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Lorenz Ratios of Technically Important Metals and Alloys

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Lorenz Ratios of Technically Important Metals and Alloys

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Lorenz Ratios of Technically Important Metals and Alloys

J. G. Hust and L. L. Sparks

A comprehensive review and compilation of the world literature on Lorenz ratio of technically important metals and alloys is presented. Lorenz ratio, electrical resistivity, thermal conductivity, and characterization data are compiled in tabular form and the Lorenz ratio data are presented in graphical form as well. Data are included here only if the research reported both thermal conductivity and electrical resistivity of the specimens. No attempt has been made to smooth data or present recommended values.

Key Words: Alloys; compilation; cryogenic; electrical resistivity; Lorenz Ratio; metals; thermal conductivity.

1. Introduction

The development of new materials and a renewed interest in existing materials by modern technological industry is creating a demand for thermal and electrical property data. These data are needed for the selection of suitable construction materials and the prediction of operating characteristics of low temperature systems. Apparatus are available at this laboratory as well as others for the accurate measurement of thermal conductivity, electrical resistivity, and thermopower of metals and alloys over the range from 4 to 300 K. However, the measurement of thermal conductivity is slow and expensive; one cannot hope to fill the immediate demand for data by measurement alone. Furthermore, metals and alloys display a wide range in their conductivity values at a given temperature and a single material may exhibit values varying over several orders of magnitude as a function of temperature. One cannot look to theory for these values, since, presently, theoretical predictions represent qualitative guidelines only. However, a strong relationship between thermal conductivity and electrical resistivity of metals was observed many years ago and the nature of this correlation has been studied ever since. This relationship, called the Wiedemann-Franz-Lorenz law, makes it possible to predict approximate values of thermal conductivity from less expensive electrical resistivity measurements. For this reason we feel a compilation of Lorenz ratios of technically important metals is overdue. The predictive value of these data is explained below.

2. Theory

In order to better understand the methods of predicting thermal conductivity from the Lorenz ratio, it will be helpful to have an understanding of the general thermal and electrical properties of metals and alloys. The following sections on thermal conductivity and electrical resistivity are included as a review of the fundamental physical behavior.

2.1 Thermal Conductivity

The thermal conductivity, λ, of a metal or alloy usually is considered to be the sum of two components- the electronic, λ_e, and lattice, λ_g:

$$\lambda = \lambda_e + \lambda_g. \tag{1}$$

There are other mechanisms of heat transport; however, they generally are not applicable here. The lattice term designates the energy carried by the lattice vibrations, called phonons. The subscript g comes from the German word for lattice, Gitter.

In "electrically pure" materials the lattice term is small (usually less than 5 and almost never more than 20 percent of the total) compared to the electron term. Electrical purity is characterized by the residual resistivity ratio, RRR, between 273 K and 4 K (RRR = $\rho_{273}/\rho_{4\ K}$). The electrical purity of a material is not specified uniquely by the chemical purity of that material; it also depends on the distribution and location of the impurity atoms and on the physical imperfections in the solid. For example, whereas the chemical purity may remain essentially unchanged in annealing, the electrical purity of a material can, in some instances, be changed by an order of magnitude or more. As will be described later, such a change also affects the thermal conductivity.

In alloys, the electronic conductivity is so small, especially at lower temperatures, that the lattice conductivity no longer is negligible. As a matter of fact, λ_g is often much larger than λ_e. The total conductivity of alloys is less than that of pure metals, and some alloys have conductivities approaching those of thermal insulators. The general temperature dependence and relative magnitude of the conductivities of several materials are illustrated in figure 1. More details are given by Powell [1].[1]

2.2 Electrical Resistivity

For commercially pure metals and some alloys, the electrical resistivity is described adequately by Matthiessen's rule. This rule, eq(2), states that the electrical resistivity of a metal is the sum of two parts: the intrinsic resistivity, ρ_i, which is characterized by electrons interacting with phonons only, and the residual resistivity, ρ_o, which is characterized by electrons interacting with the chemical and physical imperfections of the metal.

$$\rho(T) = \rho_o + \rho_i(T) \qquad (2)$$

The residual resistivity is assumed to be temperature independent while

[1] Numbers in brackets refer to list of text references at the end of this paper.

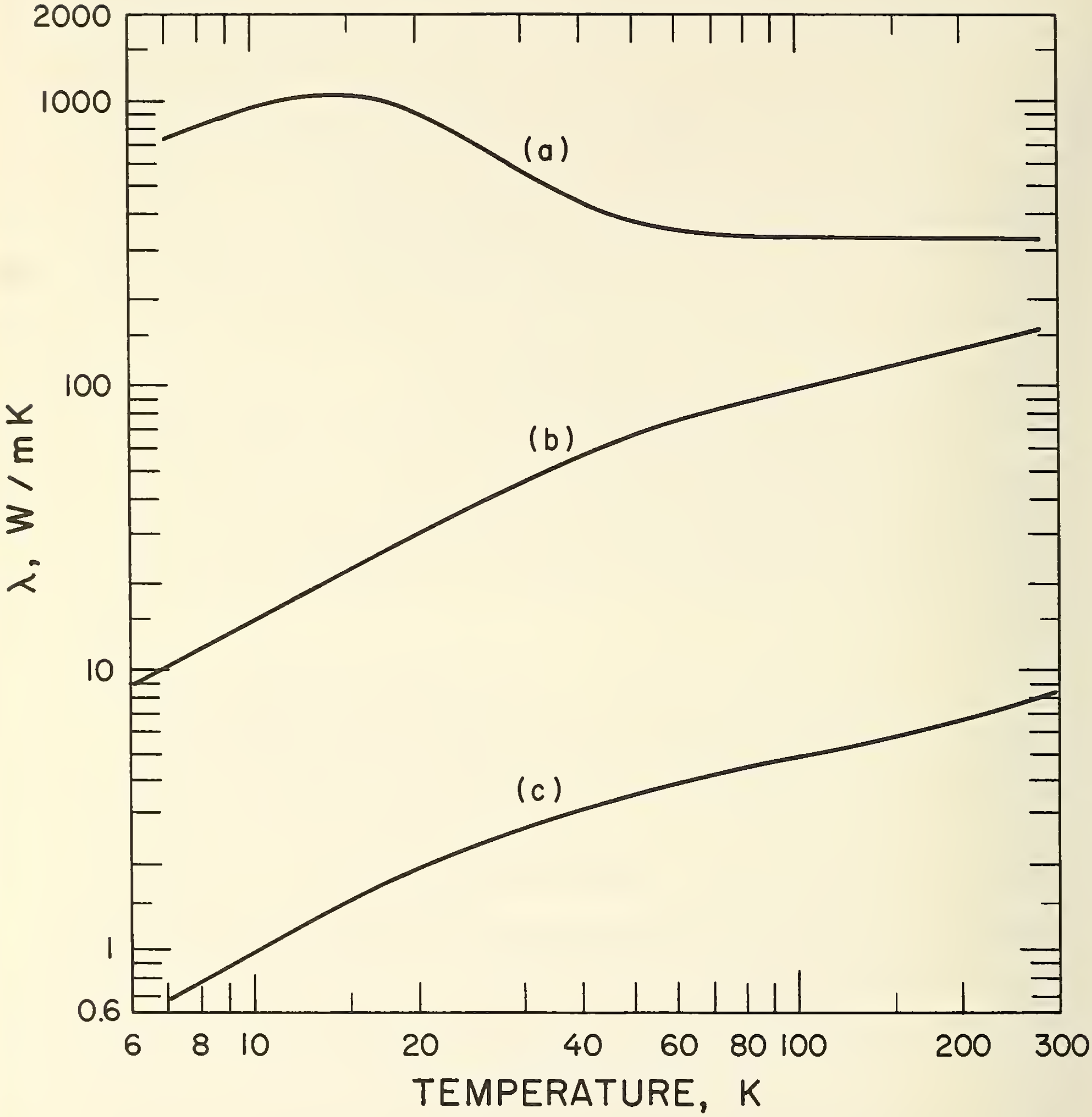

Figure 1. Thermal conductivity of metals and alloys. (a) pure metal (gold), (b) high conductivity alloy (aluminum-7039), and (c) low conductivit alloy (titanium-5Aℓ-2.5 Sn).

the intrinsic resistivity increases rapidly with temperature. The specific temperature dependence varies strongly but systematically both with temperature and material. Nevertheless, ρ_i is not dependent significantly upon small composition changes for a given metal or alloy. Thus, if one knows $\rho_i(T)$ for a given metal, $\rho(T)$ for different compositions can be obtained from eq(2) after measuring only ρ_o. The value of ρ_o is obtained by measuring ρ at low temperatures where ρ_i is negligible (liquid helium temperature is adequate). A few characteristic electrical resistivity curves of pure metals and alloys are given in figure 2.

2.3 Lorenz Ratio

In 1853 Wiedemann and Franz formulated an empirical law relating the thermal and electrical conductivities of metals, namely, that the ratio of the electrical and thermal conductivities (WF ratio) at a given temperature is the same for all metals. In 1872 Lorenz discovered that the WF ratio is proportional to temperature. The result was the Wiedemann-Franz-Lorenz (WFL) law:

$$\frac{\lambda}{\sigma} = \lambda\rho = LT, \tag{3}$$

where σ = electrical conductivity, L = Lorenz number, and T = absolute temperature.

Drude gave a theoretical derivation of the WFL law for the electronic component of thermal conductivity in 1900 and obtained a value of $2.228 \times 10^{-8}\ V^2/K^2$ for L. Sommerfeld calculated the first order approximation of L from the more recent free electron theory of metals. His value, $2.443 \times 10^{-8}\ V^2/K^2$, is commonly designated L_o. Electron Lorenz numbers, $\rho\lambda_e/T$, other than the Sommerfeld value, will be designated L_e to distinguish them from total Lorenz numbers, $L = \rho\lambda/T$.

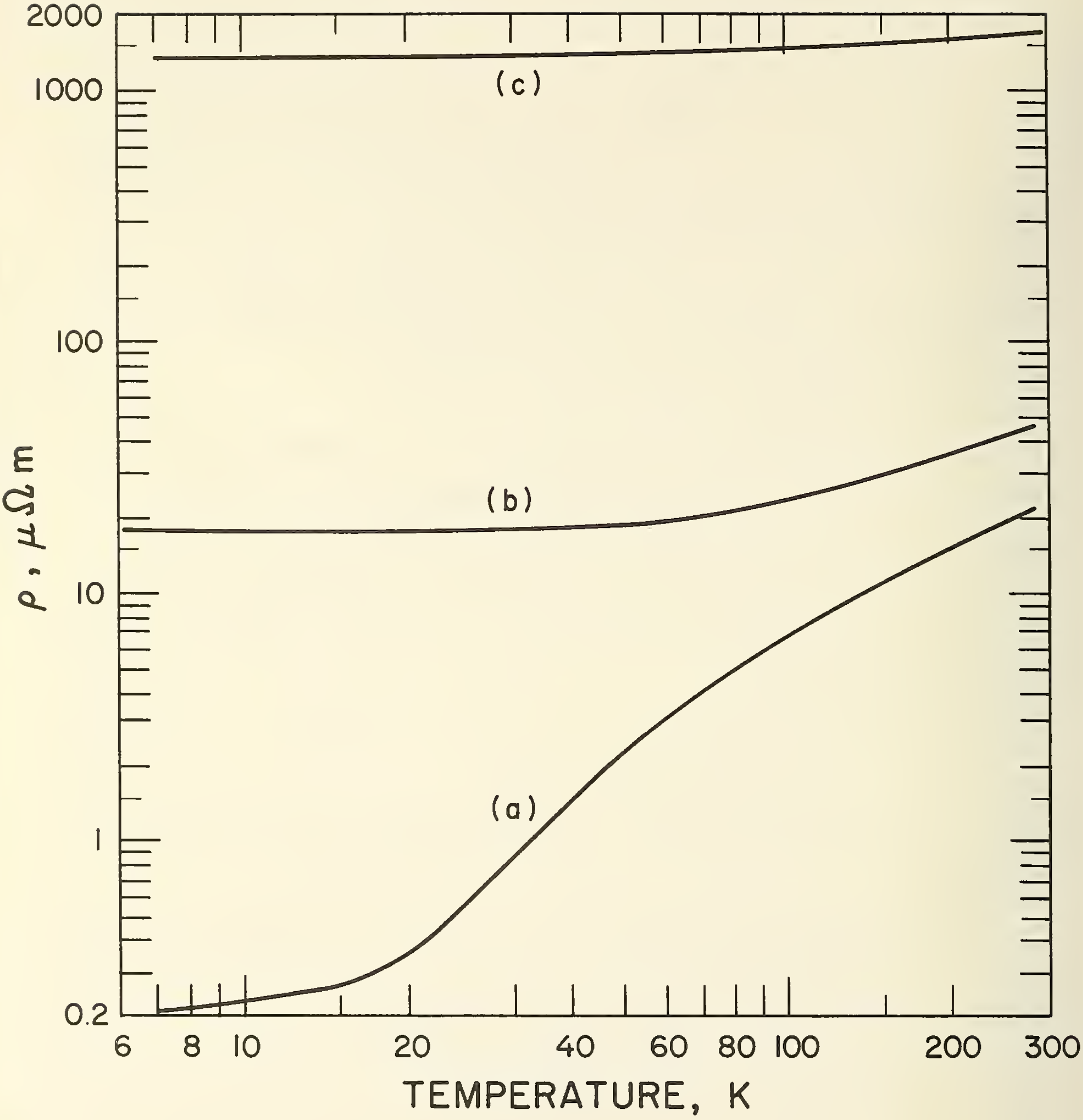

Figure 2. Electrical resistivity of metals and alloys. (a) pure metal (gold), (b) high conductivity alloy (aluminum-7039), and (c) low conductivity alloy (titanium-5Aℓ-2.5 Sn).

For many pure metals the experimentally determined values of L fall between 2.2 and 3.0 × 10^{-8} V^2/K^2 at room temperature and only slightly higher (2 to 3 percent) at 100° C. At very low temperatures the experimental values of L are also near the Sommerfeld value. At intermediate temperatures, values of L below L_o are observed. The magnitude of the decrease of L below L_o increases with increasing purity. The values of L and L_e are nearly identical for pure metals since the lattice conductivity is small.

The decrease of L_e from L_o in pure metals is caused primarily by the fact that the relaxation times for thermal and electrical conduction processes are different at intermediate temperatures. The electrical conductivity increases with decreasing temperature faster than the thermal conductivity. As the residual resistivity decreases, L_e approaches the value for a defect free crystal, thus, resulting in a curve with a lower minimum. The electronic Lorenz ratios of several metals as well as a defect free crystal are shown in figure 3.

For alloys the measured values of Lorenz ratio are always higher than their pure metal counterparts, in some instances considerably higher. However, a similarity still exists in that the L vs T curve tends toward L_o at both extremes of temperature. At intermediate temperatures values of L vary from slightly below L_o for dilute alloys to more than ten times larger than L_o for some highly alloyed structural metals. A few typical curves for alloys are shown in figures 4 and 5. The large values of Lorenz ratio observed for these alloys is caused by the presence of a significant lattice conductivity as mentioned previously. Often, knowledge of the magnitude of the lattice conductivity is so limited that it is ignored in the calculation of L_e for alloys as it is for pure metals. This is incorrect for alloys, of course, but until λ_g is known more accurately, our knowledge of L_e will also be severely limited.

