.60	103.04	103.48	1.50
1.60	103.48	103.92	104.36	104.80	105.24	105.68	106.12	106.55	106.99	107.43	107.87	1.60
1.70	107.87	108.31	108.75	109.18	109.62	110.06	110.50	110.94	111.37	111.81	112.25	1.70
1.80	112.25	112.69	113.13	113.56	114.00	114.44	114.88	115.31	115.75	116.19	116.62	1.80
1.90	116.62	117.06	117.50	117.94	118.37	118.81	119.25	119.68	120.12	120.56	120.99	1.90
2.00	120.99	121.43	121.87	122.30	122.74	123.17	123.61	124.05	124.48	124.92	125.36	2.00
2.10	125.36	125.79	126.23	126.66	127.10	127.53	127.97	128.41	128.84	129.28	129.71	2.10
2.20	129.71	130.15	130.58	131.02	131.45	131.89	132.33	132.76	133.20	133.63	134.07	2.20
2.30	134.07	134.50	134.94	135.37	135.81	136.24	136.68	137.11	137.55	137.98	138.41	2.30
2.40	138.41	138.85	139.28	139.72	140.15	140.59	141.02	141.46	141.89	142.33	142.76	2.40
2.50	142.76	143.19	143.63	144.06	144.50	144.93	145.37	145.80	146.23	146.67	147.10	2.50
2.60	147.10	147.54	147.97	148.40	148.84	149.27	149.71	150.14	150.57	151.01	151.44	2.60
2.70	151.44	151.87	152.31	152.74	153.18	153.61	154.04	154.48	154.91	155.34	155.78	2.70
2.80	155.78	156.21	156.65	157.08	157.51	157.95	158.38	158.81	159.25	159.68	160.11	2.80
2.90	160.11	160.55	160.98	161.41	161.85	162.28	162.71	163.15	163.58	164.01	164.45	2.90
3.00	164.45	164.88	165.31	165.75	166.18	166.61	167.05	167.48	167.91	168.35	168.78	3.00
3.10	168.78	169.21	169.65	170.08	170.51	170.95	171.38	171.81	172.25	172.68	173.11	3.10
3.20	173.11	173.55	173.98	174.41	174.85	175.28	175.71	176.15	176.58	177.01	177.45	3.20
3.30	177.45	177.88	178.31	178.75	179.18	179.61	180.05	180.48	180.91	181.35	181.78	3.30
3.40	181.78	182.21	182.65	183.08	183.51	183.95	184.38	184.81	185.25	185.68	186.11	3.40
3.50	186.11	186.55	186.98	187.41	187.85	188.28	188.71	189.15	189.58	190.01	190.45	3.50
3.60	190.45	190.88	191.32	191.75	192.18	192.62	193.05	193.48	193.92	194.35	194.79	3.60
3.70	194.79	195.22	195.65	196.09	196.52	196.96	197.39	197.82	198.26	198.69	199.13	3.70
3.80	199.13	199.56	199.99	200.43	200.86	201.30	201.73	202.17	202.60	203.03	203.47	3.80
3.90	203.47	203.90	204.34	204.77	205.21	205.64	206.08	206.51	206.95	207.38	207.81	3.90
4.00	207.81	208.25	208.68	209.12	209.55	209.99	210.42	210.86	211.29	211.73	212.16	4.00
4.10	212.16	212.60	213.03	213.47	213.90	214.34	214.78	215.21	215.65	216.08	216.52	4.10
4.20	216.52	216.95	217.39	217.82	218.26	218.70	219.13	219.57	220.00	220.44	220.87	4.20
4.30	220.87	221.31	221.75	222.18	222.62	223.06	223.49	223.93	224.36	224.80	225.24	4.30
4.40	225.24	225.67	226.11	226.55	226.98	227.42	227.86	228.29	228.73	229.17	229.60	4.40
4.50	229.60	230.04	230.48	230.92	231.35	231.79	232.23	232.66	233.10	233.54	233.98	4.50
4.60	233.98	234.41	234.85	235.29	235.73	236.16	236.60	237.04	237.48	237.92	238.35	4.60
4.70	238.35	238.79	239.23	239.67	240.11	240.54	240.98	241.42	241.86	242.30	242.74	4.70
4.80	242.74	243.18	243.61	244.05	244.49	244.93	245.37	245.81	246.25	246.69	247.13	4.80
4.90	247.13	247.57	248.01	248.44	248.88	249.32	249.76	250.20	250.64	251.08	251.52	4.90
5.00	251.52	251.96	252.40	252.84	253.28	253.72	254.16	254.60	255.04	255.48	255.92	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B7.2.2. ***Type K thermocouples*** *--- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	251.52	251.96	252.40	252.84	253.28	253.72	254.16	254.60	255.04	255.48	255.92	**5.00**
5.10	255.92	256.36	256.80	257.25	257.69	258.13	258.57	259.01	259.45	259.89	260.33	**5.10**
5.20	260.33	260.77	261.21	261.65	262.10	262.54	262.98	263.42	263.86	264.30	264.75	**5.20**
5.30	264.75	265.19	265.63	266.07	266.51	266.95	267.40	267.84	268.28	268.72	269.17	**5.30**
5.40	269.17	269.61	270.05	270.49	270.94	271.38	271.82	272.26	272.71	273.15	273.59	**5.40**
5.50	273.59	274.04	274.48	274.92	275.37	275.81	276.25	276.70	277.14	277.58	278.03	**5.50**
5.60	278.03	278.47	278.91	279.36	279.80	280.25	280.69	281.13	281.58	282.02	282.47	**5.60**
5.70	282.47	282.91	283.36	283.80	284.24	284.69	285.13	285.58	286.02	286.47	286.91	**5.70**
5.80	286.91	287.36	287.80	288.25	288.69	289.14	289.58	290.03	290.47	290.92	291.36	**5.80**
5.90	291.36	291.81	292.26	292.70	293.15	293.59	294.04	294.48	294.93	295.38	295.82	**5.90**
6.00	295.82	296.27	296.72	297.16	297.61	298.05	298.50	298.95	299.39	299.84	300.29	**6.00**
6.10	300.29	300.73	301.18	301.63	302.07	302.52	302.97	303.41	303.86	304.31	304.76	**6.10**
6.20	304.76	305.20	305.65	306.10	306.55	306.99	307.44	307.89	308.34	308.78	309.23	**6.20**
6.30	309.23	309.68	310.13	310.57	311.02	311.47	311.92	312.37	312.81	313.26	313.71	**6.30**
6.40	313.71	314.16	314.61	315.06	315.50	315.95	316.40	316.85	317.30	317.75	318.20	**6.40**
6.50	318.20	318.64	319.09	319.54	319.99	320.44	320.89	321.34	321.79	322.24	322.68	**6.50**
6.60	322.68	323.13	323.58	324.03	324.48	324.93	325.38	325.83	326.28	326.73	327.18	**6.60**
6.70	327.18	327.63	328.08	328.53	328.98	329.42	329.87	330.32	330.77	331.22	331.67	**6.70**
6.80	331.67	332.12	332.57	333.02	333.47	333.92	334.37	334.82	335.27	335.72	336.17	**6.80**
6.90	336.17	336.62	337.07	337.52	337.97	338.42	338.87	339.32	339.77	340.22	340.68	**6.90**
7.00	340.68	341.13	341.58	342.03	342.48	342.93	343.38	343.83	344.28	344.73	345.18	**7.00**
7.10	345.18	345.63	346.08	346.53	346.98	347.43	347.88	348.33	348.79	349.24	349.69	**7.10**
7.20	349.69	350.14	350.59	351.04	351.49	351.94	352.39	352.84	353.29	353.74	354.20	**7.20**
7.30	354.20	354.65	355.10	355.55	356.00	356.45	356.90	357.35	357.80	358.25	358.70	**7.30**
7.40	358.70	359.16	359.61	360.06	360.51	360.96	361.41	361.86	362.31	362.76	363.21	**7.40**
7.50	363.21	363.67	364.12	364.57	365.02	365.47	365.92	366.37	366.82	367.27	367.73	**7.50**
7.60	367.73	368.18	368.63	369.08	369.53	369.98	370.43	370.88	371.33	371.78	372.24	**7.60**
7.70	372.24	372.69	373.14	373.59	374.04	374.49	374.94	375.39	375.84	376.29	376.75	**7.70**
7.80	376.75	377.20	377.65	378.10	378.55	379.00	379.45	379.90	380.35	380.80	381.25	**7.80**
7.90	381.25	381.70	382.16	382.61	383.06	383.51	383.96	384.41	384.86	385.31	385.76	**7.90**
8.00	385.76	386.21	386.66	387.11	387.56	388.01	388.47	388.92	389.37	389.82	390.27	**8.00**
8.10	390.27	390.72	391.17	391.62	392.07	392.52	392.97	393.42	393.87	394.32	394.77	**8.10**
8.20	394.77	395.22	395.67	396.12	396.57	397.02	397.47	397.92	398.37	398.82	399.27	**8.20**
8.30	399.27	399.72	400.17	400.62	401.07	401.52	401.97	402.42	402.87	403.32	403.77	**8.30**
8.40	403.77	404.22	404.67	405.12	405.57	406.02	406.47	406.92	407.37	407.82	408.27	**8.40**
8.50	408.27	408.72	409.16	409.61	410.06	410.51	410.96	411.41	411.86	412.31	412.76	**8.50**
8.60	412.76	413.21	413.66	414.11	414.55	415.00	415.45	415.90	416.35	416.80	417.25	**8.60**
8.70	417.25	417.70	418.14	418.59	419.04	419.49	419.94	420.39	420.84	421.28	421.73	**8.70**
8.80	421.73	422.18	422.63	423.08	423.53	423.97	424.42	424.87	425.32	425.77	426.21	**8.80**
8.90	426.21	426.66	427.11	427.56	428.00	428.45	428.90	429.35	429.80	430.24	430.69	**8.90**
9.00	430.69	431.14	431.59	432.03	432.48	432.93	433.37	433.82	434.27	434.72	435.16	**9.00**
9.10	435.16	435.61	436.06	436.50	436.95	437.40	437.85	438.29	438.74	439.19	439.63	**9.10**
9.20	439.63	440.08	440.53	440.97	441.42	441.86	442.31	442.76	443.20	443.65	444.10	**9.20**
9.30	444.10	444.54	444.99	445.43	445.88	446.33	446.77	447.22	447.66	448.11	448.56	**9.30**
9.40	448.56	449.00	449.45	449.89	450.34	450.78	451.23	451.67	452.12	452.56	453.01	**9.40**
9.50	453.01	453.46	453.90	454.35	454.79	455.24	455.68	456.13	456.57	457.02	457.46	**9.50**
9.60	457.46	457.90	458.35	458.79	459.24	459.68	460.13	460.57	461.02	461.46	461.91	**9.60**
9.70	461.91	462.35	462.79	463.24	463.68	464.13	464.57	465.01	465.46	465.90	466.35	**9.70**
9.80	466.35	466.79	467.23	467.68	468.12	468.56	469.01	469.45	469.90	470.34	470.78	**9.80**
9.90	470.78	471.23	471.67	472.11	472.56	473.00	473.44	473.88	474.33	474.77	475.21	**9.90**
10.00	475.21	475.66	476.10	476.54	476.98	477.43	477.87	478.31	478.75	479.20	479.64	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	475.21	475.66	476.10	476.54	476.98	477.43	477.87	478.31	478.75	479.20	479.64	**10.00**
10.10	479.64	480.08	480.52	480.97	481.41	481.85	482.29	482.74	483.18	483.62	484.06	**10.10**
10.20	484.06	484.50	484.95	485.39	485.83	486.27	486.71	487.15	487.60	488.04	488.48	**10.20**
10.30	488.48	488.92	489.36	489.80	490.24	490.69	491.13	491.57	492.01	492.45	492.89	**10.30**
10.40	492.89	493.33	493.77	494.21	494.65	495.10	495.54	495.98	496.42	496.86	497.30	**10.40**
10.50	497.30	497.74	498.18	498.62	499.06	499.50	499.94	500.38	500.82	501.26	501.70	**10.50**
10.60	501.70	502.14	502.58	503.02	503.46	503.90	504.34	504.78	505.22	505.66	506.10	**10.60**
10.70	506.10	506.54	506.98	507.42	507.86	508.30	508.74	509.18	509.62	510.06	510.50	**10.70**
10.80	510.50	510.94	511.38	511.81	512.25	512.69	513.13	513.57	514.01	514.45	514.89	**10.80**
10.90	514.89	515.33	515.77	516.20	516.64	517.08	517.52	517.96	518.40	518.84	519.27	**10.90**
11.00	519.27	519.71	520.15	520.59	521.03	521.47	521.90	522.34	522.78	523.22	523.66	**11.00**
11.10	523.66	524.09	524.53	524.97	525.41	525.85	526.28	526.72	527.16	527.60	528.04	**11.10**
11.20	528.04	528.47	528.91	529.35	529.79	530.22	530.66	531.10	531.54	531.97	532.41	**11.20**
11.30	532.41	532.85	533.28	533.72	534.16	534.60	535.03	535.47	535.91	536.34	536.78	**11.30**
11.40	536.78	537.22	537.66	538.09	538.53	538.97	539.40	539.84	540.28	540.71	541.15	**11.40**
11.50	541.15	541.59	542.02	542.46	542.89	543.33	543.77	544.20	544.64	545.08	545.51	**11.50**
11.60	545.51	545.95	546.39	546.82	547.26	547.69	548.13	548.57	549.00	549.44	549.87	**11.60**
11.70	549.87	550.31	550.75	551.18	551.62	552.05	552.49	552.92	553.36	553.80	554.23	**11.70**
11.80	554.23	554.67	555.10	555.54	555.97	556.41	556.84	557.28	557.71	558.15	558.58	**11.80**
11.90	558.58	559.02	559.46	559.89	560.33	560.76	561.20	561.63	562.07	562.50	562.94	**11.90**
12.00	562.94	563.37	563.81	564.24	564.67	565.11	565.54	565.98	566.41	566.85	567.28	**12.00**
12.10	567.28	567.72	568.15	568.59	569.02	569.46	569.89	570.32	570.76	571.19	571.63	**12.10**
12.20	571.63	572.06	572.50	572.93	573.37	573.80	574.23	574.67	575.10	575.54	575.97	**12.20**
12.30	575.97	576.40	576.84	577.27	577.71	578.14	578.57	579.01	579.44	579.88	580.31	**12.30**
12.40	580.31	580.74	581.18	581.61	582.04	582.48	582.91	583.34	583.78	584.21	584.65	**12.40**
12.50	584.65	585.08	585.51	585.95	586.38	586.81	587.25	587.68	588.11	588.55	588.98	**12.50**
12.60	588.98	589.41	589.85	590.28	590.71	591.14	591.58	592.01	592.44	592.88	593.31	**12.60**
12.70	593.31	593.74	594.18	594.61	595.04	595.47	595.91	596.34	596.77	597.21	597.64	**12.70**
12.80	597.64	598.07	598.50	598.94	599.37	599.80	600.23	600.67	601.10	601.53	601.96	**12.80**
12.90	601.96	602.40	602.83	603.26	603.69	604.13	604.56	604.99	605.42	605.86	606.29	**12.90**
13.00	606.29	606.72	607.15	607.58	608.02	608.45	608.88	609.31	609.74	610.18	610.61	**13.00**
13.10	610.61	611.04	611.47	611.90	612.34	612.77	613.20	613.63	614.06	614.50	614.93	**13.10**
13.20	614.93	615.36	615.79	616.22	616.65	617.09	617.52	617.95	618.38	618.81	619.24	**13.20**
13.30	619.24	619.68	620.11	620.54	620.97	621.40	621.83	622.26	622.70	623.13	623.56	**13.30**
13.40	623.56	623.99	624.42	624.85	625.28	625.71	626.15	626.58	627.01	627.44	627.87	**13.40**
13.50	627.87	628.30	628.73	629.16	629.59	630.03	630.46	630.89	631.32	631.75	632.18	**13.50**
13.60	632.18	632.61	633.04	633.47	633.90	634.33	634.77	635.20	635.63	636.06	636.49	**13.60**
13.70	636.49	636.92	637.35	637.78	638.21	638.64	639.07	639.50	639.93	640.36	640.79	**13.70**
13.80	640.79	641.22	641.66	642.09	642.52	642.95	643.38	643.81	644.24	644.67	645.10	**13.80**
13.90	645.10	645.53	645.96	646.39	646.82	647.25	647.68	648.11	648.54	648.97	649.40	**13.90**
14.00	649.40	649.83	650.26	650.69	651.12	651.55	651.98	652.41	652.84	653.27	653.70	**14.00**
14.10	653.70	654.13	654.56	654.99	655.42	655.85	656.28	656.71	657.14	657.57	658.00	**14.10**
14.20	658.00	658.43	658.86	659.29	659.72	660.15	660.58	661.01	661.44	661.86	662.29	**14.20**
14.30	662.29	662.72	663.15	663.58	664.01	664.44	664.87	665.30	665.73	666.16	666.59	**14.30**
14.40	666.59	667.02	667.45	667.88	668.31	668.74	669.16	669.59	670.02	670.45	670.88	**14.40**
14.50	670.88	671.31	671.74	672.17	672.60	673.03	673.46	673.88	674.31	674.74	675.17	**14.50**
14.60	675.17	675.60	676.03	676.46	676.89	677.32	677.75	678.17	678.60	679.03	679.46	**14.60**
14.70	679.46	679.89	680.32	680.75	681.18	681.60	682.03	682.46	682.89	683.32	683.75	**14.70**
14.80	683.75	684.18	684.61	685.03	685.46	685.89	686.32	686.75	687.18	687.60	688.03	**14.80**
14.90	688.03	688.46	688.89	689.32	689.75	690.18	690.60	691.03	691.46	691.89	692.32	**14.90**
15.00	692.32	692.75	693.17	693.60	694.03	694.46	694.89	695.31	695.74	696.17	696.60	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	692.32	692.75	693.17	693.60	694.03	694.46	694.89	695.31	695.74	696.17	696.60	15.00
15.10	696.60	697.03	697.46	697.88	698.31	698.74	699.17	699.60	700.02	700.45	700.88	15.10
15.20	700.88	701.31	701.74	702.16	702.59	703.02	703.45	703.87	704.30	704.73	705.16	15.20
15.30	705.16	705.59	706.01	706.44	706.87	707.30	707.72	708.15	708.58	709.01	709.44	15.30
15.40	709.44	709.86	710.29	710.72	711.15	711.57	712.00	712.43	712.86	713.28	713.71	15.40
15.50	713.71	714.14	714.57	714.99	715.42	715.85	716.28	716.70	717.13	717.56	717.98	15.50
15.60	717.98	718.41	718.84	719.27	719.69	720.12	720.55	720.98	721.40	721.83	722.26	15.60
15.70	722.26	722.68	723.11	723.54	723.97	724.39	724.82	725.25	725.67	726.10	726.53	15.70
15.80	726.53	726.96	727.38	727.81	728.24	728.66	729.09	729.52	729.94	730.37	730.80	15.80
15.90	730.80	731.22	731.65	732.08	732.50	732.93	733.36	733.79	734.21	734.64	735.07	15.90
16.00	735.07	735.49	735.92	736.35	736.77	737.20	737.63	738.05	738.48	738.90	739.33	16.00
16.10	739.33	739.76	740.18	740.61	741.04	741.46	741.89	742.32	742.74	743.17	743.60	16.10
16.20	743.60	744.02	744.45	744.88	745.30	745.73	746.15	746.58	747.01	747.43	747.86	16.20
16.30	747.86	748.29	748.71	749.14	749.56	749.99	750.42	750.84	751.27	751.70	752.12	16.30
16.40	752.12	752.55	752.97	753.40	753.83	754.25	754.68	755.10	755.53	755.96	756.38	16.40
16.50	756.38	756.81	757.23	757.66	758.09	758.51	758.94	759.36	759.79	760.22	760.64	16.50
16.60	760.64	761.07	761.49	761.92	762.34	762.77	763.20	763.62	764.05	764.47	764.90	16.60
16.70	764.90	765.33	765.75	766.18	766.60	767.03	767.45	767.88	768.30	768.73	769.16	16.70
16.80	769.16	769.58	770.01	770.43	770.86	771.28	771.71	772.13	772.56	772.99	773.41	16.80
16.90	773.41	773.84	774.26	774.69	775.11	775.54	775.96	776.39	776.81	777.24	777.66	16.90
17.00	777.66	778.09	778.52	778.94	779.37	779.79	780.22	780.64	781.07	781.49	781.92	17.00
17.10	781.92	782.34	782.77	783.19	783.62	784.04	784.47	784.89	785.32	785.74	786.17	17.10
17.20	786.17	786.59	787.02	787.44	787.87	788.29	788.72	789.14	789.57	789.99	790.42	17.20
17.30	790.42	790.84	791.27	791.69	792.12	792.54	792.97	793.39	793.82	794.24	794.67	17.30
17.40	794.67	795.09	795.52	795.94	796.37	796.79	797.22	797.64	798.07	798.49	798.92	17.40
17.50	798.92	799.34	799.76	800.19	800.61	801.04	801.46	801.89	802.31	802.74	803.16	17.50
17.60	803.16	803.59	804.01	804.44	804.86	805.28	805.71	806.13	806.56	806.98	807.41	17.60
17.70	807.41	807.83	808.26	808.68	809.10	809.53	809.95	810.38	810.80	811.23	811.65	17.70
17.80	811.65	812.08	812.50	812.92	813.35	813.77	814.20	814.62	815.05	815.47	815.89	17.80
17.90	815.89	816.32	816.74	817.17	817.59	818.02	818.44	818.86	819.29	819.71	820.14	17.90
18.00	820.14	820.56	820.98	821.41	821.83	822.26	822.68	823.10	823.53	823.95	824.38	18.00
18.10	824.38	824.80	825.22	825.65	826.07	826.50	826.92	827.34	827.77	828.19	828.62	18.10
18.20	828.62	829.04	829.46	829.89	830.31	830.74	831.16	831.58	832.01	832.43	832.86	18.20
18.30	832.86	833.28	833.70	834.13	834.55	834.97	835.40	835.82	836.25	836.67	837.09	18.30
18.40	837.09	837.52	837.94	838.36	838.79	839.21	839.64	840.06	840.48	840.91	841.33	18.40
18.50	841.33	841.75	842.18	842.60	843.02	843.45	843.87	844.30	844.72	845.14	845.57	18.50
18.60	845.57	845.99	846.41	846.84	847.26	847.68	848.11	848.53	848.95	849.38	849.80	18.60
18.70	849.80	850.22	850.65	851.07	851.50	851.92	852.34	852.77	853.19	853.61	854.04	18.70
18.80	854.04	854.46	854.88	855.31	855.73	856.15	856.58	857.00	857.42	857.85	858.27	18.80
18.90	858.27	858.69	859.12	859.54	859.96	860.39	860.81	861.23	861.65	862.08	862.50	18.90
19.00	862.50	862.92	863.35	863.77	864.19	864.62	865.04	865.46	865.89	866.31	866.73	19.00
19.10	866.73	867.16	867.58	868.00	868.43	868.85	869.27	869.69	870.12	870.54	870.96	19.10
19.20	870.96	871.39	871.81	872.23	872.66	873.08	873.50	873.93	874.35	874.77	875.19	19.20
19.30	875.19	875.62	876.04	876.46	876.89	877.31	877.73	878.15	878.58	879.00	879.42	19.30
19.40	879.42	879.85	880.27	880.69	881.12	881.54	881.96	882.38	882.81	883.23	883.65	19.40
19.50	883.65	884.08	884.50	884.92	885.34	885.77	886.19	886.61	887.03	887.46	887.88	19.50
19.60	887.88	888.30	888.73	889.15	889.57	889.99	890.42	890.84	891.26	891.68	892.11	19.60
19.70	892.11	892.53	892.95	893.38	893.80	894.22	894.64	895.07	895.49	895.91	896.33	19.70
19.80	896.33	896.76	897.18	897.60	898.02	898.45	898.87	899.29	899.72	900.14	900.56	19.80
19.90	900.56	900.98	901.41	901.83	902.25	902.67	903.10	903.52	903.94	904.36	904.79	19.90
20.00	904.79	905.21	905.63	906.05	906.48	906.90	907.32	907.74	908.17	908.59	909.01	20.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B7.2.2. ***Type K thermocouples*** *--- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
20.00	904.79	905.21	905.63	906.05	906.48	906.90	907.32	907.74	908.17	908.59	909.01	**20.00**
20.10	909.01	909.43	909.86	910.28	910.70	911.12	911.55	911.97	912.39	912.81	913.24	**20.10**
20.20	913.24	913.66	914.08	914.50	914.93	915.35	915.77	916.19	916.62	917.04	917.46	**20.20**
20.30	917.46	917.88	918.30	918.73	919.15	919.57	919.99	920.42	920.84	921.26	921.68	**20.30**
20.40	921.68	922.11	922.53	922.95	923.37	923.80	924.22	924.64	925.06	925.48	925.91	**20.40**
20.50	925.91	926.33	926.75	927.17	927.60	928.02	928.44	928.86	929.29	929.71	930.13	**20.50**
20.60	930.13	930.55	930.97	931.40	931.82	932.24	932.66	933.09	933.51	933.93	934.35	**20.60**
20.70	934.35	934.77	935.20	935.62	936.04	936.46	936.89	937.31	937.73	938.15	938.57	**20.70**
20.80	938.57	939.00	939.42	939.84	940.26	940.69	941.11	941.53	941.95	942.37	942.80	**20.80**
20.90	942.80	943.22	943.64	944.06	944.49	944.91	945.33	945.75	946.17	946.60	947.02	**20.90**
21.00	947.02	947.44	947.86	948.28	948.71	949.13	949.55	949.97	950.40	950.82	951.24	**21.00**
21.10	951.24	951.66	952.08	952.51	952.93	953.35	953.77	954.19	954.62	955.04	955.46	**21.10**
21.20	955.46	955.88	956.30	956.73	957.15	957.57	957.99	958.42	958.84	959.26	959.68	**21.20**
21.30	959.68	960.10	960.53	960.95	961.37	961.79	962.21	962.64	963.06	963.48	963.90	**21.30**
21.40	963.90	964.32	964.75	965.17	965.59	966.01	966.44	966.86	967.28	967.70	968.12	**21.40**
21.50	968.12	968.55	968.97	969.39	969.81	970.23	970.66	971.08	971.50	971.92	972.34	**21.50**
21.60	972.34	972.77	973.19	973.61	974.03	974.45	974.88	975.30	975.72	976.14	976.56	**21.60**
21.70	976.56	976.99	977.41	977.83	978.25	978.67	979.10	979.52	979.94	980.36	980.79	**21.70**
21.80	980.79	981.21	981.63	982.05	982.47	982.90	983.32	983.74	984.16	984.58	985.01	**21.80**
21.90	985.01	985.43	985.85	986.27	986.69	987.12	987.54	987.96	988.38	988.80	989.23	**21.90**
22.00	989.23	989.65	990.07	990.49	990.91	991.34	991.76	992.18	992.60	993.02	993.45	**22.00**
22.10	993.45	993.87	994.29	994.71	995.14	995.56	995.98	996.40	996.82	997.25	997.67	**22.10**
22.20	997.67	998.09	998.51	998.93	999.36	999.78	1000.20	1000.62	1001.04	1001.47	1001.89	**22.20**
22.30	1001.89	1002.31	1002.73	1003.15	1003.58	1004.00	1004.42	1004.84	1005.27	1005.69	1006.11	**22.30**
22.40	1006.11	1006.53	1006.95	1007.38	1007.80	1008.22	1008.64	1009.06	1009.49	1009.91	1010.33	**22.40**
22.50	1010.33	1010.75	1011.17	1011.60	1012.02	1012.44	1012.86	1013.29	1013.71	1014.13	1014.55	**22.50**
22.60	1014.55	1014.97	1015.40	1015.82	1016.24	1016.66	1017.08	1017.51	1017.93	1018.35	1018.77	**22.60**
22.70	1018.77	1019.20	1019.62	1020.04	1020.46	1020.88	1021.31	1021.73	1022.15	1022.57	1023.00	**22.70**
22.80	1023.00	1023.42	1023.84	1024.26	1024.68	1025.11	1025.53	1025.95	1026.37	1026.80	1027.22	**22.80**
22.90	1027.22	1027.64	1028.06	1028.48	1028.91	1029.33	1029.75	1030.17	1030.60	1031.02	1031.44	**22.90**
23.00	1031.44	1031.86	1032.28	1032.71	1033.13	1033.55	1033.97	1034.40	1034.82	1035.24	1035.66	**23.00**
23.10	1035.66	1036.08	1036.51	1036.93	1037.35	1037.77	1038.20	1038.62	1039.04	1039.46	1039.89	**23.10**
23.20	1039.89	1040.31	1040.73	1041.15	1041.58	1042.00	1042.42	1042.84	1043.26	1043.69	1044.11	**23.20**
23.30	1044.11	1044.53	1044.95	1045.38	1045.80	1046.22	1046.64	1047.07	1047.49	1047.91	1048.33	**23.30**
23.40	1048.33	1048.76	1049.18	1049.60	1050.02	1050.45	1050.87	1051.29	1051.71	1052.14	1052.56	**23.40**
23.50	1052.56	1052.98	1053.40	1053.83	1054.25	1054.67	1055.09	1055.52	1055.94	1056.36	1056.78	**23.50**
23.60	1056.78	1057.21	1057.63	1058.05	1058.47	1058.90	1059.32	1059.74	1060.16	1060.59	1061.01	**23.60**
23.70	1061.01	1061.43	1061.85	1062.28	1062.70	1063.12	1063.54	1063.97	1064.39	1064.81	1065.24	**23.70**
23.80	1065.24	1065.66	1066.08	1066.50	1066.93	1067.35	1067.77	1068.19	1068.62	1069.04	1069.46	**23.80**
23.90	1069.46	1069.88	1070.31	1070.73	1071.15	1071.58	1072.00	1072.42	1072.84	1073.27	1073.69	**23.90**
24.00	1073.69	1074.11	1074.53	1074.96	1075.38	1075.80	1076.23	1076.65	1077.07	1077.49	1077.92	**24.00**
24.10	1077.92	1078.34	1078.76	1079.19	1079.61	1080.03	1080.45	1080.88	1081.30	1081.72	1082.15	**24.10**
24.20	1082.15	1082.57	1082.99	1083.41	1083.84	1084.26	1084.68	1085.11	1085.53	1085.95	1086.38	**24.20**
24.30	1086.38	1086.80	1087.22	1087.64	1088.07	1088.49	1088.91	1089.34	1089.76	1090.18	1090.61	**24.30**
24.40	1090.61	1091.03	1091.45	1091.87	1092.30	1092.72	1093.14	1093.57	1093.99	1094.41	1094.84	**24.40**
24.50	1094.84	1095.26	1095.68	1096.11	1096.53	1096.95	1097.38	1097.80	1098.22	1098.65	1099.07	**24.50**
24.60	1099.07	1099.49	1099.91	1100.34	1100.76	1101.18	1101.61	1102.03	1102.45	1102.88	1103.30	**24.60**
24.70	1103.30	1103.72	1104.15	1104.57	1104.99	1105.42	1105.84	1106.26	1106.69	1107.11	1107.53	**24.70**
24.80	1107.53	1107.96	1108.38	1108.80	1109.23	1109.65	1110.07	1110.50	1110.92	1111.35	1111.77	**24.80**
24.90	1111.77	1112.19	1112.62	1113.04	1113.46	1113.89	1114.31	1114.73	1115.16	1115.58	1116.00	**24.90**
25.00	1116.00	1116.43	1116.85	1117.27	1117.70	1118.12	1118.55	1118.97	1119.39	1119.82	1120.24	**25.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
25.00	1116.00	1116.43	1116.85	1117.27	1117.70	1118.12	1118.55	1118.97	1119.39	1119.82	1120.24	**25.00**
25.10	1120.24	1120.66	1121.09	1121.51	1121.93	1122.36	1122.78	1123.21	1123.63	1124.05	1124.48	**25.10**
25.20	1124.48	1124.90	1125.32	1125.75	1126.17	1126.60	1127.02	1127.44	1127.87	1128.29	1128.72	**25.20**
25.30	1128.72	1129.14	1129.56	1129.99	1130.41	1130.83	1131.26	1131.68	1132.11	1132.53	1132.95	**25.30**
25.40	1132.95	1133.38	1133.80	1134.23	1134.65	1135.07	1135.50	1135.92	1136.35	1136.77	1137.19	**25.40**
25.50	1137.19	1137.62	1138.04	1138.47	1138.89	1139.31	1139.74	1140.16	1140.59	1141.01	1141.44	**25.50**
25.60	1141.44	1141.86	1142.28	1142.71	1143.13	1143.56	1143.98	1144.41	1144.83	1145.25	1145.68	**25.60**
25.70	1145.68	1146.10	1146.53	1146.95	1147.38	1147.80	1148.22	1148.65	1149.07	1149.50	1149.92	**25.70**
25.80	1149.92	1150.35	1150.77	1151.19	1151.62	1152.04	1152.47	1152.89	1153.32	1153.74	1154.17	**25.80**
25.90	1154.17	1154.59	1155.02	1155.44	1155.86	1156.29	1156.71	1157.14	1157.56	1157.99	1158.41	**25.90**
26.00	1158.41	1158.84	1159.26	1159.69	1160.11	1160.54	1160.96	1161.38	1161.81	1162.23	1162.66	**26.00**
26.10	1162.66	1163.08	1163.51	1163.93	1164.36	1164.78	1165.21	1165.63	1166.06	1166.48	1166.91	**26.10**
26.20	1166.91	1167.33	1167.76	1168.18	1168.61	1169.03	1169.46	1169.88	1170.31	1170.73	1171.16	**26.20**
26.30	1171.16	1171.58	1172.01	1172.43	1172.86	1173.28	1173.71	1174.13	1174.56	1174.98	1175.41	**26.30**
26.40	1175.41	1175.83	1176.26	1176.68	1177.11	1177.53	1177.96	1178.38	1178.81	1179.23	1179.66	**26.40**
26.50	1179.66	1180.08	1180.51	1180.94	1181.36	1181.79	1182.21	1182.64	1183.06	1183.49	1183.91	**26.50**
26.60	1183.91	1184.34	1184.76	1185.19	1185.61	1186.04	1186.47	1186.89	1187.32	1187.74	1188.17	**26.60**
26.70	1188.17	1188.59	1189.02	1189.44	1189.87	1190.30	1190.72	1191.15	1191.57	1192.00	1192.42	**26.70**
26.80	1192.42	1192.85	1193.28	1193.70	1194.13	1194.55	1194.98	1195.40	1195.83	1196.26	1196.68	**26.80**
26.90	1196.68	1197.11	1197.53	1197.96	1198.39	1198.81	1199.24	1199.66	1200.09	1200.51	1200.94	**26.90**
27.00	1200.94	1201.37	1201.79	1202.22	1202.64	1203.07	1203.50	1203.92	1204.35	1204.78	1205.20	**27.00**
27.10	1205.20	1205.63	1206.05	1206.48	1206.91	1207.33	1207.76	1208.18	1208.61	1209.04	1209.46	**27.10**
27.20	1209.46	1209.89	1210.32	1210.74	1211.17	1211.59	1212.02	1212.45	1212.87	1213.30	1213.73	**27.20**
27.30	1213.73	1214.15	1214.58	1215.01	1215.43	1215.86	1216.29	1216.71	1217.14	1217.57	1217.99	**27.30**
27.40	1217.99	1218.42	1218.85	1219.27	1219.70	1220.13	1220.55	1220.98	1221.41	1221.83	1222.26	**27.40**
27.50	1222.26	1222.69	1223.11	1223.54	1223.97	1224.39	1224.82	1225.25	1225.67	1226.10	1226.53	**27.50**
27.60	1226.53	1226.95	1227.38	1227.81	1228.23	1228.66	1229.09	1229.52	1229.94	1230.37	1230.80	**27.60**
27.70	1230.80	1231.22	1231.65	1232.08	1232.51	1232.93	1233.36	1233.79	1234.21	1234.64	1235.07	**27.70**
27.80	1235.07	1235.50	1235.92	1236.35	1236.78	1237.20	1237.63	1238.06	1238.49	1238.91	1239.34	**27.80**
27.90	1239.34	1239.77	1240.20	1240.62	1241.05	1241.48	1241.91	1242.33	1242.76	1243.19	1243.62	**27.90**
28.00	1243.62	1244.04	1244.47	1244.90	1245.33	1245.75	1246.18	1246.61	1247.04	1247.46	1247.89	**28.00**
28.10	1247.89	1248.32	1248.75	1249.18	1249.60	1250.03	1250.46	1250.89	1251.31	1251.74	1252.17	**28.10**
28.20	1252.17	1252.60	1253.03	1253.45	1253.88	1254.31	1254.74	1255.17	1255.59	1256.02	1256.45	**28.20**
28.30	1256.45	1256.88	1257.31	1257.73	1258.16	1258.59	1259.02	1259.45	1259.88	1260.30	1260.73	**28.30**
28.40	1260.73	1261.16	1261.59	1262.02	1262.45	1262.87	1263.30	1263.73	1264.16	1264.59	1265.02	**28.40**
28.50	1265.02	1265.44	1265.87	1266.30	1266.73	1267.16	1267.59	1268.02	1268.44	1268.87	1269.30	**28.50**
28.60	1269.30	1269.73	1270.16	1270.59	1271.02	1271.44	1271.87	1272.30	1272.73	1273.16	1273.59	**28.60**
28.70	1273.59	1274.02	1274.45	1274.87	1275.30	1275.73	1276.16	1276.59	1277.02	1277.45	1277.88	**28.70**
28.80	1277.88	1278.31	1278.74	1279.16	1279.59	1280.02	1280.45	1280.88	1281.31	1281.74	1282.17	**28.80**
28.90	1282.17	1282.60	1283.03	1283.46	1283.88	1284.31	1284.74	1285.17	1285.60	1286.03	1286.46	**28.90**
29.00	1286.46	1286.89	1287.32	1287.75	1288.18	1288.61	1289.04	1289.47	1289.90	1290.33	1290.76	**29.00**
29.10	1290.76	1291.18	1291.61	1292.04	1292.47	1292.90	1293.33	1293.76	1294.19	1294.62	1295.05	**29.10**
29.20	1295.05	1295.48	1295.91	1296.34	1296.77	1297.20	1297.63	1298.06	1298.49	1298.92	1299.35	**29.20**
29.30	1299.35	1299.78	1300.21	1300.64	1301.07	1301.50	1301.93	1302.36	1302.79	1303.22	1303.65	**29.30**
29.40	1303.65	1304.08	1304.51	1304.94	1305.37	1305.80	1306.23	1306.66	1307.09	1307.52	1307.95	**29.40**
29.50	1307.95	1308.38	1308.81	1309.24	1309.67	1310.11	1310.54	1310.97	1311.40	1311.83	1312.26	**29.50**
29.60	1312.26	1312.69	1313.12	1313.55	1313.98	1314.41	1314.84	1315.27	1315.70	1316.13	1316.56	**29.60**
29.70	1316.56	1317.00	1317.43	1317.86	1318.29	1318.72	1319.15	1319.58	1320.01	1320.44	1320.87	**29.70**
29.80	1320.87	1321.30	1321.73	1322.17	1322.60	1323.03	1323.46	1323.89	1324.32	1324.75	1325.18	**29.80**
29.90	1325.18	1325.61	1326.05	1326.48	1326.91	1327.34	1327.77	1328.20	1328.63	1329.06	1329.50	**29.90**
30.00	1329.50	1329.93	1330.36	1330.79	1331.22	1331.65	1332.08	1332.52	1332.95	1333.38	1333.81	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
30.00	1329.50	1329.93	1330.36	1330.79	1331.22	1331.65	1332.08	1332.52	1332.95	1333.38	1333.81	**30.00**
30.10	1333.81	1334.24	1334.67	1335.11	1335.54	1335.97	1336.40	1336.83	1337.26	1337.70	1338.13	**30.10**
30.20	1338.13	1338.56	1338.99	1339.42	1339.85	1340.29	1340.72	1341.15	1341.58	1342.01	1342.45	**30.20**
30.30	1342.45	1342.88	1343.31	1343.74	1344.17	1344.61	1345.04	1345.47	1345.90	1346.34	1346.77	**30.30**
30.40	1346.77	1347.20	1347.63	1348.06	1348.50	1348.93	1349.36	1349.79	1350.23	1350.66	1351.09	**30.40**
30.50	1351.09	1351.52	1351.96	1352.39	1352.82	1353.25	1353.69	1354.12	1354.55	1354.98	1355.42	**30.50**
30.60	1355.42	1355.85	1356.28	1356.71	1357.15	1357.58	1358.01	1358.45	1358.88	1359.31	1359.74	**30.60**
30.70	1359.74	1360.18	1360.61	1361.04	1361.48	1361.91	1362.34	1362.77	1363.21	1363.64	1364.07	**30.70**
30.80	1364.07	1364.51	1364.94	1365.37	1365.81	1366.24	1366.67	1367.11	1367.54	1367.97	1368.41	**30.80**
30.90	1368.41	1368.84	1369.27	1369.71	1370.14	1370.57	1371.01	1371.44	1371.87	1372.31	1372.74	**30.90**
31.00	1372.74	1373.17	1373.61	1374.04	1374.47	1374.91	1375.34	1375.78	1376.21	1376.64	1377.08	**31.00**
31.10	1377.08	1377.51	1377.94	1378.38	1378.81	1379.25	1379.68	1380.11	1380.55	1380.98	1381.42	**31.10**
31.20	1381.42	1381.85	1382.28	1382.72	1383.15	1383.59	1384.02	1384.45	1384.89	1385.32	1385.76	**31.20**
31.30	1385.76	1386.19	1386.63	1387.06	1387.49	1387.93	1388.36	1388.80	1389.23	1389.67	1390.10	**31.30**
31.40	1390.10	1390.54	1390.97	1391.40	1391.84	1392.27	1392.71	1393.14	1393.58	1394.01	1394.45	**31.40**
31.50	1394.45	1394.88	1395.32	1395.75	1396.19	1396.62	1397.06	1397.49	1397.92	1398.36	1398.79	**31.50**
31.60	1398.79	1399.23	1399.66	1400.10	1400.53	1400.97	1401.40	1401.84	1402.27	1402.71	1403.15	**31.60**
31.70	1403.15	1403.58	1404.02	1404.45	1404.89	1405.32	1405.76	1406.19	1406.63	1407.06	1407.50	**31.70**
31.80	1407.50	1407.93	1408.37	1408.80	1409.24	1409.68	1410.11	1410.55	1410.98	1411.42	1411.85	**31.80**
31.90	1411.85	1412.29	1412.72	1413.16	1413.60	1414.03	1414.47	1414.90	1415.34	1415.77	1416.21	**31.90**
32.00	1416.21	1416.65	1417.08	1417.52	1417.95	1418.39	1418.83	1419.26	1419.70	1420.13	1420.57	**32.00**
32.10	1420.57	1421.01	1421.44	1421.88	1422.32	1422.75	1423.19	1423.62	1424.06	1424.50	1424.93	**32.10**
32.20	1424.93	1425.37	1425.81	1426.24	1426.68	1427.11	1427.55	1427.99	1428.42	1428.86	1429.30	**32.20**
32.30	1429.30	1429.73	1430.17	1430.61	1431.04	1431.48	1431.92	1432.35	1432.79	1433.23	1433.66	**32.30**
32.40	1433.66	1434.10	1434.54	1434.98	1435.41	1435.85	1436.29	1436.72	1437.16	1437.60	1438.03	**32.40**
32.50	1438.03	1438.47	1438.91	1439.35	1439.78	1440.22	1440.66	1441.09	1441.53	1441.97	1442.41	**32.50**
32.60	1442.41	1442.84	1443.28	1443.72	1444.16	1444.59	1445.03	1445.47	1445.91	1446.34	1446.78	**32.60**
32.70	1446.78	1447.22	1447.66	1448.09	1448.53	1448.97	1449.41	1449.84	1450.28	1450.72	1451.16	**32.70**
32.80	1451.16	1451.60	1452.03	1452.47	1452.91	1453.35	1453.79	1454.22	1454.66	1455.10	1455.54	**32.80**
32.90	1455.54	1455.98	1456.41	1456.85	1457.29	1457.73	1458.17	1458.60	1459.04	1459.48	1459.92	**32.90**
33.00	1459.92	1460.36	1460.80	1461.23	1461.67	1462.11	1462.55	1462.99	1463.43	1463.87	1464.30	**33.00**
33.10	1464.30	1464.74	1465.18	1465.62	1466.06	1466.50	1466.94	1467.37	1467.81	1468.25	1468.69	**33.10**
33.20	1468.69	1469.13	1469.57	1470.01	1470.45	1470.89	1471.32	1471.76	1472.20	1472.64	1473.08	**33.20**
33.30	1473.08	1473.52	1473.96	1474.40	1474.84	1475.28	1475.72	1476.16	1476.59	1477.03	1477.47	**33.30**
33.40	1477.47	1477.91	1478.35	1478.79	1479.23	1479.67	1480.11	1480.55	1480.99	1481.43	1481.87	**33.40**
33.50	1481.87	1482.31	1482.75	1483.19	1483.63	1484.07	1484.51	1484.95	1485.39	1485.83	1486.26	**33.50**
33.60	1486.26	1486.70	1487.14	1487.58	1488.02	1488.46	1488.90	1489.34	1489.78	1490.22	1490.66	**33.60**
33.70	1490.66	1491.10	1491.55	1491.99	1492.43	1492.87	1493.31	1493.75	1494.19	1494.63	1495.07	**33.70**
33.80	1495.07	1495.51	1495.95	1496.39	1496.83	1497.27	1497.71	1498.15	1498.59	1499.03	1499.47	**33.80**
33.90	1499.47	1499.91	1500.35	1500.79	1501.23	1501.68	1502.12	1502.56	1503.00	1503.44	1503.88	**33.90**
34.00	1503.88	1504.32	1504.76	1505.20	1505.64	1506.08	1506.53	1506.97	1507.41	1507.85	1508.29	**34.00**
34.10	1508.29	1508.73	1509.17	1509.61	1510.05	1510.50	1510.94	1511.38	1511.82	1512.26	1512.70	**34.10**
34.20	1512.70	1513.14	1513.59	1514.03	1514.47	1514.91	1515.35	1515.79	1516.23	1516.68	1517.12	**34.20**
34.30	1517.12	1517.56	1518.00	1518.44	1518.88	1519.33	1519.77	1520.21	1520.65	1521.09	1521.54	**34.30**
34.40	1521.54	1521.98	1522.42	1522.86	1523.30	1523.75	1524.19	1524.63	1525.07	1525.51	1525.96	**34.40**
34.50	1525.96	1526.40	1526.84	1527.28	1527.73	1528.17	1528.61	1529.05	1529.50	1529.94	1530.38	**34.50**
34.60	1530.38	1530.82	1531.26	1531.71	1532.15	1532.59	1533.04	1533.48	1533.92	1534.36	1534.81	**34.60**
34.70	1534.81	1535.25	1535.69	1536.13	1536.58	1537.02	1537.46	1537.91	1538.35	1538.79	1539.23	**34.70**
34.80	1539.23	1539.68	1540.12	1540.56	1541.01	1541.45	1541.89	1542.34	1542.78	1543.22	1543.67	**34.80**
34.90	1543.67	1544.11	1544.55	1545.00	1545.44	1545.88	1546.33	1546.77	1547.21	1547.66	1548.10	**34.90**
35.00	1548.10	1548.54	1548.99	1549.43	1549.87	1550.32	1550.76	1551.21	1551.65	1552.09	1552.54	**35.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
35.00	1548.10	1548.54	1548.99	1549.43	1549.87	1550.32	1550.76	1551.21	1551.65	1552.09	1552.54	**35.00**
35.10	1552.54	1552.98	1553.42	1553.87	1554.31	1554.76	1555.20	1555.64	1556.09	1556.53	1556.98	**35.10**
35.20	1556.98	1557.42	1557.86	1558.31	1558.75	1559.20	1559.64	1560.08	1560.53	1560.97	1561.42	**35.20**
35.30	1561.42	1561.86	1562.31	1562.75	1563.20	1563.64	1564.08	1564.53	1564.97	1565.42	1565.86	**35.30**
35.40	1565.86	1566.31	1566.75	1567.20	1567.64	1568.09	1568.53	1568.98	1569.42	1569.86	1570.31	**35.40**
35.50	1570.31	1570.75	1571.20	1571.64	1572.09	1572.53	1572.98	1573.42	1573.87	1574.31	1574.76	**35.50**
35.60	1574.76	1575.21	1575.65	1576.10	1576.54	1576.99	1577.43	1577.88	1578.32	1578.77	1579.21	**35.60**
35.70	1579.21	1579.66	1580.10	1580.55	1580.99	1581.44	1581.89	1582.33	1582.78	1583.22	1583.67	**35.70**
35.80	1583.67	1584.11	1584.56	1585.01	1585.45	1585.90	1586.34	1586.79	1587.23	1587.68	1588.13	**35.80**
35.90	1588.13	1588.57	1589.02	1589.46	1589.91	1590.36	1590.80	1591.25	1591.70	1592.14	1592.59	**35.90**
36.00	1592.59	1593.03	1593.48	1593.93	1594.37	1594.82	1595.27	1595.71	1596.16	1596.61	1597.05	**36.00**
36.10	1597.05	1597.50	1597.94	1598.39	1598.84	1599.28	1599.73	1600.18	1600.62	1601.07	1601.52	**36.10**
36.20	1601.52	1601.96	1602.41	1602.86	1603.31	1603.75	1604.20	1604.65	1605.09	1605.54	1605.99	**36.20**
36.30	1605.99	1606.43	1606.88	1607.33	1607.78	1608.22	1608.67	1609.12	1609.56	1610.01	1610.46	**36.30**
36.40	1610.46	1610.91	1611.35	1611.80	1612.25	1612.70	1613.14	1613.59	1614.04	1614.49	1614.93	**36.40**
36.50	1614.93	1615.38	1615.83	1616.28	1616.73	1617.17	1617.62	1618.07	1618.52	1618.96	1619.41	**36.50**
36.60	1619.41	1619.86	1620.31	1620.76	1621.20	1621.65	1622.10	1622.55	1623.00	1623.44	1623.89	**36.60**
36.70	1623.89	1624.34	1624.79	1625.24	1625.69	1626.13	1626.58	1627.03	1627.48	1627.93	1628.38	**36.70**
36.80	1628.38	1628.82	1629.27	1629.72	1630.17	1630.62	1631.07	1631.52	1631.96	1632.41	1632.86	**36.80**
36.90	1632.86	1633.31	1633.76	1634.21	1634.66	1635.11	1635.55	1636.00	1636.45	1636.90	1637.35	**36.90**
37.00	1637.35	1637.80	1638.25	1638.70	1639.15	1639.60	1640.05	1640.49	1640.94	1641.39	1641.84	**37.00**
37.10	1641.84	1642.29	1642.74	1643.19	1643.64	1644.09	1644.54	1644.99	1645.44	1645.89	1646.34	**37.10**
37.20	1646.34	1646.79	1647.24	1647.69	1648.14	1648.59	1649.03	1649.48	1649.93	1650.38	1650.83	**37.20**
37.30	1650.83	1651.28	1651.73	1652.18	1652.63	1653.08	1653.53	1653.98	1654.43	1654.88	1655.33	**37.30**
37.40	1655.33	1655.78	1656.23	1656.68	1657.14	1657.59	1658.04	1658.49	1658.94	1659.39	1659.84	**37.40**
37.50	1659.84	1660.29	1660.74	1661.19	1661.64	1662.09	1662.54	1662.99	1663.44	1663.89	1664.34	**37.50**
37.60	1664.34	1664.79	1665.24	1665.70	1666.15	1666.60	1667.05	1667.50	1667.95	1668.40	1668.85	**37.60**
37.70	1668.85	1669.30	1669.75	1670.20	1670.66	1671.11	1671.56	1672.01	1672.46	1672.91	1673.36	**37.70**
37.80	1673.36	1673.81	1674.27	1674.72	1675.17	1675.62	1676.07	1676.52	1676.97	1677.43	1677.88	**37.80**
37.90	1677.88	1678.33	1678.78	1679.23	1679.68	1680.14	1680.59	1681.04	1681.49	1681.94	1682.39	**37.90**
38.00	1682.39	1682.85	1683.30	1683.75	1684.20	1684.65	1685.11	1685.56	1686.01	1686.46	1686.91	**38.00**
38.10	1686.91	1687.37	1687.82	1688.27	1688.72	1689.18	1689.63	1690.08	1690.53	1690.99	1691.44	**38.10**
38.20	1691.44	1691.89	1692.34	1692.80	1693.25	1693.70	1694.15	1694.61	1695.06	1695.51	1695.96	**38.20**
38.30	1695.96	1696.42	1696.87	1697.32	1697.77	1698.23	1698.68	1699.13	1699.59	1700.04	1700.49	**38.30**
38.40	1700.49	1700.95	1701.40	1701.85	1702.30	1702.76	1703.21	1703.66	1704.12	1704.57	1705.02	**38.40**
38.50	1705.02	1705.48	1705.93	1706.38	1706.84	1707.29	1707.74	1708.20	1708.65	1709.11	1709.56	**38.50**
38.60	1709.56	1710.01	1710.47	1710.92	1711.37	1711.83	1712.28	1712.73	1713.19	1713.64	1714.10	**38.60**
38.70	1714.10	1714.55	1715.00	1715.46	1715.91	1716.37	1716.82	1717.27	1717.73	1718.18	1718.64	**38.70**
38.80	1718.64	1719.09	1719.55	1720.00	1720.45	1720.91	1721.36	1721.82	1722.27	1722.73	1723.18	**38.80**
38.90	1723.18	1723.63	1724.09	1724.54	1725.00	1725.45	1725.91	1726.36	1726.82	1727.27	1727.73	**38.90**
39.00	1727.73	1728.18	1728.64	1729.09	1729.55	1730.00	1730.46	1730.91	1731.37	1731.82	1732.28	**39.00**
39.10	1732.28	1732.73	1733.19	1733.64	1734.10	1734.55	1735.01	1735.46	1735.92	1736.37	1736.83	**39.10**
39.20	1736.83	1737.28	1737.74	1738.19	1738.65	1739.11	1739.56	1740.02	1740.47	1740.93	1741.38	**39.20**
39.30	1741.38	1741.84	1742.29	1742.75	1743.21	1743.66	1744.12	1744.57	1745.03	1745.49	1745.94	**39.30**
39.40	1745.94	1746.40	1746.85	1747.31	1747.77	1748.22	1748.68	1749.13	1749.59	1750.05	1750.50	**39.40**
39.50	1750.50	1750.96	1751.42	1751.87	1752.33	1752.78	1753.24	1753.70	1754.15	1754.61	1755.07	**39.50**
39.60	1755.07	1755.52	1755.98	1756.44	1756.89	1757.35	1757.81	1758.26	1758.72	1759.18	1759.63	**39.60**
39.70	1759.63	1760.09	1760.55	1761.00	1761.46	1761.92	1762.38	1762.83	1763.29	1763.75	1764.20	**39.70**
39.80	1764.20	1764.66	1765.12	1765.58	1766.03	1766.49	1766.95	1767.41	1767.86	1768.32	1768.78	**39.80**
39.90	1768.78	1769.23	1769.69	1770.15	1770.61	1771.07	1771.52	1771.98	1772.44	1772.90	1773.35	**39.90**
40.00	1773.35	1773.81	1774.27	1774.73	1775.19	1775.64	1776.10	1776.56	1777.02	1777.48	1777.93	**40.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
40.00	1773.35	1773.81	1774.27	1774.73	1775.19	1775.64	1776.10	1776.56	1777.02	1777.48	1777.93	**40.00**
40.10	1777.93	1778.39	1778.85	1779.31	1779.77	1780.22	1780.68	1781.14	1781.60	1782.06	1782.52	**40.10**
40.20	1782.52	1782.97	1783.43	1783.89	1784.35	1784.81	1785.27	1785.72	1786.18	1786.64	1787.10	**40.20**
40.30	1787.10	1787.56	1788.02	1788.48	1788.94	1789.39	1789.85	1790.31	1790.77	1791.23	1791.69	**40.30**
40.40	1791.69	1792.15	1792.61	1793.07	1793.53	1793.98	1794.44	1794.90	1795.36	1795.82	1796.28	**40.40**
40.50	1796.28	1796.74	1797.20	1797.66	1798.12	1798.58	1799.04	1799.50	1799.96	1800.42	1800.88	**40.50**
40.60	1800.88	1801.34	1801.79	1802.25	1802.71	1803.17	1803.63	1804.09	1804.55	1805.01	1805.47	**40.60**
40.70	1805.47	1805.93	1806.39	1806.85	1807.31	1807.77	1808.23	1808.69	1809.15	1809.61	1810.07	**40.70**
40.80	1810.07	1810.53	1810.99	1811.46	1811.92	1812.38	1812.84	1813.30	1813.76	1814.22	1814.68	**40.80**
40.90	1814.68	1815.14	1815.60	1816.06	1816.52	1816.98	1817.44	1817.90	1818.36	1818.82	1819.29	**40.90**
41.00	1819.29	1819.75	1820.21	1820.67	1821.13	1821.59	1822.05	1822.51	1822.97	1823.43	1823.90	**41.00**
41.10	1823.90	1824.36	1824.82	1825.28	1825.74	1826.20	1826.66	1827.13	1827.59	1828.05	1828.51	**41.10**
41.20	1828.51	1828.97	1829.43	1829.89	1830.36	1830.82	1831.28	1831.74	1832.20	1832.66	1833.13	**41.20**
41.30	1833.13	1833.59	1834.05	1834.51	1834.97	1835.44	1835.90	1836.36	1836.82	1837.28	1837.75	**41.30**
41.40	1837.75	1838.21	1838.67	1839.13	1839.60	1840.06	1840.52	1840.98	1841.44	1841.91	1842.37	**41.40**
41.50	1842.37	1842.83	1843.29	1843.76	1844.22	1844.68	1845.15	1845.61	1846.07	1846.53	1847.00	**41.50**
41.60	1847.00	1847.46	1847.92	1848.38	1848.85	1849.31	1849.77	1850.24	1850.70	1851.16	1851.63	**41.60**
41.70	1851.63	1852.09	1852.55	1853.02	1853.48	1853.94	1854.41	1854.87	1855.33	1855.80	1856.26	**41.70**
41.80	1856.26	1856.72	1857.19	1857.65	1858.11	1858.58	1859.04	1859.50	1859.97	1860.43	1860.89	**41.80**
41.90	1860.89	1861.36	1861.82	1862.29	1862.75	1863.21	1863.68	1864.14	1864.61	1865.07	1865.53	**41.90**
42.00	1865.53	1866.00	1866.46	1866.93	1867.39	1867.86	1868.32	1868.78	1869.25	1869.71	1870.18	**42.00**
42.10	1870.18	1870.64	1871.11	1871.57	1872.04	1872.50	1872.96	1873.43	1873.89	1874.36	1874.82	**42.10**
42.20	1874.82	1875.29	1875.75	1876.22	1876.68	1877.15	1877.61	1878.08	1878.54	1879.01	1879.47	**42.20**
42.30	1879.47	1879.94	1880.40	1880.87	1881.33	1881.80	1882.26	1882.73	1883.20	1883.66	1884.13	**42.30**
42.40	1884.13	1884.59	1885.06	1885.52	1885.99	1886.45	1886.92	1887.39	1887.85	1888.32	1888.78	**42.40**
42.50	1888.78	1889.25	1889.71	1890.18	1890.65	1891.11	1891.58	1892.04	1892.51	1892.98	1893.44	**42.50**
42.60	1893.44	1893.91	1894.37	1894.84	1895.31	1895.77	1896.24	1896.71	1897.17	1897.64	1898.11	**42.60**
42.70	1898.11	1898.57	1899.04	1899.50	1899.97	1900.44	1900.90	1901.37	1901.84	1902.31	1902.77	**42.70**
42.80	1902.77	1903.24	1903.71	1904.17	1904.64	1905.11	1905.57	1906.04	1906.51	1906.97	1907.44	**42.80**
42.90	1907.44	1907.91	1908.38	1908.84	1909.31	1909.78	1910.25	1910.71	1911.18	1911.65	1912.12	**42.90**
43.00	1912.12	1912.58	1913.05	1913.52	1913.99	1914.45	1914.92	1915.39	1915.86	1916.32	1916.79	**43.00**
43.10	1916.79	1917.26	1917.73	1918.20	1918.66	1919.13	1919.60	1920.07	1920.54	1921.01	1921.47	**43.10**
43.20	1921.47	1921.94	1922.41	1922.88	1923.35	1923.81	1924.28	1924.75	1925.22	1925.69	1926.16	**43.20**
43.30	1926.16	1926.63	1927.09	1927.56	1928.03	1928.50	1928.97	1929.44	1929.91	1930.38	1930.85	**43.30**
43.40	1930.85	1931.31	1931.78	1932.25	1932.72	1933.19	1933.66	1934.13	1934.60	1935.07	1935.54	**43.40**
43.50	1935.54	1936.01	1936.48	1936.94	1937.41	1937.88	1938.35	1938.82	1939.29	1939.76	1940.23	**43.50**
43.60	1940.23	1940.70	1941.17	1941.64	1942.11	1942.58	1943.05	1943.52	1943.99	1944.46	1944.93	**43.60**
43.70	1944.93	1945.40	1945.87	1946.34	1946.81	1947.28	1947.75	1948.22	1948.69	1949.16	1949.63	**43.70**
43.80	1949.63	1950.10	1950.57	1951.04	1951.51	1951.99	1952.46	1952.93	1953.40	1953.87	1954.34	**43.80**
43.90	1954.34	1954.81	1955.28	1955.75	1956.22	1956.69	1957.16	1957.63	1958.11	1958.58	1959.05	**43.90**
44.00	1959.05	1959.52	1959.99	1960.46	1960.93	1961.40	1961.88	1962.35	1962.82	1963.29	1963.76	**44.00**
44.10	1963.76	1964.23	1964.70	1965.18	1965.65	1966.12	1966.59	1967.06	1967.54	1968.01	1968.48	**44.10**
44.20	1968.48	1968.95	1969.42	1969.89	1970.37	1970.84	1971.31	1971.78	1972.26	1972.73	1973.20	**44.20**
44.30	1973.20	1973.67	1974.14	1974.62	1975.09	1975.56	1976.03	1976.51	1976.98	1977.45	1977.93	**44.30**
44.40	1977.93	1978.40	1978.87	1979.34	1979.82	1980.29	1980.76	1981.23	1981.71	1982.18	1982.65	**44.40**
44.50	1982.65	1983.13	1983.60	1984.07	1984.55	1985.02	1985.49	1985.97	1986.44	1986.91	1987.39	**44.50**
44.60	1987.39	1987.86	1988.33	1988.81	1989.28	1989.75	1990.23	1990.70	1991.18	1991.65	1992.12	**44.60**
44.70	1992.12	1992.60	1993.07	1993.54	1994.02	1994.49	1994.97	1995.44	1995.92	1996.39	1996.86	**44.70**
44.80	1996.86	1997.34	1997.81	1998.29	1998.76	1999.24	1999.71	2000.18	2000.66	2001.13	2001.61	**44.80**
44.90	2001.61	2002.08	2002.56	2003.03	2003.51	2003.98	2004.46	2004.93	2005.41	2005.88	2006.36	**44.90**
45.00	2006.36	2006.83	2007.31	2007.78	2008.26	2008.73	2009.21	2009.68	2010.16	2010.63	2011.11	**45.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
45.00	2006.36	2006.83	2007.31	2007.78	2008.26	2008.73	2009.21	2009.68	2010.16	2010.63	2011.11	**45.00**
45.10	2011.11	2011.58	2012.06	2012.54	2013.01	2013.49	2013.96	2014.44	2014.91	2015.39	2015.87	**45.10**
45.20	2015.87	2016.34	2016.82	2017.29	2017.77	2018.25	2018.72	2019.20	2019.67	2020.15	2020.63	**45.20**
45.30	2020.63	2021.10	2021.58	2022.06	2022.53	2023.01	2023.48	2023.96	2024.44	2024.91	2025.39	**45.30**
45.40	2025.39	2025.87	2026.34	2026.82	2027.30	2027.78	2028.25	2028.73	2029.21	2029.68	2030.16	**45.40**
45.50	2030.16	2030.64	2031.11	2031.59	2032.07	2032.55	2033.02	2033.50	2033.98	2034.46	2034.93	**45.50**
45.60	2034.93	2035.41	2035.89	2036.37	2036.84	2037.32	2037.80	2038.28	2038.76	2039.23	2039.71	**45.60**
45.70	2039.71	2040.19	2040.67	2041.15	2041.62	2042.10	2042.58	2043.06	2043.54	2044.01	2044.49	**45.70**
45.80	2044.49	2044.97	2045.45	2045.93	2046.41	2046.89	2047.36	2047.84	2048.32	2048.80	2049.28	**45.80**
45.90	2049.28	2049.76	2050.24	2050.72	2051.19	2051.67	2052.15	2052.63	2053.11	2053.59	2054.07	**45.90**
46.00	2054.07	2054.55	2055.03	2055.51	2055.99	2056.47	2056.95	2057.42	2057.90	2058.38	2058.86	**46.00**
46.10	2058.86	2059.34	2059.82	2060.30	2060.78	2061.26	2061.74	2062.22	2062.70	2063.18	2063.66	**46.10**
46.20	2063.66	2064.14	2064.62	2065.10	2065.58	2066.06	2066.54	2067.03	2067.51	2067.99	2068.47	**46.20**
46.30	2068.47	2068.95	2069.43	2069.91	2070.39	2070.87	2071.35	2071.83	2072.31	2072.79	2073.27	**46.30**
46.40	2073.27	2073.76	2074.24	2074.72	2075.20	2075.68	2076.16	2076.64	2077.12	2077.61	2078.09	**46.40**
46.50	2078.09	2078.57	2079.05	2079.53	2080.01	2080.50	2080.98	2081.46	2081.94	2082.42	2082.90	**46.50**
46.60	2082.90	2083.39	2083.87	2084.35	2084.83	2085.31	2085.80	2086.28	2086.76	2087.24	2087.73	**46.60**
46.70	2087.73	2088.21	2088.69	2089.17	2089.66	2090.14	2090.62	2091.10	2091.59	2092.07	2092.55	**46.70**
46.80	2092.55	2093.04	2093.52	2094.00	2094.48	2094.97	2095.45	2095.93	2096.42	2096.90	2097.38	**46.80**
46.90	2097.38	2097.87	2098.35	2098.83	2099.32	2099.80	2100.28	2100.77	2101.25	2101.74	2102.22	**46.90**
47.00	2102.22	2102.70	2103.19	2103.67	2104.15	2104.64	2105.12	2105.61	2106.09	2106.58	2107.06	**47.00**
47.10	2107.06	2107.54	2108.03	2108.51	2109.00	2109.48	2109.97	2110.45	2110.94	2111.42	2111.91	**47.10**
47.20	2111.91	2112.39	2112.87	2113.36	2113.84	2114.33	2114.81	2115.30	2115.78	2116.27	2116.76	**47.20**
47.30	2116.76	2117.24	2117.73	2118.21	2118.70	2119.18	2119.67	2120.15	2120.64	2121.12	2121.61	**47.30**
47.40	2121.61	2122.10	2122.58	2123.07	2123.55	2124.04	2124.53	2125.01	2125.50	2125.98	2126.47	**47.40**
47.50	2126.47	2126.96	2127.44	2127.93	2128.42	2128.90	2129.39	2129.87	2130.36	2130.85	2131.33	**47.50**
47.60	2131.33	2131.82	2132.31	2132.80	2133.28	2133.77	2134.26	2134.74	2135.23	2135.72	2136.20	**47.60**
47.70	2136.20	2136.69	2137.18	2137.67	2138.15	2138.64	2139.13	2139.62	2140.10	2140.59	2141.08	**47.70**
47.80	2141.08	2141.57	2142.06	2142.54	2143.03	2143.52	2144.01	2144.50	2144.98	2145.47	2145.96	**47.80**
47.90	2145.96	2146.45	2146.94	2147.42	2147.91	2148.40	2148.89	2149.38	2149.87	2150.36	2150.84	**47.90**
48.00	2150.84	2151.33	2151.82	2152.31	2152.80	2153.29	2153.78	2154.27	2154.76	2155.25	2155.73	**48.00**
48.10	2155.73	2156.22	2156.71	2157.20	2157.69	2158.18	2158.67	2159.16	2159.65	2160.14	2160.63	**48.10**
48.20	2160.63	2161.12	2161.61	2162.10	2162.59	2163.08	2163.57	2164.06	2164.55	2165.04	2165.53	**48.20**
48.30	2165.53	2166.02	2166.51	2167.00	2167.49	2167.98	2168.47	2168.96	2169.46	2169.95	2170.44	**48.30**
48.40	2170.44	2170.93	2171.42	2171.91	2172.40	2172.89	2173.38	2173.87	2174.37	2174.86	2175.35	**48.40**
48.50	2175.35	2175.84	2176.33	2176.82	2177.31	2177.81	2178.30	2178.79	2179.28	2179.77	2180.26	**48.50**
48.60	2180.26	2180.76	2181.25	2181.74	2182.23	2182.73	2183.22	2183.71	2184.20	2184.69	2185.19	**48.60**
48.70	2185.19	2185.68	2186.17	2186.66	2187.16	2187.65	2188.14	2188.64	2189.13	2189.62	2190.11	**48.70**
48.80	2190.11	2190.61	2191.10	2191.59	2192.09	2192.58	2193.07	2193.57	2194.06	2194.55	2195.05	**48.80**
48.90	2195.05	2195.54	2196.03	2196.53	2197.02	2197.52	2198.01	2198.50	2199.00	2199.49	2199.99	**48.90**
49.00	2199.99	2200.48	2200.97	2201.47	2201.96	2202.46	2202.95	2203.45	2203.94	2204.44	2204.93	**49.00**
49.10	2204.93	2205.42	2205.92	2206.41	2206.91	2207.40	2207.90	2208.39	2208.89	2209.38	2209.88	**49.10**
49.20	2209.88	2210.38	2210.87	2211.37	2211.86	2212.36	2212.85	2213.35	2213.84	2214.34	2214.84	**49.20**
49.30	2214.84	2215.33	2215.83	2216.32	2216.82	2217.32	2217.81	2218.31	2218.80	2219.30	2219.80	**49.30**
49.40	2219.80	2220.29	2220.79	2221.29	2221.78	2222.28	2222.78	2223.27	2223.77	2224.27	2224.76	**49.40**
49.50	2224.76	2225.26	2225.76	2226.25	2226.75	2227.25	2227.75	2228.24	2228.74	2229.24	2229.74	**49.50**
49.60	2229.74	2230.23	2230.73	2231.23	2231.73	2232.22	2232.72	2233.22	2233.72	2234.22	2234.71	**49.60**
49.70	2234.71	2235.21	2235.71	2236.21	2236.71	2237.21	2237.70	2238.20	2238.70	2239.20	2239.70	**49.70**
49.80	2239.70	2240.20	2240.70	2241.20	2241.69	2242.19	2242.69	2243.19	2243.69	2244.19	2244.69	**49.80**
49.90	2244.69	2245.19	2245.69	2246.19	2246.69	2247.19	2247.69	2248.19	2248.69	2249.19	2249.69	**49.90**
50.00	2249.69	2250.19	2250.69	2251.19	2251.69	2252.19	2252.69	2253.19	2253.69	2254.19	2254.69	**50.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B7.2.2. *Type K thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
50.00	2249.69	2250.19	2250.69	2251.19	2251.69	2252.19	2252.69	2253.19	2253.69	2254.19	2254.69	50.00
50.10	2254.69	2255.19	2255.69	2256.19	2256.69	2257.19	2257.69	2258.19	2258.69	2259.19	2259.70	50.10
50.20	2259.70	2260.20	2260.70	2261.20	2261.70	2262.20	2262.70	2263.21	2263.71	2264.21	2264.71	50.20
50.30	2264.71	2265.21	2265.71	2266.22	2266.72	2267.22	2267.72	2268.22	2268.73	2269.23	2269.73	50.30
50.40	2269.73	2270.23	2270.74	2271.24	2271.74	2272.24	2272.75	2273.25	2273.75	2274.25	2274.76	50.40
50.50	2274.76	2275.26	2275.76	2276.27	2276.77	2277.27	2277.78	2278.28	2278.78	2279.29	2279.79	50.50
50.60	2279.79	2280.29	2280.80	2281.30	2281.80	2282.31	2282.81	2283.32	2283.82	2284.32	2284.83	50.60
50.70	2284.83	2285.33	2285.84	2286.34	2286.85	2287.35	2287.86	2288.36	2288.86	2289.37	2289.87	50.70
50.80	2289.87	2290.38	2290.88	2291.39	2291.89	2292.40	2292.90	2293.41	2293.91	2294.42	2294.93	50.80
50.90	2294.93	2295.43	2295.94	2296.44	2296.95	2297.45	2297.96	2298.47	2298.97	2299.48	2299.98	50.90
51.00	2299.98	2300.49	2301.00	2301.50	2302.01	2302.51	2303.02	2303.53	2304.03	2304.54	2305.05	51.00
51.10	2305.05	2305.55	2306.06	2306.57	2307.07	2307.58	2308.09	2308.60	2309.10	2309.61	2310.12	51.10
51.20	2310.12	2310.63	2311.13	2311.64	2312.15	2312.66	2313.16	2313.67	2314.18	2314.69	2315.19	51.20
51.30	2315.19	2315.70	2316.21	2316.72	2317.23	2317.74	2318.24	2318.75	2319.26	2319.77	2320.28	51.30
51.40	2320.28	2320.79	2321.30	2321.80	2322.31	2322.82	2323.33	2323.84	2324.35	2324.86	2325.37	51.40
51.50	2325.37	2325.88	2326.39	2326.90	2327.41	2327.92	2328.42	2328.93	2329.44	2329.95	2330.46	51.50
51.60	2330.46	2330.97	2331.48	2331.99	2332.50	2333.01	2333.53	2334.04	2334.55	2335.06	2335.57	51.60
51.70	2335.57	2336.08	2336.59	2337.10	2337.61	2338.12	2338.63	2339.14	2339.65	2340.17	2340.68	51.70
51.80	2340.68	2341.19	2341.70	2342.21	2342.72	2343.23	2343.75	2344.26	2344.77	2345.28	2345.79	51.80
51.90	2345.79	2346.30	2346.82	2347.33	2347.84	2348.35	2348.86	2349.38	2349.89	2350.40	2350.91	51.90
52.00	2350.91	2351.43	2351.94	2352.45	2352.97	2353.48	2353.99	2354.50	2355.02	2355.53	2356.04	52.00
52.10	2356.04	2356.56	2357.07	2357.58	2358.10	2358.61	2359.12	2359.64	2360.15	2360.67	2361.18	52.10
52.20	2361.18	2361.69	2362.21	2362.72	2363.24	2363.75	2364.26	2364.78	2365.29	2365.81	2366.32	52.20
52.30	2366.32	2366.84	2367.35	2367.87	2368.38	2368.90	2369.41	2369.93	2370.44	2370.96	2371.47	52.30
52.40	2371.47	2371.99	2372.50	2373.02	2373.53	2374.05	2374.56	2375.08	2375.59	2376.11	2376.63	52.40
52.50	2376.63	2377.14	2377.66	2378.17	2378.69	2379.21	2379.72	2380.24	2380.76	2381.27	2381.79	52.50
52.60	2381.79	2382.30	2382.82	2383.34	2383.86	2384.37	2384.89	2385.41	2385.92	2386.44	2386.96	52.60
52.70	2386.96	2387.47	2387.99	2388.51	2389.03	2389.54	2390.06	2390.58	2391.10	2391.61	2392.13	52.70
52.80	2392.13	2392.65	2393.17	2393.69	2394.20	2394.72	2395.24	2395.76	2396.28	2396.80	2397.31	52.80
52.90	2397.31	2397.83	2398.35	2398.87	2399.39	2399.91	2400.43	2400.95	2401.47	2401.98	2402.50	52.90
53.00	2402.50	2403.02	2403.54	2404.06	2404.58	2405.10	2405.62	2406.14	2406.66	2407.18	2407.70	53.00
53.10	2407.70	2408.22	2408.74	2409.26	2409.78	2410.30	2410.82	2411.34	2411.86	2412.38	2412.90	53.10
53.20	2412.90	2413.42	2413.94	2414.46	2414.98	2415.50	2416.03	2416.55	2417.07	2417.59	2418.11	53.20
53.30	2418.11	2418.63	2419.15	2419.67	2420.19	2420.72	2421.24	2421.76	2422.28	2422.80	2423.32	53.30
53.40	2423.32	2423.85	2424.37	2424.89	2425.41	2425.93	2426.46	2426.98	2427.50	2428.02	2428.55	53.40
53.50	2428.55	2429.07	2429.59	2430.11	2430.64	2431.16	2431.68	2432.21	2432.73	2433.25	2433.77	53.50
53.60	2433.77	2434.30	2434.82	2435.34	2435.87	2436.39	2436.92	2437.44	2437.96	2438.49	2439.01	53.60
53.70	2439.01	2439.53	2440.06	2440.58	2441.11	2441.63	2442.15	2442.68	2443.20	2443.73	2444.25	53.70
53.80	2444.25	2444.78	2445.30	2445.83	2446.35	2446.87	2447.40	2447.92	2448.45	2448.97	2449.50	53.80
53.90	2449.50	2450.02	2450.55	2451.07	2451.60	2452.13	2452.65	2453.18	2453.70	2454.23	2454.75	53.90
54.00	2454.75	2455.28	2455.81	2456.33	2456.86	2457.38	2457.91	2458.44	2458.96	2459.49	2460.01	54.00
54.10	2460.01	2460.54	2461.07	2461.59	2462.12	2462.65	2463.17	2463.70	2464.23	2464.75	2465.28	54.10
54.20	2465.28	2465.81	2466.34	2466.86	2467.39	2467.92	2468.44	2468.97	2469.50	2470.03	2470.55	54.20
54.30	2470.55	2471.08	2471.61	2472.14	2472.67	2473.19	2473.72	2474.25	2474.78	2475.31	2475.83	54.30
54.40	2475.83	2476.36	2476.89	2477.42	2477.95	2478.48	2479.01	2479.53	2480.06	2480.59	2481.12	54.40
54.50	2481.12	2481.65	2482.18	2482.71	2483.24	2483.77	2484.29	2484.82	2485.35	2485.88	2486.41	54.50
54.60	2486.41	2486.94	2487.47	2488.00	2488.53	2489.06	2489.59	2490.12	2490.65	2491.18	2491.71	54.60
54.70	2491.71	2492.24	2492.77	2493.30	2493.83	2494.36	2494.89	2495.42	2495.95	2496.48	2497.01	54.70
54.80	2497.01	2497.55	2498.08	2498.61	2499.14	2499.67	2500.20	2500.73	2501.26			54.80
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

B8. Supplementary Reference Tables for Type N—Nickel-Chromium-Silicon Alloy Versus Nickel-Silicon-Magnesium Alloy Thermocouples

B8.1. Tables with Voltage as a Function of Temperature

The reference function for type N thermocouples given in the main text (see table 8.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B8.1.1 and B8.1.2. Table B8.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 1300 °C, and table B8.1.2 presents voltage values at 1 °F intervals from −454 °F to 2372 °F.

TABLE B8.1.1. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−4.345											−270
−260	−4.336	−4.337	−4.339	−4.340	−4.341	−4.342	−4.343	−4.344	−4.344	−4.345	−4.345	−260
−250	−4.313	−4.316	−4.319	−4.321	−4.324	−4.326	−4.328	−4.330	−4.332	−4.334	−4.336	−250
−240	−4.277	−4.281	−4.285	−4.289	−4.293	−4.297	−4.300	−4.304	−4.307	−4.310	−4.313	−240
−230	−4.226	−4.232	−4.238	−4.243	−4.248	−4.254	−4.258	−4.263	−4.268	−4.273	−4.277	−230
−220	−4.162	−4.169	−4.176	−4.183	−4.189	−4.196	−4.202	−4.209	−4.215	−4.221	−4.226	−220
−210	−4.083	−4.091	−4.100	−4.108	−4.116	−4.124	−4.132	−4.140	−4.147	−4.154	−4.162	−210
−200	−3.990	−4.000	−4.010	−4.020	−4.029	−4.038	−4.048	−4.057	−4.066	−4.074	−4.083	−200
−190	−3.884	−3.896	−3.907	−3.918	−3.928	−3.939	−3.950	−3.960	−3.970	−3.980	−3.990	−190
−180	−3.766	−3.778	−3.790	−3.803	−3.815	−3.827	−3.838	−3.850	−3.862	−3.873	−3.884	−180
−170	−3.634	−3.648	−3.662	−3.675	−3.688	−3.702	−3.715	−3.728	−3.740	−3.753	−3.766	−170
−160	−3.491	−3.506	−3.521	−3.535	−3.550	−3.564	−3.578	−3.593	−3.607	−3.621	−3.634	−160
−150	−3.336	−3.352	−3.368	−3.384	−3.400	−3.415	−3.431	−3.446	−3.461	−3.476	−3.491	−150
−140	−3.171	−3.188	−3.205	−3.221	−3.238	−3.255	−3.271	−3.288	−3.304	−3.320	−3.336	−140
−130	−2.994	−3.012	−3.030	−3.048	−3.066	−3.084	−3.101	−3.119	−3.136	−3.153	−3.171	−130
−120	−2.808	−2.827	−2.846	−2.865	−2.883	−2.902	−2.921	−2.939	−2.958	−2.976	−2.994	−120
−110	−2.612	−2.632	−2.652	−2.672	−2.691	−2.711	−2.730	−2.750	−2.769	−2.789	−2.808	−110
−100	−2.407	−2.428	−2.448	−2.469	−2.490	−2.510	−2.531	−2.551	−2.571	−2.592	−2.612	−100
−90	−2.193	−2.215	−2.237	−2.258	−2.280	−2.301	−2.322	−2.344	−2.365	−2.386	−2.407	−90
−80	−1.972	−1.995	−2.017	−2.039	−2.062	−2.084	−2.106	−2.128	−2.150	−2.172	−2.193	−80
−70	−1.744	−1.767	−1.790	−1.813	−1.836	−1.859	−1.882	−1.905	−1.927	−1.950	−1.972	−70
−60	−1.509	−1.533	−1.557	−1.580	−1.604	−1.627	−1.651	−1.674	−1.698	−1.721	−1.744	−60
−50	−1.269	−1.293	−1.317	−1.341	−1.366	−1.390	−1.414	−1.438	−1.462	−1.485	−1.509	−50
−40	−1.023	−1.048	−1.072	−1.097	−1.122	−1.146	−1.171	−1.195	−1.220	−1.244	−1.269	−40
−30	−0.772	−0.798	−0.823	−0.848	−0.873	−0.898	−0.923	−0.948	−0.973	−0.998	−1.023	−30
−20	−0.518	−0.544	−0.569	−0.595	−0.620	−0.646	−0.671	−0.696	−0.722	−0.747	−0.772	−20
−10	−0.260	−0.286	−0.312	−0.338	−0.364	−0.390	−0.415	−0.441	−0.467	−0.492	−0.518	−10
0	0.000	−0.026	−0.052	−0.078	−0.104	−0.131	−0.157	−0.183	−0.209	−0.234	−0.260	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B8.1.1. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.026	0.052	0.078	0.104	0.130	0.156	0.182	0.208	0.235	0.261	0
10	0.261	0.287	0.313	0.340	0.366	0.393	0.419	0.446	0.472	0.499	0.525	10
20	0.525	0.552	0.578	0.605	0.632	0.659	0.685	0.712	0.739	0.766	0.793	20
30	0.793	0.820	0.847	0.874	0.901	0.928	0.955	0.983	1.010	1.037	1.065	30
40	1.065	1.092	1.119	1.147	1.174	1.202	1.229	1.257	1.284	1.312	1.340	40
50	1.340	1.368	1.395	1.423	1.451	1.479	1.507	1.535	1.563	1.591	1.619	50
60	1.619	1.647	1.675	1.703	1.732	1.760	1.788	1.817	1.845	1.873	1.902	60
70	1.902	1.930	1.959	1.988	2.016	2.045	2.074	2.102	2.131	2.160	2.189	70
80	2.189	2.218	2.247	2.276	2.305	2.334	2.363	2.392	2.421	2.450	2.480	80
90	2.480	2.509	2.538	2.568	2.597	2.626	2.656	2.685	2.715	2.744	2.774	90
100	2.774	2.804	2.833	2.863	2.893	2.923	2.953	2.983	3.012	3.042	3.072	100
110	3.072	3.102	3.133	3.163	3.193	3.223	3.253	3.283	3.314	3.344	3.374	110
120	3.374	3.405	3.435	3.466	3.496	3.527	3.557	3.588	3.619	3.649	3.680	120
130	3.680	3.711	3.742	3.772	3.803	3.834	3.865	3.896	3.927	3.958	3.989	130
140	3.989	4.020	4.051	4.083	4.114	4.145	4.176	4.208	4.239	4.270	4.302	140
150	4.302	4.333	4.365	4.396	4.428	4.459	4.491	4.523	4.554	4.586	4.618	150
160	4.618	4.650	4.681	4.713	4.745	4.777	4.809	4.841	4.873	4.905	4.937	160
170	4.937	4.969	5.001	5.033	5.066	5.098	5.130	5.162	5.195	5.227	5.259	170
180	5.259	5.292	5.324	5.357	5.389	5.422	5.454	5.487	5.520	5.552	5.585	180
190	5.585	5.618	5.650	5.683	5.716	5.749	5.782	5.815	5.847	5.880	5.913	190
200	5.913	5.946	5.979	6.013	6.046	6.079	6.112	6.145	6.178	6.211	6.245	200
210	6.245	6.278	6.311	6.345	6.378	6.411	6.445	6.478	6.512	6.545	6.579	210
220	6.579	6.612	6.646	6.680	6.713	6.747	6.781	6.814	6.848	6.882	6.916	220
230	6.916	6.949	6.983	7.017	7.051	7.085	7.119	7.153	7.187	7.221	7.255	230
240	7.255	7.289	7.323	7.357	7.392	7.426	7.460	7.494	7.528	7.563	7.597	240
250	7.597	7.631	7.666	7.700	7.734	7.769	7.803	7.838	7.872	7.907	7.941	250
260	7.941	7.976	8.010	8.045	8.080	8.114	8.149	8.184	8.218	8.253	8.288	260
270	8.288	8.323	8.358	8.392	8.427	8.462	8.497	8.532	8.567	8.602	8.637	270
280	8.637	8.672	8.707	8.742	8.777	8.812	8.847	8.882	8.918	8.953	8.988	280
290	8.988	9.023	9.058	9.094	9.129	9.164	9.200	9.235	9.270	9.306	9.341	290
300	9.341	9.377	9.412	9.448	9.483	9.519	9.554	9.590	9.625	9.661	9.696	300
310	9.696	9.732	9.768	9.803	9.839	9.875	9.910	9.946	9.982	10.018	10.054	310
320	10.054	10.089	10.125	10.161	10.197	10.233	10.269	10.305	10.341	10.377	10.413	320
330	10.413	10.449	10.485	10.521	10.557	10.593	10.629	10.665	10.701	10.737	10.774	330
340	10.774	10.810	10.846	10.882	10.918	10.955	10.991	11.027	11.064	11.100	11.136	340
350	11.136	11.173	11.209	11.245	11.282	11.318	11.355	11.391	11.428	11.464	11.501	350
360	11.501	11.537	11.574	11.610	11.647	11.683	11.720	11.757	11.793	11.830	11.867	360
370	11.867	11.903	11.940	11.977	12.013	12.050	12.087	12.124	12.160	12.197	12.234	370
380	12.234	12.271	12.308	12.345	12.382	12.418	12.455	12.492	12.529	12.566	12.603	380
390	12.603	12.640	12.677	12.714	12.751	12.788	12.825	12.862	12.899	12.937	12.974	390
400	12.974	13.011	13.048	13.085	13.122	13.159	13.197	13.234	13.271	13.308	13.346	400
410	13.346	13.383	13.420	13.457	13.495	13.532	13.569	13.607	13.644	13.682	13.719	410
420	13.719	13.756	13.794	13.831	13.869	13.906	13.944	13.981	14.019	14.056	14.094	420
430	14.094	14.131	14.169	14.206	14.244	14.281	14.319	14.356	14.394	14.432	14.469	430
440	14.469	14.507	14.545	14.582	14.620	14.658	14.695	14.733	14.771	14.809	14.846	440
450	14.846	14.884	14.922	14.960	14.998	15.035	15.073	15.111	15.149	15.187	15.225	450
460	15.225	15.262	15.300	15.338	15.376	15.414	15.452	15.490	15.528	15.566	15.604	460
470	15.604	15.642	15.680	15.718	15.756	15.794	15.832	15.870	15.908	15.946	15.984	470
480	15.984	16.022	16.060	16.099	16.137	16.175	16.213	16.251	16.289	16.327	16.366	480
490	16.366	16.404	16.442	16.480	16.518	16.557	16.595	16.633	16.671	16.710	16.748	490
500	16.748	16.786	16.824	16.863	16.901	16.939	16.978	17.016	17.054	17.093	17.131	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B8.1.1. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	16.748	16.786	16.824	16.863	16.901	16.939	16.978	17.016	17.054	17.093	17.131	500
510	17.131	17.169	17.208	17.246	17.285	17.323	17.361	17.400	17.438	17.477	17.515	510
520	17.515	17.554	17.592	17.630	17.669	17.707	17.746	17.784	17.823	17.861	17.900	520
530	17.900	17.938	17.977	18.016	18.054	18.093	18.131	18.170	18.208	18.247	18.286	530
540	18.286	18.324	18.363	18.401	18.440	18.479	18.517	18.556	18.595	18.633	18.672	540
550	18.672	18.711	18.749	18.788	18.827	18.865	18.904	18.943	18.982	19.020	19.059	550
560	19.059	19.098	19.136	19.175	19.214	19.253	19.292	19.330	19.369	19.408	19.447	560
570	19.447	19.485	19.524	19.563	19.602	19.641	19.680	19.718	19.757	19.796	19.835	570
580	19.835	19.874	19.913	19.952	19.990	20.029	20.068	20.107	20.146	20.185	20.224	580
590	20.224	20.263	20.302	20.341	20.379	20.418	20.457	20.496	20.535	20.574	20.613	590
600	20.613	20.652	20.691	20.730	20.769	20.808	20.847	20.886	20.925	20.964	21.003	600
610	21.003	21.042	21.081	21.120	21.159	21.198	21.237	21.276	21.315	21.354	21.393	610
620	21.393	21.432	21.471	21.510	21.549	21.588	21.628	21.667	21.706	21.745	21.784	620
630	21.784	21.823	21.862	21.901	21.940	21.979	22.018	22.058	22.097	22.136	22.175	630
640	22.175	22.214	22.253	22.292	22.331	22.370	22.410	22.449	22.488	22.527	22.566	640
650	22.566	22.605	22.644	22.684	22.723	22.762	22.801	22.840	22.879	22.919	22.958	650
660	22.958	22.997	23.036	23.075	23.115	23.154	23.193	23.232	23.271	23.311	23.350	660
670	23.350	23.389	23.428	23.467	23.507	23.546	23.585	23.624	23.663	23.703	23.742	670
680	23.742	23.781	23.820	23.860	23.899	23.938	23.977	24.016	24.056	24.095	24.134	680
690	24.134	24.173	24.213	24.252	24.291	24.330	24.370	24.409	24.448	24.487	24.527	690
700	24.527	24.566	24.605	24.644	24.684	24.723	24.762	24.801	24.841	24.880	24.919	700
710	24.919	24.959	24.998	25.037	25.076	25.116	25.155	25.194	25.233	25.273	25.312	710
720	25.312	25.351	25.391	25.430	25.469	25.508	25.548	25.587	25.626	25.666	25.705	720
730	25.705	25.744	25.783	25.823	25.862	25.901	25.941	25.980	26.019	26.058	26.098	730
740	26.098	26.137	26.176	26.216	26.255	26.294	26.333	26.373	26.412	26.451	26.491	740
750	26.491	26.530	26.569	26.608	26.648	26.687	26.726	26.766	26.805	26.844	26.883	750
760	26.883	26.923	26.962	27.001	27.041	27.080	27.119	27.158	27.198	27.237	27.276	760
770	27.276	27.316	27.355	27.394	27.433	27.473	27.512	27.551	27.591	27.630	27.669	770
780	27.669	27.708	27.748	27.787	27.826	27.866	27.905	27.944	27.983	28.023	28.062	780
790	28.062	28.101	28.140	28.180	28.219	28.258	28.297	28.337	28.376	28.415	28.455	790
800	28.455	28.494	28.533	28.572	28.612	28.651	28.690	28.729	28.769	28.808	28.847	800
810	28.847	28.886	28.926	28.965	29.004	29.043	29.083	29.122	29.161	29.200	29.239	810
820	29.239	29.279	29.318	29.357	29.396	29.436	29.475	29.514	29.553	29.592	29.632	820
830	29.632	29.671	29.710	29.749	29.789	29.828	29.867	29.906	29.945	29.985	30.024	830
840	30.024	30.063	30.102	30.141	30.181	30.220	30.259	30.298	30.337	30.376	30.416	840
850	30.416	30.455	30.494	30.533	30.572	30.611	30.651	30.690	30.729	30.768	30.807	850
860	30.807	30.846	30.886	30.925	30.964	31.003	31.042	31.081	31.120	31.160	31.199	860
870	31.199	31.238	31.277	31.316	31.355	31.394	31.433	31.473	31.512	31.551	31.590	870
880	31.590	31.629	31.668	31.707	31.746	31.785	31.824	31.863	31.903	31.942	31.981	880
890	31.981	32.020	32.059	32.098	32.137	32.176	32.215	32.254	32.293	32.332	32.371	890
900	32.371	32.410	32.449	32.488	32.527	32.566	32.605	32.644	32.683	32.722	32.761	900
910	32.761	32.800	32.839	32.878	32.917	32.956	32.995	33.034	33.073	33.112	33.151	910
920	33.151	33.190	33.229	33.268	33.307	33.346	33.385	33.424	33.463	33.502	33.541	920
930	33.541	33.580	33.619	33.658	33.697	33.736	33.774	33.813	33.852	33.891	33.930	930
940	33.930	33.969	34.008	34.047	34.086	34.124	34.163	34.202	34.241	34.280	34.319	940
950	34.319	34.358	34.396	34.435	34.474	34.513	34.552	34.591	34.629	34.668	34.707	950
960	34.707	34.746	34.785	34.823	34.862	34.901	34.940	34.979	35.017	35.056	35.095	960
970	35.095	35.134	35.172	35.211	35.250	35.289	35.327	35.366	35.405	35.444	35.482	970
980	35.482	35.521	35.560	35.598	35.637	35.676	35.714	35.753	35.792	35.831	35.869	980
990	35.869	35.908	35.946	35.985	36.024	36.062	36.101	36.140	36.178	36.217	36.256	990
1000	36.256	36.294	36.333	36.371	36.410	36.449	36.487	36.526	36.564	36.603	36.641	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B8.1.1. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	36.256	36.294	36.333	36.371	36.410	36.449	36.487	36.526	36.564	36.603	36.641	**1000**
1010	36.641	36.680	36.718	36.757	36.796	36.834	36.873	36.911	36.950	36.988	37.027	**1010**
1020	37.027	37.065	37.104	37.142	37.181	37.219	37.258	37.296	37.334	37.373	37.411	**1020**
1030	37.411	37.450	37.488	37.527	37.565	37.603	37.642	37.680	37.719	37.757	37.795	**1030**
1040	37.795	37.834	37.872	37.911	37.949	37.987	38.026	38.064	38.102	38.141	38.179	**1040**
1050	38.179	38.217	38.256	38.294	38.332	38.370	38.409	38.447	38.485	38.524	38.562	**1050**
1060	38.562	38.600	38.638	38.677	38.715	38.753	38.791	38.829	38.868	38.906	38.944	**1060**
1070	38.944	38.982	39.020	39.059	39.097	39.135	39.173	39.211	39.249	39.287	39.326	**1070**
1080	39.326	39.364	39.402	39.440	39.478	39.516	39.554	39.592	39.630	39.668	39.706	**1080**
1090	39.706	39.744	39.783	39.821	39.859	39.897	39.935	39.973	40.011	40.049	40.087	**1090**
1100	40.087	40.125	40.163	40.201	40.238	40.276	40.314	40.352	40.390	40.428	40.466	**1100**
1110	40.466	40.504	40.542	40.580	40.618	40.655	40.693	40.731	40.769	40.807	40.845	**1110**
1120	40.845	40.883	40.920	40.958	40.996	41.034	41.072	41.109	41.147	41.185	41.223	**1120**
1130	41.223	41.260	41.298	41.336	41.374	41.411	41.449	41.487	41.525	41.562	41.600	**1130**
1140	41.600	41.638	41.675	41.713	41.751	41.788	41.826	41.864	41.901	41.939	41.976	**1140**
1150	41.976	42.014	42.052	42.089	42.127	42.164	42.202	42.239	42.277	42.314	42.352	**1150**
1160	42.352	42.390	42.427	42.465	42.502	42.540	42.577	42.614	42.652	42.689	42.727	**1160**
1170	42.727	42.764	42.802	42.839	42.877	42.914	42.951	42.989	43.026	43.064	43.101	**1170**
1180	43.101	43.138	43.176	43.213	43.250	43.288	43.325	43.362	43.399	43.437	43.474	**1180**
1190	43.474	43.511	43.549	43.586	43.623	43.660	43.698	43.735	43.772	43.809	43.846	**1190**
1200	43.846	43.884	43.921	43.958	43.995	44.032	44.069	44.106	44.144	44.181	44.218	**1200**
1210	44.218	44.255	44.292	44.329	44.366	44.403	44.440	44.477	44.514	44.551	44.588	**1210**
1220	44.588	44.625	44.662	44.699	44.736	44.773	44.810	44.847	44.884	44.921	44.958	**1220**
1230	44.958	44.995	45.032	45.069	45.105	45.142	45.179	45.216	45.253	45.290	45.326	**1230**
1240	45.326	45.363	45.400	45.437	45.474	45.510	45.547	45.584	45.621	45.657	45.694	**1240**
1250	45.694	45.731	45.767	45.804	45.841	45.877	45.914	45.951	45.987	46.024	46.060	**1250**
1260	46.060	46.097	46.133	46.170	46.207	46.243	46.280	46.316	46.353	46.389	46.425	**1260**
1270	46.425	46.462	46.498	46.535	46.571	46.608	46.644	46.680	46.717	46.753	46.789	**1270**
1280	46.789	46.826	46.862	46.898	46.935	46.971	47.007	47.043	47.079	47.116	47.152	**1280**
1290	47.152	47.188	47.224	47.260	47.296	47.333	47.369	47.405	47.441	47.477	47.513	**1290**
1300	47.513											**1300**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE B8.1.2. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−4.344	−4.344	−4.345	−4.345	−4.345							−450
−440	−4.339	−4.340	−4.340	−4.341	−4.341	−4.342	−4.342	−4.343	−4.343	−4.344	−4.344	−440
−430	−4.330	−4.331	−4.332	−4.333	−4.334	−4.335	−4.336	−4.337	−4.337	−4.338	−4.339	−430
−420	−4.316	−4.318	−4.319	−4.321	−4.322	−4.324	−4.325	−4.326	−4.327	−4.329	−4.330	−420
−410	−4.299	−4.301	−4.303	−4.305	−4.306	−4.308	−4.310	−4.312	−4.313	−4.315	−4.316	−410
−400	−4.277	−4.279	−4.282	−4.284	−4.286	−4.288	−4.291	−4.293	−4.295	−4.297	−4.299	−400
−390	−4.251	−4.254	−4.256	−4.259	−4.262	−4.264	−4.267	−4.270	−4.272	−4.275	−4.277	−390
−380	−4.220	−4.223	−4.226	−4.230	−4.233	−4.236	−4.239	−4.242	−4.245	−4.248	−4.251	−380
−370	−4.185	−4.189	−4.192	−4.196	−4.199	−4.203	−4.206	−4.210	−4.213	−4.217	−4.220	−370
−360	−4.145	−4.150	−4.154	−4.158	−4.162	−4.166	−4.170	−4.174	−4.177	−4.181	−4.185	−360
−350	−4.102	−4.106	−4.111	−4.115	−4.120	−4.124	−4.128	−4.133	−4.137	−4.141	−4.145	−350
−340	−4.054	−4.059	−4.064	−4.068	−4.073	−4.078	−4.083	−4.088	−4.092	−4.097	−4.102	−340
−330	−4.001	−4.007	−4.012	−4.017	−4.023	−4.028	−4.033	−4.038	−4.043	−4.049	−4.054	−330
−320	−3.945	−3.951	−3.957	−3.962	−3.968	−3.974	−3.979	−3.985	−3.990	−3.996	−4.001	−320
−310	−3.884	−3.891	−3.897	−3.903	−3.909	−3.915	−3.921	−3.927	−3.933	−3.939	−3.945	−310
−300	−3.820	−3.827	−3.833	−3.840	−3.846	−3.853	−3.859	−3.866	−3.872	−3.878	−3.884	−300
−290	−3.752	−3.759	−3.766	−3.773	−3.779	−3.786	−3.793	−3.800	−3.807	−3.813	−3.820	−290
−280	−3.679	−3.687	−3.694	−3.702	−3.709	−3.716	−3.723	−3.730	−3.738	−3.745	−3.752	−280
−270	−3.604	−3.611	−3.619	−3.627	−3.634	−3.642	−3.650	−3.657	−3.665	−3.672	−3.679	−270
−260	−3.524	−3.532	−3.540	−3.548	−3.556	−3.564	−3.572	−3.580	−3.588	−3.596	−3.604	−260
−250	−3.441	−3.449	−3.458	−3.466	−3.474	−3.483	−3.491	−3.499	−3.508	−3.516	−3.524	−250
−240	−3.354	−3.363	−3.372	−3.380	−3.389	−3.398	−3.407	−3.415	−3.424	−3.432	−3.441	−240
−230	−3.264	−3.273	−3.282	−3.291	−3.300	−3.309	−3.318	−3.327	−3.336	−3.345	−3.354	−230
−220	−3.171	−3.180	−3.189	−3.199	−3.208	−3.218	−3.227	−3.236	−3.246	−3.255	−3.264	−220
−210	−3.074	−3.084	−3.093	−3.103	−3.113	−3.123	−3.132	−3.142	−3.151	−3.161	−3.171	−210
−200	−2.974	−2.984	−2.994	−3.004	−3.014	−3.024	−3.034	−3.044	−3.054	−3.064	−3.074	−200
−190	−2.871	−2.881	−2.892	−2.902	−2.912	−2.923	−2.933	−2.943	−2.954	−2.964	−2.974	−190
−180	−2.765	−2.776	−2.786	−2.797	−2.808	−2.818	−2.829	−2.839	−2.850	−2.860	−2.871	−180
−170	−2.656	−2.667	−2.678	−2.689	−2.700	−2.711	−2.722	−2.733	−2.743	−2.754	−2.765	−170
−160	−2.544	−2.556	−2.567	−2.578	−2.589	−2.601	−2.612	−2.623	−2.634	−2.645	−2.656	−160
−150	−2.430	−2.442	−2.453	−2.465	−2.476	−2.488	−2.499	−2.510	−2.522	−2.533	−2.544	−150
−140	−2.313	−2.325	−2.337	−2.348	−2.360	−2.372	−2.384	−2.395	−2.407	−2.418	−2.430	−140
−130	−2.193	−2.206	−2.218	−2.230	−2.242	−2.254	−2.265	−2.277	−2.289	−2.301	−2.313	−130
−120	−2.072	−2.084	−2.096	−2.108	−2.121	−2.133	−2.145	−2.157	−2.169	−2.181	−2.193	−120
−110	−1.947	−1.960	−1.972	−1.985	−1.997	−2.010	−2.022	−2.035	−2.047	−2.059	−2.072	−110
−100	−1.821	−1.834	−1.846	−1.859	−1.872	−1.884	−1.897	−1.910	−1.922	−1.935	−1.947	−100
−90	−1.692	−1.705	−1.718	−1.731	−1.744	−1.757	−1.770	−1.783	−1.795	−1.808	−1.821	−90
−80	−1.562	−1.575	−1.588	−1.601	−1.614	−1.627	−1.640	−1.653	−1.666	−1.679	−1.692	−80
−70	−1.430	−1.443	−1.456	−1.470	−1.483	−1.496	−1.509	−1.522	−1.536	−1.549	−1.562	−70
−60	−1.296	−1.309	−1.323	−1.336	−1.349	−1.363	−1.376	−1.390	−1.403	−1.416	−1.430	−60
−50	−1.160	−1.174	−1.187	−1.201	−1.214	−1.228	−1.242	−1.255	−1.269	−1.282	−1.296	−50
−40	−1.023	−1.037	−1.050	−1.064	−1.078	−1.092	−1.105	−1.119	−1.133	−1.146	−1.160	−40
−30	−0.884	−0.898	−0.912	−0.926	−0.940	−0.954	−0.967	−0.981	−0.995	−1.009	−1.023	−30
−20	−0.744	−0.758	−0.772	−0.786	−0.800	−0.814	−0.828	−0.842	−0.856	−0.870	−0.884	−20
−10	−0.603	−0.617	−0.632	−0.646	−0.660	−0.674	−0.688	−0.702	−0.716	−0.730	−0.744	−10
0	−0.461	−0.475	−0.490	−0.504	−0.518	−0.532	−0.546	−0.561	−0.575	−0.589	−0.603	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B8.1.2. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.461	−0.447	−0.433	−0.418	−0.404	−0.390	−0.375	−0.361	−0.347	−0.332	−0.318	0
10	−0.318	−0.304	−0.289	−0.275	−0.260	−0.246	−0.232	−0.217	−0.203	−0.188	−0.174	10
20	−0.174	−0.159	−0.145	−0.131	−0.116	−0.102	−0.087	−0.073	−0.058	−0.044	−0.029	20
30	−0.029	−0.015	0.000	0.014	0.029	0.043	0.058	0.072	0.087	0.101	0.116	30
40	0.116	0.130	0.145	0.159	0.174	0.188	0.203	0.217	0.232	0.246	0.261	40
50	0.261	0.275	0.290	0.305	0.319	0.334	0.349	0.363	0.378	0.393	0.407	50
60	0.407	0.422	0.437	0.451	0.466	0.481	0.496	0.510	0.525	0.540	0.555	60
70	0.555	0.570	0.584	0.599	0.614	0.629	0.644	0.659	0.674	0.688	0.703	70
80	0.703	0.718	0.733	0.748	0.763	0.778	0.793	0.808	0.823	0.838	0.853	80
90	0.853	0.868	0.883	0.898	0.913	0.928	0.943	0.958	0.974	0.989	1.004	90
100	1.004	1.019	1.034	1.049	1.065	1.080	1.095	1.110	1.125	1.141	1.156	100
110	1.156	1.171	1.186	1.202	1.217	1.232	1.248	1.263	1.278	1.294	1.309	110
120	1.309	1.324	1.340	1.355	1.371	1.386	1.402	1.417	1.432	1.448	1.463	120
130	1.463	1.479	1.494	1.510	1.525	1.541	1.557	1.572	1.588	1.603	1.619	130
140	1.619	1.635	1.650	1.666	1.682	1.697	1.713	1.729	1.744	1.760	1.776	140
150	1.776	1.791	1.807	1.823	1.839	1.855	1.870	1.886	1.902	1.918	1.934	150
160	1.934	1.950	1.965	1.981	1.997	2.013	2.029	2.045	2.061	2.077	2.093	160
170	2.093	2.109	2.125	2.141	2.157	2.173	2.189	2.205	2.221	2.237	2.253	170
180	2.253	2.269	2.285	2.301	2.318	2.334	2.350	2.366	2.382	2.398	2.415	180
190	2.415	2.431	2.447	2.463	2.480	2.496	2.512	2.528	2.545	2.561	2.577	190
200	2.577	2.594	2.610	2.626	2.643	2.659	2.676	2.692	2.708	2.725	2.741	200
210	2.741	2.758	2.774	2.791	2.807	2.824	2.840	2.857	2.873	2.890	2.906	210
220	2.906	2.923	2.939	2.956	2.973	2.989	3.006	3.022	3.039	3.056	3.072	220
230	3.072	3.089	3.106	3.123	3.139	3.156	3.173	3.189	3.206	3.223	3.240	230
240	3.240	3.257	3.273	3.290	3.307	3.324	3.341	3.358	3.374	3.391	3.408	240
250	3.408	3.425	3.442	3.459	3.476	3.493	3.510	3.527	3.544	3.561	3.578	250
260	3.578	3.595	3.612	3.629	3.646	3.663	3.680	3.697	3.714	3.731	3.748	260
270	3.748	3.766	3.783	3.800	3.817	3.834	3.851	3.869	3.886	3.903	3.920	270
280	3.920	3.937	3.955	3.972	3.989	4.007	4.024	4.041	4.058	4.076	4.093	280
290	4.093	4.110	4.128	4.145	4.162	4.180	4.197	4.215	4.232	4.250	4.267	290
300	4.267	4.284	4.302	4.319	4.337	4.354	4.372	4.389	4.407	4.424	4.442	300
310	4.442	4.459	4.477	4.495	4.512	4.530	4.547	4.565	4.583	4.600	4.618	310
320	4.618	4.635	4.653	4.671	4.688	4.706	4.724	4.742	4.759	4.777	4.795	320
330	4.795	4.813	4.830	4.848	4.866	4.884	4.901	4.919	4.937	4.955	4.973	330
340	4.973	4.991	5.008	5.026	5.044	5.062	5.080	5.098	5.116	5.134	5.152	340
350	5.152	5.170	5.188	5.206	5.224	5.241	5.259	5.277	5.295	5.314	5.332	350
360	5.332	5.350	5.368	5.386	5.404	5.422	5.440	5.458	5.476	5.494	5.512	360
370	5.512	5.531	5.549	5.567	5.585	5.603	5.621	5.639	5.658	5.676	5.694	370
380	5.694	5.712	5.731	5.749	5.767	5.785	5.804	5.822	5.840	5.858	5.877	380
390	5.877	5.895	5.913	5.932	5.950	5.968	5.987	6.005	6.024	6.042	6.060	390
400	6.060	6.079	6.097	6.116	6.134	6.152	6.171	6.189	6.208	6.226	6.245	400
410	6.245	6.263	6.282	6.300	6.319	6.337	6.356	6.374	6.393	6.411	6.430	410
420	6.430	6.449	6.467	6.486	6.504	6.523	6.542	6.560	6.579	6.597	6.616	420
430	6.616	6.635	6.653	6.672	6.691	6.710	6.728	6.747	6.766	6.784	6.803	430
440	6.803	6.822	6.841	6.859	6.878	6.897	6.916	6.934	6.953	6.972	6.991	440
450	6.991	7.010	7.029	7.047	7.066	7.085	7.104	7.123	7.142	7.161	7.179	450
460	7.179	7.198	7.217	7.236	7.255	7.274	7.293	7.312	7.331	7.350	7.369	460
470	7.369	7.388	7.407	7.426	7.445	7.464	7.483	7.502	7.521	7.540	7.559	470
480	7.559	7.578	7.597	7.616	7.635	7.654	7.673	7.692	7.711	7.731	7.750	480
490	7.750	7.769	7.788	7.807	7.826	7.845	7.865	7.884	7.903	7.922	7.941	490
500	7.941	7.960	7.980	7.999	8.018	8.037	8.057	8.076	8.095	8.114	8.134	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B8.1.2. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	7.941	7.960	7.980	7.999	8.018	8.037	8.057	8.076	8.095	8.114	8.134	500
510	8.134	8.153	8.172	8.191	8.211	8.230	8.249	8.269	8.288	8.307	8.327	510
520	8.327	8.346	8.365	8.385	8.404	8.423	8.443	8.462	8.482	8.501	8.520	520
530	8.520	8.540	8.559	8.579	8.598	8.617	8.637	8.656	8.676	8.695	8.715	530
540	8.715	8.734	8.754	8.773	8.793	8.812	8.832	8.851	8.871	8.890	8.910	540
550	8.910	8.929	8.949	8.968	8.988	9.008	9.027	9.047	9.066	9.086	9.105	550
560	9.105	9.125	9.145	9.164	9.184	9.204	9.223	9.243	9.262	9.282	9.302	560
570	9.302	9.321	9.341	9.361	9.381	9.400	9.420	9.440	9.459	9.479	9.499	570
580	9.499	9.519	9.538	9.558	9.578	9.598	9.617	9.637	9.657	9.677	9.696	580
590	9.696	9.716	9.736	9.756	9.776	9.795	9.815	9.835	9.855	9.875	9.895	590
600	9.895	9.914	9.934	9.954	9.974	9.994	10.014	10.034	10.054	10.073	10.093	600
610	10.093	10.113	10.133	10.153	10.173	10.193	10.213	10.233	10.253	10.273	10.293	610
620	10.293	10.313	10.333	10.353	10.373	10.393	10.413	10.433	10.453	10.473	10.493	620
630	10.493	10.513	10.533	10.553	10.573	10.593	10.613	10.633	10.653	10.673	10.693	630
640	10.693	10.713	10.733	10.753	10.774	10.794	10.814	10.834	10.854	10.874	10.894	640
650	10.894	10.914	10.934	10.955	10.975	10.995	11.015	11.035	11.055	11.076	11.096	650
660	11.096	11.116	11.136	11.156	11.177	11.197	11.217	11.237	11.257	11.278	11.298	660
670	11.298	11.318	11.338	11.359	11.379	11.399	11.419	11.440	11.460	11.480	11.501	670
680	11.501	11.521	11.541	11.561	11.582	11.602	11.622	11.643	11.663	11.683	11.704	680
690	11.704	11.724	11.744	11.765	11.785	11.805	11.826	11.846	11.867	11.887	11.907	690
700	11.907	11.928	11.948	11.968	11.989	12.009	12.030	12.050	12.071	12.091	12.111	700
710	12.111	12.132	12.152	12.173	12.193	12.214	12.234	12.255	12.275	12.295	12.316	710
720	12.316	12.336	12.357	12.377	12.398	12.418	12.439	12.459	12.480	12.500	12.521	720
730	12.521	12.542	12.562	12.583	12.603	12.624	12.644	12.665	12.685	12.706	12.726	730
740	12.726	12.747	12.768	12.788	12.809	12.829	12.850	12.871	12.891	12.912	12.932	740
750	12.932	12.953	12.974	12.994	13.015	13.036	13.056	13.077	13.098	13.118	13.139	750
760	13.139	13.159	13.180	13.201	13.221	13.242	13.263	13.284	13.304	13.325	13.346	760
770	13.346	13.366	13.387	13.408	13.428	13.449	13.470	13.491	13.511	13.532	13.553	770
780	13.553	13.574	13.594	13.615	13.636	13.657	13.677	13.698	13.719	13.740	13.760	780
790	13.760	13.781	13.802	13.823	13.844	13.864	13.885	13.906	13.927	13.948	13.969	790
800	13.969	13.989	14.010	14.031	14.052	14.073	14.094	14.114	14.135	14.156	14.177	800
810	14.177	14.198	14.219	14.240	14.260	14.281	14.302	14.323	14.344	14.365	14.386	810
820	14.386	14.407	14.428	14.448	14.469	14.490	14.511	14.532	14.553	14.574	14.595	820
830	14.595	14.616	14.637	14.658	14.679	14.700	14.721	14.742	14.763	14.784	14.804	830
840	14.804	14.825	14.846	14.867	14.888	14.909	14.930	14.951	14.972	14.993	15.014	840
850	15.014	15.035	15.056	15.077	15.098	15.119	15.140	15.162	15.183	15.204	15.225	850
860	15.225	15.246	15.267	15.288	15.309	15.330	15.351	15.372	15.393	15.414	15.435	860
870	15.435	15.456	15.477	15.498	15.520	15.541	15.562	15.583	15.604	15.625	15.646	870
880	15.646	15.667	15.688	15.709	15.731	15.752	15.773	15.794	15.815	15.836	15.857	880
890	15.857	15.878	15.900	15.921	15.942	15.963	15.984	16.005	16.027	16.048	16.069	890
900	16.069	16.090	16.111	16.132	16.154	16.175	16.196	16.217	16.238	16.260	16.281	900
910	16.281	16.302	16.323	16.344	16.366	16.387	16.408	16.429	16.450	16.472	16.493	910
920	16.493	16.514	16.535	16.557	16.578	16.599	16.620	16.642	16.663	16.684	16.705	920
930	16.705	16.727	16.748	16.769	16.790	16.812	16.833	16.854	16.875	16.897	16.918	930
940	16.918	16.939	16.961	16.982	17.003	17.025	17.046	17.067	17.088	17.110	17.131	940
950	17.131	17.152	17.174	17.195	17.216	17.238	17.259	17.280	17.302	17.323	17.344	950
960	17.344	17.366	17.387	17.408	17.430	17.451	17.472	17.494	17.515	17.536	17.558	960
970	17.558	17.579	17.601	17.622	17.643	17.665	17.686	17.707	17.729	17.750	17.772	970
980	17.772	17.793	17.814	17.836	17.857	17.879	17.900	17.921	17.943	17.964	17.986	980
990	17.986	18.007	18.028	18.050	18.071	18.093	18.114	18.136	18.157	18.178	18.200	990
1000	18.200	18.221	18.243	18.264	18.286	18.307	18.328	18.350	18.371	18.393	18.414	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B8.1.2. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	18.200	18.221	18.243	18.264	18.286	18.307	18.328	18.350	18.371	18.393	18.414	1000
1010	18.414	18.436	18.457	18.479	18.500	18.522	18.543	18.565	18.586	18.608	18.629	1010
1020	18.629	18.650	18.672	18.693	18.715	18.736	18.758	18.779	18.801	18.822	18.844	1020
1030	18.844	18.865	18.887	18.908	18.930	18.951	18.973	18.994	19.016	19.037	19.059	1030
1040	19.059	19.081	19.102	19.124	19.145	19.167	19.188	19.210	19.231	19.253	19.274	1040
1050	19.274	19.296	19.317	19.339	19.360	19.382	19.404	19.425	19.447	19.468	19.490	1050
1060	19.490	19.511	19.533	19.554	19.576	19.598	19.619	19.641	19.662	19.684	19.705	1060
1070	19.705	19.727	19.749	19.770	19.792	19.813	19.835	19.857	19.878	19.900	19.921	1070
1080	19.921	19.943	19.964	19.986	20.008	20.029	20.051	20.072	20.094	20.116	20.137	1080
1090	20.137	20.159	20.181	20.202	20.224	20.245	20.267	20.289	20.310	20.332	20.353	1090
1100	20.353	20.375	20.397	20.418	20.440	20.462	20.483	20.505	20.527	20.548	20.570	1100
1110	20.570	20.591	20.613	20.635	20.656	20.678	20.700	20.721	20.743	20.765	20.786	1110
1120	20.786	20.808	20.830	20.851	20.873	20.895	20.916	20.938	20.960	20.981	21.003	1120
1130	21.003	21.025	21.046	21.068	21.090	21.111	21.133	21.155	21.176	21.198	21.220	1130
1140	21.220	21.241	21.263	21.285	21.306	21.328	21.350	21.371	21.393	21.415	21.437	1140
1150	21.437	21.458	21.480	21.502	21.523	21.545	21.567	21.588	21.610	21.632	21.654	1150
1160	21.654	21.675	21.697	21.719	21.740	21.762	21.784	21.806	21.827	21.849	21.871	1160
1170	21.871	21.892	21.914	21.936	21.958	21.979	22.001	22.023	22.044	22.066	22.088	1170
1180	22.088	22.110	22.131	22.153	22.175	22.197	22.218	22.240	22.262	22.284	22.305	1180
1190	22.305	22.327	22.349	22.370	22.392	22.414	22.436	22.457	22.479	22.501	22.523	1190
1200	22.523	22.544	22.566	22.588	22.610	22.631	22.653	22.675	22.697	22.718	22.740	1200
1210	22.740	22.762	22.784	22.805	22.827	22.849	22.871	22.893	22.914	22.936	22.958	1210
1220	22.958	22.980	23.001	23.023	23.045	23.067	23.088	23.110	23.132	23.154	23.176	1220
1230	23.176	23.197	23.219	23.241	23.263	23.284	23.306	23.328	23.350	23.372	23.393	1230
1240	23.393	23.415	23.437	23.459	23.480	23.502	23.524	23.546	23.568	23.589	23.611	1240
1250	23.611	23.633	23.655	23.676	23.698	23.720	23.742	23.764	23.785	23.807	23.829	1250
1260	23.829	23.851	23.873	23.894	23.916	23.938	23.960	23.982	24.003	24.025	24.047	1260
1270	24.047	24.069	24.091	24.112	24.134	24.156	24.178	24.200	24.221	24.243	24.265	1270
1280	24.265	24.287	24.309	24.330	24.352	24.374	24.396	24.418	24.439	24.461	24.483	1280
1290	24.483	24.505	24.527	24.548	24.570	24.592	24.614	24.636	24.658	24.679	24.701	1290
1300	24.701	24.723	24.745	24.767	24.788	24.810	24.832	24.854	24.876	24.897	24.919	1300
1310	24.919	24.941	24.963	24.985	25.007	25.028	25.050	25.072	25.094	25.116	25.137	1310
1320	25.137	25.159	25.181	25.203	25.225	25.247	25.268	25.290	25.312	25.334	25.356	1320
1330	25.356	25.377	25.399	25.421	25.443	25.465	25.487	25.508	25.530	25.552	25.574	1330
1340	25.574	25.596	25.618	25.639	25.661	25.683	25.705	25.727	25.748	25.770	25.792	1340
1350	25.792	25.814	25.836	25.858	25.879	25.901	25.923	25.945	25.967	25.989	26.010	1350
1360	26.010	26.032	26.054	26.076	26.098	26.119	26.141	26.163	26.185	26.207	26.229	1360
1370	26.229	26.250	26.272	26.294	26.316	26.338	26.360	26.381	26.403	26.425	26.447	1370
1380	26.447	26.469	26.491	26.512	26.534	26.556	26.578	26.600	26.622	26.643	26.665	1380
1390	26.665	26.687	26.709	26.731	26.752	26.774	26.796	26.818	26.840	26.862	26.883	1390
1400	26.883	26.905	26.927	26.949	26.971	26.993	27.014	27.036	27.058	27.080	27.102	1400
1410	27.102	27.124	27.145	27.167	27.189	27.211	27.233	27.254	27.276	27.298	27.320	1410
1420	27.320	27.342	27.364	27.385	27.407	27.429	27.451	27.473	27.495	27.516	27.538	1420
1430	27.538	27.560	27.582	27.604	27.625	27.647	27.669	27.691	27.713	27.735	27.756	1430
1440	27.756	27.778	27.800	27.822	27.844	27.866	27.887	27.909	27.931	27.953	27.975	1440
1450	27.975	27.996	28.018	28.040	28.062	28.084	28.105	28.127	28.149	28.171	28.193	1450
1460	28.193	28.215	28.236	28.258	28.280	28.302	28.324	28.345	28.367	28.389	28.411	1460
1470	28.411	28.433	28.455	28.476	28.498	28.520	28.542	28.564	28.585	28.607	28.629	1470
1480	28.629	28.651	28.673	28.694	28.716	28.738	28.760	28.782	28.803	28.825	28.847	1480
1490	28.847	28.869	28.891	28.912	28.934	28.956	28.978	29.000	29.021	29.043	29.065	1490
1500	29.065	29.087	29.109	29.130	29.152	29.174	29.196	29.218	29.239	29.261	29.283	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B8.1.2. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	29.065	29.087	29.109	29.130	29.152	29.174	29.196	29.218	29.239	29.261	29.283	**1500**
1510	29.283	29.305	29.327	29.348	29.370	29.392	29.414	29.436	29.457	29.479	29.501	**1510**
1520	29.501	29.523	29.545	29.566	29.588	29.610	29.632	29.653	29.675	29.697	29.719	**1520**
1530	29.719	29.741	29.762	29.784	29.806	29.828	29.850	29.871	29.893	29.915	29.937	**1530**
1540	29.937	29.958	29.980	30.002	30.024	30.046	30.067	30.089	30.111	30.133	30.154	**1540**
1550	30.154	30.176	30.198	30.220	30.242	30.263	30.285	30.307	30.329	30.350	30.372	**1550**
1560	30.372	30.394	30.416	30.437	30.459	30.481	30.503	30.524	30.546	30.568	30.590	**1560**
1570	30.590	30.611	30.633	30.655	30.677	30.699	30.720	30.742	30.764	30.786	30.807	**1570**
1580	30.807	30.829	30.851	30.873	30.894	30.916	30.938	30.960	30.981	31.003	31.025	**1580**
1590	31.025	31.047	31.068	31.090	31.112	31.133	31.155	31.177	31.199	31.220	31.242	**1590**
1600	31.242	31.264	31.286	31.307	31.329	31.351	31.373	31.394	31.416	31.438	31.459	**1600**
1610	31.459	31.481	31.503	31.525	31.546	31.568	31.590	31.612	31.633	31.655	31.677	**1610**
1620	31.677	31.698	31.720	31.742	31.764	31.785	31.807	31.829	31.850	31.872	31.894	**1620**
1630	31.894	31.916	31.937	31.959	31.981	32.002	32.024	32.046	32.068	32.089	32.111	**1630**
1640	32.111	32.133	32.154	32.176	32.198	32.219	32.241	32.263	32.284	32.306	32.328	**1640**
1650	32.328	32.350	32.371	32.393	32.415	32.436	32.458	32.480	32.501	32.523	32.545	**1650**
1660	32.545	32.566	32.588	32.610	32.631	32.653	32.675	32.696	32.718	32.740	32.761	**1660**
1670	32.761	32.783	32.805	32.826	32.848	32.870	32.891	32.913	32.935	32.956	32.978	**1670**
1680	32.978	33.000	33.021	33.043	33.065	33.086	33.108	33.130	33.151	33.173	33.195	**1680**
1690	33.195	33.216	33.238	33.260	33.281	33.303	33.325	33.346	33.368	33.389	33.411	**1690**
1700	33.411	33.433	33.454	33.476	33.498	33.519	33.541	33.563	33.584	33.606	33.627	**1700**
1710	33.627	33.649	33.671	33.692	33.714	33.736	33.757	33.779	33.800	33.822	33.844	**1710**
1720	33.844	33.865	33.887	33.908	33.930	33.952	33.973	33.995	34.016	34.038	34.060	**1720**
1730	34.060	34.081	34.103	34.124	34.146	34.168	34.189	34.211	34.232	34.254	34.276	**1730**
1740	34.276	34.297	34.319	34.340	34.362	34.384	34.405	34.427	34.448	34.470	34.491	**1740**
1750	34.491	34.513	34.535	34.556	34.578	34.599	34.621	34.642	34.664	34.686	34.707	**1750**
1760	34.707	34.729	34.750	34.772	34.793	34.815	34.836	34.858	34.879	34.901	34.923	**1760**
1770	34.923	34.944	34.966	34.987	35.009	35.030	35.052	35.073	35.095	35.116	35.138	**1770**
1780	35.138	35.160	35.181	35.203	35.224	35.246	35.267	35.289	35.310	35.332	35.353	**1780**
1790	35.353	35.375	35.396	35.418	35.439	35.461	35.482	35.504	35.525	35.547	35.568	**1790**
1800	35.568	35.590	35.611	35.633	35.654	35.676	35.697	35.719	35.740	35.762	35.783	**1800**
1810	35.783	35.805	35.826	35.848	35.869	35.891	35.912	35.934	35.955	35.977	35.998	**1810**
1820	35.998	36.019	36.041	36.062	36.084	36.105	36.127	36.148	36.170	36.191	36.213	**1820**
1830	36.213	36.234	36.256	36.277	36.298	36.320	36.341	36.363	36.384	36.406	36.427	**1830**
1840	36.427	36.449	36.470	36.491	36.513	36.534	36.556	36.577	36.599	36.620	36.641	**1840**
1850	36.641	36.663	36.684	36.706	36.727	36.748	36.770	36.791	36.813	36.834	36.855	**1850**
1860	36.855	36.877	36.898	36.920	36.941	36.962	36.984	37.005	37.027	37.048	37.069	**1860**
1870	37.069	37.091	37.112	37.134	37.155	37.176	37.198	37.219	37.240	37.262	37.283	**1870**
1880	37.283	37.305	37.326	37.347	37.369	37.390	37.411	37.433	37.454	37.475	37.497	**1880**
1890	37.497	37.518	37.539	37.561	37.582	37.603	37.625	37.646	37.667	37.689	37.710	**1890**
1900	37.710	37.731	37.753	37.774	37.795	37.817	37.838	37.859	37.881	37.902	37.923	**1900**
1910	37.923	37.945	37.966	37.987	38.009	38.030	38.051	38.073	38.094	38.115	38.136	**1910**
1920	38.136	38.158	38.179	38.200	38.222	38.243	38.264	38.285	38.307	38.328	38.349	**1920**
1930	38.349	38.370	38.392	38.413	38.434	38.456	38.477	38.498	38.519	38.541	38.562	**1930**
1940	38.562	38.583	38.604	38.626	38.647	38.668	38.689	38.711	38.732	38.753	38.774	**1940**
1950	38.774	38.795	38.817	38.838	38.859	38.880	38.902	38.923	38.944	38.965	38.986	**1950**
1960	38.986	39.008	39.029	39.050	39.071	39.093	39.114	39.135	39.156	39.177	39.198	**1960**
1970	39.198	39.220	39.241	39.262	39.283	39.304	39.326	39.347	39.368	39.389	39.410	**1970**
1980	39.410	39.431	39.453	39.474	39.495	39.516	39.537	39.558	39.580	39.601	39.622	**1980**
1990	39.622	39.643	39.664	39.685	39.706	39.728	39.749	39.770	39.791	39.812	39.833	**1990**
2000	39.833	39.854	39.875	39.897	39.918	39.939	39.960	39.981	40.002	40.023	40.044	**2000**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

TABLE B8.1.2. *Type N thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	39.833	39.854	39.875	39.897	39.918	39.939	39.960	39.981	40.002	40.023	40.044	2000
2010	40.044	40.066	40.087	40.108	40.129	40.150	40.171	40.192	40.213	40.234	40.255	2010
2020	40.255	40.276	40.297	40.319	40.340	40.361	40.382	40.403	40.424	40.445	40.466	2020
2030	40.466	40.487	40.508	40.529	40.550	40.571	40.592	40.613	40.634	40.655	40.677	2030
2040	40.677	40.698	40.719	40.740	40.761	40.782	40.803	40.824	40.845	40.866	40.887	2040
2050	40.887	40.908	40.929	40.950	40.971	40.992	41.013	41.034	41.055	41.076	41.097	2050
2060	41.097	41.118	41.139	41.160	41.181	41.202	41.223	41.244	41.265	41.286	41.307	2060
2070	41.307	41.328	41.349	41.370	41.390	41.411	41.432	41.453	41.474	41.495	41.516	2070
2080	41.516	41.537	41.558	41.579	41.600	41.621	41.642	41.663	41.684	41.705	41.725	2080
2090	41.725	41.746	41.767	41.788	41.809	41.830	41.851	41.872	41.893	41.914	41.935	2090
2100	41.935	41.955	41.976	41.997	42.018	42.039	42.060	42.081	42.102	42.123	42.143	2100
2110	42.143	42.164	42.185	42.206	42.227	42.248	42.269	42.289	42.310	42.331	42.352	2110
2120	42.352	42.373	42.394	42.415	42.435	42.456	42.477	42.498	42.519	42.540	42.560	2120
2130	42.560	42.581	42.602	42.623	42.644	42.664	42.685	42.706	42.727	42.748	42.768	2130
2140	42.768	42.789	42.810	42.831	42.852	42.872	42.893	42.914	42.935	42.956	42.976	2140
2150	42.976	42.997	43.018	43.039	43.059	43.080	43.101	43.122	43.142	43.163	43.184	2150
2160	43.184	43.205	43.225	43.246	43.267	43.288	43.308	43.329	43.350	43.370	43.391	2160
2170	43.391	43.412	43.433	43.453	43.474	43.495	43.515	43.536	43.557	43.578	43.598	2170
2180	43.598	43.619	43.640	43.660	43.681	43.702	43.722	43.743	43.764	43.784	43.805	2180
2190	43.805	43.826	43.846	43.867	43.888	43.908	43.929	43.950	43.970	43.991	44.012	2190
2200	44.012	44.032	44.053	44.073	44.094	44.115	44.135	44.156	44.177	44.197	44.218	2200
2210	44.218	44.238	44.259	44.280	44.300	44.321	44.341	44.362	44.383	44.403	44.424	2210
2220	44.424	44.444	44.465	44.485	44.506	44.527	44.547	44.568	44.588	44.609	44.629	2220
2230	44.629	44.650	44.671	44.691	44.712	44.732	44.753	44.773	44.794	44.814	44.835	2230
2240	44.835	44.855	44.876	44.896	44.917	44.937	44.958	44.978	44.999	45.019	45.040	2240
2250	45.040	45.060	45.081	45.101	45.122	45.142	45.163	45.183	45.204	45.224	45.245	2250
2260	45.245	45.265	45.286	45.306	45.326	45.347	45.367	45.388	45.408	45.429	45.449	2260
2270	45.449	45.469	45.490	45.510	45.531	45.551	45.572	45.592	45.612	45.633	45.653	2270
2280	45.653	45.674	45.694	45.714	45.735	45.755	45.775	45.796	45.816	45.837	45.857	2280
2290	45.857	45.877	45.898	45.918	45.938	45.959	45.979	45.999	46.020	46.040	46.060	2290
2300	46.060	46.081	46.101	46.121	46.142	46.162	46.182	46.202	46.223	46.243	46.263	2300
2310	46.263	46.284	46.304	46.324	46.344	46.365	46.385	46.405	46.425	46.446	46.466	2310
2320	46.466	46.486	46.506	46.527	46.547	46.567	46.587	46.608	46.628	46.648	46.668	2320
2330	46.668	46.688	46.709	46.729	46.749	46.769	46.789	46.810	46.830	46.850	46.870	2330
2340	46.870	46.890	46.910	46.931	46.951	46.971	46.991	47.011	47.031	47.051	47.071	2340
2350	47.071	47.092	47.112	47.132	47.152	47.172	47.192	47.212	47.232	47.252	47.272	2350
2360	47.272	47.292	47.312	47.333	47.353	47.373	47.393	47.413	47.433	47.453	47.473	2360
2370	47.473	47.493	47.513									2370
°F	0	1	2	3	4	5	6	7	8	9	10	°F

B8.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B8.2.1 and B8.2.2 was obtained by iteration of the reference function for type N thermocouples given in the main text (see table 8.3.1). Table B8.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −4.34 mV to 47.51 mV, and table B8.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−4.30	−245.88	−248.92	−252.45	−256.81	−263.14							−4.30
−4.20	−225.64	−227.24	−228.89	−230.62	−232.42	−234.31	−236.31	−238.43	−240.71	−243.17	−245.88	−4.20
−4.10	−212.02	−213.24	−214.49	−215.76	−217.06	−218.39	−219.76	−221.16	−222.61	−224.10	−225.64	−4.10
−4.00	−200.98	−202.00	−203.05	−204.10	−205.18	−206.27	−207.38	−208.51	−209.66	−210.83	−212.02	−4.00
−3.90	−191.39	−192.30	−193.22	−194.15	−195.09	−196.04	−197.00	−197.98	−198.96	−199.96	−200.98	−3.90
−3.80	−182.78	−183.61	−184.44	−185.28	−186.13	−186.99	−187.85	−188.72	−189.60	−190.49	−191.39	−3.80
−3.70	−174.88	−175.65	−176.42	−177.19	−177.97	−178.76	−179.55	−180.35	−181.15	−181.97	−182.78	−3.70
−3.60	−167.52	−168.24	−168.96	−169.68	−170.41	−171.14	−171.88	−172.62	−173.37	−174.12	−174.88	−3.60
−3.50	−160.60	−161.27	−161.95	−162.64	−163.32	−164.01	−164.71	−165.40	−166.11	−166.81	−167.52	−3.50
−3.40	−154.03	−154.67	−155.31	−155.96	−156.62	−157.27	−157.93	−158.59	−159.26	−159.93	−160.60	−3.40
−3.30	−147.75	−148.37	−148.98	−149.61	−150.23	−150.85	−151.48	−152.11	−152.75	−153.39	−154.03	−3.30
−3.20	−141.73	−142.32	−142.92	−143.51	−144.11	−144.71	−145.32	−145.92	−146.53	−147.14	−147.75	−3.20
−3.10	−135.93	−136.50	−137.07	−137.65	−138.23	−138.81	−139.39	−139.97	−140.55	−141.14	−141.73	−3.10
−3.00	−130.32	−130.88	−131.43	−131.99	−132.54	−133.10	−133.67	−134.23	−134.79	−135.36	−135.93	−3.00
−2.90	−124.88	−125.42	−125.96	−126.50	−127.04	−127.58	−128.13	−128.67	−129.22	−129.77	−130.32	−2.90
−2.80	−119.60	−120.12	−120.64	−121.17	−121.69	−122.22	−122.75	−123.28	−123.82	−124.35	−124.88	−2.80
−2.70	−114.44	−114.95	−115.47	−115.98	−116.49	−117.00	−117.52	−118.04	−118.56	−119.08	−119.60	−2.70
−2.60	−109.41	−109.91	−110.41	−110.91	−111.41	−111.92	−112.42	−112.92	−113.43	−113.94	−114.44	−2.60
−2.50	−104.49	−104.98	−105.47	−105.96	−106.45	−106.94	−107.43	−107.93	−108.42	−108.92	−109.41	−2.50
−2.40	−99.67	−100.15	−100.63	−101.11	−101.59	−102.07	−102.56	−103.04	−103.52	−104.01	−104.49	−2.40
−2.30	−94.95	−95.41	−95.88	−96.36	−96.83	−97.30	−97.77	−98.25	−98.72	−99.20	−99.67	−2.30
−2.20	−90.30	−90.76	−91.22	−91.69	−92.15	−92.61	−93.08	−93.54	−94.01	−94.48	−94.95	−2.20
−2.10	−85.73	−86.19	−86.64	−87.09	−87.55	−88.01	−88.46	−88.92	−89.38	−89.84	−90.30	−2.10
−2.00	−81.23	−81.68	−82.13	−82.58	−83.02	−83.47	−83.92	−84.38	−84.83	−85.28	−85.73	−2.00
−1.90	−76.80	−77.24	−77.68	−78.12	−78.56	−79.01	−79.45	−79.90	−80.34	−80.79	−81.23	−1.90
−1.80	−72.42	−72.86	−73.29	−73.73	−74.17	−74.60	−75.04	−75.48	−75.92	−76.36	−76.80	−1.80
−1.70	−68.10	−68.53	−68.96	−69.39	−69.83	−70.26	−70.69	−71.12	−71.56	−71.99	−72.42	−1.70
−1.60	−63.83	−64.26	−64.68	−65.11	−65.54	−65.96	−66.39	−66.82	−67.25	−67.67	−68.10	−1.60
−1.50	−59.61	−60.03	−60.45	−60.87	−61.30	−61.72	−62.14	−62.56	−62.99	−63.41	−63.83	−1.50
−1.40	−55.43	−55.85	−56.26	−56.68	−57.10	−57.52	−57.93	−58.35	−58.77	−59.19	−59.61	−1.40
−1.30	−51.29	−51.70	−52.12	−52.53	−52.94	−53.36	−53.77	−54.19	−54.60	−55.02	−55.43	−1.30
−1.20	−47.19	−47.60	−48.01	−48.42	−48.83	−49.24	−49.65	−50.06	−50.47	−50.88	−51.29	−1.20
−1.10	−43.12	−43.53	−43.93	−44.34	−44.74	−45.15	−45.56	−45.97	−46.37	−46.78	−47.19	−1.10
−1.00	−39.08	−39.49	−39.89	−40.29	−40.70	−41.10	−41.50	−41.91	−42.31	−42.72	−43.12	−1.00
−0.90	−35.08	−35.48	−35.88	−36.28	−36.68	−37.08	−37.48	−37.88	−38.28	−38.68	−39.08	−0.90
−0.80	−31.10	−31.49	−31.89	−32.29	−32.68	−33.08	−33.48	−33.88	−34.28	−34.68	−35.08	−0.80
−0.70	−27.14	−27.53	−27.93	−28.32	−28.72	−29.11	−29.51	−29.91	−30.30	−30.70	−31.10	−0.70
−0.60	−23.21	−23.60	−23.99	−24.38	−24.78	−25.17	−25.56	−25.96	−26.35	−26.75	−27.14	−0.80
−0.50	−19.30	−19.69	−20.08	−20.47	−20.86	−21.25	−21.64	−22.03	−22.42	−22.81	−23.21	−0.50
−0.40	−15.40	−15.79	−16.18	−16.57	−16.96	−17.35	−17.74	−18.13	−18.52	−18.91	−19.30	−0.40
−0.30	−11.53	−11.92	−12.30	−12.69	−13.08	−13.46	−13.85	−14.24	−14.63	−15.02	−15.40	−0.30
−0.20	−7.67	−8.06	−8.44	−8.83	−9.21	−9.60	−9.98	−10.37	−10.76	−11.14	−11.53	−0.20
−0.10	−3.83	−4.21	−4.60	−4.98	−5.36	−5.75	−6.13	−6.52	−6.90	−7.29	−7.67	−0.10
0.00	0.00	−0.38	−0.76	−1.15	−1.53	−1.91	−2.30	−2.68	−3.06	−3.45	−3.83	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
0.00	0.00	0.39	0.77	1.16	1.54	1.93	2.31	2.70	3.08	3.46	3.85	**0.00**
0.10	3.85	4.23	4.61	5.00	5.38	5.76	6.15	6.53	6.91	7.29	7.68	**0.10**
0.20	7.68	8.06	8.44	8.82	9.20	9.58	9.97	10.35	10.73	11.11	11.49	**0.20**
0.30	11.49	11.87	12.25	12.63	13.01	13.39	13.76	14.14	14.52	14.90	15.28	**0.30**
0.40	15.28	15.66	16.04	16.41	16.79	17.17	17.55	17.92	18.30	18.68	19.05	**0.40**
0.50	19.05	19.43	19.81	20.18	20.56	20.93	21.31	21.68	22.06	22.43	22.81	**0.50**
0.60	22.81	23.18	23.56	23.93	24.30	24.68	25.05	25.42	25.80	26.17	26.54	**0.60**
0.70	26.54	26.91	27.29	27.66	28.03	28.40	28.77	29.15	29.52	29.89	30.26	**0.70**
0.80	30.26	30.63	31.00	31.37	31.74	32.11	32.48	32.85	33.22	33.59	33.96	**0.80**
0.90	33.96	34.33	34.69	35.06	35.43	35.80	36.17	36.53	36.90	37.27	37.64	**0.90**
1.00	37.64	38.00	38.37	38.74	39.10	39.47	39.83	40.20	40.57	40.93	41.30	**1.00**
1.10	41.30	41.66	42.03	42.39	42.76	43.12	43.48	43.85	44.21	44.57	44.94	**1.10**
1.20	44.94	45.30	45.66	46.03	46.39	46.75	47.11	47.48	47.84	48.20	48.56	**1.20**
1.30	48.56	48.92	49.28	49.65	50.01	50.37	50.73	51.09	51.45	51.81	52.17	**1.30**
1.40	52.17	52.53	52.89	53.25	53.60	53.96	54.32	54.68	55.04	55.40	55.75	**1.40**
1.50	55.75	56.11	56.47	56.83	57.18	57.54	57.90	58.26	58.61	58.97	59.32	**1.50**
1.60	59.32	59.68	60.04	60.39	60.75	61.10	61.46	61.81	62.17	62.52	62.88	**1.60**
1.70	62.88	63.23	63.59	63.94	64.29	64.65	65.00	65.35	65.71	66.06	66.41	**1.70**
1.80	66.41	66.77	67.12	67.47	67.82	68.17	68.53	68.88	69.23	69.58	69.93	**1.80**
1.90	69.93	70.28	70.63	70.98	71.33	71.68	72.03	72.38	72.73	73.08	73.43	**1.90**
2.00	73.43	73.78	74.13	74.48	74.83	75.18	75.53	75.87	76.22	76.57	76.92	**2.00**
2.10	76.92	77.26	77.61	77.96	78.31	78.65	79.00	79.35	79.69	80.04	80.39	**2.10**
2.20	80.39	80.73	81.08	81.42	81.77	82.11	82.46	82.80	83.15	83.49	83.84	**2.20**
2.30	83.84	84.18	84.53	84.87	85.22	85.56	85.90	86.25	86.59	86.93	87.28	**2.30**
2.40	87.28	87.62	87.96	88.30	88.65	88.99	89.33	89.67	90.01	90.36	90.70	**2.40**
2.50	90.70	91.04	91.38	91.72	92.06	92.40	92.74	93.08	93.42	93.76	94.10	**2.50**
2.60	94.10	94.44	94.78	95.12	95.46	95.80	96.14	96.48	96.82	97.16	97.50	**2.60**
2.70	97.50	97.83	98.17	98.51	98.85	99.19	99.52	99.86	100.20	100.54	100.87	**2.70**
2.80	100.87	101.21	101.55	101.88	102.22	102.56	102.89	103.23	103.56	103.90	104.23	**2.80**
2.90	104.23	104.57	104.91	105.24	105.58	105.91	106.25	106.58	106.91	107.25	107.58	**2.90**
3.00	107.58	107.92	108.25	108.59	108.92	109.25	109.59	109.92	110.25	110.59	110.92	**3.00**
3.10	110.92	111.25	111.58	111.92	112.25	112.58	112.91	113.24	113.58	113.91	114.24	**3.10**
3.20	114.24	114.57	114.90	115.23	115.56	115.89	116.23	116.56	116.89	117.22	117.55	**3.20**
3.30	117.55	117.88	118.21	118.54	118.87	119.20	119.52	119.85	120.18	120.51	120.84	**3.30**
3.40	120.84	121.17	121.50	121.83	122.16	122.48	122.81	123.14	123.47	123.80	124.12	**3.40**
3.50	124.12	124.45	124.78	125.10	125.43	125.76	126.09	126.41	126.74	127.07	127.39	**3.50**
3.60	127.39	127.72	128.04	128.37	128.70	129.02	129.35	129.67	130.00	130.32	130.65	**3.60**
3.70	130.65	130.97	131.30	131.62	131.95	132.27	132.60	132.92	133.25	133.57	133.89	**3.70**
3.80	133.89	134.22	134.54	134.86	135.19	135.51	135.83	136.16	136.48	136.80	137.13	**3.80**
3.90	137.13	137.45	137.77	138.09	138.42	138.74	139.06	139.38	139.70	140.02	140.35	**3.90**
4.00	140.35	140.67	140.99	141.31	141.63	141.95	142.27	142.59	142.91	143.24	143.56	**4.00**
4.10	143.56	143.88	144.20	144.52	144.84	145.16	145.48	145.80	146.12	146.43	146.75	**4.10**
4.20	146.75	147.07	147.39	147.71	148.03	148.35	148.67	148.99	149.30	149.62	149.94	**4.20**
4.30	149.94	150.26	150.58	150.90	151.21	151.53	151.85	152.17	152.48	152.80	153.12	**4.30**
4.40	153.12	153.43	153.75	154.07	154.39	154.70	155.02	155.33	155.65	155.97	156.28	**4.40**
4.50	156.28	156.60	156.92	157.23	157.55	157.86	158.18	158.49	158.81	159.12	159.44	**4.50**
4.60	159.44	159.75	160.07	160.38	160.70	161.01	161.33	161.64	161.96	162.27	162.58	**4.60**
4.70	162.58	162.90	163.21	163.53	163.84	164.15	164.47	164.78	165.09	165.41	165.72	**4.70**
4.80	165.72	166.03	166.34	166.66	166.97	167.28	167.60	167.91	168.22	168.53	168.84	**4.80**
4.90	168.84	169.16	169.47	169.78	170.09	170.40	170.71	171.03	171.34	171.65	171.96	**4.90**
5.00	171.96	172.27	172.58	172.89	173.20	173.51	173.82	174.13	174.45	174.76	175.07	**5.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.1. ***Type N thermocouples*** *--- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	171.96	172.27	172.58	172.89	173.20	173.51	173.82	174.13	174.45	174.76	175.07	5.00
5.10	175.07	175.38	175.69	176.00	176.31	176.62	176.92	177.23	177.54	177.85	178.16	5.10
5.20	178.16	178.47	178.78	179.09	179.40	179.71	180.02	180.32	180.63	180.94	181.25	5.20
5.30	181.25	181.56	181.87	182.17	182.48	182.79	183.10	183.41	183.71	184.02	184.33	5.30
5.40	184.33	184.64	184.94	185.25	185.56	185.86	186.17	186.48	186.79	187.09	187.40	5.40
5.50	187.40	187.71	188.01	188.32	188.62	188.93	189.24	189.54	189.85	190.15	190.46	5.50
5.60	190.46	190.77	191.07	191.38	191.68	191.99	192.29	192.60	192.90	193.21	193.51	5.60
5.70	193.51	193.82	194.12	194.43	194.73	195.04	195.34	195.64	195.95	196.25	196.56	5.70
5.80	196.56	196.86	197.16	197.47	197.77	198.08	198.38	198.68	198.99	199.29	199.59	5.80
5.90	199.59	199.90	200.20	200.50	200.81	201.11	201.41	201.71	202.02	202.32	202.62	5.90
6.00	202.62	202.92	203.23	203.53	203.83	204.13	204.43	204.74	205.04	205.34	205.64	6.00
6.10	205.64	205.94	206.24	206.55	206.85	207.15	207.45	207.75	208.05	208.35	208.65	6.10
6.20	208.65	208.96	209.26	209.56	209.86	210.16	210.46	210.76	211.06	211.36	211.66	6.20
6.30	211.66	211.96	212.26	212.56	212.86	213.16	213.46	213.76	214.06	214.36	214.66	6.30
6.40	214.66	214.96	215.26	215.55	215.85	216.15	216.45	216.75	217.05	217.35	217.65	6.40
6.50	217.65	217.95	218.24	218.54	218.84	219.14	219.44	219.74	220.03	220.33	220.63	6.50
6.60	220.63	220.93	221.23	221.52	221.82	222.12	222.42	222.71	223.01	223.31	223.61	6.60
6.70	223.61	223.90	224.20	224.50	224.79	225.09	225.39	225.68	225.98	226.28	226.57	6.70
6.80	226.57	226.87	227.17	227.46	227.76	228.06	228.35	228.65	228.94	229.24	229.54	6.80
6.90	229.54	229.83	230.13	230.42	230.72	231.02	231.31	231.61	231.90	232.20	232.49	6.90
7.00	232.49	232.79	233.08	233.38	233.67	233.97	234.26	234.56	234.85	235.15	235.44	7.00
7.10	235.44	235.74	236.03	236.32	236.62	236.91	237.21	237.50	237.80	238.09	238.38	7.10
7.20	238.38	238.68	238.97	239.26	239.56	239.85	240.15	240.44	240.73	241.03	241.32	7.20
7.30	241.32	241.61	241.91	242.20	242.49	242.78	243.08	243.37	243.66	243.96	244.25	7.30
7.40	244.25	244.54	244.83	245.13	245.42	245.71	246.00	246.30	246.59	246.88	247.17	7.40
7.50	247.17	247.46	247.76	248.05	248.34	248.63	248.92	249.21	249.51	249.80	250.09	7.50
7.60	250.09	250.38	250.67	250.96	251.25	251.55	251.84	252.13	252.42	252.71	253.00	7.60
7.70	253.00	253.29	253.58	253.87	254.16	254.45	254.74	255.03	255.32	255.61	255.91	7.70
7.80	255.91	256.20	256.49	256.78	257.07	257.36	257.65	257.94	258.23	258.52	258.80	7.80
7.90	258.80	259.09	259.38	259.67	259.96	260.25	260.54	260.83	261.12	261.41	261.70	7.90
8.00	261.70	261.99	262.28	262.57	262.85	263.14	263.43	263.72	264.01	264.30	264.59	8.00
8.10	264.59	264.88	265.16	265.45	265.74	266.03	266.32	266.61	266.89	267.18	267.47	8.10
8.20	267.47	267.76	268.05	268.33	268.62	268.91	269.20	269.48	269.77	270.06	270.35	8.20
8.30	270.35	270.63	270.92	271.21	271.50	271.78	272.07	272.36	272.64	272.93	273.22	8.30
8.40	273.22	273.51	273.79	274.08	274.37	274.65	274.94	275.23	275.51	275.80	276.09	8.40
8.50	276.09	276.37	276.66	276.94	277.23	277.52	277.80	278.09	278.37	278.66	278.95	8.50
8.60	278.95	279.23	279.52	279.80	280.09	280.38	280.66	280.95	281.23	281.52	281.80	8.60
8.70	281.80	282.09	282.37	282.66	282.94	283.23	283.51	283.80	284.08	284.37	284.65	8.70
8.80	284.65	284.94	285.22	285.51	285.79	286.08	286.36	286.65	286.93	287.22	287.50	8.80
8.90	287.50	287.78	288.07	288.35	288.64	288.92	289.21	289.49	289.77	290.06	290.34	8.90
9.00	290.34	290.63	290.91	291.19	291.48	291.76	292.04	292.33	292.61	292.90	293.18	9.00
9.10	293.18	293.46	293.75	294.03	294.31	294.60	294.88	295.16	295.44	295.73	296.01	9.10
9.20	296.01	296.29	296.58	296.86	297.14	297.42	297.71	297.99	298.27	298.56	298.84	9.20
9.30	298.84	299.12	299.40	299.69	299.97	300.25	300.53	300.81	301.10	301.38	301.66	9.30
9.40	301.66	301.94	302.22	302.51	302.79	303.07	303.35	303.63	303.92	304.20	304.48	9.40
9.50	304.48	304.76	305.04	305.32	305.60	305.89	306.17	306.45	306.73	307.01	307.29	9.50
9.60	307.29	307.57	307.85	308.14	308.42	308.70	308.98	309.26	309.54	309.82	310.10	9.60
9.70	310.10	310.38	310.66	310.94	311.22	311.50	311.79	312.07	312.35	312.63	312.91	9.70
9.80	312.91	313.19	313.47	313.75	314.03	314.31	314.59	314.87	315.15	315.43	315.71	9.80
9.90	315.71	315.99	316.27	316.55	316.83	317.11	317.39	317.67	317.94	318.22	318.50	9.90
10.00	318.50	318.78	319.06	319.34	319.62	319.90	320.18	320.46	320.74	321.02	321.30	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	318.50	318.78	319.06	319.34	319.62	319.90	320.18	320.46	320.74	321.02	321.30	**10.00**
10.10	321.30	321.58	321.85	322.13	322.41	322.69	322.97	323.25	323.53	323.81	324.08	**10.10**
10.20	324.08	324.36	324.64	324.92	325.20	325.48	325.76	326.03	326.31	326.59	326.87	**10.20**
10.30	326.87	327.15	327.43	327.70	327.98	328.26	328.54	328.82	329.09	329.37	329.65	**10.30**
10.40	329.65	329.93	330.20	330.48	330.76	331.04	331.32	331.59	331.87	332.15	332.43	**10.40**
10.50	332.43	332.70	332.98	333.26	333.53	333.81	334.09	334.37	334.64	334.92	335.20	**10.50**
10.60	335.20	335.48	335.75	336.03	336.31	336.58	336.86	337.14	337.41	337.69	337.97	**10.60**
10.70	337.97	338.24	338.52	338.80	339.07	339.35	339.63	339.90	340.18	340.46	340.73	**10.70**
10.80	340.73	341.01	341.28	341.56	341.84	342.11	342.39	342.66	342.94	343.22	343.49	**10.80**
10.90	343.49	343.77	344.04	344.32	344.60	344.87	345.15	345.42	345.70	345.97	346.25	**10.90**
11.00	346.25	346.53	346.80	347.08	347.35	347.63	347.90	348.18	348.45	348.73	349.00	**11.00**
11.10	349.00	349.28	349.55	349.83	350.11	350.38	350.66	350.93	351.21	351.48	351.75	**11.10**
11.20	351.75	352.03	352.30	352.58	352.85	353.13	353.40	353.68	353.95	354.23	354.50	**11.20**
11.30	354.50	354.78	355.05	355.33	355.60	355.87	356.15	356.42	356.70	356.97	357.25	**11.30**
11.40	357.25	357.52	357.79	358.07	358.34	358.62	358.89	359.16	359.44	359.71	359.99	**11.40**
11.50	359.99	360.26	360.53	360.81	361.08	361.35	361.63	361.90	362.18	362.45	362.72	**11.50**
11.60	362.72	363.00	363.27	363.54	363.82	364.09	364.36	364.64	364.91	365.18	365.46	**11.60**
11.70	365.46	365.73	366.00	366.28	366.55	366.82	367.09	367.37	367.64	367.91	368.19	**11.70**
11.80	368.19	368.46	368.73	369.00	369.28	369.55	369.82	370.10	370.37	370.64	370.91	**11.80**
11.90	370.91	371.19	371.46	371.73	372.00	372.28	372.55	372.82	373.09	373.36	373.64	**11.90**
12.00	373.64	373.91	374.18	374.45	374.73	375.00	375.27	375.54	375.81	376.09	376.36	**12.00**
12.10	376.36	376.63	376.90	377.17	377.44	377.72	377.99	378.26	378.53	378.80	379.07	**12.10**
12.20	379.07	379.35	379.62	379.89	380.16	380.43	380.70	380.98	381.25	381.52	381.79	**12.20**
12.30	381.79	382.06	382.33	382.60	382.87	383.15	383.42	383.69	383.96	384.23	384.50	**12.30**
12.40	384.50	384.77	385.04	385.31	385.58	385.86	386.13	386.40	386.67	386.94	387.21	**12.40**
12.50	387.21	387.48	387.75	388.02	388.29	388.56	388.83	389.10	389.37	389.64	389.91	**12.50**
12.60	389.91	390.19	390.46	390.73	391.00	391.27	391.54	391.81	392.08	392.35	392.62	**12.60**
12.70	392.62	392.89	393.16	393.43	393.70	393.97	394.24	394.51	394.78	395.05	395.32	**12.70**
12.80	395.32	395.59	395.86	396.13	396.40	396.67	396.94	397.21	397.48	397.74	398.01	**12.80**
12.90	398.01	398.28	398.55	398.82	399.09	399.36	399.63	399.90	400.17	400.44	400.71	**12.90**
13.00	400.71	400.98	401.25	401.52	401.79	402.05	402.32	402.59	402.86	403.13	403.40	**13.00**
13.10	403.40	403.67	403.94	404.21	404.48	404.74	405.01	405.28	405.55	405.82	406.09	**13.10**
13.20	406.09	406.36	406.63	406.90	407.16	407.43	407.70	407.97	408.24	408.51	408.78	**13.20**
13.30	408.78	409.04	409.31	409.58	409.85	410.12	410.39	410.65	410.92	411.19	411.46	**13.30**
13.40	411.46	411.73	412.00	412.26	412.53	412.80	413.07	413.34	413.60	413.87	414.14	**13.40**
13.50	414.14	414.41	414.68	414.94	415.21	415.48	415.75	416.01	416.28	416.55	416.82	**13.50**
13.60	416.82	417.09	417.35	417.62	417.89	418.16	418.42	418.69	418.96	419.23	419.49	**13.60**
13.70	419.49	419.76	420.03	420.30	420.56	420.83	421.10	421.37	421.63	421.90	422.17	**13.70**
13.80	422.17	422.43	422.70	422.97	423.24	423.50	423.77	424.04	424.30	424.57	424.84	**13.80**
13.90	424.84	425.10	425.37	425.64	425.91	426.17	426.44	426.71	426.97	427.24	427.51	**13.90**
14.00	427.51	427.77	428.04	428.31	428.57	428.84	429.11	429.37	429.64	429.91	430.17	**14.00**
14.10	430.17	430.44	430.71	430.97	431.24	431.50	431.77	432.04	432.30	432.57	432.84	**14.10**
14.20	432.84	433.10	433.37	433.63	433.90	434.17	434.43	434.70	434.97	435.23	435.50	**14.20**
14.30	435.50	435.76	436.03	436.30	436.56	436.83	437.09	437.36	437.62	437.89	438.16	**14.30**
14.40	438.16	438.42	438.69	438.95	439.22	439.49	439.75	440.02	440.28	440.55	440.81	**14.40**
14.50	440.81	441.08	441.34	441.61	441.88	442.14	442.41	442.67	442.94	443.20	443.47	**14.50**
14.60	443.47	443.73	444.00	444.26	444.53	444.79	445.06	445.32	445.59	445.86	446.12	**14.60**
14.70	446.12	446.39	446.65	446.92	447.18	447.45	447.71	447.98	448.24	448.51	448.77	**14.70**
14.80	448.77	449.04	449.30	449.57	449.83	450.09	450.36	450.62	450.89	451.15	451.42	**14.80**
14.90	451.42	451.68	451.95	452.21	452.48	452.74	453.01	453.27	453.54	453.80	454.06	**14.90**
15.00	454.06	454.33	454.59	454.86	455.12	455.39	455.65	455.92	456.18	456.44	456.71	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
15.00	454.06	454.33	454.59	454.86	455.12	455.39	455.65	455.92	456.18	456.44	456.71	**15.00**
15.10	456.71	456.97	457.24	457.50	457.77	458.03	458.29	458.56	458.82	459.09	459.35	**15.10**
15.20	459.35	459.61	459.88	460.14	460.41	460.67	460.93	461.20	461.46	461.73	461.99	**15.20**
15.30	461.99	462.25	462.52	462.78	463.05	463.31	463.57	463.84	464.10	464.36	464.63	**15.30**
15.40	464.63	464.89	465.15	465.42	465.68	465.95	466.21	466.47	466.74	467.00	467.26	**15.40**
15.50	467.26	467.53	467.79	468.05	468.32	468.58	468.84	469.11	469.37	469.63	469.90	**15.50**
15.60	469.90	470.16	470.42	470.69	470.95	471.21	471.48	471.74	472.00	472.27	472.53	**15.60**
15.70	472.53	472.79	473.06	473.32	473.58	473.84	474.11	474.37	474.63	474.90	475.16	**15.70**
15.80	475.16	475.42	475.69	475.95	476.21	476.47	476.74	477.00	477.26	477.52	477.79	**15.80**
15.90	477.79	478.05	478.31	478.58	478.84	479.10	479.36	479.63	479.89	480.15	480.41	**15.90**
16.00	480.41	480.68	480.94	481.20	481.46	481.73	481.99	482.25	482.51	482.78	483.04	**16.00**
16.10	483.04	483.30	483.56	483.83	484.09	484.35	484.61	484.87	485.14	485.40	485.66	**16.10**
16.20	485.66	485.92	486.19	486.45	486.71	486.97	487.23	487.50	487.76	488.02	488.28	**16.20**
16.30	488.28	488.54	488.81	489.07	489.33	489.59	489.85	490.12	490.38	490.64	490.90	**16.30**
16.40	490.90	491.16	491.43	491.69	491.95	492.21	492.47	492.73	493.00	493.26	493.52	**16.40**
16.50	493.52	493.78	494.04	494.30	494.57	494.83	495.09	495.35	495.61	495.87	496.14	**16.50**
16.60	496.14	496.40	496.66	496.92	497.18	497.44	497.70	497.97	498.23	498.49	498.75	**16.60**
16.70	498.75	499.01	499.27	499.53	499.79	500.06	500.32	500.58	500.84	501.10	501.36	**16.70**
16.80	501.36	501.62	501.88	502.15	502.41	502.67	502.93	503.19	503.45	503.71	503.97	**16.80**
16.90	503.97	504.23	504.50	504.76	505.02	505.28	505.54	505.80	506.06	506.32	506.58	**16.90**
17.00	506.58	506.84	507.10	507.37	507.63	507.89	508.15	508.41	508.67	508.93	509.19	**17.00**
17.10	509.19	509.45	509.71	509.97	510.23	510.49	510.75	511.02	511.28	511.54	511.80	**17.10**
17.20	511.80	512.06	512.32	512.58	512.84	513.10	513.36	513.62	513.88	514.14	514.40	**17.20**
17.30	514.40	514.66	514.92	515.18	515.44	515.70	515.96	516.22	516.48	516.75	517.01	**17.30**
17.40	517.01	517.27	517.53	517.79	518.05	518.31	518.57	518.83	519.09	519.35	519.61	**17.40**
17.50	519.61	519.87	520.13	520.39	520.65	520.91	521.17	521.43	521.69	521.95	522.21	**17.50**
17.60	522.21	522.47	522.73	522.99	523.25	523.51	523.77	524.03	524.29	524.55	524.81	**17.60**
17.70	524.81	525.07	525.33	525.59	525.85	526.11	526.37	526.63	526.89	527.14	527.40	**17.70**
17.80	527.40	527.66	527.92	528.18	528.44	528.70	528.96	529.22	529.48	529.74	530.00	**17.80**
17.90	530.00	530.26	530.52	530.78	531.04	531.30	531.56	531.82	532.08	532.34	532.60	**17.90**
18.00	532.60	532.86	533.11	533.37	533.63	533.89	534.15	534.41	534.67	534.93	535.19	**18.00**
18.10	535.19	535.45	535.71	535.97	536.23	536.49	536.75	537.00	537.26	537.52	537.78	**18.10**
18.20	537.78	538.04	538.30	538.56	538.82	539.08	539.34	539.60	539.85	540.11	540.37	**18.20**
18.30	540.37	540.63	540.89	541.15	541.41	541.67	541.93	542.19	542.45	542.70	542.96	**18.30**
18.40	542.96	543.22	543.48	543.74	544.00	544.26	544.52	544.78	545.03	545.29	545.55	**18.40**
18.50	545.55	545.81	546.07	546.33	546.59	546.85	547.10	547.36	547.62	547.88	548.14	**18.50**
18.60	548.14	548.40	548.66	548.91	549.17	549.43	549.69	549.95	550.21	550.47	550.73	**18.60**
18.70	550.73	550.98	551.24	551.50	551.76	552.02	552.28	552.53	552.79	553.05	553.31	**18.70**
18.80	553.31	553.57	553.83	554.09	554.34	554.60	554.86	555.12	555.38	555.64	555.89	**18.80**
18.90	555.89	556.15	556.41	556.67	556.93	557.19	557.44	557.70	557.96	558.22	558.48	**18.90**
19.00	558.48	558.74	558.99	559.25	559.51	559.77	560.03	560.28	560.54	560.80	561.06	**19.00**
19.10	561.06	561.32	561.57	561.83	562.09	562.35	562.61	562.87	563.12	563.38	563.64	**19.10**
19.20	563.64	563.90	564.16	564.41	564.67	564.93	565.19	565.44	565.70	565.96	566.22	**19.20**
19.30	566.22	566.48	566.73	566.99	567.25	567.51	567.77	568.02	568.28	568.54	568.80	**19.30**
19.40	568.80	569.05	569.31	569.57	569.83	570.09	570.34	570.60	570.86	571.12	571.37	**19.40**
19.50	571.37	571.63	571.89	572.15	572.41	572.66	572.92	573.18	573.44	573.69	573.95	**19.50**
19.60	573.95	574.21	574.47	574.72	574.98	575.24	575.50	575.75	576.01	576.27	576.53	**19.60**
19.70	576.53	576.78	577.04	577.30	577.56	577.81	578.07	578.33	578.59	578.84	579.10	**19.70**
19.80	579.10	579.36	579.62	579.87	580.13	580.39	580.64	580.90	581.16	581.42	581.67	**19.80**
19.90	581.67	581.93	582.19	582.45	582.70	582.96	583.22	583.48	583.73	583.99	584.25	**19.90**
20.00	584.25	584.50	584.76	585.02	585.28	585.53	585.79	586.05	586.30	586.56	586.82	20.00
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
20.00	584.25	584.50	584.76	585.02	585.28	585.53	585.79	586.05	586.30	586.56	586.82	**20.00**
20.10	586.82	587.08	587.33	587.59	587.85	588.10	588.36	588.62	588.88	589.13	589.39	**20.10**
20.20	589.39	589.65	589.90	590.16	590.42	590.67	590.93	591.19	591.45	591.70	591.96	**20.20**
20.30	591.96	592.22	592.47	592.73	592.99	593.24	593.50	593.76	594.01	594.27	594.53	**20.30**
20.40	594.53	594.78	595.04	595.30	595.56	595.81	596.07	596.33	596.58	596.84	597.10	**20.40**
20.50	597.10	597.35	597.61	597.87	598.12	598.38	598.64	598.89	599.15	599.41	599.66	**20.50**
20.60	599.66	599.92	600.18	600.43	600.69	600.95	601.20	601.46	601.72	601.97	602.23	**20.60**
20.70	602.23	602.49	602.74	603.00	603.26	603.51	603.77	604.03	604.28	604.54	604.80	**20.70**
20.80	604.80	605.05	605.31	605.57	605.82	606.08	606.33	606.59	606.85	607.10	607.36	**20.80**
20.90	607.36	607.62	607.87	608.13	608.39	608.64	608.90	609.16	609.41	609.67	609.93	**20.90**
21.00	609.93	610.18	610.44	610.69	610.95	611.21	611.46	611.72	611.98	612.23	612.49	**21.00**
21.10	612.49	612.74	613.00	613.26	613.51	613.77	614.03	614.28	614.54	614.80	615.05	**21.10**
21.20	615.05	615.31	615.56	615.82	616.08	616.33	616.59	616.84	617.10	617.36	617.61	**21.20**
21.30	617.61	617.87	618.13	618.38	618.64	618.89	619.15	619.41	619.66	619.92	620.17	**21.30**
21.40	620.17	620.43	620.69	620.94	621.20	621.46	621.71	621.97	622.22	622.48	622.74	**21.40**
21.50	622.74	622.99	623.25	623.50	623.76	624.02	624.27	624.53	624.78	625.04	625.30	**21.50**
21.60	625.30	625.55	625.81	626.06	626.32	626.58	626.83	627.09	627.34	627.60	627.85	**21.60**
21.70	627.85	628.11	628.37	628.62	628.88	629.13	629.39	629.65	629.90	630.16	630.41	**21.70**
21.80	630.41	630.67	630.93	631.18	631.44	631.69	631.95	632.20	632.46	632.72	632.97	**21.80**
21.90	632.97	633.23	633.48	633.74	633.99	634.25	634.51	634.76	635.02	635.27	635.53	**21.90**
22.00	635.53	635.79	636.04	636.30	636.55	636.81	637.06	637.32	637.58	637.83	638.09	**22.00**
22.10	638.09	638.34	638.60	638.85	639.11	639.36	639.62	639.88	640.13	640.39	640.64	**22.10**
22.20	640.64	640.90	641.15	641.41	641.67	641.92	642.18	642.43	642.69	642.94	643.20	**22.20**
22.30	643.20	643.45	643.71	643.97	644.22	644.48	644.73	644.99	645.24	645.50	645.75	**22.30**
22.40	645.75	646.01	646.27	646.52	646.78	647.03	647.29	647.54	647.80	648.05	648.31	**22.40**
22.50	648.31	648.56	648.82	649.08	649.33	649.59	649.84	650.10	650.35	650.61	650.86	**22.50**
22.60	650.86	651.12	651.37	651.63	651.89	652.14	652.40	652.65	652.91	653.16	653.42	**22.60**
22.70	653.42	653.67	653.93	654.18	654.44	654.69	654.95	655.20	655.46	655.72	655.97	**22.70**
22.80	655.97	656.23	656.48	656.74	656.99	657.25	657.50	657.76	658.01	658.27	658.52	**22.80**
22.90	658.52	658.78	659.03	659.29	659.54	659.80	660.06	660.31	660.57	660.82	661.08	**22.90**
23.00	661.08	661.33	661.59	661.84	662.10	662.35	662.61	662.86	663.12	663.37	663.63	**23.00**
23.10	663.63	663.88	664.14	664.39	664.65	664.90	665.16	665.41	665.67	665.93	666.18	**23.10**
23.20	666.18	666.44	666.69	666.95	667.20	667.46	667.71	667.97	668.22	668.48	668.73	**23.20**
23.30	668.73	668.99	669.24	669.50	669.75	670.01	670.26	670.52	670.77	671.03	671.28	**23.30**
23.40	671.28	671.54	671.79	672.05	672.30	672.56	672.81	673.07	673.32	673.58	673.83	**23.40**
23.50	673.83	674.09	674.34	674.60	674.85	675.11	675.36	675.62	675.87	676.13	676.38	**23.50**
23.60	676.38	676.64	676.89	677.15	677.40	677.66	677.91	678.17	678.42	678.68	678.93	**23.60**
23.70	678.93	679.19	679.44	679.70	679.95	680.21	680.46	680.72	680.97	681.23	681.48	**23.70**
23.80	681.48	681.74	681.99	682.25	682.50	682.76	683.01	683.27	683.52	683.78	684.03	**23.80**
23.90	684.03	684.29	684.54	684.80	685.05	685.31	685.56	685.82	686.07	686.33	686.58	**23.90**
24.00	686.58	686.84	687.09	687.35	687.60	687.85	688.11	688.36	688.62	688.87	689.13	**24.00**
24.10	689.13	689.38	689.64	689.89	690.15	690.40	690.66	690.91	691.17	691.42	691.68	**24.10**
24.20	691.68	691.93	692.19	692.44	692.70	692.95	693.21	693.46	693.72	693.97	694.23	**24.20**
24.30	694.23	694.48	694.74	694.99	695.24	695.50	695.75	696.01	696.26	696.52	696.77	**24.30**
24.40	696.77	697.03	697.28	697.54	697.79	698.05	698.30	698.56	698.81	699.07	699.32	**24.40**
24.50	699.32	699.58	699.83	700.09	700.34	700.59	700.85	701.10	701.36	701.61	701.87	**24.50**
24.60	701.87	702.12	702.38	702.63	702.89	703.14	703.40	703.65	703.91	704.16	704.42	**24.60**
24.70	704.42	704.67	704.92	705.18	705.43	705.69	705.94	706.20	706.45	706.71	706.96	**24.70**
24.80	706.96	707.22	707.47	707.73	707.98	708.24	708.49	708.75	709.00	709.25	709.51	**24.80**
24.90	709.51	709.76	710.02	710.27	710.53	710.78	711.04	711.29	711.55	711.80	712.06	**24.90**
25.00	712.06	712.31	712.57	712.82	713.07	713.33	713.58	713.84	714.09	714.35	714.60	**25.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
25.00	712.06	712.31	712.57	712.82	713.07	713.33	713.58	713.84	714.09	714.35	714.60	**25.00**
25.10	714.60	714.86	715.11	715.37	715.62	715.88	716.13	716.38	716.64	716.89	717.15	**25.10**
25.20	717.15	717.40	717.66	717.91	718.17	718.42	718.68	718.93	719.19	719.44	719.69	**25.20**
25.30	719.69	719.95	720.20	720.46	720.71	720.97	721.22	721.48	721.73	721.99	722.24	**25.30**
25.40	722.24	722.50	722.75	723.00	723.26	723.51	723.77	724.02	724.28	724.53	724.79	**25.40**
25.50	724.79	725.04	725.30	725.55	725.80	726.06	726.31	726.57	726.82	727.08	727.33	**25.50**
25.60	727.33	727.59	727.84	728.10	728.35	728.60	728.86	729.11	729.37	729.62	729.88	**25.60**
25.70	729.88	730.13	730.39	730.64	730.90	731.15	731.41	731.66	731.91	732.17	732.42	**25.70**
25.80	732.42	732.68	732.93	733.19	733.44	733.70	733.95	734.21	734.46	734.71	734.97	**25.80**
25.90	734.97	735.22	735.48	735.73	735.99	736.24	736.50	736.75	737.01	737.26	737.51	**25.90**
26.00	737.51	737.77	738.02	738.28	738.53	738.79	739.04	739.30	739.55	739.80	740.06	**26.00**
26.10	740.06	740.31	740.57	740.82	741.08	741.33	741.59	741.84	742.10	742.35	742.60	**26.10**
26.20	742.60	742.86	743.11	743.37	743.62	743.88	744.13	744.39	744.64	744.90	745.15	**26.20**
26.30	745.15	745.40	745.66	745.91	746.17	746.42	746.68	746.93	747.19	747.44	747.70	**26.30**
26.40	747.70	747.95	748.20	748.46	748.71	748.97	749.22	749.48	749.73	749.99	750.24	**26.40**
26.50	750.24	750.50	750.75	751.00	751.26	751.51	751.77	752.02	752.28	752.53	752.79	**26.50**
26.60	752.79	753.04	753.29	753.55	753.80	754.06	754.31	754.57	754.82	755.08	755.33	**26.60**
26.70	755.33	755.59	755.84	756.09	756.35	756.60	756.86	757.11	757.37	757.62	757.88	**26.70**
26.80	757.88	758.13	758.39	758.64	758.89	759.15	759.40	759.66	759.91	760.17	760.42	**26.80**
26.90	760.42	760.68	760.93	761.19	761.44	761.69	761.95	762.20	762.46	762.71	762.97	**26.90**
27.00	762.97	763.22	763.48	763.73	763.99	764.24	764.49	764.75	765.00	765.26	765.51	**27.00**
27.10	765.51	765.77	766.02	766.28	766.53	766.79	767.04	767.29	767.55	767.80	768.06	**27.10**
27.20	768.06	768.31	768.57	768.82	769.08	769.33	769.59	769.84	770.09	770.35	770.60	**27.20**
27.30	770.60	770.86	771.11	771.37	771.62	771.88	772.13	772.39	772.64	772.89	773.15	**27.30**
27.40	773.15	773.40	773.66	773.91	774.17	774.42	774.68	774.93	775.19	775.44	775.69	**27.40**
27.50	775.69	775.95	776.20	776.46	776.71	776.97	777.22	777.48	777.73	777.99	778.24	**27.50**
27.60	778.24	778.49	778.75	779.00	779.26	779.51	779.77	780.02	780.28	780.53	780.79	**27.60**
27.70	780.79	781.04	781.30	781.55	781.80	782.06	782.31	782.57	782.82	783.08	783.33	**27.70**
27.80	783.33	783.59	783.84	784.10	784.35	784.61	784.86	785.11	785.37	785.62	785.88	**27.80**
27.90	785.88	786.13	786.39	786.64	786.90	787.15	787.41	787.66	787.92	788.17	788.42	**27.90**
28.00	788.42	788.68	788.93	789.19	789.44	789.70	789.95	790.21	790.46	790.72	790.97	**28.00**
28.10	790.97	791.23	791.48	791.74	791.99	792.24	792.50	792.75	793.01	793.26	793.52	**28.10**
28.20	793.52	793.77	794.03	794.28	794.54	794.79	795.05	795.30	795.56	795.81	796.06	**28.20**
28.30	796.06	796.32	796.57	796.83	797.08	797.34	797.59	797.85	798.10	798.36	798.61	**28.30**
28.40	798.61	798.87	799.12	799.38	799.63	799.88	800.14	800.39	800.65	800.90	801.16	**28.40**
28.50	801.16	801.41	801.67	801.92	802.18	802.43	802.69	802.94	803.20	803.45	803.71	**28.50**
28.60	803.71	803.96	804.22	804.47	804.72	804.98	805.23	805.49	805.74	806.00	806.25	**28.60**
28.70	806.25	806.51	806.76	807.02	807.27	807.53	807.78	808.04	808.29	808.55	808.80	**28.70**
28.80	808.80	809.06	809.31	809.57	809.82	810.07	810.33	810.58	810.84	811.09	811.35	**28.80**
28.90	811.35	811.60	811.86	812.11	812.37	812.62	812.88	813.13	813.39	813.64	813.90	**28.90**
29.00	813.90	814.15	814.41	814.66	814.92	815.17	815.43	815.68	815.94	816.19	816.45	**29.00**
29.10	816.45	816.70	816.96	817.21	817.46	817.72	817.97	818.23	818.48	818.74	818.99	**29.10**
29.20	818.99	819.25	819.50	819.76	820.01	820.27	820.52	820.78	821.03	821.29	821.54	**29.20**
29.30	821.54	821.80	822.05	822.31	822.56	822.82	823.07	823.33	823.58	823.84	824.09	**29.30**
29.40	824.09	824.35	824.60	824.86	825.11	825.37	825.62	825.88	826.13	826.39	826.64	**29.40**
29.50	826.64	826.90	827.15	827.41	827.66	827.92	828.17	828.43	828.68	828.94	829.19	**29.50**
29.60	829.19	829.45	829.70	829.96	830.21	830.47	830.72	830.98	831.23	831.49	831.74	**29.60**
29.70	831.74	832.00	832.25	832.51	832.76	833.02	833.27	833.53	833.78	834.04	834.29	**29.70**
29.80	834.29	834.55	834.80	835.06	835.31	835.57	835.82	836.08	836.33	836.59	836.84	**29.80**
29.90	836.84	837.10	837.35	837.61	837.86	838.12	838.37	838.63	838.88	839.14	839.39	**29.90**
30.00	839.39	839.65	839.90	840.16	840.41	840.67	840.92	841.18	841.43	841.69	841.94	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Celsius (ITS-90)											
30.00	839.39	839.65	839.90	840.16	840.41	840.67	840.92	841.18	841.43	841.69	841.94	**30.00**
30.10	841.94	842.20	842.46	842.71	842.97	843.22	843.48	843.73	843.99	844.24	844.50	**30.10**
30.20	844.50	844.75	845.01	845.26	845.52	845.77	846.03	846.28	846.54	846.79	847.05	**30.20**
30.30	847.05	847.30	847.56	847.81	848.07	848.32	848.58	848.83	849.09	849.35	849.60	**30.30**
30.40	849.60	849.86	850.11	850.37	850.62	850.88	851.13	851.39	851.64	851.90	852.15	**30.40**
30.50	852.15	852.41	852.66	852.92	853.17	853.43	853.69	853.94	854.20	854.45	854.71	**30.50**
30.60	854.71	854.96	855.22	855.47	855.73	855.98	856.24	856.49	856.75	857.00	857.26	**30.60**
30.70	857.26	857.52	857.77	858.03	858.28	858.54	858.79	859.05	859.30	859.56	859.81	**30.70**
30.80	859.81	860.07	860.32	860.58	860.84	861.09	861.35	861.60	861.86	862.11	862.37	**30.80**
30.90	862.37	862.62	862.88	863.13	863.39	863.65	863.90	864.16	864.41	864.67	864.92	**30.90**
31.00	864.92	865.18	865.43	865.69	865.94	866.20	866.46	866.71	866.97	867.22	867.48	**31.00**
31.10	867.48	867.73	867.99	868.24	868.50	868.76	869.01	869.27	869.52	869.78	870.03	**31.10**
31.20	870.03	870.29	870.54	870.80	871.06	871.31	871.57	871.82	872.08	872.33	872.59	**31.20**
31.30	872.59	872.84	873.10	873.36	873.61	873.87	874.12	874.38	874.63	874.89	875.15	**31.30**
31.40	875.15	875.40	875.66	875.91	876.17	876.42	876.68	876.94	877.19	877.45	877.70	**31.40**
31.50	877.70	877.96	878.21	878.47	878.73	878.98	879.24	879.49	879.75	880.00	880.26	**31.50**
31.60	880.26	880.52	880.77	881.03	881.28	881.54	881.79	882.05	882.31	882.56	882.82	**31.60**
31.70	882.82	883.07	883.33	883.59	883.84	884.10	884.35	884.61	884.86	885.12	885.38	**31.70**
31.80	885.38	885.63	885.89	886.14	886.40	886.66	886.91	887.17	887.42	887.68	887.93	**31.80**
31.90	887.93	888.19	888.45	888.70	888.96	889.21	889.47	889.73	889.98	890.24	890.49	**31.90**
32.00	890.49	890.75	891.01	891.26	891.52	891.77	892.03	892.29	892.54	892.80	893.05	**32.00**
32.10	893.05	893.31	893.57	893.82	894.08	894.33	894.59	894.85	895.10	895.36	895.61	**32.10**
32.20	895.61	895.87	896.13	896.38	896.64	896.89	897.15	897.41	897.66	897.92	898.17	**32.20**
32.30	898.17	898.43	898.69	898.94	899.20	899.46	899.71	899.97	900.22	900.48	900.74	**32.30**
32.40	900.74	900.99	901.25	901.50	901.76	902.02	902.27	902.53	902.79	903.04	903.30	**32.40**
32.50	903.30	903.55	903.81	904.07	904.32	904.58	904.84	905.09	905.35	905.60	905.86	**32.50**
32.60	905.86	906.12	906.37	906.63	906.89	907.14	907.40	907.65	907.91	908.17	908.42	**32.60**
32.70	908.42	908.68	908.94	909.19	909.45	909.71	909.96	910.22	910.47	910.73	910.99	**32.70**
32.80	910.99	911.24	911.50	911.76	912.01	912.27	912.53	912.78	913.04	913.30	913.55	**32.80**
32.90	913.55	913.81	914.06	914.32	914.58	914.83	915.09	915.35	915.60	915.86	916.12	**32.90**
33.00	916.12	916.37	916.63	916.89	917.14	917.40	917.66	917.91	918.17	918.43	918.68	**33.00**
33.10	918.68	918.94	919.19	919.45	919.71	919.96	920.22	920.48	920.73	920.99	921.25	**33.10**
33.20	921.25	921.50	921.76	922.02	922.27	922.53	922.79	923.04	923.30	923.56	923.81	**33.20**
33.30	923.81	924.07	924.33	924.58	924.84	925.10	925.35	925.61	925.87	926.12	926.38	**33.30**
33.40	926.38	926.64	926.90	927.15	927.41	927.67	927.92	928.18	928.44	928.69	928.95	**33.40**
33.50	928.95	929.21	929.46	929.72	929.98	930.23	930.49	930.75	931.00	931.26	931.52	**33.50**
33.60	931.52	931.77	932.03	932.29	932.55	932.80	933.06	933.32	933.57	933.83	934.09	**33.60**
33.70	934.09	934.34	934.60	934.86	935.12	935.37	935.63	935.89	936.14	936.40	936.66	**33.70**
33.80	936.66	936.91	937.17	937.43	937.69	937.94	938.20	938.46	938.71	938.97	939.23	**33.80**
33.90	939.23	939.48	939.74	940.00	940.26	940.51	940.77	941.03	941.28	941.54	941.80	**33.90**
34.00	941.80	942.06	942.31	942.57	942.83	943.08	943.34	943.60	943.86	944.11	944.37	**34.00**
34.10	944.37	944.63	944.89	945.14	945.40	945.66	945.91	946.17	946.43	946.69	946.94	**34.10**
34.20	946.94	947.20	947.46	947.72	947.97	948.23	948.49	948.74	949.00	949.26	949.52	**34.20**
34.30	949.52	949.77	950.03	950.29	950.55	950.80	951.06	951.32	951.58	951.83	952.09	**34.30**
34.40	952.09	952.35	952.61	952.86	953.12	953.38	953.64	953.89	954.15	954.41	954.67	**34.40**
34.50	954.67	954.92	955.18	955.44	955.70	955.95	956.21	956.47	956.73	956.98	957.24	**34.50**
34.60	957.24	957.50	957.76	958.01	958.27	958.53	958.79	959.05	959.30	959.56	959.82	**34.60**
34.70	959.82	960.08	960.33	960.59	960.85	961.11	961.36	961.62	961.88	962.14	962.40	**34.70**
34.80	962.40	962.65	962.91	963.17	963.43	963.68	963.94	964.20	964.46	964.72	964.97	**34.80**
34.90	964.97	965.23	965.49	965.75	966.00	966.26	966.52	966.78	967.04	967.29	967.55	**34.90**
35.00	967.55	967.81	968.07	968.33	968.58	968.84	969.10	969.36	969.62	969.87	970.13	**35.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
35.00	967.55	967.81	968.07	968.33	968.58	968.84	969.10	969.36	969.62	969.87	970.13	**35.00**
35.10	970.13	970.39	970.65	970.91	971.16	971.42	971.68	971.94	972.20	972.45	972.71	**35.10**
35.20	972.71	972.97	973.23	973.49	973.74	974.00	974.26	974.52	974.78	975.03	975.29	**35.20**
35.30	975.29	975.55	975.81	976.07	976.33	976.58	976.84	977.10	977.36	977.62	977.87	**35.30**
35.40	977.87	978.13	978.39	978.65	978.91	979.17	979.42	979.68	979.94	980.20	980.46	**35.40**
35.50	980.46	980.72	980.97	981.23	981.49	981.75	982.01	982.27	982.52	982.78	983.04	**35.50**
35.60	983.04	983.30	983.56	983.82	984.07	984.33	984.59	984.85	985.11	985.37	985.63	**35.60**
35.70	985.63	985.88	986.14	986.40	986.66	986.92	987.18	987.44	987.69	987.95	988.21	**35.70**
35.80	988.21	988.47	988.73	988.99	989.25	989.50	989.76	990.02	990.28	990.54	990.80	**35.80**
35.90	990.80	991.06	991.31	991.57	991.83	992.09	992.35	992.61	992.87	993.13	993.38	**35.90**
36.00	993.38	993.64	993.90	994.16	994.42	994.68	994.94	995.20	995.46	995.71	995.97	**36.00**
36.10	995.97	996.23	996.49	996.75	997.01	997.27	997.53	997.78	998.04	998.30	998.56	**36.10**
36.20	998.56	998.82	999.08	999.34	999.60	999.86	1000.12	1000.37	1000.63	1000.89	1001.15	**36.20**
36.30	1001.15	1001.41	1001.67	1001.93	1002.19	1002.45	1002.71	1002.97	1003.22	1003.48	1003.74	**36.30**
36.40	1003.74	1004.00	1004.26	1004.52	1004.78	1005.04	1005.30	1005.56	1005.82	1006.08	1006.33	**36.40**
36.50	1006.33	1006.59	1006.85	1007.11	1007.37	1007.63	1007.89	1008.15	1008.41	1008.67	1008.93	**36.50**
36.60	1008.93	1009.19	1009.45	1009.71	1009.96	1010.22	1010.48	1010.74	1011.00	1011.26	1011.52	**36.60**
36.70	1011.52	1011.78	1012.04	1012.30	1012.56	1012.82	1013.08	1013.34	1013.60	1013.86	1014.12	**36.70**
36.80	1014.12	1014.37	1014.63	1014.89	1015.15	1015.41	1015.67	1015.93	1016.19	1016.45	1016.71	**36.80**
36.90	1016.71	1016.97	1017.23	1017.49	1017.75	1018.01	1018.27	1018.53	1018.79	1019.05	1019.31	**36.90**
37.00	1019.31	1019.57	1019.83	1020.09	1020.35	1020.61	1020.87	1021.13	1021.39	1021.65	1021.91	**37.00**
37.10	1021.91	1022.17	1022.43	1022.68	1022.94	1023.20	1023.46	1023.72	1023.98	1024.24	1024.50	**37.10**
37.20	1024.50	1024.76	1025.02	1025.28	1025.54	1025.80	1026.06	1026.32	1026.58	1026.84	1027.10	**37.20**
37.30	1027.10	1027.36	1027.62	1027.88	1028.14	1028.40	1028.66	1028.92	1029.18	1029.44	1029.70	**37.30**
37.40	1029.70	1029.96	1030.22	1030.48	1030.75	1031.01	1031.27	1031.53	1031.79	1032.05	1032.31	**37.40**
37.50	1032.31	1032.57	1032.83	1033.09	1033.35	1033.61	1033.87	1034.13	1034.39	1034.65	1034.91	**37.50**
37.60	1034.91	1035.17	1035.43	1035.69	1035.95	1036.21	1036.47	1036.73	1036.99	1037.25	1037.51	**37.60**
37.70	1037.51	1037.77	1038.03	1038.29	1038.55	1038.82	1039.08	1039.34	1039.60	1039.86	1040.12	**37.70**
37.80	1040.12	1040.38	1040.64	1040.90	1041.16	1041.42	1041.68	1041.94	1042.20	1042.46	1042.72	**37.80**
37.90	1042.72	1042.98	1043.25	1043.51	1043.77	1044.03	1044.29	1044.55	1044.81	1045.07	1045.33	**37.90**
38.00	1045.33	1045.59	1045.85	1046.11	1046.37	1046.64	1046.90	1047.16	1047.42	1047.68	1047.94	**38.00**
38.10	1047.94	1048.20	1048.46	1048.72	1048.98	1049.24	1049.51	1049.77	1050.03	1050.29	1050.55	**38.10**
38.20	1050.55	1050.81	1051.07	1051.33	1051.59	1051.85	1052.12	1052.38	1052.64	1052.90	1053.16	**38.20**
38.30	1053.16	1053.42	1053.68	1053.94	1054.20	1054.47	1054.73	1054.99	1055.25	1055.51	1055.77	**38.30**
38.40	1055.77	1056.03	1056.29	1056.55	1056.82	1057.08	1057.34	1057.60	1057.86	1058.12	1058.38	**38.40**
38.50	1058.38	1058.65	1058.91	1059.17	1059.43	1059.69	1059.95	1060.21	1060.48	1060.74	1061.00	**38.50**
38.60	1061.00	1061.26	1061.52	1061.78	1062.04	1062.31	1062.57	1062.83	1063.09	1063.35	1063.61	**38.60**
38.70	1063.61	1063.87	1064.14	1064.40	1064.66	1064.92	1065.18	1065.44	1065.71	1065.97	1066.23	**38.70**
38.80	1066.23	1066.49	1066.75	1067.01	1067.28	1067.54	1067.80	1068.06	1068.32	1068.59	1068.85	**38.80**
38.90	1068.85	1069.11	1069.37	1069.63	1069.89	1070.16	1070.42	1070.68	1070.94	1071.20	1071 47	**38.90**
39.00	1071.47	1071.73	1071.99	1072.25	1072.51	1072.78	1073.04	1073.30	1073.56	1073.82	1074.09	**39.00**
39.10	1074.09	1074.35	1074.61	1074.87	1075.13	1075.40	1075.66	1075.92	1076.18	1076.44	1076.71	**39.10**
39.20	1076.71	1076.97	1077.23	1077.49	1077.76	1078.02	1078.28	1078.54	1078.80	1079.07	1079.33	**39.20**
39.30	1079.33	1079.59	1079.85	1080.12	1080.38	1080.64	1080.90	1081.17	1081.43	1081.69	1081.95	**39.30**
39.40	1081.95	1082.21	1082.48	1082.74	1083.00	1083.26	1083.53	1083.79	1084.05	1084.31	1084.58	**39.40**
39.50	1084.58	1084.84	1085.10	1085.36	1085.63	1085.89	1086.15	1086.42	1086.68	1086.94	1087.20	**39.50**
39.60	1087.20	1087.47	1087.73	1087.99	1088.25	1088.52	1088.78	1089.04	1089.31	1089.57	1089.83	**39.60**
39.70	1089.83	1090.09	1090.36	1090.62	1090.88	1091.14	1091.41	1091.67	1091.93	1092.20	1092.46	**39.70**
39.80	1092.46	1092.72	1092.99	1093.25	1093.51	1093.77	1094.04	1094.30	1094.56	1094.83	1095.09	**39.80**
39.90	1095.09	1095.35	1095.62	1095.88	1096.14	1096.40	1096.67	1096.93	1097.19	1097.46	1097.72	**39.90**
40.00	1097.72	1097.98	1098.25	1098.51	1098.77	1099.04	1099.30	1099.56	1099.83	1100.09	1100.35	**40.00**
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
40.00	1097.72	1097.98	1098.25	1098.51	1098.77	1099.04	1099.30	1099.56	1099.83	1100.09	1100.35	**40.00**
40.10	1100.35	1100.62	1100.88	1101.14	1101.41	1101.67	1101.93	1102.20	1102.46	1102.72	1102.99	**40.10**
40.20	1102.99	1103.25	1103.51	1103.78	1104.04	1104.30	1104.57	1104.83	1105.09	1105.36	1105.62	**40.20**
40.30	1105.62	1105.89	1106.15	1106.41	1106.68	1106.94	1107.20	1107.47	1107.73	1107.99	1108.26	**40.30**
40.40	1108.26	1108.52	1108.79	1109.05	1109.31	1109.58	1109.84	1110.10	1110.37	1110.63	1110.90	**40.40**
40.50	1110.90	1111.16	1111.42	1111.69	1111.95	1112.22	1112.48	1112.74	1113.01	1113.27	1113.53	**40.50**
40.60	1113.53	1113.80	1114.06	1114.33	1114.59	1114.85	1115.12	1115.38	1115.65	1115.91	1116.18	**40.60**
40.70	1116.18	1116.44	1116.70	1116.97	1117.23	1117.50	1117.76	1118.02	1118.29	1118.55	1118.82	**40.70**
40.80	1118.82	1119.08	1119.35	1119.61	1119.87	1120.14	1120.40	1120.67	1120.93	1121.20	1121.46	**40.80**
40.90	1121.46	1121.72	1121.99	1122.25	1122.52	1122.78	1123.05	1123.31	1123.58	1123.84	1124.10	**40.90**
41.00	1124.10	1124.37	1124.63	1124.90	1125.16	1125.43	1125.69	1125.96	1126.22	1126.49	1126.75	**41.00**
41.10	1126.75	1127.02	1127.28	1127.54	1127.81	1128.07	1128.34	1128.60	1128.87	1129.13	1129.40	**41.10**
41.20	1129.40	1129.66	1129.93	1130.19	1130.46	1130.72	1130.99	1131.25	1131.52	1131.78	1132.05	**41.20**
41.30	1132.05	1132.31	1132.58	1132.84	1133.11	1133.37	1133.64	1133.90	1134.17	1134.43	1134.70	**41.30**
41.40	1134.70	1134.96	1135.23	1135.49	1135.76	1136.02	1136.29	1136.55	1136.82	1137.08	1137.35	**41.40**
41.50	1137.35	1137.61	1137.88	1138.14	1138.41	1138.68	1138.94	1139.21	1139.47	1139.74	1140.00	**41.50**
41.60	1140.00	1140.27	1140.53	1140.80	1141.06	1141.33	1141.59	1141.86	1142.13	1142.39	1142.66	**41.60**
41.70	1142.66	1142.92	1143.19	1143.45	1143.72	1143.98	1144.25	1144.52	1144.78	1145.05	1145.31	**41.70**
41.80	1145.31	1145.58	1145.84	1146.11	1146.38	1146.64	1146.91	1147.17	1147.44	1147.70	1147.97	**41.80**
41.90	1147.97	1148.24	1148.50	1148.77	1149.03	1149.30	1149.56	1149.83	1150.10	1150.36	1150.63	**41.90**
42.00	1150.63	1150.89	1151.16	1151.43	1151.69	1151.96	1152.22	1152.49	1152.76	1153.02	1153.29	**42.00**
42.10	1153.29	1153.56	1153.82	1154.09	1154.35	1154.62	1154.89	1155.15	1155.42	1155.68	1155.95	**42.10**
42.20	1155.95	1156.22	1156.48	1156.75	1157.02	1157.28	1157.55	1157.82	1158.08	1158.35	1158.61	**42.20**
42.30	1158.61	1158.88	1159.15	1159.41	1159.68	1159.95	1160.21	1160.48	1160.75	1161.01	1161.28	**42.30**
42.40	1161.28	1161.55	1161.81	1162.08	1162.35	1162.61	1162.88	1163.15	1163.41	1163.68	1163.95	**42.40**
42.50	1163.95	1164.21	1164.48	1164.75	1165.01	1165.28	1165.55	1165.81	1166.08	1166.35	1166.61	**42.50**
42.60	1166.61	1166.88	1167.15	1167.41	1167.68	1167.95	1168.22	1168.48	1168.75	1169.02	1169.28	**42.60**
42.70	1169.28	1169.55	1169.82	1170.08	1170.35	1170.62	1170.89	1171.15	1171.42	1171.69	1171.95	**42.70**
42.80	1171.95	1172.22	1172.49	1172.76	1173.02	1173.29	1173.56	1173.82	1174.09	1174.36	1174.63	**42.80**
42.90	1174.63	1174.89	1175.16	1175.43	1175.70	1175.96	1176.23	1176.50	1176.77	1177.03	1177.30	**42.90**
43.00	1177.30	1177.57	1177.84	1178.10	1178.37	1178.64	1178.91	1179.17	1179.44	1179.71	1179.98	**43.00**
43.10	1179.98	1180.24	1180.51	1180.78	1181.05	1181.32	1181.58	1181.85	1182.12	1182.39	1182.65	**43.10**
43.20	1182.65	1182.92	1183.19	1183.46	1183.73	1183.99	1184.26	1184.53	1184.80	1185.07	1185.33	**43.20**
43.30	1185.33	1185.60	1185.87	1186.14	1186.41	1186.67	1186.94	1187.21	1187.48	1187.75	1188.01	**43.30**
43.40	1188.01	1188.28	1188.55	1188.82	1189.09	1189.36	1189.62	1189.89	1190.16	1190.43	1190.70	**43.40**
43.50	1190.70	1190.96	1191.23	1191.50	1191.77	1192.04	1192.31	1192.58	1192.84	1193.11	1193.38	**43.50**
43.60	1193.38	1193.65	1193.92	1194.19	1194.45	1194.72	1194.99	1195.26	1195.53	1195.80	1196.07	**43.60**
43.70	1196.07	1196.33	1196.60	1196.87	1197.14	1197.41	1197.68	1197.95	1198.22	1198.48	1198.75	**43.70**
43.80	1198.75	1199.02	1199.29	1199.56	1199.83	1200.10	1200.37	1200.64	1200.90	1201.17	1201.44	**43.80**
43.90	1201.44	1201.71	1201.98	1202.25	1202.52	1202.79	1203.06	1203.33	1203.60	1203.86	1204.13	**43.90**
44.00	1204.13	1204.40	1204.67	1204.94	1205.21	1205.48	1205.75	1206.02	1206.29	1206.56	1206.83	**44.00**
44.10	1206.83	1207.10	1207.36	1207.63	1207.90	1208.17	1208.44	1208.71	1208.98	1209.25	1209.52	**44.10**
44.20	1209.52	1209.79	1210.06	1210.33	1210.60	1210.87	1211.14	1211.41	1211.68	1211.95	1212.22	**44.20**
44.30	1212.22	1212.49	1212.76	1213.03	1213.30	1213.57	1213.84	1214.11	1214.37	1214.64	1214.91	**44.30**
44.40	1214.91	1215.18	1215.45	1215.72	1215.99	1216.26	1216.53	1216.80	1217.07	1217.34	1217.61	**44.40**
44.50	1217.61	1217.88	1218.15	1218.42	1218.69	1218.97	1219.24	1219.51	1219.78	1220.05	1220.32	**44.50**
44.60	1220.32	1220.59	1220.86	1221.13	1221.40	1221.67	1221.94	1222.21	1222.48	1222.75	1223.02	**44.60**
44.70	1223.02	1223.29	1223.56	1223.83	1224.10	1224.37	1224.64	1224.91	1225.18	1225.45	1225.73	**44.70**
44.80	1225.73	1226.00	1226.27	1226.54	1226.81	1227.08	1227.35	1227.62	1227.89	1228.16	1228.43	**44.80**
44.90	1228.43	1228.70	1228.97	1229.25	1229.52	1229.79	1230.06	1230.33	1230.60	1230.87	1231.14	**44.90**
45.00	1231.14	1231.41	1231.68	1231.96	1232.23	1232.50	1232.77	1233.04	1233.31	1233.58	1233.85	**45.00**
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B8.2.1. *Type N thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
45.00	1231.14	1231.41	1231.68	1231.96	1232.23	1232.50	1232.77	1233.04	1233.31	1233.58	1233.85	**45.00**
45.10	1233.85	1234.12	1234.40	1234.67	1234.94	1235.21	1235.48	1235.75	1236.02	1236.30	1236.57	**45.10**
45.20	1236.57	1236.84	1237.11	1237.38	1237.65	1237.92	1238.20	1238.47	1238.74	1239.01	1239.28	**45.20**
45.30	1239.28	1239.55	1239.83	1240.10	1240.37	1240.64	1240.91	1241.18	1241.46	1241.73	1242.00	**45.30**
45.40	1242.00	1242.27	1242.54	1242.82	1243.09	1243.36	1243.63	1243.90	1244.18	1244.45	1244.72	**45.40**
45.50	1244.72	1244.99	1245.26	1245.54	1245.81	1246.08	1246.35	1246.62	1246.90	1247.17	1247.44	**45.50**
45.60	1247.44	1247.71	1247.99	1248.26	1248.53	1248.80	1249.08	1249.35	1249.62	1249.89	1250.17	**45.60**
45.70	1250.17	1250.44	1250.71	1250.98	1251.26	1251.53	1251.80	1252.07	1252.35	1252.62	1252.89	**45.70**
45.80	1252.89	1253.17	1253.44	1253.71	1253.98	1254.26	1254.53	1254.80	1255.08	1255.35	1255.62	**45.80**
45.90	1255.62	1255.89	1256.17	1256.44	1256.71	1256.99	1257.26	1257.53	1257.81	1258.08	1258.35	**45.90**
46.00	1258.35	1258.63	1258.90	1259.17	1259.45	1259.72	1259.99	1260.27	1260.54	1260.81	1261.09	**46.00**
46.10	1261.09	1261.36	1261.63	1261.91	1262.18	1262.45	1262.73	1263.00	1263.27	1263.55	1263.82	**46.10**
46.20	1263.82	1264.10	1264.37	1264.64	1264.92	1265.19	1265.46	1265.74	1266.01	1266.29	1266.56	**46.20**
46.30	1266.56	1266.83	1267.11	1267.38	1267.66	1267.93	1268.20	1268.48	1268.75	1269.03	1269.30	**46.30**
46.40	1269.30	1269.58	1269.85	1270.12	1270.40	1270.67	1270.95	1271.22	1271.50	1271.77	1272.04	**46.40**
46.50	1272.04	1272.32	1272.59	1272.87	1273.14	1273.42	1273.69	1273.97	1274.24	1274.52	1274.79	**46.50**
46.60	1274.79	1275.07	1275.34	1275.62	1275.89	1276.17	1276.44	1276.72	1276.99	1277.27	1277.54	**46.60**
46.70	1277.54	1277.82	1278.09	1278.37	1278.64	1278.92	1279.19	1279.47	1279.74	1280.02	1280.29	**46.70**
46.80	1280.29	1280.57	1280.84	1281.12	1281.39	1281.67	1281.95	1282.22	1282.50	1282.77	1283.05	**46.80**
46.90	1283.05	1283.32	1283.60	1283.87	1284.15	1284.43	1284.70	1284.98	1285.25	1285.53	1285.81	**46.90**
47.00	1285.81	1286.08	1286.36	1286.63	1286.91	1287.19	1287.46	1287.74	1288.01	1288.29	1288.57	**47.00**
47.10	1288.57	1288.84	1289.12	1289.40	1289.67	1289.95	1290.23	1290.50	1290.78	1291.06	1291.33	**47.10**
47.20	1291.33	1291.61	1291.88	1292.16	1292.44	1292.72	1292.99	1293.27	1293.55	1293.82	1294.10	**47.20**
47.30	1294.10	1294.38	1294.65	1294.93	1295.21	1295.48	1295.76	1296.04	1296.32	1296.59	1296.87	**47.30**
47.40	1296.87	1297.15	1297.43	1297.70	1297.98	1298.26	1298.54	1298.81	1299.09	1299.37	1299.65	**47.40**
47.50	1299.65	1299.92										**47.50**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−4.30	−410.58	−416.05	−422.41	−430.26	−441.65							**−4.30**
−4.20	−374.15	−377.02	−380.00	−383.11	−386.35	−389.76	−393.36	−397.18	−401.27	−405.71	−410.58	**−4.20**
−4.10	−349.64	−351.83	−354.07	−356.36	−358.70	−361.10	−363.57	−366.09	−368.70	−371.38	−374.15	**−4.10**
−4.00	−329.76	−331.61	−333.48	−335.39	−337.32	−339.29	−341.28	−343.32	−345.39	−347.49	−349.64	**−4.00**
−3.90	−312.51	−314.14	−315.80	−317.47	−319.16	−320.87	−322.60	−324.36	−326.13	−327.93	−329.76	**−3.90**
−3.80	−297.01	−298.50	−300.00	−301.51	−303.04	−304.58	−306.13	−307.70	−309.29	−310.89	−312.51	**−3.80**
−3.70	−282.79	−284.16	−285.55	−286.94	−288.35	−289.76	−291.19	−292.63	−294.08	−295.54	−297.01	**−3.70**
−3.60	−269.54	−270.83	−272.13	−273.43	−274.74	−276.06	−277.39	−278.72	−280.07	−281.42	−282.79	**−3.60**
−3.50	−257.08	−258.29	−259.51	−260.74	−261.98	−263.22	−264.47	−265.73	−266.99	−268.26	−269.54	**−3.50**
−3.40	−245.25	−246.40	−247.57	−248.73	−249.91	−251.09	−252.27	−253.46	−254.66	−255.87	−257.08	**−3.40**
−3.30	−233.95	−235.06	−236.17	−237.29	−238.41	−239.54	−240.67	−241.81	−242.95	−244.09	−245.25	**−3.30**
−3.20	−223.12	−224.18	−225.25	−226.32	−227.40	−228.48	−229.57	−230.66	−231.75	−232.85	−233.95	**−3.20**
−3.10	−212.68	−213.70	−214.73	−215.77	−216.81	−217.85	−218.90	−219.95	−221.00	−222.06	−223.12	**−3.10**
−3.00	−202.58	−203.58	−204.57	−205.58	−206.58	−207.59	−208.60	−209.61	−210.63	−211.65	−212.68	**−3.00**
−2.90	−192.79	−193.76	−194.73	−195.70	−196.67	−197.65	−198.63	−199.61	−200.60	−201.59	−202.58	**−2.90**
−2.80	−183.27	−184.22	−185.16	−186.10	−187.05	−188.00	−188.95	−189.91	−190.87	−191.83	−192.79	**−2.80**
−2.70	−174.00	−174.92	−175.84	−176.76	−177.68	−178.61	−179.54	−180.47	−181.40	−182.34	−183.27	**−2.70**
−2.60	−164.95	−165.84	−166.74	−167.64	−168.54	−169.45	−170.35	−171.26	−172.17	−173.09	−174.00	**−2.60**
−2.50	−156.09	−156.97	−157.85	−158.73	−159.61	−160.49	−161.38	−162.27	−163.16	−164.05	−164.95	**−2.50**
−2.40	−147.41	−148.27	−149.14	−150.00	−150.86	−151.73	−152.60	−153.47	−154.34	−155.21	−156.09	**−2.40**
−2.30	−138.90	−139.75	−140.59	−141.44	−142.29	−143.14	−143.99	−144.84	−145.70	−146.56	−147.41	**−2.30**
−2.20	−130.54	−131.37	−132.20	−133.03	−133.87	−134.70	−135.54	−136.38	−137.22	−138.06	−138.90	**−2.20**
−2.10	−122.32	−123.13	−123.95	−124.77	−125.59	−126.41	−127.24	−128.06	−128.89	−129.71	−130.54	**−2.10**
−2.00	−114.22	−115.02	−115.83	−116.64	−117.44	−118.25	−119.06	−119.88	−120.69	−121.50	−122.32	**−2.00**
−1.90	−106.24	−107.03	−107.83	−108.62	−109.42	−110.21	−111.01	−111.81	−112.61	−113.42	−114.22	**−1.90**
−1.80	−98.36	−99.15	−99.93	−100.71	−101.50	−102.29	−103.08	−103.86	−104.65	−105.45	−106.24	**−1.80**
−1.70	−90.59	−91.36	−92.13	−92.91	−93.69	−94.46	−95.24	−96.02	−96.80	−97.58	−98.36	**−1.70**
−1.60	−82.90	−83.67	−84.43	−85.20	−85.97	−86.73	−87.50	−88.27	−89.04	−89.81	−90.59	**−1.60**
−1.50	−75.30	−76.06	−76.81	−77.57	−78.33	−79.09	−79.85	−80.61	−81.37	−82.14	−82.90	**−1.50**
−1.40	−67.78	−68.53	−69.28	−70.03	−70.78	−71.53	−72.28	−73.04	−73.79	−74.54	−75.30	**−1.40**
−1.30	−60.33	−61.07	−61.81	−62.55	−63.30	−64.04	−64.79	−65.53	−66.28	−67.03	−67.78	**−1.30**
−1.20	−52.94	−53.68	−54.41	−55.15	−55.89	−56.63	−57.36	−58.10	−58.84	−59.58	−60.33	**−1.20**
−1.10	−45.62	−46.35	−47.08	−47.81	−48.54	−49.27	−50.00	−50.74	−51.47	−52.21	−52.94	**−1.10**
−1.00	−38.35	−39.08	−39.80	−40.53	−41.25	−41.98	−42.70	−43.43	−44.16	−44.89	−45.62	**−1.00**
−0.90	−31.14	−31.86	−32.58	−33.30	−34.02	−34.74	−35.46	−36.18	−36.90	−37.63	−38.35	**−0.90**
−0.80	−23.97	−24.69	−25.40	−26.12	−26.83	−27.55	−28.27	−28.98	−29.70	−30.42	−31.14	**−0.80**
−0.70	−16.85	−17.56	−18.27	−18.98	−19.69	−20.41	−21.12	−21.83	−22.54	−23.26	−23.97	**−0.70**
−0.60	−9.77	−10.48	−11.19	−11.89	−12.60	−13.31	−14.02	−14.72	−15.43	−16.14	−16.85	**−0.60**
−0.50	−2.73	−3.43	−4.14	−4.84	−5.54	−6.25	−6.95	−7.66	−8.36	−9.07	−9.77	**−0.50**
−0.40	4.27	3.57	2.88	2.18	1.48	0.78	0.07	−0.63	−1.33	−2.03	−2.73	**−0.40**
−0.30	11.25	10.55	9.85	9.16	8.46	7.76	7.07	6.37	5.67	4.97	4.27	**−0.30**
−0.20	18.19	17.50	16.80	16.11	15.42	14.72	14.03	13.33	12.64	11.94	11.25	**−0.20**
−0.10	25.11	24.42	23.73	23.04	22.34	21.65	20.96	20.27	19.58	18.88	18.19	**−0.10**
0.00	32.00	31.31	30.62	29.93	29.25	28.56	27.87	27.18	26.49	25.80	25.11	**0.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	32.69	33.39	34.08	34.77	35.47	36.16	36.85	37.54	38.23	38.93	0.00
0.10	38.93	39.62	40.31	41.00	41.69	42.38	43.07	43.75	44.44	45.13	45.82	0.10
0.20	45.82	46.51	47.19	47.88	48.57	49.25	49.94	50.62	51.31	51.99	52.68	0.20
0.30	52.68	53.36	54.05	54.73	55.41	56.09	56.78	57.46	58.14	58.82	59.50	0.30
0.40	59.50	60.18	60.86	61.54	62.22	62.90	63.58	64.26	64.94	65.62	66.29	0.40
0.50	66.29	66.97	67.65	68.33	69.00	69.68	70.35	71.03	71.70	72.38	73.05	0.50
0.60	73.05	73.73	74.40	75.07	75.75	76.42	77.09	77.76	78.43	79.11	79.78	0.60
0.70	79.78	80.45	81.12	81.79	82.46	83.13	83.79	84.46	85.13	85.80	86.47	0.70
0.80	86.47	87.13	87.80	88.47	89.13	89.80	90.46	91.13	91.79	92.46	93.12	0.80
0.90	93.12	93.79	94.45	95.11	95.78	96.44	97.10	97.76	98.42	99.08	99.74	0.90
1.00	99.74	100.40	101.06	101.72	102.38	103.04	103.70	104.36	105.02	105.68	106.33	1.00
1.10	106.33	106.99	107.65	108.30	108.96	109.61	110.27	110.93	111.58	112.23	112.89	1.10
1.20	112.89	113.54	114.20	114.85	115.50	116.15	116.81	117.46	118.11	118.76	119.41	1.20
1.30	119.41	120.06	120.71	121.36	122.01	122.66	123.31	123.96	124.61	125.25	125.90	1.30
1.40	125.90	126.55	127.20	127.84	128.49	129.13	129.78	130.42	131.07	131.71	132.36	1.40
1.50	132.36	133.00	133.65	134.29	134.93	135.58	136.22	136.86	137.50	138.14	138.78	1.50
1.60	138.78	139.43	140.07	140.71	141.35	141.99	142.63	143.26	143.90	144.54	145.18	1.60
1.70	145.18	145.82	146.45	147.09	147.73	148.36	149.00	149.64	150.27	150.91	151.54	1.70
1.80	151.54	152.18	152.81	153.45	154.08	154.71	155.35	155.98	156.61	157.24	157.88	1.80
1.90	157.88	158.51	159.14	159.77	160.40	161.03	161.66	162.29	162.92	163.55	164.18	1.90
2.00	164.18	164.81	165.43	166.06	166.69	167.32	167.95	168.57	169.20	169.82	170.45	2.00
2.10	170.45	171.08	171.70	172.33	172.95	173.58	174.20	174.82	175.45	176.07	176.69	2.10
2.20	176.69	177.32	177.94	178.56	179.18	179.81	180.43	181.05	181.67	182.29	182.91	2.20
2.30	182.91	183.53	184.15	184.77	185.39	186.01	186.63	187.24	187.86	188.48	189.10	2.30
2.40	189.10	189.71	190.33	190.95	191.56	192.18	192.80	193.41	194.03	194.64	195.26	2.40
2.50	195.26	195.87	196.48	197.10	197.71	198.32	198.94	199.55	200.16	200.78	201.39	2.50
2.60	201.39	202.00	202.61	203.22	203.83	204.44	205.05	205.66	206.27	206.88	207.49	2.60
2.70	207.49	208.10	208.71	209.32	209.93	210.53	211.14	211.75	212.36	212.96	213.57	2.70
2.80	213.57	214.18	214.78	215.39	215.99	216.60	217.20	217.81	218.41	219.02	219.62	2.80
2.90	219.62	220.23	220.83	221.43	222.04	222.64	223.24	223.84	224.45	225.05	225.65	2.90
3.00	225.65	226.25	226.85	227.45	228.05	228.65	229.25	229.85	230.45	231.05	231.65	3.00
3.10	231.65	232.25	232.85	233.45	234.05	234.64	235.24	235.84	236.44	237.03	237.63	3.10
3.20	237.63	238.23	238.82	239.42	240.01	240.61	241.21	241.80	242.39	242.99	243.58	3.20
3.30	243.58	244.18	244.77	245.37	245.96	246.55	247.14	247.74	248.33	248.92	249.51	3.30
3.40	249.51	250.11	250.70	251.29	251.88	252.47	253.06	253.65	254.24	254.83	255.42	3.40
3.50	255.42	256.01	256.60	257.19	257.78	258.37	258.95	259.54	260.13	260.72	261.31	3.50
3.60	261.31	261.89	262.48	263.07	263.65	264.24	264.83	265.41	266.00	266.58	267.17	3.60
3.70	267.17	267.75	268.34	268.92	269.51	270.09	270.67	271.26	271.84	272.42	273.01	3.70
3.80	273.01	273.59	274.17	274.76	275.34	275.92	276.50	277.08	277.66	278.25	278.83	3.80
3.90	278.83	279.41	279.99	280.57	281.15	281.73	282.31	282.89	283.47	284.04	284.62	3.90
4.00	284.62	285.20	285.78	286.36	286.94	287.51	288.09	288.67	289.25	289.82	290.40	4.00
4.10	290.40	290.98	291.55	292.13	292.71	293.28	293.86	294.43	295.01	295.58	296.16	4.10
4.20	296.16	296.73	297.31	297.88	298.45	299.03	299.60	300.18	300.75	301.32	301.89	4.20
4.30	301.89	302.47	303.04	303.61	304.18	304.76	305.33	305.90	306.47	307.04	307.61	4.30
4.40	307.61	308.18	308.75	309.32	309.89	310.46	311.03	311.60	312.17	312.74	313.31	4.40
4.50	313.31	313.88	314.45	315.02	315.58	316.15	316.72	317.29	317.86	318.42	318.99	4.50
4.60	318.99	319.56	320.12	320.69	321.26	321.82	322.39	322.95	323.52	324.09	324.65	4.60
4.70	324.65	325.22	325.78	326.35	326.91	327.47	328.04	328.60	329.17	329.73	330.29	4.70
4.80	330.29	330.86	331.42	331.98	332.55	333.11	333.67	334.23	334.80	335.36	335.92	4.80
4.90	335.92	336.48	337.04	337.60	338.16	338.73	339.29	339.85	340.41	340.97	341.53	4.90
5.00	341.53	342.09	342.65	343.21	343.77	344.32	344.88	345.44	346.00	346.56	347.12	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	341.53	342.09	342.65	343.21	343.77	344.32	344.88	345.44	346.00	346.56	347.12	5.00
5.10	347.12	347.68	348.23	348.79	349.35	349.91	350.46	351.02	351.58	352.14	352.69	5.10
5.20	352.69	353.25	353.81	354.36	354.92	355.47	356.03	356.58	357.14	357.70	358.25	5.20
5.30	358.25	358.80	359.36	359.91	360.47	361.02	361.58	362.13	362.68	363.24	363.79	5.30
5.40	363.79	364.35	364.90	365.45	366.00	366.56	367.11	367.66	368.21	368.77	369.32	5.40
5.50	369.32	369.87	370.42	370.97	371.52	372.07	372.63	373.18	373.73	374.28	374.83	5.50
5.60	374.83	375.38	375.93	376.48	377.03	377.58	378.13	378.68	379.22	379.77	380.32	5.60
5.70	380.32	380.87	381.42	381.97	382.52	383.06	383.61	384.16	384.71	385.26	385.80	5.70
5.80	385.80	386.35	386.90	387.44	387.99	388.54	389.08	389.63	390.18	390.72	391.27	5.80
5.90	391.27	391.81	392.36	392.90	393.45	394.00	394.54	395.08	395.63	396.17	396.72	5.90
6.00	396.72	397.26	397.81	398.35	398.90	399.44	399.98	400.53	401.07	401.61	402.16	6.00
6.10	402.16	402.70	403.24	403.78	404.33	404.87	405.41	405.95	406.49	407.04	407.58	6.10
6.20	407.58	408.12	408.66	409.20	409.74	410.28	410.83	411.37	411.91	412.45	412.99	6.20
6.30	412.99	413.53	414.07	414.61	415.15	415.69	416.23	416.77	417.30	417.84	418.38	6.30
6.40	418.38	418.92	419.46	420.00	420.54	421.08	421.61	422.15	422.69	423.23	423.76	6.40
6.50	423.76	424.30	424.84	425.38	425.91	426.45	426.99	427.52	428.06	428.60	429.13	6.50
6.60	429.13	429.67	430.21	430.74	431.28	431.81	432.35	432.88	433.42	433.96	434.49	6.60
6.70	434.49	435.03	435.56	436.10	436.63	437.16	437.70	438.23	438.77	439.30	439.83	6.70
6.80	439.83	440.37	440.90	441.44	441.97	442.50	443.04	443.57	444.10	444.63	445.17	6.80
6.90	445.17	445.70	446.23	446.76	447.30	447.83	448.36	448.89	449.42	449.95	450.49	6.90
7.00	450.49	451.02	451.55	452.08	452.61	453.14	453.67	454.20	454.73	455.26	455.79	7.00
7.10	455.79	456.32	456.85	457.38	457.91	458.44	458.97	459.50	460.03	460.56	461.09	7.10
7.20	461.09	461.62	462.15	462.68	463.20	463.73	464.26	464.79	465.32	465.85	466.37	7.20
7.30	466.37	466.90	467.43	467.96	468.48	469.01	469.54	470.07	470.59	471.12	471.65	7.30
7.40	471.65	472.17	472.70	473.23	473.75	474.28	474.81	475.33	475.86	476.38	476.91	7.40
7.50	476.91	477.43	477.96	478.49	479.01	479.54	480.06	480.59	481.11	481.64	482.16	7.50
7.60	482.16	482.68	483.21	483.73	484.26	484.78	485.31	485.83	486.35	486.88	487.40	7.60
7.70	487.40	487.92	488.45	488.97	489.49	490.02	490.54	491.06	491.58	492.11	492.63	7.70
7.80	492.63	493.15	493.67	494.20	494.72	495.24	495.76	496.28	496.81	497.33	497.85	7.80
7.90	497.85	498.37	498.89	499.41	499.93	500.45	500.98	501.50	502.02	502.54	503.06	7.90
8.00	503.06	503.58	504.10	504.62	505.14	505.66	506.18	506.70	507.22	507.74	508.26	8.00
8.10	508.26	508.78	509.29	509.81	510.33	510.85	511.37	511.89	512.41	512.93	513.44	8.10
8.20	513.44	513.96	514.48	515.00	515.52	516.04	516.55	517.07	517.59	518.11	518.62	8.20
8.30	518.62	519.14	519.66	520.18	520.69	521.21	521.73	522.24	522.76	523.28	523.79	8.30
8.40	523.79	524.31	524.83	525.34	525.86	526.37	526.89	527.41	527.92	528.44	528.95	8.40
8.50	528.95	529.47	529.98	530.50	531.01	531.53	532.04	532.56	533.07	533.59	534.10	8.50
8.60	534.10	534.62	535.13	535.65	536.16	536.68	537.19	537.70	538.22	538.73	539.25	8.60
8.70	539.25	539.76	540.27	540.79	541.30	541.81	542.33	542.84	543.35	543.86	544.38	8.70
8.80	544.38	544.89	545.40	545.92	546.43	546.94	547.45	547.96	548.48	548.99	549.50	8.80
8.90	549.50	550.01	550.52	551.04	551.55	552.06	552.57	553.08	553.59	554.10	554.62	8.90
9.00	554.62	555.13	555.64	556.15	556.66	557.17	557.68	558.19	558.70	559.21	559.72	9.00
9.10	559.72	560.23	560.74	561.25	561.76	562.27	562.78	563.29	563.80	564.31	564.82	9.10
9.20	564.82	565.33	565.84	566.35	566.86	567.36	567.87	568.38	568.89	569.40	569.91	9.20
9.30	569.91	570.42	570.92	571.43	571.94	572.45	572.96	573.47	573.97	574.48	574.99	9.30
9.40	574.99	575.50	576.00	576.51	577.02	577.53	578.03	578.54	579.05	579.55	580.06	9.40
9.50	580.06	580.57	581.08	581.58	582.09	582.59	583.10	583.61	584.11	584.62	585.13	9.50
9.60	585.13	585.63	586.14	586.64	587.15	587.66	588.16	588.67	589.17	589.68	590.18	9.60
9.70	590.18	590.69	591.19	591.70	592.20	592.71	593.21	593.72	594.22	594.73	595.23	9.70
9.80	595.23	595.74	596.24	596.75	597.25	597.75	598.26	598.76	599.27	599.77	600.27	9.80
9.90	600.27	600.78	601.28	601.78	602.29	602.79	603.29	603.80	604.30	604.80	605.31	9.90
10.00	605.31	605.81	606.31	606.82	607.32	607.82	608.32	608.83	609.33	609.83	610.33	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	605.31	605.81	606.31	606.82	607.32	607.82	608.32	608.83	609.33	609.83	610.33	**10.00**
10.10	610.33	610.84	611.34	611.84	612.34	612.84	613.35	613.85	614.35	614.85	615.35	**10.10**
10.20	615.35	615.85	616.36	616.86	617.36	617.86	618.36	618.86	619.36	619.86	620.36	**10.20**
10.30	620.36	620.86	621.37	621.87	622.37	622.87	623.37	623.87	624.37	624.87	625.37	**10.30**
10.40	625.37	625.87	626.37	626.87	627.37	627.87	628.37	628.87	629.37	629.87	630.37	**10.40**
10.50	630.37	630.87	631.36	631.86	632.36	632.86	633.36	633.86	634.36	634.86	635.36	**10.50**
10.60	635.36	635.86	636.35	636.85	637.35	637.85	638.35	638.85	639.34	639.84	640.34	**10.60**
10.70	640.34	640.84	641.34	641.83	642.33	642.83	643.33	643.82	644.32	644.82	645.32	**10.70**
10.80	645.32	645.81	646.31	646.81	647.31	647.80	648.30	648.80	649.29	649.79	650.29	**10.80**
10.90	650.29	650.78	651.28	651.78	652.27	652.77	653.27	653.76	654.26	654.75	655.25	**10.90**
11.00	655.25	655.75	656.24	656.74	657.23	657.73	658.23	658.72	659.22	659.71	660.21	**11.00**
11.10	660.21	660.70	661.20	661.69	662.19	662.68	663.18	663.67	664.17	664.66	665.16	**11.10**
11.20	665.16	665.65	666.15	666.64	667.14	667.63	668.13	668.62	669.12	669.61	670.10	**11.20**
11.30	670.10	670.60	671.09	671.59	672.08	672.57	673.07	673.56	674.05	674.55	675.04	**11.30**
11.40	675.04	675.54	676.03	676.52	677.02	677.51	678.00	678.50	678.99	679.48	679.97	**11.40**
11.50	679.97	680.47	680.96	681.45	681.95	682.44	682.93	683.42	683.92	684.41	684.90	**11.50**
11.60	684.90	685.39	685.88	686.38	686.87	687.36	687.85	688.34	688.84	689.33	689.82	**11.60**
11.70	689.82	690.31	690.80	691.30	691.79	692.28	692.77	693.26	693.75	694.24	694.73	**11.70**
11.80	694.73	695.23	695.72	696.21	696.70	697.19	697.68	698.17	698.66	699.15	699.64	**11.80**
11.90	699.64	700.13	700.62	701.11	701.61	702.10	702.59	703.08	703.57	704.06	704.55	**11.90**
12.00	704.55	705.04	705.53	706.02	706.51	707.00	707.48	707.97	708.46	708.95	709.44	**12.00**
12.10	709.44	709.93	710.42	710.91	711.40	711.89	712.38	712.87	713.36	713.85	714.33	**12.10**
12.20	714.33	714.82	715.31	715.80	716.29	716.78	717.27	717.76	718.24	718.73	719.22	**12.20**
12.30	719.22	719.71	720.20	720.69	721.17	721.66	722.15	722.64	723.13	723.61	724.10	**12.30**
12.40	724.10	724.59	725.08	725.56	726.05	726.54	727.03	727.51	728.00	728.49	728.98	**12.40**
12.50	728.98	729.46	729.95	730.44	730.93	731.41	731.90	732.39	732.87	733.36	733.85	**12.50**
12.60	733.85	734.33	734.82	735.31	735.79	736.28	736.77	737.25	737.74	738.23	738.71	**12.60**
12.70	738.71	739.20	739.68	740.17	740.66	741.14	741.63	742.11	742.60	743.09	743.57	**12.70**
12.80	743.57	744.06	744.54	745.03	745.51	746.00	746.48	746.97	747.46	747.94	748.43	**12.80**
12.90	748.43	748.91	749.40	749.88	750.37	750.85	751.34	751.82	752.31	752.79	753.28	**12.90**
13.00	753.28	753.76	754.25	754.73	755.21	755.70	756.18	756.67	757.15	757.64	758.12	**13.00**
13.10	758.12	758.60	759.09	759.57	760.06	760.54	761.02	761.51	761.99	762.48	762.96	**13.10**
13.20	762.96	763.44	763.93	764.41	764.89	765.38	765.86	766.35	766.83	767.31	767.80	**13.20**
13.30	767.80	768.28	768.76	769.24	769.73	770.21	770.69	771.18	771.66	772.14	772.63	**13.30**
13.40	772.63	773.11	773.59	774.07	774.56	775.04	775.52	776.00	776.49	776.97	777.45	**13.40**
13.50	777.45	777.93	778.42	778.90	779.38	779.86	780.34	780.83	781.31	781.79	782.27	**13.50**
13.60	782.27	782.75	783.24	783.72	784.20	784.68	785.16	785.64	786.13	786.61	787.09	**13.60**
13.70	787.09	787.57	788.05	788.53	789.01	789.50	789.98	790.46	790.94	791.42	791.90	**13.70**
13.80	791.90	792.38	792.86	793.34	793.82	794.31	794.79	795.27	795.75	796.23	796.71	**13.80**
13.90	796.71	797.19	797.67	798.15	798.63	799.11	799.59	800.07	800.55	801.03	801.51	**13.90**
14.00	801.51	801.99	802.47	802.95	803.43	803.91	804.39	804.87	805.35	805.83	806.31	**14.00**
14.10	806.31	806.79	807.27	807.75	808.23	808.71	809.19	809.67	810.15	810.63	811.10	**14.10**
14.20	811.10	811.58	812.06	812.54	813.02	813.50	813.98	814.46	814.94	815.42	815.90	**14.20**
14.30	815.90	816.37	816.85	817.33	817.81	818.29	818.77	819.25	819.72	820.20	820.68	**14.30**
14.40	820.68	821.16	821.64	822.12	822.60	823.07	823.55	824.03	824.51	824.99	825.46	**14.40**
14.50	825.46	825.94	826.42	826.90	827.38	827.85	828.33	828.81	829.29	829.76	830.24	**14.50**
14.60	830.24	830.72	831.20	831.67	832.15	832.63	833.11	833.58	834.06	834.54	835.02	**14.60**
14.70	835.02	835.49	835.97	836.45	836.93	837.40	837.88	838.36	838.83	839.31	839.79	**14.70**
14.80	839.79	840.26	840.74	841.22	841.69	842.17	842.65	843.12	843.60	844.08	844.55	**14.80**
14.90	844.55	845.03	845.51	845.98	846.46	846.94	847.41	847.89	848.36	848.84	849.32	**14.90**
15.00	849.32	849.79	850.27	850.74	851.22	851.70	852.17	852.65	853.12	853.60	854.07	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	849.32	849.79	850.27	850.74	851.22	851.70	852.17	852.65	853.12	853.60	854.07	**15.00**
15.10	854.07	854.55	855.03	855.50	855.98	856.45	856.93	857.40	857.88	858.35	858.83	**15.10**
15.20	858.83	859.31	859.78	860.26	860.73	861.21	861.68	862.16	862.63	863.11	863.58	**15.20**
15.30	863.58	864.06	864.53	865.01	865.48	865.96	866.43	866.91	867.38	867.86	868.33	**15.30**
15.40	868.33	868.80	869.28	869.75	870.23	870.70	871.18	871.65	872.13	872.60	873.07	**15.40**
15.50	873.07	873.55	874.02	874.50	874.97	875.45	875.92	876.39	876.87	877.34	877.82	**15.50**
15.60	877.82	878.29	878.76	879.24	879.71	880.18	880.66	881.13	881.61	882.08	882.55	**15.60**
15.70	882.55	883.03	883.50	883.97	884.45	884.92	885.39	885.87	886.34	886.81	887.29	**15.70**
15.80	887.29	887.76	888.23	888.71	889.18	889.65	890.13	890.60	891.07	891.54	892.02	**15.80**
15.90	892.02	892.49	892.96	893.44	893.91	894.38	894.85	895.33	895.80	896.27	896.75	**15.90**
16.00	896.75	897.22	897.69	898.16	898.64	899.11	899.58	900.05	900.52	901.00	901.47	**16.00**
16.10	901.47	901.94	902.41	902.89	903.36	903.83	904.30	904.77	905.25	905.72	906.19	**16.10**
16.20	906.19	906.66	907.13	907.61	908.08	908.55	909.02	909.49	909.96	910.44	910.91	**16.20**
16.30	910.91	911.38	911.85	912.32	912.79	913.27	913.74	914.21	914.68	915.15	915.62	**16.30**
16.40	915.62	916.09	916.57	917.04	917.51	917.98	918.45	918.92	919.39	919.86	920.33	**16.40**
16.50	920.33	920.81	921.28	921.75	922.22	922.69	923.16	923.63	924.10	924.57	925.04	**16.50**
16.60	925.04	925.51	925.98	926.46	926.93	927.40	927.87	928.34	928.81	929.28	929.75	**16.60**
16.70	929.75	930.22	930.69	931.16	931.63	932.10	932.57	933.04	933.51	933.98	934.45	**16.70**
16.80	934.45	934.92	935.39	935.86	936.33	936.80	937.27	937.74	938.21	938.68	939.15	**16.80**
16.90	939.15	939.62	940.09	940.56	941.03	941.50	941.97	942.44	942.91	943.38	943.85	**16.90**
17.00	943.85	944.32	944.79	945.26	945.73	946.20	946.67	947.14	947.60	948.07	948.54	**17.00**
17.10	948.54	949.01	949.48	949.95	950.42	950.89	951.36	951.83	952.30	952.77	953.23	**17.10**
17.20	953.23	953.70	954.17	954.64	955.11	955.58	956.05	956.52	956.99	957.45	957.92	**17.20**
17.30	957.92	958.39	958.86	959.33	959.80	960.27	960.74	961.20	961.67	962.14	962.61	**17.30**
17.40	962.61	963.08	963.55	964.01	964.48	964.95	965.42	965.89	966.36	966.82	967.29	**17.40**
17.50	967.29	967.76	968.23	968.70	969.17	969.63	970.10	970.57	971.04	971.51	971.97	**17.50**
17.60	971.97	972.44	972.91	973.38	973.85	974.31	974.78	975.25	975.72	976.18	976.65	**17.60**
17.70	976.65	977.12	977.59	978.06	978.52	978.99	979.46	979.93	980.39	980.86	981.33	**17.70**
17.80	981.33	981.80	982.26	982.73	983.20	983.67	984.13	984.60	985.07	985.53	986.00	**17.80**
17.90	986.00	986.47	986.94	987.40	987.87	988.34	988.80	989.27	989.74	990.21	990.67	**17.90**
18.00	990.67	991.14	991.61	992.07	992.54	993.01	993.47	993.94	994.41	994.87	995.34	**18.00**
18.10	995.34	995.81	996.27	996.74	997.21	997.67	998.14	998.61	999.07	999.54	1000.01	**18.10**
18.20	1000.01	1000.47	1000.94	1001.41	1001.87	1002.34	1002.81	1003.27	1003.74	1004.21	1004.67	**18.20**
18.30	1004.67	1005.14	1005.60	1006.07	1006.54	1007.00	1007.47	1007.94	1008.40	1008.87	1009.33	**18.30**
18.40	1009.33	1009.80	1010.27	1010.73	1011.20	1011.66	1012.13	1012.60	1013.06	1013.53	1013.99	**18.40**
18.50	1013.99	1014.46	1014.92	1015.39	1015.86	1016.32	1016.79	1017.25	1017.72	1018.18	1018.65	**18.50**
18.60	1018.65	1019.12	1019.58	1020.05	1020.51	1020.98	1021.44	1021.91	1022.37	1022.84	1023.31	**18.60**
18.70	1023.31	1023.77	1024.24	1024.70	1025.17	1025.63	1026.10	1026.56	1027.03	1027.49	1027.96	**18.70**
18.80	1027.96	1028.42	1028.89	1029.35	1029.82	1030.28	1030.75	1031.21	1031.68	1032.14	1032.61	**18.80**
18.90	1032.61	1033.07	1033.54	1034.00	1034.47	1034.93	1035.40	1035.86	1036.33	1036.79	1037.26	**18.90**
19.00	1037.26	1037.72	1038.19	1038.65	1039.12	1039.58	1040.05	1040.51	1040.98	1041.44	1041.91	**19.00**
19.10	1041.91	1042.37	1042.83	1043.30	1043.76	1044.23	1044.69	1045.16	1045.62	1046.09	1046.55	**19.10**
19.20	1046.55	1047.01	1047.48	1047.94	1048.41	1048.87	1049.34	1049.80	1050.27	1050.73	1051.19	**19.20**
19.30	1051.19	1051.66	1052.12	1052.59	1053.05	1053.51	1053.98	1054.44	1054.91	1055.37	1055.83	**19.30**
19.40	1055.83	1056.30	1056.76	1057.23	1057.69	1058.15	1058.62	1059.08	1059.55	1060.01	1060.47	**19.40**
19.50	1060.47	1060.94	1061.40	1061.87	1062.33	1062.79	1063.26	1063.72	1064.18	1064.65	1065.11	**19.50**
19.60	1065.11	1065.58	1066.04	1066.50	1066.97	1067.43	1067.89	1068.36	1068.82	1069.28	1069.75	**19.60**
19.70	1069.75	1070.21	1070.67	1071.14	1071.60	1072.06	1072.53	1072.99	1073.45	1073.92	1074.38	**19.70**
19.80	1074.38	1074.84	1075.31	1075.77	1076.23	1076.70	1077.16	1077.62	1078.09	1078.55	1079.01	**19.80**
19.90	1079.01	1079.48	1079.94	1080.40	1080.87	1081.33	1081.79	1082.26	1082.72	1083.18	1083.64	**19.90**
20.00	1083.64	1084.11	1084.57	1085.03	1085.50	1085.96	1086.42	1086.88	1087.35	1087.81	1088.27	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
20.00	1083.64	1084.11	1084.57	1085.03	1085.50	1085.96	1086.42	1086.88	1087.35	1087.81	1088.27	**20.00**
20.10	1088.27	1088.74	1089.20	1089.66	1090.12	1090.59	1091.05	1091.51	1091.98	1092.44	1092.90	**20.10**
20.20	1092.90	1093.36	1093.83	1094.29	1094.75	1095.21	1095.68	1096.14	1096.60	1097.06	1097.53	**20.20**
20.30	1097.53	1097.99	1098.45	1098.91	1099.38	1099.84	1100.30	1100.76	1101.23	1101.69	1102.15	**20.30**
20.40	1102.15	1102.61	1103.08	1103.54	1104.00	1104.46	1104.92	1105.39	1105.85	1106.31	1106.77	**20.40**
20.50	1106.77	1107.24	1107.70	1108.16	1108.62	1109.08	1109.55	1110.01	1110.47	1110.93	1111.39	**20.50**
20.60	1111.39	1111.86	1112.32	1112.78	1113.24	1113.70	1114.17	1114.63	1115.09	1115.55	1116.01	**20.60**
20.70	1116.01	1116.48	1116.94	1117.40	1117.86	1118.32	1118.79	1119.25	1119.71	1120.17	1120.63	**20.70**
20.80	1120.63	1121.09	1121.56	1122.02	1122.48	1122.94	1123.40	1123.86	1124.33	1124.79	1125.25	**20.80**
20.90	1125.25	1125.71	1126.17	1126.63	1127.10	1127.56	1128.02	1128.48	1128.94	1129.40	1129.87	**20.90**
21.00	1129.87	1130.33	1130.79	1131.25	1131.71	1132.17	1132.63	1133.10	1133.56	1134.02	1134.48	**21.00**
21.10	1134.48	1134.94	1135.40	1135.86	1136.32	1136.79	1137.25	1137.71	1138.17	1138.63	1139.09	**21.10**
21.20	1139.09	1139.55	1140.01	1140.48	1140.94	1141.40	1141.86	1142.32	1142.78	1143.24	1143.70	**21.20**
21.30	1143.70	1144.17	1144.63	1145.09	1145.55	1146.01	1146.47	1146.93	1147.39	1147.85	1148.31	**21.30**
21.40	1148.31	1148.78	1149.24	1149.70	1150.16	1150.62	1151.08	1151.54	1152.00	1152.46	1152.92	**21.40**
21.50	1152.92	1153.38	1153.85	1154.31	1154.77	1155.23	1155.69	1156.15	1156.61	1157.07	1157.53	**21.50**
21.60	1157.53	1157.99	1158.45	1158.91	1159.37	1159.84	1160.30	1160.76	1161.22	1161.68	1162.14	**21.60**
21.70	1162.14	1162.60	1163.06	1163.52	1163.98	1164.44	1164.90	1165.36	1165.82	1166.28	1166.74	**21.70**
21.80	1166.74	1167.21	1167.67	1168.13	1168.59	1169.05	1169.51	1169.97	1170.43	1170.89	1171.35	**21.80**
21.90	1171.35	1171.81	1172.27	1172.73	1173.19	1173.65	1174.11	1174.57	1175.03	1175.49	1175.95	**21.90**
22.00	1175.95	1176.41	1176.87	1177.33	1177.79	1178.25	1178.71	1179.18	1179.64	1180.10	1180.56	**22.00**
22.10	1180.56	1181.02	1181.48	1181.94	1182.40	1182.86	1183.32	1183.78	1184.24	1184.70	1185.16	**22.10**
22.20	1185.16	1185.62	1186.08	1186.54	1187.00	1187.46	1187.92	1188.38	1188.84	1189.30	1189.76	**22.20**
22.30	1189.76	1190.22	1190.68	1191.14	1191.60	1192.06	1192.52	1192.98	1193.44	1193.90	1194.36	**22.30**
22.40	1194.36	1194.82	1195.28	1195.74	1196.20	1196.66	1197.12	1197.58	1198.04	1198.50	1198.96	**22.40**
22.50	1198.96	1199.42	1199.88	1200.34	1200.80	1201.26	1201.72	1202.18	1202.63	1203.09	1203.55	**22.50**
22.60	1203.55	1204.01	1204.47	1204.93	1205.39	1205.85	1206.31	1206.77	1207.23	1207.69	1208.15	**22.60**
22.70	1208.15	1208.61	1209.07	1209.53	1209.99	1210.45	1210.91	1211.37	1211.83	1212.29	1212.75	**22.70**
22.80	1212.75	1213.21	1213.67	1214.13	1214.59	1215.05	1215.50	1215.96	1216.42	1216.88	1217.34	**22.80**
22.90	1217.34	1217.80	1218.26	1218.72	1219.18	1219.64	1220.10	1220.56	1221.02	1221.48	1221.94	**22.90**
23.00	1221.94	1222.40	1222.86	1223.32	1223.78	1224.23	1224.69	1225.15	1225.61	1226.07	1226.53	**23.00**
23.10	1226.53	1226.99	1227.45	1227.91	1228.37	1228.83	1229.29	1229.75	1230.21	1230.67	1231.12	**23.10**
23.20	1231.12	1231.58	1232.04	1232.50	1232.96	1233.42	1233.88	1234.34	1234.80	1235.26	1235.72	**23.20**
23.30	1235.72	1236.18	1236.64	1237.09	1237.55	1238.01	1238.47	1238.93	1239.39	1239.85	1240.31	**23.30**
23.40	1240.31	1240.77	1241.23	1241.69	1242.14	1242.60	1243.06	1243.52	1243.98	1244.44	1244.90	**23.40**
23.50	1244.90	1245.36	1245.82	1246.28	1246.74	1247.19	1247.65	1248.11	1248.57	1249.03	1249.49	**23.50**
23.60	1249.49	1249.95	1250.41	1250.87	1251.33	1251.78	1252.24	1252.70	1253.16	1253.62	1254.08	**23.60**
23.70	1254.08	1254.54	1255.00	1255.46	1255.92	1256.37	1256.83	1257.29	1257.75	1258.21	1258.67	**23.70**
23.80	1258.67	1259.13	1259.59	1260.05	1260.50	1260.96	1261.42	1261.88	1262.34	1262.80	1263.26	**23.80**
23.90	1263.26	1263.72	1264.17	1264.63	1265.09	1265.55	1266.01	1266.47	1266.93	1267.39	1267.85	**23.90**
24.00	1267.85	1268.30	1268.76	1269.22	1269.68	1270.14	1270.60	1271.06	1271.52	1271.97	1272.43	**24.00**
24.10	1272.43	1272.89	1273.35	1273.81	1274.27	1274.73	1275.18	1275.64	1276.10	1276.56	1277.02	**24.10**
24.20	1277.02	1277.48	1277.94	1278.40	1278.85	1279.31	1279.77	1280.23	1280.69	1281.15	1281.61	**24.20**
24.30	1281.61	1282.06	1282.52	1282.98	1283.44	1283.90	1284.36	1284.82	1285.28	1285.73	1286.19	**24.30**
24.40	1286.19	1286.65	1287.11	1287.57	1288.03	1288.49	1288.94	1289.40	1289.86	1290.32	1290.78	**24.40**
24.50	1290.78	1291.24	1291.69	1292.15	1292.61	1293.07	1293.53	1293.99	1294.45	1294.90	1295.36	**24.50**
24.60	1295.36	1295.82	1296.28	1296.74	1297.20	1297.66	1298.11	1298.57	1299.03	1299.49	1299.95	**24.60**
24.70	1299.95	1300.41	1300.86	1301.32	1301.78	1302.24	1302.70	1303.16	1303.62	1304.07	1304.53	**24.70**
24.80	1304.53	1304.99	1305.45	1305.91	1306.37	1306.82	1307.28	1307.74	1308.20	1308.66	1309.12	**24.80**
24.90	1309.12	1309.58	1310.03	1310.49	1310.95	1311.41	1311.87	1312.33	1312.78	1313.24	1313.70	**24.90**
25.00	1313.70	1314.16	1314.62	1315.08	1315.53	1315.99	1316.45	1316.91	1317.37	1317.83	1318.28	**25.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
25.00	1313.70	1314.16	1314.62	1315.08	1315.53	1315.99	1316.45	1316.91	1317.37	1317.83	1318.28	**25.00**
25.10	1318.28	1318.74	1319.20	1319.66	1320.12	1320.58	1321.03	1321.49	1321.95	1322.41	1322.87	**25.10**
25.20	1322.87	1323.33	1323.78	1324.24	1324.70	1325.16	1325.62	1326.08	1326.53	1326.99	1327.45	**25.20**
25.30	1327.45	1327.91	1328.37	1328.82	1329.28	1329.74	1330.20	1330.66	1331.12	1331.57	1332.03	**25.30**
25.40	1332.03	1332.49	1332.95	1333.41	1333.87	1334.32	1334.78	1335.24	1335.70	1336.16	1336.62	**25.40**
25.50	1336.62	1337.07	1337.53	1337.99	1338.45	1338.91	1339.36	1339.82	1340.28	1340.74	1341.20	**25.50**
25.60	1341.20	1341.66	1342.11	1342.57	1343.03	1343.49	1343.95	1344.41	1344.86	1345.32	1345.78	**25.60**
25.70	1345.78	1346.24	1346.70	1347.15	1347.61	1348.07	1348.53	1348.99	1349.45	1349.90	1350.36	**25.70**
25.80	1350.36	1350.82	1351.28	1351.74	1352.19	1352.65	1353.11	1353.57	1354.03	1354.49	1354.94	**25.80**
25.90	1354.94	1355.40	1355.86	1356.32	1356.78	1357.23	1357.69	1358.15	1358.61	1359.07	1359.53	**25.90**
26.00	1359.53	1359.98	1360.44	1360.90	1361.36	1361.82	1362.27	1362.73	1363.19	1363.65	1364.11	**26.00**
26.10	1364.11	1364.57	1365.02	1365.48	1365.94	1366.40	1366.86	1367.31	1367.77	1368.23	1368.69	**26.10**
26.20	1368.69	1369.15	1369.60	1370.06	1370.52	1370.98	1371.44	1371.90	1372.35	1372.81	1373.27	**26.20**
26.30	1373.27	1373.73	1374.19	1374.64	1375.10	1375.56	1376.02	1376.48	1376.94	1377.39	1377.85	**26.30**
26.40	1377.85	1378.31	1378.77	1379.23	1379.68	1380.14	1380.60	1381.06	1381.52	1381.97	1382.43	**26.40**
26.50	1382.43	1382.89	1383.35	1383.81	1384.27	1384.72	1385.18	1385.64	1386.10	1386.56	1387.01	**26.50**
26.60	1387.01	1387.47	1387.93	1388.39	1388.85	1389.31	1389.76	1390.22	1390.68	1391.14	1391.60	**26.60**
26.70	1391.60	1392.05	1392.51	1392.97	1393.43	1393.89	1394.34	1394.80	1395.26	1395.72	1396.18	**26.70**
26.80	1396.18	1396.64	1397.09	1397.55	1398.01	1398.47	1398.93	1399.38	1399.84	1400.30	1400.76	**26.80**
26.90	1400.76	1401.22	1401.68	1402.13	1402.59	1403.05	1403.51	1403.97	1404.42	1404.88	1405.34	**26.90**
27.00	1405.34	1405.80	1406.26	1406.72	1407.17	1407.63	1408.09	1408.55	1409.01	1409.46	1409.92	**27.00**
27.10	1409.92	1410.38	1410.84	1411.30	1411.75	1412.21	1412.67	1413.13	1413.59	1414.05	1414.50	**27.10**
27.20	1414.50	1414.96	1415.42	1415.88	1416.34	1416.79	1417.25	1417.71	1418.17	1418.63	1419.09	**27.20**
27.30	1419.09	1419.54	1420.00	1420.46	1420.92	1421.38	1421.84	1422.29	1422.75	1423.21	1423.67	**27.30**
27.40	1423.67	1424.13	1424.58	1425.04	1425.50	1425.96	1426.42	1426.88	1427.33	1427.79	1428.25	**27.40**
27.50	1428.25	1428.71	1429.17	1429.62	1430.08	1430.54	1431.00	1431.46	1431.92	1432.37	1432.83	**27.50**
27.60	1432.83	1433.29	1433.75	1434.21	1434.67	1435.12	1435.58	1436.04	1436.50	1436.96	1437.42	**27.60**
27.70	1437.42	1437.87	1438.33	1438.79	1439.25	1439.71	1440.16	1440.62	1441.08	1441.54	1442.00	**27.70**
27.80	1442.00	1442.46	1442.91	1443.37	1443.83	1444.29	1444.75	1445.21	1445.66	1446.12	1446.58	**27.80**
27.90	1446.58	1447.04	1447.50	1447.96	1448.41	1448.87	1449.33	1449.79	1450.25	1450.71	1451.16	**27.90**
28.00	1451.16	1451.62	1452.08	1452.54	1453.00	1453.46	1453.91	1454.37	1454.83	1455.29	1455.75	**28.00**
28.10	1455.75	1456.21	1456.66	1457.12	1457.58	1458.04	1458.50	1458.96	1459.42	1459.87	1460.33	**28.10**
28.20	1460.33	1460.79	1461.25	1461.71	1462.17	1462.62	1463.08	1463.54	1464.00	1464.46	1464.92	**28.20**
28.30	1464.92	1465.37	1465.83	1466.29	1466.75	1467.21	1467.67	1468.13	1468.58	1469.04	1469.50	**28.30**
28.40	1469.50	1469.96	1470.42	1470.88	1471.33	1471.79	1472.25	1472.71	1473.17	1473.63	1474.09	**28.40**
28.50	1474.09	1474.54	1475.00	1475.46	1475.92	1476.38	1476.84	1477.29	1477.75	1478.21	1478.67	**28.50**
28.60	1478.67	1479.13	1479.59	1480.05	1480.50	1480.96	1481.42	1481.88	1482.34	1482.80	1483.26	**28.60**
28.70	1483.26	1483.71	1484.17	1484.63	1485.09	1485.55	1486.01	1486.47	1486.92	1487.38	1487.84	**28.70**
28.80	1487.84	1488.30	1488.76	1489.22	1489.68	1490.13	1490.59	1491.05	1491.51	1491.97	1492.43	**28.80**
28.90	1492.43	1492.89	1493.35	1493.80	1494.26	1494.72	1495.18	1495.64	1496.10	1496.56	1497.01	**28.90**
29.00	1497.01	1497.47	1497.93	1498.39	1498.85	1499.31	1499.77	1500.23	1500.68	1501.14	1501.60	**29.00**
29.10	1501.60	1502.06	1502.52	1502.98	1503.44	1503.90	1504.35	1504.81	1505.27	1505.73	1506.19	**29.10**
29.20	1506.19	1506.65	1507.11	1507.57	1508.02	1508.48	1508.94	1509.40	1509.86	1510.32	1510.78	**29.20**
29.30	1510.78	1511.24	1511.70	1512.15	1512.61	1513.07	1513.53	1513.99	1514.45	1514.91	1515.37	**29.30**
29.40	1515.37	1515.82	1516.28	1516.74	1517.20	1517.66	1518.12	1518.58	1519.04	1519.50	1519.96	**29.40**
29.50	1519.96	1520.41	1520.87	1521.33	1521.79	1522.25	1522.71	1523.17	1523.63	1524.09	1524.54	**29.50**
29.60	1524.54	1525.00	1525.46	1525.92	1526.38	1526.84	1527.30	1527.76	1528.22	1528.68	1529.13	**29.60**
29.70	1529.13	1529.59	1530.05	1530.51	1530.97	1531.43	1531.89	1532.35	1532.81	1533.27	1533.73	**29.70**
29.80	1533.73	1534.18	1534.64	1535.10	1535.56	1536.02	1536.48	1536.94	1537.40	1537.86	1538.32	**29.80**
29.90	1538.32	1538.78	1539.23	1539.69	1540.15	1540.61	1541.07	1541.53	1541.99	1542.45	1542.91	**29.90**
30.00	1542.91	1543.37	1543.83	1544.29	1544.74	1545.20	1545.66	1546.12	1546.58	1547.04	1547.50	**30.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
30.00	1542.91	1543.37	1543.83	1544.29	1544.74	1545.20	1545.66	1546.12	1546.58	1547.04	1547.50	30.00
30.10	1547.50	1547.96	1548.42	1548.88	1549.34	1549.80	1550.26	1550.72	1551.17	1551.63	1552.09	30.10
30.20	1552.09	1552.55	1553.01	1553.47	1553.93	1554.39	1554.85	1555.31	1555.77	1556.23	1556.69	30.20
30.30	1556.69	1557.15	1557.61	1558.07	1558.52	1558.98	1559.44	1559.90	1560.36	1560.82	1561.28	30.30
30.40	1561.28	1561.74	1562.20	1562.66	1563.12	1563.58	1564.04	1564.50	1564.96	1565.42	1565.88	30.40
30.50	1565.88	1566.34	1566.80	1567.25	1567.71	1568.17	1568.63	1569.09	1569.55	1570.01	1570.47	30.50
30.60	1570.47	1570.93	1571.39	1571.85	1572.31	1572.77	1573.23	1573.69	1574.15	1574.61	1575.07	30.60
30.70	1575.07	1575.53	1575.99	1576.45	1576.91	1577.37	1577.83	1578.29	1578.75	1579.21	1579.66	30.70
30.80	1579.66	1580.12	1580.58	1581.04	1581.50	1581.96	1582.42	1582.88	1583.34	1583.80	1584.26	30.80
30.90	1584.26	1584.72	1585.18	1585.64	1586.10	1586.56	1587.02	1587.48	1587.94	1588.40	1588.86	30.90
31.00	1588.86	1589.32	1589.78	1590.24	1590.70	1591.16	1591.62	1592.08	1592.54	1593.00	1593.46	31.00
31.10	1593.46	1593.92	1594.38	1594.84	1595.30	1595.76	1596.22	1596.68	1597.14	1597.60	1598.06	31.10
31.20	1598.06	1598.52	1598.98	1599.44	1599.90	1600.36	1600.82	1601.28	1601.74	1602.20	1602.66	31.20
31.30	1602.66	1603.12	1603.58	1604.04	1604.50	1604.96	1605.42	1605.88	1606.34	1606.80	1607.26	31.30
31.40	1607.26	1607.72	1608.18	1608.64	1609.10	1609.56	1610.02	1610.48	1610.94	1611.40	1611.86	31.40
31.50	1611.86	1612.32	1612.79	1613.25	1613.71	1614.17	1614.63	1615.09	1615.55	1616.01	1616.47	31.50
31.60	1616.47	1616.93	1617.39	1617.85	1618.31	1618.77	1619.23	1619.69	1620.15	1620.61	1621.07	31.60
31.70	1621.07	1621.53	1621.99	1622.45	1622.91	1623.37	1623.83	1624.30	1624.76	1625.22	1625.68	31.70
31.80	1625.68	1626.14	1626.60	1627.06	1627.52	1627.98	1628.44	1628.90	1629.36	1629.82	1630.28	31.80
31.90	1630.28	1630.74	1631.20	1631.66	1632.13	1632.59	1633.05	1633.51	1633.97	1634.43	1634.89	31.90
32.00	1634.89	1635.35	1635.81	1636.27	1636.73	1637.19	1637.65	1638.11	1638.58	1639.04	1639.50	32.00
32.10	1639.50	1639.96	1640.42	1640.88	1641.34	1641.80	1642.26	1642.72	1643.18	1643.64	1644.11	32.10
32.20	1644.11	1644.57	1645.03	1645.49	1645.95	1646.41	1646.87	1647.33	1647.79	1648.25	1648.71	32.20
32.30	1648.71	1649.18	1649.64	1650.10	1650.56	1651.02	1651.48	1651.94	1652.40	1652.86	1653.33	32.30
32.40	1653.33	1653.79	1654.25	1654.71	1655.17	1655.63	1656.09	1656.55	1657.01	1657.48	1657.94	32.40
32.50	1657.94	1658.40	1658.86	1659.32	1659.78	1660.24	1660.70	1661.17	1661.63	1662.09	1662.55	32.50
32.60	1662.55	1663.01	1663.47	1663.93	1664.39	1664.86	1665.32	1665.78	1666.24	1666.70	1667.16	32.60
32.70	1667.16	1667.62	1668.09	1668.55	1669.01	1669.47	1669.93	1670.39	1670.85	1671.32	1671.78	32.70
32.80	1671.78	1672.24	1672.70	1673.16	1673.62	1674.08	1674.55	1675.01	1675.47	1675.93	1676.39	32.80
32.90	1676.39	1676.85	1677.32	1677.78	1678.24	1678.70	1679.16	1679.62	1680.09	1680.55	1681.01	32.90
33.00	1681.01	1681.47	1681.93	1682.39	1682.86	1683.32	1683.78	1684.24	1684.70	1685.17	1685.63	33.00
33.10	1685.63	1686.09	1686.55	1687.01	1687.47	1687.94	1688.40	1688.86	1689.32	1689.78	1690.25	33.10
33.20	1690.25	1690.71	1691.17	1691.63	1692.09	1692.56	1693.02	1693.48	1693.94	1694.40	1694.87	33.20
33.30	1694.87	1695.33	1695.79	1696.25	1696.71	1697.18	1697.64	1698.10	1698.56	1699.02	1699.49	33.30
33.40	1699.49	1699.95	1700.41	1700.87	1701.34	1701.80	1702.26	1702.72	1703.18	1703.65	1704.11	33.40
33.50	1704.11	1704.57	1705.03	1705.50	1705.96	1706.42	1706.88	1707.35	1707.81	1708.27	1708.73	33.50
33.60	1708.73	1709.19	1709.66	1710.12	1710.58	1711.04	1711.51	1711.97	1712.43	1712.89	1713.36	33.60
33.70	1713.36	1713.82	1714.28	1714.74	1715.21	1715.67	1716.13	1716.60	1717.06	1717.52	1717.98	33.70
33.80	1717.98	1718.45	1718.91	1719.37	1719.83	1720.30	1720.76	1721.22	1721.68	1722.15	1722.61	33.80
33.90	1722.61	1723.07	1723.54	1724.00	1724.46	1724.92	1725.39	1725.85	1726.31	1726.78	1727.24	33.90
34.00	1727.24	1727.70	1728.16	1728.63	1729.09	1729.55	1730.02	1730.48	1730.94	1731.40	1731.87	34.00
34.10	1731.87	1732.33	1732.79	1733.26	1733.72	1734.18	1734.65	1735.11	1735.57	1736.04	1736.50	34.10
34.20	1736.50	1736.96	1737.42	1737.89	1738.35	1738.81	1739.28	1739.74	1740.20	1740.67	1741.13	34.20
34.30	1741.13	1741.59	1742.06	1742.52	1742.98	1743.45	1743.91	1744.37	1744.84	1745.30	1745.76	34.30
34.40	1745.76	1746.23	1746.69	1747.15	1747.62	1748.08	1748.54	1749.01	1749.47	1749.94	1750.40	34.40
34.50	1750.40	1750.86	1751.33	1751.79	1752.25	1752.72	1753.18	1753.64	1754.11	1754.57	1755.03	34.50
34.60	1755.03	1755.50	1755.96	1756.43	1756.89	1757.35	1757.82	1758.28	1758.74	1759.21	1759.67	34.60
34.70	1759.67	1760.14	1760.60	1761.06	1761.53	1761.99	1762.46	1762.92	1763.38	1763.85	1764.31	34.70
34.80	1764.31	1764.78	1765.24	1765.70	1766.17	1766.63	1767.10	1767.56	1768.02	1768.49	1768.95	34.80
34.90	1768.95	1769.42	1769.88	1770.34	1770.81	1771.27	1771.74	1772.20	1772.66	1773.13	1773.59	34.90
35.00	1773.59	1774.06	1774.52	1774.99	1775.45	1775.91	1776.38	1776.84	1777.31	1777.77	1778.24	35.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
35.00	1773.59	1774.06	1774.52	1774.99	1775.45	1775.91	1776.38	1776.84	1777.31	1777.77	1778.24	**35.00**
35.10	1778.24	1778.70	1779.17	1779.63	1780.09	1780.56	1781.02	1781.49	1781.95	1782.42	1782.88	**35.10**
35.20	1782.88	1783.35	1783.81	1784.27	1784.74	1785.20	1785.67	1786.13	1786.60	1787.06	1787.53	**35.20**
35.30	1787.53	1787.99	1788.46	1788.92	1789.39	1789.85	1790.32	1790.78	1791.24	1791.71	1792.17	**35.30**
35.40	1792.17	1792.64	1793.10	1793.57	1794.03	1794.50	1794.96	1795.43	1795.89	1796.36	1796.82	**35.40**
35.50	1796.82	1797.29	1797.75	1798.22	1798.68	1799.15	1799.61	1800.08	1800.54	1801.01	1801.47	**35.50**
35.60	1801.47	1801.94	1802.40	1802.87	1803.33	1803.80	1804.27	1804.73	1805.20	1805.66	1806.13	**35.60**
35.70	1806.13	1806.59	1807.06	1807.52	1807.99	1808.45	1808.92	1809.38	1809.85	1810.31	1810.78	**35.70**
35.80	1810.78	1811.25	1811.71	1812.18	1812.64	1813.11	1813.57	1814.04	1814.50	1814.97	1815.44	**35.80**
35.90	1815.44	1815.90	1816.37	1816.83	1817.30	1817.76	1818.23	1818.70	1819.16	1819.63	1820.09	**35.90**
36.00	1820.09	1820.56	1821.02	1821.49	1821.96	1822.42	1822.89	1823.35	1823.82	1824.28	1824.75	**36.00**
36.10	1824.75	1825.22	1825.68	1826.15	1826.61	1827.08	1827.55	1828.01	1828.48	1828.95	1829.41	**36.10**
36.20	1829.41	1829.88	1830.34	1830.81	1831.28	1831.74	1832.21	1832.67	1833.14	1833.61	1834.07	**36.20**
36.30	1834.07	1834.54	1835.01	1835.47	1835.94	1836.40	1836.87	1837.34	1837.80	1838.27	1838.74	**36.30**
36.40	1838.74	1839.20	1839.67	1840.14	1840.60	1841.07	1841.54	1842.00	1842.47	1842.94	1843.40	**36.40**
36.50	1843.40	1843.87	1844.33	1844.80	1845.27	1845.73	1846.20	1846.67	1847.14	1847.60	1848.07	**36.50**
36.60	1848.07	1848.54	1849.00	1849.47	1849.94	1850.40	1850.87	1851.34	1851.80	1852.27	1852.74	**36.60**
36.70	1852.74	1853.20	1853.67	1854.14	1854.61	1855.07	1855.54	1856.01	1856.47	1856.94	1857.41	**36.70**
36.80	1857.41	1857.87	1858.34	1858.81	1859.28	1859.74	1860.21	1860.68	1861.15	1861.61	1862.08	**36.80**
36.90	1862.08	1862.55	1863.01	1863.48	1863.95	1864.42	1864.88	1865.35	1865.82	1866.29	1866.75	**36.90**
37.00	1866.75	1867.22	1867.69	1868.16	1868.62	1869.09	1869.56	1870.03	1870.49	1870.96	1871.43	**37.00**
37.10	1871.43	1871.90	1872.37	1872.83	1873.30	1873.77	1874.24	1874.70	1875.17	1875.64	1876.11	**37.10**
37.20	1876.11	1876.58	1877.04	1877.51	1877.98	1878.45	1878.91	1879.38	1879.85	1880.32	1880.79	**37.20**
37.30	1880.79	1881.25	1881.72	1882.19	1882.66	1883.13	1883.60	1884.06	1884.53	1885.00	1885.47	**37.30**
37.40	1885.47	1885.94	1886.40	1886.87	1887.34	1887.81	1888.28	1888.75	1889.21	1889.68	1890.15	**37.40**
37.50	1890.15	1890.62	1891.09	1891.56	1892.03	1892.49	1892.96	1893.43	1893.90	1894.37	1894.84	**37.50**
37.60	1894.84	1895.31	1895.77	1896.24	1896.71	1897.18	1897.65	1898.12	1898.59	1899.05	1899.52	**37.60**
37.70	1899.52	1899.99	1900.46	1900.93	1901.40	1901.87	1902.34	1902.81	1903.27	1903.74	1904.21	**37.70**
37.80	1904.21	1904.68	1905.15	1905.62	1906.09	1906.56	1907.03	1907.50	1907.97	1908.43	1908.90	**37.80**
37.90	1908.90	1909.37	1909.84	1910.31	1910.78	1911.25	1911.72	1912.19	1912.66	1913.13	1913.60	**37.90**
38.00	1913.60	1914.07	1914.54	1915.00	1915.47	1915.94	1916.41	1916.88	1917.35	1917.82	1918.29	**38.00**
38.10	1918.29	1918.76	1919.23	1919.70	1920.17	1920.64	1921.11	1921.58	1922.05	1922.52	1922.99	**38.10**
38.20	1922.99	1923.46	1923.93	1924.40	1924.87	1925.34	1925.81	1926.28	1926.75	1927.22	1927.69	**38.20**
38.30	1927.69	1928.16	1928.63	1929.10	1929.57	1930.04	1930.51	1930.98	1931.45	1931.92	1932.39	**38.30**
38.40	1932.39	1932.86	1933.33	1933.80	1934.27	1934.74	1935.21	1935.68	1936.15	1936.62	1937.09	**38.40**
38.50	1937.09	1937.56	1938.03	1938.50	1938.97	1939.44	1939.91	1940.38	1940.86	1941.33	1941.80	**38.50**
38.60	1941.80	1942.27	1942.74	1943.21	1943.68	1944.15	1944.62	1945.09	1945.56	1946.03	1946.50	**38.60**
38.70	1946.50	1946.97	1947.45	1947.92	1948.39	1948.86	1949.33	1949.80	1950.27	1950.74	1951.21	**38.70**
38.80	1951.21	1951.68	1952.15	1952.63	1953.10	1953.57	1954.04	1954.51	1954.98	1955.45	1955.92	**38.80**
38.90	1955.92	1956.40	1956.87	1957.34	1957.81	1958.28	1958.75	1959.22	1959.70	1960.17	1960.64	**38.90**
39.00	1960.64	1961.11	1961.58	1962.05	1962.52	1963.00	1963.47	1963.94	1964.41	1964.88	1965.35	**39.00**
39.10	1965.35	1965.83	1966.30	1966.77	1967.24	1967.71	1968.18	1968.66	1969.13	1969.60	1970.07	**39.10**
39.20	1970.07	1970.54	1971.02	1971.49	1971.96	1972.43	1972.90	1973.38	1973.85	1974.32	1974.79	**39.20**
39.30	1974.79	1975.26	1975.74	1976.21	1976.68	1977.15	1977.63	1978.10	1978.57	1979.04	1979.51	**39.30**
39.40	1979.51	1979.99	1980.46	1980.93	1981.40	1981.88	1982.35	1982.82	1983.29	1983.77	1984.24	**39.40**
39.50	1984.24	1984.71	1985.18	1985.66	1986.13	1986.60	1987.07	1987.55	1988.02	1988.49	1988.97	**39.50**
39.60	1988.97	1989.44	1989.91	1990.38	1990.86	1991.33	1991.80	1992.28	1992.75	1993.22	1993.70	**39.60**
39.70	1993.70	1994.17	1994.64	1995.11	1995.59	1996.06	1996.53	1997.01	1997.48	1997.95	1998.43	**39.70**
39.80	1998.43	1998.90	1999.37	1999.85	2000.32	2000.79	2001.27	2001.74	2002.21	2002.69	2003.16	**39.80**
39.90	2003.16	2003.63	2004.11	2004.58	2005.05	2005.53	2006.00	2006.48	2006.95	2007.42	2007.90	**39.90**
40.00	2007.90	2008.37	2008.84	2009.32	2009.79	2010.27	2010.74	2011.21	2011.69	2012.16	2012.63	**40.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