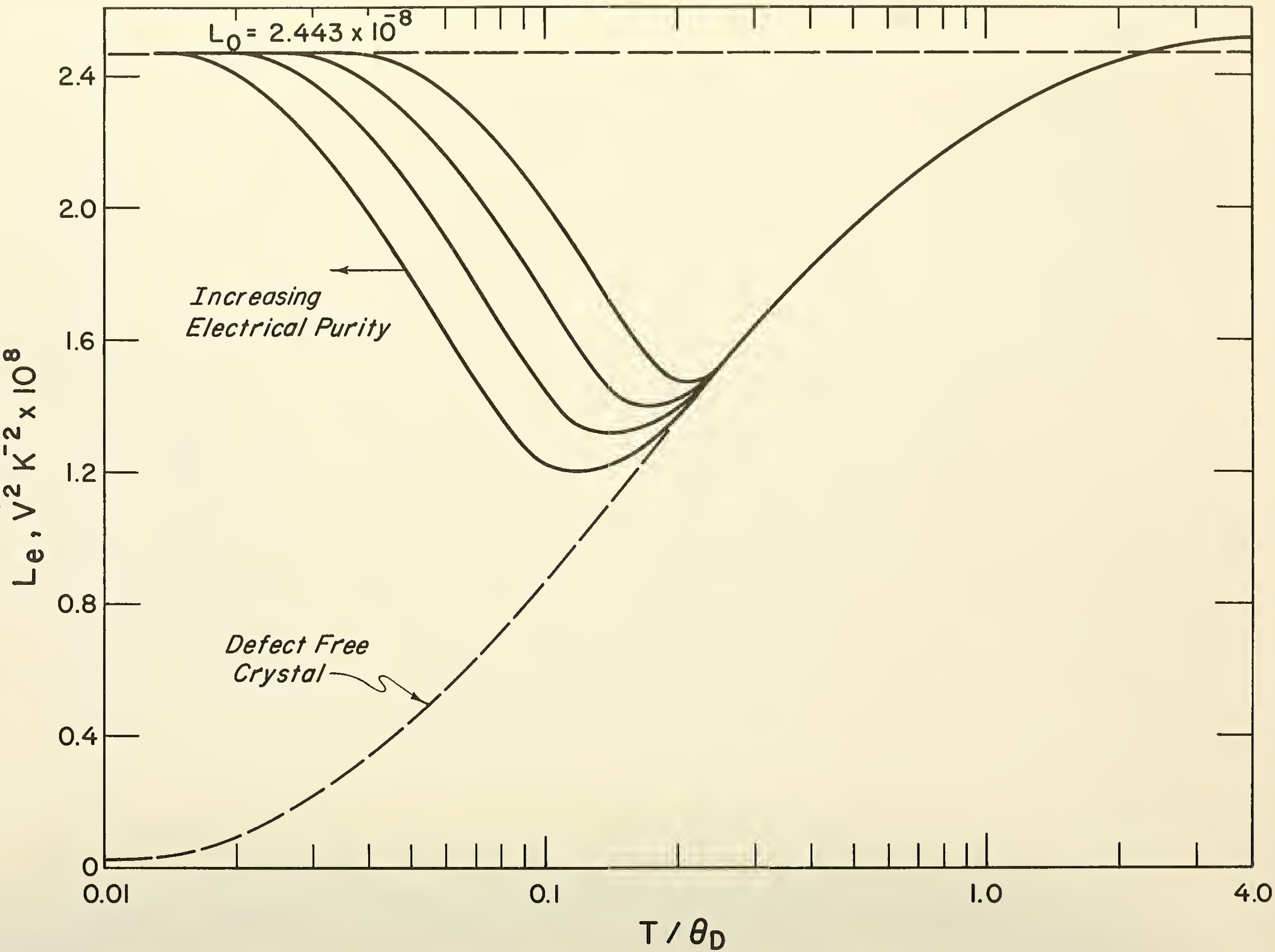

Figure 3. Electronic Lorenz ratio for pure metals and defect free metals.

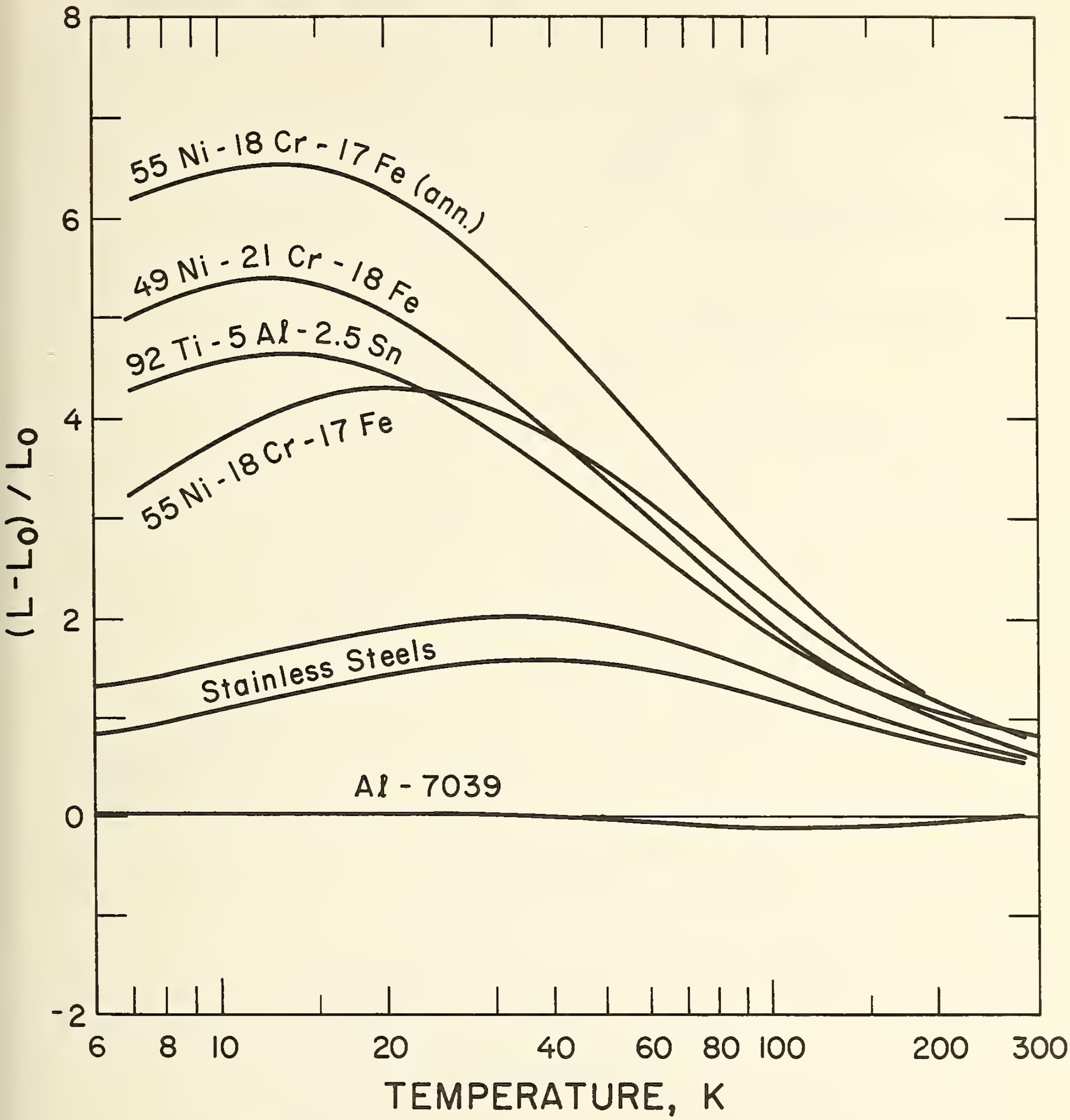

Figure 4. Values of $(L-L_0)/L_0$ for several classes of commonly used materials.

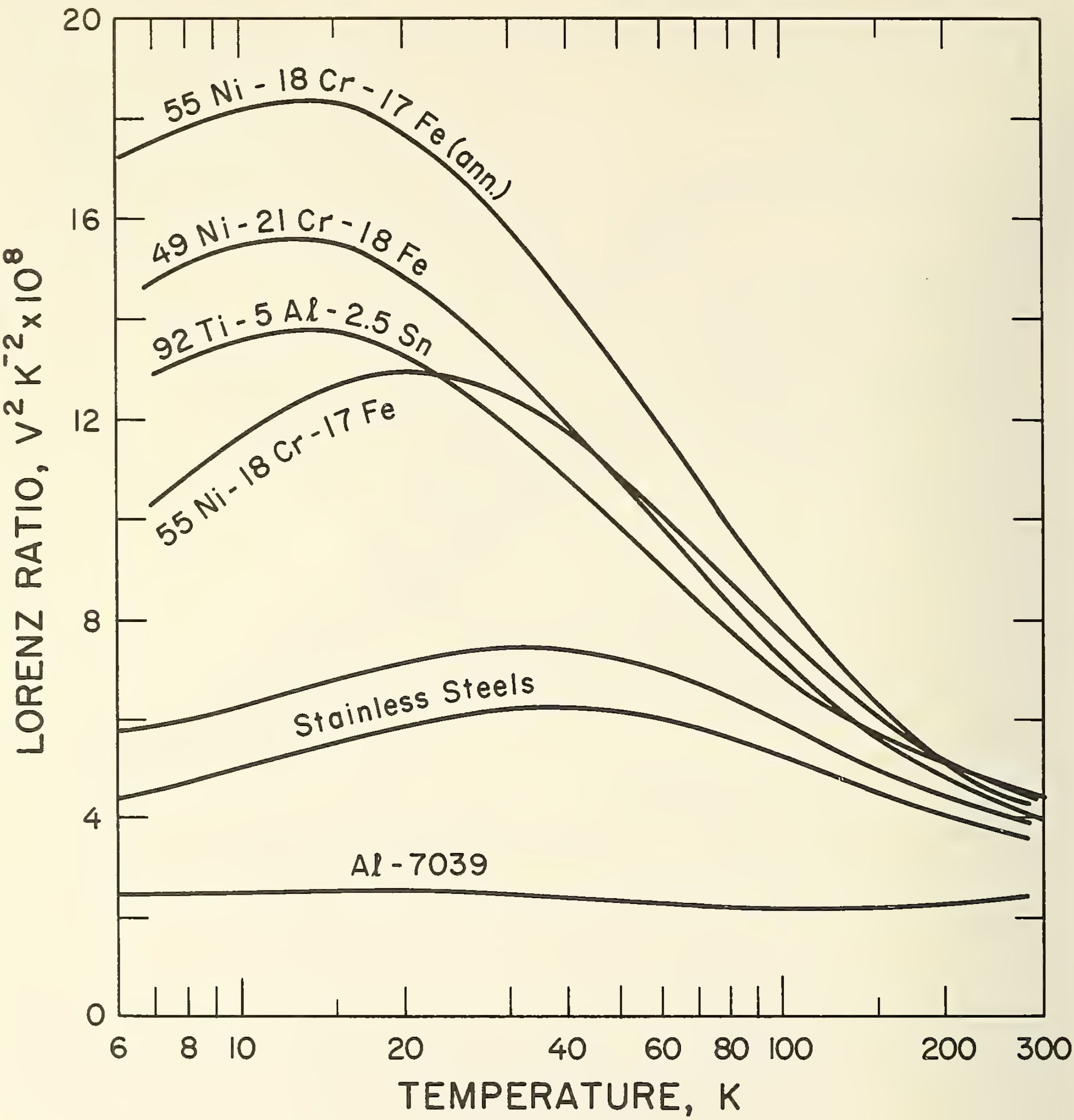

Figure 5. Values of the total Lorenz number for several classes of commonly used materials.

White [2] recently has compiled values of L_e as a function of reduced temperature, T/θ_D, for several metals (θ_D is the Debye temperature). Values of θ_D for selected metals are shown in table 1 [3]. White's L_e data show a variation of only about ±2 percent from the mean values to temperatures as low as $0.2\,\theta_D$. White calculated λ_g from eq (4) below, whose form was proposed by Leibfried and Schlömann [4] among others:

$$\lambda_g = 180\,\alpha A\,\theta_D{}^3/\gamma^3\,T \quad \mathrm{Wm^{-1}\,K^{-1}}\;. \tag{4}$$

In eq (4) α = lattice spacing, A = atomic weight, θ_D = Debye temperature, and γ = the Grüneisen parameter. For monovalent metals, values of λ_g calculated from eq (4) are only about 2 percent of the total experimentally determined conductivity. For the transition elements iron, platinum, and tungsten, λ_g values are about 20 percent of the total.

3. Data

Childs, et al.,[5] of this laboratory have recently made an extensive compilation of thermal conductivities of materials at low temperatures. From their work, publications which contained both electrical and thermal conductivity data for the same materials were identified. These references were searched for data useful to calculate Lorenz ratos and for citations to additional measurements. This search resulted in the reference sources listed in Appendix III. The electrical resistivity and thermal conductivity data from these reference sources were extracted and converted to a common set of units (SI). Lorenz ratios were calculated and are plotted in the figures of Appendix I. The tabular values of electrical resistivity, thermal conductivity, and Lorenz ratios as reported in the literature are given in the right hand columns of Appendix II. The computed values of Lorenz ratio in SI units are given in the left hand columns.

TABLE 1. Debye temperatures of selected common metals [3]

Substance	Debye temperature, θ_D (K)
Aluminum	426
Beryllium	1160
Chromium	610
Copper	344
Gold	165
Iron	464
Lead	96
Magnesium	406
Manganese	476
Molybdenum	440
Nickel	440
Platinum	240
Silver	225
Tantalum	250
Tin	195
Titanium	420
Tungsten	405
Zinc	300

In many instances, data had to be read from small graphs. The error introduced by reading these graphs was sometimes above 10%. This is unfortunate especially in those instances where the uncertainty of the original experimental data was smaller than 10%. In some instances where data are closely spaced, curves were drawn to represent these data. No attempt was made to smooth the data or to present best values. Considerably more work, both experimental and theoretical, must be done before smoothing can be done with confidence.

It is difficult to assess the uncertainty of thermal conductivity data. Probably the best one should expect is about 1% and the worst (except for blunders) is about 50%. Many sources list uncertainties between 5 and 10%. The Lorenz ratios will have comparable uncertainties since the uncertainty in electrical resistivity is generally much smaller. Childs, et al.,[5] made estimates of thermal conductivity uncertainty for each of the references. These estimates are not repeated here.

4. Predictive Procedures

In order to use the Lorenz ratio data presented here in predicting thermal conductivities of new materials one must associate this material with one whose L(T) is already known and measure the electrical resistivity of the new material. Then one may compute

$$\lambda = \frac{LT}{\rho}.$$

It is stressed that obtaining ρ is significantly easier than measuring λ. The association of one material with another may be done primarily from a knowledge of its composition but also from other characterization parameters such as electrical resistivity, hardness, density, or crystalline structure. The thermal and mechanical histories of the specimen are important as well.

In the event that no similar material has been measured, generally less accurate techniques of prediction may be considered. For purposes of prediction, divide materials into the following classes:

(1) pure metals,

(2) high conductivity alloys,

(3) low conductivity alloys,

and consider temperatures in three ranges:

(a) $T > \theta_D$,

(b) $T < \theta_D$,

(c) $T \ll \theta_D$.

We will consider pure metals first. At temperatures above θ_D or much less than θ_D (say 0.01 θ_D), one can make reasonable estimates of thermal conductivity of pure metals by calculating λ_e as $L_o T/\rho$. The lattice conductivity, λ_g, is computed from eq (4) and the total conductivity λ, from eq (1). The contribution of the lattice conductivity for pure metals is usually negligible. The electrical resistivity, $\rho(T)$, can often be obtained directly from the literature [6, 7] or from a measurement of ρ_o and values of $\rho_i(T)$, also found in the literature. At temperatures from about 0.2 θ_D to θ_D, L and L_e are temperature dependent but not appreciably dependent on purity. Thus, one can use the L_e curve obtained by White [2], shown in figure 3, to calculate λ_e from $L_e T/\rho$. Between 0.01 θ_D and 0.2 θ_D, the electronic and total Lorenz numbers are dependent on purity and temperature. No correlation between L and purity has been mathematically formulated, although it is clear that one exists. It is noted that at temperatures above about 0.2 θ_D, the thermal conductivity of pure metals is not strongly dependent upon the chemical or physical condition of the metal. Thus, if accurate conductivity values have been obtained for a pure metal, these values above 0.2 θ_D are applicable to other specimens to within about 10%.

Next we will consider high conductivity alloys. High conductivity alloys are generally dilute alloys but may also be the result of alloying similar elements. Ordered alloys also have high conductivities. The values of L for high conductivity alloys are generally near L_o at all temperatures. Thus, a first approximation of thermal conductivity can be obtained from L_oT/ρ.

Last we will consider the low conductivity alloys. Generally, these are highly alloyed structural alloys. Prediction of the thermal conductivity is most difficult at temperatures $T \leq \theta_D$ in the low conductivity alloys. Here the lattice conductivity is comparable to and sometimes much larger than the electron conductivity. If a comparable alloy has not been measured, it is probably impossible to predict a reasonable accurate value of λ for this case. We presently are engaged in a program to improve the predictive capabilities for such alloys. It appears reasonably obvious that to do this one must be able to calculate the electron component from the electrical resistivity and the lattice component by some other means. The lattice component probably will be obtained from a modified form of eq (4), but additional research will be required before a more accurate equation is found and its limitations are understood. At temperatures above θ_D, one can obtain a first approximation of thermal conductivity, usually on the low side, from L_oT/ρ. The above methods of prediction are summarized as follows:

	Pure Metals	High Conductivity Alloys	Low Conductivity Alloys
$T \ll \theta_D$	$\lambda \approx L_o T/\rho$	$\lambda \approx L_o T/\rho$	No Valid Predicting Method Known
$T < \theta_D$	$\lambda \approx L_e T/\rho$ for $0.2\ \theta_D < T < \theta_D$ L_e from White [2] ------------------- Predictions difficult for $0.01\theta_D < T < 0.2\ \theta_D$	$\lambda \approx L_o T/\rho$	
$T > \theta_D$	$\lambda \approx L_o T/\rho$	$\lambda \approx L_o T/\rho$	$\lambda \approx L_o T/\rho_o$

5. Further Work

It is seen from this compilation that the Lorenz ratios of pure metals are near the Sommerfeld value, $L_o = 2.443 \times 10^{-8}\ V^{-2}/K^2$, at low temperatures (residual region), fall to lower values at intermediate cryogenic temperatures, and increase again to near L_o at high temperatures. At intermediate temperatures a dependence on impurity concentration is observed. For alloys one obtains the expected increase in Lorenz ratio at intermediate temperatures instead of a dip as for the pure metals. This increase in L is evidence of a relatively large lattice conductivity. Somewhat challenging from a predictive standpoint is the large spread in Lorenz ratios for the given classes of materials at each temperature. This large spread will result in large uncertainties in predicted thermal conductivities based on these curves. Further subdivision of materials may be necessary to achieve a sufficiently small spread to be useful.

The objective of this Lorenz ratio compilation is to separate materials into classes based on similar Lorenz ratio curves. From these curves and a knowledge of the electrical resistivity of a new material from that class, it is often possible to approximate the thermal conductivity of the new material. This compilation has revealed some other interesting possibilities for prediction of thermal conductivities. For example, in several instances data exist in the literature which will allow computation of the specific thermal resistivity resulting from controlled addition of impurity atoms in a given host material. It has been noted that some impurities are much more effective scatterers than others. From a table of specific thermal resistivities, similar to that compiled by Blatt [8] for electrical resistivity, one may be able to accurately predict the electronic thermal conductivity of metals and alloys. Of the huge number of host-impurity element combinations which exist, only a few have been measured. However, there is a good possibility that one can construct such a table from a knowledge of L(T) for pure metals and Blatt's specific electrical resistivities. The measurements which have been compiled here and by Childs, et al., [5] can be used to check the accuracy of such calculations. The available data will also be useful in examining lattice conductivity.

6. Acknowledgments

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7. References

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APPENDIX I - FIGURES
AND
DATA REVIEW TABLES

The use in this paper of trade names is essential to a proper understanding of the work presented. Their use in no way implies any approval, endorsement, or recommendation by NBS.

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Beryllium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
HWP	Hust, Weitzel, and Powell (1971)	Be (98.7), Be O (1.18), Al (0.044), Ni (0.014), Mn (0.009)	Neutron irradiated and room temperature annealed, RRR = 3.88, Rockwell hardness = C-12, Grain size = 0.03 mm, axis of specimen is perpendicular to Pressing axis, uncertainty = 2.5%
L	Lewis (1929)	Beryllium Company of America Be (99.5) Commercially Pure	Annealed at 700°C, RRR = 4
PHG (‖)	Powell, Harden, and Gibson (1960)	Los Alamos Scientific Laboratory Be (98.7), Be O (1.2), Al (0.056), Si (0.035), Ni (0.016), Mn (0.010)	RRR = 6.01, Uncertainty = 6%, axis of specimen parallel to pressing axis
PHG (⊥)	Powell, Harden, and Gibson (1960)	Los Alamos Scientific Laboratory Be (98.7), Be O (1.18), Al (0.044), Ni (0.014), Mn (0.009)	RRR = 4.22, Same specimen used by Hust, Weitzel, and Powell (1971)
WW (1)	White and Woods (1955)	Beryllium Brush Company Be, Mg (0.2)	RRR = 4, Data taken from small graph
WW (2)	White and Woods (1955)	A.D. MacKay (Spectrographic) Be, Mg (0.1), trace of iron	RRR = 4, Data taken from small graph

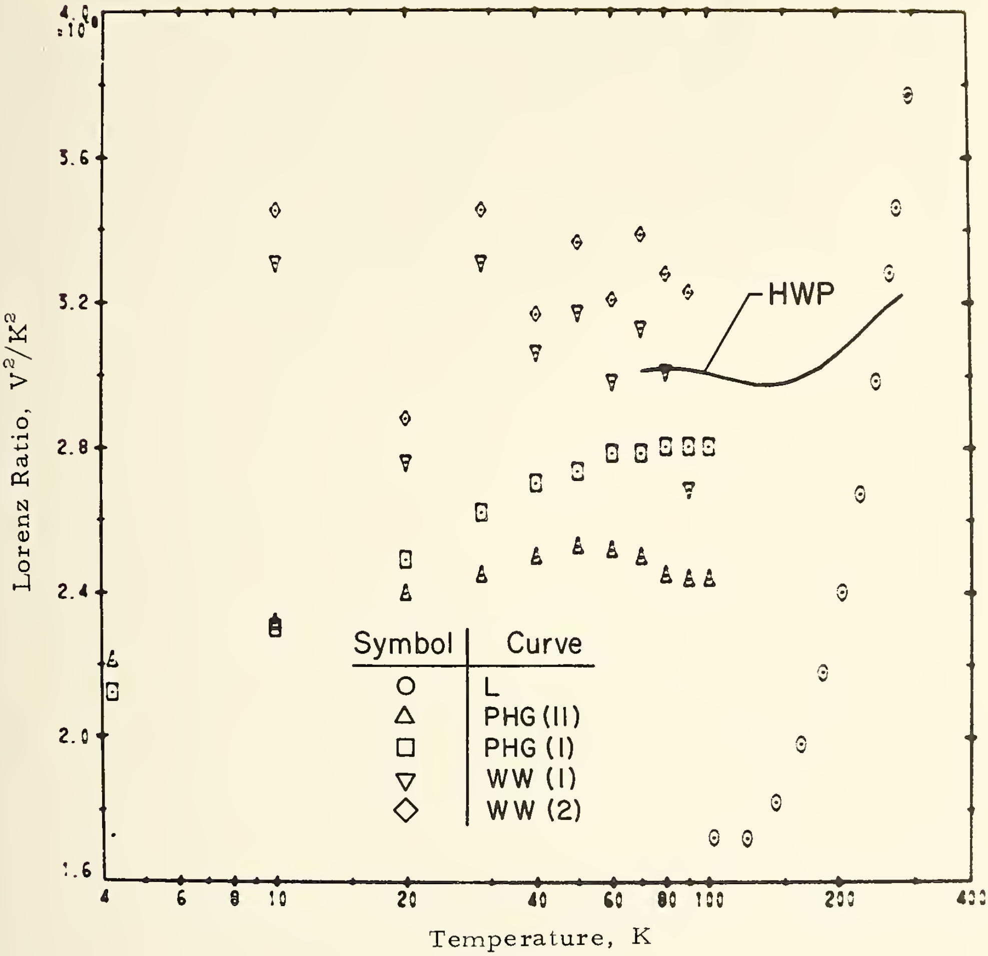

Figure 1. Lorenz ratio of beryllium

Magnesium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Alers, Spohr, and Webber (1955)	Mg, Mn (0.04)	$L = 2.64 \times 10^{-8}\ V^2 / K^2$ from 1.4 to 5 K
	Staebler (1929), Same data in Mannchen (1931)	Mg, Si (0.7)	$L = 1.12 \times 10^{-8}\ V^2 / K^2$ at 87 K
			$L = 2.88\ 10^{-8}\ V^2 / K^2$ at 273 K
		Mg, Mn (0.8)	$L = 2.18\ 10^{-8}\ V^2 / K^2$ at 87 K
			$L = 3.24\ 10^{-8}\ V^2 / K^2$ at 273 K
		Mg, Mn (0.5)	$L = 1.64\ 10^{-8}\ V^2 / K^2$ at 87 K
			$L = 3.08\ 10^{-8}\ V^2 / K^2$ at 273 K

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
AMS	Amundsen, Myhre, and Salter (1972)	Pure single crystal of Aluminum, Zone refined	RRR = 210, uncertainty = 2%
AMS	Amundsen, Myhre, and Salter (1972)	Pure single crystal of Aluminum, Zone refined	RRR = 2250, uncertainty = 2%
AMS	Amundsen, Myhre, and Salter (1972)	Pure single crystal of Aluminum, Zone refined	RRR = 3490, uncertainty = 2%
	Andrews, Webber, and Spohr (1951)	Aluminum Company of America Al (99.996), Mg (0.001), Si (0.001), Fe (0.0004), Cu (0.0004), Na (0.0004) single crystal	RRR = 840, uncertainty = 2% L = 2.21 x 10^{-8} V^2/K^2 at 4.2 K L = 1.55 x 10^{-8} V^2/K^2 at 14.5K
AWS	Andrews, Webber, and Spohr (1951)	Aluminum Company of America Al (99.996), Mg (0.001), Si (0.001), Fe (0.0004), Cu (0.0004), Na (0.0004) single crystal	RRR = 676, uncertainty = 2%
AWS	Andrews, Webber, and Spohr (1951)	Johnson and Matthey Al (99.995), Mg (0.002), Si (<0.001), Fe (<0.0005), Cu (<0.0005), Na (Faint trace) polycrystal	RRR = 476, uncertainty = 2%
FRW	Fenton, Rogers, and Woods (1963)	Consolidated Mining and Smelting Company Al (99.99999)	Acid etched, 550°C in air for 10 minutes RRR = 2770, uncertainty = 1.5% Data read from small graph
FRW	Fenton, Rogers, and Woods (1963)	Consolidated Mining and Smelting Company Al (99.99999)	Acid etched, 555°C in air for 10 minutes RRR = 4375, uncertainty = 1.5% Data read from small graph
	Gruneisen and Goens (1927)	Recrystalized Aluminum (Specimen 3)	L = 1.57 x 10^{-8} V^2/K^2 at 21.2 K L = 1.52 x 10^{-8} V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Aluminum, 2.5 Hours at 300°C in vacuum, Specimen 1	L = 1.77 x 10^{-8} V^2/K^2 at 21.2 K L = 1.27 x 10^{-8} V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Aluminum, 250±C in vacuum, specimen AL100	L = 2.18 x 10^{-8} V^2/K^2 at 21.2 K L = 1.47 x 10^{-8} V^2/K^2 at 83.2K
	Gruneisen and Goens (1927)	Aluminum, specimen 101	L = 2.20 x 10^{-8} V^2/K^2 at 21.2 K L = 1.55 x 10^{-8} V^2/K^2 at 83.2 K

Aluminum (Cont.)

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Gruneisen and Goens (1927)	Aluminum, specimen 21	$L = 2.20 \times 10^{-8}\ V^2/K^2$ at 21.2 K $L = 1.66 \times 10^{-8}\ V^2/K^2$ at 83.2 K
L	Lees (1908)	Johnson and Matthey Company Al (99)	Density = 2.70 g/cm^3 at 20°C
MMB	Moore, McElroy, and Barsoni (1966)	Reynolds Aluminum Company Al (99.999)	RRR = 520, uncertainty = 2%
PHR (sc)	Powell, Hall, and Roder (1960)	Johnson - Matthey Company Al (99.995) single crystal	2 hours at 400°C in vacuum,(001) 6° from axis of rod. RRR = 100
PHR (1100-0)	Powell, Hall, and Roder (1960)	Aluminum Company of America Al (commercial purity 1100-0); Si (0.13);Cu, Ga, Fe, Mg, V (0.1); Cr (0.02); Pb, Mn, Sn, Ti (0.01); Ca, Zr (0.001)	1 hour at 350°C in vacuum, RRR = 12, Hardness (DPH) = 22, grain size = 0.024 x 0.008 mm (long.), grain size = 0.012 mm (trans.)
PTW	Powell,Tye, and Woodman (1965)	Al (99.993)	
	Staebler (1929)	Aluminum	$L = 2.075 \times 10^{-8}\ V^2/K^2$ at 89 K $L = 2.233 \times 10^{-8}\ V^2/K^2$ at 273 K
	Wilkes and Powell (1968)	Advanced Research Materials Al (99.9999), Cu (0.5 PPM), Si (0.5 PPM), Mg (0.1 PPM)	As received Density = 2.698 g/cm^3 at 23°C Data read from a small graph

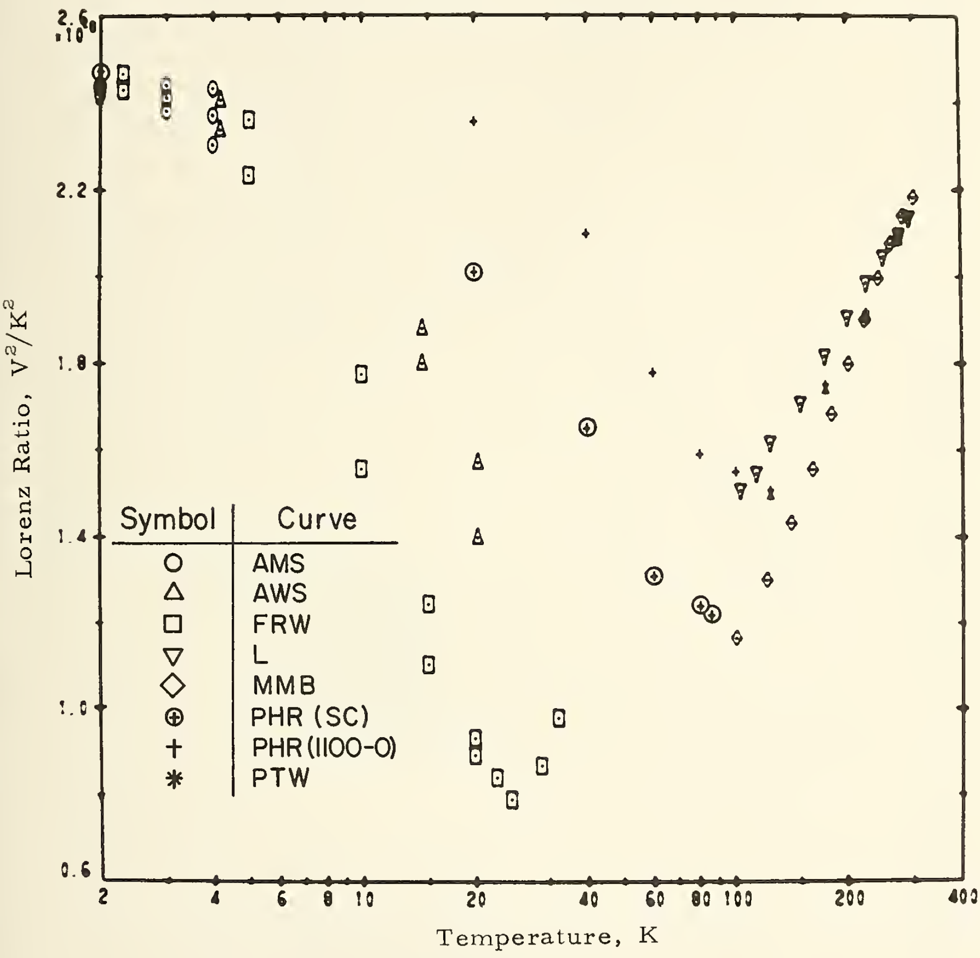

Figure 2. Lorenz ratio of aluminum

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
RS (T86)	Hust and Sparks (1971c)	Al 2024 Cu (4.1), Mg (1.4), Mn (0.5), Fe (0.2), Si (0.1), Zn (0.1), Al (bal.)	T86 heat condition, RRR = 2.6, Density = 2.768 g/cm^3, grain size = 0.025mm Rockwell hardness = B83
HS (Ann.)	Hust and Sparks (1971c)	Al 2024 Cu (4.1), Mg (1.4), Mn (0.5), Fe (0.2), Si (0.1), Zn (0.1), Al (bal.)	full anneal condition, in vacuum, 1 hour at 427°C, 6 hours at 232°C, grain size = 0.035 mm, Rockwell hardness = B26, Density = 2.768 g/cm^3
HWP	Hust, Weitzel, and Powell (1971) Hust and Powell (1968) Hust, Powell, and Weitzel (1969)	Al 7039 Al (93), Zn(3.6), Mg(2.55), Mn (0.23), Cr(0.20); Fe,Cu, Si, Ti, Be (<0.1)	RRR = 2.6, Rockwell hardness = B75, grain size = 0.005 x 0.05 mm uncertainty = 2%
PHR (6063)	Powell, Hall, and Roder (1960)	Al 6063 - T5 Al (98.8), Mg (0.65), Si (0.38); Ga, Fe, Mn (0.1); Cr, Cu, Ti, V, Zn (0.01); Ca, Pb (0.001)	RRR = 10, DP hardness = 30, grain size = 0.05 mm
PHR (5154)	Powell, Hall, and Roder (1960)	Al 5154 - O Al (96), Mg (3.32), Cr (0.21); Cu, Fe, Mn, Si (0.1); Ti, V, Zn, Zr (0.01); Ca, Pb (0.001)	RRR = 2.5, DP Hardness = 35, grain size = 0.034
PHR (5086)	Powell, Hall, and Roder (1960)	Al 5086 - F Al (95), Mg (4.10), Mn (0.51), Fe (0.28); Cr, Si, Zn (0.1); Cu (0.07), Ti (0.02)	RRR = 1.8, DP Hardness = 22, grain size = 0.07 x 0.02 mm
PHR (5052)	Powell, Hall, and Roder (1960)	Al 5052 - O Al (97), Mg (2.46), Cr (0.22); Cu, Ga, Fe, Mn, Si, Zn (0.1); Ti, V (0.01); A, Zr (0.001)	RRR = 2.5, DP Hardness = 28, grain size = 0.03 mm
PHR (2024)	Powell, Hall, and Roder (1960)	Al 2024 - T4 Al, Cu(4.58), Mg(1.70); Ga, Fe, Mn, Si, V, Zn(0.1); Cr(0.05); Sn, Ti(0.01); Ca, Ag, Zr(0.001)	RRR = 1.9, DP Hardness = 66, grain size = 0.06 mm