Temperatures in Degrees Fahrenheit

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
40.00	2007.90	2008.37	2008.84	2009.32	2009.79	2010.27	2010.74	2011.21	2011.69	2012.16	2012.63	**40.00**
40.10	2012.63	2013.11	2013.58	2014.06	2014.53	2015.00	2015.48	2015.95	2016.43	2016.90	2017.38	**40.10**
40.20	2017.38	2017.85	2018.32	2018.80	2019.27	2019.75	2020.22	2020.70	2021.17	2021.64	2022.12	**40.20**
40.30	2022.12	2022.59	2023.07	2023.54	2024.02	2024.49	2024.97	2025.44	2025.92	2026.39	2026.86	**40.30**
40.40	2026.86	2027.34	2027.81	2028.29	2028.76	2029.24	2029.71	2030.19	2030.66	2031.14	2031.61	**40.40**
40.50	2031.61	2032.09	2032.56	2033.04	2033.51	2033.99	2034.46	2034.94	2035.41	2035.89	2036.36	**40.50**
40.60	2036.36	2036.84	2037.31	2037.79	2038.26	2038.74	2039.21	2039.69	2040.16	2040.64	2041.12	**40.60**
40.70	2041.12	2041.59	2042.07	2042.54	2043.02	2043.49	2043.97	2044.44	2044.92	2045.40	2045.87	**40.70**
40.80	2045.87	2046.35	2046.82	2047.30	2047.77	2048.25	2048.73	2049.20	2049.68	2050.15	2050.63	**40.80**
40.90	2050.63	2051.10	2051.58	2052.06	2052.53	2053.01	2053.48	2053.96	2054.44	2054.91	2055.39	**40.90**
41.00	2055.39	2055.86	2056.34	2056.82	2057.29	2057.77	2058.25	2058.72	2059.20	2059.68	2060.15	**41.00**
41.10	2060.15	2060.63	2061.10	2061.58	2062.06	2062.53	2063.01	2063.49	2063.96	2064.44	2064.92	**41.10**
41.20	2064.92	2065.39	2065.87	2066.35	2066.82	2067.30	2067.78	2068.25	2068.73	2069.21	2069.68	**41.20**
41.30	2069.68	2070.16	2070.64	2071.12	2071.59	2072.07	2072.55	2073.02	2073.50	2073.98	2074.45	**41.30**
41.40	2074.45	2074.93	2075.41	2075.89	2076.36	2076.84	2077.32	2077.80	2078.27	2078.75	2079.23	**41.40**
41.50	2079.23	2079.71	2080.18	2080.66	2081.14	2081.62	2082.09	2082.57	2083.05	2083.53	2084.00	**41.50**
41.60	2084.00	2084.48	2084.96	2085.44	2085.91	2086.39	2086.87	2087.35	2087.83	2088.30	2088.78	**41.60**
41.70	2088.78	2089.26	2089.74	2090.22	2090.69	2091.17	2091.65	2092.13	2092.61	2093.08	2093.56	**41.70**
41.80	2093.56	2094.04	2094.52	2095.00	2095.48	2095.95	2096.43	2096.91	2097.39	2097.87	2098.35	**41.80**
41.90	2098.35	2098.82	2099.30	2099.78	2100.26	2100.74	2101.22	2101.70	2102.17	2102.65	2103.13	**41.90**
42.00	2103.13	2103.61	2104.09	2104.57	2105.05	2105.53	2106.00	2106.48	2106.96	2107.44	2107.92	**42.00**
42.10	2107.92	2108.40	2108.88	2109.36	2109.84	2110.32	2110.79	2111.27	2111.75	2112.23	2112.71	**42.10**
42.20	2112.71	2113.19	2113.67	2114.15	2114.63	2115.11	2115.59	2116.07	2116.55	2117.03	2117.51	**42.20**
42.30	2117.51	2117.99	2118.46	2118.94	2119.42	2119.90	2120.38	2120.86	2121.34	2121.82	2122.30	**42.30**
42.40	2122.30	2122.78	2123.26	2123.74	2124.22	2124.70	2125.18	2125.66	2126.14	2126.62	2127.10	**42.40**
42.50	2127.10	2127.58	2128.06	2128.54	2129.02	2129.50	2129.98	2130.46	2130.94	2131.42	2131.90	**42.50**
42.60	2131.90	2132.38	2132.87	2133.35	2133.83	2134.31	2134.79	2135.27	2135.75	2136.23	2136.71	**42.60**
42.70	2136.71	2137.19	2137.67	2138.15	2138.63	2139.11	2139.59	2140.07	2140.56	2141.04	2141.52	**42.70**
42.80	2141.52	2142.00	2142.48	2142.96	2143.44	2143.92	2144.40	2144.88	2145.37	2145.85	2146.33	**42.80**
42.90	2146.33	2146.81	2147.29	2147.77	2148.25	2148.73	2149.22	2149.70	2150.18	2150.66	2151.14	**42.90**
43.00	2151.14	2151.62	2152.10	2152.59	2153.07	2153.55	2154.03	2154.51	2154.99	2155.48	2155.96	**43.00**
43.10	2155.96	2156.44	2156.92	2157.40	2157.89	2158.37	2158.85	2159.33	2159.81	2160.30	2160.78	**43.10**
43.20	2160.78	2161.26	2161.74	2162.22	2162.71	2163.19	2163.67	2164.15	2164.64	2165.12	2165.60	**43.20**
43.30	2165.60	2166.08	2166.56	2167.05	2167.53	2168.01	2168.49	2168.98	2169.46	2169.94	2170.43	**43.30**
43.40	2170.43	2170.91	2171.39	2171.87	2172.36	2172.84	2173.32	2173.80	2174.29	2174.77	2175.25	**43.40**
43.50	2175.25	2175.74	2176.22	2176.70	2177.19	2177.67	2178.15	2178.64	2179.12	2179.60	2180.08	**43.50**
43.60	2180.08	2180.57	2181.05	2181.53	2182.02	2182.50	2182.98	2183.47	2183.95	2184.44	2184.92	**43.60**
43.70	2184.92	2185.40	2185.89	2186.37	2186.85	2187.34	2187.82	2188.30	2188.79	2189.27	2189.76	**43.70**
43.80	2189.76	2190.24	2190.72	2191.21	2191.69	2192.18	2192.66	2193.14	2193.63	2194.11	2194.60	**43.80**
43.90	2194.60	2195.08	2195.57	2196.05	2196.53	2197.02	2197.50	2197.99	2198.47	2198.96	2199.44	**43.90**
44.00	2199.44	2199.92	2200.41	2200.89	2201.38	2201.86	2202.35	2202.83	2203.32	2203.80	2204.29	**44.00**
44.10	2204.29	2204.77	2205.26	2205.74	2206.23	2206.71	2207.20	2207.68	2208.17	2208.65	2209.14	**44.10**
44.20	2209.14	2209.62	2210.11	2210.59	2211.08	2211.56	2212.05	2212.53	2213.02	2213.50	2213.99	**44.20**
44.30	2213.99	2214.48	2214.96	2215.45	2215.93	2216.42	2216.90	2217.39	2217.87	2218.36	2218.85	**44.30**
44.40	2218.85	2219.33	2219.82	2220.30	2220.79	2221.28	2221.76	2222.25	2222.73	2223.22	2223.71	**44.40**
44.50	2223.71	2224.19	2224.68	2225.16	2225.65	2226.14	2226.62	2227.11	2227.60	2228.08	2228.57	**44.50**
44.60	2228.57	2229.06	2229.54	2230.03	2230.52	2231.00	2231.49	2231.98	2232.46	2232.95	2233.44	**44.60**
44.70	2233.44	2233.92	2234.41	2234.90	2235.38	2235.87	2236.36	2236.84	2237.33	2237.82	2238.31	**44.70**
44.80	2238.31	2238.79	2239.28	2239.77	2240.25	2240.74	2241.23	2241.72	2242.20	2242.69	2243.18	**44.80**
44.90	2243.18	2243.67	2244.15	2244.64	2245.13	2245.62	2246.10	2246.59	2247.08	2247.57	2248.06	**44.90**
45.00	2248.06	2248.54	2249.03	2249.52	2250.01	2250.50	2250.98	2251.47	2251.96	2252.45	2252.94	**45.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B8.2.2 *Type N thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
45.00	2248.06	2248.54	2249.03	2249.52	2250.01	2250.50	2250.98	2251.47	2251.96	2252.45	2252.94	45.00
45.10	2252.94	2253.42	2253.91	2254.40	2254.89	2255.38	2255.87	2256.35	2256.84	2257.33	2257.82	45.10
45.20	2257.82	2258.31	2258.80	2259.29	2259.78	2260.26	2260.75	2261.24	2261.73	2262.22	2262.71	45.20
45.30	2262.71	2263.20	2263.69	2264.18	2264.66	2265.15	2265.64	2266.13	2266.62	2267.11	2267.60	45.30
45.40	2267.60	2268.09	2268.58	2269.07	2269.56	2270.05	2270.54	2271.03	2271.52	2272.01	2272.50	45.40
45.50	2272.50	2272.99	2273.48	2273.97	2274.45	2274.94	2275.43	2275.92	2276.41	2276.90	2277.40	45.50
45.60	2277.40	2277.89	2278.38	2278.87	2279.36	2279.85	2280.34	2280.83	2281.32	2281.81	2282.30	45.60
45.70	2282.30	2282.79	2283.28	2283.77	2284.26	2284.75	2285.24	2285.73	2286.22	2286.72	2287.21	45.70
45.80	2287.21	2287.70	2288.19	2288.68	2289.17	2289.66	2290.15	2290.64	2291.14	2291.63	2292.12	45.80
45.90	2292.12	2292.61	2293.10	2293.59	2294.08	2294.58	2295.07	2295.56	2296.05	2296.54	2297.03	45.90
46.00	2297.03	2297.53	2298.02	2298.51	2299.00	2299.49	2299.99	2300.48	2300.97	2301.46	2301.95	46.00
46.10	2301.95	2302.45	2302.94	2303.43	2303.92	2304.42	2304.91	2305.40	2305.89	2306.39	2306.88	46.10
46.20	2306.88	2307.37	2307.86	2308.36	2308.85	2309.34	2309.84	2310.33	2310.82	2311.31	2311.81	46.20
46.30	2311.81	2312.30	2312.79	2313.29	2313.78	2314.27	2314.77	2315.26	2315.75	2316.25	2316.74	46.30
46.40	2316.74	2317.24	2317.73	2318.22	2318.72	2319.21	2319.70	2320.20	2320.69	2321.19	2321.68	46.40
46.50	2321.68	2322.17	2322.67	2323.16	2323.66	2324.15	2324.65	2325.14	2325.64	2326.13	2326.62	46.50
46.60	2326.62	2327.12	2327.61	2328.11	2328.60	2329.10	2329.59	2330.09	2330.58	2331.08	2331.57	46.60
46.70	2331.57	2332.07	2332.56	2333.06	2333.55	2334.05	2334.54	2335.04	2335.54	2336.03	2336.53	46.70
46.80	2336.53	2337.02	2337.52	2338.01	2338.51	2339.01	2339.50	2340.00	2340.49	2340.99	2341.49	46.80
46.90	2341.49	2341.98	2342.48	2342.97	2343.47	2343.97	2344.46	2344.96	2345.46	2345.95	2346.45	46.90
47.00	2346.45	2346.95	2347.44	2347.94	2348.44	2348.94	2349.43	2349.93	2350.43	2350.92	2351.42	47.00
47.10	2351.42	2351.92	2352.42	2352.91	2353.41	2353.91	2354.41	2354.90	2355.40	2355.90	2356.40	47.10
47.20	2356.40	2356.89	2357.39	2357.89	2358.39	2358.89	2359.39	2359.88	2360.38	2360.88	2361.38	47.20
47.30	2361.38	2361.88	2362.38	2362.87	2363.37	2363.87	2364.37	2364.87	2365.37	2365.87	2366.37	47.30
47.40	2366.37	2366.87	2367.37	2367.86	2368.36	2368.86	2369.36	2369.86	2370.36	2370.86	2371.36	47.40
47.50	2371.36	2371.86										47.50
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

B9. Supplementary Reference Tables for Type T—Copper Versus Copper-Nickel Alloy Thermocouples

B9.1. Tables with Voltage as a Function of Temperature

The reference function for type T thermocouples given in the main text (see table 9.3.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables B9.1.1 and B9.1.2. Table B9.1.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 400 °C, and table B9.1.2 presents voltage values at 1 °F intervals from −454 °F to 752 °F.

TABLE B9.1.1. *Type T thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−6.258											−270
−260	−6.232	−6.236	−6.239	−6.242	−6.245	−6.248	−6.251	−6.253	−6.255	−6.256	−6.258	−260
−250	−6.180	−6.187	−6.193	−6.198	−6.204	−6.209	−6.214	−6.219	−6.223	−6.228	−6.232	−250
−240	−6.105	−6.114	−6.122	−6.130	−6.138	−6.146	−6.153	−6.160	−6.167	−6.174	−6.180	−240
−230	−6.007	−6.017	−6.028	−6.038	−6.049	−6.059	−6.068	−6.078	−6.087	−6.096	−6.105	−230
−220	−5.888	−5.901	−5.914	−5.926	−5.938	−5.950	−5.962	−5.973	−5.985	−5.996	−6.007	−220
−210	−5.753	−5.767	−5.782	−5.795	−5.809	−5.823	−5.836	−5.850	−5.863	−5.876	−5.888	−210
−200	−5.603	−5.619	−5.634	−5.650	−5.665	−5.680	−5.695	−5.710	−5.724	−5.739	−5.753	−200
−190	−5.439	−5.456	−5.473	−5.489	−5.506	−5.523	−5.539	−5.555	−5.571	−5.587	−5.603	−190
−180	−5.261	−5.279	−5.297	−5.316	−5.334	−5.351	−5.369	−5.387	−5.404	−5.421	−5.439	−180
−170	−5.070	−5.089	−5.109	−5.128	−5.148	−5.167	−5.186	−5.205	−5.224	−5.242	−5.261	−170
−160	−4.865	−4.886	−4.907	−4.928	−4.949	−4.969	−4.989	−5.010	−5.030	−5.050	−5.070	−160
−150	−4.648	−4.671	−4.693	−4.715	−4.737	−4.759	−4.780	−4.802	−4.823	−4.844	−4.865	−150
−140	−4.419	−4.443	−4.466	−4.489	−4.512	−4.535	−4.558	−4.581	−4.604	−4.626	−4.648	−140
−130	−4.177	−4.202	−4.226	−4.251	−4.275	−4.300	−4.324	−4.348	−4.372	−4.395	−4.419	−130
−120	−3.923	−3.949	−3.975	−4.000	−4.026	−4.052	−4.077	−4.102	−4.127	−4.152	−4.177	−120
−110	−3.657	−3.684	−3.711	−3.738	−3.765	−3.791	−3.818	−3.844	−3.871	−3.897	−3.923	−110
−100	−3.379	−3.407	−3.435	−3.463	−3.491	−3.519	−3.547	−3.574	−3.602	−3.629	−3.657	−100
−90	−3.089	−3.118	−3.148	−3.177	−3.206	−3.235	−3.264	−3.293	−3.322	−3.350	−3.379	−90
−80	−2.788	−2.818	−2.849	−2.879	−2.910	−2.940	−2.970	−3.000	−3.030	−3.059	−3.089	−80
−70	−2.476	−2.507	−2.539	−2.571	−2.602	−2.633	−2.664	−2.695	−2.726	−2.757	−2.788	−70
−60	−2.153	−2.186	−2.218	−2.251	−2.283	−2.316	−2.348	−2.380	−2.412	−2.444	−2.476	−60
−50	−1.819	−1.853	−1.887	−1.920	−1.954	−1.987	−2.021	−2.054	−2.087	−2.120	−2.153	−50
−40	−1.475	−1.510	−1.545	−1.579	−1.614	−1.648	−1.683	−1.717	−1.751	−1.785	−1.819	−40
−30	−1.121	−1.157	−1.192	−1.228	−1.264	−1.299	−1.335	−1.370	−1.405	−1.440	−1.475	−30
−20	−0.757	−0.794	−0.830	−0.867	−0.904	−0.940	−0.976	−1.013	−1.049	−1.085	−1.121	−20
−10	−0.383	−0.421	−0.459	−0.496	−0.534	−0.571	−0.608	−0.646	−0.683	−0.720	−0.757	−10
0	0.000	−0.039	−0.077	−0.116	−0.154	−0.193	−0.231	−0.269	−0.307	−0.345	−0.383	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE B9.1.1. *Type T thermocouples --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
0	0.000	0.039	0.078	0.117	0.156	0.195	0.234	0.273	0.312	0.352	0.391	0
10	0.391	0.431	0.470	0.510	0.549	0.589	0.629	0.669	0.709	0.749	0.790	10
20	0.790	0.830	0.870	0.911	0.951	0.992	1.033	1.074	1.114	1.155	1.196	20
30	1.196	1.238	1.279	1.320	1.362	1.403	1.445	1.486	1.528	1.570	1.612	30
40	1.612	1.654	1.696	1.738	1.780	1.823	1.865	1.908	1.950	1.993	2.036	40
50	2.036	2.079	2.122	2.165	2.208	2.251	2.294	2.338	2.381	2.425	2.468	50
60	2.468	2.512	2.556	2.600	2.643	2.687	2.732	2.776	2.820	2.864	2.909	60
70	2.909	2.953	2.998	3.043	3.087	3.132	3.177	3.222	3.267	3.312	3.358	70
80	3.358	3.403	3.448	3.494	3.539	3.585	3.631	3.677	3.722	3.768	3.814	80
90	3.814	3.860	3.907	3.953	3.999	4.046	4.092	4.138	4.185	4.232	4.279	90
100	4.279	4.325	4.372	4.419	4.466	4.513	4.561	4.608	4.655	4.702	4.750	100
110	4.750	4.798	4.845	4.893	4.941	4.988	5.036	5.084	5.132	5.180	5.228	110
120	5.228	5.277	5.325	5.373	5.422	5.470	5.519	5.567	5.616	5.665	5.714	120
130	5.714	5.763	5.812	5.861	5.910	5.959	6.008	6.057	6.107	6.156	6.206	130
140	6.206	6.255	6.305	6.355	6.404	6.454	6.504	6.554	6.604	6.654	6.704	140
150	6.704	6.754	6.805	6.855	6.905	6.956	7.006	7.057	7.107	7.158	7.209	150
160	7.209	7.260	7.310	7.361	7.412	7.463	7.515	7.566	7.617	7.668	7.720	160
170	7.720	7.771	7.823	7.874	7.926	7.977	8.029	8.081	8.133	8.185	8.237	170
180	8.237	8.289	8.341	8.393	8.445	8.497	8.550	8.602	8.654	8.707	8.759	180
190	8.759	8.812	8.865	8.917	8.970	9.023	9.076	9.129	9.182	9.235	9.288	190
200	9.288	9.341	9.395	9.448	9.501	9.555	9.608	9.662	9.715	9.769	9.822	200
210	9.822	9.876	9.930	9.984	10.038	10.092	10.146	10.200	10.254	10.308	10.362	210
220	10.362	10.417	10.471	10.525	10.580	10.634	10.689	10.743	10.798	10.853	10.907	220
230	10.907	10.962	11.017	11.072	11.127	11.182	11.237	11.292	11.347	11.403	11.458	230
240	11.458	11.513	11.569	11.624	11.680	11.735	11.791	11.846	11.902	11.958	12.013	240
250	12.013	12.069	12.125	12.181	12.237	12.293	12.349	12.405	12.461	12.518	12.574	250
260	12.574	12.630	12.687	12.743	12.799	12.856	12.912	12.969	13.026	13.082	13.139	260
270	13.139	13.196	13.253	13.310	13.366	13.423	13.480	13.537	13.595	13.652	13.709	270
280	13.709	13.766	13.823	13.881	13.938	13.995	14.053	14.110	14.168	14.226	14.283	280
290	14.283	14.341	14.399	14.456	14.514	14.572	14.630	14.688	14.746	14.804	14.862	290
300	14.862	14.920	14.978	15.036	15.095	15.153	15.211	15.270	15.328	15.386	15.445	300
310	15.445	15.503	15.562	15.621	15.679	15.738	15.797	15.856	15.914	15.973	16.032	310
320	16.032	16.091	16.150	16.209	16.268	16.327	16.387	16.446	16.505	16.564	16.624	320
330	16.624	16.683	16.742	16.802	16.861	16.921	16.980	17.040	17.100	17.159	17.219	330
340	17.219	17.279	17.339	17.399	17.458	17.518	17.578	17.638	17.698	17.759	17.819	340
350	17.819	17.879	17.939	17.999	18.060	18.120	18.180	18.241	18.301	18.362	18.422	350
360	18.422	18.483	18.543	18.604	18.665	18.725	18.786	18.847	18.908	18.969	19.030	360
370	19.030	19.091	19.152	19.213	19.274	19.335	19.396	19.457	19.518	19.579	19.641	370
380	19.641	19.702	19.763	19.825	19.886	19.947	20.009	20.070	20.132	20.193	20.255	380
390	20.255	20.317	20.378	20.440	20.502	20.563	20.625	20.687	20.748	20.810	20.872	390
400	20.872											400
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE B9.1.2. *Type T thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−6.254	−6.255	−6.256	−6.257	−6.258							−450
−440	−6.240	−6.242	−6.243	−6.245	−6.247	−6.248	−6.250	−6.251	−6.252	−6.253	−6.254	−440
−430	−6.217	−6.220	−6.222	−6.225	−6.227	−6.230	−6.232	−6.234	−6.236	−6.238	−6.240	−430
−420	−6.187	−6.191	−6.194	−6.197	−6.200	−6.203	−6.206	−6.209	−6.212	−6.215	−6.217	−420
−410	−6.150	−6.154	−6.158	−6.162	−6.166	−6.170	−6.173	−6.177	−6.180	−6.184	−6.187	−410
−400	−6.105	−6.110	−6.115	−6.119	−6.124	−6.128	−6.133	−6.137	−6.141	−6.146	−6.150	−400
−390	−6.053	−6.059	−6.064	−6.069	−6.075	−6.080	−6.085	−6.090	−6.095	−6.100	−6.105	−390
−380	−5.994	−6.001	−6.007	−6.013	−6.019	−6.025	−6.030	−6.036	−6.042	−6.047	−6.053	−380
−370	−5.930	−5.937	−5.943	−5.950	−5.956	−5.963	−5.969	−5.976	−5.982	−5.988	−5.994	−370
−360	−5.860	−5.867	−5.874	−5.881	−5.888	−5.896	−5.902	−5.909	−5.916	−5.923	−5.930	−360
−350	−5.785	−5.792	−5.800	−5.808	−5.815	−5.823	−5.830	−5.838	−5.845	−5.853	−5.860	−350
−340	−5.705	−5.713	−5.721	−5.729	−5.737	−5.745	−5.753	−5.761	−5.769	−5.777	−5.785	−340
−330	−5.620	−5.629	−5.638	−5.646	−5.655	−5.663	−5.672	−5.680	−5.688	−5.697	−5.705	−330
−320	−5.532	−5.541	−5.550	−5.559	−5.568	−5.577	−5.585	−5.594	−5.603	−5.612	−5.620	−320
−310	−5.439	−5.448	−5.458	−5.467	−5.476	−5.486	−5.495	−5.504	−5.513	−5.523	−5.532	−310
−300	−5.341	−5.351	−5.361	−5.371	−5.381	−5.391	−5.400	−5.410	−5.420	−5.429	−5.439	−300
−290	−5.240	−5.250	−5.261	−5.271	−5.281	−5.291	−5.301	−5.312	−5.322	−5.332	−5.341	−290
−280	−5.135	−5.145	−5.156	−5.167	−5.177	−5.188	−5.198	−5.209	−5.219	−5.230	−5.240	−280
−270	−5.025	−5.036	−5.048	−5.059	−5.070	−5.081	−5.091	−5.102	−5.113	−5.124	−5.135	−270
−260	−4.912	−4.923	−4.935	−4.946	−4.958	−4.969	−4.980	−4.992	−5.003	−5.014	−5.025	−260
−250	−4.794	−4.806	−4.818	−4.830	−4.842	−4.854	−4.865	−4.877	−4.889	−4.900	−4.912	−250
−240	−4.673	−4.685	−4.698	−4.710	−4.722	−4.734	−4.746	−4.759	−4.771	−4.783	−4.794	−240
−230	−4.548	−4.561	−4.573	−4.586	−4.599	−4.611	−4.624	−4.636	−4.648	−4.661	−4.673	−230
−220	−4.419	−4.432	−4.445	−4.458	−4.471	−4.484	−4.497	−4.510	−4.523	−4.535	−4.548	−220
−210	−4.286	−4.300	−4.313	−4.326	−4.340	−4.353	−4.366	−4.380	−4.393	−4.406	−4.419	−210
−200	−4.149	−4.163	−4.177	−4.191	−4.205	−4.218	−4.232	−4.246	−4.259	−4.273	−4.286	−200
−190	−4.009	−4.023	−4.037	−4.052	−4.066	−4.080	−4.094	−4.108	−4.122	−4.136	−4.149	−190
−180	−3.865	−3.879	−3.894	−3.908	−3.923	−3.937	−3.952	−3.966	−3.980	−3.995	−4.009	−180
−170	−3.717	−3.732	−3.747	−3.762	−3.777	−3.791	−3.806	−3.821	−3.836	−3.850	−3.865	−170
−160	−3.565	−3.581	−3.596	−3.611	−3.626	−3.642	−3.657	−3.672	−3.687	−3.702	−3.717	−160
−150	−3.410	−3.426	−3.441	−3.457	−3.473	−3.488	−3.504	−3.519	−3.535	−3.550	−3.565	−150
−140	−3.251	−3.267	−3.283	−3.299	−3.315	−3.331	−3.347	−3.363	−3.379	−3.394	−3.410	−140
−130	−3.089	−3.105	−3.122	−3.138	−3.154	−3.171	−3.187	−3.203	−3.219	−3.235	−3.251	−130
−120	−2.923	−2.940	−2.956	−2.973	−2.990	−3.006	−3.023	−3.040	−3.056	−3.072	−3.089	−120
−110	−2.754	−2.771	−2.788	−2.805	−2.822	−2.839	−2.856	−2.873	−2.889	−2.906	−2.923	−110
−100	−2.581	−2.598	−2.616	−2.633	−2.651	−2.668	−2.685	−2.702	−2.719	−2.737	−2.754	−100
−90	−2.405	−2.423	−2.440	−2.458	−2.476	−2.493	−2.511	−2.529	−2.546	−2.564	−2.581	−90
−80	−2.225	−2.244	−2.262	−2.280	−2.298	−2.316	−2.334	−2.351	−2.369	−2.387	−2.405	−80
−70	−2.043	−2.061	−2.079	−2.098	−2.116	−2.134	−2.153	−2.171	−2.189	−2.207	−2.225	−70
−60	−1.857	−1.875	−1.894	−1.913	−1.931	−1.950	−1.969	−1.987	−2.006	−2.024	−2.043	−60
−50	−1.667	−1.686	−1.705	−1.724	−1.743	−1.762	−1.781	−1.800	−1.819	−1.838	−1.857	−50
−40	−1.475	−1.494	−1.514	−1.533	−1.552	−1.572	−1.591	−1.610	−1.629	−1.648	−1.667	−40
−30	−1.279	−1.299	−1.319	−1.338	−1.358	−1.378	−1.397	−1.417	−1.436	−1.456	−1.475	−30
−20	−1.081	−1.101	−1.121	−1.141	−1.161	−1.181	−1.200	−1.220	−1.240	−1.260	−1.279	−20
−10	−0.879	−0.900	−0.920	−0.940	−0.960	−0.980	−1.001	−1.021	−1.041	−1.061	−1.081	−10
0	−0.675	−0.695	−0.716	−0.736	−0.757	−0.777	−0.798	−0.818	−0.839	−0.859	−0.879	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE B9.1.2. *Type T thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.675	−0.654	−0.633	−0.613	−0.592	−0.571	−0.550	−0.530	−0.509	−0.488	−0.467	0
10	−0.467	−0.446	−0.425	−0.404	−0.383	−0.362	−0.341	−0.320	−0.299	−0.278	−0.256	10
20	−0.256	−0.235	−0.214	−0.193	−0.171	−0.150	−0.129	−0.107	−0.086	−0.064	−0.043	20
30	−0.043	−0.022	0.000	0.022	0.043	0.065	0.086	0.108	0.130	0.151	0.173	30
40	0.173	0.195	0.216	0.238	0.260	0.282	0.303	0.325	0.347	0.369	0.391	40
50	0.391	0.413	0.435	0.457	0.479	0.501	0.523	0.545	0.567	0.589	0.611	50
60	0.611	0.634	0.656	0.678	0.700	0.723	0.745	0.767	0.790	0.812	0.834	60
70	0.834	0.857	0.879	0.902	0.924	0.947	0.969	0.992	1.015	1.037	1.060	70
80	1.060	1.083	1.105	1.128	1.151	1.174	1.196	1.219	1.242	1.265	1.288	80
90	1.288	1.311	1.334	1.357	1.380	1.403	1.426	1.449	1.472	1.496	1.519	90
100	1.519	1.542	1.565	1.588	1.612	1.635	1.658	1.682	1.705	1.729	1.752	100
110	1.752	1.776	1.799	1.823	1.846	1.870	1.893	1.917	1.941	1.964	1.988	110
120	1.988	2.012	2.036	2.060	2.083	2.107	2.131	2.155	2.179	2.203	2.227	120
130	2.227	2.251	2.275	2.299	2.323	2.347	2.371	2.395	2.420	2.444	2.468	130
140	2.468	2.492	2.517	2.541	2.565	2.590	2.614	2.639	2.663	2.687	2.712	140
150	2.712	2.737	2.761	2.786	2.810	2.835	2.860	2.884	2.909	2.934	2.958	150
160	2.958	2.983	3.008	3.033	3.058	3.082	3.107	3.132	3.157	3.182	3.207	160
170	3.207	3.232	3.257	3.282	3.307	3.333	3.358	3.383	3.408	3.433	3.459	170
180	3.459	3.484	3.509	3.534	3.560	3.585	3.610	3.636	3.661	3.687	3.712	180
190	3.712	3.738	3.763	3.789	3.814	3.840	3.866	3.891	3.917	3.943	3.968	190
200	3.968	3.994	4.020	4.046	4.071	4.097	4.123	4.149	4.175	4.201	4.227	200
210	4.227	4.253	4.279	4.305	4.331	4.357	4.383	4.409	4.435	4.461	4.487	210
220	4.487	4.513	4.540	4.566	4.592	4.618	4.645	4.671	4.697	4.724	4.750	220
230	4.750	4.776	4.803	4.829	4.856	4.882	4.909	4.935	4.962	4.988	5.015	230
240	5.015	5.042	5.068	5.095	5.122	5.148	5.175	5.202	5.228	5.255	5.282	240
250	5.282	5.309	5.336	5.363	5.389	5.416	5.443	5.470	5.497	5.524	5.551	250
260	5.551	5.578	5.605	5.632	5.660	5.687	5.714	5.741	5.768	5.795	5.823	260
270	5.823	5.850	5.877	5.904	5.932	5.959	5.986	6.014	6.041	6.068	6.096	270
280	6.096	6.123	6.151	6.178	6.206	6.233	6.261	6.288	6.316	6.343	6.371	280
290	6.371	6.399	6.426	6.454	6.482	6.510	6.537	6.565	6.593	6.621	6.648	290
300	6.648	6.676	6.704	6.732	6.760	6.788	6.816	6.844	6.872	6.900	6.928	300
310	6.928	6.956	6.984	7.012	7.040	7.068	7.096	7.124	7.152	7.181	7.209	310
320	7.209	7.237	7.265	7.294	7.322	7.350	7.378	7.407	7.435	7.463	7.492	320
330	7.492	7.520	7.549	7.577	7.606	7.634	7.663	7.691	7.720	7.748	7.777	330
340	7.777	7.805	7.834	7.863	7.891	7.920	7.949	7.977	8.006	8.035	8.064	340
350	8.064	8.092	8.121	8.150	8.179	8.208	8.237	8.266	8.294	8.323	8.352	350
360	8.352	8.381	8.410	8.439	8.468	8.497	8.526	8.555	8.585	8.614	8.643	360
370	8.643	8.672	8.701	8.730	8.759	8.789	8.818	8.847	8.876	8.906	8.935	370
380	8.935	8.964	8.994	9.023	9.052	9.082	9.111	9.141	9.170	9.200	9.229	380
390	9.229	9.259	9.288	9.318	9.347	9.377	9.406	9.436	9.466	9.495	9.525	390
400	9.525	9.555	9.584	9.614	9.644	9.673	9.703	9.733	9.763	9.793	9.822	400
410	9.822	9.852	9.882	9.912	9.942	9.972	10.002	10.032	10.062	10.092	10.122	410
420	10.122	10.152	10.182	10.212	10.242	10.272	10.302	10.332	10.362	10.392	10.423	420
430	10.423	10.453	10.483	10.513	10.543	10.574	10.604	10.634	10.664	10.695	10.725	430
440	10.725	10.755	10.786	10.816	10.847	10.877	10.907	10.938	10.968	10.999	11.029	440
450	11.029	11.060	11.090	11.121	11.151	11.182	11.213	11.243	11.274	11.304	11.335	450
460	11.335	11.366	11.396	11.427	11.458	11.489	11.519	11.550	11.581	11.612	11.643	460
470	11.643	11.673	11.704	11.735	11.766	11.797	11.828	11.859	11.890	11.920	11.951	470
480	11.951	11.982	12.013	12.044	12.075	12.106	12.138	12.169	12.200	12.231	12.262	480
490	12.262	12.293	12.324	12.355	12.386	12.418	12.449	12.480	12.511	12.543	12.574	490
500	12.574	12.605	12.636	12.668	12.699	12.730	12.762	12.793	12.824	12.856	12.887	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE B9.1.2. *Type T thermocouples --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	12.574	12.605	12.636	12.668	12.699	12.730	12.762	12.793	12.824	12.856	12.887	500
510	12.887	12.919	12.950	12.982	13.013	13.045	13.076	13.108	13.139	13.171	13.202	510
520	13.202	13.234	13.265	13.297	13.328	13.360	13.392	13.423	13.455	13.487	13.518	520
530	13.518	13.550	13.582	13.614	13.645	13.677	13.709	13.741	13.772	13.804	13.836	530
540	13.836	13.868	13.900	13.932	13.964	13.995	14.027	14.059	14.091	14.123	14.155	540
550	14.155	14.187	14.219	14.251	14.283	14.315	14.347	14.379	14.411	14.444	14.476	550
560	14.476	14.508	14.540	14.572	14.604	14.636	14.669	14.701	14.733	14.765	14.797	560
570	14.797	14.830	14.862	14.894	14.926	14.959	14.991	15.023	15.056	15.088	15.121	570
580	15.121	15.153	15.185	15.218	15.250	15.283	15.315	15.347	15.380	15.412	15.445	580
590	15.445	15.477	15.510	15.543	15.575	15.608	15.640	15.673	15.705	15.738	15.771	590
600	15.771	15.803	15.836	15.869	15.901	15.934	15.967	15.999	16.032	16.065	16.098	600
610	16.098	16.130	16.163	16.196	16.229	16.262	16.295	16.327	16.360	16.393	16.426	610
620	16.426	16.459	16.492	16.525	16.558	16.591	16.624	16.657	16.690	16.723	16.756	620
630	16.756	16.789	16.822	16.855	16.888	16.921	16.954	16.987	17.020	17.053	17.086	630
640	17.086	17.120	17.153	17.186	17.219	17.252	17.286	17.319	17.352	17.385	17.418	640
650	17.418	17.452	17.485	17.518	17.552	17.585	17.618	17.652	17.685	17.718	17.752	650
660	17.752	17.785	17.819	17.852	17.886	17.919	17.952	17.986	18.019	18.053	18.086	660
670	18.086	18.120	18.153	18.187	18.221	18.254	18.288	18.321	18.355	18.389	18.422	670
680	18.422	18.456	18.490	18.523	18.557	18.591	18.624	18.658	18.692	18.725	18.759	680
690	18.759	18.793	18.827	18.861	18.894	18.928	18.962	18.996	19.030	19.064	19.097	690
700	19.097	19.131	19.165	19.199	19.233	19.267	19.301	19.335	19.369	19.403	19.437	700
710	19.437	19.471	19.505	19.539	19.573	19.607	19.641	19.675	19.709	19.743	19.777	710
720	19.777	19.811	19.845	19.879	19.913	19.947	19.982	20.016	20.050	20.084	20.118	720
730	20.118	20.152	20.187	20.221	20.255	20.289	20.323	20.358	20.392	20.426	20.460	730
740	20.460	20.495	20.529	20.563	20.597	20.632	20.666	20.700	20.735	20.769	20.803	740
750	20.803	20.838	20.872									750
°F	0	1	2	3	4	5	6	7	8	9	10	°F

B9.2. Tables with Temperature as a Function of Voltage

The temperature as a function of thermoelectric voltage presented in tables B9.2.1 and B9.2.2 was obtained by iteration of the reference function for type T thermocouples given in the main text (see table 9.3.1). Table B9.2.1 presents values of temperature in degrees Celsius at 0.01 mV intervals from −6.25 mV to 20.87 mV, and table B9.2.2 presents values of temperature in degrees Fahrenheit at 0.01 mV intervals over the same voltage range.

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
−6.20	−253.29	−255.17	−257.24	−259.56	−262.26	−265.71						**−6.20**
−6.10	−239.43	−240.58	−241.76	−242.99	−244.26	−245.58	−246.96	−248.40	−249.93	−251.55	−253.29	**−6.10**
−6.00	−229.39	−230.30	−231.24	−232.19	−233.15	−234.14	−235.15	−236.18	−237.24	−238.32	−239.43	**−6.00**
−5.90	−220.91	−221.71	−222.52	−223.34	−224.17	−225.01	−225.86	−226.72	−227.60	−228.49	−229.39	**−5.90**
−5.80	−213.33	−214.06	−214.79	−215.53	−216.28	−217.03	−217.79	−218.56	−219.34	−220.12	−220.91	**−5.80**
−5.70	−206.35	−207.02	−207.70	−208.39	−209.08	−209.77	−210.47	−211.18	−211.89	−212.61	−213.33	**−5.70**
−5.60	−199.81	−200.45	−201.09	−201.73	−202.38	−203.03	−203.68	−204.34	−205.01	−205.67	−206.35	**−5.60**
−5.50	−193.64	−194.24	−194.85	−195.46	−196.07	−196.68	−197.30	−197.93	−198.55	−199.18	−199.81	**−5.50**
−5.40	−187.76	−188.34	−188.92	−189.50	−190.08	−190.67	−191.25	−191.85	−192.44	−193.04	−193.64	**−5.40**
−5.30	−182.14	−182.69	−183.25	−183.80	−184.36	−184.92	−185.49	−186.05	−186.62	−187.19	−187.76	**−5.30**
−5.20	−176.75	−177.28	−177.81	−178.34	−178.88	−179.42	−179.96	−180.50	−181.05	−181.59	−182.14	**−5.20**
−5.10	−171.55	−172.06	−172.57	−173.09	−173.60	−174.12	−174.64	−175.17	−175.69	−176.22	−176.75	**−5.10**
−5.00	−166.52	−167.02	−167.51	−168.01	−168.51	−169.01	−169.52	−170.02	−170.53	−171.04	−171.55	**−5.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Celsius (ITS-90)							
−5.00	−166.52	−167.02	−167.51	−168.01	−168.51	−169.01	−169.52	−170.02	−170.53	−171.04	−171.55	−5.00
−4.90	−161.65	−162.13	−162.61	−163.10	−163.58	−164.07	−164.56	−165.04	−165.53	−166.03	−166.52	−4.90
−4.80	−156.92	−157.39	−157.86	−158.33	−158.80	−159.27	−159.74	−160.22	−160.69	−161.17	−161.65	−4.80
−4.70	−152.32	−152.78	−153.23	−153.69	−154.15	−154.61	−155.07	−155.53	−155.99	−156.46	−156.92	−4.70
−4.60	−147.84	−148.29	−148.73	−149.17	−149.62	−150.07	−150.52	−150.97	−151.42	−151.87	−152.32	−4.60
−4.50	−143.47	−143.90	−144.33	−144.77	−145.21	−145.64	−146.08	−146.52	−146.96	−147.40	−147.84	−4.50
−4.40	−139.20	−139.62	−140.04	−140.47	−140.89	−141.32	−141.75	−142.18	−142.61	−143.04	−143.47	−4.40
−4.30	−135.02	−135.43	−135.85	−136.26	−136.68	−137.09	−137.51	−137.93	−138.35	−138.77	−139.20	−4.30
−4.20	−130.92	−131.33	−131.74	−132.14	−132.55	−132.96	−133.37	−133.78	−134.19	−134.60	−135.02	−4.20
−4.10	−126.91	−127.31	−127.71	−128.11	−128.51	−128.91	−129.31	−129.71	−130.12	−130.52	−130.92	−4.10
−4.00	−122.98	−123.37	−123.76	−124.15	−124.55	−124.94	−125.33	−125.73	−126.12	−126.52	−126.91	−4.00
−3.90	−119.12	−119.50	−119.89	−120.27	−120.66	−121.04	−121.43	−121.82	−122.20	−122.59	−122.98	−3.90
−3.80	−115.33	−115.70	−116.08	−116.46	−116.84	−117.21	−117.59	−117.97	−118.36	−118.74	−119.12	−3.80
−3.70	−111.60	−111.97	−112.34	−112.71	−113.08	−113.45	−113.83	−114.20	−114.58	−114.95	−115.33	−3.70
−3.60	−107.93	−108.29	−108.66	−109.02	−109.39	−109.75	−110.12	−110.49	−110.86	−111.23	−111.60	−3.60
−3.50	−104.31	−104.67	−105.03	−105.39	−105.75	−106.11	−106.48	−106.84	−107.20	−107.56	−107.93	−3.50
−3.40	−100.76	−101.11	−101.46	−101.82	−102.17	−102.53	−102.88	−103.24	−103.60	−103.96	−104.31	−3.40
−3.30	−97.25	−97.60	−97.95	−98.29	−98.64	−99.00	−99.35	−99.70	−100.05	−100.40	−100.76	−3.30
−3.20	−93.79	−94.13	−94.48	−94.82	−95.17	−95.51	−95.86	−96.21	−96.55	−96.90	−97.25	−3.20
−3.10	−90.38	−90.72	−91.06	−91.40	−91.74	−92.08	−92.42	−92.76	−93.10	−93.45	−93.79	−3.10
−3.00	−87.01	−87.34	−87.68	−88.01	−88.35	−88.69	−89.02	−89.36	−89.70	−90.04	−90.38	−3.00
−2.90	−83.68	−84.01	−84.34	−84.67	−85.01	−85.34	−85.67	−86.01	−86.34	−86.67	−87.01	−2.90
−2.80	−80.40	−80.72	−81.05	−81.38	−81.71	−82.03	−82.36	−82.69	−83.02	−83.35	−83.68	−2.80
−2.70	−77.15	−77.47	−77.79	−78.12	−78.44	−78.77	−79.09	−79.42	−79.74	−80.07	−80.40	−2.70
−2.60	−73.94	−74.26	−74.58	−74.90	−75.22	−75.54	−75.86	−76.18	−76.50	−76.83	−77.15	−2.60
−2.50	−70.76	−71.08	−71.40	−71.71	−72.03	−72.35	−72.66	−72.98	−73.30	−73.62	−73.94	−2.50
−2.40	−67.62	−67.94	−68.25	−68.56	−68.88	−69.19	−69.50	−69.82	−70.13	−70.45	−70.76	−2.40
−2.30	−64.52	−64.83	−65.14	−65.45	−65.76	−66.07	−66.38	−66.69	−67.00	−67.31	−67.62	−2.30
−2.20	−61.44	−61.75	−62.06	−62.36	−62.67	−62.98	−63.28	−63.59	−63.90	−64.21	−64.52	−2.20
−2.10	−58.40	−58.70	−59.01	−59.31	−59.61	−59.92	−60.22	−60.53	−60.83	−61.14	−61.44	−2.10
−2.00	−55.38	−55.68	−55.98	−56.29	−56.59	−56.89	−57.19	−57.49	−57.79	−58.10	−58.40	−2.00
−1.90	−52.40	−52.70	−52.99	−53.29	−53.59	−53.89	−54.19	−54.49	−54.78	−55.08	−55.38	−1.90
−1.80	−49.44	−49.73	−50.03	−50.32	−50.62	−50.91	−51.21	−51.51	−51.80	−52.10	−52.40	−1.80
−1.70	−46.51	−46.80	−47.09	−47.38	−47.68	−47.97	−48.26	−48.56	−48.85	−49.14	−49.44	−1.70
−1.60	−43.60	−43.89	−44.18	−44.47	−44.76	−45.05	−45.34	−45.63	−45.92	−46.21	−46.51	−1.60
−1.50	−40.72	−41.00	−41.29	−41.58	−41.87	−42.16	−42.44	−42.73	−43.02	−43.31	−43.60	−1.50
−1.40	−37.86	−38.14	−38.43	−38.71	−39.00	−39.28	−39.57	−39.86	−40.14	−40.43	−40.72	−1.40
−1.30	−35.02	−35.31	−35.59	−35.87	−36.15	−36.44	−36.72	−37.01	−37.29	−37.57	−37.86	−1.30
−1.20	−32.21	−32.49	−32.77	−33.05	−33.33	−33.61	−33.90	−34.18	−34.46	−34.74	−35.02	−1.20
−1.10	−29.42	−29.70	−29.98	−30.25	−30.53	−30.81	−31.09	−31.37	−31.65	−31.93	−32.21	−1.10
−1.00	−26.65	−26.93	−27.20	−27.48	−27.75	−28.03	−28.31	−28.59	−28.86	−29.14	−29.42	−1.00
−0.90	−23.90	−24.17	−24.45	−24.72	−25.00	−25.27	−25.55	−25.82	−26.10	−26.37	−26.65	−0.90
−0.80	−21.17	−21.44	−21.72	−21.99	−22.26	−22.53	−22.81	−23.08	−23.35	−23.63	−23.90	−0.80
−0.70	−18.46	−18.73	−19.00	−19.27	−19.54	−19.81	−20.09	−20.36	−20.63	−20.90	−21.17	−0.70
−0.60	−15.77	−16.04	−16.31	−16.58	−16.85	−17.12	−17.38	−17.65	−17.92	−18.19	−18.46	−0.60
−0.50	−13.10	−13.37	−13.63	−13.90	−14.17	−14.43	−14.70	−14.97	−15.24	−15.50	−15.77	−0.50
−0.40	−10.45	−10.71	−10.98	−11.24	−11.51	−11.77	−12.04	−12.30	−12.57	−12.84	−13.10	−0.40
−0.30	−7.81	−8.07	−8.34	−8.60	−8.86	−9.13	−9.39	−9.66	−9.92	−10.18	−10.45	−0.30
−0.20	−5.19	−5.45	−5.71	−5.98	−6.24	−6.50	−6.76	−7.02	−7.29	−7.55	−7.81	−0.20
−0.10	−2.59	−2.85	−3.11	−3.37	−3.63	−3.89	−4.15	−4.41	−4.67	−4.93	−5.19	−0.10
0.00	0.00	−0.26	−0.52	−0.77	−1.03	−1.29	−1.55	−1.81	−2.07	−2.33	−2.59	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
0.00	0.00	0.26	0.52	0.77	1.03	1.29	1.55	1.80	2.06	2.32	2.57	**0.00**
0.10	2.57	2.83	3.09	3.35	3.60	3.86	4.11	4.37	4.63	4.88	5.14	**0.10**
0.20	5.14	5.39	5.65	5.90	6.16	6.42	6.67	6.93	7.18	7.43	7.69	**0.20**
0.30	7.69	7.94	8.20	8.45	8.71	8.96	9.21	9.47	9.72	9.97	10.23	**0.30**
0.40	10.23	10.48	10.73	10.99	11.24	11.49	11.75	12.00	12.25	12.50	12.75	**0.40**
0.50	12.75	13.01	13.26	13.51	13.76	14.01	14.26	14.52	14.77	15.02	15.27	**0.50**
0.60	15.27	15.52	15.77	16.02	16.27	16.52	16.77	17.02	17.27	17.52	17.77	**0.60**
0.70	17.77	18.02	18.27	18.52	18.77	19.02	19.26	19.51	19.76	20.01	20.26	**0.70**
0.80	20.26	20.51	20.75	21.00	21.25	21.50	21.74	21.99	22.24	22.49	22.73	**0.80**
0.90	22.73	22.98	23.23	23.47	23.72	23.97	24.21	24.46	24.71	24.95	25.20	**0.90**
1.00	25.20	25.44	25.69	25.93	26.18	26.42	26.67	26.91	27.16	27.40	27.65	**1.00**
1.10	27.65	27.89	28.14	28.38	28.62	28.87	29.11	29.36	29.60	29.84	30.09	**1.10**
1.20	30.09	30.33	30.57	30.82	31.06	31.30	31.54	31.79	32.03	32.27	32.51	**1.20**
1.30	32.51	32.75	33.00	33.24	33.48	33.72	33.96	34.20	34.44	34.69	34.93	**1.30**
1.40	34.93	35.17	35.41	35.65	35.89	36.13	36.37	36.61	36.85	37.09	37.33	**1.40**
1.50	37.33	37.57	37.81	38.05	38.29	38.53	38.76	39.00	39.24	39.48	39.72	**1.50**
1.60	39.72	39.96	40.20	40.43	40.67	40.91	41.15	41.39	41.62	41.86	42.10	**1.60**
1.70	42.10	42.33	42.57	42.81	43.05	43.28	43.52	43.76	43.99	44.23	44.46	**1.70**
1.80	44.46	44.70	44.94	45.17	45.41	45.64	45.88	46.11	46.35	46.59	46.82	**1.80**
1.90	46.82	47.06	47.29	47.52	47.76	47.99	48.23	48.46	48.70	48.93	49.17	**1.90**
2.00	49.17	49.40	49.63	49.87	50.10	50.33	50.57	50.80	51.03	51.27	51.50	**2.00**
2.10	51.50	51.73	51.96	52.20	52.43	52.66	52.89	53.13	53.36	53.59	53.82	**2.10**
2.20	53.82	54.05	54.29	54.52	54.75	54.98	55.21	55.44	55.67	55.90	56.13	**2.20**
2.30	56.13	56.37	56.60	56.83	57.06	57.29	57.52	57.75	57.98	58.21	58.44	**2.30**
2.40	58.44	58.67	58.90	59.13	59.35	59.58	59.81	60.04	60.27	60.50	60.73	**2.40**
2.50	60.73	60.96	61.19	61.41	61.64	61.87	62.10	62.33	62.56	62.78	63.01	**2.50**
2.60	63.01	63.24	63.47	63.69	63.92	64.15	64.38	64.60	64.83	65.06	65.28	**2.60**
2.70	65.28	65.51	65.74	65.96	66.19	66.42	66.64	66.87	67.09	67.32	67.55	**2.70**
2.80	67.55	67.77	68.00	68.22	68.45	68.67	68.90	69.12	69.35	69.58	69.80	**2.80**
2.90	69.80	70.02	70.25	70.47	70.70	70.92	71.15	71.37	71.60	71.82	72.04	**2.90**
3.00	72.04	72.27	72.49	72.72	72.94	73.16	73.39	73.61	73.83	74.06	74.28	**3.00**
3.10	74.28	74.50	74.73	74.95	75.17	75.39	75.62	75.84	76.06	76.28	76.51	**3.10**
3.20	76.51	76.73	76.95	77.17	77.39	77.62	77.84	78.06	78.28	78.50	78.72	**3.20**
3.30	78.72	78.95	79.17	79.39	79.61	79.83	80.05	80.27	80.49	80.71	80.93	**3.30**
3.40	80.93	81.15	81.37	81.59	81.81	82.03	82.25	82.47	82.69	82.91	83.13	**3.40**
3.50	83.13	83.35	83.57	83.79	84.01	84.23	84.45	84.67	84.89	85.11	85.33	**3.50**
3.60	85.33	85.55	85.76	85.98	86.20	86.42	86.64	86.86	87.08	87.29	87.51	**3.60**
3.70	87.51	87.73	87.95	88.17	88.38	88.60	88.82	89.04	89.25	89.47	89.69	**3.70**
3.80	89.69	89.91	90.12	90.34	90.56	90.77	90.99	91.21	91.42	91.64	91.86	**3.80**
3.90	91.86	92.07	92.29	92.51	92.72	92.94	93.16	93.37	93.59	93.80	94.02	**3.90**
4.00	94.02	94.23	94.45	94.67	94.88	95.10	95.31	95.53	95.74	95.96	96.17	**4.00**
4.10	96.17	96.39	96.60	96.82	97.03	97.25	97.46	97.68	97.89	98.11	98.32	**4.10**
4.20	98.32	98.53	98.75	98.96	99.18	99.39	99.60	99.82	100.03	100.25	100.46	**4.20**
4.30	100.46	100.67	100.89	101.10	101.31	101.53	101.74	101.95	102.17	102.38	102.59	**4.30**
4.40	102.59	102.80	103.02	103.23	103.44	103.65	103.87	104.08	104.29	104.50	104.72	**4.40**
4.50	104.72	104.93	105.14	105.35	105.57	105.78	105.99	106.20	106.41	106.62	106.84	**4.50**
4.60	106.84	107.05	107.26	107.47	107.68	107.89	108.10	108.31	108.53	108.74	108.95	**4.60**
4.70	108.95	109.16	109.37	109.58	109.79	110.00	110.21	110.42	110.63	110.84	111.05	**4.70**
4.80	111.05	111.26	111.47	111.68	111.89	112.10	112.31	112.52	112.73	112.94	113.15	**4.80**
4.90	113.15	113.36	113.57	113.78	113.99	114.20	114.41	114.62	114.83	115.03	115.24	**4.90**
5.00	115.24	115.45	115.66	115.87	116.08	116.29	116.50	116.70	116.91	117.12	117.33	**5.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
5.00	115.24	115.45	115.66	115.87	116.08	116.29	116.50	116.70	116.91	117.12	117.33	**5.00**
5.10	117.33	117.54	117.75	117.95	118.16	118.37	118.58	118.79	118.99	119.20	119.41	**5.10**
5.20	119.41	119.62	119.82	120.03	120.24	120.45	120.65	120.86	121.07	121.28	121.48	**5.20**
5.30	121.48	121.69	121.90	122.10	122.31	122.52	122.72	122.93	123.14	123.34	123.55	**5.30**
5.40	123.55	123.76	123.96	124.17	124.38	124.58	124.79	124.99	125.20	125.41	125.61	**5.40**
5.50	125.61	125.82	126.02	126.23	126.44	126.64	126.85	127.05	127.26	127.46	127.67	**5.50**
5.60	127.67	127.87	128.08	128.28	128.49	128.69	128.90	129.10	129.31	129.51	129.72	**5.60**
5.70	129.72	129.92	130.13	130.33	130.54	130.74	130.95	131.15	131.35	131.56	131.76	**5.70**
5.80	131.76	131.97	132.17	132.38	132.58	132.78	132.99	133.19	133.39	133.60	133.80	**5.80**
5.90	133.80	134.01	134.21	134.41	134.62	134.82	135.02	135.23	135.43	135.63	135.83	**5.90**
6.00	135.83	136.04	136.24	136.44	136.65	136.85	137.05	137.25	137.46	137.66	137.86	**6.00**
6.10	137.86	138.07	138.27	138.47	138.67	138.87	139.08	139.28	139.48	139.68	139.89	**6.10**
6.20	139.89	140.09	140.29	140.49	140.69	140.89	141.10	141.30	141.50	141.70	141.90	**6.20**
6.30	141.90	142.10	142.30	142.51	142.71	142.91	143.11	143.31	143.51	143.71	143.91	**6.30**
6.40	143.91	144.11	144.32	144.52	144.72	144.92	145.12	145.32	145.52	145.72	145.92	**6.40**
6.50	145.92	146.12	146.32	146.52	146.72	146.92	147.12	147.32	147.52	147.72	147.92	**6.50**
6.60	147.92	148.12	148.32	148.52	148.72	148.92	149.12	149.32	149.52	149.72	149.92	**6.60**
6.70	149.92	150.12	150.32	150.52	150.72	150.91	151.11	151.31	151.51	151.71	151.91	**6.70**
6.80	151.91	152.11	152.31	152.51	152.71	152.90	153.10	153.30	153.50	153.70	153.90	**6.80**
6.90	153.90	154.09	154.29	154.49	154.69	154.89	155.09	155.28	155.48	155.68	155.88	**6.90**
7.00	155.88	156.08	156.27	156.47	156.67	156.87	157.06	157.26	157.46	157.66	157.85	**7.00**
7.10	157.85	158.05	158.25	158.45	158.64	158.84	159.04	159.24	159.43	159.63	159.83	**7.10**
7.20	159.83	160.02	160.22	160.42	160.61	160.81	161.01	161.20	161.40	161.60	161.79	**7.20**
7.30	161.79	161.99	162.19	162.38	162.58	162.78	162.97	163.17	163.36	163.56	163.76	**7.30**
7.40	163.76	163.95	164.15	164.34	164.54	164.74	164.93	165.13	165.32	165.52	165.71	**7.40**
7.50	165.71	165.91	166.11	166.30	166.50	166.69	166.89	167.08	167.28	167.47	167.67	**7.50**
7.60	167.67	167.86	168.06	168.25	168.45	168.64	168.84	169.03	169.23	169.42	169.62	**7.60**
7.70	169.62	169.81	170.01	170.20	170.40	170.59	170.78	170.98	171.17	171.37	171.56	**7.70**
7.80	171.56	171.76	171.95	172.14	172.34	172.53	172.73	172.92	173.11	173.31	173.50	**7.80**
7.90	173.50	173.70	173.89	174.08	174.28	174.47	174.66	174.86	175.05	175.24	175.44	**7.90**
8.00	175.44	175.63	175.82	176.02	176.21	176.40	176.60	176.79	176.98	177.18	177.37	**8.00**
8.10	177.37	177.56	177.75	177.95	178.14	178.33	178.53	178.72	178.91	179.10	179.30	**8.10**
8.20	179.30	179.49	179.68	179.87	180.07	180.26	180.45	180.64	180.83	181.03	181.22	**8.20**
8.30	181.22	181.41	181.60	181.79	181.99	182.18	182.37	182.56	182.75	182.95	183.14	**8.30**
8.40	183.14	183.33	183.52	183.71	183.90	184.09	184.29	184.48	184.67	184.86	185.05	**8.40**
8.50	185.05	185.24	185.43	185.63	185.82	186.01	186.20	186.39	186.58	186.77	186.96	**8.50**
8.60	186.96	187.15	187.34	187.53	187.73	187.92	188.11	188.30	188.49	188.68	188.87	**8.60**
8.70	188.87	189.06	189.25	189.44	189.63	189.82	190.01	190.20	190.39	190.58	190.77	**8.70**
8.80	190.77	190.96	191.15	191.34	191.53	191.72	191.91	192.10	192.29	192.48	192.67	**8.80**
8.90	192.67	192.86	193.05	193.24	193.43	193.62	193.81	194.00	194.19	194.37	194.56	**8.90**
9.00	194.56	194.75	194.94	195.13	195.32	195.51	195.70	195.89	196.08	196.27	196.45	**9.00**
9.10	196.45	196.64	196.83	197.02	197.21	197.40	197.59	197.78	197.96	198.15	198.34	**9.10**
9.20	198.34	198.53	198.72	198.91	199.09	199.28	199.47	199.66	199.85	200.04	200.22	**9.20**
9.30	200.22	200.41	200.60	200.79	200.98	201.16	201.35	201.54	201.73	201.92	202.10	**9.30**
9.40	202.10	202.29	202.48	202.67	202.85	203.04	203.23	203.42	203.60	203.79	203.98	**9.40**
9.50	203.98	204.17	204.35	204.54	204.73	204.91	205.10	205.29	205.48	205.66	205.85	**9.50**
9.60	205.85	206.04	206.22	206.41	206.60	206.78	206.97	207.16	207.34	207.53	207.72	**9.60**
9.70	207.72	207.90	208.09	208.28	208.46	208.65	208.84	209.02	209.21	209.40	209.58	**9.70**
9.80	209.58	209.77	209.96	210.14	210.33	210.51	210.70	210.89	211.07	211.26	211.44	**9.80**
9.90	211.44	211.63	211.82	212.00	212.19	212.37	212.56	212.74	212.93	213.12	213.30	**9.90**
10.00	213.30	213.49	213.67	213.86	214.04	214.23	214.41	214.60	214.78	214.97	215.15	**10.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
10.00	213.30	213.49	213.67	213.86	214.04	214.23	214.41	214.60	214.78	214.97	215.15	**10.00**
10.10	215.15	215.34	215.53	215.71	215.90	216.08	216.27	216.45	216.64	216.82	217.01	**10.10**
10.20	217.01	217.19	217.37	217.56	217.74	217.93	218.11	218.30	218.48	218.67	218.85	**10.20**
10.30	218.85	219.04	219.22	219.41	219.59	219.77	219.96	220.14	220.33	220.51	220.70	**10.30**
10.40	220.70	220.88	221.06	221.25	221.43	221.62	221.80	221.98	222.17	222.35	222.54	**10.40**
10.50	222.54	222.72	222.90	223.09	223.27	223.45	223.64	223.82	224.01	224.19	224.37	**10.50**
10.60	224.37	224.56	224.74	224.92	225.11	225.29	225.47	225.66	225.84	226.02	226.21	**10.60**
10.70	226.21	226.39	226.57	226.76	226.94	227.12	227.31	227.49	227.67	227.85	228.04	**10.70**
10.80	228.04	228.22	228.40	228.59	228.77	228.95	229.13	229.32	229.50	229.68	229.86	**10.80**
10.90	229.86	230.05	230.23	230.41	230.59	230.78	230.96	231.14	231.32	231.51	231.69	**10.90**
11.00	231.69	231.87	232.05	232.23	232.42	232.60	232.78	232.96	233.14	233.33	233.51	**11.00**
11.10	233.51	233.69	233.87	234.05	234.24	234.42	234.60	234.78	234.96	235.14	235.33	**11.10**
11.20	235.33	235.51	235.69	235.87	236.05	236.23	236.42	236.60	236.78	236.96	237.14	**11.20**
11.30	237.14	237.32	237.50	237.68	237.87	238.05	238.23	238.41	238.59	238.77	238.95	**11.30**
11.40	238.95	239.13	239.31	239.50	239.68	239.86	240.04	240.22	240.40	240.58	240.76	**11.40**
11.50	240.76	240.94	241.12	241.30	241.48	241.66	241.84	242.03	242.21	242.39	242.57	**11.50**
11.60	242.57	242.75	242.93	243.11	243.29	243.47	243.65	243.83	244.01	244.19	244.37	**11.60**
11.70	244.37	244.55	244.73	244.91	245.09	245.27	245.45	245.63	245.81	245.99	246.17	**11.70**
11.80	246.17	246.35	246.53	246.71	246.89	247.07	247.25	247.43	247.61	247.79	247.97	**11.80**
11.90	247.97	248.15	248.32	248.50	248.68	248.86	249.04	249.22	249.40	249.58	249.76	**11.90**
12.00	249.76	249.94	250.12	250.30	250.48	250.66	250.83	251.01	251.19	251.37	251.55	**12.00**
12.10	251.55	251.73	251.91	252.09	252.27	252.45	252.62	252.80	252.98	253.16	253.34	**12.10**
12.20	253.34	253.52	253.70	253.87	254.05	254.23	254.41	254.59	254.77	254.95	255.12	**12.20**
12.30	255.12	255.30	255.48	255.66	255.84	256.02	256.19	256.37	256.55	256.73	256.91	**12.30**
12.40	256.91	257.09	257.26	257.44	257.62	257.80	257.98	258.15	258.33	258.51	258.69	**12.40**
12.50	258.69	258.87	259.04	259.22	259.40	259.58	259.75	259.93	260.11	260.29	260.46	**12.50**
12.60	260.46	260.64	260.82	261.00	261.17	261.35	261.53	261.71	261.88	262.06	262.24	**12.60**
12.70	262.24	262.42	262.59	262.77	262.95	263.13	263.30	263.48	263.66	263.83	264.01	**12.70**
12.80	264.01	264.19	264.37	264.54	264.72	264.90	265.07	265.25	265.43	265.60	265.78	**12.80**
12.90	265.78	265.96	266.13	266.31	266.49	266.66	266.84	267.02	267.19	267.37	267.55	**12.90**
13.00	267.55	267.72	267.90	268.08	268.25	268.43	268.61	268.78	268.96	269.14	269.31	**13.00**
13.10	269.31	269.49	269.66	269.84	270.02	270.19	270.37	270.55	270.72	270.90	271.07	**13.10**
13.20	271.07	271.25	271.43	271.60	271.78	271.95	272.13	272.31	272.48	272.66	272.83	**13.20**
13.30	272.83	273.01	273.18	273.36	273.54	273.71	273.89	274.06	274.24	274.41	274.59	**13.30**
13.40	274.59	274.76	274.94	275.12	275.29	275.47	275.64	275.82	275.99	276.17	276.34	**13.40**
13.50	276.34	276.52	276.69	276.87	277.04	277.22	277.39	277.57	277.75	277.92	278.10	**13.50**
13.60	278.10	278.27	278.45	278.62	278.80	278.97	279.15	279.32	279.50	279.67	279.84	**13.60**
13.70	279.84	280.02	280.19	280.37	280.54	280.72	280.89	281.07	281.24	281.42	281.59	**13.70**
13.80	281.59	281.77	281.94	282.12	282.29	282.46	282.64	282.81	282.99	283.16	283.34	**13.80**
13.90	283.34	283.51	283.68	283.86	284.03	284.21	284.38	284.56	284.73	284.90	285.08	**13.90**
14.00	285.08	285.25	285.43	285.60	285.77	285.95	286.12	286.30	286.47	286.64	286.82	**14.00**
14.10	286.82	286.99	287.17	287.34	287.51	287.69	287.86	288.03	288.21	288.38	288.56	**14.10**
14.20	288.56	288.73	288.90	289.08	289.25	289.42	289.60	289.77	289.94	290.12	290.29	**14.20**
14.30	290.29	290.46	290.64	290.81	290.98	291.16	291.33	291.50	291.68	291.85	292.02	**14.30**
14.40	292.02	292.20	292.37	292.54	292.72	292.89	293.06	293.24	293.41	293.58	293.75	**14.40**
14.50	293.75	293.93	294.10	294.27	294.45	294.62	294.79	294.96	295.14	295.31	295.48	**14.50**
14.60	295.48	295.66	295.83	296.00	296.17	296.35	296.52	296.69	296.86	297.04	297.21	**14.60**
14.70	297.21	297.38	297.55	297.73	297.90	298.07	298.24	298.42	298.59	298.76	298.93	**14.70**
14.80	298.93	299.11	299.28	299.45	299.62	299.79	299.97	300.14	300.31	300.48	300.66	**14.80**
14.90	300.66	300.83	301.00	301.17	301.34	301.52	301.69	301.86	302.03	302.20	302.37	**14.90**
15.00	302.37	302.55	302.72	302.89	303.06	303.23	303.41	303.58	303.75	303.92	304.09	**15.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
15.00	302.37	302.55	302.72	302.89	303.06	303.23	303.41	303.58	303.75	303.92	304.09	**15.00**
15.10	304.09	304.26	304.44	304.61	304.78	304.95	305.12	305.29	305.46	305.64	305.81	**15.10**
15.20	305.81	305.98	306.15	306.32	306.49	306.66	306.84	307.01	307.18	307.35	307.52	**15.20**
15.30	307.52	307.69	307.86	308.03	308.21	308.38	308.55	308.72	308.89	309.06	309.23	**15.30**
15.40	309.23	309.40	309.57	309.74	309.92	310.09	310.26	310.43	310.60	310.77	310.94	**15.40**
15.50	310.94	311.11	311.28	311.45	311.62	311.79	311.97	312.14	312.31	312.48	312.65	**15.50**
15.60	312.65	312.82	312.99	313.16	313.33	313.50	313.67	313.84	314.01	314.18	314.35	**15.60**
15.70	314.35	314.52	314.69	314.86	315.03	315.20	315.37	315.54	315.71	315.88	316.05	**15.70**
15.80	316.05	316.23	316.40	316.57	316.74	316.91	317.08	317.25	317.42	317.59	317.76	**15.80**
15.90	317.76	317.93	318.10	318.27	318.44	318.60	318.77	318.94	319.11	319.28	319.45	**15.90**
16.00	319.45	319.62	319.79	319.96	320.13	320.30	320.47	320.64	320.81	320.98	321.15	**16.00**
16.10	321.15	321.32	321.49	321.66	321.83	322.00	322.17	322.34	322.51	322.68	322.84	**16.10**
16.20	322.84	323.01	323.18	323.35	323.52	323.69	323.86	324.03	324.20	324.37	324.54	**16.20**
16.30	324.54	324.71	324.88	325.04	325.21	325.38	325.55	325.72	325.89	326.06	326.23	**16.30**
16.40	326.23	326.40	326.57	326.73	326.90	327.07	327.24	327.41	327.58	327.75	327.92	**16.40**
16.50	327.92	328.09	328.25	328.42	328.59	328.76	328.93	329.10	329.27	329.43	329.60	**16.50**
16.60	329.60	329.77	329.94	330.11	330.28	330.45	330.61	330.78	330.95	331.12	331.29	**16.60**
16.70	331.29	331.46	331.62	331.79	331.96	332.13	332.30	332.47	332.63	332.80	332.97	**16.70**
16.80	332.97	333.14	333.31	333.47	333.64	333.81	333.98	334.15	334.31	334.48	334.65	**16.80**
16.90	334.65	334.82	334.99	335.15	335.32	335.49	335.66	335.83	335.99	336.16	336.33	**16.90**
17.00	336.33	336.50	336.66	336.83	337.00	337.17	337.34	337.50	337.67	337.84	338.01	**17.00**
17.10	338.01	338.17	338.34	338.51	338.68	338.84	339.01	339.18	339.35	339.51	339.68	**17.10**
17.20	339.68	339.85	340.02	340.18	340.35	340.52	340.68	340.85	341.02	341.19	341.35	**17.20**
17.30	341.35	341.52	341.69	341.85	342.02	342.19	342.36	342.52	342.69	342.86	343.02	**17.30**
17.40	343.02	343.19	343.36	343.53	343.69	343.86	344.03	344.19	344.36	344.53	344.69	**17.40**
17.50	344.69	344.86	345.03	345.19	345.36	345.53	345.69	345.86	346.03	346.19	346.36	**17.50**
17.60	346.36	346.53	346.69	346.86	347.03	347.19	347.36	347.53	347.69	347.86	348.03	**17.60**
17.70	348.03	348.19	348.36	348.53	348.69	348.86	349.02	349.19	349.36	349.52	349.69	**17.70**
17.80	349.69	349.86	350.02	350.19	350.35	350.52	350.69	350.85	351.02	351.19	351.35	**17.80**
17.90	351.35	351.52	351.68	351.85	352.02	352.18	352.35	352.51	352.68	352.85	353.01	**17.90**
18.00	353.01	353.18	353.34	353.51	353.67	353.84	354.01	354.17	354.34	354.50	354.67	**18.00**
18.10	354.67	354.83	355.00	355.17	355.33	355.50	355.66	355.83	355.99	356.16	356.33	**18.10**
18.20	356.33	356.49	356.66	356.82	356.99	357.15	357.32	357.48	357.65	357.81	357.98	**18.20**
18.30	357.98	358.15	358.31	358.48	358.64	358.81	358.97	359.14	359.30	359.47	359.63	**18.30**
18.40	359.63	359.80	359.96	360.13	360.29	360.46	360.62	360.79	360.95	361.12	361.28	**18.40**
18.50	361.28	361.45	361.61	361.78	361.94	362.11	362.27	362.44	362.60	362.77	362.93	**18.50**
18.60	362.93	363.10	363.26	363.43	363.59	363.76	363.92	364.09	364.25	364.42	364.58	**18.60**
18.70	364.58	364.75	364.91	365.07	365.24	365.40	365.57	365.73	365.90	366.06	366.23	**18.70**
18.80	366.23	366.39	366.56	366.72	366.88	367.05	367.21	367.38	367.54	367.71	367.87	**18.80**
18.90	367.87	368.03	368.20	368.36	368.53	368.69	368.86	369.02	369.18	369.35	369.51	**18.90**
19.00	369.51	369.68	369.84	370.01	370.17	370.33	370.50	370.66	370.83	370.99	371.15	**19.00**
19.10	371.15	371.32	371.48	371.65	371.81	371.97	372.14	372.30	372.47	372.63	372.79	**19.10**
19.20	372.79	372.96	373.12	373.29	373.45	373.61	373.78	373.94	374.10	374.27	374.43	**19.20**
19.30	374.43	374.60	374.76	374.92	375.09	375.25	375.41	375.58	375.74	375.90	376.07	**19.30**
19.40	376.07	376.23	376.39	376.56	376.72	376.89	377.05	377.21	377.38	377.54	377.70	**19.40**
19.50	377.70	377.87	378.03	378.19	378.36	378.52	378.68	378.85	379.01	379.17	379.34	**19.50**
19.60	379.34	379.50	379.66	379.83	379.99	380.15	380.31	380.48	380.64	380.80	380.97	**19.60**
19.70	380.97	381.13	381.29	381.46	381.62	381.78	381.95	382.11	382.27	382.43	382.60	**19.70**
19.80	382.60	382.76	382.92	383.09	383.25	383.41	383.58	383.74	383.90	384.06	384.23	**19.80**
19.90	384.23	384.39	384.55	384.72	384.88	385.04	385.20	385.37	385.53	385.69	385.85	**19.90**
20.00	385.85	386.02	386.18	386.34	386.51	386.67	386.83	386.99	387.16	387.32	387.48	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B9.2.1. *Type T thermocouples --- temperature (°C) as a function of thermoelectric voltage; reference junctions at 0 °C--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Celsius (ITS-90)						
20.00	385.85	386.02	386.18	386.34	386.51	386.67	386.83	386.99	387.16	387.32	387.48	**20.00**
20.10	387.48	387.64	387.81	387.97	388.13	388.29	388.46	388.62	388.78	388.94	389.11	**20.10**
20.20	389.11	389.27	389.43	389.59	389.76	389.92	390.08	390.24	390.41	390.57	390.73	**20.20**
20.30	390.73	390.89	391.06	391.22	391.38	391.54	391.70	391.87	392.03	392.19	392.35	**20.30**
20.40	392.35	392.52	392.68	392.84	393.00	393.16	393.33	393.49	393.65	393.81	393.98	**20.40**
20.50	393.98	394.14	394.30	394.46	394.62	394.79	394.95	395.11	395.27	395.43	395.60	**20.50**
20.60	395.60	395.76	395.92	396.08	396.24	396.41	396.57	396.73	396.89	397.05	397.22	**20.60**
20.70	397.22	397.38	397.54	397.70	397.86	398.03	398.19	398.35	398.51	398.67	398.84	**20.70**
20.80	398.84	399.00	399.16	399.32	399.48	399.64	399.81	399.97				**20.80**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B9.2.2. ***Type T thermocouples*** *--- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
					Temperatures in Degrees Fahrenheit							
−6.20	−423.92	−427.31	−431.02	−435.20	−440.07	−446.28						**−6.20**
−6.10	−398.98	−401.05	−403.17	−405.38	−407.66	−410.04	−412.52	−415.13	−417.88	−420.80	−423.92	**−6.10**
−6.00	−380.90	−382.55	−384.23	−385.94	−387.68	−389.46	−391.27	−393.13	−395.03	−396.98	−398.98	**−6.00**
−5.90	−365.64	−367.08	−368.54	−370.01	−371.51	−373.02	−374.55	−376.10	−377.68	−379.28	−380.90	**−5.90**
−5.80	−351.99	−353.30	−354.62	−355.96	−357.30	−358.66	−360.03	−361.41	−362.81	−364.22	−365.64	**−5.80**
−5.70	−339.42	−340.64	−341.86	−343.10	−344.34	−345.59	−346.85	−348.12	−349.40	−350.69	−351.99	**−5.70**
−5.60	−327.66	−328.81	−329.96	−331.12	−332.28	−333.45	−334.63	−335.82	−337.01	−338.21	−339.42	**−5.60**
−5.50	−316.55	−317.63	−318.72	−319.82	−320.92	−322.03	−323.15	−324.27	−325.39	−326.52	−327.66	**−5.50**
−5.40	−305.97	−307.01	−308.05	−309.09	−310.14	−311.20	−312.26	−313.32	−314.39	−315.47	−316.55	**−5.40**
−5.30	−295.86	−296.85	−297.85	−298.85	−299.85	−300.86	−301.87	−302.89	−303.91	−304.94	−305.97	**−5.30**
−5.20	−286.14	−287.10	−288.06	−289.02	−289.98	−290.95	−291.93	−292.90	−293.88	−294.87	−295.86	**−5.20**
−5.10	−276.78	−277.70	−278.63	−279.56	−280.49	−281.42	−282.36	−283.30	−284.24	−285.19	−286.14	**−5.10**
−5.00	−267.74	−268.63	−269.52	−270.42	−271.32	−272.22	−273.13	−274.04	−274.95	−275.87	−276.78	**−5.00**
mV	**0.00**	**−0.01**	**−0.02**	**−0.03**	**−0.04**	**−0.05**	**−0.06**	**−0.07**	**−0.08**	**−0.09**	**−0.10**	**mV**

TABLE B9.2.2. *Type T thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV
						Temperatures in Degrees Fahrenheit						
−5.00	−267.74	−268.63	−269.52	−270.42	−271.32	−272.22	−273.13	−274.04	−274.95	−275.87	−276.78	−5.00
−4.90	−258.97	−259.84	−260.70	−261.57	−262.45	−263.32	−264.20	−265.08	−265.96	−266.85	−267.74	−4.90
−4.80	−250.46	−251.30	−252.14	−252.99	−253.84	−254.69	−255.54	−256.39	−257.25	−258.11	−258.97	−4.80
−4.70	−242.18	−243.00	−243.82	−244.64	−245.47	−246.29	−247.12	−247.95	−248.79	−249.62	−250.46	−4.70
−4.60	−234.12	−234.91	−235.71	−236.51	−237.32	−238.12	−238.93	−239.74	−240.55	−241.37	−242.18	−4.60
−4.50	−226.24	−227.02	−227.80	−228.59	−229.37	−230.16	−230.94	−231.73	−232.53	−233.32	−234.12	−4.50
−4.40	−218.55	−219.31	−220.08	−220.84	−221.61	−222.38	−223.15	−223.92	−224.69	−225.47	−226.24	−4.40
−4.30	−211.03	−211.78	−212.52	−213.27	−214.02	−214.77	−215.52	−216.28	−217.03	−217.79	−218.55	−4.30
−4.20	−203.66	−204.39	−205.13	−205.86	−206.59	−207.33	−208.07	−208.80	−209.54	−210.29	−211.03	−4.20
−4.10	−196.45	−197.16	−197.88	−198.60	−199.32	−200.04	−200.76	−201.48	−202.21	−202.94	−203.66	−4.10
−4.00	−189.37	−190.07	−190.77	−191.48	−192.18	−192.89	−193.60	−194.31	−195.02	−195.73	−196.45	−4.00
−3.90	−182.42	−183.11	−183.80	−184.49	−185.18	−185.88	−186.57	−187.27	−187.97	−188.67	−189.37	−3.90
−3.80	−175.59	−176.26	−176.94	−177.62	−178.30	−178.99	−179.67	−180.35	−181.04	−181.73	−182.42	−3.80
−3.70	−168.87	−169.54	−170.21	−170.88	−171.55	−172.22	−172.89	−173.56	−174.24	−174.91	−175.59	−3.70
−3.60	−162.27	−162.92	−163.58	−164.24	−164.90	−165.56	−166.22	−166.88	−167.54	−168.21	−168.87	−3.60
−3.50	−155.77	−156.41	−157.06	−157.71	−158.35	−159.00	−159.66	−160.31	−160.96	−161.61	−162.27	−3.50
−3.40	−149.36	−150.00	−150.63	−151.27	−151.91	−152.55	−153.19	−153.83	−154.48	−155.12	−155.77	−3.40
−3.30	−143.05	−143.67	−144.30	−144.93	−145.56	−146.19	−146.82	−147.46	−148.09	−148.72	−149.36	−3.30
−3.20	−136.82	−137.44	−138.06	−138.68	−139.30	−139.92	−140.55	−141.17	−141.79	−142.42	−143.05	−3.20
−3.10	−130.68	−131.29	−131.90	−132.51	−133.12	−133.74	−134.35	−134.97	−135.59	−136.20	−136.82	−3.10
−3.00	−124.61	−125.22	−125.82	−126.42	−127.03	−127.64	−128.24	−128.85	−129.46	−130.07	−130.68	−3.00
−2.90	−118.63	−119.22	−119.82	−120.41	−121.01	−121.61	−122.21	−122.81	−123.41	−124.01	−124.61	−2.90
−2.80	−112.71	−113.30	−113.89	−114.48	−115.07	−115.66	−116.25	−116.84	−117.44	−118.03	−118.63	−2.80
−2.70	−106.87	−107.45	−108.03	−108.61	−109.20	−109.78	−110.37	−110.95	−111.54	−112.12	−112.71	−2.70
−2.60	−101.09	−101.66	−102.24	−102.82	−103.39	−103.97	−104.55	−105.13	−105.71	−106.29	−106.87	−2.60
−2.50	−95.38	−95.94	−96.51	−97.08	−97.65	−98.22	−98.80	−99.37	−99.94	−100.51	−101.09	−2.50
−2.40	−89.72	−90.29	−90.85	−91.41	−91.98	−92.54	−93.11	−93.67	−94.24	−94.81	−95.38	−2.40
−2.30	−84.13	−84.69	−85.25	−85.80	−86.36	−86.92	−87.48	−88.04	−88.60	−89.16	−89.72	−2.30
−2.20	−78.60	−79.15	−79.70	−80.25	−80.80	−81.36	−81.91	−82.47	−83.02	−83.58	−84.13	−2.20
−2.10	−73.12	−73.66	−74.21	−74.76	−75.30	−75.85	−76.40	−76.95	−77.50	−78.05	−78.60	−2.10
−2.00	−67.69	−68.23	−68.77	−69.31	−69.86	−70.40	−70.94	−71.48	−72.03	−72.57	−73.12	−2.00
−1.90	−62.32	−62.85	−63.39	−63.92	−64.46	−65.00	−65.53	−66.07	−66.61	−67.15	−67.69	−1.90
−1.80	−56.99	−57.52	−58.05	−58.58	−59.11	−59.65	−60.18	−60.71	−61.25	−61.78	−62.32	−1.80
−1.70	−51.71	−52.24	−52.76	−53.29	−53.82	−54.34	−54.87	−55.40	−55.93	−56.46	−56.99	−1.70
−1.60	−46.48	−47.00	−47.52	−48.04	−48.57	−49.09	−49.61	−50.14	−50.66	−51.19	−51.71	−1.60
−1.50	−41.29	−41.81	−42.32	−42.84	−43.36	−43.88	−44.40	−44.92	−45.44	−45.96	−46.48	−1.50
−1.40	−36.15	−36.66	−37.17	−37.68	−38.20	−38.71	−39.23	−39.74	−40.26	−40.77	−41.29	−1.40
−1.30	−31.04	−31.55	−32.06	−32.57	−33.08	−33.59	−34.10	−34.61	−35.12	−35.63	−36.15	−1.30
−1.20	−25.98	−26.48	−26.99	−27.49	−28.00	−28.51	−29.01	−29.52	−30.03	−30.53	−31.04	−1.20
−1.10	−20.95	−21.46	−21.96	−22.46	−22.96	−23.46	−23.96	−24.47	−24.97	−25.47	−25.98	−1.10
−1.00	−15.97	−16.47	−16.96	−17.46	−17.96	−18.46	−18.96	−19.45	−19.95	−20.45	−20.95	−1.00
−0.90	−11.02	−11.51	−12.01	−12.50	−13.00	−13.49	−13.99	−14.48	−14.98	−15.47	−15.97	−0.90
−0.80	−6.11	−6.60	−7.09	−7.58	−8.07	−8.56	−9.05	−9.54	−10.04	−10.53	−11.02	−0.80
−0.70	−1.23	−1.72	−2.21	−2.69	−3.18	−3.67	−4.15	−4.64	−5.13	−5.62	−6.11	−0.70
−0.60	3.61	3.13	2.64	2.16	1.68	1.19	0.71	0.22	−0.26	−0.75	−1.23	−0.60
−0.50	8.42	7.94	7.46	6.98	6.50	6.02	5.54	5.06	4.57	4.09	3.61	−0.50
−0.40	13.19	12.72	12.24	11.76	11.29	10.81	10.33	9.85	9.38	8.90	8.42	−0.40
−0.30	17.94	17.47	16.99	16.52	16.04	15.57	15.10	14.62	14.15	13.67	13.19	−0.30
−0.20	22.65	22.18	21.71	21.24	20.77	20.30	19.83	19.36	18.88	18.41	17.94	−0.20
−0.10	27.34	26.87	26.41	25.94	25.47	25.00	24.53	24.06	23.59	23.12	22.65	−0.10
0.00	32.00	31.54	31.07	30.61	30.14	29.67	29.21	28.74	28.27	27.81	27.34	0.00
mV	0.00	−0.01	−0.02	−0.03	−0.04	−0.05	−0.06	−0.07	−0.08	−0.09	−0.10	mV

TABLE B9.2.2. *Type T thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
0.00	32.00	32.46	32.93	33.39	33.86	34.32	34.78	35.25	35.71	36.17	36.63	0.00
0.10	36.63	37.10	37.56	38.02	38.48	38.94	39.41	39.87	40.33	40.79	41.25	0.10
0.20	41.25	41.71	42.17	42.63	43.09	43.55	44.01	44.47	44.92	45.38	45.84	0.20
0.30	45.84	46.30	46.76	47.21	47.67	48.13	48.59	49.04	49.50	49.95	50.41	0.30
0.40	50.41	50.87	51.32	51.78	52.23	52.69	53.14	53.60	54.05	54.50	54.96	0.40
0.50	54.96	55.41	55.86	56.32	56.77	57.22	57.68	58.13	58.58	59.03	59.48	0.50
0.60	59.48	59.93	60.39	60.84	61.29	61.74	62.19	62.64	63.09	63.54	63.98	0.60
0.70	63.98	64.43	64.88	65.33	65.78	66.23	66.68	67.12	67.57	68.02	68.46	0.70
0.80	68.46	68.91	69.36	69.80	70.25	70.70	71.14	71.59	72.03	72.48	72.92	0.80
0.90	72.92	73.37	73.81	74.25	74.70	75.14	75.58	76.03	76.47	76.91	77.35	0.90
1.00	77.35	77.80	78.24	78.68	79.12	79.56	80.00	80.45	80.89	81.33	81.77	1.00
1.10	81.77	82.21	82.65	83.09	83.52	83.96	84.40	84.84	85.28	85.72	86.16	1.10
1.20	86.16	86.59	87.03	87.47	87.91	88.34	88.78	89.21	89.65	90.09	90.52	1.20
1.30	90.52	90.96	91.39	91.83	92.26	92.70	93.13	93.57	94.00	94.43	94.87	1.30
1.40	94.87	95.30	95.73	96.17	96.60	97.03	97.46	97.90	98.33	98.76	99.19	1.40
1.50	99.19	99.62	100.05	100.48	100.92	101.35	101.78	102.21	102.64	103.06	103.49	1.50
1.60	103.49	103.92	104.35	104.78	105.21	105.64	106.07	106.49	106.92	107.35	107.78	1.60
1.70	107.78	108.20	108.63	109.06	109.48	109.91	110.33	110.76	111.19	111.61	112.04	1.70
1.80	112.04	112.46	112.89	113.31	113.73	114.16	114.58	115.01	115.43	115.85	116.28	1.80
1.90	116.28	116.70	117.12	117.54	117.97	118.39	118.81	119.23	119.65	120.08	120.50	1.90
2.00	120.50	120.92	121.34	121.76	122.18	122.60	123.02	123.44	123.86	124.28	124.70	2.00
2.10	124.70	125.12	125.54	125.95	126.37	126.79	127.21	127.63	128.04	128.46	128.88	2.10
2.20	128.88	129.30	129.71	130.13	130.55	130.96	131.38	131.80	132.21	132.63	133.04	2.20
2.30	133.04	133.46	133.87	134.29	134.70	135.12	135.53	135.94	136.36	136.77	137.19	2.30
2.40	137.19	137.60	138.01	138.43	138.84	139.25	139.66	140.08	140.49	140.90	141.31	2.40
2.50	141.31	141.72	142.14	142.55	142.96	143.37	143.78	144.19	144.60	145.01	145.42	2.50
2.60	145.42	145.83	146.24	146.65	147.06	147.47	147.88	148.29	148.69	149.10	149.51	2.60
2.70	149.51	149.92	150.33	150.73	151.14	151.55	151.96	152.36	152.77	153.18	153.58	2.70
2.80	153.58	153.99	154.40	154.80	155.21	155.61	156.02	156.42	156.83	157.24	157.64	2.80
2.90	157.64	158.04	158.45	158.85	159.26	159.66	160.07	160.47	160.87	161.28	161.68	2.90
3.00	161.68	162.08	162.49	162.89	163.29	163.69	164.10	164.50	164.90	165.30	165.70	3.00
3.10	165.70	166.10	166.51	166.91	167.31	167.71	168.11	168.51	168.91	169.31	169.71	3.10
3.20	169.71	170.11	170.51	170.91	171.31	171.71	172.11	172.51	172.91	173.30	173.70	3.20
3.30	173.70	174.10	174.50	174.90	175.30	175.69	176.09	176.49	176.89	177.28	177.68	3.30
3.40	177.68	178.08	178.47	178.87	179.27	179.66	180.06	180.45	180.85	181.25	181.64	3.40
3.50	181.64	182.04	182.43	182.83	183.22	183.62	184.01	184.41	184.80	185.19	185.59	3.50
3.60	185.59	185.98	186.38	186.77	187.16	187.56	187.95	188.34	188.74	189.13	189.52	3.60
3.70	189.52	189.91	190.31	190.70	191.09	191.48	191.87	192.26	192.66	193.05	193.44	3.70
3.80	193.44	193.83	194.22	194.61	195.00	195.39	195.78	196.17	196.56	196.95	197.34	3.80
3.90	197.34	197.73	198.12	198.51	198.90	199.29	199.68	200.07	200.46	200.85	201.23	3.90
4.00	201.23	201.62	202.01	202.40	202.79	203.17	203.56	203.95	204.34	204.72	205.11	4.00
4.10	205.11	205.50	205.88	206.27	206.66	207.04	207.43	207.82	208.20	208.59	208.98	4.10
4.20	208.98	209.36	209.75	210.13	210.52	210.90	211.29	211.67	212.06	212.44	212.83	4.20
4.30	212.83	213.21	213.59	213.98	214.36	214.75	215.13	215.51	215.90	216.28	216.66	4.30
4.40	216.66	217.05	217.43	217.81	218.20	218.58	218.96	219.34	219.73	220.11	220.49	4.40
4.50	220.49	220.87	221.25	221.64	222.02	222.40	222.78	223.16	223.54	223.92	224.30	4.50
4.60	224.30	224.68	225.06	225.45	225.83	226.21	226.59	226.97	227.35	227.73	228.11	4.60
4.70	228.11	228.48	228.86	229.24	229.62	230.00	230.38	230.76	231.14	231.52	231.89	4.70
4.80	231.89	232.27	232.65	233.03	233.41	233.78	234.16	234.54	234.92	235.30	235.67	4.80
4.90	235.67	236.05	236.43	236.80	237.18	237.56	237.93	238.31	238.69	239.06	239.44	4.90
5.00	239.44	239.81	240.19	240.57	240.94	241.32	241.69	242.07	242.44	242.82	243.19	5.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B9.2.2. *Type T thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
5.00	239.44	239.81	240.19	240.57	240.94	241.32	241.69	242.07	242.44	242.82	243.19	5.00
5.10	243.19	243.57	243.94	244.32	244.69	245.07	245.44	245.82	246.19	246.56	246.94	5.10
5.20	246.94	247.31	247.68	248.06	248.43	248.80	249.18	249.55	249.92	250.30	250.67	5.20
5.30	250.67	251.04	251.41	251.79	252.16	252.53	252.90	253.28	253.65	254.02	254.39	5.30
5.40	254.39	254.76	255.13	255.51	255.88	256.25	256.62	256.99	257.36	257.73	258.10	5.40
5.50	258.10	258.47	258.84	259.21	259.58	259.95	260.32	260.69	261.06	261.43	261.80	5.50
5.60	261.80	262.17	262.54	262.91	263.28	263.65	264.02	264.39	264.76	265.12	265.49	5.60
5.70	265.49	265.86	266.23	266.60	266.97	267.33	267.70	268.07	268.44	268.81	269.17	5.70
5.80	269.17	269.54	269.91	270.28	270.64	271.01	271.38	271.74	272.11	272.48	272.84	5.80
5.90	272.84	273.21	273.58	273.94	274.31	274.67	275.04	275.41	275.77	276.14	276.50	5.90
6.00	276.50	276.87	277.23	277.60	277.96	278.33	278.69	279.06	279.42	279.79	280.15	6.00
6.10	280.15	280.52	280.88	281.25	281.61	281.97	282.34	282.70	283.07	283.43	283.79	6.10
6.20	283.79	284.16	284.52	284.88	285.25	285.61	285.97	286.34	286.70	287.06	287.42	6.20
6.30	287.42	287.79	288.15	288.51	288.87	289.24	289.60	289.96	290.32	290.68	291.05	6.30
6.40	291.05	291.41	291.77	292.13	292.49	292.85	293.21	293.57	293.94	294.30	294.66	6.40
6.50	294.66	295.02	295.38	295.74	296.10	296.46	296.82	297.18	297.54	297.90	298.26	6.50
6.60	298.26	298.62	298.98	299.34	299.70	300.06	300.42	300.78	301.14	301.49	301.85	6.60
6.70	301.85	302.21	302.57	302.93	303.29	303.65	304.01	304.36	304.72	305.08	305.44	6.70
6.80	305.44	305.80	306.15	306.51	306.87	307.23	307.58	307.94	308.30	308.66	309.01	6.80
6.90	309.01	309.37	309.73	310.08	310.44	310.80	311.15	311.51	311.87	312.22	312.58	6.90
7.00	312.58	312.94	313.29	313.65	314.00	314.36	314.72	315.07	315.43	315.78	316.14	7.00
7.10	316.14	316.49	316.85	317.20	317.56	317.91	318.27	318.62	318.98	319.33	319.69	7.10
7.20	319.69	320.04	320.40	320.75	321.11	321.46	321.81	322.17	322.52	322.88	323.23	7.20
7.30	323.23	323.58	323.94	324.29	324.64	325.00	325.35	325.70	326.06	326.41	326.76	7.30
7.40	326.76	327.11	327.47	327.82	328.17	328.53	328.88	329.23	329.58	329.93	330.29	7.40
7.50	330.29	330.64	330.99	331.34	331.69	332.05	332.40	332.75	333.10	333.45	333.80	7.50
7.60	333.80	334.15	334.50	334.86	335.21	335.56	335.91	336.26	336.61	336.96	337.31	7.60
7.70	337.31	337.66	338.01	338.36	338.71	339.06	339.41	339.76	340.11	340.46	340.81	7.70
7.80	340.81	341.16	341.51	341.86	342.21	342.56	342.91	343.26	343.60	343.95	344.30	7.80
7.90	344.30	344.65	345.00	345.35	345.70	346.05	346.39	346.74	347.09	347.44	347.79	7.90
8.00	347.79	348.13	348.48	348.83	349.18	349.53	349.87	350.22	350.57	350.92	351.26	8.00
8.10	351.26	351.61	351.96	352.30	352.65	353.00	353.35	353.69	354.04	354.39	354.73	8.10
8.20	354.73	355.08	355.42	355.77	356.12	356.46	356.81	357.16	357.50	357.85	358.19	8.20
8.30	358.19	358.54	358.88	359.23	359.58	359.92	360.27	360.61	360.96	361.30	361.65	8.30
8.40	361.65	361.99	362.34	362.68	363.03	363.37	363.72	364.06	364.40	364.75	365.09	8.40
8.50	365.09	365.44	365.78	366.13	366.47	366.81	367.16	367.50	367.84	368.19	368.53	8.50
8.60	368.53	368.88	369.22	369.56	369.91	370.25	370.59	370.93	371.28	371.62	371.96	8.60
8.70	371.96	372.31	372.65	372.99	373.33	373.68	374.02	374.36	374.70	375.05	375.39	8.70
8.80	375.39	375.73	376.07	376.41	376.76	377.10	377.44	377.78	378.12	378.46	378.80	8.80
8.90	378.80	379.15	379.49	379.83	380.17	380.51	380.85	381.19	381.53	381.87	382.21	8.90
9.00	382.21	382.56	382.90	383.24	383.58	383.92	384.26	384.60	384.94	385.28	385.62	9.00
9.10	385.62	385.96	386.30	386.64	386.98	387.32	387.66	388.00	388.33	388.67	389.01	9.10
9.20	389.01	389.35	389.69	390.03	390.37	390.71	391.05	391.39	391.73	392.06	392.40	9.20
9.30	392.40	392.74	393.08	393.42	393.76	394.09	394.43	394.77	395.11	395.45	395.79	9.30
9.40	395.79	396.12	396.46	396.80	397.14	397.47	397.81	398.15	398.49	398.82	399.16	9.40
9.50	399.16	399.50	399.84	400.17	400.51	400.85	401.18	401.52	401.86	402.19	402.53	9.50
9.60	402.53	402.87	403.20	403.54	403.88	404.21	404.55	404.88	405.22	405.56	405.89	9.60
9.70	405.89	406.23	406.56	406.90	407.24	407.57	407.91	408.24	408.58	408.91	409.25	9.70
9.80	409.25	409.58	409.92	410.25	410.59	410.92	411.26	411.59	411.93	412.26	412.60	9.80
9.90	412.60	412.93	413.27	413.60	413.94	414.27	414.61	414.94	415.27	415.61	415.94	9.90
10.00	415.94	416.28	416.61	416.94	417.28	417.61	417.94	418.28	418.61	418.95	419.28	10.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B9.2.2. *Type T thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
10.00	415.94	416.28	416.61	416.94	417.28	417.61	417.94	418.28	418.61	418.95	419.28	10.00
10.10	419.28	419.61	419.95	420.28	420.61	420.94	421.28	421.61	421.94	422.28	422.61	10.10
10.20	422.61	422.94	423.27	423.61	423.94	424.27	424.60	424.94	425.27	425.60	425.93	10.20
10.30	425.93	426.27	426.60	426.93	427.26	427.59	427.93	428.26	428.59	428.92	429.25	10.30
10.40	429.25	429.58	429.92	430.25	430.58	430.91	431.24	431.57	431.90	432.23	432.56	10.40
10.50	432.56	432.90	433.23	433.56	433.89	434.22	434.55	434.88	435.21	435.54	435.87	10.50
10.60	435.87	436.20	436.53.	436.86	437.19	437.52	437.85	438.18	438.51	438.84	439.17	10.60
10.70	439.17	439.50	439.83	440.16	440.49	440.82	441.15	441.48	441.81	442.14	442.47	10.70
10.80	442.47	442.80	443.12	443.45	443.78	444.11	444.44	444.77	445.10	445.43	445.76	10.80
10.90	445.76	446.08	446.41	446.74	447.07	447.40	447.73	448.05	448.38	448.71	449.04	10.90
11.00	449.04	449.37	449.69	450.02	450.35	450.68	451.01	451.33	451.66	451.99	452.32	11.00
11.10	452.32	452.64	452.97	453.30	453.63	453.95	454.28	454.61	454.93	455.26	455.59	11.10
11.20	455.59	455.91	456.24	456.57	456.89	457.22	457.55	457.87	458.20	458.53	458.85	11.20
11.30	458.85	459.18	459.51	459.83	460.16	460.48	460.81	461.14	461.46	461.79	462.11	11.30
11.40	462.11	462.44	462.77	463.09	463.42	463.74	464.07	464.39	464.72	465.04	465.37	11.40
11.50	465.37	465.70	466.02	466.35	466.67	467.00	467.32	467.65	467.97	468.30	468.62	11.50
11.60	468.62	468.94	469.27	469.59	469.92	470.24	470.57	470.89	471.22	471.54	471.86	11.60
11.70	471.86	472.19	472.51	472.84	473.16	473.49	473.81	474.13	474.46	474.78	475.10	11.70
11.80	475.10	475.43	475.75	476.07	476.40	476.72	477.05	477.37	477.69	478.02	478.34	11.80
11.90	478.34	478.66	478.98	479.31	479.63	479.95	480.28	480.60	480.92	481.24	481.57	11.90
12.00	481.57	481.89	482.21	482.54	482.86	483.18	483.50	483.82	484.15	484.47	484.79	12.00
12.10	484.79	485.11	485.44	485.76	486.08	486.40	486.72	487.05	487.37	487.69	488.01	12.10
12.20	488.01	488.33	488.65	488.97	489.30	489.62	489.94	490.26	490.58	490.90	491.22	12.20
12.30	491.22	491.55	491.87	492.19	492.51	492.83	493.15	493.47	493.79	494.11	494.43	12.30
12.40	494.43	494.75	495.07	495.39	495.72	496.04	496.36	496.68	497.00	497.32	497.64	12.40
12.50	497.64	497.96	498.28	498.60	498.92	499.24	499.56	499.88	500.20	500.52	500.84	12.50
12.60	500.84	501.16	501.48	501.80	502.11	502.43	502.75	503.07	503.39	503.71	504.03	12.60
12.70	504.03	504.35	504.67	504.99	505.31	505.63	505.94	506.26	506.58	506.90	507.22	12.70
12.80	507.22	507.54	507.86	508.18	508.49	508.81	509.13	509.45	509.77	510.09	510.41	12.80
12.90	510.41	510.72	511.04	511.36	511.68	512.00	512.31	512.63	512.95	513.27	513.59	12.90
13.00	513.59	513.90	514.22	514.54	514.86	515.17	515.49	515.81	516.13	516.44	516.76	13.00
13.10	516.76	517.08	517.40	517.71	518.03	518.35	518.66	518.98	519.30	519.62	519.93	13.10
13.20	519.93	520.25	520.57	520.88	521.20	521.52	521.83	522.15	522.47	522.78	523.10	13.20
13.30	523.10	523.42	523.73	524.05	524.36	524.68	525.00	525.31	525.63	525.94	526.26	13.30
13.40	526.26	526.58	526.89	527.21	527.52	527.84	528.16	528.47	528.79	529.10	529.42	13.40
13.50	529.42	529.73	530.05	530.36	530.68	531.00	531.31	531.63	531.94	532.26	532.57	13.50
13.60	532.57	532.89	533.20	533.52	533.83	534.15	534.46	534.78	535.09	535.41	535.72	13.60
13.70	535.72	536.04	536.35	536.66	536.98	537.29	537.61	537.92	538.24	538.55	538.87	13.70
13.80	538.87	539.18	539.49	539.81	540.12	540.44	540.75	541.06	541.38	541.69	542.01	13.80
13.90	542.01	542.32	542.63	542.95	543.26	543.57	543.89	544.20	544.51	544.83	545.14	13.90
14.00	545.14	545.45	545.77	546.08	546.39	546.71	547.02	547.33	547.65	547.96	548.27	14.00
14.10	548.27	548.59	548.90	549.21	549.52	549.84	550.15	550.46	550.78	551.09	551.40	14.10
14.20	551.40	551.71	552.03	552.34	552.65	552.96	553.28	553.59	553.90	554.21	554.52	14.20
14.30	554.52	554.84	555.15	555.46	555.77	556.08	556.40	556.71	557.02	557.33	557.64	14.30
14.40	557.64	557.96	558.27	558.58	558.89	559.20	559.51	559.82	560.14	560.45	560.76	14.40
14.50	560.76	561.07	561.38	561.69	562.00	562.31	562.63	562.94	563.25	563.56	563.87	14.50
14.60	563.87	564.18	564.49	564.80	565.11	565.42	565.73	566.05	566.36	566.67	566.98	14.60
14.70	566.98	567.29	567.60	567.91	568.22	568.53	568.84	569.15	569.46	569.77	570.08	14.70
14.80	570.08	570.39	570.70	571.01	571.32	571.63	571.94	572.25	572.56	572.87	573.18	14.80
14.90	573.18	573.49	573.80	574.11	574.42	574.73	575.04	575.35	575.66	575.97	576.27	14.90
15.00	576.27	576.58	576.89	577.20	577.51	577.82	578.13	578.44	578.75	579.06	579.37	15.00
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

TABLE B9.2.2. *Type T thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued*

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
						Temperatures in Degrees Fahrenheit						
15.00	576.27	576.58	576.89	577.20	577.51	577.82	578.13	578.44	578.75	579.06	579.37	**15.00**
15.10	579.37	579.68	579.98	580.29	580.60	580.91	581.22	581.53	581.84	582.15	582.45	**15.10**
15.20	582.45	582.76	583.07	583.38	583.69	584.00	584.30	584.61	584.92	585.23	585.54	**15.20**
15.30	585.54	585.85	586.15	586.46	586.77	587.08	587.39	587.69	588.00	588.31	588.62	**15.30**
15.40	588.62	588.92	589.23	589.54	589.85	590.16	590.46	590.77	591.08	591.39	591.69	**15.40**
15.50	591.69	592.00	592.31	592.62	592.92	593.23	593.54	593.84	594.15	594.46	594.77	**15.50**
15.60	594.77	595.07	595.38	595.69	595.99	596.30	596.61	596.91	597.22	597.53	597.83	**15.60**
15.70	597.83	598.14	598.45	598.75	599.06	599.37	599.67	599.98	600.29	600.59	600.90	**15.70**
15.80	600.90	601.21	601.51	601.82	602.12	602.43	602.74	603.04	603.35	603.65	603.96	**15.80**
15.90	603.96	604.27	604.57	604.88	605.18	605.49	605.79	606.10	606.41	606.71	607.02	**15.90**
16.00	607.02	607.32	607.63	607.93	608.24	608.54	608.85	609.16	609.46	609.77	610.07	**16.00**
16.10	610.07	610.38	610.68	610.99	611.29	611.60	611.90	612.21	612.51	612.82	613.12	**16.10**
16.20	613.12	613.43	613.73	614.04	614.34	614.64	614.95	615.25	615.56	615.86	616.17	**16.20**
16.30	616.17	616.47	616.78	617.08	617.38	617.69	617.99	618.30	618.60	618.91	619.21	**16.30**
16.40	619.21	619.51	619.82	620.12	620.43	620.73	621.03	621.34	621.64	621.95	622.25	**16.40**
16.50	622.25	622.55	622.86	623.16	623.46	623.77	624.07	624.37	624.68	624.98	625.29	**16.50**
16.60	625.29	625.59	625.89	626.20	626.50	626.80	627.10	627.41	627.71	628.01	628.32	**16.60**
16.70	628.32	628.62	628.92	629.23	629.53	629.83	630.13	630.44	630.74	631.04	631.35	**16.70**
16.80	631.35	631.65	631.95	632.25	632.56	632.86	633.16	633.46	633.77	634.07	634.37	**16.80**
16.90	634.37	634.67	634.98	635.28	635.58	635.88	636.18	636.49	636.79	637.09	637.39	**16.90**
17.00	637.39	637.69	638.00	638.30	638.60	638.90	639.20	639.51	639.81	640.11	640.41	**17.00**
17.10	640.41	640.71	641.01	641.32	641.62	641.92	642.22	642.52	642.82	643.12	643.42	**17.10**
17.20	643.42	643.73	644.03	644.33	644.63	644.93	645.23	645.53	645.83	646.14	646.44	**17.20**
17.30	646.44	646.74	647.04	647.34	647.64	647.94	648.24	648.54	648.84	649.14	649.44	**17.30**
17.40	649.44	649.74	650.05	650.35	650.65	650.95	651.25	651.55	651.85	652.15	652.45	**17.40**
17.50	652.45	652.75	653.05	653.35	653.65	653.95	654.25	654.55	654.85	655.15	655.45	**17.50**
17.60	655.45	655.75	656.05	656.35	656.65	656.95	657.25	657.55	657.85	658.15	658.45	**17.60**
17.70	658.45	658.75	659.05	659.35	659.65	659.94	660.24	660.54	660.84	661.14	661.44	**17.70**
17.80	661.44	661.74	662.04	662.34	662.64	662.94	663.24	663.54	663.83	664.13	664.43	**17.80**
17.90	664.43	664.73	665.03	665.33	665.63	665.93	666.23	666.52	666.82	667.12	667.42	**17.90**
18.00	667.42	667.72	668.02	668.32	668.61	668.91	669.21	669.51	669.81	670.11	670.40	**18.00**
18.10	670.40	670.70	671.00	671.30	671.60	671.90	672.19	672.49	672.79	673.09	673.39	**18.10**
18.20	673.39	673.68	673.98	674.28	674.58	674.88	675.17	675.47	675.77	676.07	676.36	**18.20**
18.30	676.36	676.66	676.96	677.26	677.55	677.85	678.15	678.45	678.74	679.04	679.34	**18.30**
18.40	679.34	679.64	679.93	680.23	680.53	680.83	681.12	681.42	681.72	682.01	682.31	**18.40**
18.50	682.31	682.61	682.90	683.20	683.50	683.80	684.09	684.39	684.69	684.98	685.28	**18.50**
18.60	685.28	685.58	685.87	686.17	686.47	686.76	687.06	687.36	687.65	687.95	688.24	**18.60**
18.70	688.24	688.54	688.84	689.13	689.43	689.73	690.02	690.32	690.62	690.91	691.21	**18.70**
18.80	691.21	691.50	691.80	692.10	692.39	692.69	692.98	693.28	693.58	693.87	694.17	**18.80**
18.90	694.17	694.46	694.76	695.05	695.35	695.65	695.94	696.24	696.53	696.83	697.12	**18.90**
19.00	697.12	697.42	697.71	698.01	698.31	698.60	698.90	699.19	699.49	699.78	700.08	**19.00**
19.10	700.08	700.37	700.67	700.96	701.26	701.55	701.85	702.14	702.44	702.73	703.03	**19.10**
19.20	703.03	703.32	703.62	703.91	704.21	704.50	704.80	705.09	705.39	705.68	705.98	**19.20**
19.30	705.98	706.27	706.57	706.86	707.15	707.45	707.74	708.04	708.33	708.63	708.92	**19.30**
19.40	708.92	709.22	709.51	709.80	710.10	710.39	710.69	710.98	711.28	711.57	711.86	**19.40**
19.50	711.86	712.16	712.45	712.75	713.04	713.33	713.63	713.92	714.22	714.51	714.80	**19.50**
19.60	714.80	715.10	715.39	715.69	715.98	716.27	716.57	716.86	717.15	717.45	717.74	**19.60**
19.70	717.74	718.04	718.33	718.62	718.92	719.21	719.50	719.80	720.09	720.38	720.68	**19.70**
19.80	720.68	720.97	721.26	721.56	721.85	722.14	722.44	722.73	723.02	723.32	723.61	**19.80**
19.90	723.61	723.90	724.19	724.49	724.78	725.07	725.37	725.66	725.95	726.25	726.54	**19.90**
20.00	726.54	726.83	727.12	727.42	727.71	728.00	728.30	728.59	728.88	729.17	729.47	**20.00**
mV	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**mV**

TABLE B9.2.2. ***Type T thermocouples --- temperature (°F) as a function of thermoelectric voltage; reference junctions at 32 °F--Continued***

mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV
	Temperatures in Degrees Fahrenheit											
20.00	726.54	726.83	727.12	727.42	727.71	728.00	728.30	728.59	728.88	729.17	729.47	20.00
20.10	729.47	729.76	730.05	730.34	730.64	730.93	731.22	731.51	731.81	732.10	732.39	20.10
20.20	732.39	732.68	732.98	733.27	733.56	733.85	734.15	734.44	734.73	735.02	735.32	20.20
20.30	735.32	735.61	735.90	736.19	736.48	736.78	737.07	737.36	737.65	737.94	738.24	20.30
20.40	738.24	738.53	738.82	739.11	739.40	739.70	739.99	740.28	740.57	740.86	741.16	20.40
20.50	741.16	741.45	741.74	742.03	742.32	742.62	742.91	743.20	743.49	743.78	744.07	20.50
20.60	744.07	744.37	744.66	744.95	745.24	745.53	745.82	746.11	746.41	746.70	746.99	20.60
20.70	746.99	747.28	747.57	747.86	748.16	748.45	748.74	749.03	749.32	749.61	749.90	20.70
20.80	749.90	750.19	750.49	750.78	751.07	751.36	751.65	751.94				20.80
mV	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	mV

Appendix C. Supplementary Reference Tables of Temperature-Thermoelectric Voltage for the Letter-Designated Thermoelement Types Versus Platinum, Pt-67

C1. Introduction

The reference tables presented in the main text for the various letter-designated thermoelement types versus Pt-67 give the thermoelectric voltage to more digits than is often necessary. Also, the form of the tables is not always the most usable for many applications. The purpose of the supplementary reference tables included in this appendix is to present the same temperature-thermoelectric voltage data in different formats to satisfy special needs.

Two reference tables are presented for each of the following thermoelement types: BP, BN, JP, JN, KP (same as EP), KN, NP, NN, TP, and TN (same as EN). Both tables give the thermoelectric voltage as a function of temperature. The temperature values are given in degrees Celsius in one table and in degrees Fahrenheit in the other table. A value in degrees Fahrenheit, t_F, is defined by the relation $t_F = (9/5)t_{90} + 32$, where t_{90} is the value in degrees Celsius (ITS-90). In both tables the values of thermoelectric voltage are given at 1 degree intervals and are expressed in millivolts rather than microvolts. The voltage values are given to the nearest 0.001 mV (the reference tables given in the main text have a resolution of either 0.1 μV or 0.01 μV depending on thermoelement type and temperature range).

All the tables presented in this appendix are based on reference junctions at 0 °C (or 32 °F).

C2. Supplementary Reference Tables for the Positive Thermoelement, Type BP, a Platinum-30% Rhodium Alloy Versus Platinum, Pt-67

The reference function for type BP thermoelements versus platinum, Pt-67, given in the main text (see table 2.4.1), was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C2.1 and C2.2. Table C2.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from 0 °C to 1768 °C, and table C2.2 presents voltage values at 1 °F intervals from 32 °F to 3214 °F.

TABLE C2.1. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.005	0.010	0.015	0.020	0.025	0.029	0.035	0.040	0.045	0.050	0
10	0.050	0.055	0.060	0.065	0.071	0.076	0.081	0.086	0.092	0.097	0.103	10
20	0.103	0.108	0.113	0.119	0.124	0.130	0.136	0.141	0.147	0.153	0.158	20
30	0.158	0.164	0.170	0.175	0.181	0.187	0.193	0.199	0.205	0.211	0.217	30
40	0.217	0.223	0.229	0.235	0.241	0.247	0.253	0.259	0.265	0.271	0.278	40
50	0.278	0.284	0.290	0.296	0.303	0.309	0.316	0.322	0.328	0.335	0.341	50
60	0.341	0.348	0.354	0.361	0.367	0.374	0.381	0.387	0.394	0.401	0.407	60
70	0.407	0.414	0.421	0.428	0.434	0.441	0.448	0.455	0.462	0.469	0.476	70
80	0.476	0.483	0.490	0.497	0.504	0.511	0.518	0.525	0.532	0.539	0.546	80
90	0.546	0.554	0.561	0.568	0.575	0.583	0.590	0.597	0.604	0.612	0.619	90
100	0.619	0.627	0.634	0.641	0.649	0.656	0.664	0.671	0.679	0.687	0.694	100
110	0.694	0.702	0.709	0.717	0.725	0.732	0.740	0.748	0.756	0.763	0.771	110
120	0.771	0.779	0.787	0.795	0.802	0.810	0.818	0.826	0.834	0.842	0.850	120
130	0.850	0.858	0.866	0.874	0.882	0.890	0.898	0.906	0.914	0.923	0.931	130
140	0.931	0.939	0.947	0.955	0.964	0.972	0.980	0.988	0.997	1.005	1.013	140
150	1.013	1.022	1.030	1.039	1.047	1.055	1.064	1.072	1.081	1.089	1.098	150
160	1.098	1.106	1.115	1.123	1.132	1.141	1.149	1.158	1.167	1.175	1.184	160
170	1.184	1.193	1.201	1.210	1.219	1.228	1.236	1.245	1.254	1.263	1.272	170
180	1.272	1.281	1.289	1.298	1.307	1.316	1.325	1.334	1.343	1.352	1.361	180
190	1.361	1.370	1.379	1.388	1.397	1.406	1.415	1.425	1.434	1.443	1.452	190
200	1.452	1.461	1.470	1.480	1.489	1.498	1.507	1.517	1.526	1.535	1.544	200
210	1.544	1.554	1.563	1.572	1.582	1.591	1.601	1.610	1.620	1.629	1.638	210
220	1.638	1.648	1.657	1.667	1.676	1.686	1.695	1.705	1.715	1.724	1.734	220
230	1.734	1.743	1.753	1.763	1.772	1.782	1.792	1.801	1.811	1.821	1.831	230
240	1.831	1.840	1.850	1.860	1.870	1.880	1.889	1.899	1.909	1.919	1.929	240
250	1.929	1.939	1.949	1.959	1.969	1.979	1.988	1.998	2.008	2.018	2.028	250
260	2.028	2.038	2.049	2.059	2.069	2.079	2.089	2.099	2.109	2.119	2.129	260
270	2.129	2.140	2.150	2.160	2.170	2.180	2.191	2.201	2.211	2.221	2.232	270
280	2.232	2.242	2.252	2.263	2.273	2.283	2.294	2.304	2.314	2.325	2.335	280
290	2.335	2.346	2.356	2.366	2.377	2.387	2.398	2.408	2.419	2.429	2.440	290
300	2.440	2.450	2.461	2.472	2.482	2.493	2.503	2.514	2.525	2.535	2.546	300
310	2.546	2.557	2.567	2.578	2.589	2.599	2.610	2.621	2.632	2.642	2.653	310
320	2.653	2.664	2.675	2.686	2.696	2.707	2.718	2.729	2.740	2.751	2.762	320
330	2.762	2.772	2.783	2.794	2.805	2.816	2.827	2.838	2.849	2.860	2.871	330
340	2.871	2.882	2.893	2.904	2.915	2.926	2.938	2.949	2.960	2.971	2.982	340
350	2.982	2.993	3.004	3.016	3.027	3.038	3.049	3.060	3.072	3.083	3.094	350
360	3.094	3.105	3.117	3.128	3.139	3.150	3.162	3.173	3.184	3.196	3.207	360
370	3.207	3.219	3.230	3.241	3.253	3.264	3.276	3.287	3.299	3.310	3.321	370
380	3.321	3.333	3.344	3.356	3.367	3.379	3.391	3.402	3.414	3.425	3.437	380
390	3.437	3.448	3.460	3.472	3.483	3.495	3.507	3.518	3.530	3.542	3.553	390
400	3.553	3.565	3.577	3.589	3.600	3.612	3.624	3.636	3.647	3.659	3.671	400
410	3.671	3.683	3.695	3.707	3.718	3.730	3.742	3.754	3.766	3.778	3.790	410
420	3.790	3.802	3.814	3.826	3.838	3.850	3.862	3.874	3.886	3.898	3.910	420
430	3.910	3.922	3.934	3.946	3.958	3.970	3.982	3.994	4.006	4.018	4.031	430
440	4.031	4.043	4.055	4.067	4.079	4.091	4.104	4.116	4.128	4.140	4.153	440
450	4.153	4.165	4.177	4.189	4.202	4.214	4.226	4.239	4.251	4.263	4.276	450
460	4.276	4.288	4.300	4.313	4.325	4.338	4.350	4.363	4.375	4.387	4.400	460
470	4.400	4.412	4.425	4.437	4.450	4.462	4.475	4.487	4.500	4.513	4.525	470
480	4.525	4.538	4.550	4.563	4.576	4.588	4.601	4.613	4.626	4.639	4.651	480
490	4.651	4.664	4.677	4.690	4.702	4.715	4.728	4.740	4.753	4.766	4.779	490
500	4.779	4.792	4.804	4.817	4.830	4.843	4.856	4.869	4.881	4.894	4.907	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C2.1. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	4.779	4.792	4.804	4.817	4.830	4.843	4.856	4.869	4.881	4.894	4.907	500
510	4.907	4.920	4.933	4.946	4.959	4.972	4.985	4.998	5.011	5.024	5.037	510
520	5.037	5.050	5.063	5.076	5.089	5.102	5.115	5.128	5.141	5.154	5.167	520
530	5.167	5.180	5.193	5.206	5.220	5.233	5.246	5.259	5.272	5.285	5.299	530
540	5.299	5.312	5.325	5.338	5.351	5.365	5.378	5.391	5.405	5.418	5.431	540
550	5.431	5.444	5.458	5.471	5.484	5.498	5.511	5.525	5.538	5.551	5.565	550
560	5.565	5.578	5.592	5.605	5.618	5.632	5.645	5.659	5.672	5.686	5.699	560
570	5.699	5.713	5.726	5.740	5.753	5.767	5.781	5.794	5.808	5.821	5.835	570
580	5.835	5.849	5.862	5.876	5.889	5.903	5.917	5.930	5.944	5.958	5.972	580
590	5.972	5.985	5.999	6.013	6.026	6.040	6.054	6.068	6.082	6.095	6.109	590
600	6.109	6.123	6.137	6.151	6.164	6.178	6.192	6.206	6.220	6.234	6.248	600
610	6.248	6.262	6.276	6.290	6.303	6.317	6.331	6.345	6.359	6.373	6.387	610
620	6.387	6.401	6.415	6.429	6.444	6.458	6.472	6.486	6.500	6.514	6.528	620
630	6.528	6.542	6.556	6.570	6.585	6.599	6.613	6.627	6.641	6.655	6.670	630
640	6.670	6.684	6.698	6.712	6.726	6.741	6.755	6.769	6.784	6.798	6.812	640
650	6.812	6.826	6.841	6.855	6.869	6.884	6.898	6.912	6.927	6.941	6.956	650
660	6.956	6.970	6.984	6.999	7.013	7.028	7.042	7.057	7.071	7.085	7.100	660
670	7.100	7.114	7.129	7.143	7.158	7.173	7.187	7.202	7.216	7.231	7.245	670
680	7.245	7.260	7.275	7.289	7.304	7.318	7.333	7.348	7.362	7.377	7.392	680
690	7.392	7.406	7.421	7.436	7.450	7.465	7.480	7.495	7.509	7.524	7.539	690
700	7.539	7.554	7.569	7.583	7.598	7.613	7.628	7.643	7.658	7.672	7.687	700
710	7.687	7.702	7.717	7.732	7.747	7.762	7.777	7.792	7.807	7.822	7.837	710
720	7.837	7.852	7.867	7.882	7.897	7.912	7.927	7.942	7.957	7.972	7.987	720
730	7.987	8.002	8.017	8.032	8.047	8.062	8.078	8.093	8.108	8.123	8.138	730
740	8.138	8.153	8.169	8.184	8.199	8.214	8.230	8.245	8.260	8.275	8.291	740
750	8.291	8.306	8.321	8.336	8.352	8.367	8.382	8.398	8.413	8.429	8.444	750
760	8.444	8.459	8.475	8.490	8.505	8.521	8.536	8.552	8.567	8.583	8.598	760
770	8.598	8.614	8.629	8.645	8.660	8.676	8.691	8.707	8.722	8.738	8.754	770
780	8.754	8.769	8.785	8.800	8.816	8.832	8.847	8.863	8.878	8.894	8.910	780
790	8.910	8.925	8.941	8.957	8.973	8.988	9.004	9.020	9.036	9.051	9.067	790
800	9.067	9.083	9.099	9.114	9.130	9.146	9.162	9.178	9.194	9.209	9.225	800
810	9.225	9.241	9.257	9.273	9.289	9.305	9.321	9.337	9.353	9.369	9.385	810
820	9.385	9.401	9.417	9.433	9.449	9.465	9.481	9.497	9.513	9.529	9.545	820
830	9.545	9.561	9.577	9.593	9.609	9.625	9.641	9.657	9.674	9.690	9.706	830
840	9.706	9.722	9.738	9.754	9.771	9.787	9.803	9.819	9.836	9.852	9.868	840
850	9.868	9.884	9.901	9.917	9.933	9.949	9.966	9.982	9.998	10.015	10.031	850
860	10.031	10.047	10.064	10.080	10.097	10.113	10.129	10.146	10.162	10.179	10.195	860
870	10.195	10.211	10.228	10.244	10.261	10.277	10.294	10.310	10.327	10.343	10.360	870
880	10.360	10.376	10.393	10.410	10.426	10.443	10.459	10.476	10.493	10.509	10.526	880
890	10.526	10.542	10.559	10.576	10.592	10.609	10.626	10.642	10.659	10.676	10.693	890
900	10.693	10.709	10.726	10.743	10.759	10.776	10.793	10.810	10.827	10.843	10.860	900
910	10.860	10.877	10.894	10.911	10.928	10.944	10.961	10.978	10.995	11.012	11.029	910
920	11.029	11.046	11.063	11.079	11.096	11.113	11.130	11.147	11.164	11.181	11.198	920
930	11.198	11.215	11.232	11.249	11.266	11.283	11.300	11.317	11.334	11.351	11.369	930
940	11.369	11.386	11.403	11.420	11.437	11.454	11.471	11.488	11.505	11.523	11.540	940
950	11.540	11.557	11.574	11.591	11.608	11.626	11.643	11.660	11.677	11.695	11.712	950
960	11.712	11.729	11.746	11.764	11.781	11.798	11.815	11.833	11.850	11.867	11.885	960
970	11.885	11.902	11.919	11.937	11.954	11.972	11.989	12.006	12.024	12.041	12.058	970
980	12.058	12.076	12.093	12.111	12.128	12.146	12.163	12.181	12.198	12.216	12.233	980
990	12.233	12.251	12.268	12.286	12.303	12.321	12.338	12.356	12.373	12.391	12.409	990
1000	12.409	12.426	12.444	12.461	12.479	12.497	12.514	12.532	12.550	12.567	12.585	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C2.1. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	12.409	12.426	12.444	12.461	12.479	12.497	12.514	12.532	12.550	12.567	12.585	**1000**
1010	12.585	12.603	12.620	12.638	12.656	12.673	12.691	12.709	12.726	12.744	12.762	**1010**
1020	12.762	12.780	12.797	12.815	12.833	12.851	12.869	12.886	12.904	12.922	12.940	**1020**
1030	12.940	12.958	12.976	12.993	13.011	13.029	13.047	13.065	13.083	13.101	13.119	**1030**
1040	13.119	13.136	13.154	13.172	13.190	13.208	13.226	13.244	13.262	13.280	13.298	**1040**
1050	13.298	13.316	13.334	13.352	13.370	13.388	13.406	13.424	13.442	13.460	13.478	**1050**
1060	13.478	13.496	13.515	13.533	13.551	13.569	13.587	13.605	13.623	13.641	13.659	**1060**
1070	13.659	13.678	13.696	13.714	13.732	13.750	13.768	13.787	13.805	13.823	13.841	**1070**
1080	13.841	13.860	13.878	13.896	13.914	13.932	13.951	13.969	13.987	14.006	14.024	**1080**
1090	14.024	14.042	14.060	14.079	14.097	14.115	14.134	14.152	14.170	14.189	14.207	**1090**
1100	14.207	14.226	14.244	14.262	14.281	14.299	14.318	14.336	14.354	14.373	14.391	**1100**
1110	14.391	14.410	14.428	14.447	14.465	14.484	14.502	14.521	14.539	14.558	14.576	**1110**
1120	14.576	14.595	14.613	14.632	14.650	14.669	14.687	14.706	14.725	14.743	14.762	**1120**
1130	14.762	14.780	14.799	14.817	14.836	14.855	14.873	14.892	14.911	14.929	14.948	**1130**
1140	14.948	14.967	14.985	15.004	15.023	15.041	15.060	15.079	15.097	15.116	15.135	**1140**
1150	15.135	15.154	15.172	15.191	15.210	15.229	15.247	15.266	15.285	15.304	15.323	**1150**
1160	15.323	15.341	15.360	15.379	15.398	15.417	15.435	15.454	15.473	15.492	15.511	**1160**
1170	15.511	15.530	15.549	15.568	15.586	15.605	15.624	15.643	15.662	15.681	15.700	**1170**
1180	15.700	15.719	15.738	15.757	15.776	15.795	15.814	15.833	15.852	15.871	15.890	**1180**
1190	15.890	15.909	15.928	15.947	15.966	15.985	16.004	16.023	16.042	16.061	16.080	**1190**
1200	16.080	16.099	16.118	16.137	16.156	16.175	16.194	16.213	16.233	16.252	16.271	**1200**
1210	16.271	16.290	16.309	16.328	16.347	16.367	16.386	16.405	16.424	16.443	16.462	**1210**
1220	16.462	16.482	16.501	16.520	16.539	16.558	16.578	16.597	16.616	16.635	16.655	**1220**
1230	16.655	16.674	16.693	16.712	16.732	16.751	16.770	16.789	16.809	16.828	16.847	**1230**
1240	16.847	16.867	16.886	16.905	16.925	16.944	16.963	16.983	17.002	17.021	17.041	**1240**
1250	17.041	17.060	17.079	17.099	17.118	17.137	17.157	17.176	17.196	17.215	17.234	**1250**
1260	17.234	17.254	17.273	17.293	17.312	17.332	17.351	17.371	17.390	17.409	17.429	**1260**
1270	17.429	17.448	17.468	17.487	17.507	17.526	17.546	17.565	17.585	17.604	17.624	**1270**
1280	17.624	17.643	17.663	17.682	17.702	17.722	17.741	17.761	17.780	17.800	17.819	**1280**
1290	17.819	17.839	17.858	17.878	17.898	17.917	17.937	17.956	17.976	17.996	18.015	**1290**
1300	18.015	18.035	18.055	18.074	18.094	18.113	18.133	18.153	18.172	18.192	18.212	**1300**
1310	18.212	18.231	18.251	18.271	18.290	18.310	18.330	18.350	18.369	18.389	18.409	**1310**
1320	18.409	18.428	18.448	18.468	18.487	18.507	18.527	18.547	18.566	18.586	18.606	**1320**
1330	18.606	18.626	18.645	18.665	18.685	18.705	18.725	18.744	18.764	18.784	18.804	**1330**
1340	18.804	18.823	18.843	18.863	18.883	18.903	18.923	18.942	18.962	18.982	19.002	**1340**
1350	19.002	19.022	19.041	19.061	19.081	19.101	19.121	19.141	19.161	19.180	19.200	**1350**
1360	19.200	19.220	19.240	19.260	19.280	19.300	19.320	19.340	19.359	19.379	19.399	**1360**
1370	19.399	19.419	19.439	19.459	19.479	19.499	19.519	19.539	19.559	19.578	19.598	**1370**
1380	19.598	19.618	19.638	19.658	19.678	19.698	19.718	19.738	19.758	19.778	19.798	**1380**
1390	19.798	19.818	19.838	19.858	19.878	19.898	19.918	19.938	19.958	19.978	19.998	**1390**
1400	19.998	20.018	20.038	20.058	20.078	20.098	20.118	20.138	20.158	20.178	20.198	**1400**
1410	20.198	20.218	20.238	20.258	20.278	20.298	20.318	20.338	20.358	20.378	20.398	**1410**
1420	20.398	20.418	20.438	20.458	20.478	20.498	20.518	20.538	20.558	20.579	20.599	**1420**
1430	20.599	20.619	20.639	20.659	20.679	20.699	20.719	20.739	20.759	20.779	20.799	**1430**
1440	20.799	20.819	20.839	20.860	20.880	20.900	20.920	20.940	20.960	20.980	21.000	**1440**
1450	21.000	21.020	21.040	21.060	21.081	21.101	21.121	21.141	21.161	21.181	21.201	**1450**
1460	21.201	21.221	21.241	21.262	21.282	21.302	21.322	21.342	21.362	21.382	21.402	**1460**
1470	21.402	21.422	21.443	21.463	21.483	21.503	21.523	21.543	21.563	21.583	21.604	**1470**
1480	21.604	21.624	21.644	21.664	21.684	21.704	21.724	21.744	21.765	21.785	21.805	**1480**
1490	21.805	21.825	21.845	21.865	21.885	21.906	21.926	21.946	21.966	21.986	22.006	**1490**
1500	22.006	22.026	22.046	22.067	22.087	22.107	22.127	22.147	22.167	22.187	22.208	**1500**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C2.1. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1500	22.006	22.026	22.046	22.067	22.087	22.107	22.127	22.147	22.167	22.187	22.208	**1500**
1510	22.208	22.228	22.248	22.268	22.288	22.308	22.328	22.349	22.369	22.389	22.409	**1510**
1520	22.409	22.429	22.449	22.469	22.489	22.510	22.530	22.550	22.570	22.590	22.610	**1520**
1530	22.610	22.630	22.650	22.671	22.691	22.711	22.731	22.751	22.771	22.791	22.811	**1530**
1540	22.811	22.832	22.852	22.872	22.892	22.912	22.932	22.952	22.972	22.993	23.013	**1540**
1550	23.013	23.033	23.053	23.073	23.093	23.113	23.133	23.153	23.173	23.194	23.214	**1550**
1560	23.214	23.234	23.254	23.274	23.294	23.314	23.334	23.354	23.374	23.394	23.415	**1560**
1570	23.415	23.435	23.455	23.475	23.495	23.515	23.535	23.555	23.575	23.595	23.615	**1570**
1580	23.615	23.635	23.655	23.676	23.696	23.716	23.736	23.756	23.776	23.796	23.816	**1580**
1590	23.816	23.836	23.856	23.876	23.896	23.916	23.936	23.956	23.976	23.996	24.016	**1590**
1600	24.016	24.036	24.056	24.076	24.096	24.116	24.136	24.156	24.176	24.196	24.216	**1600**
1610	24.216	24.236	24.256	24.276	24.296	24.316	24.336	24.356	24.376	24.396	24.416	**1610**
1620	24.416	24.436	24.456	24.476	24.496	24.516	24.536	24.556	24.576	24.596	24.616	**1620**
1630	24.616	24.636	24.656	24.676	24.696	24.715	24.735	24.755	24.775	24.795	24.815	**1630**
1640	24.815	24.835	24.855	24.875	24.895	24.915	24.935	24.954	24.974	24.994	25.014	**1640**
1650	25.014	25.034	25.054	25.074	25.094	25.113	25.133	25.153	25.173	25.193	25.213	**1650**
1660	25.213	25.233	25.252	25.272	25.292	25.312	25.332	25.352	25.371	25.391	25.411	**1660**
1670	25.411	25.431	25.451	25.470	25.490	25.510	25.530	25.550	25.569	25.589	25.609	**1670**
1680	25.609	25.629	25.648	25.668	25.688	25.708	25.727	25.747	25.767	25.787	25.806	**1680**
1690	25.806	25.826	25.846	25.866	25.885	25.905	25.925	25.944	25.964	25.984	26.004	**1690**
1700	26.004	26.023	26.043	26.063	26.082	26.102	26.122	26.141	26.161	26.181	26.200	**1700**
1710	26.200	26.220	26.239	26.259	26.279	26.298	26.318	26.338	26.357	26.377	26.396	**1710**
1720	26.396	26.416	26.436	26.455	26.475	26.494	26.514	26.534	26.553	26.573	26.592	**1720**
1730	26.592	26.612	26.631	26.651	26.670	26.690	26.710	26.729	26.749	26.768	26.788	**1730**
1740	26.788	26.807	26.827	26.846	26.866	26.885	26.905	26.924	26.944	26.963	26.983	**1740**
1750	26.983	27.002	27.021	27.041	27.060	27.080	27.099	27.119	27.138	27.158	27.177	**1750**
1760	27.177	27.196	27.216	27.235	27.255	27.274	27.293	27.313	27.332			**1760**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
30			0.000	0.003	0.005	0.008	0.011	0.014	0.016	0.019	0.022	30
40	0.022	0.025	0.027	0.030	0.033	0.036	0.038	0.041	0.044	0.047	0.050	40
50	0.050	0.053	0.055	0.058	0.061	0.064	0.067	0.070	0.073	0.076	0.079	50
60	0.079	0.082	0.085	0.088	0.091	0.094	0.097	0.100	0.103	0.106	0.109	60
70	0.109	0.112	0.115	0.118	0.121	0.124	0.127	0.130	0.133	0.136	0.139	70
80	0.139	0.142	0.146	0.149	0.152	0.155	0.158	0.161	0.165	0.168	0.171	80
90	0.171	0.174	0.177	0.181	0.184	0.187	0.190	0.194	0.197	0.200	0.203	90
100	0.203	0.207	0.210	0.213	0.217	0.220	0.223	0.227	0.230	0.233	0.237	100
110	0.237	0.240	0.243	0.247	0.250	0.254	0.257	0.260	0.264	0.267	0.271	110
120	0.271	0.274	0.278	0.281	0.285	0.288	0.292	0.295	0.299	0.302	0.306	120
130	0.306	0.309	0.313	0.316	0.320	0.323	0.327	0.330	0.334	0.338	0.341	130
140	0.341	0.345	0.348	0.352	0.356	0.359	0.363	0.367	0.370	0.374	0.378	140
150	0.378	0.381	0.385	0.389	0.392	0.396	0.400	0.404	0.407	0.411	0.415	150
160	0.415	0.419	0.422	0.426	0.430	0.434	0.437	0.441	0.445	0.449	0.453	160
170	0.453	0.456	0.460	0.464	0.468	0.472	0.476	0.480	0.483	0.487	0.491	170
180	0.491	0.495	0.499	0.503	0.507	0.511	0.515	0.519	0.523	0.527	0.530	180
190	0.530	0.534	0.538	0.542	0.546	0.550	0.554	0.558	0.562	0.566	0.570	190
200	0.570	0.574	0.578	0.583	0.587	0.591	0.595	0.599	0.603	0.607	0.611	200
210	0.611	0.615	0.619	0.623	0.627	0.632	0.636	0.640	0.644	0.648	0.652	210
220	0.652	0.656	0.661	0.665	0.669	0.673	0.677	0.681	0.686	0.690	0.694	220
230	0.694	0.698	0.703	0.707	0.711	0.715	0.720	0.724	0.728	0.732	0.737	230
240	0.737	0.741	0.745	0.750	0.754	0.758	0.762	0.767	0.771	0.775	0.780	240
250	0.780	0.784	0.788	0.793	0.797	0.802	0.806	0.810	0.815	0.819	0.823	250
260	0.823	0.828	0.832	0.837	0.841	0.846	0.850	0.854	0.859	0.863	0.868	260
270	0.868	0.872	0.877	0.881	0.886	0.890	0.895	0.899	0.904	0.908	0.913	270
280	0.913	0.917	0.922	0.926	0.931	0.935	0.940	0.944	0.949	0.954	0.958	280
290	0.958	0.963	0.967	0.972	0.976	0.981	0.986	0.990	0.995	1.000	1.004	290
300	1.004	1.009	1.013	1.018	1.023	1.027	1.032	1.037	1.041	1.046	1.051	300
310	1.051	1.055	1.060	1.065	1.069	1.074	1.079	1.084	1.088	1.093	1.098	310
320	1.098	1.103	1.107	1.112	1.117	1.122	1.126	1.131	1.136	1.141	1.145	320
330	1.145	1.150	1.155	1.160	1.165	1.169	1.174	1.179	1.184	1.189	1.194	330
340	1.194	1.198	1.203	1.208	1.213	1.218	1.223	1.228	1.232	1.237	1.242	340
350	1.242	1.247	1.252	1.257	1.262	1.267	1.272	1.277	1.282	1.286	1.291	350
360	1.291	1.296	1.301	1.306	1.311	1.316	1.321	1.326	1.331	1.336	1.341	360
370	1.341	1.346	1.351	1.356	1.361	1.366	1.371	1.376	1.381	1.386	1.391	370
380	1.391	1.396	1.401	1.406	1.411	1.416	1.421	1.427	1.432	1.437	1.442	380
390	1.442	1.447	1.452	1.457	1.462	1.467	1.472	1.478	1.483	1.488	1.493	390
400	1.493	1.498	1.503	1.508	1.513	1.519	1.524	1.529	1.534	1.539	1.544	400
410	1.544	1.550	1.555	1.560	1.565	1.570	1.576	1.581	1.586	1.591	1.596	410
420	1.596	1.602	1.607	1.612	1.617	1.623	1.628	1.633	1.638	1.644	1.649	420
430	1.649	1.654	1.659	1.665	1.670	1.675	1.681	1.686	1.691	1.697	1.702	430
440	1.702	1.707	1.713	1.718	1.723	1.728	1.734	1.739	1.745	1.750	1.755	440
450	1.755	1.761	1.766	1.771	1.777	1.782	1.787	1.793	1.798	1.804	1.809	450
460	1.809	1.814	1.820	1.825	1.831	1.836	1.842	1.847	1.852	1.858	1.863	460
470	1.863	1.869	1.874	1.880	1.885	1.891	1.896	1.901	1.907	1.912	1.918	470
480	1.918	1.923	1.929	1.934	1.940	1.945	1.951	1.956	1.962	1.967	1.973	480
490	1.973	1.979	1.984	1.990	1.995	2.001	2.006	2.012	2.017	2.023	2.028	490
500	2.028	2.034	2.040	2.045	2.051	2.056	2.062	2.068	2.073	2.079	2.084	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	2.028	2.034	2.040	2.045	2.051	2.056	2.062	2.068	2.073	2.079	2.084	500
510	2.084	2.090	2.096	2.101	2.107	2.112	2.118	2.124	2.129	2.135	2.141	510
520	2.141	2.146	2.152	2.158	2.163	2.169	2.175	2.180	2.186	2.192	2.197	520
530	2.197	2.203	2.209	2.214	2.220	2.226	2.232	2.237	2.243	2.249	2.254	530
540	2.254	2.260	2.266	2.272	2.277	2.283	2.289	2.295	2.300	2.306	2.312	540
550	2.312	2.318	2.324	2.329	2.335	2.341	2.347	2.352	2.358	2.364	2.370	550
560	2.370	2.376	2.382	2.387	2.393	2.399	2.405	2.411	2.416	2.422	2.428	560
570	2.428	2.434	2.440	2.446	2.452	2.457	2.463	2.469	2.475	2.481	2.487	570
580	2.487	2.493	2.499	2.505	2.510	2.516	2.522	2.528	2.534	2.540	2.546	580
590	2.546	2.552	2.558	2.564	2.570	2.576	2.582	2.587	2.593	2.599	2.605	590
600	2.605	2.611	2.617	2.623	2.629	2.635	2.641	2.647	2.653	2.659	2.665	600
610	2.665	2.671	2.677	2.683	2.689	2.695	2.701	2.707	2.713	2.719	2.725	610
620	2.725	2.731	2.737	2.743	2.749	2.756	2.762	2.768	2.774	2.780	2.786	620
630	2.786	2.792	2.798	2.804	2.810	2.816	2.822	2.828	2.835	2.841	2.847	630
640	2.847	2.853	2.859	2.865	2.871	2.877	2.883	2.890	2.896	2.902	2.908	640
650	2.908	2.914	2.920	2.926	2.933	2.939	2.945	2.951	2.957	2.963	2.970	650
660	2.970	2.976	2.982	2.988	2.994	3.001	3.007	3.013	3.019	3.025	3.032	660
670	3.032	3.038	3.044	3.050	3.057	3.063	3.069	3.075	3.082	3.088	3.094	670
680	3.094	3.100	3.107	3.113	3.119	3.125	3.132	3.138	3.144	3.150	3.157	680
690	3.157	3.163	3.169	3.176	3.182	3.188	3.195	3.201	3.207	3.213	3.220	690
700	3.220	3.226	3.232	3.239	3.245	3.251	3.258	3.264	3.271	3.277	3.283	700
710	3.283	3.290	3.296	3.302	3.309	3.315	3.321	3.328	3.334	3.341	3.347	710
720	3.347	3.353	3.360	3.366	3.373	3.379	3.385	3.392	3.398	3.405	3.411	720
730	3.411	3.418	3.424	3.430	3.437	3.443	3.450	3.456	3.463	3.469	3.476	730
740	3.476	3.482	3.489	3.495	3.501	3.508	3.514	3.521	3.527	3.534	3.540	740
750	3.540	3.547	3.553	3.560	3.566	3.573	3.579	3.586	3.592	3.599	3.606	750
760	3.606	3.612	3.619	3.625	3.632	3.638	3.645	3.651	3.658	3.664	3.671	760
770	3.671	3.678	3.684	3.691	3.697	3.704	3.711	3.717	3.724	3.730	3.737	770
780	3.737	3.743	3.750	3.757	3.763	3.770	3.777	3.783	3.790	3.796	3.803	780
790	3.803	3.810	3.816	3.823	3.830	3.836	3.843	3.850	3.856	3.863	3.870	790
800	3.870	3.876	3.883	3.890	3.896	3.903	3.910	3.916	3.923	3.930	3.936	800
810	3.936	3.943	3.950	3.957	3.963	3.970	3.977	3.983	3.990	3.997	4.004	810
820	4.004	4.010	4.017	4.024	4.031	4.037	4.044	4.051	4.058	4.064	4.071	820
830	4.071	4.078	4.085	4.091	4.098	4.105	4.112	4.119	4.125	4.132	4.139	830
840	4.139	4.146	4.153	4.159	4.166	4.173	4.180	4.187	4.194	4.200	4.207	840
850	4.207	4.214	4.221	4.228	4.235	4.241	4.248	4.255	4.262	4.269	4.276	850
860	4.276	4.283	4.289	4.296	4.303	4.310	4.317	4.324	4.331	4.338	4.345	860
870	4.345	4.351	4.358	4.365	4.372	4.379	4.386	4.393	4.400	4.407	4.414	870
880	4.414	4.421	4.428	4.435	4.442	4.448	4.455	4.462	4.469	4.476	4.483	880
890	4.483	4.490	4.497	4.504	4.511	4.518	4.525	4.532	4.539	4.546	4.553	890
900	4.553	4.560	4.567	4.574	4.581	4.588	4.595	4.602	4.609	4.616	4.623	900
910	4.623	4.630	4.637	4.644	4.651	4.658	4.666	4.673	4.680	4.687	4.694	910
920	4.694	4.701	4.708	4.715	4.722	4.729	4.736	4.743	4.750	4.757	4.765	920
930	4.765	4.772	4.779	4.786	4.793	4.800	4.807	4.814	4.821	4.829	4.836	930
940	4.836	4.843	4.850	4.857	4.864	4.871	4.879	4.886	4.893	4.900	4.907	940
950	4.907	4.914	4.921	4.929	4.936	4.943	4.950	4.957	4.965	4.972	4.979	950
960	4.979	4.986	4.993	5.001	5.008	5.015	5.022	5.029	5.037	5.044	5.051	960
970	5.051	5.058	5.066	5.073	5.080	5.087	5.094	5.102	5.109	5.116	5.123	970
980	5.123	5.131	5.138	5.145	5.153	5.160	5.167	5.174	5.182	5.189	5.196	980
990	5.196	5.204	5.211	5.218	5.225	5.233	5.240	5.247	5.255	5.262	5.269	990
1000	5.269	5.277	5.284	5.291	5.299	5.306	5.313	5.321	5.328	5.335	5.343	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	5.269	5.277	5.284	5.291	5.299	5.306	5.313	5.321	5.328	5.335	5.343	1000
1010	5.343	5.350	5.357	5.365	5.372	5.379	5.387	5.394	5.402	5.409	5.416	1010
1020	5.416	5.424	5.431	5.439	5.446	5.453	5.461	5.468	5.476	5.483	5.490	1020
1030	5.490	5.498	5.505	5.513	5.520	5.527	5.535	5.542	5.550	5.557	5.565	1030
1040	5.565	5.572	5.580	5.587	5.595	5.602	5.609	5.617	5.624	5.632	5.639	1040
1050	5.639	5.647	5.654	5.662	5.669	5.677	5.684	5.692	5.699	5.707	5.714	1050
1060	5.714	5.722	5.729	5.737	5.744	5.752	5.759	5.767	5.774	5.782	5.790	1060
1070	5.790	5.797	5.805	5.812	5.820	5.827	5.835	5.842	5.850	5.858	5.865	1070
1080	5.865	5.873	5.880	5.888	5.895	5.903	5.911	5.918	5.926	5.933	5.941	1080
1090	5.941	5.949	5.956	5.964	5.972	5.979	5.987	5.994	6.002	6.010	6.017	1090
1100	6.017	6.025	6.033	6.040	6.048	6.055	6.063	6.071	6.078	6.086	6.094	1100
1110	6.094	6.101	6.109	6.117	6.124	6.132	6.140	6.148	6.155	6.163	6.171	1110
1120	6.171	6.178	6.186	6.194	6.201	6.209	6.217	6.225	6.232	6.240	6.248	1120
1130	6.248	6.255	6.263	6.271	6.279	6.286	6.294	6.302	6.310	6.317	6.325	1130
1140	6.325	6.333	6.341	6.348	6.356	6.364	6.372	6.380	6.387	6.395	6.403	1140
1150	6.403	6.411	6.419	6.426	6.434	6.442	6.450	6.458	6.465	6.473	6.481	1150
1160	6.481	6.489	6.497	6.505	6.512	6.520	6.528	6.536	6.544	6.552	6.559	1160
1170	6.559	6.567	6.575	6.583	6.591	6.599	6.607	6.614	6.622	6.630	6.638	1170
1180	6.638	6.646	6.654	6.662	6.670	6.677	6.685	6.693	6.701	6.709	6.717	1180
1190	6.717	6.725	6.733	6.741	6.749	6.757	6.764	6.772	6.780	6.788	6.796	1190
1200	6.796	6.804	6.812	6.820	6.828	6.836	6.844	6.852	6.860	6.868	6.876	1200
1210	6.876	6.884	6.892	6.900	6.908	6.916	6.924	6.932	6.940	6.948	6.956	1210
1220	6.956	6.964	6.972	6.980	6.988	6.996	7.004	7.012	7.020	7.028	7.036	1220
1230	7.036	7.044	7.052	7.060	7.068	7.076	7.084	7.092	7.100	7.108	7.116	1230
1240	7.116	7.124	7.132	7.140	7.148	7.156	7.164	7.173	7.181	7.189	7.197	1240
1250	7.197	7.205	7.213	7.221	7.229	7.237	7.245	7.253	7.262	7.270	7.278	1250
1260	7.278	7.286	7.294	7.302	7.310	7.318	7.326	7.335	7.343	7.351	7.359	1260
1270	7.359	7.367	7.375	7.383	7.392	7.400	7.408	7.416	7.424	7.432	7.441	1270
1280	7.441	7.449	7.457	7.465	7.473	7.482	7.490	7.498	7.506	7.514	7.523	1280
1290	7.523	7.531	7.539	7.547	7.555	7.564	7.572	7.580	7.588	7.597	7.605	1290
1300	7.605	7.613	7.621	7.630	7.638	7.646	7.654	7.663	7.671	7.679	7.687	1300
1310	7.687	7.696	7.704	7.712	7.720	7.729	7.737	7.745	7.754	7.762	7.770	1310
1320	7.770	7.778	7.787	7.795	7.803	7.812	7.820	7.828	7.837	7.845	7.853	1320
1330	7.853	7.862	7.870	7.878	7.887	7.895	7.903	7.912	7.920	7.928	7.937	1330
1340	7.937	7.945	7.953	7.962	7.970	7.979	7.987	7.995	8.004	8.012	8.020	1340
1350	8.020	8.029	8.037	8.046	8.054	8.062	8.071	8.079	8.088	8.096	8.105	1350
1360	8.105	8.113	8.121	8.130	8.138	8.147	8.155	8.164	8.172	8.180	8.189	1360
1370	8.189	8.197	8.206	8.214	8.223	8.231	8.240	8.248	8.257	8.265	8.274	1370
1380	8.274	8.282	8.291	8.299	8.308	8.316	8.325	8.333	8.342	8.350	8.359	1380
1390	8.359	8.367	8.376	8.384	8.393	8.401	8.410	8.418	8.427	8.435	8.444	1390
1400	8.444	8.452	8.461	8.470	8.478	8.487	8.495	8.504	8.512	8.521	8.529	1400
1410	8.529	8.538	8.547	8.555	8.564	8.572	8.581	8.590	8.598	8.607	8.615	1410
1420	8.615	8.624	8.633	8.641	8.650	8.658	8.667	8.676	8.684	8.693	8.702	1420
1430	8.702	8.710	8.719	8.728	8.736	8.745	8.754	8.762	8.771	8.779	8.788	1430
1440	8.788	8.797	8.805	8.814	8.823	8.832	8.840	8.849	8.858	8.866	8.875	1440
1450	8.875	8.884	8.892	8.901	8.910	8.919	8.927	8.936	8.945	8.953	8.962	1450
1460	8.962	8.971	8.980	8.988	8.997	9.006	9.015	9.023	9.032	9.041	9.050	1460
1470	9.050	9.058	9.067	9.076	9.085	9.093	9.102	9.111	9.120	9.129	9.137	1470
1480	9.137	9.146	9.155	9.164	9.172	9.181	9.190	9.199	9.208	9.217	9.225	1480
1490	9.225	9.234	9.243	9.252	9.261	9.269	9.278	9.287	9.296	9.305	9.314	1490
1500	9.314	9.323	9.331	9.340	9.349	9.358	9.367	9.376	9.385	9.393	9.402	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	9.314	9.323	9.331	9.340	9.349	9.358	9.367	9.376	9.385	9.393	9.402	1500
1510	9.402	9.411	9.420	9.429	9.438	9.447	9.456	9.465	9.473	9.482	9.491	1510
1520	9.491	9.500	9.509	9.518	9.527	9.536	9.545	9.554	9.563	9.572	9.580	1520
1530	9.580	9.589	9.598	9.607	9.616	9.625	9.634	9.643	9.652	9.661	9.670	1530
1540	9.670	9.679	9.688	9.697	9.706	9.715	9.724	9.733	9.742	9.751	9.760	1540
1550	9.760	9.769	9.778	9.787	9.796	9.805	9.814	9.823	9.832	9.841	9.850	1550
1560	9.850	9.859	9.868	9.877	9.886	9.895	9.904	9.913	9.922	9.931	9.940	1560
1570	9.940	9.949	9.958	9.968	9.977	9.986	9.995	10.004	10.013	10.022	10.031	1570
1580	10.031	10.040	10.049	10.058	10.067	10.077	10.086	10.095	10.104	10.113	10.122	1580
1590	10.122	10.131	10.140	10.149	10.159	10.168	10.177	10.186	10.195	10.204	10.213	1590
1600	10.213	10.222	10.232	10.241	10.250	10.259	10.268	10.277	10.287	10.296	10.305	1600
1610	10.305	10.314	10.323	10.332	10.342	10.351	10.360	10.369	10.378	10.388	10.397	1610
1620	10.397	10.406	10.415	10.424	10.434	10.443	10.452	10.461	10.470	10.480	10.489	1620
1630	10.489	10.498	10.507	10.517	10.526	10.535	10.544	10.554	10.563	10.572	10.581	1630
1640	10.581	10.591	10.600	10.609	10.618	10.628	10.637	10.646	10.655	10.665	10.674	1640
1650	10.674	10.683	10.693	10.702	10.711	10.720	10.730	10.739	10.748	10.758	10.767	1650
1660	10.767	10.776	10.786	10.795	10.804	10.814	10.823	10.832	10.842	10.851	10.860	1660
1670	10.860	10.870	10.879	10.888	10.898	10.907	10.916	10.926	10.935	10.944	10.954	1670
1680	10.954	10.963	10.972	10.982	10.991	11.001	11.010	11.019	11.029	11.038	11.048	1680
1690	11.048	11.057	11.066	11.076	11.085	11.095	11.104	11.113	11.123	11.132	11.142	1690
1700	11.142	11.151	11.160	11.170	11.179	11.189	11.198	11.208	11.217	11.227	11.236	1700
1710	11.236	11.245	11.255	11.264	11.274	11.283	11.293	11.302	11.312	11.321	11.331	1710
1720	11.331	11.340	11.350	11.359	11.369	11.378	11.388	11.397	11.406	11.416	11.425	1720
1730	11.425	11.435	11.445	11.454	11.464	11.473	11.483	11.492	11.502	11.511	11.521	1730
1740	11.521	11.530	11.540	11.549	11.559	11.568	11.578	11.587	11.597	11.607	11.616	1740
1750	11.616	11.626	11.635	11.645	11.654	11.664	11.673	11.683	11.693	11.702	11.712	1750
1760	11.712	11.721	11.731	11.741	11.750	11.760	11.769	11.779	11.789	11.798	11.808	1760
1770	11.808	11.817	11.827	11.837	11.846	11.856	11.865	11.875	11.885	11.894	11.904	1770
1780	11.904	11.914	11.923	11.933	11.943	11.952	11.962	11.972	11.981	11.991	12.000	1780
1790	12.000	12.010	12.020	12.029	12.039	12.049	12.058	12.068	12.078	12.088	12.097	1790
1800	12.097	12.107	12.117	12.126	12.136	12.146	12.155	12.165	12.175	12.185	12.194	1800
1810	12.194	12.204	12.214	12.223	12.233	12.243	12.253	12.262	12.272	12.282	12.292	1810
1820	12.292	12.301	12.311	12.321	12.330	12.340	12.350	12.360	12.370	12.379	12.389	1820
1830	12.389	12.399	12.409	12.418	12.428	12.438	12.448	12.457	12.467	12.477	12.487	1830
1840	12.487	12.497	12.506	12.516	12.526	12.536	12.546	12.555	12.565	12.575	12.585	1840
1850	12.585	12.595	12.604	12.614	12.624	12.634	12.644	12.654	12.663	12.673	12.683	1850
1860	12.683	12.693	12.703	12.713	12.723	12.732	12.742	12.752	12.762	12.772	12.782	1860
1870	12.782	12.792	12.801	12.811	12.821	12.831	12.841	12.851	12.861	12.871	12.880	1870
1880	12.880	12.890	12.900	12.910	12.920	12.930	12.940	12.950	12.960	12.970	12.980	1880
1890	12.980	12.989	12.999	13.009	13.019	13.029	13.039	13.049	13.059	13.069	13.079	1890
1900	13.079	13.089	13.099	13.109	13.119	13.129	13.138	13.148	13.158	13.168	13.178	1900
1910	13.178	13.188	13.198	13.208	13.218	13.228	13.238	13.248	13.258	13.268	13.278	1910
1920	13.278	13.288	13.298	13.308	13.318	13.328	13.338	13.348	13.358	13.368	13.378	1920
1930	13.378	13.388	13.398	13.408	13.418	13.428	13.438	13.448	13.458	13.468	13.478	1930
1940	13.478	13.488	13.498	13.508	13.519	13.529	13.539	13.549	13.559	13.569	13.579	1940
1950	13.579	13.589	13.599	13.609	13.619	13.629	13.639	13.649	13.659	13.670	13.680	1950
1960	13.680	13.690	13.700	13.710	13.720	13.730	13.740	13.750	13.760	13.770	13.781	1960
1970	13.781	13.791	13.801	13.811	13.821	13.831	13.841	13.851	13.862	13.872	13.882	1970
1980	13.882	13.892	13.902	13.912	13.922	13.932	13.943	13.953	13.963	13.973	13.983	1980
1990	13.983	13.993	14.004	14.014	14.024	14.034	14.044	14.054	14.065	14.075	14.085	1990
2000	14.085	14.095	14.105	14.115	14.126	14.136	14.146	14.156	14.166	14.177	14.187	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	14.085	14.095	14.105	14.115	14.126	14.136	14.146	14.156	14.166	14.177	14.187	**2000**
2010	14.187	14.197	14.207	14.217	14.228	14.238	14.248	14.258	14.269	14.279	14.289	**2010**
2020	14.289	14.299	14.309	14.320	14.330	14.340	14.350	14.361	14.371	14.381	14.391	**2020**
2030	14.391	14.402	14.412	14.422	14.432	14.443	14.453	14.463	14.473	14.484	14.494	**2030**
2040	14.494	14.504	14.514	14.525	14.535	14.545	14.556	14.566	14.576	14.586	14.597	**2040**
2050	14.597	14.607	14.617	14.628	14.638	14.648	14.659	14.669	14.679	14.689	14.700	**2050**
2060	14.700	14.710	14.720	14.731	14.741	14.751	14.762	14.772	14.782	14.793	14.803	**2060**
2070	14.803	14.813	14.824	14.834	14.844	14.855	14.865	14.875	14.886	14.896	14.906	**2070**
2080	14.906	14.917	14.927	14.938	14.948	14.958	14.969	14.979	14.989	15.000	15.010	**2080**
2090	15.010	15.021	15.031	15.041	15.052	15.062	15.073	15.083	15.093	15.104	15.114	**2090**
2100	15.114	15.125	15.135	15.145	15.156	15.166	15.177	15.187	15.197	15.208	15.218	**2100**
2110	15.218	15.229	15.239	15.250	15.260	15.270	15.281	15.291	15.302	15.312	15.323	**2110**
2120	15.323	15.333	15.343	15.354	15.364	15.375	15.385	15.396	15.406	15.417	15.427	**2120**
2130	15.427	15.438	15.448	15.459	15.469	15.479	15.490	15.500	15.511	15.521	15.532	**2130**
2140	15.532	15.542	15.553	15.563	15.574	15.584	15.595	15.605	15.616	15.626	15.637	**2140**
2150	15.637	15.647	15.658	15.668	15.679	15.689	15.700	15.710	15.721	15.731	15.742	**2150**
2160	15.742	15.753	15.763	15.774	15.784	15.795	15.805	15.816	15.826	15.837	15.847	**2160**
2170	15.847	15.858	15.868	15.879	15.890	15.900	15.911	15.921	15.932	15.942	15.953	**2170**
2180	15.953	15.963	15.974	15.985	15.995	16.006	16.016	16.027	16.038	16.048	16.059	**2180**
2190	16.059	16.069	16.080	16.090	16.101	16.112	16.122	16.133	16.143	16.154	16.165	**2190**
2200	16.165	16.175	16.186	16.196	16.207	16.218	16.228	16.239	16.250	16.260	16.271	**2200**
2210	16.271	16.281	16.292	16.303	16.313	16.324	16.335	16.345	16.356	16.367	16.377	**2210**
2220	16.377	16.388	16.398	16.409	16.420	16.430	16.441	16.452	16.462	16.473	16.484	**2220**
2230	16.484	16.494	16.505	16.516	16.526	16.537	16.548	16.558	16.569	16.580	16.590	**2230**
2240	16.590	16.601	16.612	16.622	16.633	16.644	16.655	16.665	16.676	16.687	16.697	**2240**
2250	16.697	16.708	16.719	16.729	16.740	16.751	16.762	16.772	16.783	16.794	16.804	**2250**
2260	16.804	16.815	16.826	16.837	16.847	16.858	16.869	16.879	16.890	16.901	16.912	**2260**
2270	16.912	16.922	16.933	16.944	16.955	16.965	16.976	16.987	16.998	17.008	17.019	**2270**
2280	17.019	17.030	17.041	17.051	17.062	17.073	17.084	17.094	17.105	17.116	17.127	**2280**
2290	17.127	17.137	17.148	17.159	17.170	17.181	17.191	17.202	17.213	17.224	17.234	**2290**
2300	17.234	17.245	17.256	17.267	17.278	17.288	17.299	17.310	17.321	17.332	17.342	**2300**
2310	17.342	17.353	17.364	17.375	17.386	17.396	17.407	17.418	17.429	17.440	17.451	**2310**
2320	17.451	17.461	17.472	17.483	17.494	17.505	17.515	17.526	17.537	17.548	17.559	**2320**
2330	17.559	17.570	17.580	17.591	17.602	17.613	17.624	17.635	17.646	17.656	17.667	**2330**
2340	17.667	17.678	17.689	17.700	17.711	17.722	17.732	17.743	17.754	17.765	17.776	**2340**
2350	17.776	17.787	17.798	17.808	17.819	17.830	17.841	17.852	17.863	17.874	17.885	**2350**
2360	17.885	17.895	17.906	17.917	17.928	17.939	17.950	17.961	17.972	17.983	17.993	**2360**
2370	17.993	18.004	18.015	18.026	18.037	18.048	18.059	18.070	18.081	18.092	18.103	**2370**
2380	18.103	18.113	18.124	18.135	18.146	18.157	18.168	18.179	18.190	18.201	18.212	**2380**
2390	18.212	18.223	18.234	18.245	18.255	18.266	18.277	18.288	18.299	18.310	18.321	**2390**
2400	18.321	18.332	18.343	18.354	18.365	18.376	18.387	18.398	18.409	18.420	18.431	**2400**
2410	18.431	18.441	18.452	18.463	18.474	18.485	18.496	18.507	18.518	18.529	18.540	**2410**
2420	18.540	18.551	18.562	18.573	18.584	18.595	18.606	18.617	18.628	18.639	18.650	**2420**
2430	18.650	18.661	18.672	18.683	18.694	18.705	18.716	18.727	18.738	18.749	18.760	**2430**
2440	18.760	18.771	18.782	18.793	18.804	18.815	18.826	18.837	18.848	18.859	18.870	**2440**
2450	18.870	18.881	18.892	18.903	18.914	18.925	18.936	18.947	18.958	18.969	18.980	**2450**
2460	18.980	18.991	19.002	19.013	19.024	19.035	19.046	19.057	19.068	19.079	19.090	**2460**
2470	19.090	19.101	19.112	19.123	19.134	19.145	19.156	19.167	19.178	19.189	19.200	**2470**
2480	19.200	19.211	19.222	19.233	19.245	19.256	19.267	19.278	19.289	19.300	19.311	**2480**
2490	19.311	19.322	19.333	19.344	19.355	19.366	19.377	19.388	19.399	19.410	19.421	**2490**
2500	19.421	19.432	19.443	19.455	19.466	19.477	19.488	19.499	19.510	19.521	19.532	**2500**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2500	19.421	19.432	19.443	19.455	19.466	19.477	19.488	19.499	19.510	19.521	19.532	**2500**
2510	19.532	19.543	19.554	19.565	19.576	19.587	19.598	19.609	19.621	19.632	19.643	**2510**
2520	19.643	19.654	19.665	19.676	19.687	19.698	19.709	19.720	19.731	19.742	19.754	**2520**
2530	19.754	19.765	19.776	19.787	19.798	19.809	19.820	19.831	19.842	19.853	19.864	**2530**
2540	19.864	19.876	19.887	19.898	19.909	19.920	19.931	19.942	19.953	19.964	19.976	**2540**
2550	19.976	19.987	19.998	20.009	20.020	20.031	20.042	20.053	20.064	20.075	20.087	**2550**
2560	20.087	20.098	20.109	20.120	20.131	20.142	20.153	20.164	20.176	20.187	20.198	**2560**
2570	20.198	20.209	20.220	20.231	20.242	20.253	20.265	20.276	20.287	20.298	20.309	**2570**
2580	20.309	20.320	20.331	20.342	20.354	20.365	20.376	20.387	20.398	20.409	20.420	**2580**
2590	20.420	20.431	20.443	20.454	20.465	20.476	20.487	20.498	20.509	20.521	20.532	**2590**
2600	20.532	20.543	20.554	20.565	20.576	20.587	20.599	20.610	20.621	20.632	20.643	**2600**
2610	20.643	20.654	20.665	20.677	20.688	20.699	20.710	20.721	20.732	20.744	20.755	**2610**
2620	20.755	20.766	20.777	20.788	20.799	20.810	20.822	20.833	20.844	20.855	20.866	**2620**
2630	20.866	20.877	20.889	20.900	20.911	20.922	20.933	20.944	20.956	20.967	20.978	**2630**
2640	20.978	20.989	21.000	21.011	21.023	21.034	21.045	21.056	21.067	21.078	21.090	**2640**
2650	21.090	21.101	21.112	21.123	21.134	21.145	21.157	21.168	21.179	21.190	21.201	**2650**
2660	21.201	21.212	21.224	21.235	21.246	21.257	21.268	21.279	21.291	21.302	21.313	**2660**
2670	21.313	21.324	21.335	21.346	21.358	21.369	21.380	21.391	21.402	21.414	21.425	**2670**
2680	21.425	21.436	21.447	21.458	21.469	21.481	21.492	21.503	21.514	21.525	21.537	**2680**
2690	21.537	21.548	21.559	21.570	21.581	21.592	21.604	21.615	21.626	21.637	21.648	**2690**
2700	21.648	21.659	21.671	21.682	21.693	21.704	21.715	21.727	21.738	21.749	21.760	**2700**
2710	21.760	21.771	21.783	21.794	21.805	21.816	21.827	21.838	21.850	21.861	21.872	**2710**
2720	21.872	21.883	21.894	21.906	21.917	21.928	21.939	21.950	21.961	21.973	21.984	**2720**
2730	21.984	21.995	22.006	22.017	22.029	22.040	22.051	22.062	22.073	22.085	22.096	**2730**
2740	22.096	22.107	22.118	22.129	22.140	22.152	22.163	22.174	22.185	22.196	22.208	**2740**
2750	22.208	22.219	22.230	22.241	22.252	22.264	22.275	22.286	22.297	22.308	22.319	**2750**
2760	22.319	22.331	22.342	22.353	22.364	22.375	22.387	22.398	22.409	22.420	22.431	**2760**
2770	22.431	22.442	22.454	22.465	22.476	22.487	22.498	22.510	22.521	22.532	22.543	**2770**
2780	22.543	22.554	22.565	22.577	22.588	22.599	22.610	22.621	22.633	22.644	22.655	**2780**
2790	22.655	22.666	22.677	22.688	22.700	22.711	22.722	22.733	22.744	22.756	22.767	**2790**
2800	22.767	22.778	22.789	22.800	22.811	22.823	22.834	22.845	22.856	22.867	22.879	**2800**
2810	22.879	22.890	22.901	22.912	22.923	22.934	22.946	22.957	22.968	22.979	22.990	**2810**
2820	22.990	23.001	23.013	23.024	23.035	23.046	23.057	23.068	23.080	23.091	23.102	**2820**
2830	23.102	23.113	23.124	23.136	23.147	23.158	23.169	23.180	23.191	23.203	23.214	**2830**
2840	23.214	23.225	23.236	23.247	23.258	23.269	23.281	23.292	23.303	23.314	23.325	**2840**
2850	23.325	23.336	23.348	23.359	23.370	23.381	23.392	23.403	23.415	23.426	23.437	**2850**
2860	23.437	23.448	23.459	23.470	23.482	23.493	23.504	23.515	23.526	23.537	23.548	**2860**
2870	23.548	23.560	23.571	23.582	23.593	23.604	23.615	23.626	23.638	23.649	23.660	**2870**
2880	23.660	23.671	23.682	23.693	23.704	23.716	23.727	23.738	23.749	23.760	23.771	**2880**
2890	23.771	23.782	23.794	23.805	23.816	23.827	23.838	23.849	23.860	23.872	23.883	**2890**
2900	23.883	23.894	23.905	23.916	23.927	23.938	23.949	23.961	23.972	23.983	23.994	**2900**
2910	23.994	24.005	24.016	24.027	24.038	24.050	24.061	24.072	24.083	24.094	24.105	**2910**
2920	24.105	24.116	24.127	24.139	24.150	24.161	24.172	24.183	24.194	24.205	24.216	**2920**
2930	24.216	24.227	24.239	24.250	24.261	24.272	24.283	24.294	24.305	24.316	24.327	**2930**
2940	24.327	24.339	24.350	24.361	24.372	24.383	24.394	24.405	24.416	24.427	24.438	**2940**
2950	24.438	24.450	24.461	24.472	24.483	24.494	24.505	24.516	24.527	24.538	24.549	**2950**
2960	24.549	24.560	24.571	24.583	24.594	24.605	24.616	24.627	24.638	24.649	24.660	**2960**
2970	24.660	24.671	24.682	24.693	24.704	24.715	24.727	24.738	24.749	24.760	24.771	**2970**
2980	24.771	24.782	24.793	24.804	24.815	24.826	24.837	24.848	24.859	24.870	24.881	**2980**
2990	24.881	24.893	24.904	24.915	24.926	24.937	24.948	24.959	24.970	24.981	24.992	**2990**
3000	24.992	25.003	25.014	25.025	25.036	25.047	25.058	25.069	25.080	25.091	25.102	**3000**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

TABLE C2.2. *Type BP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	24.992	25.003	25.014	25.025	25.036	25.047	25.058	25.069	25.080	25.091	25.102	3000
3010	25.102	25.113	25.124	25.136	25.147	25.158	25.169	25.180	25.191	25.202	25.213	3010
3020	25.213	25.224	25.235	25.246	25.257	25.268	25.279	25.290	25.301	25.312	25.323	3020
3030	25.323	25.334	25.345	25.356	25.367	25.378	25.389	25.400	25.411	25.422	25.433	3030
3040	25.433	25.444	25.455	25.466	25.477	25.488	25.499	25.510	25.521	25.532	25.543	3040
3050	25.543	25.554	25.565	25.576	25.587	25.598	25.609	25.620	25.631	25.642	25.653	3050
3060	25.653	25.664	25.675	25.686	25.697	25.708	25.719	25.730	25.741	25.752	25.763	3060
3070	25.763	25.774	25.784	25.795	25.806	25.817	25.828	25.839	25.850	25.861	25.872	3070
3080	25.872	25.883	25.894	25.905	25.916	25.927	25.938	25.949	25.960	25.971	25.982	3080
3090	25.982	25.993	26.004	26.014	26.025	26.036	26.047	26.058	26.069	26.080	26.091	3090
3100	26.091	26.102	26.113	26.124	26.135	26.146	26.157	26.167	26.178	26.189	26.200	3100
3110	26.200	26.211	26.222	26.233	26.244	26.255	26.266	26.277	26.287	26.298	26.309	3110
3120	26.309	26.320	26.331	26.342	26.353	26.364	26.375	26.386	26.396	26.407	26.418	3120
3130	26.418	26.429	26.440	26.451	26.462	26.473	26.484	26.494	26.505	26.516	26.527	3130
3140	26.527	26.538	26.549	26.560	26.571	26.581	26.592	26.603	26.614	26.625	26.636	3140
3150	26.636	26.647	26.657	26.668	26.679	26.690	26.701	26.712	26.723	26.733	26.744	3150
3160	26.744	26.755	26.766	26.777	26.788	26.798	26.809	26.820	26.831	26.842	26.853	3160
3170	26.853	26.863	26.874	26.885	26.896	26.907	26.918	26.928	26.939	26.950	26.961	3170
3180	26.961	26.972	26.983	26.993	27.004	27.015	27.026	27.037	27.047	27.058	27.069	3180
3190	27.069	27.080	27.091	27.101	27.112	27.123	27.134	27.145	27.155	27.166	27.177	3190
3200	27.177	27.188	27.199	27.209	27.220	27.231	27.242	27.252	27.263	27.274	27.285	3200
3210	27.285	27.296	27.306	27.317	27.328							3210
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C3. Supplementary Reference Tables for the Negative Thermoelement, Type BN, a Platinum-6% Rhodium Alloy Versus Platinum, Pt-67

The reference function for type BN thermoelements versus platinum, Pt-67, given in the main text (see table 2.5.1), was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C3.1 and C3.2. Table C3.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from 0 °C to 1768 °C, and table C3.2 presents voltage values at 1 °F intervals from 32 °F to 3214 °F.