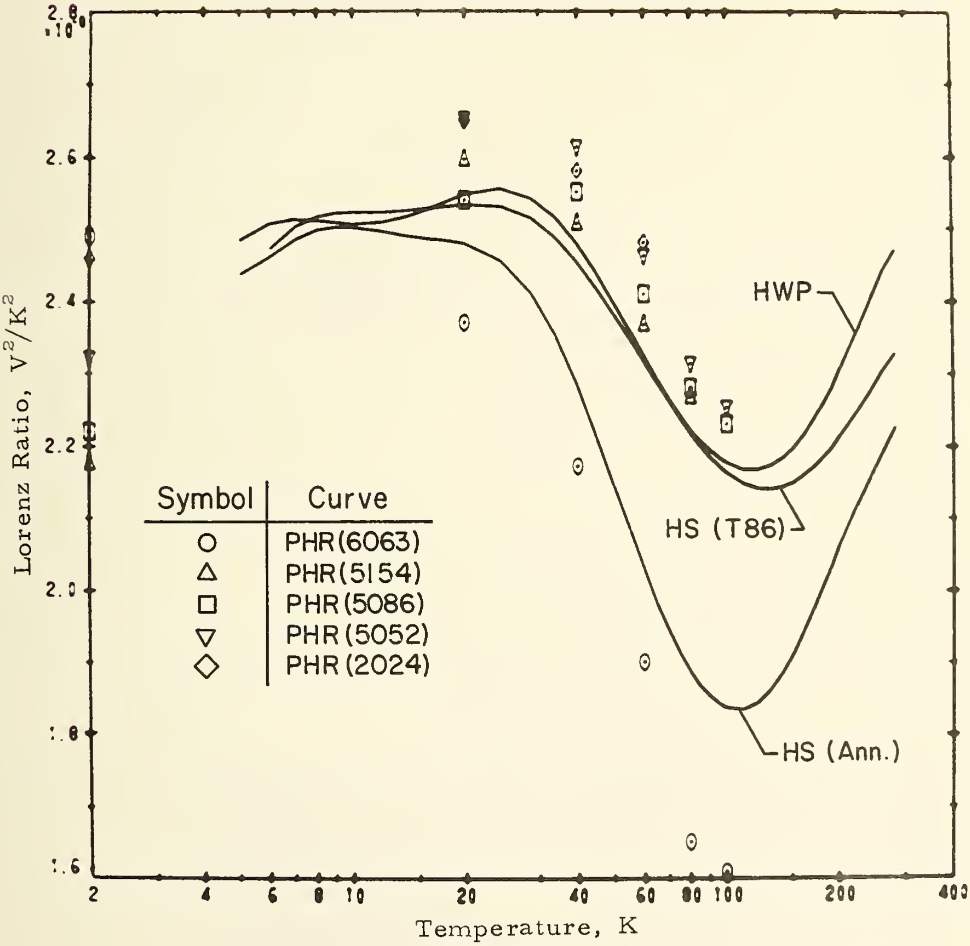

Figure 3. Lorenz ratio of aluminum alloys

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
L (Pb)	Lees (1908)	Baxendale Pure Pb	Density = 11.29 $g \cdot cm^3$ at 25°C
L (Sn)	Lees (1908)	Kahlbaum Pure Sn	Density = 7.28 g/cm^3 at 21°C

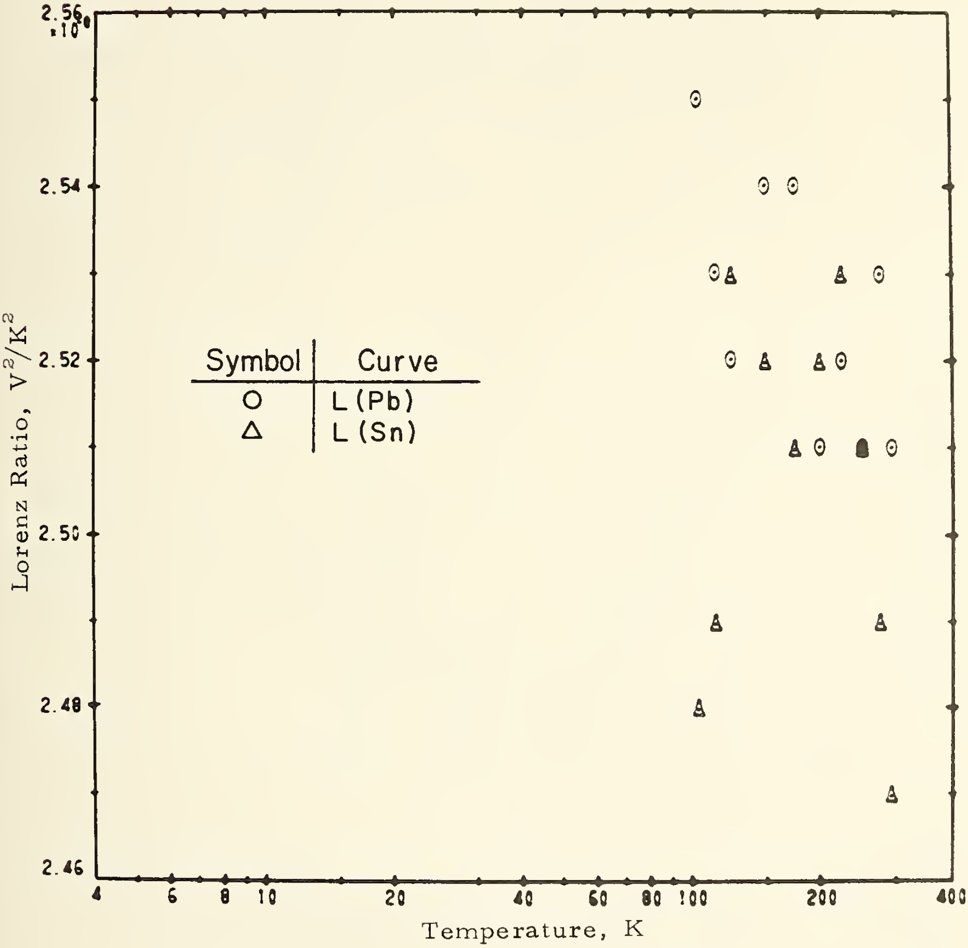

Figure 4. Lorenz ratio of lead and tin

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
	Gruneisen and Goens (1927)	Au, ingle crystal, very pure, nbeaten, V. Mylus	$L = 1.05 \times 10^{-8}$ V^2/K^2 at 21.2 K $L = 1.95 \times 10^{-8}$ V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Au, single crystal, very pure, unbeaten, Dieselbe	$L = 1.16 \times 10^{-8}$ V^2/K^2 at 21.2 K $L = 1.99 \times 10^{-8}$ V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Au, single crystal, Dieselbe, 5.5 hours at 380°C	$L = 1.08 \times 10^{-8}$ V^2/K^2 at 21.2 K $L = 1.95 \times 10^{-8}$ V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Au, technically pure, untempered, Silberscheiddeanstalt	$L = 1.95 \times 10^{-8}$ V^2/K^2 at 21.2 K $L = 2.09 \times 10^{-8}$ V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Au, technically pure, Dieselbe, 3 hours at 390°C	$L = 1.85 \times 10^{-8}$ V^2/K^2 at 21.2 K $L = 2.05 \times 10^{-8}$ V^2/K^2 at 83.2 K
	Gruneisen and Goens (1927)	Au, untempered, very unpure, Dieselbe	$L = 3.06 \times 10^{-8}$ V^2/K^2 at 21.2 K $L = 2.60 \times 10^{-8}$ V^2/K^2 at 83.2 K
HS (1)	Hust and Sparks (1971)	AGARD, Au (99.999) Swaged and unannealed (20% reduction in area)	Density = 19.28 g/cm^3, DP Hardness = 58, grain size = 0.004 mm, RRR = 98
HS (2)	Hust and Sparks (1971)	Same specimen after 72% reduction in area	Density and DP Hardness are the same, grain size = 0.009 mm, RRR = 57
HS (3)	Hust and Sparks (1971)	Same specimen annealed for 2 hours at 400°C in a vacuum	Density = 19.28 g/cm^3, DP Hardness = 29, grain size = 0.013 mm, RRR = 289
	Kannuluik (1931)	Heraeus Au (99.99)	Uncertainty = 5% $L = 2.39 \times 10^{-8}$ V^2/K^2 at 273 K

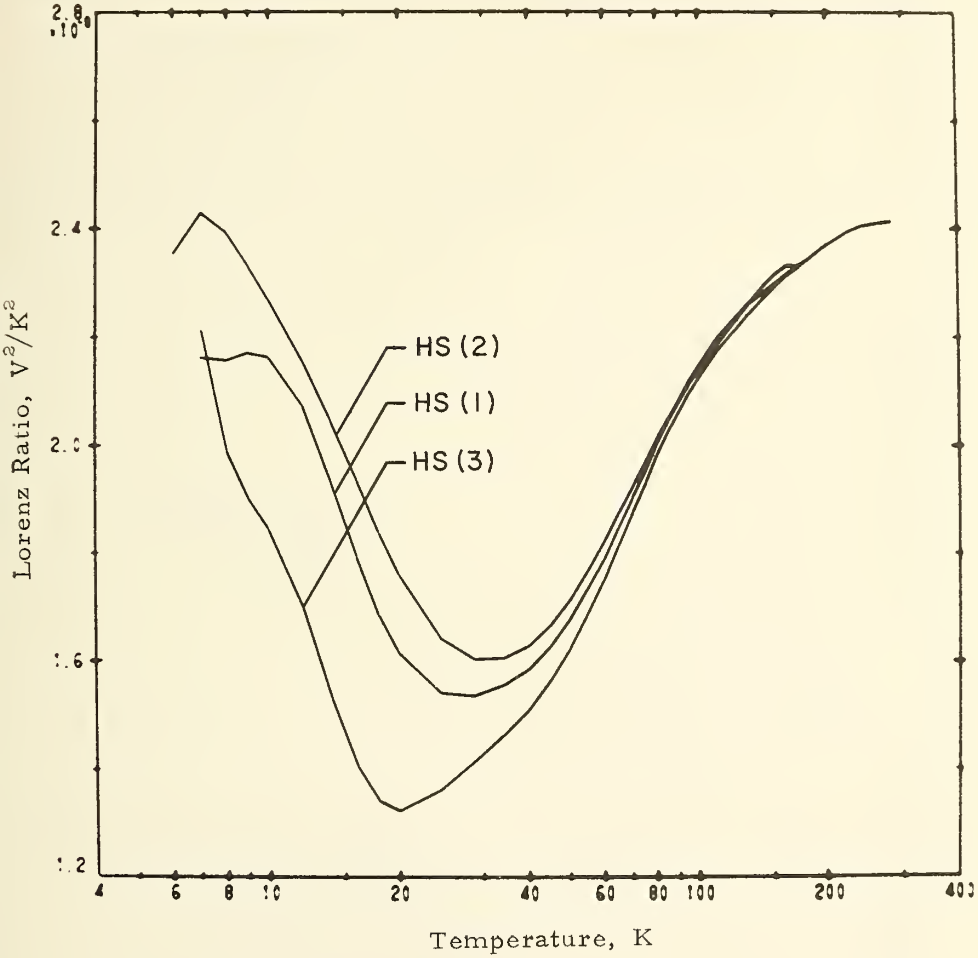

Figure 5. Lorenz ratio of gold

Gold Cobalt Alloy

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
PBG	Powell, Bunch, and Gibson (1960)	Sigmund Cohn Corporation Hard drawn Au—2.1% Co thermocouple wire	

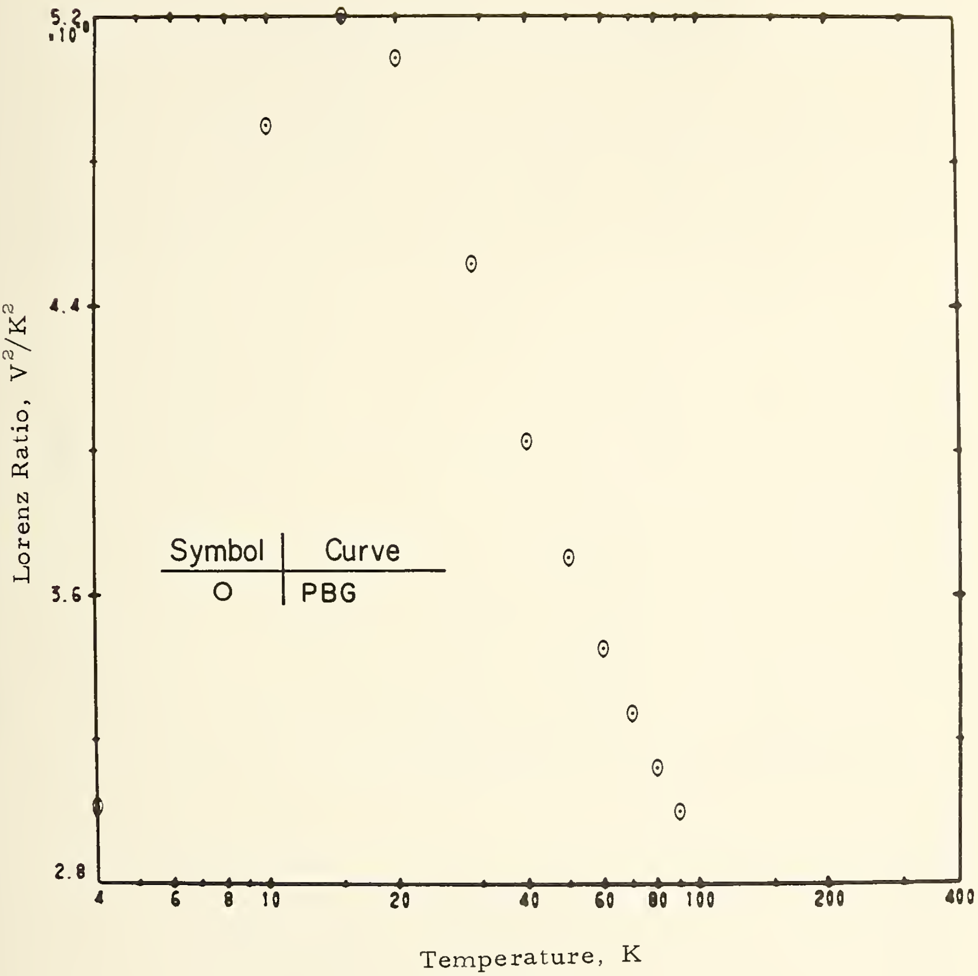

Figure 6. Lorenz ratio of gold-cobalt alloy

Silver

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
FRW (1)	Fenton, Rogers, and Wood (1963)	Engelhard Pure Ag (specimen 1)	3 hours at 850°C in vacuum, RRR = 1800
FRW (2)	Fenton, Rogers, and Woods (1963)	Engelhard Pure Ag (specimen 2)	3 hours at 850°C in vacuum, RRR = 2200
K (1)	Kannuluik (1933)	Hilger, Ltd. Ag	Drawn
K (2)	Kannuluik (1933)	Ag	same specimen with 500°C anneal
	Kannuluik (1931)	Ag (Commercially Pure, electrolytic)	L = 2.32×10^{-8} V^2/K^2 at 273 K
	Kannuluik (1931)	Ag (Spectrographic purity - contaminated)	L = 2.41×10^{-8} V^2/K^2 at 273 K
L	Lees (1908)	Johnson - Matthey Company Ag (99.9)	Density = 10.47 at 21°C
MW	Malm and Woods (1966)	Consolidated Mining and Smelting Company of Canada Ag (99.999) Johnson - Matthey Company Mg (99.9999)	4 hours at 750°C in vacuum, RRR = 1030
MW	Malm and Woods (1966)	Ag + Mg (0.005)	4 hours at 750°C in vacuum
MW	Malm and Woods (1966)	Ag + Mg (0.067)	4 hours at 750°C in vacuum
MW	Malm and Woods (1966)	Ag + Mg (0.11)	4 hours at 750°C in vacuum
MW	Malm and Woods (1966)	Ag + Mg (0.31)	4 hours at 750°C in vacuum