TABLE C3.1. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.005	0.010	0.015	0.020	0.026	0.031	0.036	0.041	0.046	0.052	0
10	0.052	0.057	0.062	0.068	0.073	0.078	0.084	0.089	0.094	0.100	0.105	10
20	0.105	0.111	0.116	0.122	0.127	0.133	0.138	0.144	0.149	0.155	0.160	20
30	0.160	0.166	0.172	0.177	0.183	0.189	0.194	0.200	0.206	0.211	0.217	30
40	0.217	0.223	0.229	0.234	0.240	0.246	0.252	0.258	0.264	0.269	0.275	40
50	0.275	0.281	0.287	0.293	0.299	0.305	0.311	0.317	0.323	0.329	0.335	50
60	0.335	0.341	0.347	0.353	0.359	0.365	0.372	0.378	0.384	0.390	0.396	60
70	0.396	0.402	0.408	0.415	0.421	0.427	0.433	0.439	0.446	0.452	0.458	70
80	0.458	0.465	0.471	0.477	0.483	0.490	0.496	0.502	0.509	0.515	0.522	80
90	0.522	0.528	0.534	0.541	0.547	0.554	0.560	0.567	0.573	0.580	0.586	90
100	0.586	0.592	0.599	0.606	0.612	0.619	0.625	0.632	0.638	0.645	0.651	100
110	0.651	0.658	0.665	0.671	0.678	0.684	0.691	0.698	0.704	0.711	0.718	110
120	0.718	0.724	0.731	0.738	0.744	0.751	0.758	0.765	0.771	0.778	0.785	120
130	0.785	0.792	0.798	0.805	0.812	0.819	0.825	0.832	0.839	0.846	0.853	130
140	0.853	0.860	0.866	0.873	0.880	0.887	0.894	0.901	0.908	0.914	0.921	140
150	0.921	0.928	0.935	0.942	0.949	0.956	0.963	0.970	0.977	0.984	0.991	150
160	0.991	0.998	1.005	1.012	1.019	1.026	1.033	1.040	1.047	1.054	1.061	160
170	1.061	1.068	1.075	1.082	1.089	1.096	1.103	1.110	1.117	1.124	1.131	170
180	1.131	1.138	1.145	1.152	1.159	1.167	1.174	1.181	1.188	1.195	1.202	180
190	1.202	1.209	1.216	1.224	1.231	1.238	1.245	1.252	1.259	1.267	1.274	190
200	1.274	1.281	1.288	1.295	1.302	1.310	1.317	1.324	1.331	1.338	1.346	200
210	1.346	1.353	1.360	1.367	1.375	1.382	1.389	1.396	1.404	1.411	1.418	210
220	1.418	1.425	1.433	1.440	1.447	1.454	1.462	1.469	1.476	1.484	1.491	220
230	1.491	1.498	1.506	1.513	1.520	1.527	1.535	1.542	1.549	1.557	1.564	230
240	1.564	1.571	1.579	1.586	1.593	1.601	1.608	1.616	1.623	1.630	1.638	240
250	1.638	1.645	1.652	1.660	1.667	1.674	1.682	1.689	1.697	1.704	1.711	250
260	1.711	1.719	1.726	1.734	1.741	1.748	1.756	1.763	1.771	1.778	1.785	260
270	1.785	1.793	1.800	1.808	1.815	1.823	1.830	1.838	1.845	1.852	1.860	270
280	1.860	1.867	1.875	1.882	1.890	1.897	1.905	1.912	1.919	1.927	1.934	280
290	1.934	1.942	1.949	1.957	1.964	1.972	1.979	1.987	1.994	2.002	2.009	290
300	2.009	2.017	2.024	2.032	2.039	2.047	2.054	2.062	2.069	2.077	2.084	300
310	2.084	2.092	2.099	2.107	2.114	2.122	2.129	2.137	2.144	2.152	2.159	310
320	2.159	2.167	2.175	2.182	2.190	2.197	2.205	2.212	2.220	2.227	2.235	320
330	2.235	2.242	2.250	2.258	2.265	2.273	2.280	2.288	2.295	2.303	2.310	330
340	2.310	2.318	2.326	2.333	2.341	2.348	2.356	2.363	2.371	2.379	2.386	340
350	2.386	2.394	2.401	2.409	2.416	2.424	2.432	2.439	2.447	2.454	2.462	350
360	2.462	2.470	2.477	2.485	2.492	2.500	2.508	2.515	2.523	2.530	2.538	360
370	2.538	2.546	2.553	2.561	2.568	2.576	2.584	2.591	2.599	2.607	2.614	370
380	2.614	2.622	2.629	2.637	2.645	2.652	2.660	2.668	2.675	2.683	2.690	380
390	2.690	2.698	2.706	2.713	2.721	2.729	2.736	2.744	2.752	2.759	2.767	390
400	2.767	2.775	2.782	2.790	2.797	2.805	2.813	2.820	2.828	2.836	2.843	400
410	2.843	2.851	2.859	2.866	2.874	2.882	2.889	2.897	2.905	2.912	2.920	410
420	2.920	2.928	2.935	2.943	2.951	2.958	2.966	2.974	2.981	2.989	2.997	420
430	2.997	3.004	3.012	3.020	3.028	3.035	3.043	3.051	3.058	3.066	3.074	430
440	3.074	3.081	3.089	3.097	3.104	3.112	3.120	3.127	3.135	3.143	3.151	440
450	3.151	3.158	3.166	3.174	3.181	3.189	3.197	3.205	3.212	3.220	3.228	450
460	3.228	3.235	3.243	3.251	3.259	3.266	3.274	3.282	3.289	3.297	3.305	460
470	3.305	3.313	3.320	3.328	3.336	3.343	3.351	3.359	3.367	3.374	3.382	470
480	3.382	3.390	3.398	3.405	3.413	3.421	3.428	3.436	3.444	3.452	3.459	480
490	3.459	3.467	3.475	3.483	3.490	3.498	3.506	3.514	3.521	3.529	3.537	490
500	3.537	3.545	3.552	3.560	3.568	3.576	3.583	3.591	3.599	3.607	3.614	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C3.1. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	3.537	3.545	3.552	3.560	3.568	3.576	3.583	3.591	3.599	3.607	3.614	**500**
510	3.614	3.622	3.630	3.638	3.646	3.653	3.661	3.669	3.677	3.684	3.692	**510**
520	3.692	3.700	3.708	3.715	3.723	3.731	3.739	3.747	3.754	3.762	3.770	**520**
530	3.770	3.778	3.786	3.793	3.801	3.809	3.817	3.824	3.832	3.840	3.848	**530**
540	3.848	3.856	3.863	3.871	3.879	3.887	3.895	3.902	3.910	3.918	3.926	**540**
550	3.926	3.934	3.941	3.949	3.957	3.965	3.973	3.980	3.988	3.996	4.004	**550**
560	4.004	4.012	4.019	4.027	4.035	4.043	4.051	4.059	4.066	4.074	4.082	**560**
570	4.082	4.090	4.098	4.106	4.113	4.121	4.129	4.137	4.145	4.153	4.160	**570**
580	4.160	4.168	4.176	4.184	4.192	4.200	4.207	4.215	4.223	4.231	4.239	**580**
590	4.239	4.247	4.254	4.262	4.270	4.278	4.286	4.294	4.302	4.309	4.317	**590**
600	4.317	4.325	4.333	4.341	4.349	4.357	4.364	4.372	4.380	4.388	4.396	**600**
610	4.396	4.404	4.412	4.419	4.427	4.435	4.443	4.451	4.459	4.467	4.475	**610**
620	4.475	4.482	4.490	4.498	4.506	4.514	4.522	4.530	4.538	4.546	4.553	**620**
630	4.553	4.561	4.569	4.577	4.585	4.593	4.601	4.609	4.617	4.625	4.632	**630**
640	4.632	4.640	4.648	4.656	4.664	4.672	4.680	4.688	4.696	4.704	4.711	**640**
650	4.711	4.719	4.727	4.735	4.743	4.751	4.759	4.767	4.775	4.783	4.791	**650**
660	4.791	4.799	4.806	4.814	4.822	4.830	4.838	4.846	4.854	4.862	4.870	**660**
670	4.870	4.878	4.886	4.894	4.902	4.910	4.917	4.925	4.933	4.941	4.949	**670**
680	4.949	4.957	4.965	4.973	4.981	4.989	4.997	5.005	5.013	5.021	5.029	**680**
690	5.029	5.037	5.045	5.053	5.061	5.069	5.076	5.084	5.092	5.100	5.108	**690**
700	5.108	5.116	5.124	5.132	5.140	5.148	5.156	5.164	5.172	5.180	5.188	**700**
710	5.188	5.196	5.204	5.212	5.220	5.228	5.236	5.244	5.252	5.260	5.268	**710**
720	5.268	5.276	5.284	5.292	5.300	5.308	5.316	5.324	5.332	5.340	5.348	**720**
730	5.348	5.356	5.364	5.372	5.380	5.388	5.396	5.404	5.412	5.420	5.428	**730**
740	5.428	5.436	5.444	5.453	5.461	5.469	5.477	5.485	5.493	5.501	5.509	**740**
750	5.509	5.517	5.525	5.533	5.541	5.549	5.557	5.565	5.573	5.581	5.589	**750**
760	5.589	5.597	5.606	5.614	5.622	5.630	5.638	5.646	5.654	5.662	5.670	**760**
770	5.670	5.678	5.686	5.694	5.703	5.711	5.719	5.727	5.735	5.743	5.751	**770**
780	5.751	5.759	5.767	5.775	5.784	5.792	5.800	5.808	5.816	5.824	5.832	**780**
790	5.832	5.840	5.848	5.857	5.865	5.873	5.881	5.889	5.897	5.905	5.913	**790**
800	5.913	5.922	5.930	5.938	5.946	5.954	5.962	5.970	5.979	5.987	5.995	**800**
810	5.995	6.003	6.011	6.019	6.028	6.036	6.044	6.052	6.060	6.068	6.077	**810**
820	6.077	6.085	6.093	6.101	6.109	6.117	6.126	6.134	6.142	6.150	6.158	**820**
830	6.158	6.166	6.175	6.183	6.191	6.199	6.207	6.216	6.224	6.232	6.240	**830**
840	6.240	6.248	6.257	6.265	6.273	6.281	6.290	6.298	6.306	6.314	6.322	**840**
850	6.322	6.331	6.339	6.347	6.355	6.364	6.372	6.380	6.388	6.396	6.405	**850**
860	6.405	6.413	6.421	6.429	6.438	6.446	6.454	6.462	6.471	6.479	6.487	**860**
870	6.487	6.495	6.504	6.512	6.520	6.528	6.537	6.545	6.553	6.562	6.570	**870**
880	6.570	6.578	6.586	6.595	6.603	6.611	6.619	6.628	6.636	6.644	6.653	**880**
890	6.653	6.661	6.669	6.677	6.686	6.694	6.702	6.711	6.719	6.727	6.736	**890**
900	6.736	6.744	6.752	6.761	6.769	6.777	6.785	6.794	6.802	6.810	6.819	**900**
910	6.819	6.827	6.835	6.844	6.852	6.860	6.869	6.877	6.885	6.894	6.902	**910**
920	6.902	6.910	6.919	6.927	6.935	6.944	6.952	6.960	6.969	6.977	6.986	**920**
930	6.986	6.994	7.002	7.011	7.019	7.027	7.036	7.044	7.052	7.061	7.069	**930**
940	7.069	7.078	7.086	7.094	7.103	7.111	7.119	7.128	7.136	7.145	7.153	**940**
950	7.153	7.161	7.170	7.178	7.187	7.195	7.203	7.212	7.220	7.228	7.237	**950**
960	7.237	7.245	7.254	7.262	7.271	7.279	7.287	7.296	7.304	7.313	7.321	**960**
970	7.321	7.329	7.338	7.346	7.355	7.363	7.372	7.380	7.388	7.397	7.405	**970**
980	7.405	7.414	7.422	7.431	7.439	7.447	7.456	7.464	7.473	7.481	7.490	**980**
990	7.490	7.498	7.507	7.515	7.523	7.532	7.540	7.549	7.557	7.566	7.574	**990**
1000	7.574	7.583	7.591	7.600	7.608	7.617	7.625	7.634	7.642	7.650	7.659	**1000**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C3.1. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	7.574	7.583	7.591	7.600	7.608	7.617	7.625	7.634	7.642	7.650	7.659	1000
1010	7.659	7.667	7.676	7.684	7.693	7.701	7.710	7.718	7.727	7.735	7.744	1010
1020	7.744	7.752	7.761	7.769	7.778	7.786	7.795	7.803	7.812	7.820	7.829	1020
1030	7.829	7.837	7.846	7.854	7.863	7.871	7.880	7.888	7.897	7.905	7.914	1030
1040	7.914	7.922	7.931	7.940	7.948	7.957	7.965	7.974	7.982	7.991	7.999	1040
1050	7.999	8.008	8.016	8.025	8.033	8.042	8.050	8.059	8.068	8.076	8.085	1050
1060	8.085	8.093	8.102	8.110	8.119	8.127	8.136	8.145	8.153	8.162	8.170	1060
1070	8.170	8.179	8.187	8.196	8.204	8.213	8.222	8.230	8.239	8.247	8.256	1070
1080	8.256	8.265	8.273	8.282	8.290	8.299	8.307	8.316	8.325	8.333	8.342	1080
1090	8.342	8.350	8.359	8.368	8.376	8.385	8.393	8.402	8.411	8.419	8.428	1090
1100	8.428	8.436	8.445	8.454	8.462	8.471	8.479	8.488	8.497	8.505	8.514	1100
1110	8.514	8.522	8.531	8.540	8.548	8.557	8.565	8.574	8.583	8.591	8.600	1110
1120	8.600	8.609	8.617	8.626	8.634	8.643	8.652	8.660	8.669	8.678	8.686	1120
1130	8.686	8.695	8.704	8.712	8.721	8.729	8.738	8.747	8.755	8.764	8.773	1130
1140	8.773	8.781	8.790	8.799	8.807	8.816	8.825	8.833	8.842	8.851	8.859	1140
1150	8.859	8.868	8.877	8.885	8.894	8.903	8.911	8.920	8.929	8.937	8.946	1150
1160	8.946	8.955	8.963	8.972	8.981	8.989	8.998	9.007	9.015	9.024	9.033	1160
1170	9.033	9.041	9.050	9.059	9.067	9.076	9.085	9.093	9.102	9.111	9.119	1170
1180	9.119	9.128	9.137	9.146	9.154	9.163	9.172	9.180	9.189	9.198	9.206	1180
1190	9.206	9.215	9.224	9.233	9.241	9.250	9.259	9.267	9.276	9.285	9.293	1190
1200	9.293	9.302	9.311	9.320	9.328	9.337	9.346	9.354	9.363	9.372	9.381	1200
1210	9.381	9.389	9.398	9.407	9.415	9.424	9.433	9.442	9.450	9.459	9.468	1210
1220	9.468	9.476	9.485	9.494	9.503	9.511	9.520	9.529	9.538	9.546	9.555	1220
1230	9.555	9.564	9.572	9.581	9.590	9.599	9.607	9.616	9.625	9.634	9.642	1230
1240	9.642	9.651	9.660	9.668	9.677	9.686	9.695	9.703	9.712	9.721	9.730	1240
1250	9.730	9.738	9.747	9.756	9.765	9.773	9.782	9.791	9.800	9.808	9.817	1250
1260	9.817	9.826	9.835	9.843	9.852	9.861	9.870	9.878	9.887	9.896	9.905	1260
1270	9.905	9.913	9.922	9.931	9.939	9.948	9.957	9.966	9.974	9.983	9.992	1270
1280	9.992	10.001	10.009	10.018	10.027	10.036	10.045	10.053	10.062	10.071	10.080	1280
1290	10.080	10.088	10.097	10.106	10.115	10.123	10.132	10.141	10.150	10.158	10.167	1290
1300	10.167	10.176	10.185	10.193	10.202	10.211	10.220	10.228	10.237	10.246	10.255	1300
1310	10.255	10.263	10.272	10.281	10.290	10.298	10.307	10.316	10.325	10.333	10.342	1310
1320	10.342	10.351	10.360	10.368	10.377	10.386	10.395	10.403	10.412	10.421	10.430	1320
1330	10.430	10.438	10.447	10.456	10.465	10.473	10.482	10.491	10.500	10.508	10.517	1330
1340	10.517	10.526	10.535	10.543	10.552	10.561	10.570	10.578	10.587	10.596	10.605	1340
1350	10.605	10.613	10.622	10.631	10.640	10.648	10.657	10.666	10.675	10.683	10.692	1350
1360	10.692	10.701	10.710	10.718	10.727	10.736	10.745	10.753	10.762	10.771	10.780	1360
1370	10.780	10.788	10.797	10.806	10.815	10.823	10.832	10.841	10.850	10.858	10.867	1370
1380	10.867	10.876	10.884	10.893	10.902	10.911	10.919	10.928	10.937	10.946	10.954	1380
1390	10.954	10.963	10.972	10.980	10.989	10.998	11.007	11.015	11.024	11.033	11.042	1390
1400	11.042	11.050	11.059	11.068	11.076	11.085	11.094	11.103	11.111	11.120	11.129	1400
1410	11.129	11.137	11.146	11.155	11.163	11.172	11.181	11.190	11.198	11.207	11.216	1410
1420	11.216	11.224	11.233	11.242	11.250	11.259	11.268	11.277	11.285	11.294	11.303	1420
1430	11.303	11.311	11.320	11.329	11.337	11.346	11.355	11.363	11.372	11.381	11.389	1430
1440	11.389	11.398	11.407	11.415	11.424	11.433	11.441	11.450	11.459	11.467	11.476	1440
1450	11.476	11.485	11.493	11.502	11.511	11.519	11.528	11.537	11.545	11.554	11.563	1450
1460	11.563	11.571	11.580	11.589	11.597	11.606	11.614	11.623	11.632	11.640	11.649	1460
1470	11.649	11.658	11.666	11.675	11.684	11.692	11.701	11.709	11.718	11.727	11.735	1470
1480	11.735	11.744	11.752	11.761	11.770	11.778	11.787	11.796	11.804	11.813	11.821	1480
1490	11.821	11.830	11.838	11.847	11.856	11.864	11.873	11.881	11.890	11.899	11.907	1490
1500	11.907	11.916	11.924	11.933	11.941	11.950	11.959	11.967	11.976	11.984	11.993	1500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C3.1. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1500	11.907	11.916	11.924	11.933	11.941	11.950	11.959	11.967	11.976	11.984	11.993	**1500**
1510	11.993	12.001	12.010	12.018	12.027	12.036	12.044	12.053	12.061	12.070	12.078	**1510**
1520	12.078	12.087	12.095	12.104	12.112	12.121	12.129	12.138	12.146	12.155	12.164	**1520**
1530	12.164	12.172	12.181	12.189	12.198	12.206	12.215	12.223	12.232	12.240	12.249	**1530**
1540	12.249	12.257	12.265	12.274	12.282	12.291	12.299	12.308	12.316	12.325	12.333	**1540**
1550	12.333	12.342	12.350	12.359	12.367	12.376	12.384	12.392	12.401	12.409	12.418	**1550**
1560	12.418	12.426	12.435	12.443	12.452	12.460	12.468	12.477	12.485	12.494	12.502	**1560**
1570	12.502	12.510	12.519	12.527	12.536	12.544	12.553	12.561	12.569	12.578	12.586	**1570**
1580	12.586	12.594	12.603	12.611	12.620	12.628	12.636	12.645	12.653	12.661	12.670	**1580**
1590	12.670	12.678	12.687	12.695	12.703	12.712	12.720	12.728	12.737	12.745	12.753	**1590**
1600	12.753	12.762	12.770	12.778	12.787	12.795	12.803	12.811	12.820	12.828	12.836	**1600**
1610	12.836	12.845	12.853	12.861	12.870	12.878	12.886	12.894	12.903	12.911	12.919	**1610**
1620	12.919	12.928	12.936	12.944	12.952	12.961	12.969	12.977	12.985	12.994	13.002	**1620**
1630	13.002	13.010	13.018	13.027	13.035	13.043	13.051	13.059	13.068	13.076	13.084	**1630**
1640	13.084	13.092	13.100	13.109	13.117	13.125	13.133	13.141	13.150	13.158	13.166	**1640**
1650	13.166	13.174	13.182	13.191	13.199	13.207	13.215	13.223	13.231	13.239	13.248	**1650**
1660	13.248	13.256	13.264	13.272	13.280	13.288	13.296	13.305	13.313	13.321	13.329	**1660**
1670	13.329	13.337	13.345	13.353	13.361	13.369	13.378	13.386	13.394	13.402	13.410	**1670**
1680	13.410	13.418	13.426	13.434	13.442	13.450	13.458	13.466	13.474	13.483	13.491	**1680**
1690	13.491	13.499	13.507	13.515	13.523	13.531	13.539	13.547	13.555	13.563	13.571	**1690**
1700	13.571	13.579	13.587	13.595	13.603	13.611	13.619	13.627	13.635	13.643	13.651	**1700**
1710	13.651	13.659	13.667	13.675	13.683	13.691	13.699	13.707	13.715	13.723	13.731	**1710**
1720	13.731	13.739	13.747	13.755	13.763	13.771	13.778	13.786	13.794	13.802	13.810	**1720**
1730	13.810	13.818	13.826	13.834	13.842	13.850	13.858	13.866	13.874	13.881	13.889	**1730**
1740	13.889	13.897	13.905	13.913	13.921	13.929	13.937	13.945	13.952	13.960	13.968	**1740**
1750	13.968	13.976	13.984	13.992	14.000	14.008	14.015	14.023	14.031	14.039	14.047	**1750**
1760	14.047	14.055	14.062	14.070	14.078	14.086	14.094	14.102	14.109			**1760**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
30			0.000	0.003	0.006	0.008	0.011	0.014	0.017	0.020	0.023	30
40	0.023	0.026	0.028	0.031	0.034	0.037	0.040	0.043	0.046	0.049	0.052	40
50	0.052	0.055	0.058	0.060	0.063	0.066	0.069	0.072	0.075	0.078	0.081	50
60	0.081	0.084	0.087	0.090	0.093	0.096	0.099	0.102	0.105	0.108	0.111	60
70	0.111	0.114	0.117	0.120	0.123	0.126	0.129	0.133	0.136	0.139	0.142	70
80	0.142	0.145	0.148	0.151	0.154	0.157	0.160	0.163	0.167	0.170	0.173	80
90	0.173	0.176	0.179	0.182	0.185	0.189	0.192	0.195	0.198	0.201	0.204	90
100	0.204	0.208	0.211	0.214	0.217	0.220	0.223	0.227	0.230	0.233	0.236	100
110	0.236	0.240	0.243	0.246	0.249	0.253	0.256	0.259	0.262	0.266	0.269	110
120	0.269	0.272	0.275	0.279	0.282	0.285	0.289	0.292	0.295	0.298	0.302	120
130	0.302	0.305	0.308	0.312	0.315	0.318	0.322	0.325	0.328	0.332	0.335	130
140	0.335	0.338	0.342	0.345	0.349	0.352	0.355	0.359	0.362	0.365	0.369	140
150	0.369	0.372	0.376	0.379	0.382	0.386	0.389	0.393	0.396	0.399	0.403	150
160	0.403	0.406	0.410	0.413	0.417	0.420	0.424	0.427	0.430	0.434	0.437	160
170	0.437	0.441	0.444	0.448	0.451	0.455	0.458	0.462	0.465	0.469	0.472	170
180	0.472	0.476	0.479	0.483	0.486	0.490	0.493	0.497	0.500	0.504	0.507	180
190	0.507	0.511	0.515	0.518	0.522	0.525	0.529	0.532	0.536	0.539	0.543	190
200	0.543	0.547	0.550	0.554	0.557	0.561	0.564	0.568	0.572	0.575	0.579	200
210	0.579	0.582	0.586	0.590	0.593	0.597	0.600	0.604	0.608	0.611	0.615	210
220	0.615	0.619	0.622	0.626	0.629	0.633	0.637	0.640	0.644	0.648	0.651	220
230	0.651	0.655	0.659	0.662	0.666	0.670	0.673	0.677	0.681	0.684	0.688	230
240	0.688	0.692	0.695	0.699	0.703	0.707	0.710	0.714	0.718	0.721	0.725	240
250	0.725	0.729	0.732	0.736	0.740	0.744	0.747	0.751	0.755	0.759	0.762	250
260	0.762	0.766	0.770	0.774	0.777	0.781	0.785	0.789	0.792	0.796	0.800	260
270	0.800	0.804	0.807	0.811	0.815	0.819	0.822	0.826	0.830	0.834	0.838	270
280	0.838	0.841	0.845	0.849	0.853	0.856	0.860	0.864	0.868	0.872	0.876	280
290	0.876	0.879	0.883	0.887	0.891	0.895	0.898	0.902	0.906	0.910	0.914	290
300	0.914	0.918	0.921	0.925	0.929	0.933	0.937	0.941	0.944	0.948	0.952	300
310	0.952	0.956	0.960	0.964	0.967	0.971	0.975	0.979	0.983	0.987	0.991	310
320	0.991	0.995	0.998	1.002	1.006	1.010	1.014	1.018	1.022	1.026	1.029	320
330	1.029	1.033	1.037	1.041	1.045	1.049	1.053	1.057	1.061	1.065	1.068	330
340	1.068	1.072	1.076	1.080	1.084	1.088	1.092	1.096	1.100	1.104	1.108	340
350	1.108	1.111	1.115	1.119	1.123	1.127	1.131	1.135	1.139	1.143	1.147	350
360	1.147	1.151	1.155	1.159	1.163	1.167	1.171	1.174	1.178	1.182	1.186	360
370	1.186	1.190	1.194	1.198	1.202	1.206	1.210	1.214	1.218	1.222	1.226	370
380	1.226	1.230	1.234	1.238	1.242	1.246	1.250	1.254	1.258	1.262	1.266	380
390	1.266	1.270	1.274	1.278	1.282	1.286	1.290	1.294	1.298	1.302	1.306	390
400	1.306	1.310	1.314	1.318	1.322	1.326	1.330	1.334	1.338	1.342	1.346	400
410	1.346	1.350	1.354	1.358	1.362	1.366	1.370	1.374	1.378	1.382	1.386	410
420	1.386	1.390	1.394	1.398	1.402	1.406	1.410	1.414	1.418	1.422	1.426	420
430	1.426	1.430	1.434	1.438	1.442	1.446	1.450	1.454	1.459	1.463	1.467	430
440	1.467	1.471	1.475	1.479	1.483	1.487	1.491	1.495	1.499	1.503	1.507	440
450	1.507	1.511	1.515	1.519	1.523	1.527	1.532	1.536	1.540	1.544	1.548	450
460	1.548	1.552	1.556	1.560	1.564	1.568	1.572	1.576	1.580	1.584	1.589	460
470	1.589	1.593	1.597	1.601	1.605	1.609	1.613	1.617	1.621	1.625	1.629	470
480	1.629	1.634	1.638	1.642	1.646	1.650	1.654	1.658	1.662	1.666	1.670	480
490	1.670	1.674	1.679	1.683	1.687	1.691	1.695	1.699	1.703	1.707	1.711	490
500	1.711	1.716	1.720	1.724	1.728	1.732	1.736	1.740	1.744	1.748	1.753	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	1.711	1.716	1.720	1.724	1.728	1.732	1.736	1.740	1.744	1.748	1.753	500
510	1.753	1.757	1.761	1.765	1.769	1.773	1.777	1.781	1.785	1.790	1.794	510
520	1.794	1.798	1.802	1.806	1.810	1.814	1.819	1.823	1.827	1.831	1.835	520
530	1.835	1.839	1.843	1.847	1.852	1.856	1.860	1.864	1.868	1.872	1.876	530
540	1.876	1.881	1.885	1.889	1.893	1.897	1.901	1.905	1.910	1.914	1.918	540
550	1.918	1.922	1.926	1.930	1.934	1.939	1.943	1.947	1.951	1.955	1.959	550
560	1.959	1.963	1.968	1.972	1.976	1.980	1.984	1.988	1.993	1.997	2.001	560
570	2.001	2.005	2.009	2.013	2.018	2.022	2.026	2.030	2.034	2.038	2.043	570
580	2.043	2.047	2.051	2.055	2.059	2.063	2.068	2.072	2.076	2.080	2.084	580
590	2.084	2.088	2.093	2.097	2.101	2.105	2.109	2.113	2.118	2.122	2.126	590
600	2.126	2.130	2.134	2.139	2.143	2.147	2.151	2.155	2.159	2.164	2.168	600
610	2.168	2.172	2.176	2.180	2.185	2.189	2.193	2.197	2.201	2.206	2.210	610
620	2.210	2.214	2.218	2.222	2.226	2.231	2.235	2.239	2.243	2.247	2.252	620
630	2.252	2.256	2.260	2.264	2.268	2.273	2.277	2.281	2.285	2.289	2.294	630
640	2.294	2.298	2.302	2.306	2.310	2.315	2.319	2.323	2.327	2.331	2.336	640
650	2.336	2.340	2.344	2.348	2.352	2.357	2.361	2.365	2.369	2.374	2.378	650
660	2.378	2.382	2.386	2.390	2.395	2.399	2.403	2.407	2.411	2.416	2.420	660
670	2.420	2.424	2.428	2.433	2.437	2.441	2.445	2.449	2.454	2.458	2.462	670
680	2.462	2.466	2.470	2.475	2.479	2.483	2.487	2.492	2.496	2.500	2.504	680
690	2.504	2.508	2.513	2.517	2.521	2.525	2.530	2.534	2.538	2.542	2.546	690
700	2.546	2.551	2.555	2.559	2.563	2.568	2.572	2.576	2.580	2.585	2.589	700
710	2.589	2.593	2.597	2.601	2.606	2.610	2.614	2.618	2.623	2.627	2.631	710
720	2.631	2.635	2.640	2.644	2.648	2.652	2.657	2.661	2.665	2.669	2.674	720
730	2.674	2.678	2.682	2.686	2.690	2.695	2.699	2.703	2.707	2.712	2.716	730
740	2.716	2.720	2.724	2.729	2.733	2.737	2.741	2.746	2.750	2.754	2.758	740
750	2.758	2.763	2.767	2.771	2.775	2.780	2.784	2.788	2.792	2.797	2.801	750
760	2.801	2.805	2.809	2.814	2.818	2.822	2.826	2.831	2.835	2.839	2.843	760
770	2.843	2.848	2.852	2.856	2.860	2.865	2.869	2.873	2.877	2.882	2.886	770
780	2.886	2.890	2.894	2.899	2.903	2.907	2.912	2.916	2.920	2.924	2.929	780
790	2.929	2.933	2.937	2.941	2.946	2.950	2.954	2.958	2.963	2.967	2.971	790
800	2.971	2.975	2.980	2.984	2.988	2.993	2.997	3.001	3.005	3.010	3.014	800
810	3.014	3.018	3.022	3.027	3.031	3.035	3.039	3.044	3.048	3.052	3.057	810
820	3.057	3.061	3.065	3.069	3.074	3.078	3.082	3.086	3.091	3.095	3.099	820
830	3.099	3.104	3.108	3.112	3.116	3.121	3.125	3.129	3.133	3.138	3.142	830
840	3.142	3.146	3.151	3.155	3.159	3.163	3.168	3.172	3.176	3.181	3.185	840
850	3.185	3.189	3.193	3.198	3.202	3.206	3.211	3.215	3.219	3.223	3.228	850
860	3.228	3.232	3.236	3.241	3.245	3.249	3.253	3.258	3.262	3.266	3.271	860
870	3.271	3.275	3.279	3.283	3.288	3.292	3.296	3.301	3.305	3.309	3.313	870
880	3.313	3.318	3.322	3.326	3.331	3.335	3.339	3.343	3.348	3.352	3.356	880
890	3.356	3.361	3.365	3.369	3.373	3.378	3.382	3.386	3.391	3.395	3.399	890
900	3.399	3.404	3.408	3.412	3.416	3.421	3.425	3.429	3.434	3.438	3.442	900
910	3.442	3.447	3.451	3.455	3.459	3.464	3.468	3.472	3.477	3.481	3.485	910
920	3.485	3.490	3.494	3.498	3.502	3.507	3.511	3.515	3.520	3.524	3.528	920
930	3.528	3.533	3.537	3.541	3.546	3.550	3.554	3.558	3.563	3.567	3.571	930
940	3.571	3.576	3.580	3.584	3.589	3.593	3.597	3.602	3.606	3.610	3.614	940
950	3.614	3.619	3.623	3.627	3.632	3.636	3.640	3.645	3.649	3.653	3.658	950
960	3.658	3.662	3.666	3.671	3.675	3.679	3.684	3.688	3.692	3.696	3.701	960
970	3.701	3.705	3.709	3.714	3.718	3.722	3.727	3.731	3.735	3.740	3.744	970
980	3.744	3.748	3.753	3.757	3.761	3.766	3.770	3.774	3.779	3.783	3.787	980
990	3.787	3.792	3.796	3.800	3.805	3.809	3.813	3.818	3.822	3.826	3.830	990
1000	3.830	3.835	3.839	3.843	3.848	3.852	3.856	3.861	3.865	3.869	3.874	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	3.830	3.835	3.839	3.843	3.848	3.852	3.856	3.861	3.865	3.869	3.874	1000
1010	3.874	3.878	3.882	3.887	3.891	3.895	3.900	3.904	3.908	3.913	3.917	1010
1020	3.917	3.921	3.926	3.930	3.934	3.939	3.943	3.947	3.952	3.956	3.960	1020
1030	3.960	3.965	3.969	3.973	3.978	3.982	3.987	3.991	3.995	4.000	4.004	1030
1040	4.004	4.008	4.013	4.017	4.021	4.026	4.030	4.034	4.039	4.043	4.047	1040
1050	4.047	4.052	4.056	4.060	4.065	4.069	4.073	4.078	4.082	4.086	4.091	1050
1060	4.091	4.095	4.099	4.104	4.108	4.112	4.117	4.121	4.126	4.130	4.134	1060
1070	4.134	4.139	4.143	4.147	4.152	4.156	4.160	4.165	4.169	4.173	4.178	1070
1080	4.178	4.182	4.186	4.191	4.195	4.200	4.204	4.208	4.213	4.217	4.221	1080
1090	4.221	4.226	4.230	4.234	4.239	4.243	4.247	4.252	4.256	4.261	4.265	1090
1100	4.265	4.269	4.274	4.278	4.282	4.287	4.291	4.295	4.300	4.304	4.309	1100
1110	4.309	4.313	4.317	4.322	4.326	4.330	4.335	4.339	4.343	4.348	4.352	1110
1120	4.352	4.357	4.361	4.365	4.370	4.374	4.378	4.383	4.387	4.392	4.396	1120
1130	4.396	4.400	4.405	4.409	4.413	4.418	4.422	4.426	4.431	4.435	4.440	1130
1140	4.440	4.444	4.448	4.453	4.457	4.461	4.466	4.470	4.475	4.479	4.483	1140
1150	4.483	4.488	4.492	4.497	4.501	4.505	4.510	4.514	4.518	4.523	4.527	1150
1160	4.527	4.532	4.536	4.540	4.545	4.549	4.553	4.558	4.562	4.567	4.571	1160
1170	4.571	4.575	4.580	4.584	4.589	4.593	4.597	4.602	4.606	4.610	4.615	1170
1180	4.615	4.619	4.624	4.628	4.632	4.637	4.641	4.646	4.650	4.654	4.659	1180
1190	4.659	4.663	4.668	4.672	4.676	4.681	4.685	4.689	4.694	4.698	4.703	1190
1200	4.703	4.707	4.711	4.716	4.720	4.725	4.729	4.733	4.738	4.742	4.747	1200
1210	4.747	4.751	4.755	4.760	4.764	4.769	4.773	4.777	4.782	4.786	4.791	1210
1220	4.791	4.795	4.799	4.804	4.808	4.813	4.817	4.821	4.826	4.830	4.835	1220
1230	4.835	4.839	4.843	4.848	4.852	4.857	4.861	4.865	4.870	4.874	4.879	1230
1240	4.879	4.883	4.887	4.892	4.896	4.901	4.905	4.910	4.914	4.918	4.923	1240
1250	4.923	4.927	4.932	4.936	4.940	4.945	4.949	4.954	4.958	4.962	4.967	1250
1260	4.967	4.971	4.976	4.980	4.985	4.989	4.993	4.998	5.002	5.007	5.011	1260
1270	5.011	5.015	5.020	5.024	5.029	5.033	5.038	5.042	5.046	5.051	5.055	1270
1280	5.055	5.060	5.064	5.069	5.073	5.077	5.082	5.086	5.091	5.095	5.100	1280
1290	5.100	5.104	5.108	5.113	5.117	5.122	5.126	5.131	5.135	5.139	5.144	1290
1300	5.144	5.148	5.153	5.157	5.162	5.166	5.170	5.175	5.179	5.184	5.188	1300
1310	5.188	5.193	5.197	5.201	5.206	5.210	5.215	5.219	5.224	5.228	5.233	1310
1320	5.233	5.237	5.241	5.246	5.250	5.255	5.259	5.264	5.268	5.273	5.277	1320
1330	5.277	5.281	5.286	5.290	5.295	5.299	5.304	5.308	5.313	5.317	5.321	1330
1340	5.321	5.326	5.330	5.335	5.339	5.344	5.348	5.353	5.357	5.362	5.366	1340
1350	5.366	5.370	5.375	5.379	5.384	5.388	5.393	5.397	5.402	5.406	5.411	1350
1360	5.411	5.415	5.420	5.424	5.428	5.433	5.437	5.442	5.446	5.451	5.455	1360
1370	5.455	5.460	5.464	5.469	5.473	5.478	5.482	5.486	5.491	5.495	5.500	1370
1380	5.500	5.504	5.509	5.513	5.518	5.522	5.527	5.531	5.536	5.540	5.545	1380
1390	5.545	5.549	5.554	5.558	5.563	5.567	5.572	5.576	5.580	5.585	5.589	1390
1400	5.589	5.594	5.598	5.603	5.607	5.612	5.616	5.621	5.625	5.630	5.634	1400
1410	5.634	5.639	5.643	5.648	5.652	5.657	5.661	5.666	5.670	5.675	5.679	1410
1420	5.679	5.684	5.688	5.693	5.697	5.702	5.706	5.711	5.715	5.720	5.724	1420
1430	5.724	5.729	5.733	5.738	5.742	5.747	5.751	5.756	5.760	5.765	5.769	1430
1440	5.769	5.774	5.778	5.783	5.787	5.792	5.796	5.801	5.805	5.810	5.814	1440
1450	5.814	5.819	5.823	5.828	5.832	5.837	5.841	5.846	5.850	5.855	5.859	1450
1460	5.859	5.864	5.868	5.873	5.877	5.882	5.886	5.891	5.895	5.900	5.904	1460
1470	5.904	5.909	5.913	5.918	5.923	5.927	5.932	5.936	5.941	5.945	5.950	1470
1480	5.950	5.954	5.959	5.963	5.968	5.972	5.977	5.981	5.986	5.990	5.995	1480
1490	5.995	5.999	6.004	6.008	6.013	6.018	6.022	6.027	6.031	6.036	6.040	1490
1500	6.040	6.045	6.049	6.054	6.058	6.063	6.067	6.072	6.077	6.081	6.086	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	6.040	6.045	6.049	6.054	6.058	6.063	6.067	6.072	6.077	6.081	6.086	1500
1510	6.086	6.090	6.095	6.099	6.104	6.108	6.113	6.117	6.122	6.126	6.131	1510
1520	6.131	6.136	6.140	6.145	6.149	6.154	6.158	6.163	6.167	6.172	6.177	1520
1530	6.177	6.181	6.186	6.190	6.195	6.199	6.204	6.208	6.213	6.217	6.222	1530
1540	6.222	6.227	6.231	6.236	6.240	6.245	6.249	6.254	6.259	6.263	6.268	1540
1550	6.268	6.272	6.277	6.281	6.286	6.290	6.295	6.300	6.304	6.309	6.313	1550
1560	6.313	6.318	6.322	6.327	6.332	6.336	6.341	6.345	6.350	6.354	6.359	1560
1570	6.359	6.364	6.368	6.373	6.377	6.382	6.386	6.391	6.396	6.400	6.405	1570
1580	6.405	6.409	6.414	6.418	6.423	6.428	6.432	6.437	6.441	6.446	6.450	1580
1590	6.450	6.455	6.460	6.464	6.469	6.473	6.478	6.483	6.487	6.492	6.496	1590
1600	6.496	6.501	6.506	6.510	6.515	6.519	6.524	6.528	6.533	6.538	6.542	1600
1610	6.542	6.547	6.551	6.556	6.561	6.565	6.570	6.574	6.579	6.584	6.588	1610
1620	6.588	6.593	6.597	6.602	6.607	6.611	6.616	6.620	6.625	6.630	6.634	1620
1630	6.634	6.639	6.643	6.648	6.653	6.657	6.662	6.666	6.671	6.676	6.680	1630
1640	6.680	6.685	6.689	6.694	6.699	6.703	6.708	6.713	6.717	6.722	6.726	1640
1650	6.726	6.731	6.736	6.740	6.745	6.749	6.754	6.759	6.763	6.768	6.773	1650
1660	6.773	6.777	6.782	6.786	6.791	6.796	6.800	6.805	6.809	6.814	6.819	1660
1670	6.819	6.823	6.828	6.833	6.837	6.842	6.846	6.851	6.856	6.860	6.865	1670
1680	6.865	6.870	6.874	6.879	6.884	6.888	6.893	6.897	6.902	6.907	6.911	1680
1690	6.911	6.916	6.921	6.925	6.930	6.934	6.939	6.944	6.948	6.953	6.958	1690
1700	6.958	6.962	6.967	6.972	6.976	6.981	6.986	6.990	6.995	6.999	7.004	1700
1710	7.004	7.009	7.013	7.018	7.023	7.027	7.032	7.037	7.041	7.046	7.051	1710
1720	7.051	7.055	7.060	7.064	7.069	7.074	7.078	7.083	7.088	7.092	7.097	1720
1730	7.097	7.102	7.106	7.111	7.116	7.120	7.125	7.130	7.134	7.139	7.144	1730
1740	7.144	7.148	7.153	7.158	7.162	7.167	7.172	7.176	7.181	7.186	7.190	1740
1750	7.190	7.195	7.200	7.204	7.209	7.214	7.218	7.223	7.228	7.232	7.237	1750
1760	7.237	7.242	7.246	7.251	7.256	7.260	7.265	7.270	7.274	7.279	7.284	1760
1770	7.284	7.288	7.293	7.298	7.302	7.307	7.312	7.316	7.321	7.326	7.330	1770
1780	7.330	7.335	7.340	7.344	7.349	7.354	7.358	7.363	7.368	7.372	7.377	1780
1790	7.377	7.382	7.387	7.391	7.396	7.401	7.405	7.410	7.415	7.419	7.424	1790
1800	7.424	7.429	7.433	7.438	7.443	7.447	7.452	7.457	7.462	7.466	7.471	1800
1810	7.471	7.476	7.480	7.485	7.490	7.494	7.499	7.504	7.508	7.513	7.518	1810
1820	7.518	7.523	7.527	7.532	7.537	7.541	7.546	7.551	7.555	7.560	7.565	1820
1830	7.565	7.570	7.574	7.579	7.584	7.588	7.593	7.598	7.602	7.607	7.612	1830
1840	7.612	7.617	7.621	7.626	7.631	7.635	7.640	7.645	7.650	7.654	7.659	1840
1850	7.659	7.664	7.668	7.673	7.678	7.683	7.687	7.692	7.697	7.701	7.706	1850
1860	7.706	7.711	7.716	7.720	7.725	7.730	7.734	7.739	7.744	7.749	7.753	1860
1870	7.753	7.758	7.763	7.767	7.772	7.777	7.782	7.786	7.791	7.796	7.800	1870
1880	7.800	7.805	7.810	7.815	7.819	7.824	7.829	7.834	7.838	7.843	7.848	1880
1890	7.848	7.852	7.857	7.862	7.867	7.871	7.876	7.881	7.886	7.890	7.895	1890
1900	7.895	7.900	7.904	7.909	7.914	7.919	7.923	7.928	7.933	7.938	7.942	1900
1910	7.942	7.947	7.952	7.957	7.961	7.966	7.971	7.976	7.980	7.985	7.990	1910
1920	7.990	7.995	7.999	8.004	8.009	8.013	8.018	8.023	8.028	8.032	8.037	1920
1930	8.037	8.042	8.047	8.051	8.056	8.061	8.066	8.070	8.075	8.080	8.085	1930
1940	8.085	8.089	8.094	8.099	8.104	8.108	8.113	8.118	8.123	8.127	8.132	1940
1950	8.132	8.137	8.142	8.146	8.151	8.156	8.161	8.165	8.170	8.175	8.180	1950
1960	8.180	8.185	8.189	8.194	8.199	8.204	8.208	8.213	8.218	8.223	8.227	1960
1970	8.227	8.232	8.237	8.242	8.246	8.251	8.256	8.261	8.265	8.270	8.275	1970
1980	8.275	8.280	8.285	8.289	8.294	8.299	8.304	8.308	8.313	8.318	8.323	1980
1990	8.323	8.327	8.332	8.337	8.342	8.347	8.351	8.356	8.361	8.366	8.370	1990
2000	8.370	8.375	8.380	8.385	8.389	8.394	8.399	8.404	8.409	8.413	8.418	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	8.370	8.375	8.380	8.385	8.389	8.394	8.399	8.404	8.409	8.413	8.418	2000
2010	8.418	8.423	8.428	8.432	8.437	8.442	8.447	8.452	8.456	8.461	8.466	2010
2020	8.466	8.471	8.476	8.480	8.485	8.490	8.495	8.499	8.504	8.509	8.514	2020
2030	8.514	8.519	8.523	8.528	8.533	8.538	8.543	8.547	8.552	8.557	8.562	2030
2040	8.562	8.566	8.571	8.576	8.581	8.586	8.590	8.595	8.600	8.605	8.610	2040
2050	8.610	8.614	8.619	8.624	8.629	8.634	8.638	8.643	8.648	8.653	8.658	2050
2060	8.658	8.662	8.667	8.672	8.677	8.681	8.686	8.691	8.696	8.701	8.705	2060
2070	8.705	8.710	8.715	8.720	8.725	8.729	8.734	8.739	8.744	8.749	8.754	2070
2080	8.754	8.758	8.763	8.768	8.773	8.778	8.782	8.787	8.792	8.797	8.802	2080
2090	8.802	8.806	8.811	8.816	8.821	8.826	8.830	8.835	8.840	8.845	8.850	2090
2100	8.850	8.854	8.859	8.864	8.869	8.874	8.879	8.883	8.888	8.893	8.898	2100
2110	8.898	8.903	8.907	8.912	8.917	8.922	8.927	8.931	8.936	8.941	8.946	2110
2120	8.946	8.951	8.956	8.960	8.965	8.970	8.975	8.980	8.984	8.989	8.994	2120
2130	8.994	8.999	9.004	9.009	9.013	9.018	9.023	9.028	9.033	9.037	9.042	2130
2140	9.042	9.047	9.052	9.057	9.062	9.066	9.071	9.076	9.081	9.086	9.091	2140
2150	9.091	9.095	9.100	9.105	9.110	9.115	9.119	9.124	9.129	9.134	9.139	2150
2160	9.139	9.144	9.148	9.153	9.158	9.163	9.168	9.173	9.177	9.182	9.187	2160
2170	9.187	9.192	9.197	9.202	9.206	9.211	9.216	9.221	9.226	9.231	9.235	2170
2180	9.235	9.240	9.245	9.250	9.255	9.260	9.264	9.269	9.274	9.279	9.284	2180
2190	9.284	9.289	9.293	9.298	9.303	9.308	9.313	9.318	9.322	9.327	9.332	2190
2200	9.332	9.337	9.342	9.347	9.352	9.356	9.361	9.366	9.371	9.376	9.381	2200
2210	9.381	9.385	9.390	9.395	9.400	9.405	9.410	9.414	9.419	9.424	9.429	2210
2220	9.429	9.434	9.439	9.443	9.448	9.453	9.458	9.463	9.468	9.473	9.477	2220
2230	9.477	9.482	9.487	9.492	9.497	9.502	9.506	9.511	9.516	9.521	9.526	2230
2240	9.526	9.531	9.536	9.540	9.545	9.550	9.555	9.560	9.565	9.570	9.574	2240
2250	9.574	9.579	9.584	9.589	9.594	9.599	9.603	9.608	9.613	9.618	9.623	2250
2260	9.623	9.628	9.633	9.637	9.642	9.647	9.652	9.657	9.662	9.667	9.671	2260
2270	9.671	9.676	9.681	9.686	9.691	9.696	9.701	9.705	9.710	9.715	9.720	2270
2280	9.720	9.725	9.730	9.734	9.739	9.744	9.749	9.754	9.759	9.764	9.768	2280
2290	9.768	9.773	9.778	9.783	9.788	9.793	9.798	9.802	9.807	9.812	9.817	2290
2300	9.817	9.822	9.827	9.832	9.836	9.841	9.846	9.851	9.856	9.861	9.866	2300
2310	9.866	9.870	9.875	9.880	9.885	9.890	9.895	9.900	9.905	9.909	9.914	2310
2320	9.914	9.919	9.924	9.929	9.934	9.939	9.943	9.948	9.953	9.958	9.963	2320
2330	9.963	9.968	9.973	9.977	9.982	9.987	9.992	9.997	10.002	10.007	10.011	2330
2340	10.011	10.016	10.021	10.026	10.031	10.036	10.041	10.045	10.050	10.055	10.060	2340
2350	10.060	10.065	10.070	10.075	10.080	10.084	10.089	10.094	10.099	10.104	10.109	2350
2360	10.109	10.114	10.118	10.123	10.128	10.133	10.138	10.143	10.148	10.152	10.157	2360
2370	10.157	10.162	10.167	10.172	10.177	10.182	10.187	10.191	10.196	10.201	10.206	2370
2380	10.206	10.211	10.216	10.221	10.225	10.230	10.235	10.240	10.245	10.250	10.255	2380
2390	10.255	10.259	10.264	10.269	10.274	10.279	10.284	10.289	10.294	10.298	10.303	2390
2400	10.303	10.308	10.313	10.318	10.323	10.328	10.332	10.337	10.342	10.347	10.352	2400
2410	10.352	10.357	10.362	10.366	10.371	10.376	10.381	10.386	10.391	10.396	10.401	2410
2420	10.401	10.405	10.410	10.415	10.420	10.425	10.430	10.435	10.439	10.444	10.449	2420
2430	10.449	10.454	10.459	10.464	10.469	10.473	10.478	10.483	10.488	10.493	10.498	2430
2440	10.498	10.503	10.507	10.512	10.517	10.522	10.527	10.532	10.537	10.542	10.546	2440
2450	10.546	10.551	10.556	10.561	10.566	10.571	10.576	10.580	10.585	10.590	10.595	2450
2460	10.595	10.600	10.605	10.610	10.614	10.619	10.624	10.629	10.634	10.639	10.644	2460
2470	10.644	10.648	10.653	10.658	10.663	10.668	10.673	10.678	10.682	10.687	10.692	2470
2480	10.692	10.697	10.702	10.707	10.712	10.716	10.721	10.726	10.731	10.736	10.741	2480
2490	10.741	10.746	10.750	10.755	10.760	10.765	10.770	10.775	10.780	10.784	10.789	2490
2500	10.789	10.794	10.799	10.804	10.809	10.814	10.818	10.823	10.828	10.833	10.838	2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2500	10.789	10.794	10.799	10.804	10.809	10.814	10.818	10.823	10.828	10.833	10.838	2500
2510	10.838	10.843	10.848	10.852	10.857	10.862	10.867	10.872	10.877	10.882	10.886	2510
2520	10.886	10.891	10.896	10.901	10.906	10.911	10.915	10.920	10.925	10.930	10.935	2520
2530	10.935	10.940	10.945	10.949	10.954	10.959	10.964	10.969	10.974	10.979	10.983	2530
2540	10.983	10.988	10.993	10.998	11.003	11.008	11.012	11.017	11.022	11.027	11.032	2540
2550	11.032	11.037	11.042	11.046	11.051	11.056	11.061	11.066	11.071	11.075	11.080	2550
2560	11.080	11.085	11.090	11.095	11.100	11.104	11.109	11.114	11.119	11.124	11.129	2560
2570	11.129	11.133	11.138	11.143	11.148	11.153	11.158	11.163	11.167	11.172	11.177	2570
2580	11.177	11.182	11.187	11.192	11.196	11.201	11.206	11.211	11.216	11.221	11.225	2580
2590	11.225	11.230	11.235	11.240	11.245	11.250	11.254	11.259	11.264	11.269	11.274	2590
2600	11.274	11.278	11.283	11.288	11.293	11.298	11.303	11.307	11.312	11.317	11.322	2600
2610	11.322	11.327	11.332	11.336	11.341	11.346	11.351	11.356	11.361	11.365	11.370	2610
2620	11.370	11.375	11.380	11.385	11.389	11.394	11.399	11.404	11.409	11.414	11.418	2620
2630	11.418	11.423	11.428	11.433	11.438	11.442	11.447	11.452	11.457	11.462	11.466	2630
2640	11.466	11.471	11.476	11.481	11.486	11.491	11.495	11.500	11.505	11.510	11.515	2640
2650	11.515	11.519	11.524	11.529	11.534	11.539	11.543	11.548	11.553	11.558	11.563	2650
2660	11.563	11.567	11.572	11.577	11.582	11.587	11.591	11.596	11.601	11.606	11.611	2660
2670	11.611	11.615	11.620	11.625	11.630	11.635	11.639	11.644	11.649	11.654	11.659	2670
2680	11.659	11.663	11.668	11.673	11.678	11.683	11.687	11.692	11.697	11.702	11.707	2680
2690	11.707	11.711	11.716	11.721	11.726	11.730	11.735	11.740	11.745	11.750	11.754	2690
2700	11.754	11.759	11.764	11.769	11.774	11.778	11.783	11.788	11.793	11.797	11.802	2700
2710	11.802	11.807	11.812	11.817	11.821	11.826	11.831	11.836	11.840	11.845	11.850	2710
2720	11.850	11.855	11.859	11.864	11.869	11.874	11.879	11.883	11.888	11.893	11.898	2720
2730	11.898	11.902	11.907	11.912	11.917	11.921	11.926	11.931	11.936	11.940	11.945	2730
2740	11.945	11.950	11.955	11.960	11.964	11.969	11.974	11.979	11.983	11.988	11.993	2740
2750	11.993	11.998	12.002	12.007	12.012	12.017	12.021	12.026	12.031	12.036	12.040	2750
2760	12.040	12.045	12.050	12.055	12.059	12.064	12.069	12.074	12.078	12.083	12.088	2760
2770	12.088	12.093	12.097	12.102	12.107	12.111	12.116	12.121	12.126	12.130	12.135	2770
2780	12.135	12.140	12.145	12.149	12.154	12.159	12.164	12.168	12.173	12.178	12.182	2780
2790	12.182	12.187	12.192	12.197	12.201	12.206	12.211	12.215	12.220	12.225	12.230	2790
2800	12.230	12.234	12.239	12.244	12.249	12.253	12.258	12.263	12.267	12.272	12.277	2800
2810	12.277	12.282	12.286	12.291	12.296	12.300	12.305	12.310	12.314	12.319	12.324	2810
2820	12.324	12.329	12.333	12.338	12.343	12.347	12.352	12.357	12.361	12.366	12.371	2820
2830	12.371	12.376	12.380	12.385	12.390	12.394	12.399	12.404	12.408	12.413	12.418	2830
2840	12.418	12.423	12.427	12.432	12.437	12.441	12.446	12.451	12.455	12.460	12.465	2840
2850	12.465	12.469	12.474	12.479	12.483	12.488	12.493	12.497	12.502	12.507	12.511	2850
2860	12.511	12.516	12.521	12.525	12.530	12.535	12.539	12.544	12.549	12.553	12.558	2860
2870	12.558	12.563	12.567	12.572	12.577	12.581	12.586	12.591	12.595	12.600	12.605	2870
2880	12.605	12.609	12.614	12.619	12.623	12.628	12.633	12.637	12.642	12.647	12.651	2880
2890	12.651	12.656	12.661	12.665	12.670	12.674	12.679	12.684	12.688	12.693	12.698	2890
2900	12.698	12.702	12.707	12.712	12.716	12.721	12.725	12.730	12.735	12.739	12.744	2900
2910	12.744	12.749	12.753	12.758	12.762	12.767	12.772	12.776	12.781	12.786	12.790	2910
2920	12.790	12.795	12.799	12.804	12.809	12.813	12.818	12.823	12.827	12.832	12.836	2920
2930	12.836	12.841	12.846	12.850	12.855	12.859	12.864	12.869	12.873	12.878	12.882	2930
2940	12.882	12.887	12.892	12.896	12.901	12.905	12.910	12.915	12.919	12.924	12.928	2940
2950	12.928	12.933	12.938	12.942	12.947	12.951	12.956	12.961	12.965	12.970	12.974	2950
2960	12.974	12.979	12.983	12.988	12.993	12.997	13.002	13.006	13.011	13.016	13.020	2960
2970	13.020	13.025	13.029	13.034	13.038	13.043	13.048	13.052	13.057	13.061	13.066	2970
2980	13.066	13.070	13.075	13.079	13.084	13.089	13.093	13.098	13.102	13.107	13.111	2980
2990	13.111	13.116	13.121	13.125	13.130	13.134	13.139	13.143	13.148	13.152	13.157	2990
3000	13.157	13.161	13.166	13.171	13.175	13.180	13.184	13.189	13.193	13.198	13.202	3000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C3.2. *Type BN thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
3000	13.157	13.161	13.166	13.171	13.175	13.180	13.184	13.189	13.193	13.198	13.202	**3000**
3010	13.202	13.207	13.211	13.216	13.220	13.225	13.230	13.234	13.239	13.243	13.248	**3010**
3020	13.248	13.252	13.257	13.261	13.266	13.270	13.275	13.279	13.284	13.288	13.293	**3020**
3030	13.293	13.297	13.302	13.306	13.311	13.315	13.320	13.324	13.329	13.333	13.338	**3030**
3040	13.338	13.342	13.347	13.351	13.356	13.360	13.365	13.369	13.374	13.378	13.383	**3040**
3050	13.383	13.387	13.392	13.396	13.401	13.405	13.410	13.414	13.419	13.423	13.428	**3050**
3060	13.428	13.432	13.437	13.441	13.446	13.450	13.455	13.459	13.464	13.468	13.473	**3060**
3070	13.473	13.477	13.482	13.486	13.491	13.495	13.500	13.504	13.508	13.513	13.517	**3070**
3080	13.517	13.522	13.526	13.531	13.535	13.540	13.544	13.549	13.553	13.558	13.562	**3080**
3090	13.562	13.567	13.571	13.575	13.580	13.584	13.589	13.593	13.598	13.602	13.607	**3090**
3100	13.607	13.611	13.615	13.620	13.624	13.629	13.633	13.638	13.642	13.647	13.651	**3100**
3110	13.651	13.655	13.660	13.664	13.669	13.673	13.678	13.682	13.687	13.691	13.695	**3110**
3120	13.695	13.700	13.704	13.709	13.713	13.717	13.722	13.726	13.731	13.735	13.740	**3120**
3130	13.740	13.744	13.748	13.753	13.757	13.762	13.766	13.771	13.775	13.779	13.784	**3130**
3140	13.784	13.788	13.793	13.797	13.801	13.806	13.810	13.815	13.819	13.823	13.828	**3140**
3150	13.828	13.832	13.837	13.841	13.845	13.850	13.854	13.859	13.863	13.867	13.872	**3150**
3160	13.872	13.876	13.881	13.885	13.889	13.894	13.898	13.903	13.907	13.911	13.916	**3160**
3170	13.916	13.920	13.924	13.929	13.933	13.938	13.942	13.946	13.951	13.955	13.959	**3170**
3180	13.959	13.964	13.968	13.973	13.977	13.981	13.986	13.990	13.994	13.999	14.003	**3180**
3190	14.003	14.008	14.012	14.016	14.021	14.025	14.029	14.034	14.038	14.042	14.047	**3190**
3200	14.047	14.051	14.055	14.060	14.064	14.069	14.073	14.077	14.082	14.086	14.090	**3200**
3210	14.090	14.095	14.099	14.103	14.108							**3210**
°F	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°F**

C4. Supplementary Reference Tables for the Positive Thermoelement, Type JP, Iron Versus Platinum, Pt-67

The reference function for type JP thermoelements versus platinum, Pt-67, given in the main text (see table 6.4.1), was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C4.1 and C4.2. Table C4.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −210 °C to 760 °C, and table C4.2 presents voltage values at 1 °F intervals from −346 °F to 1400 °F.

The tables in this section merely give average values for industrial materials which have a wide variability. As mentioned in section 6.4, **neither the ASTM nor the ISA recognize type JP or type JN thermoelements as standardized materials.**

TABLE C4.1. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−210	−2.560											−210
−200	−2.553	−2.555	−2.556	−2.557	−2.558	−2.559	−2.560	−2.560	−2.560	−2.560	−2.560	−200
−190	−2.527	−2.530	−2.534	−2.537	−2.540	−2.542	−2.545	−2.547	−2.549	−2.551	−2.553	−190
−180	−2.483	−2.488	−2.493	−2.498	−2.503	−2.507	−2.512	−2.516	−2.520	−2.523	−2.527	−180
−170	−2.423	−2.430	−2.436	−2.443	−2.449	−2.455	−2.461	−2.467	−2.472	−2.478	−2.483	−170
−160	−2.349	−2.357	−2.365	−2.372	−2.380	−2.388	−2.395	−2.402	−2.409	−2.416	−2.423	−160
−150	−2.261	−2.270	−2.279	−2.288	−2.297	−2.306	−2.315	−2.324	−2.332	−2.340	−2.349	−150
−140	−2.160	−2.171	−2.181	−2.191	−2.202	−2.212	−2.222	−2.232	−2.241	−2.251	−2.261	−140
−130	−2.049	−2.060	−2.072	−2.083	−2.095	−2.106	−2.117	−2.128	−2.139	−2.149	−2.160	−130
−120	−1.927	−1.940	−1.952	−1.965	−1.977	−1.989	−2.001	−2.013	−2.025	−2.037	−2.049	−120
−110	−1.797	−1.810	−1.824	−1.837	−1.850	−1.863	−1.876	−1.889	−1.902	−1.915	−1.927	−110
−100	−1.658	−1.673	−1.687	−1.701	−1.715	−1.729	−1.742	−1.756	−1.770	−1.783	−1.797	−100
−90	−1.513	−1.528	−1.542	−1.557	−1.572	−1.586	−1.601	−1.615	−1.630	−1.644	−1.658	−90
−80	−1.361	−1.376	−1.392	−1.407	−1.422	−1.437	−1.453	−1.468	−1.483	−1.498	−1.513	−80
−70	−1.203	−1.219	−1.235	−1.251	−1.267	−1.283	−1.298	−1.314	−1.330	−1.345	−1.361	−70
−60	−1.041	−1.057	−1.074	−1.090	−1.106	−1.122	−1.139	−1.155	−1.171	−1.187	−1.203	−60
−50	−0.874	−0.891	−0.908	−0.925	−0.941	−0.958	−0.975	−0.991	−1.008	−1.024	−1.041	−50
−40	−0.704	−0.721	−0.738	−0.755	−0.773	−0.790	−0.807	−0.824	−0.840	−0.857	−0.874	−40
−30	−0.531	−0.549	−0.566	−0.583	−0.601	−0.618	−0.635	−0.653	−0.670	−0.687	−0.704	−30
−20	−0.356	−0.373	−0.391	−0.409	−0.426	−0.444	−0.461	−0.479	−0.496	−0.514	−0.531	−20
−10	−0.179	−0.196	−0.214	−0.232	−0.250	−0.267	−0.285	−0.303	−0.320	−0.338	−0.356	−10
0	0.000	−0.018	−0.036	−0.054	−0.072	−0.089	−0.107	−0.125	−0.143	−0.161	−0.179	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C4.1. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.018	0.036	0.054	0.072	0.090	0.108	0.126	0.144	0.162	0.180	0
10	0.180	0.198	0.216	0.234	0.252	0.270	0.288	0.306	0.324	0.342	0.360	10
20	0.360	0.378	0.396	0.414	0.432	0.450	0.468	0.486	0.504	0.522	0.540	20
30	0.540	0.558	0.576	0.594	0.612	0.630	0.648	0.666	0.684	0.702	0.720	30
40	0.720	0.738	0.756	0.774	0.792	0.810	0.828	0.845	0.863	0.881	0.899	40
50	0.899	0.917	0.935	0.953	0.971	0.989	1.007	1.024	1.042	1.060	1.078	50
60	1.078	1.096	1.113	1.131	1.149	1.167	1.185	1.202	1.220	1.238	1.255	60
70	1.255	1.273	1.291	1.308	1.326	1.344	1.361	1.379	1.396	1.414	1.432	70
80	1.432	1.449	1.467	1.484	1.502	1.519	1.537	1.554	1.571	1.589	1.606	80
90	1.606	1.623	1.641	1.658	1.675	1.693	1.710	1.727	1.745	1.762	1.779	90
100	1.779	1.796	1.813	1.830	1.847	1.865	1.882	1.899	1.916	1.933	1.950	100
110	1.950	1.967	1.984	2.000	2.017	2.034	2.051	2.068	2.085	2.102	2.118	110
120	2.118	2.135	2.152	2.168	2.185	2.202	2.218	2.235	2.252	2.268	2.285	120
130	2.285	2.301	2.318	2.334	2.350	2.367	2.383	2.400	2.416	2.432	2.448	130
140	2.448	2.465	2.481	2.497	2.513	2.529	2.546	2.562	2.578	2.594	2.610	140
150	2.610	2.626	2.642	2.658	2.673	2.689	2.705	2.721	2.737	2.753	2.768	150
160	2.768	2.784	2.800	2.815	2.831	2.847	2.862	2.878	2.893	2.909	2.924	160
170	2.924	2.940	2.955	2.970	2.986	3.001	3.016	3.032	3.047	3.062	3.077	170
180	3.077	3.092	3.107	3.123	3.138	3.153	3.168	3.183	3.198	3.212	3.227	180
190	3.227	3.242	3.257	3.272	3.287	3.301	3.316	3.331	3.345	3.360	3.375	190
200	3.375	3.389	3.404	3.418	3.433	3.447	3.461	3.476	3.490	3.504	3.519	200
210	3.519	3.533	3.547	3.561	3.576	3.590	3.604	3.618	3.632	3.646	3.660	210
220	3.660	3.674	3.688	3.702	3.716	3.730	3.743	3.757	3.771	3.785	3.798	220
230	3.798	3.812	3.826	3.839	3.853	3.866	3.880	3.893	3.907	3.920	3.934	230
240	3.934	3.947	3.960	3.974	3.987	4.000	4.013	4.026	4.040	4.053	4.066	240
250	4.066	4.079	4.092	4.105	4.118	4.131	4.144	4.157	4.170	4.182	4.195	250
260	4.195	4.208	4.221	4.234	4.246	4.259	4.272	4.284	4.297	4.309	4.322	260
270	4.322	4.334	4.347	4.359	4.372	4.384	4.396	4.409	4.421	4.433	4.445	270
280	4.445	4.458	4.470	4.482	4.494	4.506	4.518	4.530	4.542	4.554	4.566	280
290	4.566	4.578	4.590	4.602	4.614	4.626	4.638	4.649	4.661	4.673	4.685	290
300	4.685	4.696	4.708	4.720	4.731	4.743	4.754	4.766	4.777	4.789	4.800	300
310	4.800	4.812	4.823	4.834	4.846	4.857	4.868	4.880	4.891	4.902	4.913	310
320	4.913	4.925	4.936	4.947	4.958	4.969	4.980	4.991	5.002	5.013	5.024	320
330	5.024	5.035	5.046	5.057	5.068	5.079	5.089	5.100	5.111	5.122	5.133	330
340	5.133	5.143	5.154	5.165	5.175	5.186	5.197	5.207	5.218	5.228	5.239	340
350	5.239	5.249	5.260	5.270	5.281	5.291	5.302	5.312	5.322	5.333	5.343	350
360	5.343	5.353	5.364	5.374	5.384	5.395	5.405	5.415	5.425	5.435	5.446	360
370	5.446	5.456	5.466	5.476	5.486	5.496	5.506	5.516	5.526	5.536	5.546	370
380	5.546	5.556	5.566	5.576	5.586	5.596	5.606	5.616	5.626	5.636	5.646	380
390	5.646	5.655	5.665	5.675	5.685	5.695	5.704	5.714	5.724	5.734	5.743	390
400	5.743	5.753	5.763	5.772	5.782	5.792	5.801	5.811	5.821	5.830	5.840	400
410	5.840	5.850	5.859	5.869	5.878	5.888	5.898	5.907	5.917	5.926	5.936	410
420	5.936	5.945	5.955	5.964	5.974	5.983	5.993	6.002	6.012	6.021	6.031	420
430	6.031	6.040	6.049	6.059	6.068	6.078	6.087	6.097	6.106	6.115	6.125	430
440	6.125	6.134	6.144	6.153	6.162	6.172	6.181	6.191	6.200	6.209	6.219	440
450	6.219	6.228	6.237	6.247	6.256	6.266	6.275	6.284	6.294	6.303	6.312	450
460	6.312	6.322	6.331	6.341	6.350	6.359	6.369	6.378	6.387	6.397	6.406	460
470	6.406	6.416	6.425	6.434	6.444	6.453	6.463	6.472	6.481	6.491	6.500	470
480	6.500	6.510	6.519	6.529	6.538	6.547	6.557	6.566	6.576	6.585	6.595	480
490	6.595	6.604	6.614	6.623	6.633	6.642	6.652	6.661	6.671	6.681	6.690	490
500	6.690	6.700	6.709	6.719	6.729	6.738	6.748	6.757	6.767	6.777	6.786	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C4.1. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	6.690	6.700	6.709	6.719	6.729	6.738	6.748	6.757	6.767	6.777	6.786	500
510	6.786	6.796	6.806	6.816	6.825	6.835	6.845	6.855	6.864	6.874	6.884	510
520	6.884	6.894	6.904	6.913	6.923	6.933	6.943	6.953	6.963	6.973	6.983	520
530	6.983	6.993	7.003	7.013	7.023	7.033	7.043	7.053	7.063	7.073	7.083	530
540	7.083	7.094	7.104	7.114	7.124	7.134	7.145	7.155	7.165	7.175	7.186	540
550	7.186	7.196	7.207	7.217	7.227	7.238	7.248	7.259	7.269	7.280	7.290	550
560	7.290	7.301	7.312	7.322	7.333	7.344	7.354	7.365	7.376	7.387	7.397	560
570	7.397	7.408	7.419	7.430	7.441	7.452	7.463	7.474	7.485	7.496	7.507	570
580	7.507	7.518	7.529	7.540	7.551	7.563	7.574	7.585	7.596	7.608	7.619	580
590	7.619	7.630	7.642	7.653	7.665	7.676	7.688	7.699	7.711	7.723	7.734	590
600	7.734	7.746	7.758	7.769	7.781	7.793	7.805	7.817	7.829	7.840	7.852	600
610	7.852	7.864	7.876	7.889	7.901	7.913	7.925	7.937	7.949	7.962	7.974	610
620	7.974	7.986	7.999	8.011	8.024	8.036	8.049	8.061	8.074	8.086	8.099	620
630	8.099	8.112	8.124	8.137	8.150	8.163	8.176	8.189	8.202	8.215	8.228	630
640	8.228	8.241	8.254	8.267	8.280	8.293	8.307	8.320	8.333	8.347	8.360	640
650	8.360	8.373	8.387	8.400	8.414	8.427	8.441	8.455	8.468	8.482	8.496	650
660	8.496	8.510	8.524	8.538	8.551	8.565	8.579	8.594	8.608	8.622	8.636	660
670	8.636	8.650	8.664	8.679	8.693	8.707	8.722	8.736	8.751	8.765	8.780	670
680	8.780	8.794	8.809	8.824	8.838	8.853	8.868	8.883	8.897	8.912	8.927	680
690	8.927	8.942	8.957	8.972	8.987	9.003	9.018	9.033	9.048	9.064	9.079	690
700	9.079	9.094	9.110	9.125	9.141	9.156	9.172	9.187	9.203	9.218	9.234	700
710	9.234	9.250	9.266	9.282	9.297	9.313	9.329	9.345	9.361	9.377	9.393	710
720	9.393	9.409	9.425	9.442	9.458	9.474	9.490	9.507	9.523	9.539	9.556	720
730	9.556	9.572	9.589	9.605	9.622	9.638	9.655	9.672	9.688	9.705	9.722	730
740	9.722	9.738	9.755	9.772	9.789	9.806	9.823	9.840	9.857	9.874	9.891	740
750	9.891	9.908	9.925	9.942	9.959	9.976	9.994	10.011	10.028	10.045	10.063	750
760	10.063											760
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C4.2. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−340	−2.560	−2.560	−2.560	−2.560	−2.560	−2.560	−2.560					−340
−330	−2.555	−2.556	−2.556	−2.557	−2.558	−2.558	−2.559	−2.559	−2.560	−2.560	−2.560	−330
−320	−2.544	−2.545	−2.547	−2.548	−2.549	−2.550	−2.551	−2.552	−2.553	−2.554	−2.555	−320
−310	−2.527	−2.529	−2.531	−2.533	−2.534	−2.536	−2.538	−2.539	−2.541	−2.542	−2.544	−310
−300	−2.505	−2.507	−2.510	−2.512	−2.514	−2.517	−2.519	−2.521	−2.523	−2.525	−2.527	−300
−290	−2.477	−2.480	−2.483	−2.486	−2.489	−2.492	−2.494	−2.497	−2.500	−2.502	−2.505	−290
−280	−2.445	−2.448	−2.452	−2.455	−2.458	−2.462	−2.465	−2.468	−2.471	−2.474	−2.477	−280
−270	−2.408	−2.412	−2.416	−2.420	−2.423	−2.427	−2.431	−2.434	−2.438	−2.441	−2.445	−270
−260	−2.366	−2.371	−2.375	−2.379	−2.384	−2.388	−2.392	−2.396	−2.400	−2.404	−2.408	−260
−250	−2.321	−2.325	−2.330	−2.335	−2.339	−2.344	−2.349	−2.353	−2.358	−2.362	−2.366	−250
−240	−2.271	−2.276	−2.281	−2.286	−2.291	−2.296	−2.301	−2.306	−2.311	−2.316	−2.321	−240
−230	−2.217	−2.223	−2.228	−2.234	−2.239	−2.245	−2.250	−2.255	−2.261	−2.266	−2.271	−230
−220	−2.160	−2.166	−2.172	−2.178	−2.183	−2.189	−2.195	−2.201	−2.206	−2.212	−2.217	−220
−210	−2.100	−2.106	−2.112	−2.118	−2.124	−2.130	−2.136	−2.142	−2.148	−2.154	−2.160	−210
−200	−2.036	−2.042	−2.049	−2.055	−2.062	−2.068	−2.074	−2.081	−2.087	−2.093	−2.100	−200
−190	−1.969	−1.976	−1.982	−1.989	−1.996	−2.003	−2.009	−2.016	−2.023	−2.029	−2.036	−190
−180	−1.899	−1.906	−1.913	−1.920	−1.927	−1.934	−1.941	−1.948	−1.955	−1.962	−1.969	−180
−170	−1.827	−1.834	−1.841	−1.849	−1.856	−1.863	−1.870	−1.878	−1.885	−1.892	−1.899	−170
−160	−1.752	−1.759	−1.767	−1.774	−1.782	−1.789	−1.797	−1.804	−1.812	−1.819	−1.827	−160
−150	−1.674	−1.682	−1.690	−1.698	−1.705	−1.713	−1.721	−1.729	−1.736	−1.744	−1.752	−150
−140	−1.594	−1.602	−1.611	−1.619	−1.627	−1.635	−1.642	−1.650	−1.658	−1.666	−1.674	−140
−130	−1.513	−1.521	−1.529	−1.537	−1.546	−1.554	−1.562	−1.570	−1.578	−1.586	−1.594	−130
−120	−1.429	−1.437	−1.446	−1.454	−1.463	−1.471	−1.479	−1.488	−1.496	−1.504	−1.513	−120
−110	−1.343	−1.352	−1.361	−1.369	−1.378	−1.386	−1.395	−1.403	−1.412	−1.420	−1.429	−110
−100	−1.256	−1.265	−1.274	−1.283	−1.291	−1.300	−1.309	−1.317	−1.326	−1.335	−1.343	−100
−90	−1.167	−1.176	−1.185	−1.194	−1.203	−1.212	−1.221	−1.230	−1.239	−1.247	−1.256	−90
−80	−1.077	−1.086	−1.095	−1.104	−1.113	−1.122	−1.132	−1.141	−1.149	−1.158	−1.167	−80
−70	−0.986	−0.995	−1.004	−1.013	−1.022	−1.032	−1.041	−1.050	−1.059	−1.068	−1.077	−70
−60	−0.893	−0.902	−0.912	−0.921	−0.930	−0.939	−0.949	−0.958	−0.967	−0.976	−0.986	−60
−50	−0.799	−0.808	−0.818	−0.827	−0.837	−0.846	−0.855	−0.865	−0.874	−0.884	−0.893	−50
−40	−0.704	−0.714	−0.723	−0.733	−0.742	−0.752	−0.761	−0.771	−0.780	−0.790	−0.799	−40
−30	−0.608	−0.618	−0.628	−0.637	−0.647	−0.656	−0.666	−0.675	−0.685	−0.695	−0.704	−30
−20	−0.512	−0.521	−0.531	−0.541	−0.551	−0.560	−0.570	−0.579	−0.589	−0.599	−0.608	−20
−10	−0.414	−0.424	−0.434	−0.444	−0.453	−0.463	−0.473	−0.483	−0.492	−0.502	−0.512	−10
0	−0.317	−0.326	−0.336	−0.346	−0.356	−0.366	−0.375	−0.385	−0.395	−0.405	−0.414	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C4.2. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.317	−0.307	−0.297	−0.287	−0.277	−0.267	−0.258	−0.248	−0.238	−0.228	−0.218	0
10	−0.218	−0.208	−0.198	−0.188	−0.179	−0.169	−0.159	−0.149	−0.139	−0.129	−0.119	10
20	−0.119	−0.109	−0.099	−0.089	−0.080	−0.070	−0.060	−0.050	−0.040	−0.030	−0.020	20
30	−0.020	−0.010	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080	30
40	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150	0.160	0.170	0.180	40
50	0.180	0.190	0.200	0.210	0.220	0.230	0.240	0.250	0.260	0.270	0.280	50
60	0.280	0.290	0.300	0.310	0.320	0.330	0.340	0.350	0.360	0.370	0.380	60
70	0.380	0.390	0.400	0.410	0.420	0.430	0.440	0.450	0.460	0.470	0.480	70
80	0.480	0.490	0.500	0.510	0.520	0.530	0.540	0.550	0.560	0.570	0.580	80
90	0.580	0.590	0.600	0.610	0.620	0.630	0.640	0.650	0.660	0.670	0.680	90
100	0.680	0.690	0.700	0.710	0.720	0.730	0.740	0.750	0.760	0.770	0.780	100
110	0.780	0.790	0.800	0.810	0.820	0.830	0.840	0.849	0.859	0.869	0.879	110
120	0.879	0.889	0.899	0.909	0.919	0.929	0.939	0.949	0.959	0.969	0.979	120
130	0.979	0.989	0.999	1.009	1.018	1.028	1.038	1.048	1.058	1.068	1.078	130
140	1.078	1.088	1.098	1.108	1.117	1.127	1.137	1.147	1.157	1.167	1.177	140
150	1.177	1.187	1.196	1.206	1.216	1.226	1.236	1.246	1.255	1.265	1.275	150
160	1.275	1.285	1.295	1.304	1.314	1.324	1.334	1.344	1.353	1.363	1.373	160
170	1.373	1.383	1.393	1.402	1.412	1.422	1.432	1.441	1.451	1.461	1.471	170
180	1.471	1.480	1.490	1.500	1.509	1.519	1.529	1.538	1.548	1.558	1.567	180
190	1.567	1.577	1.587	1.596	1.606	1.616	1.625	1.635	1.645	1.654	1.664	190
200	1.664	1.674	1.683	1.693	1.702	1.712	1.722	1.731	1.741	1.750	1.760	200
210	1.760	1.769	1.779	1.788	1.798	1.808	1.817	1.827	1.836	1.846	1.855	210
220	1.855	1.865	1.874	1.884	1.893	1.902	1.912	1.921	1.931	1.940	1.950	220
230	1.950	1.959	1.969	1.978	1.987	1.997	2.006	2.016	2.025	2.034	2.044	230
240	2.044	2.053	2.062	2.072	2.081	2.090	2.100	2.109	2.118	2.128	2.137	240
250	2.137	2.146	2.155	2.165	2.174	2.183	2.192	2.202	2.211	2.220	2.229	250
260	2.229	2.239	2.248	2.257	2.266	2.275	2.285	2.294	2.303	2.312	2.321	260
270	2.321	2.330	2.339	2.349	2.358	2.367	2.376	2.385	2.394	2.403	2.412	270
280	2.412	2.421	2.430	2.439	2.448	2.457	2.466	2.475	2.485	2.493	2.502	280
290	2.502	2.511	2.520	2.529	2.538	2.547	2.556	2.565	2.574	2.583	2.592	290
300	2.592	2.601	2.610	2.619	2.627	2.636	2.645	2.654	2.663	2.672	2.681	300
310	2.681	2.689	2.698	2.707	2.716	2.725	2.733	2.742	2.751	2.760	2.768	310
320	2.768	2.777	2.786	2.794	2.803	2.812	2.821	2.829	2.838	2.847	2.855	320
330	2.855	2.864	2.873	2.881	2.890	2.898	2.907	2.916	2.924	2.933	2.941	330
340	2.941	2.950	2.958	2.967	2.976	2.984	2.993	3.001	3.010	3.018	3.027	340
350	3.027	3.035	3.043	3.052	3.060	3.069	3.077	3.086	3.094	3.102	3.111	350
360	3.111	3.119	3.128	3.136	3.144	3.153	3.161	3.169	3.178	3.186	3.194	360
370	3.194	3.203	3.211	3.219	3.227	3.236	3.244	3.252	3.260	3.269	3.277	370
380	3.277	3.285	3.293	3.301	3.309	3.318	3.326	3.334	3.342	3.350	3.358	380
390	3.358	3.366	3.375	3.383	3.391	3.399	3.407	3.415	3.423	3.431	3.439	390
400	3.439	3.447	3.455	3.463	3.471	3.479	3.487	3.495	3.503	3.511	3.519	400
410	3.519	3.527	3.535	3.543	3.550	3.558	3.566	3.574	3.582	3.590	3.598	410
420	3.598	3.605	3.613	3.621	3.629	3.637	3.644	3.652	3.660	3.668	3.676	420
430	3.676	3.683	3.691	3.699	3.706	3.714	3.722	3.730	3.737	3.745	3.753	430
440	3.753	3.760	3.768	3.775	3.783	3.791	3.798	3.806	3.813	3.821	3.829	440
450	3.829	3.836	3.844	3.851	3.859	3.866	3.874	3.881	3.889	3.896	3.904	450
460	3.904	3.911	3.919	3.926	3.934	3.941	3.948	3.956	3.963	3.971	3.978	460
470	3.978	3.985	3.993	4.000	4.007	4.015	4.022	4.029	4.037	4.044	4.051	470
480	4.051	4.059	4.066	4.073	4.080	4.088	4.095	4.102	4.109	4.117	4.124	480
490	4.124	4.131	4.138	4.145	4.152	4.160	4.167	4.174	4.181	4.188	4.195	490
500	4.195	4.202	4.209	4.217	4.224	4.231	4.238	4.245	4.252	4.259	4.266	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C4.2. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	4.195	4.202	4.209	4.217	4.224	4.231	4.238	4.245	4.252	4.259	4.266	500
510	4.266	4.273	4.280	4.287	4.294	4.301	4.308	4.315	4.322	4.329	4.336	510
520	4.336	4.343	4.350	4.356	4.363	4.370	4.377	4.384	4.391	4.398	4.405	520
530	4.405	4.411	4.418	4.425	4.432	4.439	4.445	4.452	4.459	4.466	4.473	530
540	4.473	4.479	4.486	4.493	4.500	4.506	4.513	4.520	4.526	4.533	4.540	540
550	4.540	4.546	4.553	4.560	4.566	4.573	4.580	4.586	4.593	4.599	4.606	550
560	4.606	4.613	4.619	4.626	4.632	4.639	4.645	4.652	4.659	4.665	4.672	560
570	4.672	4.678	4.685	4.691	4.698	4.704	4.711	4.717	4.723	4.730	4.736	570
580	4.736	4.743	4.749	4.756	4.762	4.768	4.775	4.781	4.788	4.794	4.800	580
590	4.800	4.807	4.813	4.819	4.826	4.832	4.838	4.845	4.851	4.857	4.863	590
600	4.863	4.870	4.876	4.882	4.888	4.895	4.901	4.907	4.913	4.920	4.926	600
610	4.926	4.932	4.938	4.944	4.951	4.957	4.963	4.969	4.975	4.981	4.987	610
620	4.987	4.994	5.000	5.006	5.012	5.018	5.024	5.030	5.036	5.042	5.048	620
630	5.048	5.054	5.060	5.067	5.073	5.079	5.085	5.091	5.097	5.103	5.109	630
640	5.109	5.115	5.121	5.127	5.133	5.139	5.144	5.150	5.156	5.162	5.168	640
650	5.168	5.174	5.180	5.186	5.192	5.198	5.204	5.210	5.215	5.221	5.227	650
660	5.227	5.233	5.239	5.245	5.251	5.256	5.262	5.268	5.274	5.280	5.285	660
670	5.285	5.291	5.297	5.303	5.309	5.314	5.320	5.326	5.332	5.337	5.343	670
680	5.343	5.349	5.355	5.360	5.366	5.372	5.378	5.383	5.389	5.395	5.400	680
690	5.400	5.406	5.412	5.417	5.423	5.429	5.434	5.440	5.446	5.451	5.457	690
700	5.457	5.463	5.468	5.474	5.479	5.485	5.491	5.496	5.502	5.507	5.513	700
710	5.513	5.519	5.524	5.530	5.535	5.541	5.546	5.552	5.557	5.563	5.569	710
720	5.569	5.574	5.580	5.585	5.591	5.596	5.602	5.607	5.613	5.618	5.624	720
730	5.624	5.629	5.635	5.640	5.646	5.651	5.656	5.662	5.667	5.673	5.678	730
740	5.678	5.684	5.689	5.695	5.700	5.705	5.711	5.716	5.722	5.727	5.733	740
750	5.733	5.738	5.743	5.749	5.754	5.760	5.765	5.770	5.776	5.781	5.786	750
760	5.786	5.792	5.797	5.803	5.808	5.813	5.819	5.824	5.829	5.835	5.840	760
770	5.840	5.845	5.851	5.856	5.861	5.867	5.872	5.877	5.883	5.888	5.893	770
780	5.893	5.899	5.904	5.909	5.915	5.920	5.925	5.930	5.936	5.941	5.946	780
790	5.946	5.952	5.957	5.962	5.967	5.973	5.978	5.983	5.988	5.994	5.999	790
800	5.999	6.004	6.010	6.015	6.020	6.025	6.031	6.036	6.041	6.046	6.052	800
810	6.052	6.057	6.062	6.067	6.073	6.078	6.083	6.088	6.093	6.099	6.104	810
820	6.104	6.109	6.114	6.120	6.125	6.130	6.135	6.141	6.146	6.151	6.156	820
830	6.156	6.161	6.167	6.172	6.177	6.182	6.187	6.193	6.198	6.203	6.208	830
840	6.208	6.214	6.219	6.224	6.229	6.234	6.240	6.245	6.250	6.255	6.260	840
850	6.260	6.266	6.271	6.276	6.281	6.286	6.292	6.297	6.302	6.307	6.312	850
860	6.312	6.318	6.323	6.328	6.333	6.338	6.344	6.349	6.354	6.359	6.365	860
870	6.365	6.370	6.375	6.380	6.385	6.391	6.396	6.401	6.406	6.411	6.417	870
880	6.417	6.422	6.427	6.432	6.438	6.443	6.448	6.453	6.458	6.464	6.469	880
890	6.469	6.474	6.479	6.485	6.490	6.495	6.500	6.506	6.511	6.516	6.521	890
900	6.521	6.526	6.532	6.537	6.542	6.547	6.553	6.558	6.563	6.569	6.574	900
910	6.574	6.579	6.584	6.590	6.595	6.600	6.605	6.611	6.616	6.621	6.627	910
920	6.627	6.632	6.637	6.642	6.648	6.653	6.658	6.664	6.669	6.674	6.680	920
930	6.680	6.685	6.690	6.695	6.701	6.706	6.711	6.717	6.722	6.727	6.733	930
940	6.733	6.738	6.743	6.749	6.754	6.760	6.765	6.770	6.776	6.781	6.786	940
950	6.786	6.792	6.797	6.803	6.808	6.813	6.819	6.824	6.830	6.835	6.840	950
960	6.840	6.846	6.851	6.857	6.862	6.868	6.873	6.878	6.884	6.889	6.895	960
970	6.895	6.900	6.906	6.911	6.917	6.922	6.928	6.933	6.939	6.944	6.950	970
980	6.950	6.955	6.961	6.966	6.972	6.977	6.983	6.988	6.994	6.999	7.005	980
990	7.005	7.011	7.016	7.022	7.027	7.033	7.038	7.044	7.050	7.055	7.061	990
1000	7.061	7.066	7.072	7.078	7.083	7.089	7.095	7.100	7.106	7.112	7.117	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C4.2. *Type JP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
					Thermoelectric Voltage in Millivolts							
1000	7.061	7.066	7.072	7.078	7.083	7.089	7.095	7.100	7.106	7.112	7.117	1000
1010	7.117	7.123	7.129	7.134	7.140	7.146	7.151	7.157	7.163	7.169	7.174	1010
1020	7.174	7.180	7.186	7.192	7.197	7.203	7.209	7.215	7.220	7.226	7.232	1020
1030	7.232	7.238	7.244	7.249	7.255	7.261	7.267	7.273	7.279	7.285	7.290	1030
1040	7.290	7.296	7.302	7.308	7.314	7.320	7.326	7.332	7.338	7.344	7.350	1040
1050	7.350	7.355	7.361	7.367	7.373	7.379	7.385	7.391	7.397	7.403	7.409	1050
1060	7.409	7.415	7.421	7.427	7.434	7.440	7.446	7.452	7.458	7.464	7.470	1060
1070	7.470	7.476	7.482	7.488	7.494	7.501	7.507	7.513	7.519	7.525	7.531	1070
1080	7.531	7.538	7.544	7.550	7.556	7.563	7.569	7.575	7.581	7.588	7.594	1080
1090	7.594	7.600	7.606	7.613	7.619	7.625	7.632	7.638	7.644	7.651	7.657	1090
1100	7.657	7.663	7.670	7.676	7.683	7.689	7.695	7.702	7.708	7.715	7.721	1100
1110	7.721	7.728	7.734	7.741	7.747	7.754	7.760	7.767	7.773	7.780	7.786	1110
1120	7.786	7.793	7.799	7.806	7.813	7.819	7.826	7.833	7.839	7.846	7.852	1120
1130	7.852	7.859	7.866	7.872	7.879	7.886	7.893	7.899	7.906	7.913	7.920	1130
1140	7.920	7.926	7.933	7.940	7.947	7.954	7.960	7.967	7.974	7.981	7.988	1140
1150	7.988	7.995	8.002	8.008	8.015	8.022	8.029	8.036	8.043	8.050	8.057	1150
1160	8.057	8.064	8.071	8.078	8.085	8.092	8.099	8.106	8.113	8.120	8.127	1160
1170	8.127	8.134	8.142	8.149	8.156	8.163	8.170	8.177	8.184	8.192	8.199	1170
1180	8.199	8.206	8.213	8.220	8.228	8.235	8.242	8.249	8.257	8.264	8.271	1180
1190	8.271	8.279	8.286	8.293	8.301	8.308	8.315	8.323	8.330	8.338	8.345	1190
1200	8.345	8.352	8.360	8.367	8.375	8.382	8.390	8.397	8.405	8.412	8.420	1200
1210	8.420	8.427	8.435	8.443	8.450	8.458	8.465	8.473	8.481	8.488	8.496	1210
1220	8.496	8.504	8.511	8.519	8.527	8.534	8.542	8.550	8.558	8.565	8.573	1220
1230	8.573	8.581	8.589	8.597	8.604	8.612	8.620	8.628	8.636	8.644	8.652	1230
1240	8.652	8.660	8.668	8.675	8.683	8.691	8.699	8.707	8.715	8.723	8.731	1240
1250	8.731	8.739	8.747	8.755	8.764	8.772	8.780	8.788	8.796	8.804	8.812	1250
1260	8.812	8.820	8.828	8.837	8.845	8.853	8.861	8.869	8.878	8.886	8.894	1260
1270	8.894	8.902	8.911	8.919	8.927	8.936	8.944	8.952	8.961	8.969	8.977	1270
1280	8.977	8.986	8.994	9.003	9.011	9.019	9.028	9.036	9.045	9.053	9.062	1280
1290	9.062	9.070	9.079	9.087	9.096	9.104	9.113	9.122	9.130	9.139	9.147	1290
1300	9.147	9.156	9.165	9.173	9.182	9.191	9.199	9.208	9.217	9.225	9.234	1300
1310	9.234	9.243	9.252	9.260	9.269	9.278	9.287	9.296	9.304	9.313	9.322	1310
1320	9.322	9.331	9.340	9.349	9.358	9.366	9.375	9.384	9.393	9.402	9.411	1320
1330	9.411	9.420	9.429	9.438	9.447	9.456	9.465	9.474	9.483	9.492	9.501	1330
1340	9.501	9.510	9.519	9.528	9.538	9.547	9.556	9.565	9.574	9.583	9.592	1340
1350	9.592	9.602	9.611	9.620	9.629	9.638	9.648	9.657	9.666	9.675	9.685	1350
1360	9.685	9.694	9.703	9.712	9.722	9.731	9.740	9.750	9.759	9.768	9.778	1360
1370	9.778	9.787	9.796	9.806	9.815	9.825	9.834	9.843	9.853	9.862	9.872	1370
1380	9.872	9.881	9.891	9.900	9.910	9.919	9.929	9.938	9.948	9.957	9.967	1380
1390	9.967	9.976	9.986	9.995	10.005	10.015	10.024	10.034	10.043	10.053	10.063	1390
1400	10.063											1400
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C5. Supplementary Reference Tables for Platinum, Pt-67, Versus the Negative Thermoelement, Type JN, a Copper-Nickel Alloy

The reference function for platinum, Pt-67, versus type JN thermoelements, given in the main text (see table 6.5.1), was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C5.1 and C5.2. Table C5.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −210 °C to 760 °C, and table C5.2 presents voltage values at 1 °F intervals from −346 °F to 1400 °F.