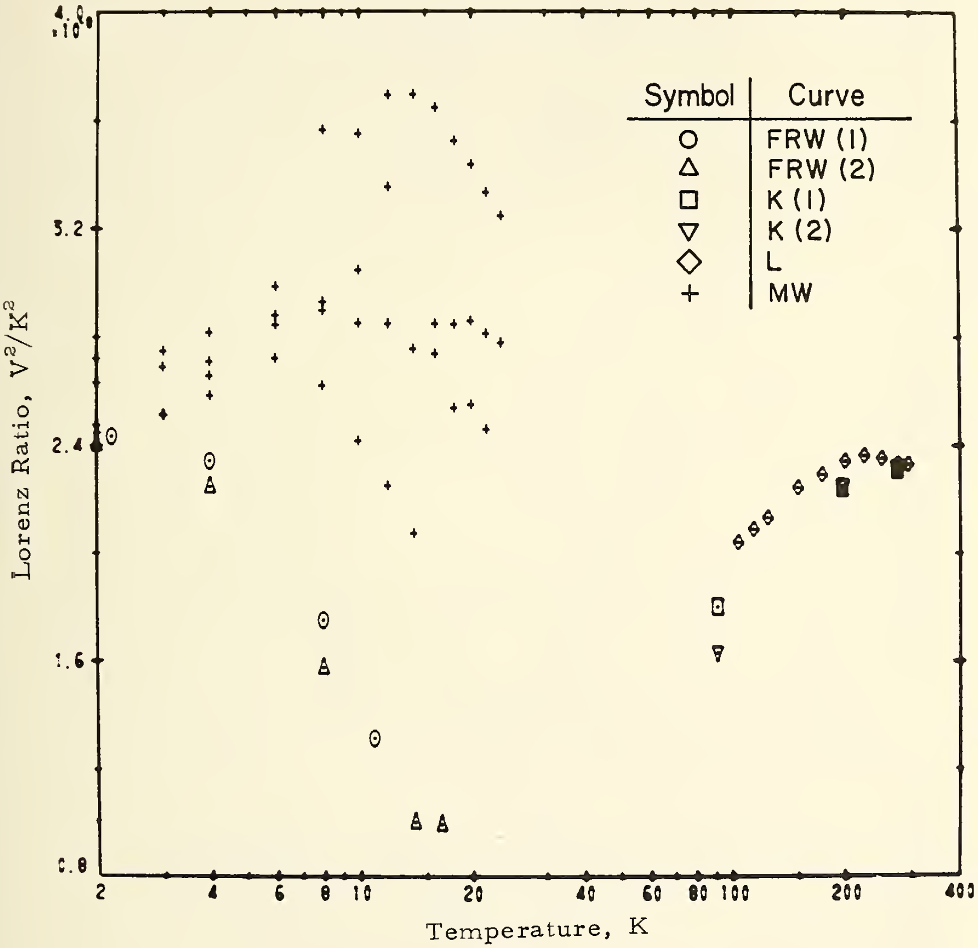

Figure 7. Lorenz ratio of silver

Copper

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Allen and Mendoza (1947)	Johnson - Matthey Company Cu (99.99); Ag, Ni, Pb (0.003)	L = 3.3×10^{-8} V^2/K^2 from 2 to 4 K
	Aoyama (1940)	Electrolytic Cu	L = 1.649×10^{-8} V^2/K^2 at 87.15 K
	Gruneisen and Goens (1927)	Cu	An extensive series of coppers in various states of anneal and chemical imperfection was measured at 21.2 K and 83.2 K. Values of L varied from 0.77×10^{-8} to 2.03×10^{-8} V^2/K^2 at 21.2 K and from 1.56×10^{-8} to 1.62×10^{-8} V^2/K^2 at 83.2 K
	Kemp, Klemens, and Tainsh (1959b)	Cu (99.55) , As (0.35), P (0.05) Specimen 0	Prolonged anneal at 450°C, RRR = 1.6 L = 3.23×10^{-8} V^2/K^2 at 4.2 K L = 3.16×10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1959b)	Cu (99.55), As (0.35), P (0.05) Specimen 1	same as specimen 0 but deformed, RRR = 1.6 L = 2.32×10^{-8} V^2/K^2 at 4.2 K L = 2.97×10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1959b)	Cu (99.55), As (0.35), P (0.05) Specimen 4	same as 1 but reannealed at 450°C, RRR = 1.6 L = 2.64×10^{-8} V^2/K^2 at 4.2 K L = 3.20×10^{-8} V^2/K^2 at 90 K
L	Lees (1908)	Soft drawn high conductivity Cu	Density = 8.84 g/cm^3 at 23 °C
MMG	Moore, McElroy, and Graves (1967)	National Research Council, Ottawa Cu (99.999)	RRR = 900, DP Hardness = 40, grain size = 0.574 mm, uncertainty = 2%
PRH (CD)	Powell, Roder, and Rall (1959)	Central Research Laboratory of American Smelting and Refining Company Cu (99.999)	Cold drawn for 26% reduction in area - no post anneal RRR = 100, uncertainty = 2%
PRH (Ann)	Powell, Roder, and Rall (1959)	Central Research Laboratory of American Smelting and Refining Company Cu (99.999)	Annealed for 2 hours at 400°C in vacuum, RRR = 1530, uncertainty = 2%
WT	White, and Tainsh (1960)	American Smelting and Refining Company Cu (99.999), Fe (1 ppm), Sb (1ppm), Se (1ppm), Te (2ppm), As(2ppm).	Several hours at 530°C RRR = 2000

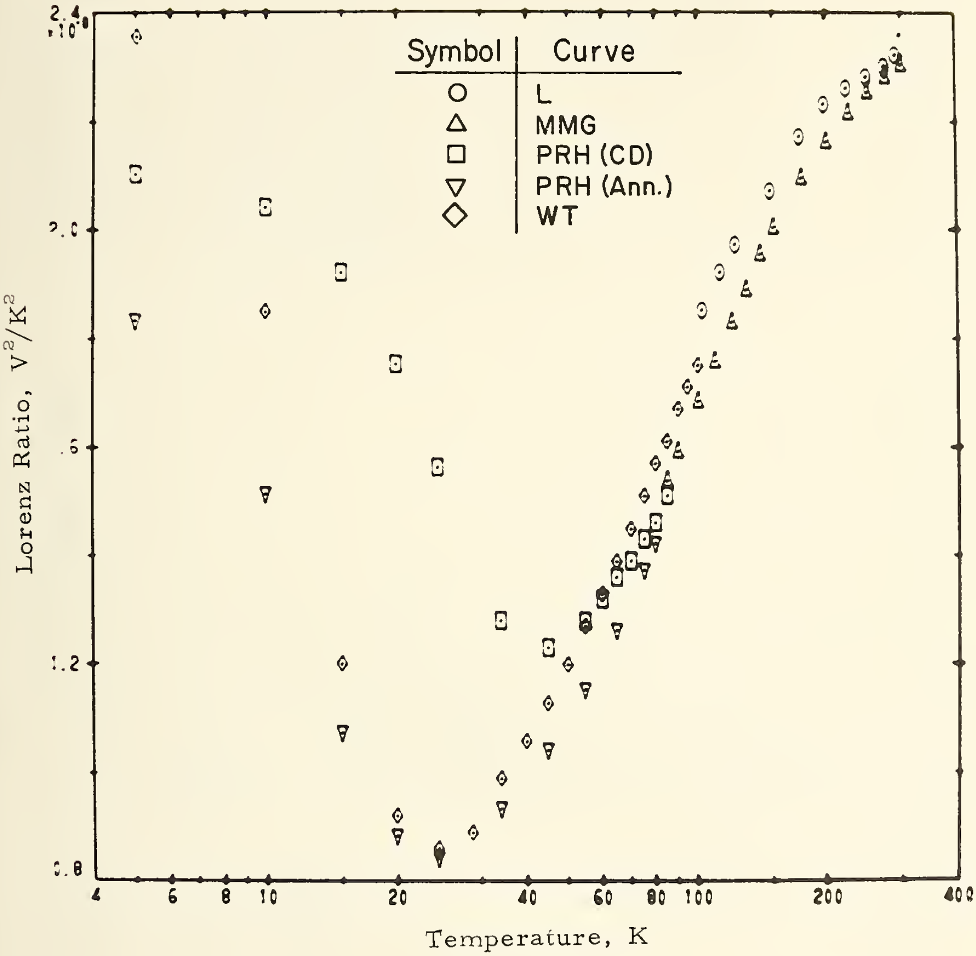

Figure 8. Lorenz ratio of copper

Copper Alloys (German Silver & Brass)

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
AM	Allen and Mendoza (1947)	German Silver Cu(45.9), Zn(42.1), Ni(9.8), Pb(2.0), Fe(0.15), Mn(0.05)	
B (G-Ar)	Berman (1951)	German Silver Cu(47), Zn(41), Pb(2), Ni(9)	Grain size = 0.02 mm
B (con)	Berman (1951)	Constantan Cu(60), Ni(40)	
KS (SB)	Karweil and Schafer (1939)	German Silver Cu (46), Zn (41), Ni (13)	
KS (NS)	Karweil and Schafer (1939)	German Silver Cu (64), Ni (16), Zn (20)	
L (G-Ag)	Lees (1908)	Johnson - Matthey Company German Silver Cu (62), Ni (15), Zn (22)	Density = 8.67 g/cm^3 at 22°C
L (Ptd)	Lees (1908)	Platinoid (Similar to German Silver)	Density = 8.66 g/cm^3 at 22°C
	Kemp, Klemens, and Tainsh (1957)	Garrett, Davidson, and Matthey Company Cu (98), Zn (2)	4 hours at 850°C L = 2.59 x 10^{-8} V^2/K^2 at 5 K L = 2.41 x 10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1957)	Cu (95), Zn (5)	4 hours at 850°C L = 2.88 c 10^{-8} V^2/K^2 at 5 K L = 2.69 x 10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1957)	Cu (90), Zn (10)	4 hours at 850°C L = 2.72 x 10^{-8} V^2/K^2 at 5 K L = 2.80 x 10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1959)	Alpha brass, deformed Cu (68), Zn (32)	No anneal, RRR = 1.58 L = 3.28 x 10^{-8} V^2/K^2 at 4.2 K L = 2.61 x 10^{-8} V^2/K^2 at 90 K

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Kemp, Klemens, and Tainsh (1959)	Alpha brass, deformed Cu(68), Zn(32), 250°C	RRR = 1.64 L = 3.00×10^{-8} V^2/K^2 at 4.2 K L = 2.74×10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1959)	Alpha brass, deformed Cu (68), Zn (32), 290°C	RRR = 1.69 L = 2.79×10^{-8} V^2/K^2 at 4.2 K L = 2.67×10^{-8} V^2/K^2 at 90 K
	Kemp, Klemens, and Tainsh (1959)	Alpha brass, deformed Cu (68), Zn (32), 400°C	RRR = 1.72 L = 3.49×10^{-8} V^2/K^2 at 4.2 K L = 2.78×10^{-8} V^2/K^2 at 90 K
L	Lees (1908)	Brass Cu (70), Zn (30)	Density = 8.44 at 22°C

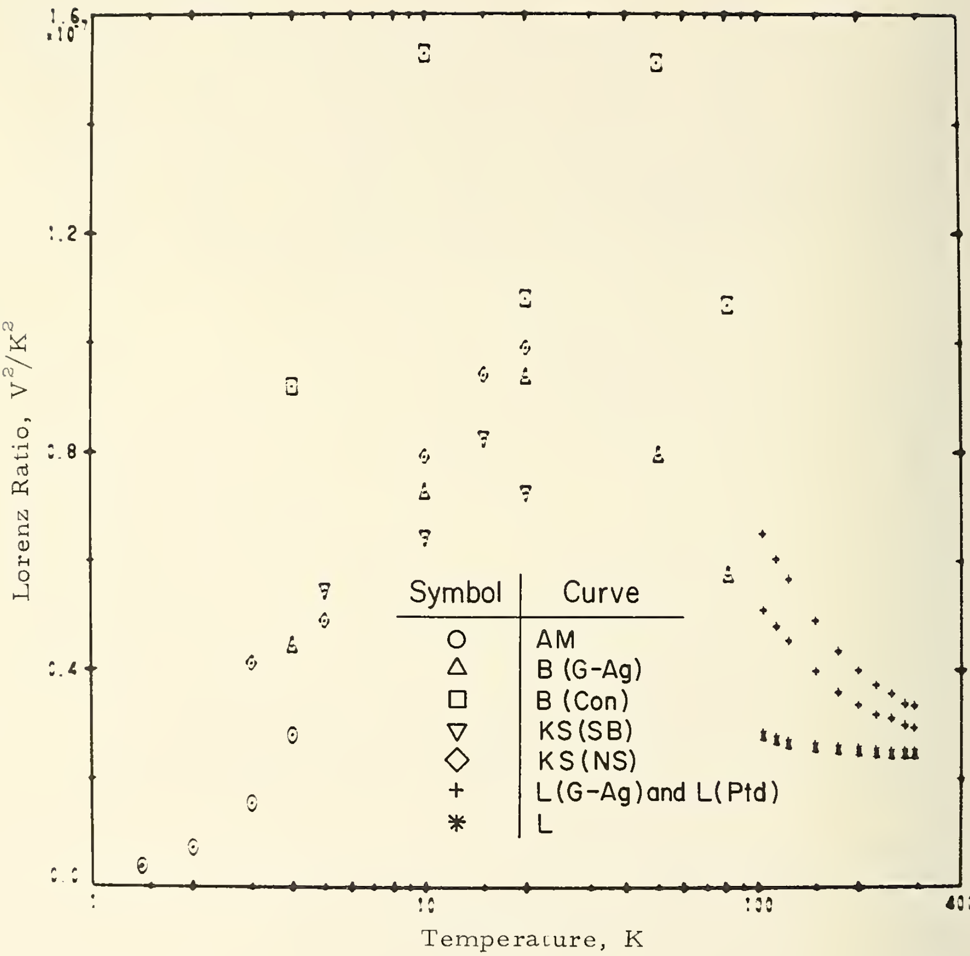

Figure 9. Lorenz ratio of copper alloys (German silver and brass)

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
GG ($Zn\perp$)	Goens and Gruneisen (1932)	Zn (pure)	Perpendicular to C axis
GG ($Zn\parallel$)	Goens and Gruneisen (1932)	Zn (pure)	Parallel to C axis
L (Zn)	Lees (1908)	Zn (Pure, redistilled)	Density = 7.10 g/cm^3 at 21°C
	Staebler (1929)	Zn	L = 2.51×10^{-8} V^2/K^2 at 83.2 K L = 2.60×10^{-8} V^2/K^2 at 273 K
GG ($Cd\parallel$)	Goens and Gruneisen (1932)	Cd (pure)	Parallel to C axis
GG ($Cd\perp$)	Goens and Gruneisen (1932)	Cd (pure)	Perpendicular to C axis
L (Cd)	Lees (1908)	Cd (pure, redistilled)	Density = 8.64 g/cm^3 at 21°C

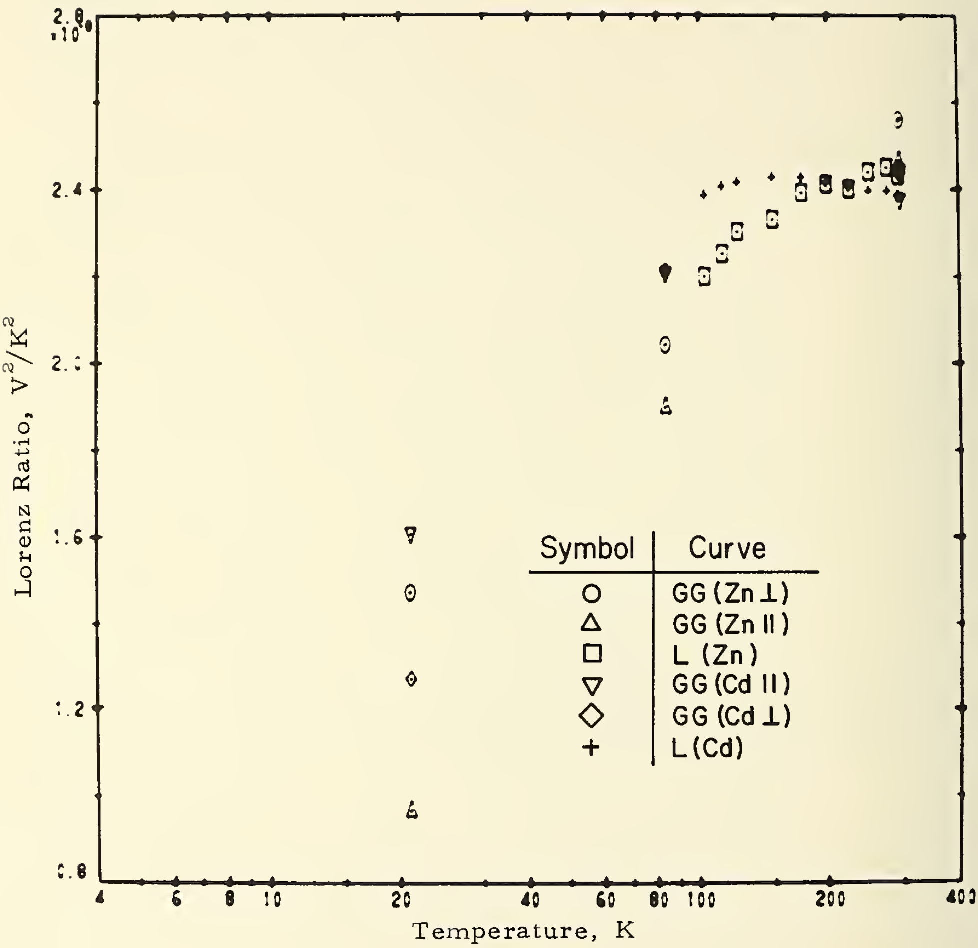

Figure 10. Lorenz ratio of zinc and cadmium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Aliyev and Volkenshteyn (1965)	Sc (99.9)	RRR = 9.5 L = 2.96×10^{-8} V^2/K^2 at 4.2 K
	Aliyev and Volkeoshteyn (1965)	Y (99.9)	RRR = 7.3 L = 3.00×10^{-8} V^2/K^2 at 4.2 K
AC	Arajs and Colvin (1964)	Sc	RRR = 4
	Powell and Jolliffe	Johnson - Matthey Company, Ltd. Sc (high purity)	Uncertainty = 5% L = 2.70×10^{-8} V^2/K^2 at 291 K
TCS (∥)	Tamarin, Chuprikov, and Shalyt (1969)	Y (99.7), Cu (0.002), Pb (0.001), O_2 (0.15), Gd (0.01); Dy, H_2, Tb, Ho(< 0.001); N_2 (0.12)	Parallel to C axis RRR = 14
TCS (⊥)	Tamarin, Chuprikov, and Shalyt (1969)	Y(99.7), Cu(0.002), Pb(0.001),O_2(0.15), Gd(0.01); Dy,H_2, Tb, Ho (<0.001);N_2(0.12)	Perpenpendicular to C axis RRR = 9

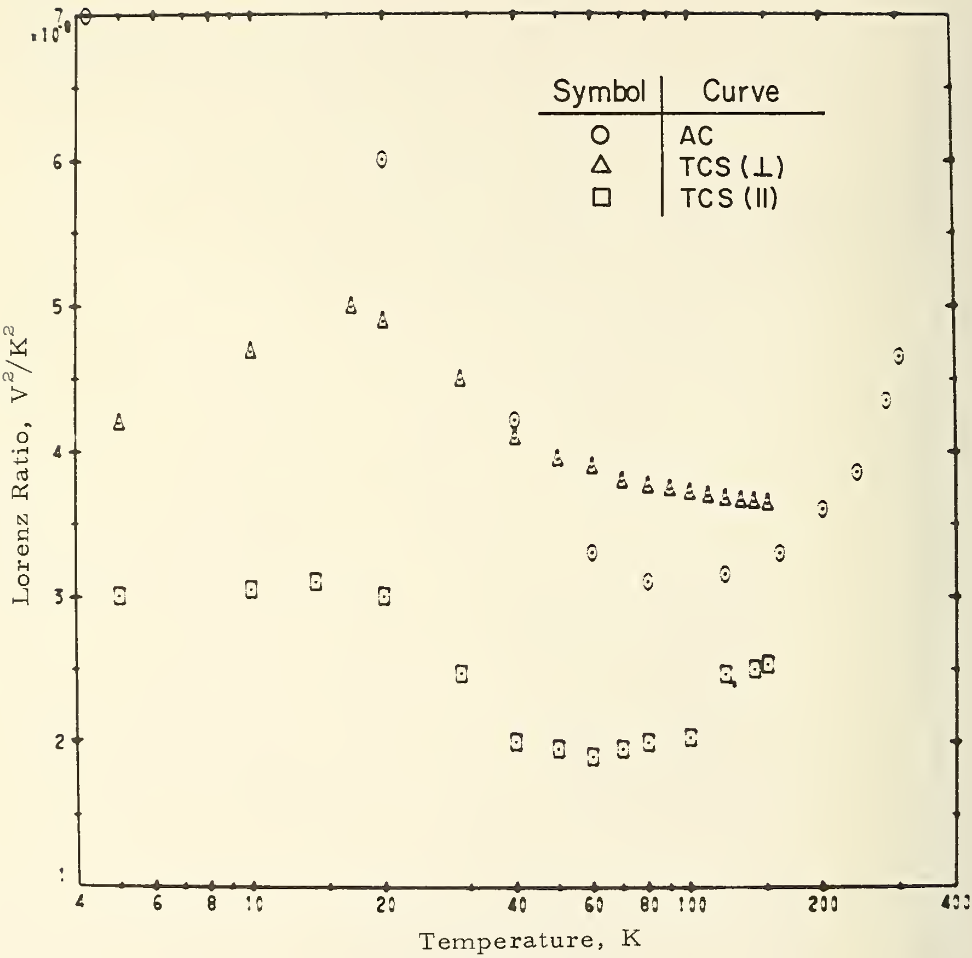

Figure 11. Lorenz ratio of scandium and yttrium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
KKW (Ti)	Kemp, Klemens, and White (1956)	Johnsom - Matthey Company Ti (98)	5 hours at 950°C RRR = 2.4
KKW (Zr)	Kemp, Klemens, and White (1956)	Johnson - Matthey Company Zr (99.99)	5 hours at 950°C RRR = 2.9
	Powell and Tye (1961)	Ti (very high Purity)	DP Hardness = 60 L = 3.21×10^{-8} V^2/K^2 at 193 K
WW (Hf)	White and Woods (1957a)	Foote Mineral Company Hf (99.3), Zr (0.7)	RRR = 8

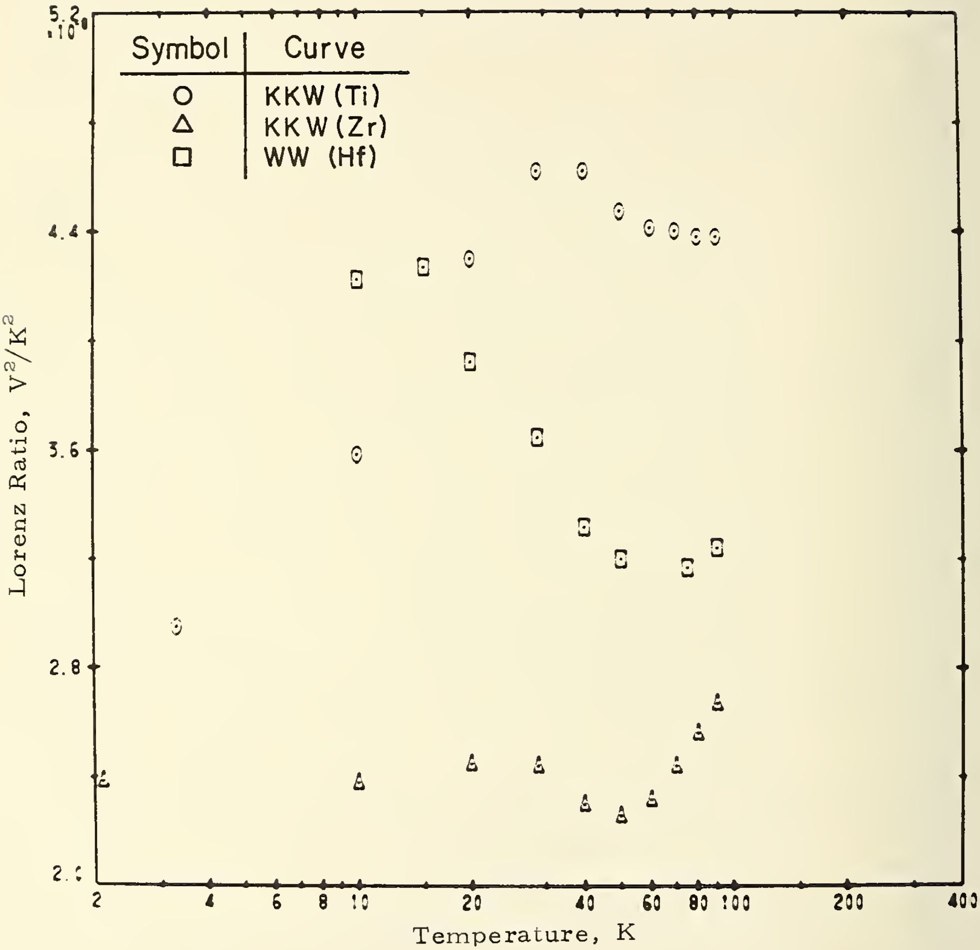

Figure 12. Lorenz ratio of titanium, hafnium, and zirconium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
HWP	Hust, Weitzel, and Powell (1967) and (1971) Hust, Powell, and Weitzel (1969) Hust and Powell (1968)	Ti - All 0 AT (Ti 5Al 2.5Sn) To (91.5), Al (5.5), Sn(2.5), Fe (0.2), C,N, H,	Rockwell hardness = C35, grain size = 0.015 mm, annealed

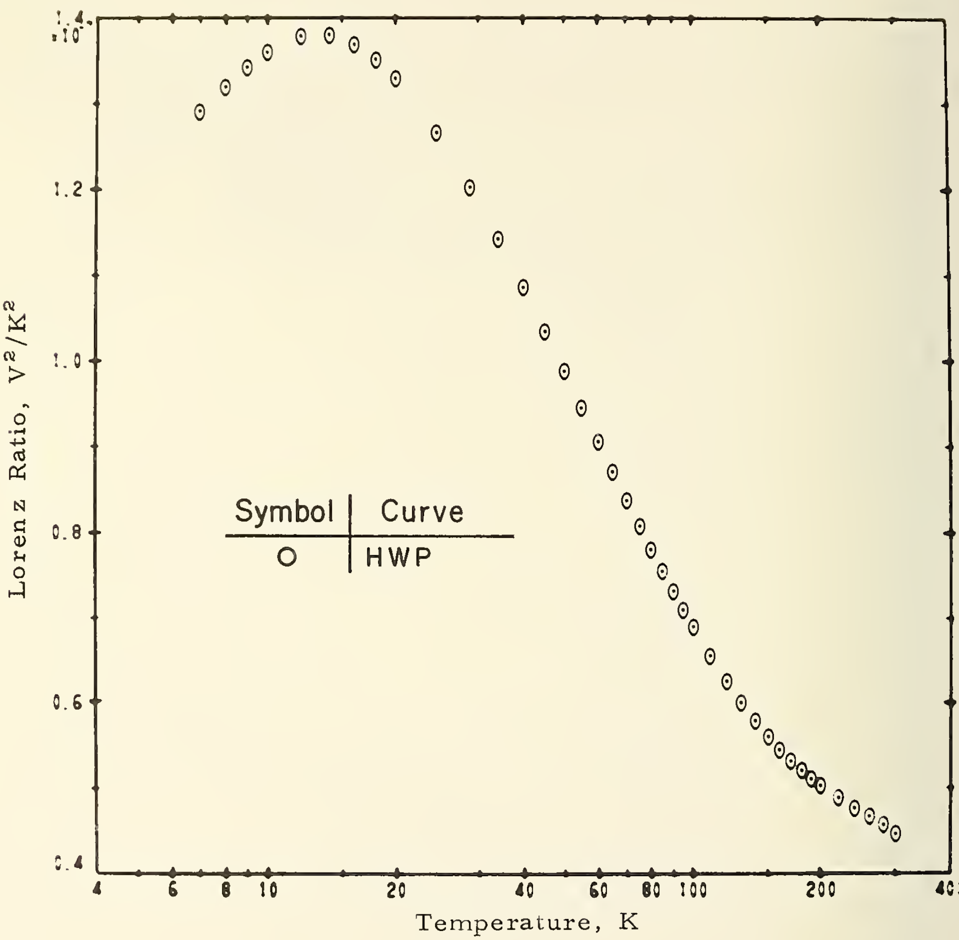

Figure 13. Lorenz ratio of titanium alloys

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
B	Backlund (1967)	Johnson - Matthey Company, Ltd. W (Spectroscopically standardized)	RRR = 3.9 uncertainty = 1.5%
DD	DeHass and DeNoble (1938)	W	Single crystal (111) direction RRR = 100
	Gruneisen and Goens (1927)	W (very pure)	Single crystal $L = 0.95 \times 10^{-8}\ V^2/K^2$ at 21.2 K $L = 1.9 \times 10^{-8}\ V^2/K^2$ at 83.2 K
	Gruneisen and Goens (1927)	W (impure)	$L = 2.26 \times 10^{-8}\ V^2/K^2$ at 21.2 K $L = 2.25 \times 10^{-8}\ V^2/K^2$ at 83.2 K
	Kannuluik (1931)	General Electric W (impure)	220°C anneal $L = 3.58 \times 10^{-8}\ V^2/K^2$ at 273 K
	Kannuluik (1931)	General Electric W (impure)	1300°C anneal $L = 3.44 \times 10^{-8}\ V^2/K^2$ at 273 K
K	Kannuluik (1933)	W (99.97); Co, Cr, In, O_2, Pt, Sn (0.001); Si, Ta, V (0.01); Se (trace)	Single crystal (100) direction
K	Kannuluik (1933)	W (99.97); Co, Cr, In, O_2, Pt, Sn (0.001); Si, Ta, V (0.01); Se (trace)	Single crystal (111) direction
MMB	Moore, McElroy, and Barisoni (1966)	ORNL Metals and Ceramics Division W (high purity)	RRR = 400, Density = 19.29 g/cm^3 uncertainty = 2%
MMB	Moore, McElroy, and Barisoni (1966)	W (99.98)	RRR = 31.4, Density = 19.08
WW	White and Woods (1957b)	Johnson - Matthey, Ltd. W (99.99), Mo (0.01)	RRR = 181, annealed at 1350°C
WGB	Wagner, Garland, and Bowers (1971)	W (Zone Refined)	(111) direction, RRR = 9400
WGB	Wagner, Garland, and Bowers (1971)	W (Zone Refined)	(110) direction, RRR = 30,000
WGB	Wagner, Garland, and Bowers (1971)	W (Zone Refined)	(110) direction, RRR = 43,000
WGB	Wagner, Garland, and Bowers (1971)	W (Zone Refined)	(110) direction, RRR = 59,000
WGB	Wagner, Garland, and Bowers (1971)	W (Zone Refined)	(110) direction, RRR = 75,000
WGB	Wagner, Garland, and Bowers (1971)	W (Zone Refined)	(110) direction, RRR = 95,000