The tables in this section merely give average values for industrial materials which have a wide variability. As mentioned in section 6.5, **neither the ASTM nor the ISA recognize type JP or type JN thermoelements as standardized materials.**

TABLE C5.1. ***Platinum, Pt-67, versus type JN thermoelements*** *--- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−210	−5.535											**−210**
−200	−5.337	−5.357	−5.377	−5.397	−5.417	−5.437	−5.457	−5.477	−5.496	−5.516	−5.535	**−200**
−190	−5.132	−5.153	−5.174	−5.194	−5.215	−5.236	−5.256	−5.276	−5.297	−5.317	−5.337	**−190**
−180	−4.919	−4.941	−4.962	−4.984	−5.005	−5.027	−5.048	−5.069	−5.090	−5.111	−5.132	**−180**
−170	−4.700	−4.722	−4.744	−4.766	−4.788	−4.810	−4.832	−4.854	−4.876	−4.898	−4.919	**−170**
−160	−4.473	−4.496	−4.519	−4.542	−4.564	−4.587	−4.610	−4.632	−4.655	−4.677	−4.700	**−160**
−150	−4.239	−4.263	−4.287	−4.310	−4.333	−4.357	−4.380	−4.403	−4.427	−4.450	−4.473	**−150**
−140	−3.999	−4.023	−4.048	−4.072	−4.096	−4.120	−4.144	−4.168	−4.192	−4.216	−4.239	**−140**
−130	−3.752	−3.777	−3.802	−3.827	−3.852	−3.877	−3.901	−3.926	−3.950	−3.975	−3.999	**−130**
−120	−3.499	−3.525	−3.550	−3.576	−3.601	−3.627	−3.652	−3.677	−3.702	−3.727	−3.752	**−120**
−110	−3.240	−3.266	−3.292	−3.318	−3.344	−3.370	−3.396	−3.422	−3.448	−3.474	−3.499	**−110**
−100	−2.974	−3.001	−3.028	−3.055	−3.081	−3.108	−3.134	−3.161	−3.187	−3.214	−3.240	**−100**
−90	−2.703	−2.730	−2.757	−2.785	−2.812	−2.839	−2.866	−2.893	−2.920	−2.947	−2.974	**−90**
−80	−2.425	−2.453	−2.481	−2.509	−2.537	−2.564	−2.592	−2.620	−2.647	−2.675	−2.703	**−80**
−70	−2.141	−2.170	−2.199	−2.227	−2.255	−2.284	−2.312	−2.340	−2.369	−2.397	−2.425	**−70**
−60	−1.852	−1.881	−1.910	−1.939	−1.968	−1.997	−2.026	−2.055	−2.084	−2.113	−2.141	**−60**
−50	−1.557	−1.587	−1.617	−1.646	−1.676	−1.705	−1.735	−1.764	−1.794	−1.823	−1.852	**−50**
−40	−1.257	−1.287	−1.317	−1.347	−1.377	−1.407	−1.438	−1.467	−1.497	−1.527	−1.557	**−40**
−30	−0.950	−0.981	−1.012	−1.043	−1.074	−1.104	−1.135	−1.165	−1.196	−1.226	−1.257	**−30**
−20	−0.639	−0.670	−0.702	−0.733	−0.764	−0.795	−0.826	−0.858	−0.889	−0.920	−0.950	**−20**
−10	−0.322	−0.354	−0.386	−0.418	−0.449	−0.481	−0.513	−0.544	−0.576	−0.607	−0.639	**−10**
0	0.000	−0.032	−0.065	−0.097	−0.129	−0.162	−0.194	−0.226	−0.258	−0.290	−0.322	**0**
°C	**0**	**−1**	**−2**	**−3**	**−4**	**−5**	**−6**	**−7**	**−8**	**−9**	**−10**	**°C**

TABLE C5.1. ***Platinum, Pt-67, versus type JN thermoelements*** *--- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.032	0.065	0.098	0.130	0.163	0.196	0.229	0.261	0.294	0.327	0
10	0.327	0.360	0.393	0.426	0.460	0.493	0.526	0.559	0.593	0.626	0.660	10
20	0.660	0.693	0.727	0.760	0.794	0.828	0.861	0.895	0.929	0.963	0.997	20
30	0.997	1.031	1.065	1.099	1.133	1.167	1.202	1.236	1.270	1.305	1.339	30
40	1.339	1.374	1.408	1.443	1.477	1.512	1.547	1.581	1.616	1.651	1.686	40
50	1.686	1.721	1.756	1.791	1.826	1.861	1.897	1.932	1.967	2.002	2.038	50
60	2.038	2.073	2.109	2.144	2.180	2.215	2.251	2.287	2.322	2.358	2.394	60
70	2.394	2.430	2.466	2.502	2.538	2.574	2.610	2.646	2.682	2.719	2.755	70
80	2.755	2.791	2.828	2.864	2.901	2.937	2.974	3.010	3.047	3.084	3.120	80
90	3.120	3.157	3.194	3.231	3.268	3.305	3.342	3.379	3.416	3.453	3.490	90
100	3.490	3.527	3.564	3.602	3.639	3.676	3.714	3.751	3.789	3.826	3.864	100
110	3.864	3.902	3.939	3.977	4.015	4.052	4.090	4.128	4.166	4.204	4.242	110
120	4.242	4.280	4.318	4.356	4.394	4.433	4.471	4.509	4.547	4.586	4.624	120
130	4.624	4.663	4.701	4.740	4.778	4.817	4.855	4.894	4.933	4.971	5.010	130
140	5.010	5.049	5.088	5.127	5.166	5.205	5.244	5.283	5.322	5.361	5.400	140
150	5.400	5.439	5.479	5.518	5.557	5.597	5.636	5.675	5.715	5.754	5.794	150
160	5.794	5.833	5.873	5.913	5.952	5.992	6.032	6.072	6.111	6.151	6.191	160
170	6.191	6.231	6.271	6.311	6.351	6.391	6.431	6.472	6.512	6.552	6.592	170
180	6.592	6.632	6.673	6.713	6.753	6.794	6.834	6.875	6.915	6.956	6.997	180
190	6.997	7.037	7.078	7.118	7.159	7.200	7.241	7.282	7.322	7.363	7.404	190
200	7.404	7.445	7.486	7.527	7.568	7.609	7.650	7.692	7.733	7.774	7.815	200
210	7.815	7.856	7.898	7.939	7.980	8.022	8.063	8.105	8.146	8.188	8.229	210
220	8.229	8.271	8.312	8.354	8.396	8.437	8.479	8.521	8.563	8.605	8.646	220
230	8.646	8.688	8.730	8.772	8.814	8.856	8.898	8.940	8.982	9.024	9.066	230
240	9.066	9.109	9.151	9.193	9.235	9.278	9.320	9.362	9.405	9.447	9.489	240
250	9.489	9.532	9.574	9.617	9.659	9.702	9.744	9.787	9.830	9.872	9.915	250
260	9.915	9.958	10.000	10.043	10.086	10.129	10.172	10.214	10.257	10.300	10.343	260
270	10.343	10.386	10.429	10.472	10.515	10.558	10.601	10.644	10.688	10.731	10.774	270
280	10.774	10.817	10.860	10.904	10.947	10.990	11.034	11.077	11.120	11.164	11.207	280
290	11.207	11.251	11.294	11.338	11.381	11.425	11.468	11.512	11.555	11.599	11.643	290
300	11.643	11.686	11.730	11.774	11.817	11.861	11.905	11.949	11.993	12.036	12.080	300
310	12.080	12.124	12.168	12.212	12.256	12.300	12.344	12.388	12.432	12.476	12.520	310
320	12.520	12.564	12.608	12.653	12.697	12.741	12.785	12.829	12.874	12.918	12.962	320
330	12.962	13.006	13.051	13.095	13.139	13.184	13.228	13.273	13.317	13.361	13.406	330
340	13.406	13.450	13.495	13.539	13.584	13.629	13.673	13.718	13.762	13.807	13.852	340
350	13.852	13.896	13.941	13.986	14.030	14.075	14.120	14.165	14.209	14.254	14.299	350
360	14.299	14.344	14.389	14.434	14.478	14.523	14.568	14.613	14.658	14.703	14.748	360
370	14.748	14.793	14.838	14.883	14.928	14.973	15.018	15.063	15.109	15.154	15.199	370
380	15.199	15.244	15.289	15.334	15.380	15.425	15.470	15.515	15.561	15.606	15.651	380
390	15.651	15.696	15.742	15.787	15.832	15.878	15.923	15.968	16.014	16.059	16.105	390
400	16.105	16.150	16.196	16.241	16.287	16.332	16.378	16.423	16.469	16.514	16.560	400
410	16.560	16.605	16.651	16.696	16.742	16.788	16.833	16.879	16.925	16.970	17.016	410
420	17.016	17.062	17.107	17.153	17.199	17.244	17.290	17.336	17.382	17.427	17.473	420
430	17.473	17.519	17.565	17.611	17.657	17.702	17.748	17.794	17.840	17.886	17.932	430
440	17.932	17.978	18.024	18.070	18.116	18.161	18.207	18.253	18.299	18.345	18.391	440
450	18.391	18.437	18.483	18.529	18.575	18.622	18.668	18.714	18.760	18.806	18.852	450
460	18.852	18.898	18.944	18.990	19.036	19.083	19.129	19.175	19.221	19.267	19.313	460
470	19.313	19.360	19.406	19.452	19.498	19.544	19.591	19.637	19.683	19.729	19.776	470
480	19.776	19.822	19.868	19.914	19.961	20.007	20.053	20.100	20.146	20.192	20.239	480
490	20.239	20.285	20.331	20.378	20.424	20.470	20.517	20.563	20.610	20.656	20.702	490
500	20.702	20.749	20.795	20.842	20.888	20.935	20.981	21.028	21.074	21.120	21.167	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C5.1. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	20.702	20.749	20.795	20.842	20.888	20.935	20.981	21.028	21.074	21.120	21.167	500
510	21.167	21.213	21.260	21.306	21.353	21.399	21.446	21.492	21.539	21.585	21.632	510
520	21.632	21.679	21.725	21.772	21.818	21.865	21.911	21.958	22.004	22.051	22.098	520
530	22.098	22.144	22.191	22.237	22.284	22.331	22.377	22.424	22.470	22.517	22.564	530
540	22.564	22.610	22.657	22.704	22.750	22.797	22.844	22.890	22.937	22.984	23.030	540
550	23.030	23.077	23.124	23.170	23.217	23.264	23.310	23.357	23.404	23.451	23.497	550
560	23.497	23.544	23.591	23.637	23.684	23.731	23.778	23.824	23.871	23.918	23.965	560
570	23.965	24.011	24.058	24.105	24.152	24.198	24.245	24.292	24.339	24.385	24.432	570
580	24.432	24.479	24.526	24.573	24.619	24.666	24.713	24.760	24.807	24.853	24.900	580
590	24.900	24.947	24.994	25.041	25.087	25.134	25.181	25.228	25.275	25.321	25.368	590
600	25.368	25.415	25.462	25.509	25.556	25.602	25.649	25.696	25.743	25.790	25.837	600
610	25.837	25.883	25.930	25.977	26.024	26.071	26.118	26.164	26.211	26.258	26.305	610
620	26.305	26.352	26.399	26.446	26.492	26.539	26.586	26.633	26.680	26.727	26.774	620
630	26.774	26.820	26.867	26.914	26.961	27.008	27.055	27.102	27.148	27.195	27.242	630
640	27.242	27.289	27.336	27.383	27.430	27.476	27.523	27.570	27.617	27.664	27.711	640
650	27.711	27.758	27.805	27.851	27.898	27.945	27.992	28.039	28.086	28.133	28.179	650
660	28.179	28.226	28.273	28.320	28.367	28.414	28.461	28.507	28.554	28.601	28.648	660
670	28.648	28.695	28.742	28.789	28.835	28.882	28.929	28.976	29.023	29.070	29.116	670
680	29.116	29.163	29.210	29.257	29.304	29.351	29.397	29.444	29.491	29.538	29.585	680
690	29.585	29.632	29.678	29.725	29.772	29.819	29.866	29.913	29.959	30.006	30.053	690
700	30.053	30.100	30.147	30.193	30.240	30.287	30.334	30.381	30.427	30.474	30.521	700
710	30.521	30.568	30.614	30.661	30.708	30.755	30.802	30.848	30.895	30.942	30.989	710
720	30.989	31.035	31.082	31.129	31.176	31.222	31.269	31.316	31.363	31.409	31.456	720
730	31.456	31.503	31.549	31.596	31.643	31.690	31.736	31.783	31.830	31.876	31.923	730
740	31.923	31.970	32.016	32.063	32.110	32.156	32.203	32.250	32.296	32.343	32.390	740
750	32.390	32.436	32.483	32.530	32.576	32.623	32.670	32.716	32.763	32.809	32.856	750
760	32.856											760
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C5.2. ***Platinum, Pt-67, versus type JN thermoelements*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
						Thermoelectric Voltage in Millivolts						
−340	−5.470	−5.481	−5.492	−5.503	−5.514	−5.524	−5.535					−340
−330	−5.360	−5.371	−5.382	−5.393	−5.404	−5.415	−5.426	−5.437	−5.448	−5.459	−5.470	−330
−320	−5.247	−5.258	−5.270	−5.281	−5.292	−5.304	−5.315	−5.326	−5.337	−5.348	−5.360	−320
−310	−5.132	−5.144	−5.155	−5.167	−5.178	−5.190	−5.201	−5.213	−5.224	−5.236	−5.247	−310
−300	−5.015	−5.027	−5.038	−5.050	−5.062	−5.074	−5.085	−5.097	−5.109	−5.120	−5.132	−300
−290	−4.895	−4.907	−4.919	−4.931	−4.943	−4.955	−4.967	−4.979	−4.991	−5.003	−5.015	−290
−280	−4.774	−4.786	−4.798	−4.810	−4.822	−4.835	−4.847	−4.859	−4.871	−4.883	−4.895	−280
−270	−4.650	−4.662	−4.675	−4.687	−4.700	−4.712	−4.724	−4.737	−4.749	−4.761	−4.774	−270
−260	−4.524	−4.536	−4.549	−4.562	−4.574	−4.587	−4.600	−4.612	−4.625	−4.637	−4.650	−260
−250	−4.396	−4.409	−4.421	−4.434	−4.447	−4.460	−4.473	−4.486	−4.498	−4.511	−4.524	−250
−240	−4.266	−4.279	−4.292	−4.305	−4.318	−4.331	−4.344	−4.357	−4.370	−4.383	−4.396	−240
−230	−4.133	−4.147	−4.160	−4.173	−4.186	−4.200	−4.213	−4.226	−4.239	−4.252	−4.266	−230
−220	−3.999	−4.013	−4.026	−4.040	−4.053	−4.066	−4.080	−4.093	−4.107	−4.120	−4.133	−220
−210	−3.863	−3.877	−3.890	−3.904	−3.918	−3.931	−3.945	−3.958	−3.972	−3.986	−3.999	−210
−200	−3.725	−3.738	−3.752	−3.766	−3.780	−3.794	−3.808	−3.822	−3.835	−3.849	−3.863	−200
−190	−3.584	−3.598	−3.612	−3.627	−3.641	−3.655	−3.669	−3.683	−3.697	−3.711	−3.725	−190
−180	−3.442	−3.456	−3.471	−3.485	−3.499	−3.513	−3.528	−3.542	−3.556	−3.570	−3.584	−180
−170	−3.298	−3.312	−3.327	−3.341	−3.356	−3.370	−3.385	−3.399	−3.413	−3.428	−3.442	−170
−160	−3.152	−3.167	−3.181	−3.196	−3.211	−3.225	−3.240	−3.254	−3.269	−3.283	−3.298	−160
−150	−3.004	−3.019	−3.034	−3.049	−3.063	−3.078	−3.093	−3.108	−3.122	−3.137	−3.152	−150
−140	−2.854	−2.869	−2.884	−2.899	−2.914	−2.929	−2.944	−2.959	−2.974	−2.989	−3.004	−140
−130	−2.703	−2.718	−2.733	−2.748	−2.763	−2.779	−2.794	−2.809	−2.824	−2.839	−2.854	−130
−120	−2.549	−2.564	−2.580	−2.595	−2.611	−2.626	−2.641	−2.657	−2.672	−2.687	−2.703	−120
−110	−2.394	−2.409	−2.425	−2.440	−2.456	−2.472	−2.487	−2.503	−2.518	−2.534	−2.549	−110
−100	−2.237	−2.252	−2.268	−2.284	−2.300	−2.315	−2.331	−2.347	−2.362	−2.378	−2.394	−100
−90	−2.078	−2.094	−2.109	−2.125	−2.141	−2.157	−2.173	−2.189	−2.205	−2.221	−2.237	−90
−80	−1.917	−1.933	−1.949	−1.965	−1.981	−1.997	−2.013	−2.030	−2.046	−2.062	−2.078	−80
−70	−1.754	−1.771	−1.787	−1.803	−1.820	−1.836	−1.852	−1.868	−1.884	−1.901	−1.917	−70
−60	−1.590	−1.607	−1.623	−1.640	−1.656	−1.672	−1.689	−1.705	−1.722	−1.738	−1.754	−60
−50	−1.424	−1.441	−1.458	−1.474	−1.491	−1.507	−1.524	−1.541	−1.557	−1.574	−1.590	−50
−40	−1.257	−1.273	−1.290	−1.307	−1.324	−1.341	−1.357	−1.374	−1.391	−1.407	−1.424	−40
−30	−1.087	−1.104	−1.121	−1.138	−1.155	−1.172	−1.189	−1.206	−1.223	−1.240	−1.257	−30
−20	−0.916	−0.933	−0.950	−0.968	−0.985	−1.002	−1.019	−1.036	−1.053	−1.070	−1.087	−20
−10	−0.743	−0.761	−0.778	−0.795	−0.813	−0.830	−0.847	−0.864	−0.882	−0.899	−0.916	−10
0	−0.569	−0.586	−0.604	−0.621	−0.639	−0.656	−0.674	−0.691	−0.709	−0.726	−0.743	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C5.2. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.569	−0.551	−0.534	−0.516	−0.499	−0.481	−0.464	−0.446	−0.428	−0.411	−0.393	0
10	−0.393	−0.375	−0.358	−0.340	−0.322	−0.304	−0.287	−0.269	−0.251	−0.233	−0.215	10
20	−0.215	−0.197	−0.180	−0.162	−0.144	−0.126	−0.108	−0.090	−0.072	−0.054	−0.036	20
30	−0.036	−0.018	0.000	0.018	0.036	0.054	0.072	0.090	0.109	0.127	0.145	30
40	0.145	0.163	0.181	0.199	0.218	0.236	0.254	0.272	0.291	0.309	0.327	40
50	0.327	0.346	0.364	0.382	0.401	0.419	0.437	0.456	0.474	0.493	0.511	50
60	0.511	0.530	0.548	0.567	0.585	0.604	0.622	0.641	0.660	0.678	0.697	60
70	0.697	0.715	0.734	0.753	0.771	0.790	0.809	0.828	0.846	0.865	0.884	70
80	0.884	0.903	0.921	0.940	0.959	0.978	0.997	1.016	1.035	1.054	1.072	80
90	1.072	1.091	1.110	1.129	1.148	1.167	1.186	1.205	1.224	1.244	1.263	90
100	1.263	1.282	1.301	1.320	1.339	1.358	1.377	1.397	1.416	1.435	1.454	100
110	1.454	1.473	1.493	1.512	1.531	1.551	1.570	1.589	1.609	1.628	1.647	110
120	1.647	1.667	1.686	1.705	1.725	1.744	1.764	1.783	1.803	1.822	1.842	120
130	1.842	1.861	1.881	1.900	1.920	1.940	1.959	1.979	1.998	2.018	2.038	130
140	2.038	2.057	2.077	2.097	2.117	2.136	2.156	2.176	2.196	2.215	2.235	140
150	2.235	2.255	2.275	2.295	2.315	2.334	2.354	2.374	2.394	2.414	2.434	150
160	2.434	2.454	2.474	2.494	2.514	2.534	2.554	2.574	2.594	2.614	2.634	160
170	2.634	2.654	2.674	2.695	2.715	2.735	2.755	2.775	2.795	2.816	2.836	170
180	2.836	2.856	2.876	2.897	2.917	2.937	2.957	2.978	2.998	3.018	3.039	180
190	3.039	3.059	3.080	3.100	3.120	3.141	3.161	3.182	3.202	3.223	3.243	190
200	3.243	3.264	3.284	3.305	3.325	3.346	3.366	3.387	3.407	3.428	3.449	200
210	3.449	3.469	3.490	3.511	3.531	3.552	3.573	3.593	3.614	3.635	3.656	210
220	3.656	3.676	3.697	3.718	3.739	3.760	3.780	3.801	3.822	3.843	3.864	220
230	3.864	3.885	3.906	3.927	3.948	3.969	3.990	4.010	4.031	4.052	4.073	230
240	4.073	4.094	4.116	4.137	4.158	4.179	4.200	4.221	4.242	4.263	4.284	240
250	4.284	4.305	4.327	4.348	4.369	4.390	4.411	4.433	4.454	4.475	4.496	250
260	4.496	4.518	4.539	4.560	4.581	4.603	4.624	4.645	4.667	4.688	4.710	260
270	4.710	4.731	4.752	4.774	4.795	4.817	4.838	4.860	4.881	4.903	4.924	270
280	4.924	4.946	4.967	4.989	5.010	5.032	5.053	5.075	5.097	5.118	5.140	280
290	5.140	5.161	5.183	5.205	5.226	5.248	5.270	5.291	5.313	5.335	5.357	290
300	5.357	5.378	5.400	5.422	5.444	5.466	5.487	5.509	5.531	5.553	5.575	300
310	5.575	5.597	5.618	5.640	5.662	5.684	5.706	5.728	5.750	5.772	5.794	310
320	5.794	5.816	5.838	5.860	5.882	5.904	5.926	5.948	5.970	5.992	6.014	320
330	6.014	6.036	6.058	6.081	6.103	6.125	6.147	6.169	6.191	6.213	6.236	330
340	6.236	6.258	6.280	6.302	6.324	6.347	6.369	6.391	6.414	6.436	6.458	340
350	6.458	6.480	6.503	6.525	6.547	6.570	6.592	6.615	6.637	6.659	6.682	350
360	6.682	6.704	6.727	6.749	6.771	6.794	6.816	6.839	6.861	6.884	6.906	360
370	6.906	6.929	6.951	6.974	6.997	7.019	7.042	7.064	7.087	7.109	7.132	370
380	7.132	7.155	7.177	7.200	7.223	7.245	7.268	7.291	7.313	7.336	7.359	380
390	7.359	7.381	7.404	7.427	7.450	7.472	7.495	7.518	7.541	7.564	7.586	390
400	7.586	7.609	7.632	7.655	7.678	7.701	7.724	7.746	7.769	7.792	7.815	400
410	7.815	7.838	7.861	7.884	7.907	7.930	7.953	7.976	7.999	8.022	8.045	410
420	8.045	8.068	8.091	8.114	8.137	8.160	8.183	8.206	8.229	8.252	8.275	420
430	8.275	8.299	8.322	8.345	8.368	8.391	8.414	8.437	8.461	8.484	8.507	430
440	8.507	8.530	8.553	8.577	8.600	8.623	8.646	8.670	8.693	8.716	8.739	440
450	8.739	8.763	8.786	8.809	8.833	8.856	8.879	8.903	8.926	8.949	8.973	450
460	8.973	8.996	9.020	9.043	9.066	9.090	9.113	9.137	9.160	9.184	9.207	460
470	9.207	9.231	9.254	9.278	9.301	9.325	9.348	9.372	9.395	9.419	9.442	470
480	9.442	9.466	9.489	9.513	9.536	9.560	9.584	9.607	9.631	9.655	9.678	480
490	9.678	9.702	9.725	9.749	9.773	9.796	9.820	9.844	9.868	9.891	9.915	490
500	9.915	9.939	9.962	9.986	10.010	10.034	10.057	10.081	10.105	10.129	10.153	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C5.2. ***Platinum, Pt-67, versus type JN thermoelements*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	9.915	9.939	9.962	9.986	10.010	10.034	10.057	10.081	10.105	10.129	10.153	500
510	10.153	10.176	10.200	10.224	10.248	10.272	10.295	10.319	10.343	10.367	10.391	510
520	10.391	10.415	10.439	10.463	10.486	10.510	10.534	10.558	10.582	10.606	10.630	520
530	10.630	10.654	10.678	10.702	10.726	10.750	10.774	10.798	10.822	10.846	10.870	530
540	10.870	10.894	10.918	10.942	10.966	10.990	11.014	11.038	11.062	11.087	11.111	540
550	11.111	11.135	11.159	11.183	11.207	11.231	11.255	11.280	11.304	11.328	11.352	550
560	11.352	11.376	11.400	11.425	11.449	11.473	11.497	11.521	11.546	11.570	11.594	560
570	11.594	11.618	11.643	11.667	11.691	11.715	11.740	11.764	11.788	11.813	11.837	570
580	11.837	11.861	11.886	11.910	11.934	11.959	11.983	12.007	12.032	12.056	12.080	580
590	12.080	12.105	12.129	12.153	12.178	12.202	12.227	12.251	12.276	12.300	12.324	590
600	12.324	12.349	12.373	12.398	12.422	12.447	12.471	12.496	12.520	12.545	12.569	600
610	12.569	12.594	12.618	12.643	12.667	12.692	12.716	12.741	12.765	12.790	12.815	610
620	12.815	12.839	12.864	12.888	12.913	12.937	12.962	12.987	13.011	13.036	13.061	620
630	13.061	13.085	13.110	13.134	13.159	13.184	13.208	13.233	13.258	13.282	13.307	630
640	13.307	13.332	13.357	13.381	13.406	13.431	13.455	13.480	13.505	13.530	13.554	640
650	13.554	13.579	13.604	13.629	13.653	13.678	13.703	13.728	13.752	13.777	13.802	650
660	13.802	13.827	13.852	13.876	13.901	13.926	13.951	13.976	14.001	14.025	14.050	660
670	14.050	14.075	14.100	14.125	14.150	14.175	14.199	14.224	14.249	14.274	14.299	670
680	14.299	14.324	14.349	14.374	14.399	14.424	14.449	14.474	14.498	14.523	14.548	680
690	14.548	14.573	14.598	14.623	14.648	14.673	14.698	14.723	14.748	14.773	14.798	690
700	14.798	14.823	14.848	14.873	14.898	14.923	14.948	14.973	14.998	15.023	15.048	700
710	15.048	15.074	15.099	15.124	15.149	15.174	15.199	15.224	15.249	15.274	15.299	710
720	15.299	15.324	15.349	15.375	15.400	15.425	15.450	15.475	15.500	15.525	15.550	720
730	15.550	15.576	15.601	15.626	15.651	15.676	15.701	15.727	15.752	15.777	15.802	730
740	15.802	15.827	15.853	15.878	15.903	15.928	15.953	15.979	16.004	16.029	16.054	740
750	16.054	16.079	16.105	16.130	16.155	16.180	16.206	16.231	16.256	16.281	16.307	750
760	16.307	16.332	16.357	16.383	16.408	16.433	16.458	16.484	16.509	16.534	16.560	760
770	16.560	16.585	16.610	16.636	16.661	16.686	16.712	16.737	16.762	16.788	16.813	770
780	16.813	16.838	16.864	16.889	16.914	16.940	16.965	16.990	17.016	17.041	17.067	780
790	17.067	17.092	17.117	17.143	17.168	17.194	17.219	17.244	17.270	17.295	17.321	790
800	17.321	17.346	17.372	17.397	17.422	17.448	17.473	17.499	17.524	17.550	17.575	800
810	17.575	17.601	17.626	17.651	17.677	17.702	17.728	17.753	17.779	17.804	17.830	810
820	17.830	17.855	17.881	17.906	17.932	17.957	17.983	18.008	18.034	18.059	18.085	820
830	18.085	18.110	18.136	18.161	18.187	18.213	18.238	18.264	18.289	18.315	18.340	830
840	18.340	18.366	18.391	18.417	18.442	18.468	18.494	18.519	18.545	18.570	18.596	840
850	18.596	18.622	18.647	18.673	18.698	18.724	18.749	18.775	18.801	18.826	18.852	850
860	18.852	18.878	18.903	18.929	18.954	18.980	19.006	19.031	19.057	19.083	19.108	860
870	19.108	19.134	19.159	19.185	19.211	19.236	19.262	19.288	19.313	19.339	19.365	870
880	19.365	19.390	19.416	19.442	19.467	19.493	19.519	19.544	19.570	19.596	19.621	860
890	19.621	19.647	19.673	19.699	19.724	19.750	19.776	19.801	19.827	19.853	19.878	890
900	19.878	19.904	19.930	19.956	19.981	20.007	20.033	20.059	20.084	20.110	20.136	900
910	20.136	20.161	20.187	20.213	20.239	20.264	20.290	20.316	20.342	20.367	20.393	910
920	20.393	20.419	20.445	20.470	20.496	20.522	20.548	20.574	20.599	20.625	20.651	920
930	20.651	20.677	20.702	20.728	20.754	20.780	20.806	20.831	20.857	20.883	20.909	930
940	20.909	20.935	20.960	20.986	21.012	21.038	21.064	21.089	21.115	21.141	21.167	940
950	21.167	21.193	21.219	21.244	21.270	21.296	21.322	21.348	21.374	21.399	21.425	950
960	21.425	21.451	21.477	21.503	21.529	21.554	21.580	21.606	21.632	21.658	21.684	960
970	21.684	21.710	21.735	21.761	21.787	21.813	21.839	21.865	21.891	21.916	21.942	970
980	21.942	21.968	21.994	22.020	22.046	22.072	22.098	22.123	22.149	22.175	22.201	980
990	22.201	22.227	22.253	22.279	22.305	22.331	22.356	22.382	22.408	22.434	22.460	990
1000	22.460	22.486	22.512	22.538	22.564	22.590	22.616	22.641	22.667	22.693	22.719	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C5.2. *Platinum, Pt-67, versus type JN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	22.460	22.486	22.512	22.538	22.564	22.590	22.616	22.641	22.667	22.693	22.719	1000
1010	22.719	22.745	22.771	22.797	22.823	22.849	22.875	22.901	22.927	22.952	22.978	1010
1020	22.978	23.004	23.030	23.056	23.082	23.108	23.134	23.160	23.186	23.212	23.238	1020
1030	23.238	23.264	23.290	23.316	23.342	23.367	23.393	23.419	23.445	23.471	23.497	1030
1040	23.497	23.523	23.549	23.575	23.601	23.627	23.653	23.679	23.705	23.731	23.757	1040
1050	23.757	23.783	23.809	23.835	23.861	23.887	23.913	23.939	23.965	23.991	24.017	1050
1060	24.017	24.042	24.068	24.094	24.120	24.146	24.172	24.198	24.224	24.250	24.276	1060
1070	24.276	24.302	24.328	24.354	24.380	24.406	24.432	24.458	24.484	24.510	24.536	1070
1080	24.536	24.562	24.588	24.614	24.640	24.666	24.692	24.718	24.744	24.770	24.796	1080
1090	24.796	24.822	24.848	24.874	24.900	24.926	24.952	24.978	25.004	25.030	25.056	1090
1100	25.056	25.082	25.108	25.134	25.160	25.186	25.212	25.238	25.264	25.290	25.316	1100
1110	25.316	25.342	25.368	25.394	25.420	25.446	25.472	25.498	25.524	25.550	25.576	1110
1120	25.576	25.602	25.628	25.654	25.680	25.706	25.732	25.758	25.785	25.811	25.837	1120
1130	25.837	25.863	25.889	25.915	25.941	25.967	25.993	26.019	26.045	26.071	26.097	1130
1140	26.097	26.123	26.149	26.175	26.201	26.227	26.253	26.279	26.305	26.331	26.357	1140
1150	26.357	26.383	26.409	26.435	26.461	26.487	26.513	26.539	26.565	26.591	26.617	1150
1160	26.617	26.643	26.669	26.695	26.721	26.748	26.774	26.800	26.826	26.852	26.878	1160
1170	26.878	26.904	26.930	26.956	26.982	27.008	27.034	27.060	27.086	27.112	27.138	1170
1180	27.138	27.164	27.190	27.216	27.242	27.268	27.294	27.320	27.346	27.372	27.398	1180
1190	27.398	27.424	27.450	27.476	27.503	27.529	27.555	27.581	27.607	27.633	27.659	1190
1200	27.659	27.685	27.711	27.737	27.763	27.789	27.815	27.841	27.867	27.893	27.919	1200
1210	27.919	27.945	27.971	27.997	28.023	28.049	28.075	28.101	28.127	28.153	28.179	1210
1220	28.179	28.205	28.231	28.258	28.284	28.310	28.336	28.362	28.388	28.414	28.440	1220
1230	28.440	28.466	28.492	28.518	28.544	28.570	28.596	28.622	28.648	28.674	28.700	1230
1240	28.700	28.726	28.752	28.778	28.804	28.830	28.856	28.882	28.908	28.934	28.960	1240
1250	28.960	28.986	29.012	29.038	29.064	29.090	29.116	29.142	29.168	29.195	29.221	1250
1260	29.221	29.247	29.273	29.299	29.325	29.351	29.377	29.403	29.429	29.455	29.481	1260
1270	29.481	29.507	29.533	29.559	29.585	29.611	29.637	29.663	29.689	29.715	29.741	1270
1280	29.741	29.767	29.793	29.819	29.845	29.871	29.897	29.923	29.949	29.975	30.001	1280
1290	30.001	30.027	30.053	30.079	30.105	30.131	30.157	30.183	30.209	30.235	30.261	1290
1300	30.261	30.287	30.313	30.339	30.365	30.391	30.417	30.443	30.469	30.495	30.521	1300
1310	30.521	30.547	30.573	30.599	30.625	30.651	30.677	30.703	30.729	30.755	30.781	1310
1320	30.781	30.807	30.833	30.859	30.885	30.911	30.937	30.963	30.989	31.015	31.041	1320
1330	31.041	31.067	31.093	31.118	31.144	31.170	31.196	31.222	31.248	31.274	31.300	1330
1340	31.300	31.326	31.352	31.378	31.404	31.430	31.456	31.482	31.508	31.534	31.560	1340
1350	31.560	31.586	31.612	31.638	31.664	31.690	31.716	31.741	31.767	31.793	31.819	1350
1360	31.819	31.845	31.871	31.897	31.923	31.949	31.975	32.001	32.027	32.053	32.079	1360
1370	32.079	32.105	32.131	32.156	32.182	32.208	32.234	32.260	32.286	32.312	32.338	1370
1380	32.338	32.364	32.390	32.416	32.442	32.468	32.493	32.519	32.545	32.571	32.597	1380
1390	32.597	32.623	32.649	32.675	32.701	32.727	32.752	32.778	32.804	32.830	32.856	1390
1400	32.856											1400
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C6. Supplementary Reference Tables for the Positive Thermoelement, Type KP (or EP), a Nickel-Chromium Alloy Versus Platinum, Pt-67

The reference function for type KP (or EP) thermoelements versus platinum, Pt-67, given in the main text (see table 7.4.1), was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C6.1 and C6.2. Table C6.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 1372 °C, and table C6.2 presents voltage values at 1 °F intervals from −454 °F to 2501 °F.

TABLE C6.1. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−3.558											−270
−260	−3.549	−3.550	−3.551	−3.552	−3.553	−3.553	−3.554	−3.555	−3.556	−3.557	−3.558	−260
−250	−3.539	−3.540	−3.541	−3.542	−3.543	−3.544	−3.545	−3.546	−3.547	−3.548	−3.549	−250
−240	−3.528	−3.529	−3.530	−3.532	−3.533	−3.534	−3.535	−3.536	−3.537	−3.538	−3.539	−240
−230	−3.513	−3.514	−3.516	−3.518	−3.519	−3.521	−3.522	−3.524	−3.525	−3.527	−3.528	−230
−220	−3.491	−3.494	−3.496	−3.498	−3.501	−3.503	−3.505	−3.507	−3.509	−3.511	−3.513	−220
−210	−3.460	−3.463	−3.467	−3.470	−3.474	−3.477	−3.480	−3.483	−3.486	−3.488	−3.491	−210
−200	−3.416	−3.421	−3.426	−3.431	−3.435	−3.440	−3.444	−3.448	−3.452	−3.456	−3.460	−200
−190	−3.359	−3.366	−3.372	−3.378	−3.384	−3.390	−3.395	−3.401	−3.406	−3.411	−3.416	−190
−180	−3.288	−3.295	−3.303	−3.311	−3.318	−3.325	−3.332	−3.339	−3.346	−3.353	−3.359	−180
−170	−3.201	−3.211	−3.220	−3.229	−3.238	−3.246	−3.255	−3.263	−3.271	−3.280	−3.288	−170
−160	−3.101	−3.111	−3.122	−3.132	−3.143	−3.153	−3.163	−3.173	−3.182	−3.192	−3.201	−160
−150	−2.986	−2.998	−3.010	−3.022	−3.034	−3.045	−3.057	−3.068	−3.079	−3.090	−3.101	−150
−140	−2.859	−2.872	−2.885	−2.898	−2.911	−2.924	−2.937	−2.950	−2.962	−2.974	−2.986	−140
−130	−2.718	−2.733	−2.748	−2.762	−2.776	−2.790	−2.804	−2.818	−2.832	−2.845	−2.859	−130
−120	−2.566	−2.582	−2.597	−2.613	−2.628	−2.644	−2.659	−2.674	−2.689	−2.704	−2.718	−120
−110	−2.402	−2.419	−2.436	−2.452	−2.469	−2.485	−2.502	−2.518	−2.534	−2.550	−2.566	−110
−100	−2.227	−2.245	−2.263	−2.281	−2.299	−2.316	−2.333	−2.351	−2.368	−2.385	−2.402	−100
−90	−2.042	−2.061	−2.080	−2.099	−2.118	−2.136	−2.155	−2.173	−2.191	−2.209	−2.227	−90
−80	−1.848	−1.868	−1.888	−1.907	−1.927	−1.946	−1.966	−1.985	−2.004	−2.023	−2.042	−80
−70	−1.644	−1.665	−1.686	−1.706	−1.727	−1.747	−1.767	−1.788	−1.808	−1.828	−1.848	−70
−60	−1.432	−1.453	−1.475	−1.496	−1.518	−1.539	−1.560	−1.581	−1.602	−1.623	−1.644	−60
−50	−1.211	−1.234	−1.256	−1.278	−1.300	−1.322	−1.344	−1.366	−1.388	−1.410	−1.432	−50
−40	−0.983	−1.006	−1.029	−1.052	−1.075	−1.098	−1.121	−1.143	−1.166	−1.189	−1.211	−40
−30	−0.747	−0.771	−0.795	−0.818	−0.842	−0.866	−0.889	−0.913	−0.936	−0.959	−0.983	−30
−20	−0.505	−0.529	−0.554	−0.578	−0.602	−0.627	−0.651	−0.675	−0.699	−0.723	−0.747	−20
−10	−0.255	−0.281	−0.306	−0.331	−0.356	−0.381	−0.406	−0.430	−0.455	−0.480	−0.505	−10
0	0.000	−0.026	−0.052	−0.077	−0.103	−0.128	−0.154	−0.179	−0.205	−0.230	−0.255	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C6.1. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.026	0.052	0.078	0.104	0.130	0.156	0.182	0.208	0.234	0.261	0
10	0.261	0.287	0.314	0.340	0.367	0.393	0.420	0.446	0.473	0.500	0.527	10
20	0.527	0.554	0.580	0.607	0.634	0.661	0.689	0.716	0.743	0.770	0.797	20
30	0.797	0.825	0.852	0.880	0.907	0.935	0.962	0.990	1.018	1.045	1.073	30
40	1.073	1.101	1.129	1.157	1.184	1.212	1.240	1.269	1.297	1.325	1.353	40
50	1.353	1.381	1.410	1.438	1.466	1.495	1.523	1.552	1.580	1.609	1.637	50
60	1.637	1.666	1.695	1.723	1.752	1.781	1.810	1.839	1.868	1.897	1.926	80
70	1.926	1.955	1.984	2.013	2.042	2.071	2.101	2.130	2.159	2.189	2.218	70
80	2.218	2.248	2.277	2.307	2.336	2.366	2.395	2.425	2.455	2.484	2.514	80
90	2.514	2.544	2.574	2.604	2.634	2.663	2.693	2.723	2.754	2.784	2.814	90
100	2.814	2.844	2.874	2.904	2.935	2.965	2.995	3.025	3.056	3.086	3.117	100
110	3.117	3.147	3.178	3.208	3.239	3.269	3.300	3.331	3.361	3.392	3.423	110
120	3.423	3.454	3.485	3.515	3.546	3.577	3.608	3.639	3.670	3.701	3.732	120
130	3.732	3.763	3.794	3.826	3.857	3.888	3.919	3.950	3.982	4.013	4.044	130
140	4.044	4.076	4.107	4.139	4.170	4.201	4.233	4.265	4.296	4.328	4.359	140
150	4.359	4.391	4.423	4.454	4.486	4.518	4.549	4.581	4.613	4.645	4.677	150
160	4.677	4.709	4.741	4.773	4.804	4.836	4.868	4.901	4.933	4.965	4.997	160
170	4.997	5.029	5.061	5.093	5.125	5.158	5.190	5.222	5.254	5.287	5.319	170
180	5.319	5.351	5.384	5.416	5.449	5.481	5.513	5.546	5.578	5.611	5.644	180
190	5.644	5.676	5.709	5.741	5.774	5.807	5.839	5.872	5.905	5.937	5.970	190
200	5.970	6.003	6.036	6.068	6.101	6.134	6.167	6.200	6.233	6.266	6.299	200
210	6.299	6.332	6.365	6.398	6.431	6.464	6.497	6.530	6.563	6.596	6.629	210
220	6.629	6.662	6.695	6.728	6.762	6.795	6.828	6.861	6.894	6.928	6.961	220
230	6.961	6.994	7.028	7.061	7.094	7.128	7.161	7.194	7.228	7.261	7.294	230
240	7.294	7.328	7.361	7.395	7.428	7.462	7.495	7.529	7.562	7.596	7.630	240
250	7.630	7.663	7.697	7.730	7.764	7.798	7.831	7.865	7.899	7.932	7.966	250
260	7.966	8.000	8.033	8.067	8.101	8.135	8.168	8.202	8.236	8.270	8.304	260
270	8.304	8.337	8.371	8.405	8.439	8.473	8.507	8.541	8.575	8.608	8.642	270
280	8.642	8.676	8.710	8.744	8.778	8.812	8.846	8.880	8.914	8.948	8.982	280
290	8.982	9.016	9.050	9.084	9.118	9.153	9.187	9.221	9.255	9.289	9.323	290
300	9.323	9.357	9.391	9.425	9.460	9.494	9.528	9.562	9.596	9.631	9.665	300
310	9.665	9.699	9.733	9.767	9.802	9.836	9.870	9.904	9.939	9.973	10.007	310
320	10.007	10.041	10.076	10.110	10.144	10.179	10.213	10.247	10.282	10.316	10.350	320
330	10.350	10.385	10.419	10.453	10.488	10.522	10.556	10.591	10.625	10.660	10.694	330
340	10.694	10.728	10.763	10.797	10.832	10.866	10.900	10.935	10.969	11.004	11.038	340
350	11.038	11.073	11.107	11.142	11.176	11.210	11.245	11.279	11.314	11.348	11.383	350
360	11.383	11.417	11.452	11.486	11.521	11.555	11.590	11.624	11.659	11.693	11.728	360
370	11.728	11.762	11.797	11.831	11.866	11.900	11.935	11.969	12.004	12.039	12.073	370
380	12.073	12.108	12.142	12.177	12.211	12.246	12.280	12.315	12.349	12.384	12.419	380
390	12.419	12.453	12.488	12.522	12.557	12.591	12.626	12.660	12.695	12.730	12.764	390
400	12.764	12.799	12.833	12.868	12.902	12.937	12.971	13.006	13.041	13.075	13.110	400
410	13.110	13.144	13.179	13.213	13.248	13.283	13.317	13.352	13.386	13.421	13.455	410
420	13.455	13.490	13.524	13.559	13.594	13.628	13.663	13.697	13.732	13.766	13.801	420
430	13.801	13.835	13.870	13.905	13.939	13.974	14.008	14.043	14.077	14.112	14.146	430
440	14.146	14.181	14.215	14.250	14.285	14.319	14.354	14.388	14.423	14.457	14.492	440
450	14.492	14.526	14.561	14.595	14.630	14.664	14.699	14.733	14.768	14.802	14.837	450
460	14.837	14.871	14.906	14.940	14.975	15.009	15.044	15.078	15.113	15.147	15.181	460
470	15.181	15.216	15.250	15.285	15.319	15.354	15.388	15.423	15.457	15.491	15.526	470
480	15.526	15.560	15.595	15.629	15.664	15.698	15.732	15.767	15.801	15.835	15.870	480
490	15.870	15.904	15.939	15.973	16.007	16.042	16.076	16.110	16.145	16.179	16.213	490
500	16.213	16.248	16.282	16.316	16.351	16.385	16.419	16.454	16.488	16.522	16.557	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C6.1. ***Type KP (or EP) thermoelements versus platinum, Pt-67*** *--- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	16.213	16.248	16.282	16.316	16.351	16.385	16.419	16.454	16.488	16.522	16.557	500
510	16.557	16.591	16.625	16.659	16.694	16.728	16.762	16.797	16.831	16.865	16.899	510
520	16.899	16.933	16.968	17.002	17.036	17.070	17.105	17.139	17.173	17.207	17.241	520
530	17.241	17.275	17.310	17.344	17.378	17.412	17.446	17.480	17.515	17.549	17.583	530
540	17.583	17.617	17.651	17.685	17.719	17.753	17.787	17.822	17.856	17.890	17.924	540
550	17.924	17.958	17.992	18.026	18.060	18.094	18.128	18.162	18.196	18.230	18.264	550
560	18.264	18.298	18.332	18.366	18.400	18.434	18.468	18.502	18.536	18.570	18.604	560
570	18.604	18.638	18.671	18.705	18.739	18.773	18.807	18.841	18.875	18.909	18.943	570
580	18.943	18.976	19.010	19.044	19.078	19.112	19.146	19.179	19.213	19.247	19.281	580
590	19.281	19.315	19.348	19.382	19.416	19.450	19.483	19.517	19.551	19.585	19.618	590
600	19.618	19.652	19.686	19.719	19.753	19.787	19.820	19.854	19.888	19.921	19.955	600
610	19.955	19.989	20.022	20.056	20.090	20.123	20.157	20.190	20.224	20.257	20.291	610
620	20.291	20.325	20.358	20.392	20.425	20.459	20.492	20.526	20.559	20.593	20.626	620
630	20.626	20.660	20.693	20.727	20.760	20.794	20.827	20.860	20.894	20.927	20.961	630
640	20.961	20.994	21.028	21.061	21.094	21.128	21.161	21.194	21.228	21.261	21.294	640
650	21.294	21.328	21.361	21.394	21.428	21.461	21.494	21.528	21.561	21.594	21.627	650
660	21.627	21.661	21.694	21.727	21.760	21.793	21.827	21.860	21.893	21.926	21.959	660
670	21.959	21.993	22.026	22.059	22.092	22.125	22.158	22.191	22.225	22.258	22.291	670
680	22.291	22.324	22.357	22.390	22.423	22.456	22.489	22.522	22.555	22.588	22.621	680
690	22.621	22.654	22.687	22.720	22.753	22.786	22.819	22.852	22.885	22.918	22.951	690
700	22.951	22.984	23.017	23.050	23.083	23.115	23.148	23.181	23.214	23.247	23.280	700
710	23.280	23.313	23.346	23.378	23.411	23.444	23.477	23.510	23.542	23.575	23.608	710
720	23.608	23.641	23.674	23.706	23.739	23.772	23.804	23.837	23.870	23.903	23.935	720
730	23.935	23.968	24.001	24.033	24.066	24.099	24.131	24.164	24.197	24.229	24.262	730
740	24.262	24.294	24.327	24.360	24.392	24.425	24.457	24.490	24.523	24.555	24.588	740
750	24.588	24.620	24.653	24.685	24.718	24.750	24.783	24.815	24.848	24.880	24.913	750
760	24.913	24.945	24.978	25.010	25.042	25.075	25.107	25.140	25.172	25.204	25.237	760
770	25.237	25.269	25.302	25.334	25.366	25.399	25.431	25.463	25.496	25.528	25.560	770
780	25.560	25.593	25.625	25.657	25.689	25.722	25.754	25.786	25.819	25.851	25.883	780
790	25.883	25.915	25.947	25.980	26.012	26.044	26.076	26.108	26.141	26.173	26.205	790
800	26.205	26.237	26.269	26.301	26.334	26.366	26.398	26.430	26.462	26.494	26.526	800
810	26.526	26.558	26.590	26.622	26.655	26.687	26.719	26.751	26.783	26.815	26.847	810
820	26.847	26.879	26.911	26.943	26.975	27.007	27.039	27.071	27.103	27.135	27.167	820
830	27.167	27.198	27.230	27.262	27.294	27.326	27.358	27.390	27.422	27.454	27.486	830
840	27.486	27.517	27.549	27.581	27.613	27.645	27.677	27.709	27.740	27.772	27.804	840
850	27.804	27.836	27.868	27.899	27.931	27.963	27.995	28.026	28.058	28.090	28.122	850
860	28.122	28.153	28.185	28.217	28.249	28.280	28.312	28.344	28.375	28.407	28.439	860
870	28.439	28.470	28.502	28.534	28.565	28.597	28.629	28.660	28.692	28.723	28.755	870
880	28.755	28.787	28.818	28.850	28.881	28.913	28.944	28.976	29.008	29.039	29.071	880
890	29.071	29.102	29.134	29.165	29.197	29.228	29.260	29.291	29.323	29.354	29.386	890
900	29.386	29.417	29.448	29.480	29.511	29.543	29.574	29.606	29.637	29.668	29.700	900
910	29.700	29.731	29.763	29.794	29.825	29.857	29.888	29.919	29.951	29.982	30.014	910
920	30.014	30.045	30.076	30.107	30.139	30.170	30.201	30.233	30.264	30.295	30.326	920
930	30.326	30.358	30.389	30.420	30.451	30.483	30.514	30.545	30.576	30.608	30.639	930
940	30.639	30.670	30.701	30.732	30.764	30.795	30.826	30.857	30.888	30.919	30.950	940
950	30.950	30.982	31.013	31.044	31.075	31.106	31.137	31.168	31.199	31.230	31.261	950
960	31.261	31.293	31.324	31.355	31.386	31.417	31.448	31.479	31.510	31.541	31.572	960
970	31.572	31.603	31.634	31.665	31.696	31.727	31.758	31.789	31.820	31.851	31.881	970
980	31.881	31.912	31.943	31.974	32.005	32.036	32.067	32.098	32.129	32.160	32.190	980
990	32.190	32.221	32.252	32.283	32.314	32.345	32.376	32.406	32.437	32.468	32.499	990
1000	32.499	32.530	32.560	32.591	32.622	32.653	32.683	32.714	32.745	32.776	32.806	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C6.1. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	32.499	32.530	32.560	32.591	32.622	32.653	32.683	32.714	32.745	32.776	32.806	1000
1010	32.806	32.837	32.868	32.899	32.929	32.960	32.991	33.021	33.052	33.083	33.113	1010
1020	33.113	33.144	33.175	33.205	33.236	33.267	33.297	33.328	33.359	33.389	33.420	1020
1030	33.420	33.450	33.481	33.511	33.542	33.573	33.603	33.634	33.664	33.695	33.725	1030
1040	33.725	33.756	33.786	33.817	33.847	33.878	33.908	33.939	33.969	34.000	34.030	1040
1050	34.030	34.061	34.091	34.122	34.152	34.182	34.213	34.243	34.274	34.304	34.334	1050
1060	34.334	34.365	34.395	34.425	34.456	34.486	34.517	34.547	34.577	34.607	34.638	1060
1070	34.638	34.668	34.698	34.729	34.759	34.789	34.820	34.850	34.880	34.910	34.940	1070
1080	34.940	34.971	35.001	35.031	35.061	35.092	35.122	35.152	35.182	35.212	35.242	1080
1090	35.242	35.273	35.303	35.333	35.363	35.393	35.423	35.453	35.483	35.513	35.544	1090
1100	35.544	35.574	35.604	35.634	35.664	35.694	35.724	35.754	35.784	35.814	35.844	1100
1110	35.844	35.874	35.904	35.934	35.964	35.994	36.024	36.054	36.084	36.114	36.143	1110
1120	36.143	36.173	36.203	36.233	36.263	36.293	36.323	36.353	36.383	36.412	36.442	1120
1130	36.442	36.472	36.502	36.532	36.561	36.591	36.621	36.651	36.681	36.710	36.740	1130
1140	36.740	36.770	36.800	36.829	36.859	36.889	36.918	36.948	36.978	37.007	37.037	1140
1150	37.037	37.067	37.096	37.126	37.156	37.185	37.215	37.244	37.274	37.304	37.333	1150
1160	37.333	37.363	37.392	37.422	37.451	37.481	37.510	37.540	37.569	37.599	37.628	1160
1170	37.628	37.658	37.687	37.717	37.746	37.776	37.805	37.835	37.864	37.893	37.923	1170
1180	37.923	37.952	37.981	38.011	38.040	38.069	38.099	38.128	38.157	38.187	38.216	1180
1190	38.216	38.245	38.274	38.304	38.333	38.362	38.391	38.421	38.450	38.479	38.508	1190
1200	38.508	38.537	38.567	38.596	38.625	38.654	38.683	38.712	38.741	38.770	38.799	1200
1210	38.799	38.829	38.858	38.887	38.916	38.945	38.974	39.003	39.032	39.061	39.090	1210
1220	39.090	39.119	39.148	39.176	39.205	39.234	39.263	39.292	39.321	39.350	39.379	1220
1230	39.379	39.407	39.436	39.465	39.494	39.523	39.552	39.580	39.609	39.638	39.667	1230
1240	39.667	39.695	39.724	39.753	39.781	39.810	39.839	39.867	39.896	39.925	39.953	1240
1250	39.953	39.982	40.010	40.039	40.067	40.096	40.124	40.153	40.182	40.210	40.238	1250
1260	40.238	40.267	40.295	40.324	40.352	40.381	40.409	40.437	40.466	40.494	40.522	1260
1270	40.522	40.551	40.579	40.607	40.636	40.664	40.692	40.720	40.749	40.777	40.805	1270
1280	40.805	40.833	40.861	40.890	40.918	40.946	40.974	41.002	41.030	41.058	41.086	1280
1290	41.086	41.114	41.142	41.170	41.198	41.226	41.254	41.282	41.310	41.338	41.366	1290
1300	41.366	41.393	41.421	41.449	41.477	41.505	41.532	41.560	41.588	41.616	41.643	1300
1310	41.643	41.671	41.699	41.726	41.754	41.781	41.809	41.837	41.864	41.892	41.919	1310
1320	41.919	41.947	41.974	42.002	42.029	42.056	42.084	42.111	42.138	42.166	42.193	1320
1330	42.193	42.220	42.248	42.275	42.302	42.329	42.356	42.384	42.411	42.438	42.465	1330
1340	42.465	42.492	42.519	42.546	42.573	42.600	42.627	42.654	42.681	42.708	42.734	1340
1350	42.734	42.761	42.788	42.815	42.842	42.868	42.895	42.922	42.948	42.975	43.002	1350
1360	43.002	43.028	43.055	43.081	43.108	43.134	43.160	43.187	43.213	43.240	43.266	1360
1370	43.266	43.292	43.318									1370
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C6.2. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−3.556	−3.556	−3.557	−3.557	−3.558							−450
−440	−3.551	−3.552	−3.552	−3.553	−3.553	−3.553	−3.554	−3.554	−3.555	−3.555	−3.556	−440
−430	−3.546	−3.546	−3.547	−3.548	−3.548	−3.549	−3.549	−3.550	−3.550	−3.551	−3.551	−430
−420	−3.541	−3.541	−3.542	−3.542	−3.543	−3.543	−3.544	−3.544	−3.545	−3.545	−3.546	−420
−410	−3.535	−3.535	−3.536	−3.536	−3.537	−3.538	−3.538	−3.539	−3.539	−3.540	−3.541	−410
−400	−3.528	−3.529	−3.529	−3.530	−3.531	−3.531	−3.532	−3.533	−3.533	−3.534	−3.535	−400
−390	−3.520	−3.521	−3.522	−3.523	−3.523	−3.524	−3.525	−3.526	−3.526	−3.527	−3.528	−390
−380	−3.511	−3.512	−3.513	−3.514	−3.515	−3.516	−3.517	−3.517	−3.518	−3.519	−3.520	−380
−370	−3.499	−3.500	−3.502	−3.503	−3.504	−3.505	−3.506	−3.507	−3.509	−3.510	−3.511	−370
−360	−3.485	−3.487	−3.488	−3.490	−3.491	−3.492	−3.494	−3.495	−3.497	−3.498	−3.499	−360
−350	−3.468	−3.470	−3.471	−3.473	−3.475	−3.477	−3.478	−3.480	−3.482	−3.483	−3.485	−350
−340	−3.447	−3.449	−3.451	−3.453	−3.456	−3.458	−3.460	−3.462	−3.464	−3.466	−3.468	−340
−330	−3.422	−3.425	−3.427	−3.430	−3.432	−3.435	−3.437	−3.440	−3.442	−3.444	−3.447	−330
−320	−3.393	−3.396	−3.399	−3.402	−3.405	−3.408	−3.411	−3.414	−3.416	−3.419	−3.422	−320
−310	−3.359	−3.363	−3.366	−3.370	−3.373	−3.377	−3.380	−3.383	−3.386	−3.390	−3.393	−310
−300	−3.321	−3.325	−3.329	−3.333	−3.337	−3.341	−3.345	−3.348	−3.352	−3.356	−3.359	−300
−290	−3.279	−3.283	−3.288	−3.292	−3.296	−3.301	−3.305	−3.309	−3.313	−3.317	−3.321	−290
−280	−3.232	−3.237	−3.241	−3.246	−3.251	−3.256	−3.260	−3.265	−3.270	−3.274	−3.279	−280
−270	−3.180	−3.186	−3.191	−3.196	−3.201	−3.206	−3.212	−3.217	−3.222	−3.227	−3.232	−270
−260	−3.124	−3.130	−3.136	−3.142	−3.147	−3.153	−3.158	−3.164	−3.169	−3.175	−3.180	−260
−250	−3.064	−3.070	−3.077	−3.083	−3.089	−3.095	−3.101	−3.107	−3.113	−3.119	−3.124	−250
−240	−3.000	−3.006	−3.013	−3.020	−3.026	−3.033	−3.039	−3.045	−3.052	−3.058	−3.064	−240
−230	−2.931	−2.938	−2.945	−2.952	−2.959	−2.966	−2.973	−2.980	−2.986	−2.993	−3.000	−230
−220	−2.859	−2.866	−2.874	−2.881	−2.888	−2.895	−2.903	−2.910	−2.917	−2.924	−2.931	−220
−210	−2.782	−2.790	−2.798	−2.806	−2.813	−2.821	−2.829	−2.836	−2.844	−2.851	−2.859	−210
−200	−2.702	−2.710	−2.718	−2.727	−2.735	−2.743	−2.751	−2.759	−2.767	−2.775	−2.782	−200
−190	−2.618	−2.627	−2.635	−2.644	−2.652	−2.661	−2.669	−2.677	−2.686	−2.694	−2.702	−190
−180	−2.531	−2.539	−2.548	−2.557	−2.566	−2.575	−2.584	−2.592	−2.601	−2.610	−2.618	−180
−170	−2.439	−2.449	−2.458	−2.467	−2.476	−2.485	−2.495	−2.504	−2.513	−2.522	−2.531	−170
−160	−2.345	−2.355	−2.364	−2.374	−2.383	−2.393	−2.402	−2.412	−2.421	−2.430	−2.439	−160
−150	−2.247	−2.257	−2.267	−2.277	−2.287	−2.297	−2.306	−2.316	−2.326	−2.335	−2.345	−150
−140	−2.146	−2.157	−2.167	−2.177	−2.187	−2.197	−2.207	−2.217	−2.227	−2.237	−2.247	−140
−130	−2.042	−2.053	−2.063	−2.074	−2.084	−2.095	−2.105	−2.116	−2.126	−2.136	−2.146	−130
−120	−1.936	−1.946	−1.957	−1.968	−1.979	−1.989	−2.000	−2.011	−2.021	−2.032	−2.042	−120
−110	−1.826	−1.837	−1.848	−1.859	−1.870	−1.881	−1.892	−1.903	−1.914	−1.925	−1.936	−110
−100	−1.713	−1.724	−1.736	−1.747	−1.758	−1.770	−1.781	−1.792	−1.803	−1.815	−1.826	−100
−90	−1.598	−1.609	−1.621	−1.633	−1.644	−1.656	−1.667	−1.679	−1.690	−1.702	−1.713	−90
−80	−1.480	−1.492	−1.504	−1.515	−1.527	−1.539	−1.551	−1.563	−1.574	−1.586	−1.598	−80
−70	−1.359	−1.371	−1.383	−1.396	−1.408	−1.420	−1.432	−1.444	−1.456	−1.468	−1.480	−70
−60	−1.236	−1.248	−1.261	−1.273	−1.286	−1.298	−1.310	−1.322	−1.335	−1.347	−1.359	−60
−50	−1.111	−1.123	−1.136	−1.148	−1.161	−1.174	−1.186	−1.199	−1.211	−1.224	−1.236	−50
−40	−0.983	−0.996	−1.008	−1.021	−1.034	−1.047	−1.060	−1.072	−1.085	−1.098	−1.111	−40
−30	−0.853	−0.866	−0.879	−0.892	−0.905	−0.918	−0.931	−0.944	−0.957	−0.970	−0.983	−30
−20	−0.720	−0.734	−0.747	−0.760	−0.774	−0.787	−0.800	−0.813	−0.826	−0.840	−0.853	−20
−10	−0.586	−0.600	−0.613	−0.627	−0.640	−0.654	−0.667	−0.680	−0.694	−0.707	−0.720	−10
0	−0.450	−0.463	−0.477	−0.491	−0.505	−0.518	−0.532	−0.545	−0.559	−0.573	−0.586	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C6.2. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.450	−0.436	−0.422	−0.408	−0.395	−0.381	−0.367	−0.353	−0.339	−0.325	−0.311	0
10	−0.311	−0.297	−0.283	−0.269	−0.255	−0.241	−0.227	−0.213	−0.199	−0.185	−0.171	10
20	−0.171	−0.157	−0.143	−0.128	−0.114	−0.100	−0.086	−0.072	−0.057	−0.043	−0.029	20
30	−0.029	−0.014	0.000	0.014	0.029	0.043	0.057	0.072	0.086	0.101	0.115	30
40	0.115	0.130	0.144	0.159	0.173	0.188	0.202	0.217	0.232	0.246	0.261	40
50	0.261	0.275	0.290	0.305	0.319	0.334	0.349	0.364	0.378	0.393	0.408	50
60	0.408	0.423	0.437	0.452	0.467	0.482	0.497	0.512	0.527	0.542	0.557	60
70	0.557	0.571	0.586	0.601	0.616	0.631	0.646	0.661	0.677	0.692	0.707	70
80	0.707	0.722	0.737	0.752	0.767	0.782	0.797	0.813	0.828	0.843	0.858	80
90	0.858	0.874	0.889	0.904	0.919	0.935	0.950	0.965	0.981	0.996	1.011	90
100	1.011	1.027	1.042	1.058	1.073	1.088	1.104	1.119	1.135	1.150	1.166	100
110	1.166	1.181	1.197	1.212	1.228	1.244	1.259	1.275	1.290	1.306	1.322	110
120	1.322	1.337	1.353	1.369	1.384	1.400	1.416	1.432	1.447	1.463	1.479	120
130	1.479	1.495	1.510	1.526	1.542	1.558	1.574	1.590	1.606	1.621	1.637	130
140	1.637	1.653	1.669	1.685	1.701	1.717	1.733	1.749	1.765	1.781	1.797	140
150	1.797	1.813	1.829	1.845	1.861	1.877	1.894	1.910	1.926	1.942	1.958	150
160	1.958	1.974	1.990	2.007	2.023	2.039	2.055	2.071	2.088	2.104	2.120	160
170	2.120	2.136	2.153	2.169	2.185	2.202	2.218	2.234	2.251	2.267	2.284	170
180	2.284	2.300	2.316	2.333	2.349	2.366	2.382	2.399	2.415	2.432	2.448	180
190	2.448	2.465	2.481	2.498	2.514	2.531	2.547	2.564	2.580	2.597	2.614	190
200	2.614	2.630	2.647	2.663	2.680	2.697	2.713	2.730	2.747	2.764	2.780	200
210	2.780	2.797	2.814	2.830	2.847	2.864	2.881	2.898	2.914	2.931	2.948	210
220	2.948	2.965	2.982	2.999	3.015	3.032	3.049	3.066	3.083	3.100	3.117	220
230	3.117	3.134	3.151	3.168	3.184	3.201	3.218	3.235	3.252	3.269	3.286	230
240	3.286	3.303	3.321	3.338	3.355	3.372	3.389	3.406	3.423	3.440	3.457	240
250	3.457	3.474	3.491	3.509	3.526	3.543	3.560	3.577	3.594	3.612	3.629	250
260	3.629	3.646	3.663	3.680	3.698	3.715	3.732	3.749	3.767	3.784	3.801	260
270	3.801	3.819	3.836	3.853	3.871	3.888	3.905	3.923	3.940	3.957	3.975	270
280	3.975	3.992	4.010	4.027	4.044	4.062	4.079	4.097	4.114	4.132	4.149	280
290	4.149	4.166	4.184	4.201	4.219	4.236	4.254	4.272	4.289	4.307	4.324	290
300	4.324	4.342	4.359	4.377	4.394	4.412	4.430	4.447	4.465	4.482	4.500	300
310	4.500	4.518	4.535	4.553	4.571	4.588	4.606	4.624	4.641	4.659	4.677	310
320	4.677	4.694	4.712	4.730	4.748	4.765	4.783	4.801	4.819	4.836	4.854	320
330	4.854	4.872	4.890	4.908	4.925	4.943	4.961	4.979	4.997	5.015	5.032	330
340	5.032	5.050	5.068	5.086	5.104	5.122	5.140	5.158	5.176	5.193	5.211	340
350	5.211	5.229	5.247	5.265	5.283	5.301	5.319	5.337	5.355	5.373	5.391	350
360	5.391	5.409	5.427	5.445	5.463	5.481	5.499	5.517	5.535	5.553	5.571	360
370	5.571	5.589	5.607	5.625	5.644	5.662	5.680	5.698	5.716	5.734	5.752	370
380	5.752	5.770	5.788	5.807	5.825	5.843	5.861	5.879	5.897	5.916	5.934	380
390	5.934	5.952	5.970	5.988	6.007	6.025	6.043	6.061	6.079	6.098	6.116	390
400	6.116	6.134	6.152	6.171	6.189	6.207	6.225	6.244	6.262	6.280	6.299	400
410	6.299	6.317	6.335	6.354	6.372	6.390	6.409	6.427	6.445	6.464	6.482	410
420	6.482	6.500	6.519	6.537	6.555	6.574	6.592	6.611	6.629	6.647	6.666	420
430	6.666	6.684	6.703	6.721	6.739	6.758	6.776	6.795	6.813	6.832	6.850	430
440	6.850	6.869	6.887	6.905	6.924	6.942	6.961	6.979	6.998	7.016	7.035	440
450	7.035	7.053	7.072	7.090	7.109	7.128	7.146	7.165	7.183	7.202	7.220	450
460	7.220	7.239	7.257	7.276	7.294	7.313	7.332	7.350	7.369	7.387	7.406	460
470	7.406	7.425	7.443	7.462	7.480	7.499	7.518	7.536	7.555	7.574	7.592	470
480	7.592	7.611	7.630	7.648	7.667	7.686	7.704	7.723	7.742	7.760	7.779	480
490	7.779	7.798	7.816	7.835	7.854	7.872	7.891	7.910	7.928	7.947	7.966	490
500	7.966	7.985	8.003	8.022	8.041	8.060	8.078	8.097	8.116	8.135	8.153	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C6.2. ***Type KP (or EP) thermoelements versus platinum, Pt-67*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	7.966	7.985	8.003	8.022	8.041	8.060	8.078	8.097	8.116	8.135	8.153	500
510	8.153	8.172	8.191	8.210	8.228	8.247	8.266	8.285	8.304	8.322	8.341	510
520	8.341	8.360	8.379	8.398	8.416	8.435	8.454	8.473	8.492	8.511	8.529	520
530	8.529	8.548	8.567	8.586	8.605	8.624	8.642	8.661	8.680	8.699	8.718	530
540	8.718	8.737	8.756	8.774	8.793	8.812	8.831	8.850	8.869	8.888	8.907	540
550	8.907	8.926	8.944	8.963	8.982	9.001	9.020	9.039	9.058	9.077	9.096	550
560	9.096	9.115	9.134	9.153	9.171	9.190	9.209	9.228	9.247	9.266	9.285	560
570	9.285	9.304	9.323	9.342	9.361	9.380	9.399	9.418	9.437	9.456	9.475	570
580	9.475	9.494	9.513	9.532	9.551	9.570	9.589	9.608	9.627	9.646	9.665	580
590	9.665	9.684	9.703	9.722	9.741	9.760	9.779	9.798	9.817	9.836	9.855	590
600	9.855	9.874	9.893	9.912	9.931	9.950	9.969	9.988	10.007	10.026	10.045	600
610	10.045	10.064	10.083	10.102	10.121	10.141	10.160	10.179	10.198	10.217	10.236	610
620	10.236	10.255	10.274	10.293	10.312	10.331	10.350	10.369	10.388	10.408	10.427	620
630	10.427	10.446	10.465	10.484	10.503	10.522	10.541	10.560	10.579	10.598	10.618	630
640	10.618	10.637	10.656	10.675	10.694	10.713	10.732	10.751	10.770	10.790	10.809	640
650	10.809	10.828	10.847	10.866	10.885	10.904	10.923	10.943	10.962	10.981	11.000	650
660	11.000	11.019	11.038	11.057	11.076	11.096	11.115	11.134	11.153	11.172	11.191	660
670	11.191	11.210	11.230	11.249	11.268	11.287	11.306	11.325	11.345	11.364	11.383	670
680	11.383	11.402	11.421	11.440	11.459	11.479	11.498	11.517	11.536	11.555	11.574	680
690	11.574	11.594	11.613	11.632	11.651	11.670	11.689	11.709	11.728	11.747	11.766	690
700	11.766	11.785	11.804	11.824	11.843	11.862	11.881	11.900	11.920	11.939	11.958	700
710	11.958	11.977	11.996	12.015	12.035	12.054	12.073	12.092	12.111	12.131	12.150	710
720	12.150	12.169	12.188	12.207	12.227	12.246	12.265	12.284	12.303	12.323	12.342	720
730	12.342	12.361	12.380	12.399	12.419	12.438	12.457	12.476	12.495	12.514	12.534	730
740	12.534	12.553	12.572	12.591	12.610	12.630	12.649	12.668	12.687	12.706	12.726	740
750	12.726	12.745	12.764	12.783	12.802	12.822	12.841	12.860	12.879	12.898	12.918	750
760	12.918	12.937	12.956	12.975	12.995	13.014	13.033	13.052	13.071	13.091	13.110	760
770	13.110	13.129	13.148	13.167	13.187	13.206	13.225	13.244	13.263	13.283	13.302	770
780	13.302	13.321	13.340	13.359	13.379	13.398	13.417	13.436	13.455	13.475	13.494	780
790	13.494	13.513	13.532	13.551	13.571	13.590	13.609	13.628	13.647	13.667	13.686	790
800	13.686	13.705	13.724	13.743	13.763	13.782	13.801	13.820	13.839	13.859	13.878	800
810	13.878	13.897	13.916	13.935	13.954	13.974	13.993	14.012	14.031	14.050	14.070	810
820	14.070	14.089	14.108	14.127	14.146	14.166	14.185	14.204	14.223	14.242	14.262	820
830	14.262	14.281	14.300	14.319	14.338	14.357	14.377	14.396	14.415	14.434	14.453	830
840	14.453	14.472	14.492	14.511	14.530	14.549	14.568	14.588	14.607	14.626	14.645	840
850	14.645	14.664	14.683	14.703	14.722	14.741	14.760	14.779	14.798	14.818	14.837	850
860	14.837	14.856	14.875	14.894	14.913	14.932	14.952	14.971	14.990	15.009	15.028	860
870	15.028	15.047	15.067	15.086	15.105	15.124	15.143	15.162	15.181	15.201	15.220	870
880	15.220	15.239	15.258	15.277	15.296	15.315	15.335	15.354	15.373	15.392	15.411	880
890	15.411	15.430	15.449	15.468	15.488	15.507	15.526	15.545	15.564	15.583	15.602	890
900	15.602	15.621	15.641	15.660	15.679	15.698	15.717	15.736	15.755	15.774	15.793	900
910	15.793	15.813	15.832	15.851	15.870	15.889	15.908	15.927	15.946	15.965	15.984	910
920	15.984	16.004	16.023	16.042	16.061	16.080	16.099	16.118	16.137	16.156	16.175	920
930	16.175	16.194	16.213	16.233	16.252	16.271	16.290	16.309	16.328	16.347	16.366	930
940	16.366	16.385	16.404	16.423	16.442	16.461	16.480	16.499	16.519	16.538	16.557	940
950	16.557	16.576	16.595	16.614	16.633	16.652	16.671	16.690	16.709	16.728	16.747	950
960	16.747	16.766	16.785	16.804	16.823	16.842	16.861	16.880	16.899	16.918	16.937	960
970	16.937	16.956	16.975	16.994	17.013	17.032	17.051	17.070	17.089	17.108	17.127	970
980	17.127	17.146	17.165	17.184	17.203	17.222	17.241	17.260	17.279	17.298	17.317	980
990	17.317	17.336	17.355	17.374	17.393	17.412	17.431	17.450	17.469	17.488	17.507	990
1000	17.507	17.526	17.545	17.564	17.583	17.602	17.621	17.640	17.659	17.678	17.697	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C6.2. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	17.507	17.526	17.545	17.564	17.583	17.602	17.621	17.640	17.659	17.678	17.697	1000
1010	17.697	17.715	17.734	17.753	17.772	17.791	17.810	17.829	17.848	17.867	17.886	1010
1020	17.886	17.905	17.924	17.943	17.962	17.980	17.999	18.018	18.037	18.056	18.075	1020
1030	18.075	18.094	18.113	18.132	18.151	18.170	18.188	18.207	18.226	18.245	18.264	1030
1040	18.264	18.283	18.302	18.321	18.340	18.358	18.377	18.396	18.415	18.434	18.453	1040
1050	18.453	18.472	18.490	18.509	18.528	18.547	18.566	18.585	18.604	18.622	18.641	1050
1060	18.641	18.660	18.679	18.698	18.717	18.735	18.754	18.773	18.792	18.811	18.830	1060
1070	18.830	18.848	18.867	18.886	18.905	18.924	18.943	18.961	18.980	18.999	19.018	1070
1080	19.018	19.037	19.055	19.074	19.093	19.112	19.131	19.149	19.168	19.187	19.206	1080
1090	19.206	19.224	19.243	19.262	19.281	19.300	19.318	19.337	19.356	19.375	19.393	1090
1100	19.393	19.412	19.431	19.450	19.468	19.487	19.506	19.525	19.543	19.562	19.581	1100
1110	19.581	19.600	19.618	19.637	19.656	19.674	19.693	19.712	19.731	19.749	19.768	1110
1120	19.768	19.787	19.805	19.824	19.843	19.862	19.880	19.899	19.918	19.936	19.955	1120
1130	19.955	19.974	19.992	20.011	20.030	20.048	20.067	20.086	20.104	20.123	20.142	1130
1140	20.142	20.160	20.179	20.198	20.216	20.235	20.254	20.272	20.291	20.310	20.328	1140
1150	20.328	20.347	20.366	20.384	20.403	20.421	20.440	20.459	20.477	20.496	20.515	1150
1160	20.515	20.533	20.552	20.570	20.589	20.608	20.626	20.645	20.663	20.682	20.701	1160
1170	20.701	20.719	20.738	20.756	20.775	20.794	20.812	20.831	20.849	20.868	20.886	1170
1180	20.886	20.905	20.924	20.942	20.961	20.979	20.998	21.016	21.035	21.054	21.072	1180
1190	21.072	21.091	21.109	21.128	21.146	21.165	21.183	21.202	21.220	21.239	21.257	1190
1200	21.257	21.276	21.294	21.313	21.331	21.350	21.368	21.387	21.405	21.424	21.442	1200
1210	21.442	21.461	21.479	21.498	21.516	21.535	21.553	21.572	21.590	21.609	21.627	1210
1220	21.627	21.646	21.664	21.683	21.701	21.720	21.738	21.757	21.775	21.793	21.812	1220
1230	21.812	21.830	21.849	21.867	21.886	21.904	21.923	21.941	21.959	21.978	21.996	1230
1240	21.996	22.015	22.033	22.052	22.070	22.088	22.107	22.125	22.144	22.162	22.180	1240
1250	22.180	22.199	22.217	22.236	22.254	22.272	22.291	22.309	22.327	22.346	22.364	1250
1260	22.364	22.383	22.401	22.419	22.438	22.456	22.474	22.493	22.511	22.530	22.548	1260
1270	22.548	22.566	22.585	22.603	22.621	22.640	22.658	22.676	22.695	22.713	22.731	1270
1280	22.731	22.750	22.768	22.786	22.805	22.823	22.841	22.859	22.878	22.896	22.914	1280
1290	22.914	22.933	22.951	22.969	22.988	23.006	23.024	23.042	23.061	23.079	23.097	1290
1300	23.097	23.115	23.134	23.152	23.170	23.189	23.207	23.225	23.243	23.262	23.280	1300
1310	23.280	23.298	23.316	23.335	23.353	23.371	23.389	23.408	23.426	23.444	23.462	1310
1320	23.462	23.480	23.499	23.517	23.535	23.553	23.572	23.590	23.608	23.626	23.644	1320
1330	23.644	23.663	23.681	23.699	23.717	23.735	23.754	23.772	23.790	23.808	23.826	1330
1340	23.826	23.844	23.863	23.881	23.899	23.917	23.935	23.953	23.972	23.990	24.008	1340
1350	24.008	24.026	24.044	24.062	24.081	24.099	24.117	24.135	24.153	24.171	24.189	1350
1360	24.189	24.207	24.226	24.244	24.262	24.280	24.298	24.316	24.334	24.352	24.371	1360
1370	24.371	24.389	24.407	24.425	24.443	24.461	24.479	24.497	24.515	24.533	24.551	1370
1380	24.551	24.570	24.588	24.606	24.624	24.642	24.660	24.678	24.696	24.714	24.732	1380
1390	24.732	24.750	24.768	24.786	24.804	24.822	24.840	24.858	24.877	24.895	24.913	1390
1400	24.913	24.931	24.949	24.967	24.985	25.003	25.021	25.039	25.057	25.075	25.093	1400
1410	25.093	25.111	25.129	25.147	25.165	25.183	25.201	25.219	25.237	25.255	25.273	1410
1420	25.273	25.291	25.309	25.327	25.345	25.363	25.381	25.399	25.417	25.435	25.453	1420
1430	25.453	25.471	25.488	25.506	25.524	25.542	25.560	25.578	25.596	25.614	25.632	1430
1440	25.632	25.650	25.668	25.686	25.704	25.722	25.740	25.758	25.776	25.793	25.811	1440
1450	25.811	25.829	25.847	25.865	25.883	25.901	25.919	25.937	25.955	25.973	25.990	1450
1460	25.990	26.008	26.026	26.044	26.062	26.080	26.098	26.116	26.133	26.151	26.169	1460
1470	26.169	26.187	26.205	26.223	26.241	26.259	26.276	26.294	26.312	26.330	26.348	1470
1480	26.348	26.366	26.384	26.401	26.419	26.437	26.455	26.473	26.491	26.508	26.526	1480
1490	26.526	26.544	26.562	26.580	26.597	26.615	26.633	26.651	26.669	26.687	26.704	1490
1500	26.704	26.722	26.740	26.758	26.776	26.793	26.811	26.829	26.847	26.865	26.882	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C6.2. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	26.704	26.722	26.740	26.758	26.776	26.793	26.811	26.829	26.847	26.865	26.882	1500
1510	26.882	26.900	26.918	26.936	26.953	26.971	26.989	27.007	27.024	27.042	27.060	1510
1520	27.060	27.078	27.096	27.113	27.131	27.149	27.167	27.184	27.202	27.220	27.237	1520
1530	27.237	27.255	27.273	27.291	27.308	27.326	27.344	27.362	27.379	27.397	27.415	1530
1540	27.415	27.432	27.450	27.468	27.486	27.503	27.521	27.539	27.556	27.574	27.592	1540
1550	27.592	27.609	27.627	27.645	27.663	27.680	27.698	27.716	27.733	27.751	27.769	1550
1560	27.769	27.786	27.804	27.822	27.839	27.857	27.875	27.892	27.910	27.928	27.945	1560
1570	27.945	27.963	27.981	27.998	28.016	28.033	28.051	28.069	28.086	28.104	28.122	1570
1580	28.122	28.139	28.157	28.175	28.192	28.210	28.227	28.245	28.263	28.280	28.298	1580
1590	28.298	28.315	28.333	28.351	28.368	28.386	28.403	28.421	28.439	28.456	28.474	1590
1600	28.474	28.491	28.509	28.527	28.544	28.562	28.579	28.597	28.614	28.632	28.650	1600
1610	28.650	28.667	28.685	28.702	28.720	28.737	28.755	28.773	28.790	28.808	28.825	1610
1620	28.825	28.843	28.860	28.878	28.895	28.913	28.930	28.948	28.965	28.983	29.001	1620
1630	29.001	29.018	29.036	29.053	29.071	29.088	29.106	29.123	29.141	29.158	29.176	1630
1640	29.176	29.193	29.211	29.228	29.246	29.263	29.281	29.298	29.316	29.333	29.351	1640
1650	29.351	29.368	29.386	29.403	29.421	29.438	29.455	29.473	29.490	29.508	29.525	1650
1660	29.525	29.543	29.560	29.578	29.595	29.613	29.630	29.648	29.665	29.682	29.700	1660
1670	29.700	29.717	29.735	29.752	29.770	29.787	29.804	29.822	29.839	29.857	29.874	1670
1680	29.874	29.892	29.909	29.926	29.944	29.961	29.979	29.996	30.014	30.031	30.048	1680
1690	30.048	30.066	30.083	30.101	30.118	30.135	30.153	30.170	30.187	30.205	30.222	1690
1700	30.222	30.240	30.257	30.274	30.292	30.309	30.326	30.344	30.361	30.379	30.396	1700
1710	30.396	30.413	30.431	30.448	30.465	30.483	30.500	30.517	30.535	30.552	30.569	1710
1720	30.569	30.587	30.604	30.621	30.639	30.656	30.673	30.691	30.708	30.725	30.743	1720
1730	30.743	30.760	30.777	30.795	30.812	30.829	30.847	30.864	30.881	30.899	30.916	1730
1740	30.916	30.933	30.950	30.968	30.985	31.002	31.020	31.037	31.054	31.071	31.089	1740
1750	31.089	31.106	31.123	31.141	31.158	31.175	31.192	31.210	31.227	31.244	31.261	1750
1760	31.261	31.279	31.296	31.313	31.330	31.348	31.365	31.382	31.399	31.417	31.434	1760
1770	31.434	31.451	31.468	31.486	31.503	31.520	31.537	31.555	31.572	31.589	31.606	1770
1780	31.606	31.623	31.641	31.658	31.675	31.692	31.710	31.727	31.744	31.761	31.778	1780
1790	31.778	31.796	31.813	31.830	31.847	31.864	31.881	31.899	31.916	31.933	31.950	1790
1800	31.950	31.967	31.985	32.002	32.019	32.036	32.053	32.070	32.088	32.105	32.122	1800
1810	32.122	32.139	32.156	32.173	32.190	32.208	32.225	32.242	32.259	32.276	32.293	1810
1820	32.293	32.310	32.328	32.345	32.362	32.379	32.396	32.413	32.430	32.447	32.465	1820
1830	32.465	32.482	32.499	32.516	32.533	32.550	32.567	32.584	32.601	32.619	32.636	1830
1840	32.636	32.653	32.670	32.687	32.704	32.721	32.738	32.755	32.772	32.789	32.806	1840
1850	32.806	32.824	32.841	32.858	32.875	32.892	32.909	32.926	32.943	32.960	32.977	1850
1860	32.977	32.994	33.011	33.028	33.045	33.062	33.079	33.096	33.113	33.130	33.148	1860
1870	33.148	33.165	33.182	33.199	33.216	33.233	33.250	33.267	33.284	33.301	33.318	1870
1880	33.318	33.335	33.352	33.369	33.386	33.403	33.420	33.437	33.454	33.471	33.488	1880
1890	33.488	33.505	33.522	33.539	33.556	33.573	33.590	33.607	33.624	33.641	33.657	1890
1900	33.657	33.674	33.691	33.708	33.725	33.742	33.759	33.776	33.793	33.810	33.827	1900
1910	33.827	33.844	33.861	33.878	33.895	33.912	33.929	33.946	33.963	33.979	33.996	1910
1920	33.996	34.013	34.030	34.047	34.064	34.081	34.098	34.115	34.132	34.149	34.165	1920
1930	34.165	34.182	34.199	34.216	34.233	34.250	34.267	34.284	34.301	34.317	34.334	1930
1940	34.334	34.351	34.368	34.385	34.402	34.419	34.436	34.452	34.469	34.486	34.503	1940
1950	34.503	34.520	34.537	34.554	34.570	34.587	34.604	34.621	34.638	34.655	34.671	1950
1960	34.671	34.688	34.705	34.722	34.739	34.756	34.772	34.789	34.806	34.823	34.840	1960
1970	34.840	34.856	34.873	34.890	34.907	34.924	34.940	34.957	34.974	34.991	35.008	1970
1980	35.008	35.024	35.041	35.058	35.075	35.092	35.108	35.125	35.142	35.159	35.175	1980
1990	35.175	35.192	35.209	35.226	35.242	35.259	35.276	35.293	35.309	35.326	35.343	1990
2000	35.343	35.360	35.376	35.393	35.410	35.427	35.443	35.460	35.477	35.493	35.510	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C6.2. *Type KP (or EP) thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	35.343	35.360	35.376	35.393	35.410	35.427	35.443	35.460	35.477	35.493	35.510	2000
2010	35.510	35.527	35.544	35.560	35.577	35.594	35.610	35.627	35.644	35.660	35.677	2010
2020	35.677	35.694	35.711	35.727	35.744	35.761	35.777	35.794	35.811	35.827	35.844	2020
2030	35.844	35.861	35.877	35.894	35.911	35.927	35.944	35.961	35.977	35.994	36.010	2030
2040	36.010	36.027	36.044	36.060	36.077	36.094	36.110	36.127	36.143	36.160	36.177	2040
2050	36.177	36.193	36.210	36.227	36.243	36.260	36.276	36.293	36.310	36.326	36.343	2050
2060	36.343	36.359	36.376	36.392	36.409	36.426	36.442	36.459	36.475	36.492	36.508	2060
2070	36.508	36.525	36.542	36.558	36.575	36.591	36.608	36.624	36.641	36.657	36.674	2070
2080	36.674	36.691	36.707	36.724	36.740	36.757	36.773	36.790	36.806	36.823	36.839	2080
2090	36.839	36.856	36.872	36.889	36.905	36.922	36.938	36.955	36.971	36.988	37.004	2090
2100	37.004	37.021	37.037	37.054	37.070	37.087	37.103	37.119	37.136	37.152	37.169	2100
2110	37.169	37.185	37.202	37.218	37.235	37.251	37.267	37.284	37.300	37.317	37.333	2110
2120	37.333	37.350	37.366	37.382	37.399	37.415	37.432	37.448	37.465	37.481	37.497	2120
2130	37.497	37.514	37.530	37.547	37.563	37.579	37.596	37.612	37.628	37.645	37.661	2130
2140	37.661	37.678	37.694	37.710	37.727	37.743	37.759	37.776	37.792	37.808	37.825	2140
2150	37.825	37.841	37.857	37.874	37.890	37.906	37.923	37.939	37.955	37.972	37.988	2150
2160	37.988	38.004	38.021	38.037	38.053	38.069	38.086	38.102	38.118	38.135	38.151	2160
2170	38.151	38.167	38.183	38.200	38.216	38.232	38.248	38.265	38.281	38.297	38.314	2170
2180	38.314	38.330	38.346	38.362	38.378	38.395	38.411	38.427	38.443	38.460	38.476	2180
2190	38.476	38.492	38.508	38.524	38.541	38.557	38.573	38.589	38.605	38.622	38.638	2190
2200	38.638	38.654	38.670	38.686	38.703	38.719	38.735	38.751	38.767	38.783	38.799	2200
2210	38.799	38.816	38.832	38.848	38.864	38.880	38.896	38.912	38.929	38.945	38.961	2210
2220	38.961	38.977	38.993	39.009	39.025	39.041	39.057	39.074	39.090	39.106	39.122	2220
2230	39.122	39.138	39.154	39.170	39.186	39.202	39.218	39.234	39.250	39.266	39.282	2230
2240	39.282	39.298	39.315	39.331	39.347	39.363	39.379	39.395	39.411	39.427	39.443	2240
2250	39.443	39.459	39.475	39.491	39.507	39.523	39.539	39.555	39.571	39.587	39.603	2250
2260	39.603	39.619	39.635	39.651	39.667	39.682	39.698	39.714	39.730	39.746	39.762	2260
2270	39.762	39.778	39.794	39.810	39.826	39.842	39.858	39.874	39.890	39.905	39.921	2270
2280	39.921	39.937	39.953	39.969	39.985	40.001	40.017	40.033	40.048	40.064	40.080	2280
2290	40.080	40.096	40.112	40.128	40.144	40.159	40.175	40.191	40.207	40.223	40.238	2290
2300	40.238	40.254	40.270	40.286	40.302	40.318	40.333	40.349	40.365	40.381	40.396	2300
2310	40.396	40.412	40.428	40.444	40.459	40.475	40.491	40.507	40.522	40.538	40.554	2310
2320	40.554	40.570	40.585	40.601	40.617	40.633	40.648	40.664	40.680	40.695	40.711	2320
2330	40.711	40.727	40.742	40.758	40.774	40.789	40.805	40.821	40.836	40.852	40.868	2330
2340	40.868	40.883	40.899	40.915	40.930	40.946	40.961	40.977	40.993	41.008	41.024	2340
2350	41.024	41.039	41.055	41.071	41.086	41.102	41.117	41.133	41.148	41.164	41.179	2350
2360	41.179	41.195	41.210	41.226	41.242	41.257	41.273	41.288	41.304	41.319	41.335	2360
2370	41.335	41.350	41.366	41.381	41.396	41.412	41.427	41.443	41.458	41.474	41.489	2370
2380	41.489	41.505	41.520	41.535	41.551	41.566	41.582	41.597	41.612	41.628	41.643	2380
2390	41.643	41.659	41.674	41.689	41.705	41.720	41.735	41.751	41.766	41.781	41.797	2390
2400	41.797	41.812	41.827	41.843	41.858	41.873	41.889	41.904	41.919	41.934	41.950	2400
2410	41.950	41.965	41.980	41.995	42.011	42.026	42.041	42.056	42.072	42.087	42.102	2410
2420	42.102	42.117	42.132	42.148	42.163	42.178	42.193	42.208	42.223	42.239	42.254	2420
2430	42.254	42.269	42.284	42.299	42.314	42.329	42.344	42.359	42.375	42.390	42.405	2430
2440	42.405	42.420	42.435	42.450	42.465	42.480	42.495	42.510	42.525	42.540	42.555	2440
2450	42.555	42.570	42.585	42.600	42.615	42.630	42.645	42.660	42.675	42.690	42.705	2450
2460	42.705	42.720	42.734	42.749	42.764	42.779	42.794	42.809	42.824	42.839	42.853	2460
2470	42.853	42.868	42.883	42.898	42.913	42.928	42.942	42.957	42.972	42.987	43.002	2470
2480	43.002	43.016	43.031	43.046	43.061	43.075	43.090	43.105	43.119	43.134	43.149	2480
2490	43.149	43.163	43.178	43.193	43.207	43.222	43.237	43.251	43.266	43.281	43.295	2490
2500	43.295	43.310										2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C7. Supplementary Reference Tables for Platinum, Pt-67, Versus the Negative Thermoelement, Type KN, a Nickel-Aluminum Alloy

The reference function for platinum, Pt-67, versus type KN thermoelements given in the main text (see table 7.5.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C7.1 and C7.2. Table C7.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 1372 °C, and table C7.2 presents voltage values at 1 °F intervals from −454 °F to 2501 °F.