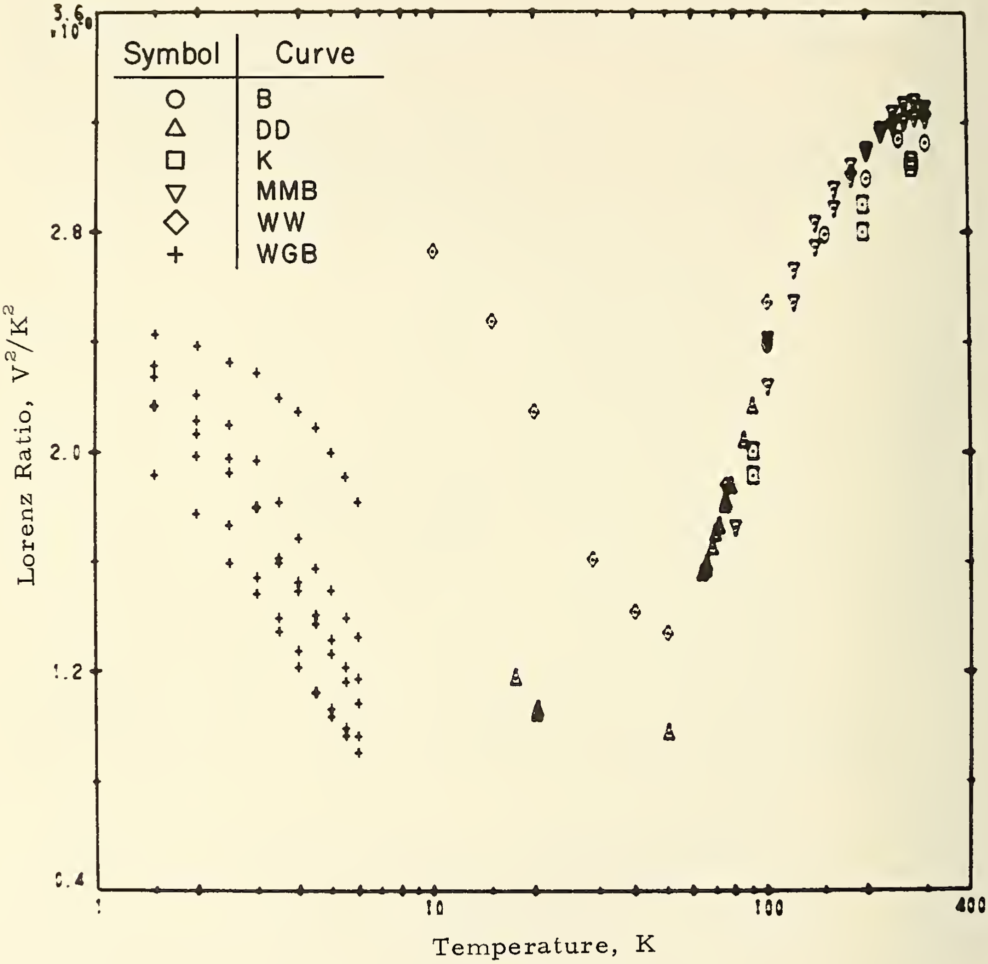

Figure 14. Lorenz ratio of tungsten

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
B	Backlund (1967)	Johnson - Matthey, Ltd. Mo (spectroscopically standardized)	RRR = 3.3, uncertainty = 1.5%
K (1)	Kannuluik (1933)	Mo (99.8); Al, Ge, W,V,Ti,Sn (0.01); Bi, Cd (0.05); C (Trace); Co, Cu, Pt, Rh (0.001)	
K (2)	Kannuluik (1933)	Mo (99.8); Al, Ge, W, V, Ti, Sn (0.01); Bi, Cd (0.05); C (Trace); Co, Cu, Pt, Rh (0.001)	
	Kannuluik (1931)	N.V. Philips (Holland) Mo (very pure)	Annealed at 220°C L = 2.6 x 10^{-8} V^2/K^2 at 273 K
	Kannuluik (1931)	N.V. Philips (Holland) Mo (very pure)	Annealed at 900°C L = 2.67 x 10^{-8} V^2/K^2 at 273 K
	Kannuluik (1931)	General Electric Mo (Less pure)	Annealed at 220°C L = 2.81 x 10^{-8} V^2/K^2 at 273 K

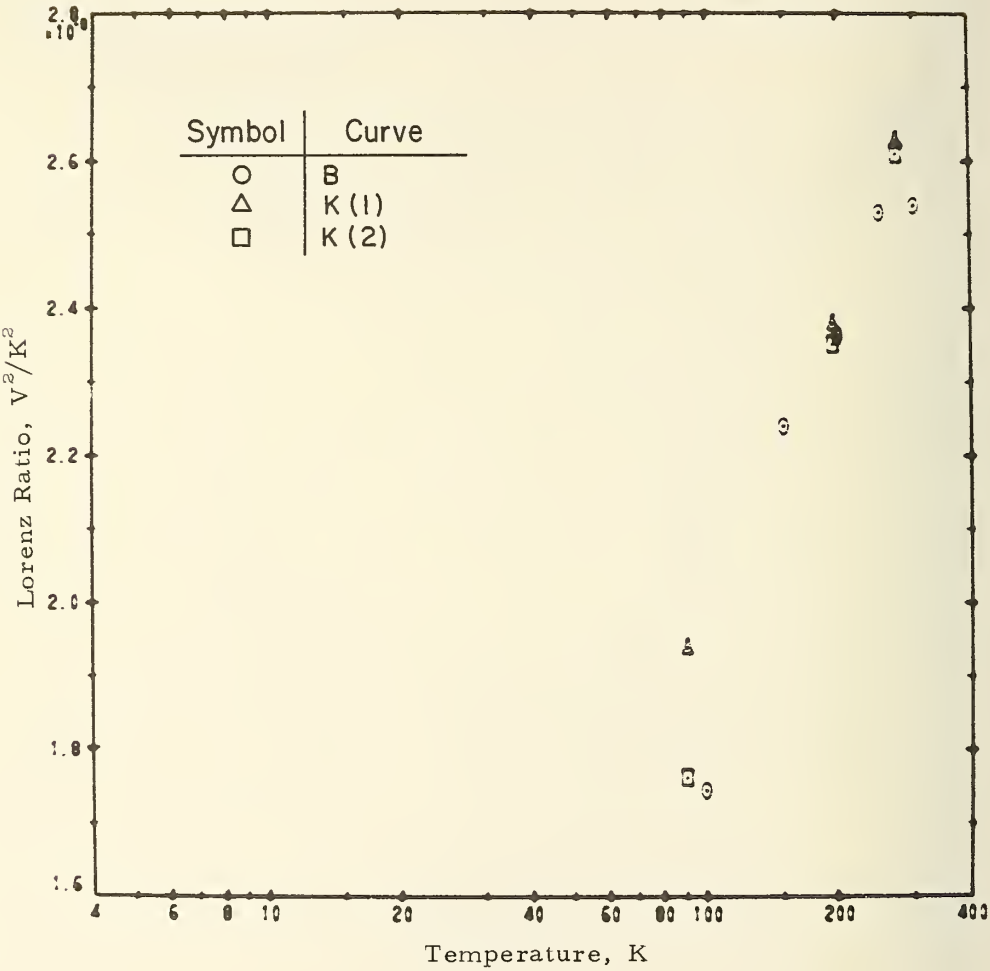

Figure 15. Lorenz ratio of molybdenum

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
G	Goff (1970)	Cr (99.92), Mn (0.004), Fe (0.005), Mg (0.002), Cu (0.003), S, P, Ni	Arc - Cast, 24 hours at 900°C RRR = 72
G	Goff (1970)	Cr (99.92), Mn (0.004), Fe (0.005), Mg (0.002), Cu (0.003), S, P, Ni	twice annealed RRR = 88
HKKTW	Harper, Kemp, Klemens, Tainsh, and White (1957)	Cr (99.998)	Cold worked RRR = 47
HKKTW	Harper, Kemp, Klemens, Tainsh, and White (1957)	Cr (99.998)	4 hours at 1050°C RRR = 67
HKKTW	Harper, Kemp, Klemens, Tainsh, and White (1957)	Cr (99.998)	Partially recrystallized RRR = 97
HKKTW	Harper, Kemp, Klemens, Tainsh, and White (1957)	Cr (99.998)	4 hours at 1050°C RRR = 134
HKKTW	Harper, Kemp, Klemens, Tainsh, and White (1957)	Cr (99.998)	Fully recrystallized RRR = 220
MWM (68)	Moore, Williams, and McElroy (1968)	Dr. Goff's Cr specimen Cr (99.92), Mn (0.004), Fe (0.005), Mg (0.002), Cu (0.003), S, P, Ni	RRR = 70, uncertainty = 2%
MWM (67)	Moore, Williams, and McElroy (1968)	Cr (99.98), Ag (0.3ppm), Ca (0.1ppm), Cu (0.1ppm), Fe (18ppm), Mg (0.3ppm), Mn (0.1ppm), V (0.3ppm), Si (10ppm), O (5ppm), H (0.2ppm)	Extruded, RRR = 280, Density = 7.19 g/cm^3, DP Hardness = 121, grain size = 0.063 mm, uncertainty = 2%
MWM (67)	Moore, Williams, and McElroy (1968)	Cr (99.92), Ag (0.3ppm), Ca (0.1ppm) Cu (0.1ppm), Fe (18ppm), Mg (0.3ppm), Mn (0.1ppm), V (0.3ppm), Si (10ppm), O (5ppm), H (0.2ppm)	Cast, RRR = 58, Density = 7.15 g/cm^3, DP Hardness = 123, grain size = 0.84 mm, uncertainty = 2%

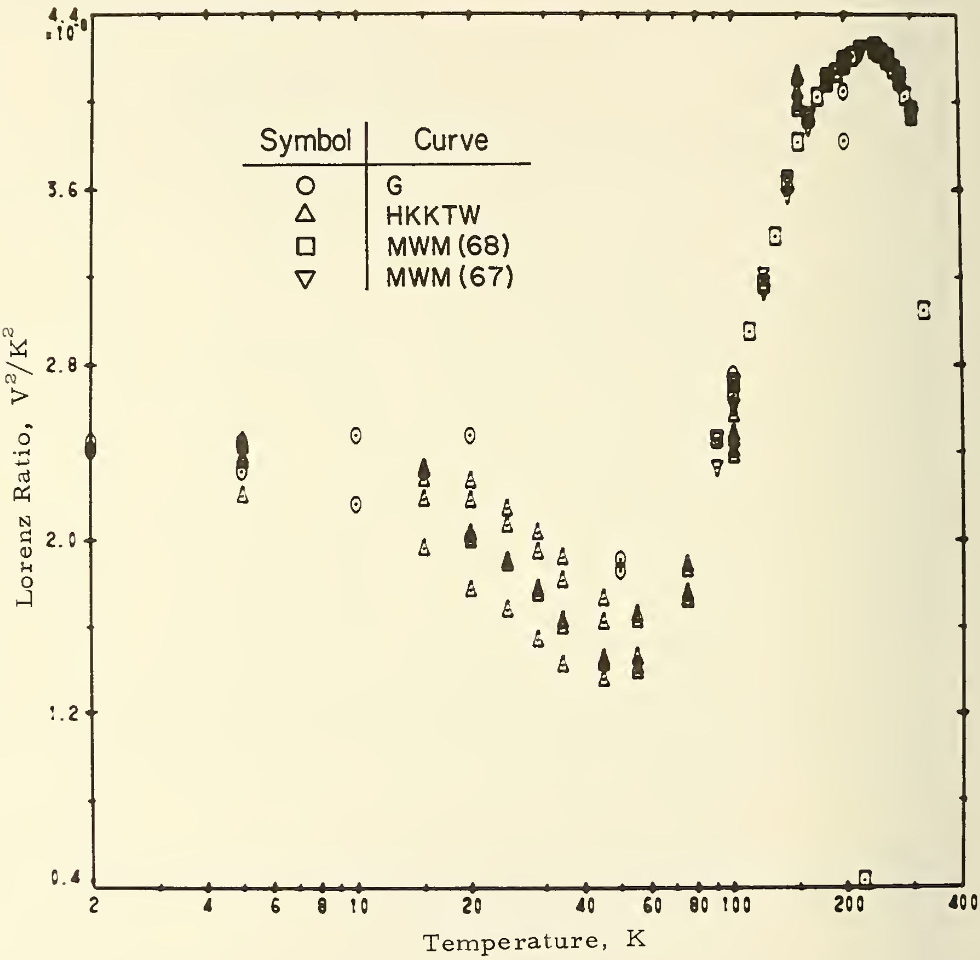

Figure 16. Lorenz ratio of chromium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
R	Reddemann (1935)	β-Mn	
WW (Mn)	White and Woods (1957c)	A.D. MacKay Inc. α- Mn (99.9), Mg (10 pp)	RRR = 8.33, 10 hours at 600°C Data read from small graph
WW (Re 1)	White and Woods (1957b)	A.D. MacKay Inc. Re (99.5)	RRR = 20, unannealed, Density = 21.3 g/cm^3
WW (Re 2)	White and Woods (1957b)	A.D. MacKay Inc. Re (99.5)	annealed at 700°C RRR = 36
WW (Re 3)	White and Woods (1957b)	A.D. MacKay Inc. Re (99.99)	Zone melted RRR = 1357