TABLE C7.1. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−2.900											−270
−260	−2.892	−2.894	−2.895	−2.896	−2.897	−2.898	−2.899	−2.900	−2.900	−2.900	−2.900	−260
−250	−2.864	−2.868	−2.871	−2.875	−2.878	−2.881	−2.883	−2.886	−2.888	−2.890	−2.892	−250
−240	−2.816	−2.822	−2.827	−2.833	−2.838	−2.843	−2.847	−2.852	−2.856	−2.860	−2.864	−240
−230	−2.749	−2.757	−2.764	−2.771	−2.778	−2.785	−2.791	−2.798	−2.804	−2.810	−2.816	−230
−220	−2.667	−2.676	−2.685	−2.693	−2.702	−2.710	−2.718	−2.726	−2.734	−2.742	−2.749	−220
−210	−2.575	−2.584	−2.594	−2.604	−2.613	−2.622	−2.631	−2.641	−2.650	−2.659	−2.667	−210
−200	−2.475	−2.485	−2.495	−2.506	−2.516	−2.526	−2.536	−2.546	−2.555	−2.565	−2.575	−200
−190	−2.371	−2.381	−2.392	−2.402	−2.413	−2.423	−2.434	−2.444	−2.454	−2.465	−2.475	−190
−180	−2.263	−2.274	−2.285	−2.295	−2.306	−2.317	−2.328	−2.338	−2.349	−2.360	−2.371	−180
−170	−2.153	−2.164	−2.175	−2.186	−2.197	−2.208	−2.219	−2.230	−2.241	−2.252	−2.263	−170
−160	−2.040	−2.052	−2.063	−2.074	−2.086	−2.097	−2.108	−2.119	−2.130	−2.142	−2.153	−160
−150	−1.926	−1.938	−1.949	−1.961	−1.972	−1.984	−1.995	−2.006	−2.018	−2.029	−2.040	−150
−140	−1.810	−1.822	−1.834	−1.845	−1.857	−1.868	−1.880	−1.892	−1.903	−1.915	−1.926	−140
−130	−1.692	−1.704	−1.716	−1.728	−1.740	−1.751	−1.763	−1.775	−1.787	−1.798	−1.810	−130
−120	−1.572	−1.584	−1.596	−1.608	−1.620	−1.632	−1.644	−1.656	−1.668	−1.680	−1.692	−120
−110	−1.450	−1.463	−1.475	−1.487	−1.499	−1.511	−1.524	−1.536	−1.548	−1.560	−1.572	−110
−100	−1.326	−1.339	−1.351	−1.364	−1.376	−1.388	−1.401	−1.413	−1.426	−1.438	−1.450	−100
−90	−1.200	−1.213	−1.226	−1.238	−1.251	−1.263	−1.276	−1.289	−1.301	−1.314	−1.326	−90
−80	−1.072	−1.085	−1.098	−1.111	−1.124	−1.136	−1.149	−1.162	−1.175	−1.188	−1.200	−80
−70	−0.942	−0.955	−0.969	−0.982	−0.995	−1.008	−1.021	−1.033	−1.046	−1.059	−1.072	−70
−60	−0.811	−0.824	−0.837	−0.851	−0.864	−0.877	−0.890	−0.903	−0.916	−0.929	−0.942	−60
−50	−0.678	−0.692	−0.705	−0.718	−0.732	−0.745	−0.758	−0.771	−0.785	−0.798	−0.811	−50
−40	−0.544	−0.558	−0.571	−0.585	−0.598	−0.611	−0.625	−0.638	−0.652	−0.665	−0.678	−40
−30	−0.409	−0.423	−0.436	−0.450	−0.463	−0.477	−0.490	−0.504	−0.517	−0.531	−0.544	−30
−20	−0.273	−0.287	−0.300	−0.314	−0.328	−0.341	−0.355	−0.368	−0.382	−0.396	−0.409	−20
−10	−0.136	−0.150	−0.164	−0.177	−0.191	−0.205	−0.218	−0.232	−0.246	−0.259	−0.273	−10
0	0.000	−0.014	−0.027	−0.041	−0.055	−0.068	−0.082	−0.095	−0.109	−0.123	−0.136	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C7.1. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.014	0.027	0.041	0.055	0.068	0.082	0.095	0.109	0.123	0.136	0
10	0.136	0.150	0.163	0.177	0.190	0.204	0.217	0.231	0.244	0.258	0.271	10
20	0.271	0.285	0.298	0.312	0.325	0.339	0.352	0.366	0.379	0.392	0.406	20
30	0.406	0.419	0.433	0.446	0.459	0.472	0.486	0.499	0.512	0.526	0.539	30
40	0.539	0.552	0.565	0.578	0.592	0.605	0.618	0.631	0.644	0.657	0.670	40
50	0.670	0.683	0.696	0.709	0.722	0.735	0.748	0.761	0.774	0.786	0.799	50
60	0.799	0.812	0.825	0.837	0.850	0.863	0.875	0.888	0.900	0.913	0.925	60
70	0.925	0.938	0.950	0.963	0.975	0.987	1.000	1.012	1.024	1.036	1.049	70
80	1.049	1.061	1.073	1.085	1.097	1.109	1.121	1.132	1.144	1.156	1.168	80
90	1.168	1.179	1.191	1.203	1.214	1.226	1.237	1.249	1.260	1.271	1.282	90
100	1.282	1.294	1.305	1.316	1.327	1.338	1.349	1.360	1.371	1.382	1.392	100
110	1.392	1.403	1.414	1.424	1.435	1.445	1.456	1.466	1.476	1.487	1.497	110
120	1.497	1.507	1.517	1.527	1.537	1.547	1.557	1.567	1.577	1.587	1.596	120
130	1.596	1.606	1.615	1.625	1.634	1.644	1.653	1.663	1.672	1.681	1.690	130
140	1.690	1.699	1.708	1.717	1.726	1.735	1.744	1.753	1.762	1.770	1.779	140
150	1.779	1.788	1.796	1.805	1.813	1.822	1.830	1.839	1.847	1.855	1.863	150
160	1.863	1.872	1.880	1.888	1.896	1.904	1.912	1.920	1.928	1.936	1.944	160
170	1.944	1.952	1.959	1.967	1.975	1.983	1.990	1.998	2.006	2.013	2.021	170
180	2.021	2.029	2.036	2.044	2.051	2.059	2.066	2.073	2.081	2.088	2.096	180
190	2.096	2.103	2.110	2.118	2.125	2.132	2.139	2.147	2.154	2.161	2.168	190
200	2.168	2.176	2.183	2.190	2.197	2.204	2.211	2.219	2.226	2.233	2.240	200
210	2.240	2.247	2.254	2.261	2.268	2.276	2.283	2.290	2.297	2.304	2.311	210
220	2.311	2.318	2.325	2.332	2.339	2.346	2.353	2.361	2.368	2.375	2.382	220
230	2.382	2.389	2.396	2.403	2.410	2.417	2.424	2.431	2.438	2.446	2.453	230
240	2.453	2.460	2.467	2.474	2.481	2.488	2.495	2.502	2.510	2.517	2.524	240
250	2.524	2.531	2.538	2.545	2.552	2.560	2.567	2.574	2.581	2.588	2.595	250
260	2.595	2.603	2.610	2.617	2.624	2.631	2.639	2.646	2.653	2.660	2.667	260
270	2.667	2.675	2.682	2.689	2.696	2.703	2.711	2.718	2.725	2.732	2.740	270
280	2.740	2.747	2.754	2.761	2.769	2.776	2.783	2.791	2.798	2.805	2.812	280
290	2.812	2.820	2.827	2.834	2.842	2.849	2.856	2.864	2.871	2.878	2.885	290
300	2.885	2.893	2.900	2.907	2.915	2.922	2.929	2.937	2.944	2.951	2.959	300
310	2.959	2.966	2.974	2.981	2.988	2.996	3.003	3.010	3.018	3.025	3.032	310
320	3.032	3.040	3.047	3.055	3.062	3.069	3.077	3.084	3.092	3.099	3.106	320
330	3.106	3.114	3.121	3.129	3.136	3.143	3.151	3.158	3.166	3.173	3.181	330
340	3.181	3.188	3.195	3.203	3.210	3.218	3.225	3.233	3.240	3.248	3.255	340
350	3.255	3.262	3.270	3.277	3.285	3.292	3.300	3.307	3.315	3.322	3.330	350
360	3.330	3.337	3.345	3.352	3.360	3.367	3.375	3.382	3.390	3.397	3.405	360
370	3.405	3.412	3.420	3.428	3.435	3.443	3.450	3.458	3.465	3.473	3.481	370
380	3.481	3.488	3.496	3.503	3.511	3.518	3.526	3.534	3.541	3.549	3.557	380
390	3.557	3.564	3.572	3.579	3.587	3.595	3.602	3.610	3.618	3.625	3.633	390
400	3.633	3.641	3.648	3.656	3.664	3.672	3.679	3.687	3.695	3.702	3.710	400
410	3.710	3.718	3.726	3.733	3.741	3.749	3.757	3.764	3.772	3.780	3.788	410
420	3.788	3.796	3.803	3.811	3.819	3.827	3.835	3.842	3.850	3.858	3.866	420
430	3.866	3.874	3.882	3.889	3.897	3.905	3.913	3.921	3.929	3.937	3.945	430
440	3.945	3.953	3.961	3.968	3.976	3.984	3.992	4.000	4.008	4.016	4.024	440
450	4.024	4.032	4.040	4.048	4.056	4.064	4.072	4.080	4.088	4.096	4.104	450
460	4.104	4.112	4.120	4.128	4.136	4.144	4.153	4.161	4.169	4.177	4.185	460
470	4.185	4.193	4.201	4.209	4.217	4.225	4.234	4.242	4.250	4.258	4.266	470
480	4.266	4.274	4.283	4.291	4.299	4.307	4.315	4.324	4.332	4.340	4.348	480
490	4.348	4.356	4.365	4.373	4.381	4.389	4.398	4.406	4.414	4.423	4.431	490
500	4.431	4.439	4.447	4.456	4.464	4.472	4.481	4.489	4.497	4.506	4.514	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C7.1. ***Platinum, Pt-67, versus type KN thermoelements*** *--- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	4.431	4.439	4.447	4.456	4.464	4.472	4.481	4.489	4.497	4.506	4.514	500
510	4.514	4.522	4.531	4.539	4.547	4.556	4.564	4.573	4.581	4.589	4.598	510
520	4.598	4.606	4.615	4.623	4.632	4.640	4.648	4.657	4.665	4.674	4.682	520
530	4.682	4.691	4.699	4.708	4.716	4.725	4.733	4.742	4.750	4.759	4.767	530
540	4.767	4.776	4.784	4.793	4.801	4.810	4.818	4.827	4.836	4.844	4.853	540
550	4.853	4.861	4.870	4.878	4.887	4.896	4.904	4.913	4.921	4.930	4.939	550
560	4.939	4.947	4.956	4.965	4.973	4.982	4.991	4.999	5.008	5.017	5.025	560
570	5.025	5.034	5.043	5.051	5.060	5.069	5.077	5.086	5.095	5.103	5.112	570
580	5.112	5.121	5.130	5.138	5.147	5.156	5.164	5.173	5.182	5.191	5.199	580
590	5.199	5.208	5.217	5.226	5.235	5.243	5.252	5.261	5.270	5.278	5.287	590
600	5.287	5.296	5.305	5.314	5.322	5.331	5.340	5.349	5.358	5.366	5.375	600
610	5.375	5.384	5.393	5.402	5.411	5.419	5.428	5.437	5.446	5.455	5.464	610
620	5.464	5.473	5.481	5.490	5.499	5.508	5.517	5.526	5.535	5.544	5.552	620
630	5.552	5.561	5.570	5.579	5.588	5.597	5.606	5.615	5.624	5.632	5.641	630
640	5.641	5.650	5.659	5.668	5.677	5.686	5.695	5.704	5.713	5.722	5.730	640
650	5.730	5.739	5.748	5.757	5.766	5.775	5.784	5.793	5.802	5.811	5.820	650
660	5.820	5.829	5.838	5.847	5.856	5.864	5.873	5.882	5.891	5.900	5.909	660
670	5.909	5.918	5.927	5.936	5.945	5.954	5.963	5.972	5.981	5.990	5.999	670
680	5.999	6.008	6.017	6.026	6.035	6.044	6.053	6.061	6.070	6.079	6.088	680
690	6.088	6.097	6.106	6.115	6.124	6.133	6.142	6.151	6.160	6.169	6.178	690
700	6.178	6.187	6.196	6.205	6.214	6.223	6.232	6.241	6.250	6.259	6.268	700
710	6.268	6.277	6.286	6.295	6.304	6.313	6.321	6.330	6.339	6.348	6.357	710
720	6.357	6.366	6.375	6.384	6.393	6.402	6.411	6.420	6.429	6.438	6.447	720
730	6.447	6.456	6.465	6.474	6.483	6.492	6.501	6.510	6.519	6.527	6.536	730
740	6.536	6.545	6.554	6.563	6.572	6.581	6.590	6.599	6.608	6.617	6.626	740
750	6.626	6.635	6.644	6.653	6.662	6.670	6.679	6.688	6.697	6.706	6.715	750
760	6.715	6.724	6.733	6.742	6.751	6.760	6.769	6.778	6.786	6.795	6.804	760
770	6.804	6.813	6.822	6.831	6.840	6.849	6.858	6.866	6.875	6.884	6.893	770
780	6.893	6.902	6.911	6.920	6.929	6.938	6.946	6.955	6.964	6.973	6.982	780
790	6.982	6.991	7.000	7.008	7.017	7.026	7.035	7.044	7.053	7.062	7.070	790
800	7.070	7.079	7.088	7.097	7.106	7.115	7.123	7.132	7.141	7.150	7.159	800
810	7.159	7.167	7.176	7.185	7.194	7.203	7.212	7.220	7.229	7.238	7.247	810
820	7.247	7.255	7.264	7.273	7.282	7.291	7.299	7.308	7.317	7.326	7.334	820
830	7.334	7.343	7.352	7.361	7.369	7.378	7.387	7.396	7.404	7.413	7.422	830
840	7.422	7.431	7.439	7.448	7.457	7.466	7.474	7.483	7.492	7.500	7.509	840
850	7.509	7.518	7.527	7.535	7.544	7.553	7.561	7.570	7.579	7.587	7.596	850
860	7.596	7.605	7.613	7.622	7.631	7.639	7.648	7.657	7.665	7.674	7.683	860
870	7.683	7.691	7.700	7.708	7.717	7.726	7.734	7.743	7.752	7.760	7.769	870
880	7.769	7.777	7.786	7.795	7.803	7.812	7.820	7.829	7.838	7.846	7.855	880
890	7.855	7.863	7.872	7.880	7.889	7.898	7.906	7.915	7.923	7.932	7.940	890
900	7.940	7.949	7.957	7.966	7.974	7.983	7.992	8.000	8.009	8.017	8.026	900
910	8.026	8.034	8.043	8.051	8.060	8.068	8.077	8.085	8.094	8.102	8.110	910
920	8.110	8.119	8.127	8.136	8.144	8.153	8.161	8.170	8.178	8.187	8.195	920
930	8.195	8.203	8.212	8.220	8.229	8.237	8.246	8.254	8.262	8.271	8.279	930
940	8.279	8.288	8.296	8.304	8.313	8.321	8.330	8.338	8.346	8.355	8.363	940
950	8.363	8.371	8.380	8.388	8.397	8.405	8.413	8.422	8.430	8.438	8.447	950
960	8.447	8.455	8.463	8.472	8.480	8.488	8.496	8.505	8.513	8.521	8.530	960
970	8.530	8.538	8.546	8.555	8.563	8.571	8.579	8.588	8.596	8.604	8.612	970
980	8.612	8.621	8.629	8.637	8.645	8.654	8.662	8.670	8.678	8.687	8.695	980
990	8.695	8.703	8.711	8.719	8.728	8.736	8.744	8.752	8.760	8.769	8.777	990
1000	8.777	8.785	8.793	8.801	8.809	8.818	8.826	8.834	8.842	8.850	8.858	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C7.1. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	8.777	8.785	8.793	8.801	8.809	8.818	8.826	8.834	8.842	8.850	8.858	1000
1010	8.858	8.867	8.875	8.883	8.891	8.899	8.907	8.915	8.923	8.932	8.940	1010
1020	8.940	8.948	8.956	8.964	8.972	8.980	8.988	8.996	9.004	9.012	9.021	1020
1030	9.021	9.029	9.037	9.045	9.053	9.061	9.069	9.077	9.085	9.093	9.101	1030
1040	9.101	9.109	9.117	9.125	9.133	9.141	9.149	9.157	9.165	9.173	9.181	1040
1050	9.181	9.189	9.197	9.205	9.213	9.221	9.229	9.237	9.245	9.253	9.261	1050
1060	9.261	9.269	9.277	9.285	9.292	9.300	9.308	9.316	9.324	9.332	9.340	1060
1070	9.340	9.348	9.356	9.364	9.372	9.379	9.387	9.395	9.403	9.411	9.419	1070
1080	9.419	9.427	9.434	9.442	9.450	9.458	9.466	9.474	9.482	9.489	9.497	1080
1090	9.497	9.505	9.513	9.521	9.528	9.536	9.544	9.552	9.560	9.567	9.575	1090
1100	9.575	9.583	9.591	9.598	9.606	9.614	9.622	9.629	9.637	9.645	9.653	1100
1110	9.653	9.660	9.668	9.676	9.684	9.691	9.699	9.707	9.714	9.722	9.730	1110
1120	9.730	9.737	9.745	9.753	9.761	9.768	9.776	9.784	9.791	9.799	9.806	1120
1130	9.806	9.814	9.822	9.829	9.837	9.845	9.852	9.860	9.867	9.875	9.883	1130
1140	9.883	9.890	9.898	9.905	9.913	9.921	9.928	9.936	9.943	9.951	9.958	1140
1150	9.958	9.966	9.973	9.981	9.989	9.996	10.004	10.011	10.019	10.026	10.034	1150
1160	10.034	10.041	10.049	10.056	10.064	10.071	10.079	10.086	10.093	10.101	10.108	1160
1170	10.108	10.116	10.123	10.131	10.138	10.146	10.153	10.160	10.168	10.175	10.183	1170
1180	10.183	10.190	10.198	10.205	10.212	10.220	10.227	10.234	10.242	10.249	10.257	1180
1190	10.257	10.264	10.271	10.279	10.286	10.293	10.301	10.308	10.315	10.323	10.330	1190
1200	10.330	10.337	10.345	10.352	10.359	10.367	10.374	10.381	10.388	10.396	10.403	1200
1210	10.403	10.410	10.417	10.425	10.432	10.439	10.447	10.454	10.461	10.468	10.475	1210
1220	10.475	10.483	10.490	10.497	10.504	10.512	10.519	10.526	10.533	10.540	10.548	1220
1230	10.548	10.555	10.562	10.569	10.576	10.584	10.591	10.598	10.605	10.612	10.619	1230
1240	10.619	10.626	10.634	10.641	10.648	10.655	10.662	10.669	10.676	10.684	10.691	1240
1250	10.691	10.698	10.705	10.712	10.719	10.726	10.733	10.741	10.748	10.755	10.762	1250
1260	10.762	10.769	10.776	10.783	10.790	10.797	10.804	10.811	10.819	10.826	10.833	1260
1270	10.833	10.840	10.847	10.854	10.861	10.868	10.875	10.882	10.889	10.896	10.903	1270
1280	10.903	10.911	10.918	10.925	10.932	10.939	10.946	10.953	10.960	10.967	10.974	1280
1290	10.974	10.981	10.988	10.995	11.002	11.009	11.016	11.024	11.031	11.038	11.045	1290
1300	11.045	11.052	11.059	11.066	11.073	11.080	11.087	11.094	11.101	11.108	11.116	1300
1310	11.116	11.123	11.130	11.137	11.144	11.151	11.158	11.165	11.172	11.180	11.187	1310
1320	11.187	11.194	11.201	11.208	11.215	11.222	11.229	11.237	11.244	11.251	11.258	1320
1330	11.258	11.265	11.273	11.280	11.287	11.294	11.301	11.309	11.316	11.323	11.330	1330
1340	11.330	11.338	11.345	11.352	11.359	11.367	11.374	11.381	11.389	11.396	11.403	1340
1350	11.403	11.411	11.418	11.425	11.433	11.440	11.448	11.455	11.462	11.470	11.477	1350
1360	11.477	11.485	11.492	11.500	11.507	11.515	11.522	11.530	11.537	11.545	11.553	1360
1370	11.553	11.560	11.568									1370
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C7.2. ***Platinum, Pt-67, versus type KN thermoelements*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−2.900	−2.900	−2.900	−2.900	−2.900							−450
−440	−2.895	−2.896	−2.897	−2.897	−2.898	−2.898	−2.899	−2.899	−2.899	−2.900	−2.900	−440
−430	−2.885	−2.886	−2.888	−2.889	−2.890	−2.891	−2.892	−2.893	−2.894	−2.895	−2.895	−430
−420	−2.868	−2.870	−2.872	−2.874	−2.876	−2.878	−2.879	−2.881	−2.882	−2.884	−2.885	−420
−410	−2.845	−2.848	−2.850	−2.853	−2.855	−2.858	−2.860	−2.862	−2.864	−2.866	−2.868	−410
−400	−2.816	−2.819	−2.822	−2.825	−2.828	−2.831	−2.834	−2.837	−2.840	−2.843	−2.845	−400
−390	−2.781	−2.785	−2.788	−2.792	−2.796	−2.799	−2.803	−2.806	−2.809	−2.813	−2.816	−390
−380	−2.741	−2.745	−2.749	−2.753	−2.757	−2.761	−2.765	−2.769	−2.773	−2.777	−2.781	−380
−370	−2.696	−2.701	−2.705	−2.710	−2.714	−2.719	−2.723	−2.728	−2.732	−2.736	−2.741	−370
−360	−2.648	−2.653	−2.658	−2.662	−2.667	−2.672	−2.677	−2.682	−2.687	−2.691	−2.696	−360
−350	−2.596	−2.601	−2.607	−2.612	−2.617	−2.622	−2.627	−2.632	−2.638	−2.643	−2.648	−350
−340	−2.542	−2.548	−2.553	−2.559	−2.564	−2.569	−2.575	−2.580	−2.586	−2.591	−2.596	−340
−330	−2.486	−2.492	−2.498	−2.503	−2.509	−2.515	−2.520	−2.526	−2.531	−2.537	−2.542	−330
−320	−2.429	−2.435	−2.441	−2.446	−2.452	−2.458	−2.464	−2.469	−2.475	−2.481	−2.486	−320
−310	−2.371	−2.376	−2.382	−2.388	−2.394	−2.400	−2.406	−2.412	−2.417	−2.423	−2.429	−310
−300	−2.311	−2.317	−2.323	−2.329	−2.335	−2.341	−2.347	−2.353	−2.359	−2.365	−2.371	−300
−290	−2.251	−2.257	−2.263	−2.269	−2.275	−2.281	−2.287	−2.293	−2.299	−2.305	−2.311	−290
−280	−2.190	−2.196	−2.202	−2.208	−2.214	−2.220	−2.226	−2.232	−2.239	−2.245	−2.251	−280
−270	−2.128	−2.134	−2.140	−2.146	−2.153	−2.159	−2.165	−2.171	−2.177	−2.183	−2.190	−270
−260	−2.066	−2.072	−2.078	−2.084	−2.091	−2.097	−2.103	−2.109	−2.115	−2.122	−2.128	−260
−250	−2.003	−2.009	−2.015	−2.022	−2.028	−2.034	−2.040	−2.047	−2.053	−2.059	−2.066	−250
−240	−1.939	−1.945	−1.952	−1.958	−1.965	−1.971	−1.977	−1.984	−1.990	−1.996	−2.003	−240
−230	−1.875	−1.881	−1.888	−1.894	−1.901	−1.907	−1.913	−1.920	−1.926	−1.933	−1.939	−230
−220	−1.810	−1.817	−1.823	−1.830	−1.836	−1.843	−1.849	−1.856	−1.862	−1.868	−1.875	−220
−210	−1.745	−1.751	−1.758	−1.765	−1.771	−1.778	−1.784	−1.791	−1.797	−1.804	−1.810	−210
−200	−1.679	−1.686	−1.692	−1.699	−1.705	−1.712	−1.719	−1.725	−1.732	−1.738	−1.745	−200
−190	−1.612	−1.619	−1.626	−1.632	−1.639	−1.646	−1.652	−1.659	−1.666	−1.672	−1.679	−190
−180	−1.545	−1.552	−1.559	−1.565	−1.572	−1.579	−1.586	−1.592	−1.599	−1.606	−1.612	−180
−170	−1.478	−1.484	−1.491	−1.498	−1.505	−1.511	−1.518	−1.525	−1.532	−1.539	−1.545	−170
−160	−1.409	−1.416	−1.423	−1.430	−1.437	−1.443	−1.450	−1.457	−1.464	−1.471	−1.478	−160
−150	−1.340	−1.347	−1.354	−1.361	−1.368	−1.375	−1.382	−1.388	−1.395	−1.402	−1.409	−150
−140	−1.270	−1.277	−1.284	−1.291	−1.298	−1.305	−1.312	−1.319	−1.326	−1.333	−1.340	−140
−130	−1.200	−1.207	−1.214	−1.221	−1.228	−1.235	−1.242	−1.249	−1.256	−1.263	−1.270	−130
−120	−1.129	−1.136	−1.144	−1.151	−1.158	−1.165	−1.172	−1.179	−1.186	−1.193	−1.200	−120
−110	−1.058	−1.065	−1.072	−1.079	−1.087	−1.094	−1.101	−1.108	−1.115	−1.122	−1.129	−110
−100	−0.986	−0.993	−1.000	−1.008	−1.015	−1.022	−1.029	−1.036	−1.044	−1.051	−1.058	−100
−90	−0.913	−0.921	−0.928	−0.935	−0.942	−0.950	−0.957	−0.964	−0.971	−0.979	−0.986	−90
−80	−0.840	−0.848	−0.855	−0.862	−0.870	−0.877	−0.884	−0.892	−0.899	−0.906	−0.913	−80
−70	−0.767	−0.774	−0.782	−0.789	−0.796	−0.804	−0.811	−0.818	−0.826	−0.833	−0.840	−70
−60	−0.693	−0.700	−0.708	−0.715	−0.723	−0.730	−0.737	−0.745	−0.752	−0.760	−0.767	−60
−50	−0.619	−0.626	−0.634	−0.641	−0.649	−0.656	−0.663	−0.671	−0.678	−0.686	−0.693	−50
−40	−0.544	−0.552	−0.559	−0.567	−0.574	−0.582	−0.589	−0.597	−0.604	−0.611	−0.619	−40
−30	−0.469	−0.477	−0.484	−0.492	−0.499	−0.507	−0.514	−0.522	−0.529	−0.537	−0.544	−30
−20	−0.394	−0.402	−0.409	−0.417	−0.424	−0.432	−0.439	−0.447	−0.454	−0.462	−0.469	−20
−10	−0.318	−0.326	−0.334	−0.341	−0.349	−0.356	−0.364	−0.371	−0.379	−0.386	−0.394	−10
0	−0.243	−0.250	−0.258	−0.265	−0.273	−0.281	−0.288	−0.296	−0.303	−0.311	−0.318	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C7.2. ***Platinum, Pt-67, versus type KN thermoelements*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.243	−0.235	−0.228	−0.220	−0.212	−0.205	−0.197	−0.190	−0.182	−0.174	−0.167	0
10	−0.167	−0.159	−0.152	−0.144	−0.136	−0.129	−0.121	−0.114	−0.106	−0.099	−0.091	10
20	−0.091	−0.083	−0.076	−0.068	−0.061	−0.053	−0.045	−0.038	−0.030	−0.023	−0.015	20
30	−0.015	−0.008	0.000	0.008	0.015	0.023	0.030	0.038	0.045	0.053	0.061	30
40	0.061	0.068	0.076	0.083	0.091	0.098	0.106	0.113	0.121	0.129	0.136	40
50	0.136	0.144	0.151	0.159	0.166	0.174	0.181	0.189	0.196	0.204	0.211	50
60	0.211	0.219	0.226	0.234	0.241	0.249	0.256	0.264	0.271	0.279	0.286	60
70	0.286	0.294	0.301	0.309	0.316	0.324	0.331	0.339	0.346	0.354	0.361	70
80	0.361	0.369	0.376	0.383	0.391	0.398	0.406	0.413	0.421	0.428	0.435	80
90	0.435	0.443	0.450	0.458	0.465	0.472	0.480	0.487	0.495	0.502	0.509	90
100	0.509	0.517	0.524	0.531	0.539	0.546	0.553	0.561	0.568	0.575	0.583	100
110	0.583	0.590	0.597	0.605	0.612	0.619	0.627	0.634	0.641	0.648	0.656	110
120	0.656	0.663	0.670	0.677	0.685	0.692	0.699	0.706	0.713	0.721	0.728	120
130	0.728	0.735	0.742	0.749	0.756	0.764	0.771	0.778	0.785	0.792	0.799	130
140	0.799	0.806	0.813	0.820	0.827	0.835	0.842	0.849	0.856	0.863	0.870	140
150	0.870	0.877	0.884	0.891	0.898	0.905	0.912	0.919	0.925	0.932	0.939	150
160	0.939	0.946	0.953	0.960	0.967	0.974	0.981	0.987	0.994	1.001	1.008	160
170	1.008	1.015	1.022	1.028	1.035	1.042	1.049	1.055	1.062	1.069	1.075	170
180	1.075	1.082	1.089	1.095	1.102	1.109	1.115	1.122	1.128	1.135	1.142	180
190	1.142	1.148	1.155	1.161	1.168	1.174	1.181	1.187	1.194	1.200	1.207	190
200	1.207	1.213	1.219	1.226	1.232	1.238	1.245	1.251	1.257	1.264	1.270	200
210	1.270	1.276	1.282	1.289	1.295	1.301	1.307	1.314	1.320	1.326	1.332	210
220	1.332	1.338	1.344	1.350	1.356	1.362	1.368	1.374	1.380	1.386	1.392	220
230	1.392	1.398	1.404	1.410	1.416	1.422	1.428	1.434	1.439	1.445	1.451	230
240	1.451	1.457	1.463	1.468	1.474	1.480	1.486	1.491	1.497	1.503	1.508	240
250	1.508	1.514	1.519	1.525	1.531	1.536	1.542	1.547	1.553	1.558	1.564	250
260	1.564	1.569	1.575	1.580	1.585	1.591	1.596	1.602	1.607	1.612	1.618	260
270	1.618	1.623	1.628	1.633	1.639	1.644	1.649	1.654	1.659	1.665	1.670	270
280	1.670	1.675	1.680	1.685	1.690	1.695	1.700	1.705	1.710	1.715	1.720	280
290	1.720	1.725	1.730	1.735	1.740	1.745	1.750	1.755	1.760	1.765	1.769	290
300	1.769	1.774	1.779	1.784	1.789	1.793	1.798	1.803	1.808	1.812	1.817	300
310	1.817	1.822	1.826	1.831	1.836	1.840	1.845	1.850	1.854	1.859	1.863	310
320	1.863	1.868	1.873	1.877	1.882	1.886	1.891	1.895	1.900	1.904	1.909	320
330	1.909	1.913	1.917	1.922	1.926	1.931	1.935	1.939	1.944	1.948	1.953	330
340	1.953	1.957	1.961	1.966	1.970	1.974	1.978	1.983	1.987	1.991	1.996	340
350	1.996	2.000	2.004	2.008	2.013	2.017	2.021	2.025	2.029	2.034	2.038	350
360	2.038	2.042	2.046	2.050	2.054	2.059	2.063	2.067	2.071	2.075	2.079	360
370	2.079	2.083	2.087	2.091	2.096	2.100	2.104	2.108	2.112	2.116	2.120	370
380	2.120	2.124	2.128	2.132	2.136	2.140	2.144	2.148	2.152	2.156	2.160	380
390	2.160	2.164	2.168	2.172	2.176	2.180	2.184	2.188	2.192	2.196	2.200	390
400	2.200	2.204	2.208	2.212	2.216	2.220	2.224	2.228	2.232	2.236	2.240	400
410	2.240	2.244	2.248	2.252	2.256	2.260	2.264	2.268	2.272	2.276	2.279	410
420	2.279	2.283	2.287	2.291	2.295	2.299	2.303	2.307	2.311	2.315	2.319	420
430	2.319	2.323	2.327	2.331	2.335	2.339	2.342	2.346	2.350	2.354	2.358	430
440	2.358	2.362	2.366	2.370	2.374	2.378	2.382	2.386	2.390	2.394	2.398	440
450	2.398	2.401	2.405	2.409	2.413	2.417	2.421	2.425	2.429	2.433	2.437	450
460	2.437	2.441	2.445	2.449	2.453	2.457	2.461	2.465	2.468	2.472	2.476	460
470	2.476	2.480	2.484	2.488	2.492	2.496	2.500	2.504	2.508	2.512	2.516	470
480	2.516	2.520	2.524	2.528	2.532	2.536	2.540	2.544	2.548	2.552	2.556	480
490	2.556	2.560	2.564	2.568	2.571	2.575	2.579	2.583	2.587	2.591	2.595	490
500	2.595	2.599	2.603	2.607	2.611	2.615	2.619	2.623	2.627	2.631	2.635	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C7.2. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	2.595	2.599	2.603	2.607	2.611	2.615	2.619	2.623	2.627	2.631	2.635	500
510	2.635	2.639	2.643	2.647	2.651	2.655	2.659	2.663	2.667	2.671	2.675	510
520	2.675	2.679	2.683	2.687	2.691	2.695	2.699	2.703	2.708	2.712	2.716	520
530	2.716	2.720	2.724	2.728	2.732	2.736	2.740	2.744	2.748	2.752	2.756	530
540	2.756	2.760	2.764	2.768	2.772	2.776	2.780	2.784	2.788	2.792	2.796	540
550	2.796	2.800	2.804	2.808	2.812	2.816	2.821	2.825	2.829	2.833	2.837	550
560	2.837	2.841	2.845	2.849	2.853	2.857	2.861	2.865	2.869	2.873	2.877	560
570	2.877	2.881	2.885	2.890	2.894	2.898	2.902	2.906	2.910	2.914	2.918	570
580	2.918	2.922	2.926	2.930	2.934	2.938	2.943	2.947	2.951	2.955	2.959	580
590	2.959	2.963	2.967	2.971	2.975	2.979	2.983	2.987	2.992	2.996	3.000	590
600	3.000	3.004	3.008	3.012	3.016	3.020	3.024	3.028	3.032	3.037	3.041	600
610	3.041	3.045	3.049	3.053	3.057	3.061	3.065	3.069	3.073	3.078	3.082	610
620	3.082	3.086	3.090	3.094	3.098	3.102	3.106	3.110	3.115	3.119	3.123	620
630	3.123	3.127	3.131	3.135	3.139	3.143	3.148	3.152	3.156	3.160	3.164	630
640	3.164	3.168	3.172	3.176	3.181	3.185	3.189	3.193	3.197	3.201	3.205	640
650	3.205	3.209	3.214	3.218	3.222	3.226	3.230	3.234	3.238	3.243	3.247	650
660	3.247	3.251	3.255	3.259	3.263	3.267	3.272	3.276	3.280	3.284	3.288	660
670	3.288	3.292	3.296	3.301	3.305	3.309	3.313	3.317	3.321	3.326	3.330	670
680	3.330	3.334	3.338	3.342	3.346	3.351	3.355	3.359	3.363	3.367	3.371	680
690	3.371	3.376	3.380	3.384	3.388	3.392	3.397	3.401	3.405	3.409	3.413	690
700	3.413	3.417	3.422	3.426	3.430	3.434	3.438	3.443	3.447	3.451	3.455	700
710	3.455	3.459	3.464	3.468	3.472	3.476	3.481	3.485	3.489	3.493	3.497	710
720	3.497	3.502	3.506	3.510	3.514	3.518	3.523	3.527	3.531	3.535	3.540	720
730	3.540	3.544	3.548	3.552	3.557	3.561	3.565	3.569	3.573	3.578	3.582	730
740	3.582	3.586	3.590	3.595	3.599	3.603	3.607	3.612	3.616	3.620	3.625	740
750	3.625	3.629	3.633	3.637	3.642	3.646	3.650	3.654	3.659	3.663	3.667	750
760	3.667	3.672	3.676	3.680	3.684	3.689	3.693	3.697	3.702	3.706	3.710	760
770	3.710	3.714	3.719	3.723	3.727	3.732	3.736	3.740	3.745	3.749	3.753	770
780	3.753	3.757	3.762	3.766	3.770	3.775	3.779	3.783	3.788	3.792	3.796	780
790	3.796	3.801	3.805	3.809	3.814	3.818	3.822	3.827	3.831	3.835	3.840	790
800	3.840	3.844	3.848	3.853	3.857	3.862	3.866	3.870	3.875	3.879	3.883	800
810	3.883	3.888	3.892	3.896	3.901	3.905	3.910	3.914	3.918	3.923	3.927	810
820	3.927	3.932	3.936	3.940	3.945	3.949	3.954	3.958	3.962	3.967	3.971	820
830	3.971	3.976	3.980	3.984	3.989	3.993	3.998	4.002	4.006	4.011	4.015	830
840	4.015	4.020	4.024	4.029	4.033	4.037	4.042	4.046	4.051	4.055	4.060	840
850	4.060	4.064	4.069	4.073	4.077	4.082	4.086	4.091	4.095	4.100	4.104	850
860	4.104	4.109	4.113	4.118	4.122	4.127	4.131	4.136	4.140	4.144	4.149	860
870	4.149	4.153	4.158	4.162	4.167	4.171	4.176	4.180	4.185	4.189	4.194	870
880	4.194	4.198	4.203	4.207	4.212	4.216	4.221	4.225	4.230	4.235	4.239	880
890	4.239	4.244	4.248	4.253	4.257	4.262	4.266	4.271	4.275	4.280	4.284	890
900	4.284	4.289	4.293	4.298	4.303	4.307	4.312	4.316	4.321	4.325	4.330	900
910	4.330	4.335	4.339	4.344	4.348	4.353	4.357	4.362	4.367	4.371	4.376	910
920	4.376	4.380	4.385	4.389	4.394	4.399	4.403	4.408	4.412	4.417	4.422	920
930	4.422	4.426	4.431	4.435	4.440	4.445	4.449	4.454	4.458	4.463	4.468	930
940	4.468	4.472	4.477	4.482	4.486	4.491	4.495	4.500	4.505	4.509	4.514	940
950	4.514	4.519	4.523	4.528	4.533	4.537	4.542	4.547	4.551	4.556	4.561	950
960	4.561	4.565	4.570	4.575	4.579	4.584	4.589	4.593	4.598	4.603	4.607	960
970	4.607	4.612	4.617	4.621	4.626	4.631	4.635	4.640	4.645	4.649	4.654	970
980	4.654	4.659	4.663	4.668	4.673	4.678	4.682	4.687	4.692	4.696	4.701	980
990	4.701	4.706	4.711	4.715	4.720	4.725	4.729	4.734	4.739	4.744	4.748	990
1000	4.748	4.753	4.758	4.762	4.767	4.772	4.777	4.781	4.786	4.791	4.796	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C7.2. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	4.748	4.753	4.758	4.762	4.767	4.772	4.777	4.781	4.786	4.791	4.796	1000
1010	4.796	4.800	4.805	4.810	4.815	4.819	4.824	4.829	4.834	4.838	4.843	1010
1020	4.843	4.848	4.853	4.857	4.862	4.867	4.872	4.877	4.881	4.886	4.891	1020
1030	4.891	4.896	4.900	4.905	4.910	4.915	4.920	4.924	4.929	4.934	4.939	1030
1040	4.939	4.943	4.948	4.953	4.958	4.963	4.967	4.972	4.977	4.982	4.987	1040
1050	4.987	4.991	4.996	5.001	5.006	5.011	5.016	5.020	5.025	5.030	5.035	1050
1060	5.035	5.040	5.044	5.049	5.054	5.059	5.064	5.069	5.073	5.078	5.083	1060
1070	5.083	5.088	5.093	5.098	5.102	5.107	5.112	5.117	5.122	5.127	5.131	1070
1080	5.131	5.136	5.141	5.146	5.151	5.156	5.161	5.165	5.170	5.175	5.180	1080
1090	5.180	5.185	5.190	5.195	5.199	5.204	5.209	5.214	5.219	5.224	5.229	1090
1100	5.229	5.234	5.238	5.243	5.248	5.253	5.258	5.263	5.268	5.273	5.277	1100
1110	5.277	5.282	5.287	5.292	5.297	5.302	5.307	5.312	5.317	5.321	5.326	1110
1120	5.326	5.331	5.336	5.341	5.346	5.351	5.356	5.361	5.365	5.370	5.375	1120
1130	5.375	5.380	5.385	5.390	5.395	5.400	5.405	5.410	5.415	5.419	5.424	1130
1140	5.424	5.429	5.434	5.439	5.444	5.449	5.454	5.459	5.464	5.469	5.474	1140
1150	5.474	5.478	5.483	5.488	5.493	5.498	5.503	5.508	5.513	5.518	5.523	1150
1160	5.523	5.528	5.533	5.538	5.543	5.547	5.552	5.557	5.562	5.567	5.572	1160
1170	5.572	5.577	5.582	5.587	5.592	5.597	5.602	5.607	5.612	5.617	5.622	1170
1180	5.622	5.626	5.631	5.636	5.641	5.646	5.651	5.656	5.661	5.666	5.671	1180
1190	5.671	5.676	5.681	5.686	5.691	5.696	5.701	5.706	5.711	5.716	5.721	1190
1200	5.721	5.725	5.730	5.735	5.740	5.745	5.750	5.755	5.760	5.765	5.770	1200
1210	5.770	5.775	5.780	5.785	5.790	5.795	5.800	5.805	5.810	5.815	5.820	1210
1220	5.820	5.825	5.830	5.835	5.840	5.845	5.850	5.855	5.859	5.864	5.869	1220
1230	5.869	5.874	5.879	5.884	5.889	5.894	5.899	5.904	5.909	5.914	5.919	1230
1240	5.919	5.924	5.929	5.934	5.939	5.944	5.949	5.954	5.959	5.964	5.969	1240
1250	5.969	5.974	5.979	5.984	5.989	5.994	5.999	6.004	6.009	6.014	6.019	1250
1260	6.019	6.024	6.029	6.034	6.039	6.044	6.049	6.054	6.058	6.063	6.068	1260
1270	6.068	6.073	6.078	6.083	6.088	6.093	6.098	6.103	6.108	6.113	6.118	1270
1280	6.118	6.123	6.128	6.133	6.138	6.143	6.148	6.153	6.158	6.163	6.168	1280
1290	6.168	6.173	6.178	6.183	6.188	6.193	6.198	6.203	6.208	6.213	6.218	1290
1300	6.218	6.223	6.228	6.233	6.238	6.243	6.248	6.253	6.258	6.263	6.268	1300
1310	6.268	6.273	6.278	6.283	6.288	6.293	6.298	6.303	6.308	6.313	6.318	1310
1320	6.318	6.322	6.327	6.332	6.337	6.342	6.347	6.352	6.357	6.362	6.367	1320
1330	6.367	6.372	6.377	6.382	6.387	6.392	6.397	6.402	6.407	6.412	6.417	1330
1340	6.417	6.422	6.427	6.432	6.437	6.442	6.447	6.452	6.457	6.462	6.467	1340
1350	6.467	6.472	6.477	6.482	6.487	6.492	6.497	6.502	6.507	6.512	6.517	1350
1360	6.517	6.522	6.527	6.531	6.536	6.541	6.546	6.551	6.556	6.561	6.566	1360
1370	6.566	6.571	6.576	6.581	6.586	6.591	6.596	6.601	6.606	6.611	6.616	1370
1380	6.616	6.621	6.626	6.631	6.636	6.641	6.646	6.651	6.656	6.661	6.666	1380
1390	6.666	6.670	6.675	6.680	6.685	6.690	6.695	6.700	6.705	6.710	6.715	1390
1400	6.715	6.720	6.725	6.730	6.735	6.740	6.745	6.750	6.755	6.760	6.765	1400
1410	6.765	6.770	6.775	6.779	6.784	6.789	6.794	6.799	6.804	6.809	6.814	1410
1420	6.814	6.819	6.824	6.829	6.834	6.839	6.844	6.849	6.854	6.859	6.864	1420
1430	6.864	6.868	6.873	6.878	6.883	6.888	6.893	6.898	6.903	6.908	6.913	1430
1440	6.913	6.918	6.923	6.928	6.933	6.938	6.942	6.947	6.952	6.957	6.962	1440
1450	6.962	6.967	6.972	6.977	6.982	6.987	6.992	6.997	7.002	7.007	7.011	1450
1460	7.011	7.016	7.021	7.026	7.031	7.036	7.041	7.046	7.051	7.056	7.061	1460
1470	7.061	7.065	7.070	7.075	7.080	7.085	7.090	7.095	7.100	7.105	7.110	1470
1480	7.110	7.115	7.119	7.124	7.129	7.134	7.139	7.144	7.149	7.154	7.159	1480
1490	7.159	7.164	7.168	7.173	7.178	7.183	7.188	7.193	7.198	7.203	7.208	1490
1500	7.208	7.213	7.217	7.222	7.227	7.232	7.237	7.242	7.247	7.252	7.256	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C7.2. *Platinum, Pt-67, versus type KN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	7.208	7.213	7.217	7.222	7.227	7.232	7.237	7.242	7.247	7.252	7.256	1500
1510	7.256	7.261	7.266	7.271	7.276	7.281	7.286	7.291	7.295	7.300	7.305	1510
1520	7.305	7.310	7.315	7.320	7.325	7.330	7.334	7.339	7.344	7.349	7.354	1520
1530	7.354	7.359	7.364	7.369	7.373	7.378	7.383	7.388	7.393	7.398	7.403	1530
1540	7.403	7.407	7.412	7.417	7.422	7.427	7.432	7.436	7.441	7.446	7.451	1540
1550	7.451	7.456	7.461	7.466	7.470	7.475	7.480	7.485	7.490	7.495	7.499	1550
1560	7.499	7.504	7.509	7.514	7.519	7.524	7.528	7.533	7.538	7.543	7.548	1560
1570	7.548	7.553	7.557	7.562	7.567	7.572	7.577	7.582	7.586	7.591	7.596	1570
1580	7.596	7.601	7.606	7.610	7.615	7.620	7.625	7.630	7.635	7.639	7.644	1580
1590	7.644	7.649	7.654	7.659	7.663	7.668	7.673	7.678	7.683	7.687	7.692	1590
1600	7.692	7.697	7.702	7.707	7.711	7.716	7.721	7.726	7.731	7.735	7.740	1600
1610	7.740	7.745	7.750	7.754	7.759	7.764	7.769	7.774	7.778	7.783	7.788	1610
1620	7.788	7.793	7.798	7.802	7.807	7.812	7.817	7.821	7.826	7.831	7.836	1620
1630	7.836	7.840	7.845	7.850	7.855	7.860	7.864	7.869	7.874	7.879	7.883	1630
1640	7.883	7.888	7.893	7.898	7.902	7.907	7.912	7.917	7.921	7.926	7.931	1640
1650	7.931	7.936	7.940	7.945	7.950	7.955	7.959	7.964	7.969	7.974	7.978	1650
1660	7.978	7.983	7.988	7.992	7.997	8.002	8.007	8.011	8.016	8.021	8.026	1660
1670	8.026	8.030	8.035	8.040	8.044	8.049	8.054	8.059	8.063	8.068	8.073	1670
1680	8.073	8.078	8.082	8.087	8.092	8.096	8.101	8.106	8.110	8.115	8.120	1680
1690	8.120	8.125	8.129	8.134	8.139	8.143	8.148	8.153	8.158	8.162	8.167	1690
1700	8.167	8.172	8.176	8.181	8.186	8.190	8.195	8.200	8.204	8.209	8.214	1700
1710	8.214	8.218	8.223	8.228	8.233	8.237	8.242	8.247	8.251	8.256	8.261	1710
1720	8.261	8.265	8.270	8.275	8.279	8.284	8.289	8.293	8.298	8.303	8.307	1720
1730	8.307	8.312	8.317	8.321	8.326	8.331	8.335	8.340	8.344	8.349	8.354	1730
1740	8.354	8.358	8.363	8.368	8.372	8.377	8.382	8.386	8.391	8.396	8.400	1740
1750	8.400	8.405	8.410	8.414	8.419	8.423	8.428	8.433	8.437	8.442	8.447	1750
1760	8.447	8.451	8.456	8.460	8.465	8.470	8.474	8.479	8.484	8.488	8.493	1760
1770	8.493	8.497	8.502	8.507	8.511	8.516	8.520	8.525	8.530	8.534	8.539	1770
1780	8.539	8.543	8.548	8.553	8.557	8.562	8.566	8.571	8.576	8.580	8.585	1780
1790	8.585	8.589	8.594	8.599	8.603	8.608	8.612	8.617	8.622	8.626	8.631	1790
1800	8.631	8.635	8.640	8.644	8.649	8.654	8.658	8.663	8.667	8.672	8.677	1800
1810	8.677	8.681	8.686	8.690	8.695	8.699	8.704	8.708	8.713	8.718	8.722	1810
1820	8.722	8.727	8.731	8.736	8.740	8.745	8.750	8.754	8.759	8.763	8.768	1820
1830	8.768	8.772	8.777	8.781	8.786	8.790	8.795	8.800	8.804	8.809	8.813	1830
1840	8.813	8.818	8.822	8.827	8.831	8.836	8.840	8.845	8.849	8.854	8.858	1840
1850	8.858	8.863	8.867	8.872	8.877	8.881	8.886	8.890	8.895	8.899	8.904	1850
1860	8.904	8.908	8.913	8.917	8.922	8.926	8.931	8.935	8.940	8.944	8.949	1860
1870	8.949	8.953	8.958	8.962	8.967	8.971	8.976	8.980	8.985	8.989	8.994	1870
1880	8.994	8.998	9.003	9.007	9.012	9.016	9.021	9.025	9.029	9.034	9.038	1880
1890	9.038	9.043	9.047	9.052	9.056	9.061	9.065	9.070	9.074	9.079	9.083	1890
1900	9.083	9.088	9.092	9.097	9.101	9.105	9.110	9.114	9.119	9.123	9.128	1900
1910	9.128	9.132	9.137	9.141	9.145	9.150	9.154	9.159	9.163	9.168	9.172	1910
1920	9.172	9.177	9.181	9.185	9.190	9.194	9.199	9.203	9.208	9.212	9.216	1920
1930	9.216	9.221	9.225	9.230	9.234	9.239	9.243	9.247	9.252	9.256	9.261	1930
1940	9.261	9.265	9.270	9.274	9.278	9.283	9.287	9.292	9.296	9.300	9.305	1940
1950	9.305	9.309	9.314	9.318	9.322	9.327	9.331	9.336	9.340	9.344	9.349	1950
1960	9.349	9.353	9.357	9.362	9.366	9.371	9.375	9.379	9.384	9.388	9.393	1960
1970	9.393	9.397	9.401	9.406	9.410	9.414	9.419	9.423	9.428	9.432	9.436	1970
1980	9.436	9.441	9.445	9.449	9.454	9.458	9.462	9.467	9.471	9.475	9.480	1980
1990	9.480	9.484	9.488	9.493	9.497	9.502	9.506	9.510	9.515	9.519	9.523	1990
2000	9.523	9.528	9.532	9.536	9.541	9.545	9.549	9.554	9.558	9.562	9.567	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C7.2. ***Platinum, Pt-67, versus type KN thermoelements*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	9.523	9.528	9.532	9.536	9.541	9.545	9.549	9.554	9.558	9.562	9.567	2000
2010	9.567	9.571	9.575	9.579	9.584	9.588	9.592	9.597	9.601	9.605	9.610	2010
2020	9.610	9.614	9.618	9.623	9.627	9.631	9.636	9.640	9.644	9.648	9.653	2020
2030	9.653	9.657	9.661	9.666	9.670	9.674	9.678	9.683	9.687	9.691	9.696	2030
2040	9.696	9.700	9.704	9.708	9.713	9.717	9.721	9.726	9.730	9.734	9.738	2040
2050	9.738	9.743	9.747	9.751	9.755	9.760	9.764	9.768	9.772	9.777	9.781	2050
2060	9.781	9.785	9.789	9.794	9.798	9.802	9.806	9.811	9.815	9.819	9.823	2060
2070	9.823	9.828	9.832	9.836	9.840	9.845	9.849	9.853	9.857	9.862	9.866	2070
2080	9.866	9.870	9.874	9.878	9.883	9.887	9.891	9.895	9.900	9.904	9.908	2080
2090	9.908	9.912	9.916	9.921	9.925	9.929	9.933	9.937	9.942	9.946	9.950	2090
2100	9.950	9.954	9.958	9.963	9.967	9.971	9.975	9.979	9.984	9.988	9.992	2100
2110	9.992	9.996	10.000	10.004	10.009	10.013	10.017	10.021	10.025	10.029	10.034	2110
2120	10.034	10.038	10.042	10.046	10.050	10.054	10.059	10.063	10.067	10.071	10.075	2120
2130	10.075	10.079	10.084	10.088	10.092	10.096	10.100	10.104	10.108	10.113	10.117	2130
2140	10.117	10.121	10.125	10.129	10.133	10.137	10.142	10.146	10.150	10.154	10.158	2140
2150	10.158	10.162	10.166	10.170	10.175	10.179	10.183	10.187	10.191	10.195	10.199	2150
2160	10.199	10.203	10.207	10.212	10.216	10.220	10.224	10.228	10.232	10.236	10.240	2160
2170	10.240	10.244	10.248	10.253	10.257	10.261	10.265	10.269	10.273	10.277	10.281	2170
2180	10.281	10.285	10.289	10.293	10.297	10.302	10.306	10.310	10.314	10.318	10.322	2160
2190	10.322	10.326	10.330	10.334	10.338	10.342	10.346	10.350	10.354	10.358	10.362	2190
2200	10.362	10.367	10.371	10.375	10.379	10.383	10.387	10.391	10.395	10.399	10.403	2200
2210	10.403	10.407	10.411	10.415	10.419	10.423	10.427	10.431	10.435	10.439	10.443	2210
2220	10.443	10.447	10.451	10.455	10.459	10.463	10.467	10.471	10.475	10.479	10.484	2220
2230	10.484	10.488	10.492	10.496	10.500	10.504	10.508	10.512	10.516	10.520	10.524	2230
2240	10.524	10.528	10.532	10.536	10.540	10.544	10.548	10.552	10.556	10.560	10.564	2240
2250	10.564	10.568	10.572	10.576	10.580	10.584	10.588	10.591	10.595	10.599	10.603	2250
2260	10.603	10.607	10.611	10.615	10.619	10.623	10.627	10.631	10.635	10.639	10.643	2260
2270	10.643	10.647	10.651	10.655	10.659	10.663	10.667	10.671	10.675	10.679	10.683	2270
2280	10.683	10.687	10.691	10.695	10.699	10.703	10.707	10.711	10.714	10.718	10.722	2280
2290	10.722	10.726	10.730	10.734	10.738	10.742	10.746	10.750	10.754	10.758	10.762	2290
2300	10.762	10.766	10.770	10.774	10.778	10.782	10.786	10.789	10.793	10.797	10.801	2300
2310	10.801	10.805	10.809	10.813	10.817	10.821	10.825	10.829	10.833	10.837	10.841	2310
2320	10.841	10.845	10.848	10.852	10.856	10.860	10.864	10.868	10.872	10.876	10.880	2320
2330	10.880	10.884	10.888	10.892	10.896	10.900	10.903	10.907	10.911	10.915	10.919	2330
2340	10.919	10.923	10.927	10.931	10.935	10.939	10.943	10.947	10.951	10.954	10.958	2340
2350	10.958	10.962	10.966	10.970	10.974	10.978	10.982	10.986	10.990	10.994	10.998	2350
2360	10.998	11.002	11.005	11.009	11.013	11.017	11.021	11.025	11.029	11.033	11.037	2360
2370	11.037	11.041	11.045	11.049	11.053	11.057	11.060	11.064	11.068	11.072	11.076	2370
2380	11.076	11.080	11.084	11.088	11.092	11.096	11.100	11.104	11.108	11.112	11.116	2380
2390	11.116	11.119	11.123	11.127	11.131	11.135	11.139	11.143	11.147	11.151	11.155	2390
2400	11.155	11.159	11.163	11.167	11.171	11.175	11.179	11.183	11.187	11.191	11.195	2400
2410	11.195	11.199	11.202	11.206	11.210	11.214	11.218	11.222	11.226	11.230	11.234	2410
2420	11.234	11.238	11.242	11.246	11.250	11.254	11.258	11.262	11.266	11.270	11.274	2420
2430	11.274	11.278	11.282	11.286	11.290	11.294	11.298	11.302	11.306	11.310	11.314	2430
2440	11.314	11.318	11.322	11.326	11.330	11.334	11.338	11.342	11.346	11.350	11.354	2440
2450	11.354	11.359	11.363	11.367	11.371	11.375	11.379	11.383	11.387	11.391	11.395	2450
2460	11.395	11.399	11.403	11.407	11.411	11.416	11.420	11.424	11.428	11.432	11.436	2460
2470	11.436	11.440	11.444	11.448	11.452	11.457	11.461	11.465	11.469	11.473	11.477	2470
2480	11.477	11.481	11.486	11.490	11.494	11.498	11.502	11.506	11.511	11.515	11.519	2480
2490	11.519	11.523	11.527	11.532	11.536	11.540	11.544	11.548	11.553	11.557	11.561	2490
2500	11.561	11.565										2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C8. Supplementary Reference Tables for the Positive Thermoelement, Type NP, a Nickel-Chromium-Silicon Alloy Versus Platinum, Pt-67

The reference function for type NP thermoelements versus platinum, Pt-67, given in the main text (see table 8.4.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C8.1 and C8.2. Table C8.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −200 °C to 1300 °C, and table C8.2 presents voltage values at 1 °F intervals from −328 °F to 2372 °F.

TABLE C8.1. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−200	−1.585											−200
−190	−1.594	−1.594	−1.593	−1.592	−1.591	−1.591	−1.590	−1.589	−1.587	−1.586	−1.585	−190
−180	−1.593	−1.594	−1.594	−1.595	−1.595	−1.595	−1.595	−1.595	−1.595	−1.594	−1.594	−180
−170	−1.583	−1.584	−1.586	−1.587	−1.588	−1.589	−1.590	−1.591	−1.592	−1.593	−1.593	−170
−160	−1.561	−1.564	−1.567	−1.569	−1.571	−1.573	−1.575	−1.577	−1.579	−1.581	−1.583	−160
−150	−1.530	−1.533	−1.537	−1.540	−1.544	−1.547	−1.550	−1.553	−1.556	−1.559	−1.561	−150
−140	−1.488	−1.492	−1.497	−1.501	−1.506	−1.510	−1.514	−1.518	−1.522	−1.526	−1.530	−140
−130	−1.436	−1.441	−1.447	−1.452	−1.458	−1.463	−1.468	−1.473	−1.478	−1.483	−1.488	−130
−120	−1.374	−1.380	−1.387	−1.393	−1.400	−1.406	−1.412	−1.418	−1.424	−1.430	−1.436	−120
−110	−1.302	−1.310	−1.317	−1.325	−1.332	−1.339	−1.346	−1.353	−1.360	−1.367	−1.374	−110
−100	−1.222	−1.230	−1.239	−1.247	−1.255	−1.263	−1.271	−1.279	−1.287	−1.295	−1.302	−100
−90	−1.133	−1.142	−1.151	−1.161	−1.170	−1.178	−1.187	−1.196	−1.205	−1.213	−1.222	−90
−80	−1.036	−1.046	−1.056	−1.066	−1.076	−1.085	−1.095	−1.105	−1.114	−1.124	−1.133	−80
−70	−0.930	−0.941	−0.952	−0.963	−0.973	−0.984	−0.994	−1.005	−1.015	−1.025	−1.036	−70
−60	−0.818	−0.829	−0.841	−0.852	−0.864	−0.875	−0.886	−0.897	−0.909	−0.920	−0.930	−60
−50	−0.698	−0.710	−0.722	−0.735	−0.747	−0.759	−0.771	−0.782	−0.794	−0.806	−0.818	−50
−40	−0.571	−0.584	−0.597	−0.610	−0.622	−0.635	−0.648	−0.660	−0.673	−0.685	−0.698	−40
−30	−0.437	−0.451	−0.465	−0.478	−0.492	−0.505	−0.518	−0.531	−0.545	−0.558	−0.571	−30
−20	−0.297	−0.312	−0.326	−0.340	−0.354	−0.368	−0.382	−0.396	−0.410	−0.424	−0.437	−20
−10	−0.152	−0.166	−0.181	−0.196	−0.211	−0.225	−0.240	−0.254	−0.269	−0.283	−0.297	−10
0	0.000	−0.015	−0.031	−0.046	−0.061	−0.076	−0.092	−0.107	−0.122	−0.137	−0.152	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C8.1. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.015	0.031	0.047	0.062	0.078	0.094	0.109	0.125	0.141	0.157	0
10	0.157	0.173	0.189	0.205	0.221	0.238	0.254	0.270	0.287	0.303	0.319	10
20	0.319	0.336	0.352	0.369	0.386	0.402	0.419	0.436	0.453	0.470	0.487	20
30	0.487	0.504	0.521	0.538	0.555	0.572	0.589	0.607	0.624	0.641	0.659	30
40	0.659	0.676	0.694	0.711	0.729	0.747	0.764	0.782	0.800	0.818	0.836	40
50	0.836	0.854	0.872	0.890	0.908	0.926	0.944	0.962	0.980	0.999	1.017	50
60	1.017	1.035	1.054	1.072	1.091	1.109	1.128	1.147	1.165	1.184	1.203	60
70	1.203	1.222	1.240	1.259	1.278	1.297	1.316	1.335	1.354	1.374	1.393	70
80	1.393	1.412	1.431	1.451	1.470	1.489	1.509	1.528	1.548	1.567	1.587	80
90	1.587	1.606	1.626	1.646	1.665	1.685	1.705	1.725	1.745	1.765	1.784	90
100	1.784	1.804	1.825	1.845	1.865	1.885	1.905	1.925	1.945	1.966	1.986	100
110	1.986	2.006	2.027	2.047	2.068	2.088	2.109	2.129	2.150	2.170	2.191	110
120	2.191	2.212	2.232	2.253	2.274	2.295	2.316	2.337	2.358	2.379	2.400	120
130	2.400	2.421	2.442	2.463	2.484	2.505	2.526	2.547	2.569	2.590	2.611	130
140	2.611	2.633	2.654	2.675	2.697	2.718	2.740	2.761	2.783	2.805	2.826	140
150	2.826	2.848	2.869	2.891	2.913	2.935	2.956	2.978	3.000	3.022	3.044	150
160	3.044	3.066	3.088	3.110	3.132	3.154	3.176	3.198	3.220	3.243	3.265	160
170	3.265	3.287	3.309	3.332	3.354	3.376	3.399	3.421	3.443	3.466	3.488	170
180	3.488	3.511	3.533	3.556	3.578	3.601	3.624	3.646	3.669	3.692	3.714	180
190	3.714	3.737	3.760	3.783	3.806	3.828	3.851	3.874	3.897	3.920	3.943	190
200	3.943	3.966	3.989	4.012	4.035	4.058	4.081	4.105	4.128	4.151	4.174	200
210	4.174	4.197	4.221	4.244	4.267	4.291	4.314	4.337	4.361	4.384	4.408	210
220	4.408	4.431	4.454	4.478	4.502	4.525	4.549	4.572	4.596	4.620	4.643	220
230	4.643	4.667	4.691	4.714	4.738	4.762	4.786	4.809	4.833	4.857	4.881	230
240	4.881	4.905	4.929	4.953	4.977	5.001	5.025	5.049	5.073	5.097	5.121	240
250	5.121	5.145	5.169	5.193	5.217	5.242	5.266	5.290	5.314	5.338	5.363	250
260	5.363	5.387	5.411	5.436	5.460	5.484	5.509	5.533	5.558	5.582	5.606	260
270	5.606	5.631	5.655	5.680	5.704	5.729	5.754	5.778	5.803	5.827	5.852	270
280	5.852	5.877	5.901	5.926	5.951	5.975	6.000	6.025	6.050	6.074	6.099	280
290	6.099	6.124	6.149	6.174	6.199	6.224	6.248	6.273	6.298	6.323	6.348	290
300	6.348	6.373	6.398	6.423	6.448	6.473	6.498	6.524	6.549	6.574	6.599	300
310	6.599	6.624	6.649	6.674	6.700	6.725	6.750	6.775	6.801	6.826	6.851	310
320	6.851	6.876	6.902	6.927	6.952	6.978	7.003	7.029	7.054	7.079	7.105	320
330	7.105	7.130	7.156	7.181	7.207	7.232	7.258	7.283	7.309	7.334	7.360	330
340	7.360	7.386	7.411	7.437	7.462	7.488	7.514	7.539	7.565	7.591	7.617	340
350	7.617	7.642	7.668	7.694	7.720	7.745	7.771	7.797	7.823	7.849	7.874	350
360	7.874	7.900	7.926	7.952	7.978	8.004	8.030	8.056	8.082	8.108	8.134	360
370	8.134	8.160	8.186	8.212	8.238	8.264	8.290	8.316	8.342	8.368	8.394	370
380	8.394	8.420	8.446	8.473	8.499	8.525	8.551	8.577	8.603	8.630	8.656	380
390	8.656	8.682	8.708	8.735	8.761	8.787	8.813	8.840	8.866	8.892	8.919	390
400	8.919	8.945	8.971	8.998	9.024	9.050	9.077	9.103	9.130	9.156	9.183	400
410	9.183	9.209	9.236	9.262	9.289	9.315	9.342	9.368	9.395	9.421	9.448	410
420	9.448	9.474	9.501	9.527	9.554	9.581	9.607	9.634	9.660	9.687	9.714	420
430	9.714	9.740	9.767	9.794	9.820	9.847	9.874	9.901	9.927	9.954	9.981	430
440	9.981	10.008	10.034	10.061	10.088	10.115	10.142	10.168	10.195	10.222	10.249	440
450	10.249	10.276	10.303	10.330	10.356	10.383	10.410	10.437	10.464	10.491	10.518	450
460	10.518	10.545	10.572	10.599	10.626	10.653	10.680	10.707	10.734	10.761	10.788	460
470	10.788	10.815	10.842	10.869	10.896	10.923	10.950	10.978	11.005	11.032	11.059	470
480	11.059	11.086	11.113	11.140	11.167	11.195	11.222	11.249	11.276	11.303	11.331	480
490	11.331	11.358	11.385	11.412	11.439	11.467	11.494	11.521	11.549	11.576	11.603	490
500	11.603	11.630	11.658	11.685	11.712	11.740	11.767	11.794	11.822	11.849	11.876	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C8.1. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	11.603	11.630	11.658	11.685	11.712	11.740	11.767	11.794	11.822	11.849	11.876	500
510	11.876	11.904	11.931	11.959	11.986	12.013	12.041	12.068	12.096	12.123	12.151	510
520	12.151	12.178	12.206	12.233	12.261	12.288	12.315	12.343	12.371	12.398	12.426	520
530	12.426	12.453	12.481	12.508	12.536	12.563	12.591	12.618	12.646	12.674	12.701	530
540	12.701	12.729	12.756	12.784	12.812	12.839	12.867	12.895	12.922	12.950	12.978	540
550	12.978	13.005	13.033	13.061	13.088	13.116	13.144	13.171	13.199	13.227	13.255	550
560	13.255	13.282	13.310	13.338	13.366	13.394	13.421	13.449	13.477	13.505	13.532	560
570	13.532	13.560	13.588	13.616	13.644	13.672	13.699	13.727	13.755	13.783	13.811	570
580	13.811	13.839	13.867	13.895	13.923	13.950	13.978	14.006	14.034	14.062	14.090	580
590	14.090	14.118	14.146	14.174	14.202	14.230	14.258	14.286	14.314	14.342	14.370	590
600	14.370	14.398	14.426	14.454	14.482	14.510	14.538	14.566	14.594	14.622	14.650	600
610	14.650	14.678	14.706	14.735	14.763	14.791	14.819	14.847	14.875	14.903	14.931	610
620	14.931	14.960	14.988	15.016	15.044	15.072	15.100	15.129	15.157	15.185	15.213	620
630	15.213	15.241	15.270	15.298	15.326	15.354	15.382	15.411	15.439	15.467	15.495	630
640	15.495	15.524	15.552	15.580	15.609	15.637	15.665	15.693	15.722	15.750	15.778	640
650	15.778	15.807	15.835	15.863	15.892	15.920	15.948	15.977	16.005	16.034	16.062	650
660	16.062	16.090	16.119	16.147	16.175	16.204	16.232	16.261	16.289	16.318	16.346	660
670	16.346	16.375	16.403	16.431	16.460	16.488	16.517	16.545	16.574	16.602	16.631	670
680	16.631	16.659	16.688	16.716	16.745	16.773	16.802	16.830	16.859	16.888	16.916	680
690	16.916	16.945	16.973	17.002	17.030	17.059	17.088	17.116	17.145	17.173	17.202	690
700	17.202	17.231	17.259	17.288	17.317	17.345	17.374	17.403	17.431	17.460	17.489	700
710	17.489	17.517	17.546	17.575	17.603	17.632	17.661	17.690	17.718	17.747	17.776	710
720	17.776	17.805	17.833	17.862	17.891	17.920	17.948	17.977	18.006	18.035	18.064	720
730	18.064	18.092	18.121	18.150	18.179	18.208	18.236	18.265	18.294	18.323	18.352	730
740	18.352	18.381	18.410	18.439	18.467	18.496	18.525	18.554	18.583	18.612	18.641	740
750	18.641	18.670	18.699	18.728	18.757	18.786	18.814	18.843	18.872	18.901	18.930	750
760	18.930	18.959	18.988	19.017	19.046	19.075	19.104	19.133	19.162	19.191	19.220	760
770	19.220	19.250	19.279	19.308	19.337	19.366	19.395	19.424	19.453	19.482	19.511	770
780	19.511	19.540	19.569	19.599	19.628	19.657	19.686	19.715	19.744	19.773	19.803	780
790	19.803	19.832	19.861	19.890	19.919	19.948	19.978	20.007	20.036	20.065	20.094	790
800	20.094	20.124	20.153	20.182	20.211	20.241	20.270	20.299	20.328	20.358	20.387	800
810	20.387	20.416	20.445	20.475	20.504	20.533	20.563	20.592	20.621	20.651	20.680	810
820	20.680	20.709	20.739	20.768	20.797	20.827	20.856	20.885	20.915	20.944	20.974	820
830	20.974	21.003	21.032	21.062	21.091	21.121	21.150	21.179	21.209	21.238	21.268	830
840	21.268	21.297	21.327	21.356	21.386	21.415	21.445	21.474	21.504	21.533	21.563	840
850	21.563	21.592	21.622	21.651	21.681	21.710	21.740	21.769	21.799	21.828	21.858	850
860	21.858	21.887	21.917	21.947	21.976	22.006	22.035	22.065	22.095	22.124	22.154	860
870	22.154	22.183	22.213	22.243	22.272	22.302	22.332	22.361	22.391	22.421	22.450	870
880	22.450	22.480	22.510	22.539	22.569	22.599	22.628	22.658	22.688	22.718	22.747	880
890	22.747	22.777	22.807	22.836	22.866	22.896	22.926	22.955	22.985	23.015	23.045	890
900	23.045	23.074	23.104	23.134	23.164	23.194	23.223	23.253	23.283	23.313	23.343	900
910	23.343	23.373	23.402	23.432	23.462	23.492	23.522	23.552	23.581	23.611	23.641	910
920	23.641	23.671	23.701	23.731	23.761	23.791	23.821	23.850	23.880	23.910	23.940	920
930	23.940	23.970	24.000	24.030	24.060	24.090	24.120	24.150	24.180	24.210	24.240	930
940	24.240	24.270	24.300	24.330	24.360	24.390	24.420	24.450	24.480	24.510	24.540	940
950	24.540	24.570	24.600	24.630	24.660	24.690	24.720	24.750	24.780	24.810	24.840	950
960	24.840	24.870	24.900	24.930	24.960	24.990	25.020	25.050	25.081	25.111	25.141	960
970	25.141	25.171	25.201	25.231	25.261	25.291	25.321	25.352	25.382	25.412	25.442	970
980	25.442	25.472	25.502	25.532	25.563	25.593	25.623	25.653	25.683	25.713	25.744	980
990	25.744	25.774	25.804	25.834	25.864	25.895	25.925	25.955	25.985	26.015	26.046	990
1000	26.046	26.076	26.106	26.136	26.166	26.197	26.227	26.257	26.287	26.318	26.348	1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C8.1. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
1000	26.046	26.076	26.106	26.136	26.166	26.197	26.227	26.257	26.287	26.318	26.348	**1000**
1010	26.348	26.378	26.408	26.439	26.469	26.499	26.529	26.560	26.590	26.620	26.651	**1010**
1020	26.651	26.681	26.711	26.741	26.772	26.802	26.832	26.863	26.893	26.923	26.954	**1020**
1030	26.954	26.984	27.014	27.044	27.075	27.105	27.135	27.166	27.196	27.226	27.257	**1030**
1040	27.257	27.287	27.318	27.348	27.378	27.409	27.439	27.469	27.500	27.530	27.560	**1040**
1050	27.560	27.591	27.621	27.652	27.682	27.712	27.743	27.773	27.804	27.834	27.864	**1050**
1060	27.864	27.895	27.925	27.956	27.986	28.016	28.047	28.077	28.108	28.138	28.169	**1060**
1070	28.169	28.199	28.229	28.260	28.290	28.321	28.351	28.382	28.412	28.442	28.473	**1070**
1080	28.473	28.503	28.534	28.564	28.595	28.625	28.656	28.686	28.717	28.747	28.778	**1080**
1090	28.778	28.808	28.839	28.869	28.900	28.930	28.961	28.991	29.022	29.052	29.083	**1090**
1100	29.083	29.113	29.144	29.174	29.205	29.235	29.266	29.296	29.327	29.357	29.388	**1100**
1110	29.388	29.418	29.449	29.479	29.510	29.540	29.571	29.602	29.632	29.663	29.693	**1110**
1120	29.693	29.724	29.754	29.785	29.815	29.846	29.877	29.907	29.938	29.968	29.999	**1120**
1130	29.999	30.029	30.060	30.091	30.121	30.152	30.182	30.213	30.243	30.274	30.305	**1130**
1140	30.305	30.335	30.366	30.396	30.427	30.458	30.488	30.519	30.550	30.580	30.611	**1140**
1150	30.611	30.641	30.672	30.703	30.733	30.764	30.795	30.825	30.856	30.886	30.917	**1150**
1160	30.917	30.948	30.978	31.009	31.040	31.070	31.101	31.132	31.162	31.193	31.224	**1160**
1170	31.224	31.254	31.285	31.316	31.346	31.377	31.408	31.438	31.469	31.500	31.530	**1170**
1180	31.530	31.561	31.592	31.622	31.653	31.684	31.714	31.745	31.776	31.807	31.837	**1180**
1190	31.837	31.868	31.899	31.929	31.960	31.991	32.022	32.052	32.083	32.114	32.144	**1190**
1200	32.144	32.175	32.206	32.237	32.267	32.298	32.329	32.360	32.390	32.421	32.452	**1200**
1210	32.452	32.483	32.513	32.544	32.575	32.606	32.636	32.667	32.698	32.729	32.759	**1210**
1220	32.759	32.790	32.821	32.852	32.882	32.913	32.944	32.975	33.005	33.036	33.067	**1220**
1230	33.067	33.098	33.129	33.159	33.190	33.221	33.252	33.282	33.313	33.344	33.375	**1230**
1240	33.375	33.406	33.436	33.467	33.498	33.529	33.559	33.590	33.621	33.652	33.683	**1240**
1250	33.683	33.713	33.744	33.775	33.806	33.837	33.867	33.898	33.929	33.960	33.991	**1250**
1260	33.991	34.021	34.052	34.083	34.114	34.144	34.175	34.206	34.237	34.268	34.298	**1260**
1270	34.298	34.329	34.360	34.391	34.421	34.452	34.483	34.514	34.545	34.575	34.606	**1270**
1280	34.606	34.637	34.668	34.698	34.729	34.760	34.791	34.821	34.852	34.883	34.914	**1280**
1290	34.914	34.944	34.975	35.006	35.036	35.067	35.098	35.129	35.159	35.190	35.221	**1290**
1300	35.221											**1300**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C8.2. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
						Thermoelectric Voltage in Millivolts						
−320	−1.590	−1.590	−1.589	−1.588	−1.588	−1.587	−1.586	−1.586	−1.585			−320
−310	−1.594	−1.594	−1.593	−1.593	−1.593	−1.592	−1.592	−1.592	−1.591	−1.591	−1.590	−310
−300	−1.595	−1.595	−1.595	−1.595	−1.595	−1.595	−1.595	−1.595	−1.594	−1.594	−1.594	−300
−290	−1.593	−1.593	−1.593	−1.594	−1.594	−1.594	−1.594	−1.595	−1.595	−1.595	−1.595	−290
−280	−1.587	−1.588	−1.589	−1.589	−1.590	−1.590	−1.591	−1.591	−1.592	−1.592	−1.593	−280
−270	−1.579	−1.580	−1.581	−1.582	−1.583	−1.584	−1.584	−1.585	−1.586	−1.587	−1.587	−270
−260	−1.567	−1.568	−1.570	−1.571	−1.572	−1.573	−1.575	−1.576	−1.577	−1.578	−1.579	−260
−250	−1.552	−1.554	−1.555	−1.557	−1.558	−1.560	−1.561	−1.563	−1.564	−1.566	−1.567	−250
−240	−1.534	−1.536	−1.538	−1.540	−1.541	−1.543	−1.545	−1.547	−1.549	−1.550	−1.552	−240
−230	−1.512	−1.515	−1.517	−1.519	−1.521	−1.523	−1.526	−1.528	−1.530	−1.532	−1.534	−230
−220	−1.488	−1.490	−1.493	−1.495	−1.498	−1.500	−1.503	−1.505	−1.508	−1.510	−1.512	−220
−210	−1.460	−1.463	−1.466	−1.469	−1.471	−1.474	−1.477	−1.480	−1.482	−1.485	−1.488	−210
−200	−1.429	−1.432	−1.436	−1.439	−1.442	−1.445	−1.448	−1.451	−1.454	−1.457	−1.460	−200
−190	−1.395	−1.399	−1.402	−1.406	−1.409	−1.413	−1.416	−1.419	−1.423	−1.426	−1.429	−190
−180	−1.359	−1.362	−1.366	−1.370	−1.374	−1.377	−1.381	−1.385	−1.388	−1.392	−1.395	−180
−170	−1.319	−1.323	−1.327	−1.331	−1.335	−1.339	−1.343	−1.347	−1.351	−1.355	−1.359	−170
−160	−1.277	−1.281	−1.285	−1.290	−1.294	−1.298	−1.302	−1.307	−1.311	−1.315	−1.319	−160
−150	−1.231	−1.236	−1.241	−1.245	−1.250	−1.254	−1.259	−1.263	−1.268	−1.272	−1.277	−150
−140	−1.183	−1.188	−1.193	−1.198	−1.203	−1.208	−1.212	−1.217	−1.222	−1.227	−1.231	−140
−130	−1.133	−1.138	−1.143	−1.148	−1.153	−1.158	−1.164	−1.169	−1.174	−1.178	−1.183	−130
−120	−1.080	−1.085	−1.091	−1.096	−1.101	−1.107	−1.112	−1.117	−1.123	−1.128	−1.133	−120
−110	−1.024	−1.030	−1.036	−1.041	−1.047	−1.052	−1.058	−1.063	−1.069	−1.074	−1.080	−110
−100	−0.966	−0.972	−0.978	−0.984	−0.990	−0.996	−1.001	−1.007	−1.013	−1.019	−1.024	−100
−90	−0.906	−0.912	−0.918	−0.924	−0.930	−0.937	−0.943	−0.949	−0.954	−0.960	−0.966	−90
−80	−0.843	−0.850	−0.856	−0.862	−0.869	−0.875	−0.881	−0.888	−0.894	−0.900	−0.906	−80
−70	−0.779	−0.785	−0.792	−0.798	−0.805	−0.811	−0.818	−0.824	−0.831	−0.837	−0.843	−70
−60	−0.711	−0.718	−0.725	−0.732	−0.739	−0.745	−0.752	−0.759	−0.765	−0.772	−0.779	−60
−50	−0.642	−0.649	−0.656	−0.663	−0.670	−0.677	−0.684	−0.691	−0.698	−0.705	−0.711	−50
−40	−0.571	−0.578	−0.585	−0.592	−0.600	−0.607	−0.614	−0.621	−0.628	−0.635	−0.642	−40
−30	−0.497	−0.505	−0.512	−0.520	−0.527	−0.534	−0.542	−0.549	−0.556	−0.564	−0.571	−30
−20	−0.422	−0.430	−0.437	−0.445	−0.452	−0.460	−0.468	−0.475	−0.483	−0.490	−0.497	−20
−10	−0.345	−0.353	−0.360	−0.368	−0.376	−0.384	−0.391	−0.399	−0.407	−0.414	−0.422	−10
0	−0.266	−0.274	−0.282	−0.289	−0.297	−0.305	−0.313	−0.321	−0.329	−0.337	−0.345	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C8.2. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.266	−0.257	−0.249	−0.241	−0.233	−0.225	−0.217	−0.209	−0.201	−0.193	−0.184	0
10	−0.184	−0.176	−0.168	−0.160	−0.152	−0.143	−0.135	−0.127	−0.118	−0.110	−0.102	10
20	−0.102	−0.093	−0.085	−0.076	−0.068	−0.060	−0.051	−0.043	−0.034	−0.026	−0.017	20
30	−0.017	−0.009	0.000	0.009	0.017	0.026	0.034	0.043	0.052	0.060	0.069	30
40	0.069	0.078	0.087	0.095	0.104	0.113	0.122	0.131	0.139	0.148	0.157	40
50	0.157	0.166	0.175	0.184	0.193	0.202	0.211	0.220	0.229	0.238	0.247	50
60	0.247	0.256	0.265	0.274	0.283	0.292	0.301	0.310	0.319	0.329	0.338	60
70	0.338	0.347	0.356	0.365	0.375	0.384	0.393	0.402	0.412	0.421	0.430	70
80	0.430	0.440	0.449	0.458	0.468	0.477	0.487	0.496	0.506	0.515	0.525	80
90	0.525	0.534	0.544	0.553	0.563	0.572	0.582	0.591	0.601	0.611	0.620	90
100	0.620	0.630	0.640	0.649	0.659	0.669	0.678	0.688	0.698	0.708	0.717	100
110	0.717	0.727	0.737	0.747	0.757	0.766	0.776	0.786	0.796	0.806	0.816	110
120	0.816	0.826	0.836	0.846	0.856	0.866	0.876	0.886	0.896	0.906	0.916	120
130	0.916	0.926	0.936	0.946	0.956	0.966	0.976	0.987	0.997	1.007	1.017	130
140	1.017	1.027	1.038	1.048	1.058	1.068	1.079	1.089	1.099	1.109	1.120	140
150	1.120	1.130	1.140	1.151	1.161	1.172	1.182	1.192	1.203	1.213	1.224	150
160	1.224	1.234	1.245	1.255	1.266	1.276	1.287	1.297	1.308	1.318	1.329	160
170	1.329	1.340	1.350	1.361	1.371	1.382	1.393	1.403	1.414	1.425	1.436	170
180	1.436	1.446	1.457	1.468	1.478	1.489	1.500	1.511	1.522	1.532	1.543	180
190	1.543	1.554	1.565	1.576	1.587	1.598	1.608	1.619	1.630	1.641	1.652	190
200	1.652	1.663	1.674	1.685	1.696	1.707	1.718	1.729	1.740	1.751	1.762	200
210	1.762	1.773	1.784	1.796	1.807	1.818	1.829	1.840	1.851	1.862	1.874	210
220	1.874	1.885	1.896	1.907	1.918	1.930	1.941	1.952	1.963	1.975	1.986	220
230	1.986	1.997	2.009	2.020	2.031	2.043	2.054	2.065	2.077	2.088	2.099	230
240	2.099	2.111	2.122	2.134	2.145	2.157	2.168	2.180	2.191	2.203	2.214	240
250	2.214	2.226	2.237	2.249	2.260	2.272	2.283	2.295	2.306	2.318	2.330	250
260	2.330	2.341	2.353	2.365	2.376	2.388	2.400	2.411	2.423	2.435	2.446	260
270	2.446	2.458	2.470	2.481	2.493	2.505	2.517	2.529	2.540	2.552	2.564	270
280	2.564	2.576	2.588	2.599	2.611	2.623	2.635	2.647	2.659	2.671	2.683	280
290	2.683	2.694	2.706	2.718	2.730	2.742	2.754	2.766	2.778	2.790	2.802	290
300	2.802	2.814	2.826	2.838	2.850	2.862	2.874	2.886	2.898	2.911	2.923	300
310	2.923	2.935	2.947	2.959	2.971	2.983	2.995	3.007	3.020	3.032	3.044	310
320	3.044	3.056	3.068	3.081	3.093	3.105	3.117	3.130	3.142	3.154	3.166	320
330	3.166	3.179	3.191	3.203	3.215	3.228	3.240	3.252	3.265	3.277	3.289	330
340	3.289	3.302	3.314	3.327	3.339	3.351	3.364	3.376	3.389	3.401	3.413	340
350	3.413	3.426	3.438	3.451	3.463	3.476	3.488	3.501	3.513	3.526	3.538	350
360	3.538	3.551	3.563	3.576	3.588	3.601	3.614	3.626	3.639	3.651	3.664	360
370	3.664	3.676	3.689	3.702	3.714	3.727	3.740	3.752	3.765	3.778	3.790	370
380	3.790	3.803	3.816	3.828	3.841	3.854	3.867	3.879	3.892	3.905	3.918	380
390	3.918	3.930	3.943	3.956	3.969	3.981	3.994	4.007	4.020	4.033	4.045	390
400	4.045	4.058	4.071	4.084	4.097	4.110	4.123	4.135	4.148	4.161	4.174	400
410	4.174	4.187	4.200	4.213	4.226	4.239	4.252	4.265	4.278	4.291	4.304	410
420	4.304	4.316	4.329	4.342	4.355	4.368	4.381	4.395	4.408	4.421	4.434	420
430	4.434	4.447	4.460	4.473	4.486	4.499	4.512	4.525	4.538	4.551	4.564	430
440	4.564	4.578	4.591	4.604	4.617	4.630	4.643	4.656	4.670	4.683	4.696	440
450	4.696	4.709	4.722	4.735	4.749	4.762	4.775	4.788	4.801	4.815	4.828	450
460	4.828	4.841	4.854	4.868	4.881	4.894	4.908	4.921	4.934	4.947	4.961	460
470	4.961	4.974	4.987	5.001	5.014	5.027	5.041	5.054	5.067	5.081	5.094	470
480	5.094	5.107	5.121	5.134	5.148	5.161	5.174	5.188	5.201	5.215	5.228	480
490	5.228	5.242	5.255	5.268	5.282	5.295	5.309	5.322	5.336	5.349	5.363	490
500	5.363	5.376	5.390	5.403	5.417	5.430	5.444	5.457	5.471	5.484	5.498	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C8.2. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	5.363	5.376	5.390	5.403	5.417	5.430	5.444	5.457	5.471	5.484	5.498	500
510	5.498	5.511	5.525	5.539	5.552	5.566	5.579	5.593	5.606	5.620	5.634	510
520	5.634	5.647	5.661	5.674	5.688	5.702	5.715	5.729	5.743	5.756	5.770	520
530	5.770	5.784	5.797	5.811	5.825	5.838	5.852	5.866	5.879	5.893	5.907	530
540	5.907	5.921	5.934	5.948	5.962	5.975	5.989	6.003	6.017	6.030	6.044	540
550	6.044	6.058	6.072	6.086	6.099	6.113	6.127	6.141	6.154	6.168	6.182	550
560	6.182	6.196	6.210	6.224	6.237	6.251	6.265	6.279	6.293	6.307	6.321	560
570	6.321	6.334	6.348	6.362	6.376	6.390	6.404	6.418	6.432	6.446	6.459	570
580	6.459	6.473	6.487	6.501	6.515	6.529	6.543	6.557	6.571	6.585	6.599	580
590	6.599	6.613	6.627	6.641	6.655	6.669	6.683	6.697	6.711	6.725	6.739	590
600	6.739	6.753	6.767	6.781	6.795	6.809	6.823	6.837	6.851	6.865	6.879	600
610	6.879	6.893	6.907	6.921	6.936	6.950	6.964	6.978	6.992	7.006	7.020	610
620	7.020	7.034	7.048	7.062	7.077	7.091	7.105	7.119	7.133	7.147	7.161	620
630	7.161	7.176	7.190	7.204	7.218	7.232	7.246	7.261	7.275	7.289	7.303	630
640	7.303	7.317	7.332	7.346	7.360	7.374	7.388	7.403	7.417	7.431	7.445	640
650	7.445	7.460	7.474	7.488	7.502	7.517	7.531	7.545	7.559	7.574	7.588	650
660	7.588	7.602	7.617	7.631	7.645	7.659	7.674	7.688	7.702	7.717	7.731	660
670	7.731	7.745	7.760	7.774	7.788	7.803	7.817	7.831	7.846	7.860	7.874	670
680	7.874	7.889	7.903	7.918	7.932	7.946	7.961	7.975	7.990	8.004	8.018	680
690	8.018	8.033	8.047	8.062	8.076	8.090	8.105	8.119	8.134	8.148	8.163	690
700	8.163	8.177	8.191	8.206	8.220	8.235	8.249	8.264	8.278	8.293	8.307	700
710	8.307	8.322	8.336	8.351	8.365	8.380	8.394	8.409	8.423	8.438	8.452	710
720	8.452	8.467	8.481	8.496	8.510	8.525	8.539	8.554	8.568	8.583	8.598	720
730	8.598	8.612	8.627	8.641	8.656	8.670	8.685	8.700	8.714	8.729	8.743	730
740	8.743	8.758	8.772	8.787	8.802	8.816	8.831	8.846	8.860	8.875	8.889	740
750	8.889	8.904	8.919	8.933	8.948	8.963	8.977	8.992	9.007	9.021	9.036	750
760	9.036	9.050	9.065	9.080	9.094	9.109	9.124	9.139	9.153	9.168	9.183	760
770	9.183	9.197	9.212	9.227	9.241	9.256	9.271	9.286	9.300	9.315	9.330	770
780	9.330	9.344	9.359	9.374	9.389	9.403	9.418	9.433	9.448	9.462	9.477	780
790	9.477	9.492	9.507	9.521	9.536	9.551	9.566	9.581	9.595	9.610	9.625	790
800	9.625	9.640	9.655	9.669	9.684	9.699	9.714	9.729	9.743	9.758	9.773	800
810	9.773	9.788	9.803	9.818	9.832	9.847	9.862	9.877	9.892	9.907	9.921	810
820	9.921	9.936	9.951	9.966	9.981	9.996	10.011	10.026	10.040	10.055	10.070	820
830	10.070	10.085	10.100	10.115	10.130	10.145	10.160	10.174	10.189	10.204	10.219	830
840	10.219	10.234	10.249	10.264	10.279	10.294	10.309	10.324	10.339	10.354	10.368	840
850	10.368	10.383	10.398	10.413	10.428	10.443	10.458	10.473	10.488	10.503	10.518	850
860	10.518	10.533	10.548	10.563	10.578	10.593	10.608	10.623	10.638	10.653	10.668	860
870	10.668	10.683	10.698	10.713	10.728	10.743	10.758	10.773	10.788	10.803	10.818	870
880	10.818	10.833	10.848	10.863	10.878	10.893	10.908	10.923	10.938	10.953	10.968	880
890	10.968	10.984	10.999	11.014	11.029	11.044	11.059	11.074	11.089	11.104	11.119	890
900	11.119	11.134	11.149	11.164	11.180	11.195	11.210	11.225	11.240	11.255	11.270	900
910	11.270	11.285	11.300	11.315	11.331	11.346	11.361	11.376	11.391	11.406	11.421	910
920	11.421	11.436	11.452	11.467	11.482	11.497	11.512	11.527	11.542	11.558	11.573	920
930	11.573	11.588	11.603	11.618	11.633	11.649	11.664	11.679	11.694	11.709	11.725	930
940	11.725	11.740	11.755	11.770	11.785	11.800	11.816	11.831	11.846	11.861	11.876	940
950	11.876	11.892	11.907	11.922	11.937	11.953	11.968	11.983	11.998	12.013	12.029	950
960	12.029	12.044	12.059	12.074	12.090	12.105	12.120	12.135	12.151	12.166	12.181	960
970	12.181	12.196	12.212	12.227	12.242	12.257	12.273	12.288	12.303	12.319	12.334	970
980	12.334	12.349	12.364	12.380	12.395	12.410	12.426	12.441	12.456	12.471	12.487	980
990	12.487	12.502	12.517	12.533	12.548	12.563	12.579	12.594	12.609	12.625	12.640	990
1000	12.640	12.655	12.671	12.686	12.701	12.717	12.732	12.747	12.763	12.778	12.793	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C8.2. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	12.640	12.655	12.671	12.686	12.701	12.717	12.732	12.747	12.763	12.778	12.793	1000
1010	12.793	12.809	12.824	12.839	12.855	12.870	12.885	12.901	12.916	12.931	12.947	1010
1020	12.947	12.962	12.978	12.993	13.008	13.024	13.039	13.055	13.070	13.085	13.101	1020
1030	13.101	13.116	13.131	13.147	13.162	13.178	13.193	13.208	13.224	13.239	13.255	1030
1040	13.255	13.270	13.286	13.301	13.316	13.332	13.347	13.363	13.378	13.394	13.409	1040
1050	13.409	13.424	13.440	13.455	13.471	13.486	13.502	13.517	13.532	13.548	13.563	1050
1060	13.563	13.579	13.594	13.610	13.625	13.641	13.656	13.672	13.687	13.703	13.718	1060
1070	13.718	13.734	13.749	13.765	13.780	13.795	13.811	13.826	13.842	13.857	13.873	1070
1080	13.873	13.888	13.904	13.919	13.935	13.950	13.966	13.981	13.997	14.012	14.028	1080
1090	14.028	14.044	14.059	14.075	14.090	14.106	14.121	14.137	14.152	14.168	14.183	1090
1100	14.183	14.199	14.214	14.230	14.245	14.261	14.277	14.292	14.308	14.323	14.339	1100
1110	14.339	14.354	14.370	14.385	14.401	14.417	14.432	14.448	14.463	14.479	14.494	1110
1120	14.494	14.510	14.526	14.541	14.557	14.572	14.588	14.604	14.619	14.635	14.650	1120
1130	14.650	14.666	14.682	14.697	14.713	14.728	14.744	14.760	14.775	14.791	14.806	1130
1140	14.806	14.822	14.838	14.853	14.869	14.885	14.900	14.916	14.931	14.947	14.963	1140
1150	14.963	14.978	14.994	15.010	15.025	15.041	15.057	15.072	15.088	15.103	15.119	1150
1160	15.119	15.135	15.150	15.166	15.182	15.197	15.213	15.229	15.244	15.260	15.276	1160
1170	15.276	15.291	15.307	15.323	15.338	15.354	15.370	15.386	15.401	15.417	15.433	1170
1180	15.433	15.448	15.464	15.480	15.495	15.511	15.527	15.543	15.558	15.574	15.590	1180
1190	15.590	15.605	15.621	15.637	15.653	15.668	15.684	15.700	15.715	15.731	15.747	1190
1200	15.747	15.763	15.778	15.794	15.810	15.826	15.841	15.857	15.873	15.889	15.904	1200
1210	15.904	15.920	15.936	15.952	15.967	15.983	15.999	16.015	16.030	16.046	16.062	1210
1220	16.062	16.078	16.093	16.109	16.125	16.141	16.157	16.172	16.188	16.204	16.220	1220
1230	16.220	16.235	16.251	16.267	16.283	16.299	16.314	16.330	16.346	16.362	16.378	1230
1240	16.378	16.393	16.409	16.425	16.441	16.457	16.473	16.488	16.504	16.520	16.536	1240
1250	16.536	16.552	16.567	16.583	16.599	16.615	16.631	16.647	16.662	16.678	16.694	1250
1260	16.694	16.710	16.726	16.742	16.758	16.773	16.789	16.805	16.821	16.837	16.853	1260
1270	16.853	16.869	16.884	16.900	16.916	16.932	16.948	16.964	16.980	16.996	17.011	1270
1280	17.011	17.027	17.043	17.059	17.075	17.091	17.107	17.123	17.139	17.154	17.170	1280
1290	17.170	17.186	17.202	17.218	17.234	17.250	17.266	17.282	17.298	17.313	17.329	1290
1300	17.329	17.345	17.361	17.377	17.393	17.409	17.425	17.441	17.457	17.473	17.489	1300
1310	17.489	17.505	17.521	17.536	17.552	17.568	17.584	17.600	17.616	17.632	17.648	1310
1320	17.648	17.664	17.680	17.696	17.712	17.728	17.744	17.760	17.776	17.792	17.808	1320
1330	17.808	17.824	17.840	17.856	17.872	17.888	17.904	17.920	17.936	17.952	17.968	1330
1340	17.968	17.984	18.000	18.016	18.032	18.048	18.064	18.080	18.096	18.112	18.128	1340
1350	18.128	18.144	18.160	18.176	18.192	18.208	18.224	18.240	18.256	18.272	18.288	1350
1360	18.288	18.304	18.320	18.336	18.352	18.368	18.384	18.400	18.416	18.432	18.448	1360
1370	18.448	18.464	18.480	18.496	18.512	18.528	18.544	18.561	18.577	18.593	18.609	1370
1380	18.609	18.625	18.641	18.657	18.673	18.689	18.705	18.721	18.737	18.753	18.769	1380
1390	18.769	18.786	18.802	18.818	18.834	18.850	18.866	18.882	18.898	18.914	18.930	1390
1400	18.930	18.946	18.963	18.979	18.995	19.011	19.027	19.043	19.059	19.075	19.091	1400
1410	19.091	19.108	19.124	19.140	19.156	19.172	19.188	19.204	19.220	19.237	19.253	1410
1420	19.253	19.269	19.285	19.301	19.317	19.333	19.350	19.366	19.382	19.398	19.414	1420
1430	19.414	19.430	19.447	19.463	19.479	19.495	19.511	19.527	19.544	19.560	19.576	1430
1440	19.576	19.592	19.608	19.624	19.641	19.657	19.673	19.689	19.705	19.722	19.738	1440
1450	19.738	19.754	19.770	19.786	19.803	19.819	19.835	19.851	19.867	19.884	19.900	1450
1460	19.900	19.916	19.932	19.948	19.965	19.981	19.997	20.013	20.029	20.046	20.062	1460
1470	20.062	20.078	20.094	20.111	20.127	20.143	20.159	20.176	20.192	20.208	20.224	1470
1480	20.224	20.241	20.257	20.273	20.289	20.306	20.322	20.338	20.354	20.371	20.387	1480
1490	20.387	20.403	20.419	20.436	20.452	20.468	20.484	20.501	20.517	20.533	20.550	1490
1500	20.550	20.566	20.582	20.598	20.615	20.631	20.647	20.664	20.680	20.696	20.713	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C8.2. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	20.550	20.566	20.582	20.598	20.615	20.631	20.647	20.664	20.680	20.696	20.713	1500
1510	20.713	20.729	20.745	20.761	20.778	20.794	20.810	20.827	20.843	20.859	20.876	1510
1520	20.876	20.892	20.908	20.925	20.941	20.957	20.974	20.990	21.006	21.023	21.039	1520
1530	21.039	21.055	21.072	21.088	21.104	21.121	21.137	21.153	21.170	21.186	21.202	1530
1540	21.202	21.219	21.235	21.251	21.268	21.284	21.301	21.317	21.333	21.350	21.366	1540
1550	21.366	21.382	21.399	21.415	21.431	21.448	21.464	21.481	21.497	21.513	21.530	1550
1560	21.530	21.546	21.563	21.579	21.595	21.612	21.628	21.645	21.661	21.677	21.694	1560
1570	21.694	21.710	21.727	21.743	21.759	21.776	21.792	21.809	21.825	21.841	21.858	1570
1580	21.858	21.874	21.891	21.907	21.924	21.940	21.956	21.973	21.989	22.006	22.022	1580
1590	22.022	22.039	22.055	22.072	22.088	22.104	22.121	22.137	22.154	22.170	22.187	1590
1600	22.187	22.203	22.220	22.236	22.253	22.269	22.285	22.302	22.318	22.335	22.351	1600
1610	22.351	22.368	22.384	22.401	22.417	22.434	22.450	22.467	22.483	22.500	22.516	1610
1620	22.516	22.533	22.549	22.566	22.582	22.599	22.615	22.632	22.648	22.665	22.681	1620
1630	22.681	22.698	22.714	22.731	22.747	22.764	22.780	22.797	22.813	22.830	22.846	1630
1640	22.846	22.863	22.879	22.896	22.912	22.929	22.945	22.962	22.979	22.995	23.012	1640
1650	23.012	23.028	23.045	23.061	23.078	23.094	23.111	23.127	23.144	23.161	23.177	1650
1660	23.177	23.194	23.210	23.227	23.243	23.260	23.276	23.293	23.310	23.326	23.343	1660
1670	23.343	23.359	23.376	23.392	23.409	23.426	23.442	23.459	23.475	23.492	23.509	1670
1680	23.509	23.525	23.542	23.558	23.575	23.591	23.608	23.625	23.641	23.658	23.674	1680
1690	23.674	23.691	23.708	23.724	23.741	23.757	23.774	23.791	23.807	23.824	23.841	1690
1700	23.841	23.857	23.874	23.890	23.907	23.924	23.940	23.957	23.973	23.990	24.007	1700
1710	24.007	24.023	24.040	24.057	24.073	24.090	24.107	24.123	24.140	24.156	24.173	1710
1720	24.173	24.190	24.206	24.223	24.240	24.256	24.273	24.290	24.306	24.323	24.340	1720
1730	24.340	24.356	24.373	24.390	24.406	24.423	24.440	24.456	24.473	24.490	24.506	1730
1740	24.506	24.523	24.540	24.556	24.573	24.590	24.606	24.623	24.640	24.656	24.673	1740
1750	24.673	24.690	24.706	24.723	24.740	24.757	24.773	24.790	24.807	24.823	24.840	1750
1760	24.840	24.857	24.873	24.890	24.907	24.924	24.940	24.957	24.974	24.990	25.007	1760
1770	25.007	25.024	25.040	25.057	25.074	25.091	25.107	25.124	25.141	25.158	25.174	1770
1780	25.174	25.191	25.208	25.224	25.241	25.258	25.275	25.291	25.308	25.325	25.342	1780
1790	25.342	25.358	25.375	25.392	25.408	25.425	25.442	25.459	25.475	25.492	25.509	1790
1800	25.509	25.526	25.542	25.559	25.576	25.593	25.609	25.626	25.643	25.660	25.677	1800
1810	25.677	25.693	25.710	25.727	25.744	25.760	25.777	25.794	25.811	25.827	25.844	1810
1820	25.844	25.861	25.878	25.895	25.911	25.928	25.945	25.962	25.978	25.995	26.012	1820
1830	26.012	26.029	26.046	26.062	26.079	26.096	26.113	26.129	26.146	26.163	26.180	1830
1840	26.180	26.197	26.213	26.230	26.247	26.264	26.281	26.297	26.314	26.331	26.348	1840
1850	26.348	26.365	26.381	26.398	26.415	26.432	26.449	26.466	26.482	26.499	26.516	1850
1860	26.516	26.533	26.550	26.566	26.583	26.600	26.617	26.634	26.651	26.667	26.684	1860
1870	26.684	26.701	26.718	26.735	26.751	26.768	26.785	26.802	26.819	26.836	26.852	1870
1880	26.852	26.869	26.886	26.903	26.920	26.937	26.954	26.970	26.987	27.004	27.021	1880
1890	27.021	27.038	27.055	27.071	27.088	27.105	27.122	27.139	27.156	27.173	27.189	1890
1900	27.189	27.206	27.223	27.240	27.257	27.274	27.291	27.307	27.324	27.341	27.358	1900
1910	27.358	27.375	27.392	27.409	27.425	27.442	27.459	27.476	27.493	27.510	27.527	1910
1920	27.527	27.544	27.560	27.577	27.594	27.611	27.628	27.645	27.662	27.679	27.695	1920
1930	27.695	27.712	27.729	27.746	27.763	27.780	27.797	27.814	27.831	27.847	27.864	1930
1940	27.864	27.881	27.898	27.915	27.932	27.949	27.966	27.983	27.999	28.016	28.033	1940
1950	28.033	28.050	28.067	28.084	28.101	28.118	28.135	28.152	28.169	28.185	28.202	1950
1960	28.202	28.219	28.236	28.253	28.270	28.287	28.304	28.321	28.338	28.355	28.371	1960
1970	28.371	28.388	28.405	28.422	28.439	28.456	28.473	28.490	28.507	28.524	28.541	1970
1980	28.541	28.558	28.574	28.591	28.608	28.625	28.642	28.659	28.676	28.693	28.710	1980
1990	28.710	28.727	28.744	28.761	28.778	28.795	28.812	28.828	28.845	28.862	28.879	1990
2000	28.879	28.896	28.913	28.930	28.947	28.964	28.981	28.998	29.015	29.032	29.049	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C8.2. *Type NP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	28.879	28.896	28.913	28.930	28.947	28.964	28.981	28.998	29.015	29.032	29.049	2000
2010	29.049	29.066	29.083	29.100	29.116	29.133	29.150	29.167	29.184	29.201	29.218	2010
2020	29.218	29.235	29.252	29.269	29.286	29.303	29.320	29.337	29.354	29.371	29.388	2020
2030	29.388	29.405	29.422	29.439	29.456	29.473	29.490	29.506	29.523	29.540	29.557	2030
2040	29.557	29.574	29.591	29.608	29.625	29.642	29.659	29.676	29.693	29.710	29.727	2040
2050	29.727	29.744	29.761	29.778	29.795	29.812	29.829	29.846	29.863	29.880	29.897	2050
2060	29.897	29.914	29.931	29.948	29.965	29.982	29.999	30.016	30.033	30.050	30.067	2060
2070	30.067	30.084	30.101	30.118	30.135	30.152	30.169	30.186	30.203	30.220	30.237	2070
2080	30.237	30.254	30.271	30.288	30.305	30.322	30.339	30.356	30.373	30.390	30.407	2080
2090	30.407	30.424	30.441	30.458	30.475	30.492	30.509	30.526	30.543	30.560	30.577	2090
2100	30.577	30.594	30.611	30.628	30.645	30.662	30.679	30.696	30.713	30.730	30.747	2100
2110	30.747	30.764	30.781	30.798	30.815	30.832	30.849	30.866	30.883	30.900	30.917	2110
2120	30.917	30.934	30.951	30.968	30.985	31.002	31.019	31.036	31.053	31.070	31.087	2120
2130	31.087	31.104	31.121	31.138	31.155	31.172	31.190	31.207	31.224	31.241	31.258	2130
2140	31.258	31.275	31.292	31.309	31.326	31.343	31.360	31.377	31.394	31.411	31.428	2140
2150	31.428	31.445	31.462	31.479	31.496	31.513	31.530	31.547	31.564	31.581	31.599	2150
2160	31.599	31.616	31.633	31.650	31.667	31.684	31.701	31.718	31.735	31.752	31.769	2160
2170	31.769	31.786	31.803	31.820	31.837	31.854	31.871	31.888	31.906	31.923	31.940	2170
2180	31.940	31.957	31.974	31.991	32.008	32.025	32.042	32.059	32.076	32.093	32.110	2180
2190	32.110	32.127	32.144	32.162	32.179	32.196	32.213	32.230	32.247	32.264	32.281	2190
2200	32.281	32.298	32.315	32.332	32.349	32.366	32.383	32.401	32.418	32.435	32.452	2200
2210	32.452	32.469	32.486	32.503	32.520	32.537	32.554	32.571	32.588	32.606	32.623	2210
2220	32.623	32.640	32.657	32.674	32.691	32.708	32.725	32.742	32.759	32.776	32.793	2220
2230	32.793	32.811	32.828	32.845	32.862	32.879	32.896	32.913	32.930	32.947	32.964	2230
2240	32.964	32.981	32.999	33.016	33.033	33.050	33.067	33.084	33.101	33.118	33.135	2240
2250	33.135	33.152	33.170	33.187	33.204	33.221	33.238	33.255	33.272	33.289	33.306	2250
2260	33.306	33.323	33.341	33.358	33.375	33.392	33.409	33.426	33.443	33.460	33.477	2260
2270	33.477	33.494	33.512	33.529	33.546	33.563	33.580	33.597	33.614	33.631	33.648	2270
2280	33.648	33.666	33.683	33.700	33.717	33.734	33.751	33.768	33.785	33.802	33.819	2280
2290	33.819	33.837	33.854	33.871	33.888	33.905	33.922	33.939	33.956	33.973	33.991	2290
2300	33.991	34.008	34.025	34.042	34.059	34.076	34.093	34.110	34.127	34.144	34.162	2300
2310	34.162	34.179	34.196	34.213	34.230	34.247	34.264	34.281	34.298	34.315	34.333	2310
2320	34.333	34.350	34.367	34.384	34.401	34.418	34.435	34.452	34.469	34.486	34.504	2320
2330	34.504	34.521	34.538	34.555	34.572	34.589	34.606	34.623	34.640	34.657	34.674	2330
2340	34.674	34.691	34.709	34.726	34.743	34.760	34.777	34.794	34.811	34.828	34.845	2340
2350	34.845	34.862	34.879	34.896	34.914	34.931	34.948	34.965	34.982	34.999	35.016	2350
2360	35.016	35.033	35.050	35.067	35.084	35.101	35.118	35.135	35.152	35.169	35.186	2360
2370	35.186	35.204	35.221									2370
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C9. Supplementary Reference Tables for Platinum, Pt-67, Versus the Negative Thermoelement, Type NN, a Nickel-Silicon-Magnesium Alloy

The reference function for platinum, Pt-67, versus type NN thermoelements given in the main text (see table 8.5.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C9.1 and C9.2. Table C9.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −200 °C to 1300 °C, and table C9.2 presents voltage values at 1 °F intervals from −328 °F to 2372 °F.

TABLE C9.1. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−200	−2.406											−200
−190	−2.290	−2.302	−2.314	−2.325	−2.337	−2.348	−2.360	−2.371	−2.383	−2.394	−2.406	−190
−180	−2.172	−2.184	−2.196	−2.208	−2.220	−2.232	−2.243	−2.255	−2.267	−2.279	−2.290	−180
−170	−2.052	−2.064	−2.076	−2.088	−2.100	−2.112	−2.124	−2.136	−2.148	−2.160	−2.172	−170
−160	−1.930	−1.942	−1.954	−1.966	−1.979	−1.991	−2.003	−2.015	−2.027	−2.040	−2.052	−160
−150	−1.807	−1.819	−1.831	−1.844	−1.856	−1.868	−1.881	−1.893	−1.905	−1.917	−1.930	−150
−140	−1.683	−1.695	−1.708	−1.720	−1.732	−1.745	−1.757	−1.769	−1.782	−1.794	−1.807	−140
−130	−1.559	−1.571	−1.583	−1.596	−1.608	−1.621	−1.633	−1.646	−1.658	−1.670	−1.683	−130
−120	−1.434	−1.446	−1.459	−1.471	−1.484	−1.496	−1.509	−1.521	−1.534	−1.546	−1.559	−120
−110	−1.309	−1.322	−1.334	−1.347	−1.359	−1.372	−1.384	−1.397	−1.409	−1.422	−1.434	−110
−100	−1.185	−1.197	−1.210	−1.222	−1.235	−1.247	−1.260	−1.272	−1.285	−1.297	−1.309	−100
−90	−1.061	−1.073	−1.085	−1.098	−1.110	−1.123	−1.135	−1.148	−1.160	−1.172	−1.185	−90
−80	−0.937	−0.949	−0.961	−0.974	−0.986	−0.999	−1.011	−1.023	−1.036	−1.048	−1.061	−80
−70	−0.814	−0.826	−0.838	−0.850	−0.863	−0.875	−0.887	−0.900	−0.912	−0.924	−0.937	−70
−60	−0.692	−0.704	−0.716	−0.728	−0.740	−0.752	−0.765	−0.777	−0.789	−0.801	−0.814	−60
−50	−0.571	−0.583	−0.595	−0.607	−0.619	−0.631	−0.643	−0.655	−0.667	−0.679	−0.692	−50
−40	−0.452	−0.464	−0.476	−0.487	−0.499	−0.511	−0.523	−0.535	−0.547	−0.559	−0.571	−40
−30	−0.335	−0.347	−0.358	−0.370	−0.382	−0.393	−0.405	−0.417	−0.428	−0.440	−0.452	−30
−20	−0.221	−0.232	−0.243	−0.255	−0.266	−0.278	−0.289	−0.300	−0.312	−0.323	−0.335	−20
−10	−0.109	−0.120	−0.131	−0.142	−0.153	−0.164	−0.176	−0.187	−0.198	−0.209	−0.221	−10
0	0.000	−0.011	−0.022	−0.032	−0.043	−0.054	−0.065	−0.076	−0.087	−0.098	−0.109	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C9.1. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.010	0.021	0.031	0.042	0.052	0.063	0.073	0.083	0.094	0.104	0
10	0.104	0.114	0.124	0.135	0.145	0.155	0.165	0.175	0.186	0.196	0.206	10
20	0.206	0.216	0.226	0.236	0.246	0.256	0.266	0.276	0.286	0.296	0.306	20
30	0.306	0.316	0.326	0.336	0.346	0.356	0.366	0.376	0.386	0.396	0.406	30
40	0.406	0.416	0.425	0.435	0.445	0.455	0.465	0.475	0.484	0.494	0.504	40
50	0.504	0.514	0.524	0.533	0.543	0.553	0.563	0.573	0.582	0.592	0.602	50
60	0.602	0.612	0.621	0.631	0.641	0.651	0.660	0.670	0.680	0.689	0.699	60
70	0.699	0.709	0.719	0.728	0.738	0.748	0.757	0.767	0.777	0.786	0.796	70
80	0.796	0.806	0.815	0.825	0.835	0.845	0.854	0.864	0.874	0.883	0.893	80
90	0.893	0.903	0.912	0.922	0.932	0.941	0.951	0.961	0.970	0.980	0.990	90
100	0.990	0.999	1.009	1.019	1.028	1.038	1.048	1.057	1.067	1.077	1.086	100
110	1.086	1.096	1.106	1.115	1.125	1.135	1.145	1.154	1.164	1.174	1.183	110
120	1.183	1.193	1.203	1.212	1.222	1.232	1.242	1.251	1.261	1.271	1.281	120
130	1.281	1.290	1.300	1.310	1.319	1.329	1.339	1.349	1.358	1.368	1.378	130
140	1.378	1.388	1.397	1.407	1.417	1.427	1.437	1.446	1.456	1.466	1.476	140
150	1.476	1.486	1.495	1.505	1.515	1.525	1.535	1.544	1.554	1.564	1.574	150
160	1.574	1.584	1.593	1.603	1.613	1.623	1.633	1.643	1.653	1.662	1.672	160
170	1.672	1.682	1.692	1.702	1.712	1.722	1.732	1.742	1.751	1.761	1.771	170
180	1.771	1.781	1.791	1.801	1.811	1.821	1.831	1.841	1.851	1.861	1.871	180
190	1.871	1.881	1.891	1.900	1.910	1.920	1.930	1.940	1.950	1.960	1.970	190
200	1.970	1.980	1.990	2.000	2.010	2.020	2.030	2.041	2.051	2.061	2.071	200
210	2.071	2.081	2.091	2.101	2.111	2.121	2.131	2.141	2.151	2.161	2.171	210
220	2.171	2.181	2.192	2.202	2.212	2.222	2.232	2.242	2.252	2.262	2.272	220
230	2.272	2.283	2.293	2.303	2.313	2.323	2.333	2.344	2.354	2.364	2.374	230
240	2.374	2.384	2.394	2.405	2.415	2.425	2.435	2.445	2.456	2.466	2.476	240
250	2.476	2.486	2.497	2.507	2.517	2.527	2.538	2.548	2.558	2.568	2.579	250
260	2.579	2.589	2.599	2.609	2.620	2.630	2.640	2.651	2.661	2.671	2.682	260
270	2.682	2.692	2.702	2.712	2.723	2.733	2.743	2.754	2.764	2.775	2.785	270
280	2.785	2.795	2.806	2.816	2.826	2.837	2.847	2.857	2.868	2.878	2.889	280
290	2.889	2.899	2.909	2.920	2.930	2.941	2.951	2.962	2.972	2.982	2.993	290
300	2.993	3.003	3.014	3.024	3.035	3.045	3.056	3.066	3.076	3.087	3.097	300
310	3.097	3.108	3.118	3.129	3.139	3.150	3.160	3.171	3.181	3.192	3.202	310
320	3.202	3.213	3.223	3.234	3.245	3.255	3.266	3.276	3.287	3.297	3.308	320
330	3.308	3.318	3.329	3.339	3.350	3.361	3.371	3.382	3.392	3.403	3.414	330
340	3.414	3.424	3.435	3.445	3.456	3.467	3.477	3.488	3.498	3.509	3.520	340
350	3.520	3.530	3.541	3.552	3.562	3.573	3.583	3.594	3.605	3.615	3.626	350
360	3.626	3.637	3.647	3.658	3.669	3.679	3.690	3.701	3.711	3.722	3.733	360
370	3.733	3.744	3.754	3.765	3.776	3.786	3.797	3.808	3.818	3.829	3.840	370
380	3.840	3.851	3.861	3.872	3.883	3.894	3.904	3.915	3.926	3.937	3.947	380
390	3.947	3.958	3.969	3.980	3.990	4.001	4.012	4.023	4.033	4.044	4.055	390
400	4.055	4.066	4.077	4.087	4.098	4.109	4.120	4.131	4.141	4.152	4.163	400
410	4.163	4.174	4.185	4.195	4.206	4.217	4.228	4.239	4.250	4.260	4.271	410
420	4.271	4.282	4.293	4.304	4.315	4.325	4.336	4.347	4.358	4.369	4.380	420
430	4.380	4.391	4.401	4.412	4.423	4.434	4.445	4.456	4.467	4.478	4.488	430
440	4.488	4.499	4.510	4.521	4.532	4.543	4.554	4.565	4.576	4.587	4.597	440
450	4.597	4.608	4.619	4.630	4.641	4.652	4.663	4.674	4.685	4.696	4.707	450
460	4.707	4.717	4.728	4.739	4.750	4.761	4.772	4.783	4.794	4.805	4.816	460
470	4.816	4.827	4.838	4.849	4.860	4.871	4.882	4.893	4.903	4.914	4.925	470
480	4.925	4.936	4.947	4.958	4.969	4.980	4.991	5.002	5.013	5.024	5.035	480
490	5.035	5.046	5.057	5.068	5.079	5.090	5.101	5.112	5.123	5.134	5.145	490
500	5.145	5.156	5.167	5.178	5.189	5.200	5.211	5.222	5.233	5.244	5.255	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C9.1. ***Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued***

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	5.145	5.156	5.167	5.178	5.189	5.200	5.211	5.222	5.233	5.244	5.255	**500**
510	5.255	5.266	5.277	5.288	5.299	5.310	5.320	5.331	5.342	5.353	5.364	**510**
520	5.364	5.375	5.386	5.397	5.408	5.419	5.430	5.441	5.452	5.463	5.474	**520**
530	5.474	5.485	5.496	5.507	5.518	5.529	5.540	5.551	5.562	5.573	5.584	**530**
540	5.584	5.595	5.606	5.617	5.628	5.639	5.650	5.661	5.672	5.683	5.694	**540**
550	5.694	5.705	5.716	5.727	5.738	5.749	5.760	5.771	5.782	5.793	5.804	**550**
560	5.804	5.815	5.826	5.837	5.848	5.859	5.870	5.881	5.892	5.903	5.914	**560**
570	5.914	5.925	5.936	5.947	5.958	5.969	5.980	5.991	6.002	6.013	6.024	**570**
580	6.024	6.035	6.046	6.057	6.068	6.079	6.090	6.101	6.112	6.123	6.134	**580**
590	6.134	6.145	6.156	6.167	6.178	6.188	6.199	6.210	6.221	6.232	6.243	**590**
600	6.243	6.254	6.265	6.276	6.287	6.298	6.309	6.320	6.331	6.342	6.353	**600**
610	6.353	6.364	6.374	6.385	6.396	6.407	6.418	6.429	6.440	6.451	6.462	**610**
620	6.462	6.473	6.484	6.494	6.505	6.516	6.527	6.538	6.549	6.560	6.571	**620**
630	6.571	6.582	6.592	6.603	6.614	6.625	6.636	6.647	6.658	6.669	6.679	**830**
640	6.679	6.690	6.701	6.712	6.723	6.734	6.745	6.755	6.766	6.777	6.788	**640**
650	6.788	6.799	6.809	6.820	6.831	6.842	6.853	6.864	6.874	6.885	6.896	**650**
660	6.896	6.907	6.918	6.928	6.939	6.950	6.961	6.971	6.982	6.993	7.004	**660**
670	7.004	7.014	7.025	7.036	7.047	7.057	7.068	7.079	7.090	7.100	7.111	**670**
680	7.111	7.122	7.132	7.143	7.154	7.165	7.175	7.186	7.197	7.207	7.218	**680**
690	7.218	7.229	7.239	7.250	7.261	7.271	7.282	7.293	7.303	7.314	7.325	**690**
700	7.325	7.335	7.346	7.356	7.367	7.378	7.388	7.399	7.409	7.420	7.431	**700**
710	7.431	7.441	7.452	7.462	7.473	7.483	7.494	7.505	7.515	7.526	7.536	**710**
720	7.536	7.547	7.557	7.568	7.578	7.589	7.599	7.610	7.620	7.631	7.641	**720**
730	7.641	7.652	7.662	7.673	7.683	7.694	7.704	7.714	7.725	7.735	7.746	**730**
740	7.746	7.756	7.767	7.777	7.787	7.798	7.808	7.819	7.829	7.839	7.850	**740**
750	7.850	7.860	7.870	7.881	7.891	7.901	7.912	7.922	7.932	7.943	7.953	**750**
760	7.953	7.963	7.974	7.984	7.994	8.005	8.015	8.025	8.035	8.046	8.056	**760**
770	8.056	8.066	8.076	8.087	8.097	8.107	8.117	8.127	8.138	8.148	8.158	**770**
780	8.158	8.168	8.178	8.188	8.199	8.209	8.219	8.229	8.239	8.249	8.259	**780**
790	8.259	8.269	8.280	8.290	8.300	8.310	8.320	8.330	8.340	8.350	8.360	**790**
800	8.360	8.370	8.380	8.390	8.400	8.410	8.420	8.430	8.440	8.450	8.460	**800**
810	8.460	8.470	8.480	8.490	8.500	8.510	8.520	8.530	8.540	8.550	8.560	**810**
820	8.560	8.569	8.579	8.589	8.599	8.609	8.619	8.629	8.638	8.648	8.658	**820**
830	8.658	8.668	8.678	8.688	8.697	8.707	8.717	8.727	8.736	8.746	8.756	**830**
840	8.756	8.766	8.775	8.785	8.795	8.805	8.814	8.824	8.834	8.843	8.853	**840**
850	8.853	8.863	8.872	8.882	8.892	8.901	8.911	8.921	8.930	8.940	8.949	**850**
860	8.949	8.959	8.969	8.978	8.988	8.997	9.007	9.016	9.026	9.035	9.045	**860**
870	9.045	9.054	9.064	9.073	9.083	9.092	9.102	9.111	9.121	9.130	9.140	**870**
880	9.140	9.149	9.158	9.168	9.177	9.187	9.196	9.205	9.215	9.224	9.233	**880**
890	9.233	9.243	9.252	9.261	9.271	9.280	9.289	9.299	9.308	9.317	9.327	**890**
900	9.327	9.336	9.345	9.354	9.364	9.373	9.382	9.391	9.400	9.410	9.419	**900**
910	9.419	9.428	9.437	9.446	9.455	9.465	9.474	9.483	9.492	9.501	9.510	**910**
920	9.510	9.519	9.528	9.537	9.546	9.556	9.565	9.574	9.583	9.592	9.601	**920**
930	9.601	9.610	9.619	9.628	9.637	9.646	9.655	9.664	9.672	9.681	9.690	**930**
940	9.690	9.699	9.708	9.717	9.726	9.735	9.744	9.753	9.761	9.770	9.779	**940**
950	9.779	9.788	9.797	9.806	9.814	9.823	9.832	9.841	9.850	9.858	9.867	**950**
960	9.867	9.876	9.885	9.893	9.902	9.911	9.919	9.928	9.937	9.945	9.954	**960**
970	9.954	9.963	9.971	9.980	9.989	9.997	10.006	10.015	10.023	10.032	10.040	**970**
980	10.040	10.049	10.057	10.066	10.075	10.083	10.092	10.100	10.109	10.117	10.126	**980**
990	10.126	10.134	10.143	10.151	10.159	10.168	10.176	10.185	10.193	10.202	10.210	**990**
1000	10.210	10.218	10.227	10.235	10.244	10.252	10.260	10.269	10.277	10.285	10.294	**1000**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C9.1. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
1000	10.210	10.218	10.227	10.235	10.244	10.252	10.260	10.269	10.277	10.285	10.294	**1000**
1010	10.294	10.302	10.310	10.318	10.327	10.335	10.343	10.351	10.360	10.368	10.376	**1010**
1020	10.376	10.384	10.393	10.401	10.409	10.417	10.425	10.433	10.442	10.450	10.458	**1020**
1030	10.458	10.466	10.474	10.482	10.490	10.498	10.506	10.514	10.523	10.531	10.539	**1030**
1040	10.539	10.547	10.555	10.563	10.571	10.579	10.587	10.595	10.603	10.611	10.619	**1040**
1050	10.619	10.626	10.634	10.642	10.650	10.658	10.666	10.674	10.682	10.690	10.697	**1050**
1060	10.697	10.705	10.713	10.721	10.729	10.737	10.744	10.752	10.760	10.768	10.776	**1060**
1070	10.776	10.783	10.791	10.799	10.806	10.814	10.822	10.830	10.837	10.845	10.853	**1070**
1080	10.853	10.860	10.868	10.876	10.883	10.891	10.898	10.906	10.914	10.921	10.929	**1080**
1090	10.929	10.936	10.944	10.951	10.959	10.967	10.974	10.982	10.989	10.997	11.004	**1090**
1100	11.004	11.012	11.019	11.026	11.034	11.041	11.049	11.056	11.064	11.071	11.078	**1100**
1110	11.078	11.086	11.093	11.100	11.108	11.115	11.122	11.130	11.137	11.144	11.152	**1110**
1120	11.152	11.159	11.166	11.173	11.181	11.188	11.195	11.202	11.210	11.217	11.224	**1120**
1130	11.224	11.231	11.238	11.245	11.253	11.260	11.267	11.274	11.281	11.288	11.295	**1130**
1140	11.295	11.302	11.309	11.316	11.324	11.331	11.338	11.345	11.352	11.359	11.366	**1140**
1150	11.366	11.373	11.380	11.387	11.393	11.400	11.407	11.414	11.421	11.428	11.435	**1150**
1160	11.435	11.442	11.449	11.456	11.462	11.469	11.476	11.483	11.490	11.496	11.503	**1160**
1170	11.503	11.510	11.517	11.524	11.530	11.537	11.544	11.550	11.557	11.564	11.571	**1170**
1180	11.571	11.577	11.584	11.591	11.597	11.604	11.610	11.617	11.624	11.630	11.637	**1180**
1190	11.637	11.643	11.650	11.656	11.663	11.669	11.676	11.682	11.689	11.695	11.702	**1190**
1200	11.702	11.708	11.715	11.721	11.728	11.734	11.741	11.747	11.753	11.760	11.766	**1200**
1210	11.766	11.772	11.779	11.785	11.791	11.798	11.804	11.810	11.816	11.823	11.829	**1210**
1220	11.829	11.835	11.841	11.848	11.854	11.860	11.866	11.872	11.879	11.885	11.891	**1220**
1230	11.891	11.897	11.903	11.909	11.915	11.921	11.927	11.934	11.940	11.946	11.952	**1230**
1240	11.952	11.958	11.964	11.970	11.976	11.982	11.988	11.994	11.999	12.005	12.011	**1240**
1250	12.011	12.017	12.023	12.029	12.035	12.041	12.047	12.052	12.058	12.064	12.070	**1250**
1260	12.070	12.076	12.081	12.087	12.093	12.099	12.104	12.110	12.116	12.121	12.127	**1260**
1270	12.127	12.133	12.138	12.144	12.150	12.155	12.161	12.167	12.172	12.178	12.183	**1270**
1280	12.183	12.189	12.194	12.200	12.205	12.211	12.216	12.222	12.227	12.233	12.238	**1280**
1290	12.238	12.244	12.249	12.255	12.260	12.265	12.271	12.276	12.282	12.287	12.292	**1290**
1300	12.292											**1300**
°C	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**°C**

TABLE C9.2. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−320	−2.355	−2.361	−2.368	−2.374	−2.380	−2.387	−2.393	−2.399	−2.406			**−320**
−310	−2.290	−2.297	−2.303	−2.310	−2.316	−2.323	−2.329	−2.336	−2.342	−2.348	−2.355	**−310**
−300	−2.225	−2.232	−2.238	−2.245	−2.251	−2.258	−2.264	−2.271	−2.277	−2.284	−2.290	**−300**
−290	−2.159	−2.166	−2.172	−2.179	−2.185	−2.192	−2.199	−2.205	−2.212	−2.219	−2.225	**−290**
−280	−2.092	−2.099	−2.105	−2.112	−2.119	−2.126	−2.132	−2.139	−2.146	−2.152	−2.159	**−280**
−270	−2.025	−2.031	−2.038	−2.045	−2.052	−2.058	−2.065	−2.072	−2.079	−2.085	−2.092	**−270**
−260	−1.957	−1.964	−1.970	−1.977	−1.984	−1.991	−1.998	−2.004	−2.011	−2.018	−2.025	**−260**
−250	−1.889	−1.896	−1.902	−1.909	−1.916	−1.923	−1.930	−1.936	−1.943	−1.950	−1.957	**−250**
−240	−1.820	−1.827	−1.834	−1.841	−1.848	−1.855	−1.861	−1.868	−1.875	−1.882	−1.889	**−240**
−230	−1.752	−1.758	−1.765	−1.772	−1.779	−1.786	−1.793	−1.800	−1.807	−1.813	−1.820	**−230**
−220	−1.683	−1.690	−1.697	−1.703	−1.710	−1.717	−1.724	−1.731	−1.738	−1.745	−1.752	**−220**
−210	−1.614	−1.621	−1.628	−1.635	−1.641	−1.648	−1.655	−1.662	−1.669	−1.676	−1.683	**−210**
−200	−1.545	−1.552	−1.559	−1.565	−1.572	−1.579	−1.586	−1.593	−1.600	−1.607	−1.614	**−200**
−190	−1.476	−1.482	−1.489	−1.496	−1.503	−1.510	−1.517	−1.524	−1.531	−1.538	−1.545	**−190**
−180	−1.406	−1.413	−1.420	−1.427	−1.434	−1.441	−1.448	−1.455	−1.462	−1.469	−1.476	**−180**
−170	−1.337	−1.344	−1.351	−1.358	−1.365	−1.372	−1.379	−1.386	−1.393	−1.399	−1.406	**−170**
−160	−1.268	−1.275	−1.282	−1.289	−1.296	−1.303	−1.309	−1.316	−1.323	−1.330	−1.337	**−160**
−150	−1.199	−1.206	−1.213	−1.219	−1.226	−1.233	−1.240	−1.247	−1.254	−1.261	−1.268	**−150**
−140	−1.130	−1.136	−1.143	−1.150	−1.157	−1.164	−1.171	−1.178	−1.185	−1.192	−1.199	**−140**
−130	−1.061	−1.067	−1.074	−1.081	−1.088	−1.095	−1.102	−1.109	−1.116	−1.123	−1.130	**−130**
−120	−0.992	−0.999	−1.005	−1.012	−1.019	−1.026	−1.033	−1.040	−1.047	−1.054	−1.061	**−120**
−110	−0.923	−0.930	−0.937	−0.944	−0.950	−0.957	−0.964	−0.971	−0.978	−0.985	−0.992	**−110**
−100	−0.855	−0.861	−0.868	−0.875	−0.882	−0.889	−0.896	−0.902	−0.909	−0.916	−0.923	**−100**
−90	−0.786	−0.793	−0.800	−0.807	−0.814	−0.820	−0.827	−0.834	−0.841	−0.848	−0.855	**−90**
−80	−0.719	−0.725	−0.732	−0.739	−0.746	−0.752	−0.759	−0.766	−0.773	−0.780	−0.786	**−80**
−70	−0.651	−0.658	−0.665	−0.671	−0.678	−0.685	−0.692	−0.698	−0.705	−0.712	−0.719	**−70**
−60	−0.584	−0.591	−0.598	−0.604	−0.611	−0.618	−0.624	−0.631	−0.638	−0.644	−0.651	**−60**
−50	−0.518	−0.524	−0.531	−0.538	−0.544	−0.551	−0.558	−0.564	−0.571	−0.577	−0.584	**−50**
−40	−0.452	−0.458	−0.465	−0.472	−0.478	−0.485	−0.491	−0.498	−0.505	−0.511	−0.518	**−40**
−30	−0.387	−0.393	−0.400	−0.406	−0.413	−0.419	−0.426	−0.432	−0.439	−0.445	−0.452	**−30**
−20	−0.322	−0.329	−0.335	−0.341	−0.348	−0.354	−0.361	−0.367	−0.374	−0.380	−0.387	**−20**
−10	−0.258	−0.265	−0.271	−0.278	−0.284	−0.290	−0.297	−0.303	−0.309	−0.316	−0.322	**−10**
0	−0.196	−0.202	−0.208	−0.214	−0.221	−0.227	−0.233	−0.240	−0.246	−0.252	−0.258	**0**
°F	**0**	**−1**	**−2**	**−3**	**−4**	**−5**	**−6**	**−7**	**−8**	**−9**	**−10**	**°F**

TABLE C9.2. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.196	−0.189	−0.183	−0.177	−0.171	−0.164	−0.158	−0.152	−0.146	−0.140	−0.133	0
10	−0.133	−0.127	−0.121	−0.115	−0.109	−0.103	−0.097	−0.091	−0.084	−0.078	−0.072	10
20	−0.072	−0.066	−0.060	−0.054	−0.048	−0.042	−0.036	−0.030	−0.024	−0.018	−0.012	20
30	−0.012	−0.006	0.000	0.006	0.012	0.017	0.023	0.029	0.035	0.041	0.046	30
40	0.046	0.052	0.058	0.064	0.069	0.075	0.081	0.087	0.092	0.098	0.104	40
50	0.104	0.110	0.115	0.121	0.127	0.132	0.138	0.144	0.149	0.155	0.161	50
60	0.161	0.166	0.172	0.178	0.183	0.189	0.195	0.200	0.206	0.211	0.217	60
70	0.217	0.223	0.228	0.234	0.239	0.245	0.251	0.256	0.262	0.267	0.273	70
80	0.273	0.279	0.284	0.290	0.295	0.301	0.306	0.312	0.317	0.323	0.328	80
90	0.328	0.334	0.340	0.345	0.351	0.356	0.362	0.367	0.373	0.378	0.384	90
100	0.384	0.389	0.395	0.400	0.406	0.411	0.417	0.422	0.428	0.433	0.439	100
110	0.439	0.444	0.450	0.455	0.460	0.466	0.471	0.477	0.482	0.488	0.493	110
120	0.493	0.499	0.504	0.510	0.515	0.520	0.526	0.531	0.537	0.542	0.548	120
130	0.548	0.553	0.558	0.564	0.569	0.575	0.580	0.586	0.591	0.596	0.602	130
140	0.602	0.607	0.613	0.618	0.624	0.629	0.634	0.640	0.645	0.651	0.656	140
150	0.656	0.661	0.667	0.672	0.678	0.683	0.688	0.694	0.699	0.705	0.710	150
160	0.710	0.715	0.721	0.726	0.731	0.737	0.742	0.748	0.753	0.758	0.764	160
170	0.764	0.769	0.775	0.780	0.785	0.791	0.796	0.801	0.807	0.812	0.818	170
180	0.818	0.823	0.828	0.834	0.839	0.845	0.850	0.855	0.861	0.866	0.871	180
190	0.871	0.877	0.882	0.888	0.893	0.898	0.904	0.909	0.914	0.920	0.925	190
200	0.925	0.931	0.936	0.941	0.947	0.952	0.957	0.963	0.968	0.974	0.979	200
210	0.979	0.984	0.990	0.995	1.000	1.006	1.011	1.017	1.022	1.027	1.033	210
220	1.033	1.038	1.043	1.049	1.054	1.060	1.065	1.070	1.076	1.081	1.086	220
230	1.086	1.092	1.097	1.103	1.108	1.113	1.119	1.124	1.129	1.135	1.140	230
240	1.140	1.146	1.151	1.156	1.162	1.167	1.173	1.178	1.183	1.189	1.194	240
250	1.194	1.200	1.205	1.210	1.216	1.221	1.227	1.232	1.237	1.243	1.248	250
260	1.248	1.254	1.259	1.264	1.270	1.275	1.281	1.286	1.291	1.297	1.302	260
270	1.302	1.308	1.313	1.318	1.324	1.329	1.335	1.340	1.345	1.351	1.356	270
280	1.356	1.362	1.367	1.373	1.378	1.383	1.389	1.394	1.400	1.405	1.411	280
290	1.411	1.416	1.421	1.427	1.432	1.438	1.443	1.449	1.454	1.459	1.465	290
300	1.465	1.470	1.476	1.481	1.487	1.492	1.497	1.503	1.508	1.514	1.519	300
310	1.519	1.525	1.530	1.536	1.541	1.547	1.552	1.557	1.563	1.568	1.574	310
320	1.574	1.579	1.585	1.590	1.596	1.601	1.607	1.612	1.618	1.623	1.629	320
330	1.629	1.634	1.639	1.645	1.650	1.656	1.661	1.667	1.672	1.678	1.683	330
340	1.683	1.689	1.694	1.700	1.705	1.711	1.716	1.722	1.727	1.733	1.738	340
350	1.738	1.744	1.749	1.755	1.760	1.766	1.771	1.777	1.782	1.788	1.793	350
360	1.793	1.799	1.804	1.810	1.815	1.821	1.826	1.832	1.837	1.843	1.848	360
370	1.848	1.854	1.860	1.865	1.871	1.876	1.882	1.887	1.893	1.898	1.904	370
380	1.904	1.909	1.915	1.920	1.926	1.932	1.937	1.943	1.948	1.954	1.959	380
390	1.959	1.965	1.970	1.976	1.982	1.987	1.993	1.998	2.004	2.009	2.015	390
400	2.015	2.020	2.026	2.032	2.037	2.043	2.048	2.054	2.059	2.065	2.071	400
410	2.071	2.076	2.082	2.087	2.093	2.099	2.104	2.110	2.115	2.121	2.127	410
420	2.127	2.132	2.138	2.143	2.149	2.155	2.160	2.166	2.171	2.177	2.183	420
430	2.183	2.188	2.194	2.199	2.205	2.211	2.216	2.222	2.227	2.233	2.239	430
440	2.239	2.244	2.250	2.256	2.261	2.267	2.272	2.278	2.284	2.289	2.295	440
450	2.295	2.301	2.306	2.312	2.318	2.323	2.329	2.334	2.340	2.346	2.351	450
460	2.351	2.357	2.363	2.368	2.374	2.380	2.385	2.391	2.397	2.402	2.408	460
470	2.408	2.414	2.419	2.425	2.431	2.436	2.442	2.448	2.453	2.459	2.465	470
480	2.465	2.470	2.476	2.482	2.487	2.493	2.499	2.505	2.510	2.516	2.522	480
490	2.522	2.527	2.533	2.539	2.544	2.550	2.556	2.561	2.567	2.573	2.579	490
500	2.579	2.584	2.590	2.596	2.601	2.607	2.613	2.619	2.624	2.630	2.636	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C9.2. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	2.579	2.584	2.590	2.596	2.601	2.607	2.613	2.619	2.624	2.630	2.636	500
510	2.636	2.641	2.647	2.653	2.659	2.664	2.670	2.676	2.682	2.687	2.693	510
520	2.693	2.699	2.704	2.710	2.716	2.722	2.727	2.733	2.739	2.745	2.750	520
530	2.750	2.756	2.762	2.768	2.773	2.779	2.785	2.791	2.796	2.802	2.808	530
540	2.808	2.814	2.819	2.825	2.831	2.837	2.842	2.848	2.854	2.860	2.866	540
550	2.866	2.871	2.877	2.883	2.889	2.894	2.900	2.906	2.912	2.918	2.923	550
560	2.923	2.929	2.935	2.941	2.946	2.952	2.958	2.964	2.970	2.975	2.981	560
570	2.981	2.987	2.993	2.999	3.004	3.010	3.016	3.022	3.028	3.033	3.039	570
580	3.039	3.045	3.051	3.057	3.063	3.068	3.074	3.080	3.086	3.092	3.097	580
590	3.097	3.103	3.109	3.115	3.121	3.127	3.132	3.138	3.144	3.150	3.156	590
600	3.156	3.162	3.167	3.173	3.179	3.185	3.191	3.197	3.202	3.208	3.214	600
610	3.214	3.220	3.226	3.232	3.238	3.243	3.249	3.255	3.261	3.267	3.273	610
620	3.273	3.278	3.284	3.290	3.296	3.302	3.308	3.314	3.320	3.325	3.331	620
630	3.331	3.337	3.343	3.349	3.355	3.361	3.366	3.372	3.378	3.384	3.390	630
640	3.390	3.396	3.402	3.408	3.414	3.419	3.425	3.431	3.437	3.443	3.449	640
650	3.449	3.455	3.461	3.467	3.472	3.478	3.484	3.490	3.496	3.502	3.508	650
660	3.508	3.514	3.520	3.526	3.531	3.537	3.543	3.549	3.555	3.561	3.567	660
670	3.567	3.573	3.579	3.585	3.591	3.596	3.602	3.608	3.614	3.620	3.626	670
680	3.626	3.632	3.638	3.644	3.650	3.656	3.662	3.668	3.673	3.679	3.685	680
690	3.685	3.691	3.697	3.703	3.709	3.715	3.721	3.727	3.733	3.739	3.745	690
700	3.745	3.751	3.757	3.763	3.769	3.774	3.780	3.786	3.792	3.798	3.804	700
710	3.804	3.810	3.816	3.822	3.828	3.834	3.840	3.846	3.852	3.858	3.864	710
720	3.864	3.870	3.876	3.882	3.888	3.894	3.900	3.906	3.912	3.917	3.923	720
730	3.923	3.929	3.935	3.941	3.947	3.953	3.959	3.965	3.971	3.977	3.983	730
740	3.983	3.989	3.995	4.001	4.007	4.013	4.019	4.025	4.031	4.037	4.043	740
750	4.043	4.049	4.055	4.061	4.067	4.073	4.079	4.085	4.091	4.097	4.103	750
760	4.103	4.109	4.115	4.121	4.127	4.133	4.139	4.145	4.151	4.157	4.163	760
770	4.163	4.169	4.175	4.181	4.187	4.193	4.199	4.205	4.211	4.217	4.223	770
780	4.223	4.229	4.235	4.241	4.247	4.253	4.259	4.265	4.271	4.277	4.283	780
790	4.283	4.289	4.295	4.301	4.307	4.313	4.319	4.325	4.332	4.338	4.344	790
800	4.344	4.350	4.356	4.362	4.368	4.374	4.380	4.386	4.392	4.398	4.404	800
810	4.404	4.410	4.416	4.422	4.428	4.434	4.440	4.446	4.452	4.458	4.464	810
820	4.464	4.470	4.476	4.482	4.488	4.495	4.501	4.507	4.513	4.519	4.525	820
830	4.525	4.531	4.537	4.543	4.549	4.555	4.561	4.567	4.573	4.579	4.585	830
840	4.585	4.591	4.597	4.603	4.610	4.616	4.622	4.628	4.634	4.640	4.646	840
850	4.646	4.652	4.658	4.664	4.670	4.676	4.682	4.688	4.694	4.701	4.707	850
860	4.707	4.713	4.719	4.725	4.731	4.737	4.743	4.749	4.755	4.761	4.767	860
870	4.767	4.773	4.779	4.786	4.792	4.798	4.804	4.810	4.816	4.822	4.828	870
880	4.828	4.834	4.840	4.846	4.852	4.858	4.865	4.871	4.877	4.883	4.889	880
890	4.889	4.895	4.901	4.907	4.913	4.919	4.925	4.931	4.938	4.944	4.950	890
900	4.950	4.956	4.962	4.968	4.974	4.980	4.986	4.992	4.998	5.005	5.011	900
910	5.011	5.017	5.023	5.029	5.035	5.041	5.047	5.053	5.059	5.065	5.072	910
920	5.072	5.078	5.084	5.090	5.096	5.102	5.108	5.114	5.120	5.126	5.133	920
930	5.133	5.139	5.145	5.151	5.157	5.163	5.169	5.175	5.181	5.187	5.194	930
940	5.194	5.200	5.206	5.212	5.218	5.224	5.230	5.236	5.242	5.248	5.255	940
950	5.255	5.261	5.267	5.273	5.279	5.285	5.291	5.297	5.303	5.310	5.316	950
960	5.316	5.322	5.328	5.334	5.340	5.346	5.352	5.358	5.364	5.371	5.377	960
970	5.377	5.383	5.389	5.395	5.401	5.407	5.413	5.419	5.426	5.432	5.438	970
980	5.438	5.444	5.450	5.456	5.462	5.468	5.474	5.481	5.487	5.493	5.499	980
990	5.499	5.505	5.511	5.517	5.523	5.529	5.536	5.542	5.548	5.554	5.560	990
1000	5.560	5.566	5.572	5.578	5.584	5.590	5.597	5.603	5.609	5.615	5.621	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C9.2. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	5.560	5.566	5.572	5.578	5.584	5.590	5.597	5.603	5.609	5.615	5.621	1000
1010	5.621	5.627	5.633	5.639	5.645	5.652	5.658	5.664	5.670	5.676	5.682	1010
1020	5.682	5.688	5.694	5.700	5.707	5.713	5.719	5.725	5.731	5.737	5.743	1020
1030	5.743	5.749	5.755	5.762	5.768	5.774	5.780	5.786	5.792	5.798	5.804	1030
1040	5.804	5.810	5.817	5.823	5.829	5.835	5.841	5.847	5.853	5.859	5.865	1040
1050	5.865	5.871	5.878	5.884	5.890	5.896	5.902	5.908	5.914	5.920	5.926	1050
1060	5.926	5.932	5.939	5.945	5.951	5.957	5.963	5.969	5.975	5.981	5.987	1060
1070	5.987	5.993	6.000	6.006	6.012	6.018	6.024	6.030	6.036	6.042	6.048	1070
1080	6.048	6.054	6.061	6.067	6.073	6.079	6.085	6.091	6.097	6.103	6.109	1080
1090	6.109	6.115	6.121	6.128	6.134	6.140	6.146	6.152	6.158	6.164	6.170	1090
1100	6.170	6.176	6.182	6.188	6.195	6.201	6.207	6.213	6.219	6.225	6.231	1100
1110	6.231	6.237	6.243	6.249	6.255	6.261	6.268	6.274	6.280	6.286	6.292	1110
1120	6.292	6.298	6.304	6.310	6.316	6.322	6.328	6.334	6.340	6.347	6.353	1120
1130	6.353	6.359	6.365	6.371	6.377	6.383	6.389	6.395	6.401	6.407	6.413	1130
1140	6.413	6.419	6.425	6.431	6.438	6.444	6.450	6.456	6.462	6.468	6.474	1140
1150	6.474	6.480	6.486	6.492	6.498	6.504	6.510	6.516	6.522	6.528	6.534	1150
1160	6.534	6.540	6.547	6.553	6.559	6.565	6.571	6.577	6.583	6.589	6.595	1160
1170	6.595	6.601	6.607	6.613	6.619	6.625	6.631	6.637	6.643	6.649	6.655	1170
1180	6.655	6.661	6.667	6.673	6.679	6.685	6.691	6.698	6.704	6.710	6.716	1180
1190	6.716	6.722	6.728	6.734	6.740	6.746	6.752	6.758	6.764	6.770	6.776	1190
1200	6.776	6.782	6.788	6.794	6.800	6.806	6.812	6.818	6.824	6.830	6.836	1200
1210	6.836	6.842	6.848	6.854	6.860	6.866	6.872	6.878	6.884	6.890	6.896	1210
1220	6.896	6.902	6.908	6.914	6.920	6.926	6.932	6.938	6.944	6.950	6.956	1220
1230	6.956	6.962	6.968	6.974	6.980	6.986	6.992	6.998	7.004	7.010	7.016	1230
1240	7.016	7.022	7.028	7.034	7.040	7.045	7.051	7.057	7.063	7.069	7.075	1240
1250	7.075	7.081	7.087	7.093	7.099	7.105	7.111	7.117	7.123	7.129	7.135	1250
1260	7.135	7.141	7.147	7.153	7.159	7.165	7.171	7.176	7.182	7.188	7.194	1260
1270	7.194	7.200	7.206	7.212	7.218	7.224	7.230	7.236	7.242	7.248	7.254	1270
1280	7.254	7.259	7.265	7.271	7.277	7.283	7.289	7.295	7.301	7.307	7.313	1280
1290	7.313	7.319	7.325	7.330	7.336	7.342	7.348	7.354	7.360	7.366	7.372	1290
1300	7.372	7.378	7.384	7.389	7.395	7.401	7.407	7.413	7.419	7.425	7.431	1300
1310	7.431	7.436	7.442	7.448	7.454	7.460	7.466	7.472	7.478	7.483	7.489	1310
1320	7.489	7.495	7.501	7.507	7.513	7.519	7.524	7.530	7.536	7.542	7.548	1320
1330	7.548	7.554	7.560	7.565	7.571	7.577	7.583	7.589	7.595	7.600	7.606	1330
1340	7.606	7.612	7.618	7.624	7.630	7.635	7.641	7.647	7.653	7.659	7.665	1340
1350	7.665	7.670	7.676	7.682	7.688	7.694	7.699	7.705	7.711	7.717	7.723	1350
1360	7.723	7.728	7.734	7.740	7.746	7.752	7.757	7.763	7.769	7.775	7.780	1360
1370	7.780	7.786	7.792	7.798	7.804	7.809	7.815	7.821	7.827	7.832	7.838	1370
1380	7.838	7.844	7.850	7.855	7.861	7.867	7.873	7.878	7.884	7.890	7.896	1380
1390	7.896	7.901	7.907	7.913	7.919	7.924	7.930	7.936	7.942	7.947	7.953	1390
1400	7.953	7.959	7.965	7.970	7.976	7.982	7.987	7.993	7.999	8.005	8.010	1400
1410	8.010	8.016	8.022	8.027	8.033	8.039	8.044	8.050	8.056	8.062	8.067	1410
1420	8.067	8.073	8.079	8.084	8.090	8.096	8.101	8.107	8.113	8.118	8.124	1420
1430	8.124	8.130	8.135	8.141	8.147	8.152	8.158	8.164	8.169	8.175	8.181	1430
1440	8.181	8.186	8.192	8.197	8.203	8.209	8.214	8.220	8.226	8.231	8.237	1440
1450	8.237	8.243	8.248	8.254	8.259	8.265	8.271	8.276	8.282	8.287	8.293	1450
1460	8.293	8.299	8.304	8.310	8.315	8.321	8.327	8.332	8.338	8.343	8.349	1460
1470	8.349	8.355	8.360	8.366	8.371	8.377	8.382	8.388	8.394	8.399	8.405	1470
1480	8.405	8.410	8.416	8.421	8.427	8.432	8.438	8.444	8.449	8.455	8.460	1480
1490	8.460	8.466	8.471	8.477	8.482	8.488	8.493	8.499	8.504	8.510	8.515	1490
1500	8.515	8.521	8.526	8.532	8.538	8.543	8.549	8.554	8.560	8.565	8.571	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C9.2. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
	Thermoelectric Voltage in Millivolts											
1500	8.515	8.521	8.526	8.532	8.538	8.543	8.549	8.554	8.560	8.565	8.571	1500
1510	8.571	8.576	8.582	8.587	8.592	8.598	8.603	8.609	8.614	8.620	8.625	1510
1520	8.625	8.631	8.636	8.642	8.647	8.653	8.658	8.664	8.669	8.674	8.680	1520
1530	8.680	8.685	8.691	8.696	8.702	8.707	8.713	8.718	8.723	8.729	8.734	1530
1540	8.734	8.740	8.745	8.751	8.756	8.761	8.767	8.772	8.778	8.783	8.788	1540
1550	8.788	8.794	8.799	8.805	8.810	8.815	8.821	8.826	8.832	8.837	8.842	1550
1560	8.842	8.848	8.853	8.858	8.864	8.869	8.875	8.880	8.885	8.891	8.896	1560
1570	8.896	8.901	8.907	8.912	8.917	8.923	8.928	8.933	8.939	8.944	8.949	1570
1580	8.949	8.955	8.960	8.965	8.971	8.976	8.981	8.987	8.992	8.997	9.003	1580
1590	9.003	9.008	9.013	9.018	9.024	9.029	9.034	9.040	9.045	9.050	9.055	1590
1600	9.055	9.061	9.066	9.071	9.077	9.082	9.087	9.092	9.098	9.103	9.108	1600
1610	9.108	9.113	9.119	9.124	9.129	9.134	9.140	9.145	9.150	9.155	9.161	1610
1620	9.161	9.166	9.171	9.176	9.181	9.187	9.192	9.197	9.202	9.207	9.213	1620
1630	9.213	9.218	9.223	9.228	9.233	9.239	9.244	9.249	9.254	9.259	9.265	1630
1640	9.265	9.270	9.275	9.280	9.285	9.290	9.296	9.301	9.306	9.311	9.316	1640
1650	9.316	9.321	9.327	9.332	9.337	9.342	9.347	9.352	9.357	9.363	9.368	1650
1660	9.368	9.373	9.378	9.383	9.388	9.393	9.398	9.403	9.409	9.414	9.419	1660
1670	9.419	9.424	9.429	9.434	9.439	9.444	9.449	9.454	9.459	9.465	9.470	1670
1680	9.470	9.475	9.480	9.485	9.490	9.495	9.500	9.505	9.510	9.515	9.520	1680
1690	9.520	9.525	9.530	9.535	9.540	9.545	9.550	9.556	9.561	9.566	9.571	1690
1700	9.571	9.576	9.581	9.586	9.591	9.596	9.601	9.606	9.611	9.616	9.621	1700
1710	9.621	9.626	9.631	9.636	9.641	9.646	9.651	9.656	9.661	9.666	9.670	1710
1720	9.670	9.675	9.680	9.685	9.690	9.695	9.700	9.705	9.710	9.715	9.720	1720
1730	9.720	9.725	9.730	9.735	9.740	9.745	9.750	9.755	9.759	9.764	9.769	1730
1740	9.769	9.774	9.779	9.784	9.789	9.794	9.799	9.804	9.809	9.813	9.818	1740
1750	9.818	9.823	9.828	9.833	9.838	9.843	9.848	9.852	9.857	9.862	9.867	1750
1760	9.867	9.872	9.877	9.882	9.886	9.891	9.896	9.901	9.906	9.911	9.916	1760
1770	9.916	9.920	9.925	9.930	9.935	9.940	9.945	9.949	9.954	9.959	9.964	1770
1780	9.964	9.969	9.973	9.978	9.983	9.988	9.993	9.997	10.002	10.007	10.012	1780
1790	10.012	10.016	10.021	10.026	10.031	10.036	10.040	10.045	10.050	10.055	10.059	1790
1800	10.059	10.064	10.069	10.074	10.078	10.083	10.088	10.093	10.097	10.102	10.107	1800
1810	10.107	10.111	10.116	10.121	10.126	10.130	10.135	10.140	10.144	10.149	10.154	1810
1820	10.154	10.159	10.163	10.168	10.173	10.177	10.182	10.187	10.191	10.196	10.201	1820
1830	10.201	10.205	10.210	10.215	10.219	10.224	10.229	10.233	10.238	10.243	10.247	1830
1840	10.247	10.252	10.257	10.261	10.266	10.270	10.275	10.280	10.284	10.289	10.294	1840
1850	10.294	10.298	10.303	10.307	10.312	10.317	10.321	10.326	10.330	10.335	10.340	1850
1860	10.340	10.344	10.349	10.353	10.358	10.362	10.367	10.372	10.376	10.381	10.385	1860
1870	10.385	10.390	10.394	10.399	10.403	10.408	10.413	10.417	10.422	10.426	10.431	1870
1880	10.431	10.435	10.440	10.444	10.449	10.453	10.458	10.462	10.467	10.471	10.476	1880
1890	10.476	10.480	10.485	10.489	10.494	10.498	10.503	10.507	10.512	10.516	10.521	1890
1900	10.521	10.525	10.530	10.534	10.539	10.543	10.548	10.552	10.556	10.561	10.565	1900
1910	10.565	10.570	10.574	10.579	10.583	10.588	10.592	10.596	10.601	10.605	10.610	1910
1920	10.610	10.614	10.619	10.623	10.627	10.632	10.636	10.641	10.645	10.649	10.654	1920
1930	10.654	10.658	10.663	10.667	10.671	10.676	10.680	10.684	10.689	10.693	10.697	1930
1940	10.697	10.702	10.706	10.711	10.715	10.719	10.724	10.728	10.732	10.737	10.741	1940
1950	10.741	10.745	10.750	10.754	10.758	10.763	10.767	10.771	10.776	10.780	10.784	1950
1960	10.784	10.788	10.793	10.797	10.801	10.806	10.810	10.814	10.818	10.823	10.827	1960
1970	10.827	10.831	10.836	10.840	10.844	10.848	10.853	10.857	10.861	10.865	10.870	1970
1980	10.870	10.874	10.878	10.882	10.887	10.891	10.895	10.899	10.904	10.908	10.912	1980
1990	10.912	10.916	10.920	10.925	10.929	10.933	10.937	10.941	10.946	10.950	10.954	1990
2000	10.954	10.958	10.962	10.967	10.971	10.975	10.979	10.983	10.987	10.992	10.996	2000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C9.2. *Platinum, Pt-67, versus type NN thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
2000	10.954	10.958	10.962	10.967	10.971	10.975	10.979	10.983	10.987	10.992	10.996	2000
2010	10.996	11.000	11.004	11.008	11.012	11.016	11.021	11.025	11.029	11.033	11.037	2010
2020	11.037	11.041	11.045	11.050	11.054	11.058	11.062	11.066	11.070	11.074	11.078	2020
2030	11.078	11.082	11.086	11.091	11.095	11.099	11.103	11.107	11.111	11.115	11.119	2030
2040	11.119	11.123	11.127	11.131	11.135	11.139	11.144	11.148	11.152	11.156	11.160	2040
2050	11.160	11.164	11.168	11.172	11.176	11.180	11.184	11.188	11.192	11.196	11.200	2050
2060	11.200	11.204	11.208	11.212	11.216	11.220	11.224	11.228	11.232	11.236	11.240	2060
2070	11.240	11.244	11.248	11.252	11.256	11.260	11.264	11.268	11.272	11.276	11.280	2070
2080	11.280	11.283	11.287	11.291	11.295	11.299	11.303	11.307	11.311	11.315	11.319	2080
2090	11.319	11.323	11.327	11.331	11.334	11.338	11.342	11.346	11.350	11.354	11.358	2090
2100	11.358	11.362	11.366	11.369	11.373	11.377	11.381	11.385	11.389	11.393	11.397	2100
2110	11.397	11.400	11.404	11.408	11.412	11.416	11.420	11.423	11.427	11.431	11.435	2110
2120	11.435	11.439	11.443	11.446	11.450	11.454	11.458	11.462	11.465	11.469	11.473	2120
2130	11.473	11.477	11.481	11.484	11.488	11.492	11.496	11.499	11.503	11.507	11.511	2130
2140	11.511	11.515	11.518	11.522	11.526	11.530	11.533	11.537	11.541	11.544	11.548	2140
2150	11.548	11.552	11.556	11.559	11.563	11.567	11.571	11.574	11.578	11.582	11.585	2150
2160	11.585	11.589	11.593	11.596	11.600	11.604	11.607	11.611	11.615	11.618	11.622	2160
2170	11.622	11.626	11.629	11.633	11.637	11.640	11.644	11.648	11.651	11.655	11.659	2170
2180	11.659	11.662	11.666	11.669	11.673	11.677	11.680	11.684	11.688	11.691	11.695	2180
2190	11.695	11.698	11.702	11.706	11.709	11.713	11.716	11.720	11.723	11.727	11.731	2190
2200	11.731	11.734	11.738	11.741	11.745	11.748	11.752	11.755	11.759	11.762	11.766	2200
2210	11.766	11.770	11.773	11.777	11.780	11.784	11.787	11.791	11.794	11.798	11.801	2210
2220	11.801	11.805	11.808	11.812	11.815	11.819	11.822	11.826	11.829	11.832	11.836	2220
2230	11.836	11.839	11.843	11.846	11.850	11.853	11.857	11.860	11.864	11.867	11.870	2230
2240	11.870	11.874	11.877	11.881	11.884	11.887	11.891	11.894	11.898	11.901	11.904	2240
2250	11.904	11.908	11.911	11.915	11.918	11.921	11.925	11.928	11.932	11.935	11.938	2250
2260	11.938	11.942	11.945	11.948	11.952	11.955	11.958	11.962	11.965	11.968	11.972	2260
2270	11.972	11.975	11.978	11.982	11.985	11.988	11.992	11.995	11.998	12.001	12.005	2270
2280	12.005	12.008	12.011	12.015	12.018	12.021	12.024	12.028	12.031	12.034	12.037	2280
2290	12.037	12.041	12.044	12.047	12.050	12.054	12.057	12.060	12.063	12.067	12.070	2290
2300	12.070	12.073	12.076	12.079	12.083	12.086	12.089	12.092	12.095	12.099	12.102	2300
2310	12.102	12.105	12.108	12.111	12.114	12.118	12.121	12.124	12.127	12.130	12.133	2310
2320	12.133	12.137	12.140	12.143	12.146	12.149	12.152	12.155	12.158	12.162	12.165	2320
2330	12.165	12.168	12.171	12.174	12.177	12.180	12.183	12.186	12.189	12.193	12.196	2330
2340	12.196	12.199	12.202	12.205	12.208	12.211	12.214	12.217	12.220	12.223	12.226	2340
2350	12.226	12.229	12.232	12.235	12.238	12.241	12.244	12.247	12.250	12.253	12.256	2350
2360	12.256	12.259	12.262	12.265	12.268	12.271	12.274	12.277	12.280	12.283	12.286	2360
2370	12.286	12.289	12.292									2370
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C10. Supplementary Reference Tables for the Positive Thermoelement, Type TP, Copper Versus Platinum, Pt-67

The reference function for type TP thermoelements versus platinum, Pt-67, given in the main text (see table 9.4.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C10.1 and C10.2. Table C10.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 400 °C, and table C10.2 presents voltage values at 1 °F intervals from −454 °F to 752 °F.

TABLE C10.1. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	0.020											−270
−260	0.016	0.017	0.018	0.018	0.019	0.019	0.020	0.020	0.020	0.020	0.020	−260
−250	−0.001	0.001	0.003	0.005	0.007	0.009	0.010	0.012	0.013	0.015	0.016	−250
−240	−0.029	−0.026	−0.023	−0.020	−0.017	−0.014	−0.011	−0.009	−0.006	−0.004	−0.001	−240
−230	−0.064	−0.061	−0.057	−0.053	−0.049	−0.046	−0.042	−0.039	−0.035	−0.032	−0.029	−230
−220	−0.106	−0.101	−0.097	−0.093	−0.089	−0.084	−0.080	−0.076	−0.072	−0.068	−0.064	−220
−210	−0.150	−0.146	−0.141	−0.137	−0.132	−0.128	−0.123	−0.119	−0.114	−0.110	−0.106	−210
−200	−0.195	−0.190	−0.186	−0.181	−0.177	−0.173	−0.168	−0.164	−0.159	−0.155	−0.150	−200
−190	−0.237	−0.233	−0.229	−0.225	−0.220	−0.216	−0.212	−0.208	−0.203	−0.199	−0.195	−190
−180	−0.275	−0.271	−0.268	−0.264	−0.260	−0.257	−0.253	−0.249	−0.245	−0.241	−0.237	−180
−170	−0.308	−0.305	−0.302	−0.298	−0.295	−0.292	−0.289	−0.285	−0.282	−0.278	−0.275	−170
−160	−0.335	−0.332	−0.330	−0.327	−0.324	−0.322	−0.319	−0.316	−0.313	−0.311	−0.308	−160
−150	−0.356	−0.354	−0.352	−0.350	−0.348	−0.346	−0.344	−0.341	−0.339	−0.337	−0.335	−150
−140	−0.370	−0.369	−0.368	−0.367	−0.365	−0.364	−0.362	−0.361	−0.359	−0.357	−0.356	−140
−130	−0.379	−0.379	−0.378	−0.377	−0.376	−0.376	−0.375	−0.374	−0.373	−0.372	−0.370	−130
−120	−0.382	−0.382	−0.382	−0.382	−0.381	−0.381	−0.381	−0.381	−0.380	−0.380	−0.379	−120
−110	−0.378	−0.379	−0.379	−0.380	−0.380	−0.381	−0.381	−0.381	−0.381	−0.382	−0.382	−110
−100	−0.369	−0.370	−0.371	−0.372	−0.373	−0.374	−0.375	−0.376	−0.377	−0.377	−0.378	−100
−90	−0.354	−0.356	−0.357	−0.359	−0.361	−0.362	−0.364	−0.365	−0.366	−0.368	−0.369	−90
−80	−0.334	−0.336	−0.338	−0.340	−0.343	−0.345	−0.347	−0.348	−0.350	−0.352	−0.354	−80
−70	−0.309	−0.311	−0.314	−0.317	−0.319	−0.322	−0.324	−0.327	−0.329	−0.332	−0.334	−70
−60	−0.278	−0.282	−0.285	−0.288	−0.291	−0.294	−0.297	−0.300	−0.303	−0.306	−0.309	−60
−50	−0.243	−0.247	−0.250	−0.254	−0.258	−0.261	−0.265	−0.268	−0.272	−0.275	−0.278	−50
−40	−0.203	−0.207	−0.211	−0.215	−0.219	−0.223	−0.227	−0.231	−0.235	−0.239	−0.243	−40
−30	−0.158	−0.163	−0.168	−0.172	−0.177	−0.181	−0.186	−0.190	−0.194	−0.199	−0.203	−30
−20	−0.110	−0.115	−0.120	−0.125	−0.130	−0.135	−0.139	−0.144	−0.149	−0.154	−0.158	−20
−10	−0.057	−0.062	−0.068	−0.073	−0.079	−0.084	−0.089	−0.094	−0.100	−0.105	−0.110	−10
0	0.000	−0.006	−0.012	−0.017	−0.023	−0.029	−0.035	−0.040	−0.046	−0.051	−0.057	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C10.1. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
					Thermoelectric Voltage in Millivolts							
0	0.000	0.006	0.012	0.018	0.024	0.030	0.036	0.042	0.048	0.054	0.061	0
10	0.061	0.067	0.073	0.079	0.086	0.092	0.099	0.105	0.112	0.118	0.125	10
20	0.125	0.131	0.138	0.145	0.152	0.158	0.165	0.172	0.179	0.186	0.193	20
30	0.193	0.200	0.207	0.214	0.221	0.228	0.236	0.243	0.250	0.258	0.265	30
40	0.265	0.272	0.280	0.287	0.295	0.303	0.310	0.318	0.326	0.333	0.341	40
50	0.341	0.349	0.357	0.365	0.373	0.381	0.389	0.397	0.405	0.413	0.421	50
60	0.421	0.429	0.437	0.446	0.454	0.462	0.471	0.479	0.487	0.496	0.504	60
70	0.504	0.513	0.521	0.530	0.539	0.547	0.556	0.565	0.573	0.582	0.591	70
80	0.591	0.600	0.609	0.618	0.627	0.636	0.645	0.654	0.663	0.672	0.681	80
90	0.681	0.690	0.699	0.708	0.717	0.727	0.736	0.745	0.755	0.764	0.773	90
100	0.773	0.783	0.792	0.802	0.811	0.821	0.830	0.840	0.849	0.859	0.869	100
110	0.869	0.878	0.888	0.898	0.907	0.917	0.927	0.937	0.947	0.957	0.966	110
120	0.966	0.976	0.986	0.996	1.006	1.016	1.026	1.036	1.046	1.057	1.067	120
130	1.067	1.077	1.087	1.097	1.107	1.118	1.128	1.138	1.149	1.159	1.169	130
140	1.169	1.180	1.190	1.201	1.211	1.222	1.232	1.243	1.253	1.264	1.275	140
150	1.275	1.285	1.296	1.307	1.317	1.328	1.339	1.350	1.360	1.371	1.382	150
160	1.382	1.393	1.404	1.415	1.426	1.437	1.448	1.459	1.470	1.481	1.492	160
170	1.492	1.503	1.514	1.526	1.537	1.548	1.559	1.570	1.582	1.593	1.604	170
180	1.604	1.616	1.627	1.639	1.650	1.662	1.673	1.685	1.696	1.708	1.719	180
190	1.719	1.731	1.743	1.754	1.766	1.778	1.790	1.801	1.813	1.825	1.837	190
200	1.837	1.849	1.861	1.873	1.885	1.897	1.909	1.921	1.933	1.945	1.957	200
210	1.957	1.969	1.981	1.993	2.006	2.018	2.030	2.042	2.055	2.067	2.080	210
220	2.080	2.092	2.104	2.117	2.129	2.142	2.154	2.167	2.179	2.192	2.205	220
230	2.205	2.217	2.230	2.243	2.255	2.268	2.281	2.294	2.307	2.319	2.332	230
240	2.332	2.345	2.358	2.371	2.384	2.397	2.410	2.423	2.436	2.449	2.462	240
250	2.462	2.476	2.489	2.502	2.515	2.528	2.542	2.555	2.568	2.582	2.595	250
260	2.595	2.608	2.622	2.635	2.649	2.662	2.676	2.689	2.703	2.716	2.730	260
270	2.730	2.744	2.757	2.771	2.785	2.798	2.812	2.826	2.840	2.853	2.867	270
280	2.867	2.881	2.895	2.909	2.923	2.937	2.951	2.965	2.979	2.993	3.007	280
290	3.007	3.021	3.035	3.049	3.063	3.078	3.092	3.106	3.120	3.134	3.149	290
300	3.149	3.163	3.177	3.192	3.206	3.221	3.235	3.249	3.264	3.278	3.293	300
310	3.293	3.307	3.322	3.337	3.351	3.366	3.381	3.395	3.410	3.425	3.439	310
320	3.439	3.454	3.469	3.484	3.499	3.513	3.528	3.543	3.558	3.573	3.588	320
330	3.588	3.603	3.618	3.633	3.648	3.663	3.678	3.694	3.709	3.724	3.739	330
340	3.739	3.754	3.770	3.785	3.800	3.816	3.831	3.846	3.862	3.877	3.892	340
350	3.892	3.908	3.923	3.939	3.954	3.970	3.986	4.001	4.017	4.032	4.048	350
360	4.048	4.064	4.079	4.095	4.111	4.127	4.143	4.158	4.174	4.190	4.206	360
370	4.206	4.222	4.238	4.254	4.270	4.286	4.302	4.318	4.334	4.350	4.366	370
380	4.366	4.382	4.398	4.414	4.430	4.446	4.463	4.479	4.495	4.511	4.527	380
390	4.527	4.544	4.560	4.576	4.592	4.609	4.625	4.641	4.657	4.674	4.690	390
400	4.690											400
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C10.2. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	0.020	0.020	0.020	0.020	0.020							−450
−440	0.018	0.018	0.019	0.019	0.019	0.019	0.020	0.020	0.020	0.020	0.020	−440
−430	0.011	0.012	0.013	0.014	0.014	0.015	0.016	0.016	0.017	0.017	0.018	−430
−420	0.001	0.002	0.003	0.005	0.006	0.007	0.008	0.009	0.010	0.010	0.011	−420
−410	−0.013	−0.011	−0.010	−0.008	−0.007	−0.005	−0.004	−0.003	−0.001	−0.000	0.001	−410
−400	−0.029	−0.027	−0.025	−0.024	−0.022	−0.020	−0.019	−0.017	−0.016	−0.014	−0.013	−400
−390	−0.048	−0.046	−0.044	−0.042	−0.040	−0.038	−0.036	−0.034	−0.033	−0.031	−0.029	−390
−380	−0.069	−0.067	−0.064	−0.062	−0.060	−0.058	−0.056	−0.054	−0.052	−0.050	−0.048	−380
−370	−0.091	−0.089	−0.087	−0.084	−0.082	−0.080	−0.078	−0.075	−0.073	−0.071	−0.069	−370
−360	−0.115	−0.113	−0.111	−0.108	−0.106	−0.103	−0.101	−0.099	−0.096	−0.094	−0.091	−360
−350	−0.140	−0.138	−0.135	−0.133	−0.130	−0.128	−0.125	−0.123	−0.120	−0.118	−0.115	−350
−340	−0.165	−0.163	−0.160	−0.158	−0.155	−0.153	−0.150	−0.148	−0.145	−0.143	−0.140	−340
−330	−0.190	−0.187	−0.185	−0.182	−0.180	−0.178	−0.175	−0.173	−0.170	−0.168	−0.165	−330
−320	−0.214	−0.212	−0.209	−0.207	−0.204	−0.202	−0.200	−0.197	−0.195	−0.192	−0.190	−320
−310	−0.237	−0.235	−0.232	−0.230	−0.228	−0.226	−0.223	−0.221	−0.219	−0.216	−0.214	−310
−300	−0.259	−0.257	−0.254	−0.252	−0.250	−0.248	−0.246	−0.244	−0.241	−0.239	−0.237	−300
−290	−0.279	−0.277	−0.275	−0.273	−0.271	−0.269	−0.267	−0.265	−0.263	−0.261	−0.259	−290
−280	−0.297	−0.296	−0.294	−0.292	−0.290	−0.288	−0.286	−0.285	−0.283	−0.281	−0.279	−280
−270	−0.314	−0.312	−0.311	−0.309	−0.308	−0.306	−0.304	−0.303	−0.301	−0.299	−0.297	−270
−260	−0.329	−0.328	−0.326	−0.325	−0.323	−0.322	−0.320	−0.319	−0.317	−0.316	−0.314	−260
−250	−0.342	−0.341	−0.340	−0.338	−0.337	−0.336	−0.335	−0.333	−0.332	−0.330	−0.329	−250
−240	−0.354	−0.352	−0.351	−0.350	−0.349	−0.348	−0.347	−0.346	−0.345	−0.343	−0.342	−240
−230	−0.363	−0.362	−0.361	−0.360	−0.359	−0.358	−0.358	−0.357	−0.356	−0.355	−0.354	−230
−220	−0.370	−0.370	−0.369	−0.368	−0.368	−0.367	−0.366	−0.365	−0.365	−0.364	−0.363	−220
−210	−0.376	−0.376	−0.375	−0.375	−0.374	−0.374	−0.373	−0.372	−0.372	−0.371	−0.370	−210
−200	−0.380	−0.379	−0.379	−0.379	−0.379	−0.378	−0.378	−0.377	−0.377	−0.377	−0.376	−200
−190	−0.382	−0.381	−0.381	−0.381	−0.381	−0.381	−0.381	−0.380	−0.380	−0.380	−0.380	−190
−180	−0.381	−0.382	−0.382	−0.382	−0.382	−0.382	−0.382	−0.382	−0.382	−0.382	−0.382	−180
−170	−0.379	−0.380	−0.380	−0.380	−0.380	−0.381	−0.381	−0.381	−0.381	−0.381	−0.381	−170
−160	−0.376	−0.376	−0.377	−0.377	−0.377	−0.378	−0.378	−0.378	−0.379	−0.379	−0.379	−160
−150	−0.370	−0.371	−0.371	−0.372	−0.373	−0.373	−0.374	−0.374	−0.375	−0.375	−0.376	−150
−140	−0.363	−0.364	−0.364	−0.365	−0.366	−0.367	−0.367	−0.368	−0.369	−0.369	−0.370	−140
−130	−0.354	−0.355	−0.356	−0.357	−0.358	−0.359	−0.360	−0.360	−0.361	−0.362	−0.363	−130
−120	−0.343	−0.345	−0.346	−0.347	−0.348	−0.349	−0.350	−0.351	−0.352	−0.353	−0.354	−120
−110	−0.331	−0.333	−0.334	−0.335	−0.336	−0.338	−0.339	−0.340	−0.341	−0.342	−0.343	−110
−100	−0.318	−0.319	−0.320	−0.322	−0.323	−0.325	−0.326	−0.327	−0.329	−0.330	−0.331	−100
−90	−0.302	−0.304	−0.306	−0.307	−0.309	−0.310	−0.312	−0.313	−0.315	−0.316	−0.318	−90
−80	−0.285	−0.287	−0.289	−0.291	−0.292	−0.294	−0.296	−0.297	−0.299	−0.301	−0.302	−80
−70	−0.267	−0.269	−0.271	−0.273	−0.275	−0.276	−0.278	−0.280	−0.282	−0.284	−0.285	−70
−60	−0.247	−0.249	−0.251	−0.253	−0.255	−0.257	−0.259	−0.261	−0.263	−0.265	−0.267	−60
−50	−0.226	−0.228	−0.230	−0.232	−0.234	−0.237	−0.239	−0.241	−0.243	−0.245	−0.247	−50
−40	−0.203	−0.205	−0.208	−0.210	−0.212	−0.214	−0.217	−0.219	−0.221	−0.223	−0.226	−40
−30	−0.179	−0.181	−0.184	−0.186	−0.189	−0.191	−0.193	−0.196	−0.198	−0.201	−0.203	−30
−20	−0.153	−0.156	−0.158	−0.161	−0.164	−0.166	−0.169	−0.171	−0.174	−0.176	−0.179	−20
−10	−0.126	−0.129	−0.132	−0.135	−0.137	−0.140	−0.143	−0.145	−0.148	−0.151	−0.153	−10
0	−0.098	−0.101	−0.104	−0.107	−0.110	−0.113	−0.115	−0.118	−0.121	−0.124	−0.126	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C10.2. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.098	−0.095	−0.093	−0.090	−0.087	−0.084	−0.081	−0.078	−0.075	−0.072	−0.069	0
10	−0.069	−0.066	−0.063	−0.060	−0.057	−0.054	−0.051	−0.048	−0.045	−0.041	−0.038	10
20	−0.038	−0.035	−0.032	−0.029	−0.026	−0.023	−0.019	−0.016	−0.013	−0.010	−0.007	20
30	−0.007	−0.003	0.000	0.003	0.007	0.010	0.013	0.016	0.020	0.023	0.027	30
40	0.027	0.030	0.033	0.037	0.040	0.043	0.047	0.050	0.054	0.057	0.061	40
50	0.061	0.064	0.068	0.071	0.075	0.078	0.082	0.085	0.089	0.092	0.096	50
60	0.096	0.099	0.103	0.107	0.110	0.114	0.117	0.121	0.125	0.128	0.132	60
70	0.132	0.136	0.140	0.143	0.147	0.151	0.155	0.158	0.162	0.166	0.170	70
80	0.170	0.174	0.177	0.181	0.185	0.189	0.193	0.197	0.201	0.205	0.209	80
90	0.209	0.213	0.217	0.220	0.224	0.228	0.233	0.237	0.241	0.245	0.249	90
100	0.249	0.253	0.257	0.261	0.265	0.269	0.273	0.277	0.282	0.286	0.290	100
110	0.290	0.294	0.298	0.303	0.307	0.311	0.315	0.320	0.324	0.328	0.333	110
120	0.333	0.337	0.341	0.345	0.350	0.354	0.359	0.363	0.367	0.372	0.376	120
130	0.376	0.381	0.385	0.390	0.394	0.398	0.403	0.407	0.412	0.416	0.421	130
140	0.421	0.426	0.430	0.435	0.439	0.444	0.448	0.453	0.458	0.462	0.467	140
150	0.467	0.472	0.476	0.481	0.486	0.490	0.495	0.500	0.504	0.509	0.514	150
160	0.514	0.519	0.523	0.528	0.533	0.538	0.542	0.547	0.552	0.557	0.562	160
170	0.562	0.567	0.571	0.576	0.581	0.586	0.591	0.596	0.601	0.606	0.611	170
180	0.611	0.616	0.621	0.626	0.631	0.636	0.641	0.646	0.651	0.656	0.661	180
190	0.661	0.666	0.671	0.676	0.681	0.686	0.691	0.696	0.701	0.706	0.711	190
200	0.711	0.716	0.722	0.727	0.732	0.737	0.742	0.747	0.753	0.758	0.763	200
210	0.763	0.768	0.773	0.779	0.784	0.789	0.794	0.800	0.805	0.810	0.815	210
220	0.815	0.821	0.826	0.831	0.837	0.842	0.847	0.853	0.858	0.863	0.869	220
230	0.869	0.874	0.879	0.885	0.890	0.896	0.901	0.906	0.912	0.917	0.923	230
240	0.923	0.928	0.934	0.939	0.944	0.950	0.955	0.961	0.966	0.972	0.977	240
250	0.977	0.983	0.988	0.994	1.000	1.005	1.011	1.016	1.022	1.027	1.033	250
260	1.033	1.039	1.044	1.050	1.055	1.061	1.067	1.072	1.078	1.084	1.089	260
270	1.089	1.095	1.101	1.106	1.112	1.118	1.123	1.129	1.135	1.141	1.146	270
280	1.146	1.152	1.158	1.164	1.169	1.175	1.181	1.187	1.193	1.198	1.204	280
290	1.204	1.210	1.216	1.222	1.228	1.233	1.239	1.245	1.251	1.257	1.263	290
300	1.263	1.269	1.275	1.280	1.286	1.292	1.298	1.304	1.310	1.316	1.322	300
310	1.322	1.328	1.334	1.340	1.346	1.352	1.358	1.364	1.370	1.376	1.382	310
320	1.382	1.388	1.394	1.400	1.406	1.412	1.418	1.425	1.431	1.437	1.443	320
330	1.443	1.449	1.455	1.461	1.467	1.474	1.480	1.486	1.492	1.498	1.504	330
340	1.504	1.511	1.517	1.523	1.529	1.535	1.542	1.548	1.554	1.560	1.567	340
350	1.567	1.573	1.579	1.586	1.592	1.598	1.604	1.611	1.617	1.623	1.630	350
360	1.630	1.636	1.643	1.649	1.655	1.662	1.668	1.674	1.681	1.687	1.694	360
370	1.694	1.700	1.707	1.713	1.719	1.726	1.732	1.739	1.745	1.752	1.758	370
380	1.758	1.765	1.771	1.778	1.784	1.791	1.797	1.804	1.811	1.817	1.824	380
390	1.824	1.830	1.837	1.844	1.850	1.857	1.863	1.870	1.877	1.883	1.890	390
400	1.890	1.897	1.903	1.910	1.917	1.923	1.930	1.937	1.943	1.950	1.957	400
410	1.957	1.964	1.970	1.977	1.984	1.991	1.998	2.004	2.011	2.018	2.025	410
420	2.025	2.032	2.038	2.045	2.052	2.059	2.066	2.073	2.080	2.086	2.093	420
430	2.093	2.100	2.107	2.114	2.121	2.128	2.135	2.142	2.149	2.156	2.163	430
440	2.163	2.170	2.177	2.184	2.191	2.198	2.205	2.212	2.219	2.226	2.233	440
450	2.233	2.240	2.247	2.254	2.261	2.268	2.275	2.282	2.289	2.297	2.304	450
460	2.304	2.311	2.318	2.325	2.332	2.339	2.347	2.354	2.361	2.368	2.375	460
470	2.375	2.383	2.390	2.397	2.404	2.411	2.419	2.426	2.433	2.441	2.448	470
480	2.448	2.455	2.462	2.470	2.477	2.484	2.492	2.499	2.506	2.514	2.521	480
490	2.521	2.528	2.536	2.543	2.550	2.558	2.565	2.573	2.580	2.588	2.595	490
500	2.595	2.602	2.610	2.617	2.625	2.632	2.640	2.647	2.655	2.662	2.670	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C10.2. *Type TP thermoelements versus platinum, Pt-67 --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	2.595	2.602	2.610	2.617	2.625	2.632	2.640	2.647	2.655	2.662	2.670	500
510	2.670	2.677	2.685	2.692	2.700	2.707	2.715	2.722	2.730	2.737	2.745	510
520	2.745	2.753	2.760	2.768	2.775	2.783	2.791	2.798	2.806	2.814	2.821	520
530	2.821	2.829	2.837	2.844	2.852	2.860	2.867	2.875	2.883	2.890	2.898	530
540	2.898	2.906	2.914	2.921	2.929	2.937	2.945	2.952	2.960	2.968	2.976	540
550	2.976	2.983	2.991	2.999	3.007	3.015	3.023	3.030	3.038	3.046	3.054	550
560	3.054	3.062	3.070	3.078	3.085	3.093	3.101	3.109	3.117	3.125	3.133	560
570	3.133	3.141	3.149	3.157	3.165	3.173	3.181	3.189	3.197	3.205	3.213	570
580	3.213	3.221	3.229	3.237	3.245	3.253	3.261	3.269	3.277	3.285	3.293	580
590	3.293	3.301	3.309	3.317	3.325	3.333	3.342	3.350	3.358	3.366	3.374	590
600	3.374	3.382	3.390	3.398	3.407	3.415	3.423	3.431	3.439	3.448	3.456	600
610	3.456	3.464	3.472	3.480	3.489	3.497	3.505	3.513	3.522	3.530	3.538	610
620	3.538	3.547	3.555	3.563	3.571	3.580	3.588	3.596	3.605	3.613	3.621	620
630	3.621	3.630	3.638	3.647	3.655	3.663	3.672	3.680	3.689	3.697	3.705	630
640	3.705	3.714	3.722	3.731	3.739	3.748	3.756	3.765	3.773	3.782	3.790	640
650	3.790	3.799	3.807	3.816	3.824	3.833	3.841	3.850	3.858	3.867	3.875	650
660	3.875	3.884	3.892	3.901	3.910	3.918	3.927	3.935	3.944	3.953	3.961	660
670	3.961	3.970	3.979	3.987	3.996	4.005	4.013	4.022	4.031	4.039	4.048	670
680	4.048	4.057	4.066	4.074	4.083	4.092	4.100	4.109	4.118	4.127	4.136	680
690	4.136	4.144	4.153	4.162	4.171	4.179	4.188	4.197	4.206	4.215	4.224	690
700	4.224	4.232	4.241	4.250	4.259	4.268	4.277	4.286	4.294	4.303	4.312	700
710	4.312	4.321	4.330	4.339	4.348	4.357	4.366	4.375	4.384	4.393	4.402	710
720	4.402	4.410	4.419	4.428	4.437	4.446	4.455	4.464	4.473	4.482	4.491	720
730	4.491	4.500	4.509	4.518	4.527	4.536	4.545	4.554	4.563	4.572	4.581	730
740	4.581	4.591	4.600	4.609	4.618	4.627	4.636	4.645	4.654	4.663	4.672	740
750	4.672	4.681	4.690									750
°F	0	1	2	3	4	5	6	7	8	9	10	°F

C11. Supplementary Reference Tables for Platinum, Pt-67, Versus the Negative Thermoelement, Type TN (or EN), a Copper-Nickel Alloy

The reference function for platinum, Pt-67, versus type TN (or EN) thermoelements given in the main text (see table 9.5.1) was used to generate the thermoelectric voltage as a function of temperature, as presented in tables C11.1 and C11.2. Table C11.1 presents values of the thermoelectric voltage in millivolts at 1 °C intervals from −270 °C to 1000 °C, and table C11.2 presents voltage values at 1 °F intervals from −454 °F to 1832 °F.

TABLE C11.1. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C*

°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C
					Thermoelectric Voltage in Millivolts							
−270	−6.277											−270
−260	−6.248	−6.252	−6.257	−6.261	−6.264	−6.268	−6.270	−6.273	−6.275	−6.276	−6.277	−260
−250	−6.179	−6.187	−6.196	−6.203	−6.211	−6.218	−6.224	−6.231	−6.237	−6.242	−6.248	−250
−240	−6.076	−6.088	−6.099	−6.110	−6.121	−6.132	−6.142	−6.152	−6.161	−6.170	−6.179	−240
−230	−5.942	−5.957	−5.971	−5.985	−5.999	−6.013	−6.026	−6.039	−6.052	−6.064	−6.076	−230
−220	−5.783	−5.800	−5.816	−5.833	−5.849	−5.865	−5.881	−5.897	−5.912	−5.927	−5.942	−220
−210	−5.603	−5.622	−5.640	−5.659	−5.677	−5.695	−5.713	−5.731	−5.748	−5.766	−5.783	−210
−200	−5.408	−5.428	−5.448	−5.468	−5.488	−5.507	−5.527	−5.546	−5.565	−5.584	−5.603	−200
−190	−5.202	−5.223	−5.244	−5.265	−5.286	−5.306	−5.327	−5.347	−5.368	−5.388	−5.408	−190
−180	−4.986	−5.008	−5.030	−5.052	−5.073	−5.095	−5.116	−5.138	−5.159	−5.181	−5.202	−180
−170	−4.762	−4.785	−4.807	−4.830	−4.852	−4.875	−4.897	−4.919	−4.942	−4.964	−4.986	−170
−160	−4.531	−4.554	−4.578	−4.601	−4.624	−4.647	−4.670	−4.693	−4.716	−4.739	−4.762	−160
−150	−4.293	−4.317	−4.341	−4.365	−4.389	−4.413	−4.436	−4.460	−4.484	−4.507	−4.531	−150
−140	−4.049	−4.073	−4.098	−4.123	−4.147	−4.172	−4.196	−4.220	−4.245	−4.269	−4.293	−140
−130	−3.798	−3.823	−3.849	−3.874	−3.899	−3.924	−3.949	−3.974	−3.999	−4.024	−4.049	−130
−120	−3.541	−3.567	−3.593	−3.619	−3.645	−3.670	−3.696	−3.722	−3.747	−3.773	−3.798	−120
−110	−3.279	−3.305	−3.332	−3.358	−3.384	−3.411	−3.437	−3.463	−3.489	−3.515	−3.541	−110
−100	−3.010	−3.037	−3.064	−3.091	−3.118	−3.145	−3.172	−3.199	−3.225	−3.252	−3.279	−100
−90	−2.735	−2.763	−2.790	−2.818	−2.846	−2.873	−2.901	−2.928	−2.955	−2.983	−3.010	−90
−80	−2.454	−2.482	−2.511	−2.539	−2.567	−2.595	−2.623	−2.651	−2.679	−2.707	−2.735	−80
−70	−2.167	−2.196	−2.225	−2.254	−2.283	−2.311	−2.340	−2.369	−2.397	−2.426	−2.454	−70
−60	−1.874	−1.904	−1.933	−1.963	−1.992	−2.021	−2.051	−2.080	−2.109	−2.138	−2.167	−60
−50	−1.576	−1.606	−1.636	−1.666	−1.696	−1.726	−1.756	−1.786	−1.815	−1.845	−1.874	−50
−40	−1.272	−1.303	−1.333	−1.364	−1.394	−1.425	−1.455	−1.485	−1.516	−1.546	−1.576	−40
−30	−0.962	−0.994	−1.025	−1.056	−1.087	−1.118	−1.149	−1.180	−1.211	−1.241	−1.272	−30
−20	−0.647	−0.679	−0.711	−0.742	−0.774	−0.805	−0.837	−0.868	−0.900	−0.931	−0.962	−20
−10	−0.326	−0.358	−0.391	−0.423	−0.455	−0.487	−0.519	−0.551	−0.583	−0.615	−0.647	−10
0	0.000	−0.033	−0.066	−0.098	−0.131	−0.164	−0.196	−0.229	−0.261	−0.294	−0.326	0
°C	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°C

TABLE C11.1. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
0	0.000	0.033	0.066	0.099	0.132	0.165	0.198	0.231	0.264	0.297	0.330	0
10	0.330	0.364	0.397	0.430	0.464	0.497	0.531	0.564	0.598	0.631	0.665	10
20	0.665	0.699	0.732	0.766	0.800	0.834	0.868	0.901	0.935	0.969	1.004	20
30	1.004	1.038	1.072	1.106	1.140	1.175	1.209	1.243	1.278	1.312	1.347	30
40	1.347	1.381	1.416	1.451	1.485	1.520	1.555	1.590	1.625	1.660	1.695	40
50	1.695	1.730	1.765	1.800	1.835	1.870	1.906	1.941	1.976	2.012	2.047	50
60	2.047	2.083	2.118	2.154	2.190	2.225	2.261	2.297	2.333	2.369	2.405	60
70	2.405	2.441	2.477	2.513	2.549	2.585	2.621	2.658	2.694	2.730	2.767	70
80	2.767	2.803	2.840	2.876	2.913	2.950	2.986	3.023	3.060	3.097	3.134	80
90	3.134	3.171	3.208	3.245	3.282	3.319	3.356	3.393	3.431	3.468	3.505	90
100	3.505	3.543	3.580	3.618	3.655	3.693	3.730	3.768	3.806	3.844	3.881	100
110	3.881	3.919	3.957	3.995	4.033	4.071	4.109	4.147	4.186	4.224	4.262	110
120	4.262	4.300	4.339	4.377	4.416	4.454	4.493	4.531	4.570	4.608	4.647	120
130	4.647	4.686	4.725	4.763	4.802	4.841	4.880	4.919	4.958	4.997	5.036	130
140	5.036	5.075	5.115	5.154	5.193	5.232	5.272	5.311	5.351	5.390	5.430	140
150	5.430	5.469	5.509	5.548	5.588	5.628	5.667	5.707	5.747	5.787	5.827	150
160	5.827	5.867	5.907	5.947	5.987	6.027	6.067	6.107	6.147	6.187	6.228	160
170	6.228	6.268	6.308	6.349	6.389	6.429	6.470	6.510	6.551	6.592	6.632	170
180	6.632	6.673	6.713	6.754	6.795	6.836	6.876	6.917	6.958	6.999	7.040	180
190	7.040	7.081	7.122	7.163	7.204	7.245	7.286	7.328	7.369	7.410	7.451	190
200	7.451	7.492	7.534	7.575	7.617	7.658	7.699	7.741	7.782	7.824	7.865	200
210	7.865	7.907	7.949	7.990	8.032	8.074	8.115	8.157	8.199	8.241	8.283	210
220	8.283	8.325	8.367	8.408	8.450	8.492	8.534	8.577	8.619	8.661	8.703	220
230	8.703	8.745	8.787	8.829	8.872	8.914	8.956	8.999	9.041	9.083	9.126	230
240	9.126	9.168	9.211	9.253	9.295	9.338	9.381	9.423	9.466	9.508	9.551	240
250	9.551	9.594	9.636	9.679	9.722	9.765	9.807	9.850	9.893	9.936	9.979	250
260	9.979	10.022	10.065	10.108	10.151	10.194	10.237	10.280	10.323	10.366	10.409	260
270	10.409	10.452	10.495	10.539	10.582	10.625	10.668	10.712	10.755	10.798	10.842	270
280	10.842	10.885	10.928	10.972	11.015	11.059	11.102	11.146	11.189	11.233	11.276	280
290	11.276	11.320	11.364	11.407	11.451	11.495	11.538	11.582	11.626	11.669	11.713	290
300	11.713	11.757	11.801	11.845	11.888	11.932	11.976	12.020	12.064	12.108	12.152	300
310	12.152	12.196	12.240	12.284	12.328	12.372	12.416	12.460	12.504	12.549	12.593	310
320	12.593	12.637	12.681	12.725	12.770	12.814	12.858	12.902	12.947	12.991	13.035	320
330	13.035	13.080	13.124	13.169	13.213	13.257	13.302	13.346	13.391	13.435	13.480	330
340	13.480	13.524	13.569	13.614	13.658	13.703	13.747	13.792	13.837	13.881	13.926	340
350	13.926	13.971	14.016	14.060	14.105	14.150	14.195	14.240	14.284	14.329	14.374	350
360	14.374	14.419	14.464	14.509	14.554	14.599	14.644	14.689	14.734	14.779	14.824	360
370	14.824	14.869	14.914	14.959	15.004	15.049	15.094	15.139	15.185	15.230	15.275	370
380	15.275	15.320	15.365	15.411	15.456	15.501	15.546	15.592	15.637	15.682	15.728	380
390	15.728	15.773	15.818	15.864	15.909	15.955	16.000	16.045	16.091	16.136	16.182	390
400	16.182	16.227	16.273	16.318	16.364	16.410	16.455	16.501	16.546	16.592	16.638	400
410	16.638	16.683	16.729	16.774	16.820	16.866	16.912	16.957	17.003	17.049	17.095	410
420	17.095	17.140	17.186	17.232	17.278	17.324	17.369	17.415	17.461	17.507	17.553	420
430	17.553	17.599	17.645	17.691	17.736	17.782	17.828	17.874	17.920	17.966	18.012	430
440	18.012	18.058	18.104	18.150	18.197	18.243	18.289	18.335	18.381	18.427	18.473	440
450	18.473	18.519	18.565	18.612	18.658	18.704	18.750	18.796	18.842	18.889	18.935	450
460	18.935	18.981	19.027	19.074	19.120	19.166	19.213	19.259	19.305	19.351	19.398	460
470	19.398	19.444	19.490	19.537	19.583	19.630	19.676	19.722	19.769	19.815	19.862	470
480	19.862	19.908	19.954	20.001	20.047	20.094	20.140	20.187	20.233	20.280	20.326	480
490	20.326	20.373	20.419	20.466	20.512	20.559	20.606	20.652	20.699	20.745	20.792	490
500	20.792	20.838	20.885	20.932	20.978	21.025	21.072	21.118	21.165	21.211	21.258	500
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C11.1. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°C); reference junctions at 0 °C--Continued*

°C	0	1	2	3	4	5	6	7	8	9	10	°C
						Thermoelectric Voltage in Millivolts						
500	20.792	20.838	20.885	20.932	20.978	21.025	21.072	21.118	21.165	21.211	21.258	500
510	21.258	21.305	21.351	21.398	21.445	21.492	21.538	21.585	21.632	21.678	21.725	510
520	21.725	21.772	21.819	21.865	21.912	21.959	22.006	22.052	22.099	22.146	22.193	520
530	22.193	22.239	22.286	22.333	22.380	22.427	22.473	22.520	22.567	22.614	22.661	530
540	22.661	22.707	22.754	22.801	22.848	22.895	22.942	22.989	23.035	23.082	23.129	540
550	23.129	23.176	23.223	23.270	23.317	23.363	23.410	23.457	23.504	23.551	23.598	550
560	23.598	23.645	23.692	23.739	23.786	23.832	23.879	23.926	23.973	24.020	24.067	560
570	24.067	24.114	24.161	24.208	24.255	24.302	24.349	24.395	24.442	24.489	24.536	570
580	24.536	24.583	24.630	24.677	24.724	24.771	24.818	24.865	24.912	24.959	25.006	580
590	25.006	25.053	25.100	25.146	25.193	25.240	25.287	25.334	25.381	25.428	25.475	590
600	25.475	25.522	25.569	25.616	25.663	25.710	25.757	25.804	25.851	25.898	25.945	600
610	25.945	25.991	26.038	26.085	26.132	26.179	26.226	26.273	26.320	26.367	26.414	610
620	26.414	26.461	26.508	26.555	26.602	26.649	26.696	26.742	26.789	26.836	26.883	620
630	26.883	26.930	26.977	27.024	27.071	27.118	27.165	27.212	27.259	27.305	27.352	630
640	27.352	27.399	27.446	27.493	27.540	27.587	27.634	27.681	27.727	27.774	27.821	640
650	27.821	27.868	27.915	27.962	28.009	28.056	28.102	28.149	28.196	28.243	28.290	650
660	28.290	28.337	28.384	28.430	28.477	28.524	28.571	28.618	28.665	28.711	28.758	660
670	28.758	28.805	28.852	28.899	28.946	28.992	29.039	29.086	29.133	29.180	29.226	670
680	29.226	29.273	29.320	29.367	29.413	29.460	29.507	29.554	29.601	29.647	29.694	680
690	29.694	29.741	29.788	29.834	29.881	29.928	29.975	30.021	30.068	30.115	30.161	690
700	30.161	30.208	30.255	30.302	30.348	30.395	30.442	30.488	30.535	30.582	30.628	700
710	30.628	30.675	30.722	30.768	30.815	30.862	30.908	30.955	31.002	31.048	31.095	710
720	31.095	31.142	31.188	31.235	31.282	31.328	31.375	31.421	31.468	31.515	31.561	720
730	31.561	31.608	31.654	31.701	31.748	31.794	31.841	31.887	31.934	31.981	32.027	730
740	32.027	32.074	32.120	32.167	32.213	32.260	32.306	32.353	32.399	32.446	32.492	740
750	32.492	32.539	32.585	32.632	32.678	32.725	32.771	32.818	32.864	32.911	32.957	750
760	32.957	33.004	33.050	33.097	33.143	33.190	33.236	33.283	33.329	33.375	33.422	760
770	33.422	33.468	33.515	33.561	33.608	33.654	33.700	33.747	33.793	33.840	33.886	770
780	33.886	33.932	33.979	34.025	34.071	34.118	34.164	34.210	34.257	34.303	34.349	780
790	34.349	34.396	34.442	34.488	34.535	34.581	34.627	34.674	34.720	34.766	34.812	790
800	34.812	34.859	34.905	34.951	34.997	35.044	35.090	35.136	35.182	35.229	35.275	800
810	35.275	35.321	35.367	35.413	35.460	35.506	35.552	35.598	35.644	35.690	35.737	810
820	35.737	35.783	35.829	35.875	35.921	35.967	36.013	36.060	36.106	36.152	36.198	820
830	36.198	36.244	36.290	36.336	36.382	36.428	36.474	36.520	36.566	36.612	36.658	830
840	36.658	36.704	36.750	36.796	36.842	36.888	36.934	36.980	37.026	37.072	37.118	840
850	37.118	37.164	37.210	37.256	37.301	37.347	37.393	37.439	37.485	37.531	37.577	850
860	37.577	37.622	37.668	37.714	37.760	37.806	37.851	37.897	37.943	37.989	38.034	860
870	38.034	38.080	38.126	38.171	38.217	38.263	38.309	38.354	38.400	38.445	38.491	870
880	38.491	38.537	38.582	38.628	38.673	38.719	38.765	38.810	38.856	38.901	38.947	880
890	38.947	38.992	39.038	39.083	39.129	39.174	39.219	39.265	39.310	39.356	39.401	890
900	39.401	39.446	39.492	39.537	39.582	39.628	39.673	39.718	39.764	39.809	39.854	900
910	39.854	39.899	39.945	39.990	40.035	40.080	40.125	40.170	40.216	40.261	40.306	910
920	40.306	40.351	40.396	40.441	40.486	40.531	40.576	40.621	40.666	40.711	40.756	920
930	40.756	40.801	40.846	40.891	40.936	40.981	41.025	41.070	41.115	41.160	41.205	930
940	41.205	41.250	41.294	41.339	41.384	41.429	41.473	41.518	41.563	41.608	41.652	940
950	41.652	41.697	41.742	41.786	41.831	41.875	41.920	41.965	42.009	42.054	42.098	950
960	42.098	42.143	42.187	42.232	42.276	42.321	42.365	42.410	42.454	42.499	42.543	960
970	42.543	42.588	42.632	42.676	42.721	42.765	42.810	42.854	42.898	42.943	42.987	970
980	42.987	43.032	43.076	43.120	43.165	43.209	43.253	43.298	43.342	43.386	43.431	980
990	43.431	43.475	43.519	43.564	43.608	43.652	43.697	43.741	43.785	43.830	43.874	990
1000	43.874											1000
°C	0	1	2	3	4	5	6	7	8	9	10	°C

TABLE C11.2. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F
					Thermoelectric Voltage in Millivolts							
−450	−6.274	−6.275	−6.276	−6.277	−6.277							−450
−440	−6.258	−6.260	−6.262	−6.264	−6.266	−6.268	−6.269	−6.271	−6.272	−6.273	−6.274	−440
−430	−6.229	−6.232	−6.235	−6.239	−6.242	−6.245	−6.248	−6.250	−6.253	−6.255	−6.258	−430
−420	−6.188	−6.193	−6.197	−6.202	−6.206	−6.210	−6.214	−6.218	−6.222	−6.225	−6.229	−420
−410	−6.137	−6.143	−6.148	−6.154	−6.159	−6.164	−6.169	−6.174	−6.179	−6.184	−6.188	−410
−400	−6.076	−6.083	−6.089	−6.095	−6.102	−6.108	−6.114	−6.120	−6.126	−6.132	−6.137	−400
−390	−6.005	−6.013	−6.020	−6.027	−6.035	−6.042	−6.049	−6.056	−6.063	−6.069	−6.076	−390
−380	−5.926	−5.934	−5.942	−5.950	−5.959	−5.967	−5.974	−5.982	−5.990	−5.998	−6.005	−380
−370	−5.838	−5.847	−5.856	−5.865	−5.874	−5.883	−5.892	−5.900	−5.909	−5.917	−5.926	−370
−360	−5.744	−5.754	−5.764	−5.773	−5.783	−5.792	−5.802	−5.811	−5.820	−5.829	−5.838	−360
−350	−5.645	−5.655	−5.665	−5.675	−5.685	−5.695	−5.705	−5.715	−5.725	−5.735	−5.744	−350
−340	−5.540	−5.550	−5.561	−5.572	−5.582	−5.593	−5.603	−5.614	−5.624	−5.634	−5.645	−340
−330	−5.431	−5.442	−5.453	−5.464	−5.475	−5.486	−5.496	−5.507	−5.518	−5.529	−5.540	−330
−320	−5.318	−5.329	−5.341	−5.352	−5.363	−5.375	−5.386	−5.397	−5.408	−5.419	−5.431	−320
−310	−5.202	−5.213	−5.225	−5.237	−5.248	−5.260	−5.272	−5.283	−5.295	−5.306	−5.318	−310
−300	−5.083	−5.095	−5.107	−5.119	−5.131	−5.143	−5.154	−5.166	−5.178	−5.190	−5.202	−300
−290	−4.961	−4.974	−4.986	−4.998	−5.010	−5.022	−5.035	−5.047	−5.059	−5.071	−5.083	−290
−280	−4.837	−4.850	−4.862	−4.875	−4.887	−4.900	−4.912	−4.924	−4.937	−4.949	−4.961	−280
−270	−4.711	−4.724	−4.737	−4.749	−4.762	−4.775	−4.787	−4.800	−4.812	−4.825	−4.837	−270
−260	−4.583	−4.596	−4.609	−4.622	−4.634	−4.647	−4.660	−4.673	−4.686	−4.698	−4.711	−260
−250	−4.452	−4.465	−4.479	−4.492	−4.505	−4.518	−4.531	−4.544	−4.557	−4.570	−4.583	−250
−240	−4.320	−4.333	−4.346	−4.360	−4.373	−4.386	−4.399	−4.413	−4.426	−4.439	−4.452	−240
−230	−4.185	−4.199	−4.212	−4.226	−4.239	−4.253	−4.266	−4.280	−4.293	−4.306	−4.320	−230
−220	−4.049	−4.062	−4.076	−4.090	−4.103	−4.117	−4.131	−4.144	−4.158	−4.172	−4.185	−220
−210	−3.910	−3.924	−3.938	−3.952	−3.966	−3.980	−3.993	−4.007	−4.021	−4.035	−4.049	−210
−200	−3.770	−3.784	−3.798	−3.812	−3.826	−3.840	−3.854	−3.868	−3.882	−3.896	−3.910	−200
−190	−3.627	−3.642	−3.656	−3.670	−3.685	−3.699	−3.713	−3.727	−3.741	−3.756	−3.770	−190
−180	−3.483	−3.498	−3.512	−3.527	−3.541	−3.556	−3.570	−3.584	−3.599	−3.613	−3.627	−180
−170	−3.337	−3.352	−3.367	−3.381	−3.396	−3.411	−3.425	−3.440	−3.454	−3.469	−3.483	−170
−160	−3.190	−3.205	−3.219	−3.234	−3.249	−3.264	−3.279	−3.293	−3.308	−3.323	−3.337	−160
−150	−3.040	−3.055	−3.070	−3.085	−3.100	−3.115	−3.130	−3.145	−3.160	−3.175	−3.190	−150
−140	−2.888	−2.904	−2.919	−2.934	−2.949	−2.964	−2.980	−2.995	−3.010	−3.025	−3.040	−140
−130	−2.735	−2.750	−2.766	−2.781	−2.797	−2.812	−2.827	−2.843	−2.858	−2.873	−2.888	−130
−120	−2.580	−2.595	−2.611	−2.626	−2.642	−2.657	−2.673	−2.689	−2.704	−2.719	−2.735	−120
−110	−2.422	−2.438	−2.454	−2.470	−2.486	−2.501	−2.517	−2.533	−2.548	−2.564	−2.580	−110
−100	−2.263	−2.279	−2.295	−2.311	−2.327	−2.343	−2.359	−2.375	−2.391	−2.407	−2.422	−100
−90	−2.103	−2.119	−2.135	−2.151	−2.167	−2.183	−2.199	−2.215	−2.231	−2.247	−2.263	−90
−80	−1.940	−1.956	−1.973	−1.989	−2.005	−2.021	−2.038	−2.054	−2.070	−2.086	−2.103	−80
−70	−1.776	−1.792	−1.809	−1.825	−1.842	−1.858	−1.874	−1.891	−1.907	−1.924	−1.940	−70
−60	−1.610	−1.626	−1.643	−1.660	−1.676	−1.693	−1.709	−1.726	−1.743	−1.759	−1.776	−60
−50	−1.442	−1.459	−1.475	−1.492	−1.509	−1.526	−1.543	−1.559	−1.576	−1.593	−1.610	−50
−40	−1.272	−1.289	−1.306	−1.323	−1.340	−1.357	−1.374	−1.391	−1.408	−1.425	−1.442	−40
−30	−1.101	−1.118	−1.135	−1.152	−1.170	−1.187	−1.204	−1.221	−1.238	−1.255	−1.272	−30
−20	−0.928	−0.945	−0.962	−0.980	−0.997	−1.014	−1.032	−1.049	−1.066	−1.084	−1.101	−20
−10	−0.753	−0.770	−0.788	−0.805	−0.823	−0.840	−0.858	−0.875	−0.893	−0.910	−0.928	−10
0	−0.576	−0.594	−0.612	−0.629	−0.647	−0.665	−0.682	−0.700	−0.718	−0.735	−0.753	0
°F	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	°F

TABLE C11.2. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
0	−0.576	−0.558	−0.541	−0.523	−0.505	−0.487	−0.469	−0.452	−0.434	−0.416	−0.398	0
10	−0.398	−0.380	−0.362	−0.344	−0.326	−0.308	−0.290	−0.272	−0.254	−0.236	−0.218	10
20	−0.218	−0.200	−0.182	−0.164	−0.146	−0.127	−0.109	−0.091	−0.073	−0.055	−0.036	20
30	−0.036	−0.018	0.000	0.018	0.037	0.055	0.073	0.091	0.110	0.128	0.146	30
40	0.146	0.165	0.183	0.201	0.220	0.238	0.257	0.275	0.294	0.312	0.330	40
50	0.330	0.349	0.367	0.386	0.404	0.423	0.441	0.460	0.479	0.497	0.516	50
60	0.516	0.534	0.553	0.572	0.590	0.609	0.627	0.646	0.665	0.684	0.702	60
70	0.702	0.721	0.740	0.758	0.777	0.796	0.815	0.834	0.852	0.871	0.890	70
80	0.890	0.909	0.928	0.947	0.966	0.985	1.004	1.022	1.041	1.060	1.079	80
90	1.079	1.098	1.117	1.136	1.156	1.175	1.194	1.213	1.232	1.251	1.270	90
100	1.270	1.289	1.308	1.328	1.347	1.366	1.385	1.404	1.424	1.443	1.462	100
110	1.462	1.481	1.501	1.520	1.539	1.559	1.578	1.597	1.617	1.636	1.656	110
120	1.656	1.675	1.695	1.714	1.734	1.753	1.773	1.792	1.812	1.831	1.851	120
130	1.851	1.870	1.890	1.909	1.929	1.949	1.968	1.988	2.008	2.027	2.047	130
140	2.047	2.067	2.087	2.106	2.126	2.146	2.166	2.186	2.205	2.225	2.245	140
150	2.245	2.265	2.285	2.305	2.325	2.345	2.365	2.385	2.405	2.425	2.445	150
160	2.445	2.465	2.485	2.505	2.525	2.545	2.565	2.585	2.605	2.625	2.645	160
170	2.645	2.666	2.686	2.706	2.726	2.746	2.767	2.787	2.807	2.828	2.848	170
180	2.848	2.868	2.888	2.909	2.929	2.950	2.970	2.990	3.011	3.031	3.052	180
190	3.052	3.072	3.093	3.113	3.134	3.154	3.175	3.195	3.216	3.236	3.257	190
200	3.257	3.278	3.298	3.319	3.339	3.360	3.381	3.402	3.422	3.443	3.464	200
210	3.464	3.484	3.505	3.526	3.547	3.568	3.588	3.609	3.630	3.651	3.672	210
220	3.672	3.693	3.714	3.735	3.755	3.776	3.797	3.818	3.839	3.860	3.881	220
230	3.881	3.902	3.923	3.945	3.966	3.987	4.008	4.029	4.050	4.071	4.092	230
240	4.092	4.113	4.135	4.156	4.177	4.198	4.220	4.241	4.262	4.283	4.305	240
250	4.305	4.326	4.347	4.369	4.390	4.411	4.433	4.454	4.475	4.497	4.518	250
260	4.518	4.540	4.561	4.583	4.604	4.626	4.647	4.669	4.690	4.712	4.733	260
270	4.733	4.755	4.776	4.798	4.820	4.841	4.863	4.884	4.906	4.928	4.949	270
280	4.949	4.971	4.993	5.015	5.036	5.058	5.080	5.102	5.123	5.145	5.167	280
290	5.167	5.189	5.211	5.232	5.254	5.276	5.298	5.320	5.342	5.364	5.386	290
300	5.386	5.408	5.430	5.452	5.473	5.495	5.517	5.539	5.562	5.584	5.606	300
310	5.606	5.628	5.650	5.672	5.694	5.716	5.738	5.760	5.782	5.805	5.827	310
320	5.827	5.849	5.871	5.893	5.915	5.938	5.960	5.982	6.004	6.027	6.049	320
330	6.049	6.071	6.094	6.116	6.138	6.161	6.183	6.205	6.228	6.250	6.272	330
340	6.272	6.295	6.317	6.340	6.362	6.385	6.407	6.429	6.452	6.474	6.497	340
350	6.497	6.519	6.542	6.564	6.587	6.610	6.632	6.655	6.677	6.700	6.722	350
360	6.722	6.745	6.768	6.790	6.813	6.836	6.858	6.881	6.904	6.926	6.949	360
370	6.949	6.972	6.995	7.017	7.040	7.063	7.086	7.108	7.131	7.154	7.177	370
380	7.177	7.200	7.222	7.245	7.268	7.291	7.314	7.337	7.360	7.382	7.405	380
390	7.405	7.428	7.451	7.474	7.497	7.520	7.543	7.566	7.589	7.612	7.635	390
400	7.635	7.658	7.681	7.704	7.727	7.750	7.773	7.796	7.819	7.842	7.865	400
410	7.865	7.889	7.912	7.935	7.958	7.981	8.004	8.027	8.051	8.074	8.097	410
420	8.097	8.120	8.143	8.167	8.190	8.213	8.236	8.259	8.283	8.306	8.329	420
430	8.329	8.353	8.376	8.399	8.422	8.446	8.469	8.492	8.516	8.539	8.562	430
440	8.562	8.586	8.609	8.633	8.656	8.679	8.703	8.726	8.750	8.773	8.797	440
450	8.797	8.820	8.843	8.867	8.890	8.914	8.937	8.961	8.984	9.008	9.031	450
460	9.031	9.055	9.079	9.102	9.126	9.149	9.173	9.196	9.220	9.244	9.267	460
470	9.267	9.291	9.314	9.338	9.362	9.385	9.409	9.433	9.456	9.480	9.504	470
480	9.504	9.527	9.551	9.575	9.598	9.622	9.646	9.670	9.693	9.717	9.741	480
490	9.741	9.765	9.788	9.812	9.836	9.860	9.884	9.907	9.931	9.955	9.979	490
500	9.979	10.003	10.027	10.050	10.074	10.098	10.122	10.146	10.170	10.194	10.218	500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C11.2. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
500	9.979	10.003	10.027	10.050	10.074	10.098	10.122	10.146	10.170	10.194	10.218	500
510	10.218	10.242	10.265	10.289	10.313	10.337	10.361	10.385	10.409	10.433	10.457	510
520	10.457	10.481	10.505	10.529	10.553	10.577	10.601	10.625	10.649	10.673	10.697	520
530	10.697	10.721	10.745	10.769	10.793	10.818	10.842	10.866	10.890	10.914	10.938	530
540	10.938	10.962	10.986	11.010	11.035	11.059	11.083	11.107	11.131	11.155	11.180	540
550	11.180	11.204	11.228	11.252	11.276	11.301	11.325	11.349	11.373	11.397	11.422	550
560	11.422	11.446	11.470	11.495	11.519	11.543	11.567	11.592	11.616	11.640	11.665	560
570	11.665	11.689	11.713	11.737	11.762	11.786	11.811	11.835	11.859	11.884	11.908	570
580	11.908	11.932	11.957	11.981	12.005	12.030	12.054	12.079	12.103	12.128	12.152	580
590	12.152	12.176	12.201	12.225	12.250	12.274	12.299	12.323	12.348	12.372	12.397	590
600	12.397	12.421	12.446	12.470	12.495	12.519	12.544	12.568	12.593	12.617	12.642	600
610	12.642	12.666	12.691	12.716	12.740	12.765	12.789	12.814	12.838	12.863	12.888	610
620	12.888	12.912	12.937	12.962	12.986	13.011	13.035	13.060	13.085	13.109	13.134	620
630	13.134	13.159	13.183	13.208	13.233	13.257	13.282	13.307	13.332	13.356	13.381	630
640	13.381	13.406	13.430	13.455	13.480	13.505	13.529	13.554	13.579	13.604	13.628	640
650	13.628	13.653	13.678	13.703	13.728	13.752	13.777	13.802	13.827	13.852	13.877	650
660	13.877	13.901	13.926	13.951	13.976	14.001	14.026	14.050	14.075	14.100	14.125	660
670	14.125	14.150	14.175	14.200	14.225	14.250	14.274	14.299	14.324	14.349	14.374	670
680	14.374	14.399	14.424	14.449	14.474	14.499	14.524	14.549	14.574	14.599	14.624	680
690	14.624	14.649	14.674	14.699	14.724	14.749	14.774	14.799	14.824	14.849	14.874	690
700	14.874	14.899	14.924	14.949	14.974	14.999	15.024	15.049	15.074	15.099	15.124	700
710	15.124	15.149	15.175	15.200	15.225	15.250	15.275	15.300	15.325	15.350	15.375	710
720	15.375	15.401	15.426	15.451	15.476	15.501	15.526	15.551	15.577	15.602	15.627	720
730	15.627	15.652	15.677	15.702	15.728	15.753	15.778	15.803	15.828	15.854	15.879	730
740	15.879	15.904	15.929	15.955	15.980	16.005	16.030	16.056	16.081	16.106	16.131	740
750	16.131	16.157	16.182	16.207	16.232	16.258	16.283	16.308	16.334	16.359	16.384	750
760	16.384	16.410	16.435	16.460	16.485	16.511	16.536	16.561	16.587	16.612	16.638	760
770	16.638	16.663	16.688	16.714	16.739	16.764	16.790	16.815	16.840	16.866	16.891	770
780	16.891	16.917	16.942	16.967	16.993	17.018	17.044	17.069	17.095	17.120	17.145	780
790	17.145	17.171	17.196	17.222	17.247	17.273	17.298	17.324	17.349	17.374	17.400	790
800	17.400	17.425	17.451	17.476	17.502	17.527	17.553	17.578	17.604	17.629	17.655	800
810	17.655	17.680	17.706	17.731	17.757	17.782	17.808	17.834	17.859	17.885	17.910	810
820	17.910	17.936	17.961	17.987	18.012	18.038	18.063	18.089	18.115	18.140	18.166	820
830	18.166	18.191	18.217	18.243	18.268	18.294	18.319	18.345	18.371	18.396	18.422	830
840	18.422	18.447	18.473	18.499	18.524	18.550	18.576	18.601	18.627	18.653	18.678	840
850	18.678	18.704	18.730	18.755	18.781	18.807	18.832	18.858	18.884	18.909	18.935	850
860	18.935	18.961	18.986	19.012	19.038	19.063	19.089	19.115	19.140	19.166	19.192	860
870	19.192	19.218	19.243	19.269	19.295	19.321	19.346	19.372	19.398	19.424	19.449	870
880	19.449	19.475	19.501	19.527	19.552	19.578	19.604	19.630	19.655	19.681	19.707	880
890	19.707	19.733	19.758	19.784	19.810	19.836	19.862	19.887	19.913	19.939	19.965	890
900	19.965	19.991	20.016	20.042	20.068	20.094	20.120	20.146	20.171	20.197	20.223	900
910	20.223	20.249	20.275	20.300	20.326	20.352	20.378	20.404	20.430	20.456	20.481	910
920	20.481	20.507	20.533	20.559	20.585	20.611	20.637	20.662	20.688	20.714	20.740	920
930	20.740	20.766	20.792	20.818	20.844	20.870	20.895	20.921	20.947	20.973	20.999	930
940	20.999	21.025	21.051	21.077	21.103	21.129	21.154	21.180	21.206	21.232	21.258	940
950	21.258	21.284	21.310	21.336	21.362	21.388	21.414	21.440	21.466	21.492	21.517	950
960	21.517	21.543	21.569	21.595	21.621	21.647	21.673	21.699	21.725	21.751	21.777	960
970	21.777	21.803	21.829	21.855	21.881	21.907	21.933	21.959	21.985	22.011	22.037	970
980	22.037	22.063	22.089	22.115	22.141	22.167	22.193	22.219	22.245	22.271	22.297	980
990	22.297	22.323	22.349	22.375	22.401	22.427	22.453	22.479	22.505	22.531	22.557	990
1000	22.557	22.583	22.609	22.635	22.661	22.687	22.713	22.739	22.765	22.791	22.817	1000
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C11.2. *Platinum, Pt-67, versus type TN (or EN) thermoelements --- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1000	22.557	22.583	22.609	22.635	22.661	22.687	22.713	22.739	22.765	22.791	22.817	1000
1010	22.817	22.843	22.869	22.895	22.921	22.947	22.973	22.999	23.025	23.051	23.077	1010
1020	23.077	23.103	23.129	23.155	23.181	23.207	23.233	23.259	23.285	23.311	23.337	1020
1030	23.337	23.363	23.390	23.416	23.442	23.468	23.494	23.520	23.546	23.572	23.598	1030
1040	23.598	23.624	23.650	23.676	23.702	23.728	23.754	23.780	23.806	23.832	23.858	1040
1050	23.858	23.885	23.911	23.937	23.963	23.989	24.015	24.041	24.067	24.093	24.119	1050
1060	24.119	24.145	24.171	24.197	24.223	24.249	24.276	24.302	24.328	24.354	24.380	1060
1070	24.380	24.406	24.432	24.458	24.484	24.510	24.536	24.562	24.588	24.614	24.641	1070
1080	24.641	24.667	24.693	24.719	24.745	24.771	24.797	24.823	24.849	24.875	24.901	1080
1090	24.901	24.927	24.953	24.980	25.006	25.032	25.058	25.084	25.110	25.136	25.162	1090
1100	25.162	25.188	25.214	25.240	25.266	25.293	25.319	25.345	25.371	25.397	25.423	1100
1110	25.423	25.449	25.475	25.501	25.527	25.553	25.579	25.606	25.632	25.658	25.684	1110
1120	25.684	25.710	25.736	25.762	25.788	25.814	25.840	25.866	25.892	25.918	25.945	1120
1130	25.945	25.971	25.997	26.023	26.049	26.075	26.101	26.127	26.153	26.179	26.205	1130
1140	26.205	26.231	26.257	26.284	26.310	26.336	26.362	26.388	26.414	26.440	26.466	1140
1150	26.466	26.492	26.518	26.544	26.570	26.596	26.623	26.649	26.675	26.701	26.727	1150
1160	26.727	26.753	26.779	26.805	26.831	26.857	26.883	26.909	26.935	26.961	26.987	1160
1170	26.987	27.014	27.040	27.066	27.092	27.118	27.144	27.170	27.196	27.222	27.248	1170
1180	27.248	27.274	27.300	27.326	27.352	27.378	27.404	27.431	27.457	27.483	27.509	1180
1190	27.509	27.535	27.561	27.587	27.613	27.639	27.665	27.691	27.717	27.743	27.769	1190
1200	27.769	27.795	27.821	27.847	27.873	27.899	27.925	27.951	27.977	28.004	28.030	1200
1210	28.030	28.056	28.082	28.108	28.134	28.160	28.186	28.212	28.238	28.264	28.290	1210
1220	28.290	28.316	28.342	28.368	28.394	28.420	28.446	28.472	28.498	28.524	28.550	1220
1230	28.550	28.576	28.602	28.628	28.654	28.680	28.706	28.732	28.758	28.784	28.810	1230
1240	28.810	28.836	28.862	28.888	28.914	28.940	28.966	28.992	29.018	29.044	29.070	1240
1250	29.070	29.096	29.122	29.148	29.174	29.200	29.226	29.252	29.278	29.304	29.330	1250
1260	29.330	29.356	29.382	29.408	29.434	29.460	29.486	29.512	29.538	29.564	29.590	1260
1270	29.590	29.616	29.642	29.668	29.694	29.720	29.746	29.772	29.798	29.824	29.850	1270
1280	29.850	29.876	29.902	29.928	29.954	29.980	30.006	30.032	30.058	30.084	30.110	1280
1290	30.110	30.135	30.161	30.187	30.213	30.239	30.265	30.291	30.317	30.343	30.369	1290
1300	30.369	30.395	30.421	30.447	30.473	30.499	30.525	30.551	30.577	30.603	30.628	1300
1310	30.628	30.654	30.680	30.706	30.732	30.758	30.784	30.810	30.836	30.862	30.888	1310
1320	30.888	30.914	30.940	30.965	30.991	31.017	31.043	31.069	31.095	31.121	31.147	1320
1330	31.147	31.173	31.199	31.225	31.251	31.276	31.302	31.328	31.354	31.380	31.406	1330
1340	31.406	31.432	31.458	31.484	31.509	31.535	31.561	31.587	31.613	31.639	31.665	1340
1350	31.665	31.691	31.717	31.742	31.768	31.794	31.820	31.846	31.872	31.898	31.924	1350
1360	31.924	31.949	31.975	32.001	32.027	32.053	32.079	32.105	32.131	32.156	32.182	1360
1370	32.182	32.208	32.234	32.260	32.286	32.312	32.337	32.363	32.389	32.415	32.441	1370
1380	32.441	32.467	32.492	32.518	32.544	32.570	32.596	32.622	32.647	32.673	32.699	1380
1390	32.699	32.725	32.751	32.777	32.802	32.828	32.854	32.880	32.906	32.932	32.957	1390
1400	32.957	32.983	33.009	33.035	33.061	33.086	33.112	33.138	33.164	33.190	33.215	1400
1410	33.215	33.241	33.267	33.293	33.319	33.344	33.370	33.396	33.422	33.448	33.473	1410
1420	33.473	33.499	33.525	33.551	33.577	33.602	33.628	33.654	33.680	33.706	33.731	1420
1430	33.731	33.757	33.783	33.809	33.834	33.860	33.886	33.912	33.937	33.963	33.989	1430
1440	33.989	34.015	34.040	34.066	34.092	34.118	34.143	34.169	34.195	34.221	34.246	1440
1450	34.246	34.272	34.298	34.324	34.349	34.375	34.401	34.427	34.452	34.478	34.504	1450
1460	34.504	34.530	34.555	34.581	34.607	34.632	34.658	34.684	34.710	34.735	34.761	1460
1470	34.761	34.787	34.812	34.838	34.864	34.890	34.915	34.941	34.967	34.992	35.018	1470
1480	35.018	35.044	35.069	35.095	35.121	35.146	35.172	35.198	35.223	35.249	35.275	1480
1490	35.275	35.300	35.326	35.352	35.377	35.403	35.429	35.454	35.480	35.506	35.531	1490
1500	35.531	35.557	35.583	35.608	35.634	35.660	35.685	35.711	35.737	35.762	35.788	1500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

TABLE C11.2. ***Platinum, Pt-67, versus type TN (or EN) thermoelements*** *--- thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F--Continued*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
1500	35.531	35.557	35.583	35.608	35.634	35.660	35.685	35.711	35.737	35.762	35.788	1500
1510	35.788	35.814	35.839	35.865	35.890	35.916	35.942	35.967	35.993	36.019	36.044	1510
1520	36.044	36.070	36.095	36.121	36.147	36.172	36.198	36.223	36.249	36.275	36.300	1520
1530	36.300	36.326	36.351	36.377	36.403	36.428	36.454	36.479	36.505	36.530	36.556	1530
1540	36.556	36.582	36.607	36.633	36.658	36.684	36.709	36.735	36.760	36.786	36.811	1540
1550	36.811	36.837	36.863	36.888	36.914	36.939	36.965	36.990	37.016	37.041	37.067	1550
1560	37.067	37.092	37.118	37.143	37.169	37.194	37.220	37.245	37.271	37.296	37.322	1560
1570	37.322	37.347	37.373	37.398	37.424	37.449	37.475	37.500	37.526	37.551	37.577	1570
1580	37.577	37.602	37.627	37.653	37.678	37.704	37.729	37.755	37.780	37.806	37.831	1580
1590	37.831	37.856	37.882	37.907	37.933	37.958	37.984	38.009	38.034	38.060	38.085	1590
1600	38.085	38.111	38.136	38.161	38.187	38.212	38.237	38.263	38.288	38.314	38.339	1600
1610	38.339	38.364	38.390	38.415	38.440	38.466	38.491	38.516	38.542	38.567	38.592	1610
1620	38.592	38.618	38.643	38.668	38.694	38.719	38.744	38.770	38.795	38.820	38.846	1620
1630	38.846	38.871	38.896	38.921	38.947	38.972	38.997	39.022	39.048	39.073	39.098	1630
1640	39.098	39.124	39.149	39.174	39.199	39.224	39.250	39.275	39.300	39.325	39.351	1640
1650	39.351	39.376	39.401	39.426	39.451	39.477	39.502	39.527	39.552	39.577	39.603	1650
1660	39.603	39.628	39.653	39.678	39.703	39.728	39.754	39.779	39.804	39.829	39.854	1660
1670	39.854	39.879	39.904	39.929	39.955	39.980	40.005	40.030	40.055	40.080	40.105	1670
1680	40.105	40.130	40.155	40.180	40.205	40.231	40.256	40.281	40.306	40.331	40.356	1680
1690	40.356	40.381	40.406	40.431	40.456	40.481	40.506	40.531	40.556	40.581	40.606	1690
1700	40.606	40.631	40.656	40.681	40.706	40.731	40.756	40.781	40.806	40.831	40.856	1700
1710	40.856	40.881	40.906	40.931	40.956	40.981	41.006	41.030	41.055	41.080	41.105	1710
1720	41.105	41.130	41.155	41.180	41.205	41.230	41.255	41.279	41.304	41.329	41.354	1720
1730	41.354	41.379	41.404	41.429	41.454	41.478	41.503	41.528	41.553	41.578	41.603	1730
1740	41.603	41.627	41.652	41.677	41.702	41.727	41.751	41.776	41.801	41.826	41.851	1740
1750	41.851	41.875	41.900	41.925	41.950	41.974	41.999	42.024	42.049	42.074	42.098	1750
1760	42.098	42.123	42.148	42.173	42.197	42.222	42.247	42.271	42.296	42.321	42.346	1760
1770	42.346	42.370	42.395	42.420	42.444	42.469	42.494	42.519	42.543	42.568	42.593	1770
1780	42.593	42.617	42.642	42.667	42.691	42.716	42.741	42.765	42.790	42.815	42.839	1780
1790	42.839	42.864	42.889	42.913	42.938	42.963	42.987	43.012	43.036	43.061	43.086	1790
1800	43.086	43.110	43.135	43.160	43.184	43.209	43.234	43.258	43.283	43.307	43.332	1800
1810	43.332	43.357	43.381	43.406	43.431	43.455	43.480	43.505	43.529	43.554	43.578	1810
1820	43.578	43.603	43.628	43.652	43.677	43.702	43.726	43.751	43.775	43.800	43.825	1820
1830	43.825	43.849	43.874									1830
°F	0	1	2	3	4	5	6	7	8	9	10	°F

☆ U.S. GOVERNMENT PRINTING OFFICE:1993-341-832/84033

NIST Technical Publications

Periodical

Journal of Research of the National Institute of Standards and Technology—Reports NIST research and development in those disciplines of the physical and engineering sciences in which the Institute is active. These include physics, chemistry, engineering, mathematics, and computer sciences. Papers cover a broad range of subjects, with major emphasis on measurement methodology and the basic technology underlying standardization. Also included from time to time are survey articles on topics closely related to the Institute's technical and scientific programs. Issued six times a year.

Nonperiodicals

Monographs—Major contributions to the technical literature on various subjects related to the Institute's scientific and technical activities.

Handbooks—Recommended codes of engineering and industrial practice (including safety codes) developed in cooperation with interested industries, professional organizations, and regulatory bodies.

Special Publications—Include proceedings of conferences sponsored by NIST, NIST annual reports, and other special publications appropriate to this grouping such as wall charts, pocket cards, and bibliographies.

Applied Mathematics Series—Mathematical tables, manuals, and studies of special interest to physicists, engineers, chemists, biologists, mathematicians, computer programmers, and others engaged in scientific and technical work.

National Standard Reference Data Series—Provides quantitative data on the physical and chemical properties of materials, compiled from the world's literature and critically evaluated. Developed under a worldwide program coordinated by NIST under the authority of the National Standard Data Act (Public Law 90-396). NOTE: The Journal of Physical and Chemical Reference Data (JPCRD) is published bimonthly for NIST by the American Chemical Society (ACS) and the American Institute of Physics (AIP). Subscriptions, reprints, and supplements are available from ACS, 1155 Sixteenth St., NW, Washington, DC 20056.

Building Science Series—Disseminates technical information developed at the Institute on building materials, components, systems, and whole structures. The series presents research results, test methods, and performance criteria related to the structural and environmental functions and the durability and safety characteristics of building elements and systems.

Technical Notes—Studies or reports which are complete in themselves but restrictive in their treatment of a subject. Analogous to monographs but not so comprehensive in scope or definitive in treatment of the subject area. Often serve as a vehicle for final reports of work performed at NIST under the sponsorship of other government agencies.

Voluntary Product Standards—Developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The standards establish nationally recognized requirements for products, and provide all concerned interests with a basis for common understanding of the characteristics of the products. NIST administers this program in support of the efforts of private-sector standardizing organizations.

Consumer Information Series—Practical information, based on NIST research and experience, covering areas of interest to the consumer. Easily understandable language and illustrations provide useful background knowledge for shopping in today's technological marketplace.

Order the **above** *NIST publications from: Superintendent of Documents, Government Printing Office, Washington, DC 20402.*

Order the **following** *NIST publications—FIPS and NISTIRs—from the National Technical Information Service, Springfield, VA 22161.*

Federal Information Processing Standards Publications (FIPS PUB)—Publications in this series collectively constitute the Federal Information Processing Standards Register. The Register serves as the official source of information in the Federal Government regarding standards issued by NIST pursuant to the Federal Property and Administrative Services Act of 1949 as amended, Public Law 89-306 (79 Stat. 1127), and as implemented by Executive Order 11717 (38 FR 12315, dated May 11, 1973) and Part 6 of Title 15 CFR (Code of Federal Regulations).

NIST Interagency Reports (NISTIR)—A special series of interim or final reports on work performed by NIST for outside sponsors (both government and non-government). In general, initial distribution is handled by the sponsor; public distribution is by the National Technical Information Service, Springfield, VA 22161, in paper copy or microfiche form.

U.S. Department of Commerce
National Institute of Standards and Technology
Gaithersburg, MD 20899