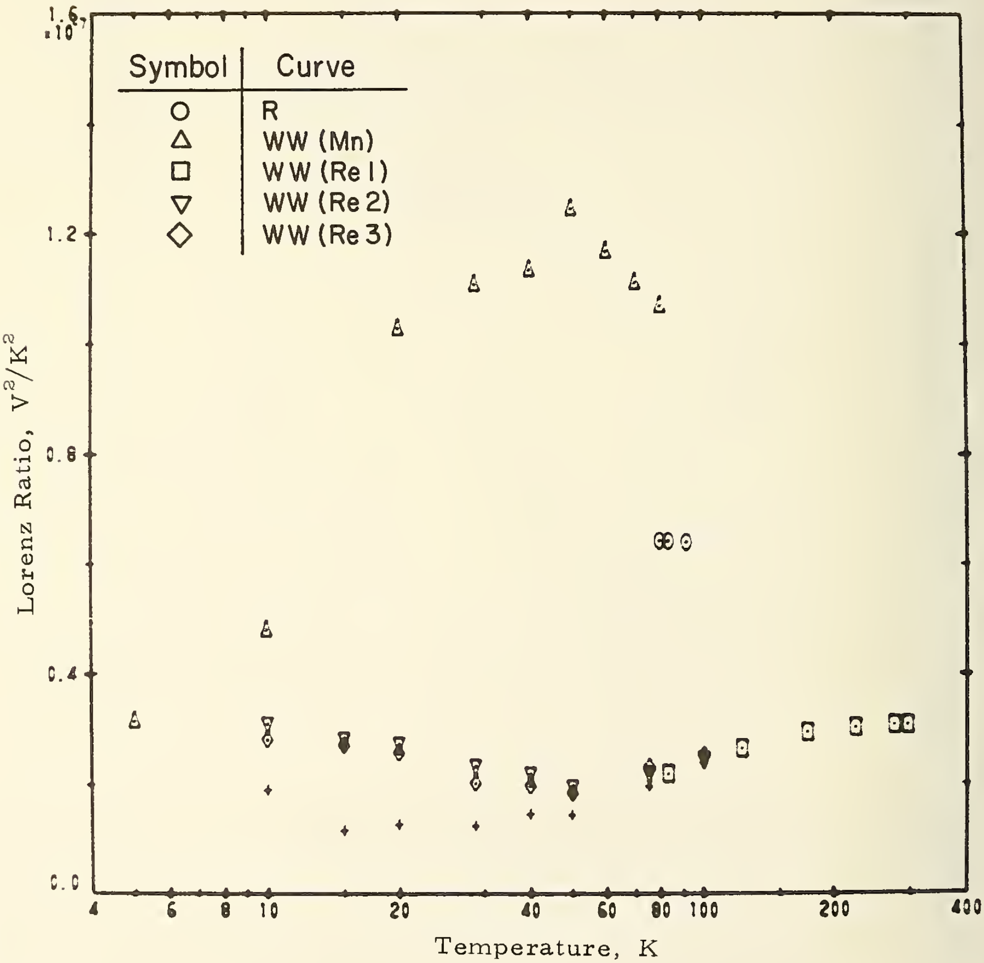

Figure 17. Lorenz ratio of manganese and rhenium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
B	Backlund (1961)	Heraeus A.G. Fe, Mn (0.26)	10 hours at 500°C RRR = 4.6 Data read from a small graph
B	Backlund (1961)	Fe, Ni (0.9)	RRR = 4.8
B	Backlund (1961)	Fe, Mn (0.53)	RRR = 3.5
B	Backlund (1961)	Fe, Ni (1.81)	RRR = 3.6
B	Backlund (1961)	Fe, Si (1.17)	RRR = 2.4
B	Backlund (1961)	Fe, Si (2.89)	RRR = 1.5
B	Backlund (1961)	Philips Research Laboratory Fe (Pure)	20 hour at 500°C RRR = 82
	Eucken and Dittrich(1927)	Fe (Electrolytic) Specimen 1	$L = 1.90 \times 10^{-8}\ V^2/K^2$ at 80 K $L = 3.32 \times 10^{-8}\ V^2/K^2$ at 273 K
	Eucken and Dittrich (1927)	Specimen 2	$L = 1.89 \times 10^{-8}\ V^2/K^2$ at 80 K $L = 3.39 \times 10^{-8}\ V^2/K^2$ at 273 K
	Eucken and Dittrich (1927)	Specimen 3	$L = 2.39 \times 10^{-8}\ V^2/K^2$ at 80 K $L = 3.20 \times 10^{-8}\ V^2/K^2$ at 273 K
Be	Beitchman, Trussel, and Coleman (1970)	Fe, Single crystal	RRR = 700 to 2000
	Gruneisen and Goens (1927)	Fe (tempered) Specimen 1	$L = 1.80 \times 10^{-8}\ V^2/K^2$ at 21.2 K $L = 1.41 \times 10^{-8}\ V^2/K^2$ at 83.2 K
	Gruneisen and Goens (1927)	Fe (technically pure)	$L = 2.04 \times 10^{-8}\ V^2/K^2$ at 21.2 K $L = 1.52 \times 10^{-8}\ V^2/K^2$ at 83.2 K
	Gruneisen and Goens (1927)	Fe (Electrolytic, 1 hour at 500°C)	$L = 2.47 \times 10^{-8}\ V^2/K^2$ at 21.2 K $L = 2.09 \times 10^{-8}\ V^2/K^2$ at 83.2 K
HPW (2)	Hust, Powell, and Weitzel (1970) also Hust (1969) and (1969a)	Battelle Memorial Institute Fe (Armco) Fe (99.9), C(0.015), Mn(0.028), P(0.005), S(0.025), Si(0.003), Cu(0.04)	As received, machined RRR = 13.8, Rockwell hardness = B40, grain size = 0.053 mm, uncertainty = 2.5%

Iron (Cont.)

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
HPW (2a)	Hust, Powell, and Weitzel (1970) also Hust (1969) and (1969a)	Battelle Memorial Institute Fe (Armco) Fe (99.9), C(0.015), Mn(0.028), P(0.005), S(0.025), Si(0.003), Cu(0.04)	$1\frac{1}{2}$ hours at 875°C, RRR = 12.57, Rockwell hardness = B31, grain size = 0.064mm., uncertainty = 2.5%
HPW (4)	Hust, Powell, and Weitzel (1970) also Hust (1969) and (1969a)	Battelle Memorial Institute Fe (Armco) Fe(99.9), C(0.015), Mn(0.028), P(0.005), S(0.025), Si(0.003), Cu(0.04)	As received, machined, RRR = 13.4, Rockwell hardness = B40, grain size = 0.05 mm, uncertainty = 2.5%
HS	Hust and Sparks (1970a),(1971f)	NBS - OSRM Fe (Electrolytic) Fe (99.9),C (0.01), Mn(0.008), P(0.002), S(0.008), Si(0.013), Cu(0.006), Ni(0.037), Cr(0.007), MO(0.005), CO(0.007), Ti(0.004), As(0.003), Al(0.002)	2 hours at 1000°C, RRR = 24.4, Density = 7.87 g/cm^3, Rockwell hardness = B24, grain size = 0.05 mm, uncertainty = 2.5%
K	Kannuluik (1933)	Fe(Armco) Fe(99.88), C(0.011), Mn(0.017), P(0.006), S(0.026), Cu(0.056), Si(0.002)	
KS	Karweil and Schafer (1939)	Fe	RRR = 29
KS	Karweil and Schafer (1939)	Fe, Si(0.35), S(0.03), C(0.4), Mn(0.6)	
KKW	Kemp, Klemens, and White (1956)	Johnson - Matthey Company Fe(99.99), Ni(0.005), Cu(0.0002), Ag(0.0001)	4 hours at 750°C, RRR = 40 Data read from small graph
KKT	Kemp, Klemens and Tainsh (1959)	Fe (Doubly refined electrolytic)	950°C anneal, RRR = 100 Data read from small graph
KK	Kolhaas and Kierspe (1965)	Fe (Pure)	
L	Lees (1908)	Fe(99.42), C(0.1), Mn(0.15), Si(0.13)	Density = 7.7? g/cm^3 at 21°C
MMB	Moore, McElroy, and Barsoni (1966)	Materials Research Corporation Fe (electron beam zone refined)	RRR = 201, Density = 7.82 g/cm^3, uncertainty = 2%

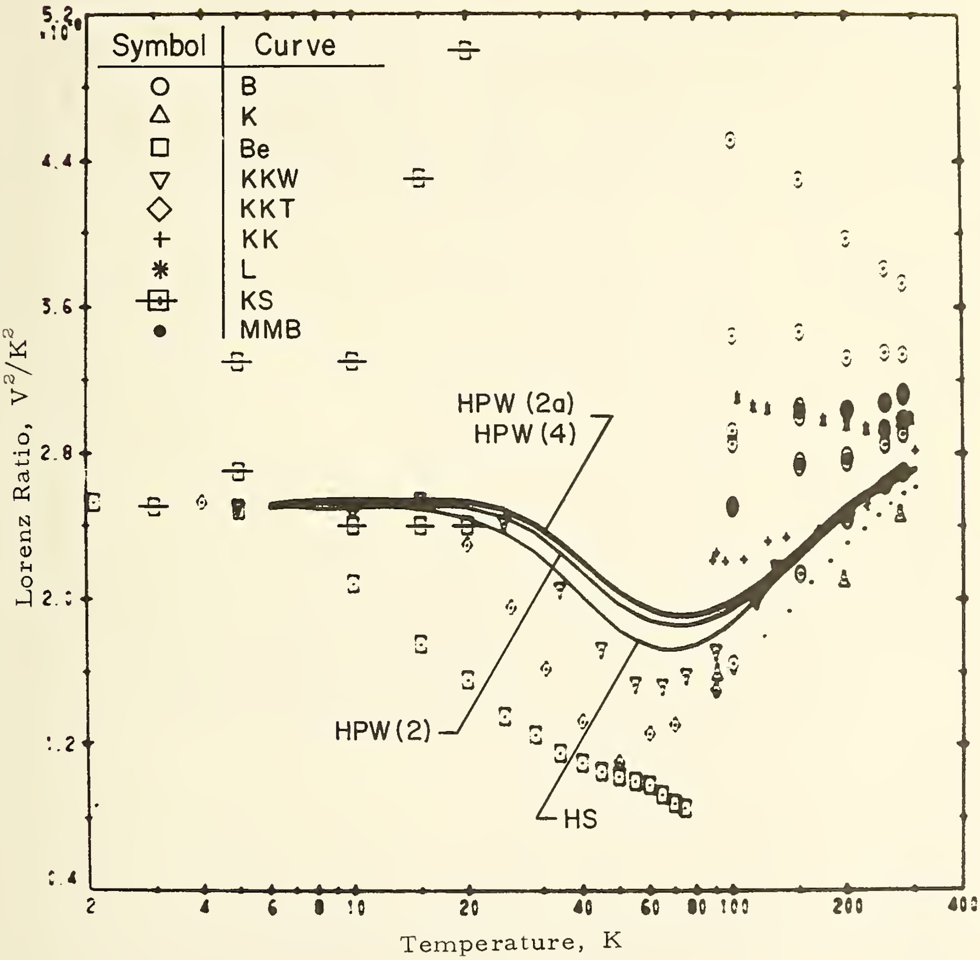

Figure 18. Lorenz ratio of iron

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
B	Berman (1951)	Austenitic Stainless Steel Fe(71.4), Ni(7.9), Cr(18.9), Si(0.7), Ti(1), C(0.1)	Grain size = 0.01 mm
EZ (303)	Estermann and Zimmerman (1952)	AISI 303 Stainless Steel	
EZ (347)	Estermann and Zimmerman (1952)	AISI 347 Stainless Steel	
F (1015)	Flynn (1971)	AISI 1015 steel	DP Hardness = B57
F (Ni)	Flynn (1971)	Fe (97.34), Ni (0.98)	DP Hardness = B72
F (2315)	Flynn (1971)	AISI 2315 Steel	DP Hardness = B84
F (4340)	Flynn (1971)	AISI 4340 (QT) Steel Fe(94.21), Ni(1.75)	DP Hardness = C34
F (2515)	Flynn (1971)	AISI 2515 Steel Fe (93.48), Ni (4.64)	DP Hardness = B89
F (Ni)	Flynn (1971)	Fe (90.08), Ni (8.13)	DP Hardness = B100
F (HP 49)	Flynn (1971)	High Permeability 49 Fe (50.4), Ni (47.6)	DP Hardness = B55
F (HM80)	Flynn (1971)	High Mu 80 Fe (16.12), Ni (79,55)	DP Hardness = B49
F (LE42)	Flynn (1971)	Low expansion 42 Fe (57.2), Ni(40.7)	DP Hardness = 79
F (INVAR)	Flynn (1971)	INVAR Fe (64.84), Ni(34.15)	DP Hardness = B79
F (FCI)	Flynn (1971)	Free Cut INVAR Fe (62.96), Ni(34.5)	DP Hardness = B92
F (NSC)	Flynn (1971)	Ni Span C Fe (49.69), Ni (40.21)	DP Hardness = C34

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
HS (1)	Hust and Sparks (1971a) and (1972)	Austenitic stainless steel specimen 1 Fe (62.1), Ni (19.9), Cr(16.41), Mn(1.20), Si(0.27), Nb(0.10), Mo(0.01), C(0.009), N (0.009), P(0.005), S(0.006)	RRR = 1.33, Density = 8.004 g/cm^3, Rockwell hardness = B40, grain hardness = 0.044 mm, uncertaioty = 2.5%
HS (WH)	Hust and Sparks (1971a) and (1972)	Austenitic stainless stesl specimen WH Fe(62.1), Ni(19.9), Cr(16.41), Mn(1.20), Si(0.27), Nb(0.10), Mo(0.01), C(0.009), N(0.009), P(0.005), S(0.006)	RRR = 1.33, Deosity = 8.004 g/cm^3, Rockwell hardness = B40, grain hardness = 0.044 mm, uncertaioty = 2.5%
HS (2)	Hust and Sparks (1971e) and (1972)	Austenitic stninless steel specimen Lot 2 Fe(62.1), Ni(19.9), Cr(16.41), Mn(1.20), Si(0.27), Nb(0.10), Mb(0.01), C(0.009), N(0.009), P(0.005), S(0.006)	RRR = 1.33, Density = 8.004 g/cm^3, Rockwell hardness = B40 grain hardness = 0.044 mm, uncertninty =-2.5%
RS (286)	Rust and Sparks (1971b)	AISI A286 Steel Fe(bal), Ni(25.4), Cr(14.8), Mn(1.4), Mo(1.2), Ti(2.1), Si (0.6), V(0.3), Al(0.2) C(0.04), P(0.01), S(0.01)	As received, RRR = 1.202, Deosity = 7.917 g/cm^3, Rockwell hardness = C30, grain size = 0.036 mm, uncertainty = 2.5%
HS (286A)	Hust and Sparks (1971b)	AISI A286 Steel Fe(bal), Ni(25.4), Cr(14.8), Mn(1.4), Mo(1.2), Ti(2.1), Si(0.6), V(0.3), Al(0.2), C(0.04), P(0.01), S(0.01)	1 hour at 982°C, RRR = 1.209, Density = 7.925, Rockwell hardness = C20, grain size = 0.015 mm, uncertainty = 2.5%
RS (22)	Rust and Sparks (1971d)	Stainless Steel Fe(bal), Cr(21.48), Ni(12.36), Mn(5.44), Mo(2.12), Si(0.42), N(0.27), V(0.20), Nb(0.19), C(0.05), Si(0.01)	grain size = 0.08 mm, Rockwell hardness = B55, uncertninty = 2.5%
H (347)	Hust (1970a)	AISI 347 steel Fe(bal), Cr(17.16), Ni(11.52), Mn(1.34), Ni + Ta(1.1), Si(0.59), C(0.057), P(0.014), S(0.007)	Triple Furnace brazed RRR = 1.38, Rockwell Hardnsss = B71, grain size = 0.0359 mm uncertainty = 2.5%
KK (1)	Kohlhaas and Kierspe (1965)	Fe, Ni(10.85), Cr(16.88), Mo(19.4), Si(0.37), Mn	
KK (1)	Kohlhaas and Kierspe (1965)	Fe, Ni(11.5), Cr(18.55), Mn(1.3), Si(0.7)	
KK (1)	Kohlhaas and Kierspe (1965)	Fe, Ni(12.76), Cr(17.16), Mn(1.37), Si(0.5)	

Stainless and Alloy Steels (Cont.)

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
KK (1)	Kohlhaas and Kierspe (1965)	Fe, Ni(15.8), Cr(15.8), Mo(19.3), Mn(1.3), Si	
KK (2)	Kohlhaas and Kierspe (1965)	Fe, C(0.13), Si(0.24), Mn(0.46), P(0.021), S(0.027), N(0.005), Al(0.036), Cr(0.09)	
KK (2)	Kohlhaas and Kierspe (1965)	Fe, C(0.18), Si(0.27), Mn(0.53), P(0.[illegible]), S(0.027), N(0.005), Al(0.027),Cr(0.09)	
KK (2)	Kohlhaas and Kierspe (1965)	Fe, C(0.10), Si(0.32), Mn(0.83), P(0.016), S(0.031), N(0.009), Al(0.22), Cr(0.076)	
KK (2)	Kohlhaas and Kierspe (1965)	Fe, C(0.06), Si(0.32), Mn(0.45)	
KK (2)	Kohlhaas and Kierspe (1965)	Fe, C(0.086), Si(0.35), Mn(0.40)	
KK (2)	Kohlhaas and Kierspe (1965)	Fe, C(0.051), Si(0.28), Mn(0.74)	
KK (Mn)	Kohlhaas and Kierspe (1965)	Fe, Cr(3.55), Mn(21.75), C(0.324)	
TW	Tyler and Wilson (1952)	Allegheny Ludlum Steel Corporation AISI 316 steel	25% cold reduction, Birnell hardness = 255, grain size = ASTM # 6
	Tyler and Wilson (1952)	AISI 304 steel	grain size = ASTM #5 L = 5 x 10^{-8} V^2/K^2 at 23.17 K L = 5.4 x 10^{-8} V^2/K^2 at 78.77 K
TNW	Tyler, Nesbitt, and Wilson (1953)	Allegheny Ludlum Corporation AISI 316 steel	25% cold reduction Brinell hardness = 255 grain size = ASTM #6
	Tyler, Nesbitt, and Wilson (1953)	AISI 304 Steel	grain size = ASTM #5 L = 5.97 x 10^{-8} V^2/K^2 at 30 K L = 6.57 x 10^{-8} V^2/K^2 at 70 K

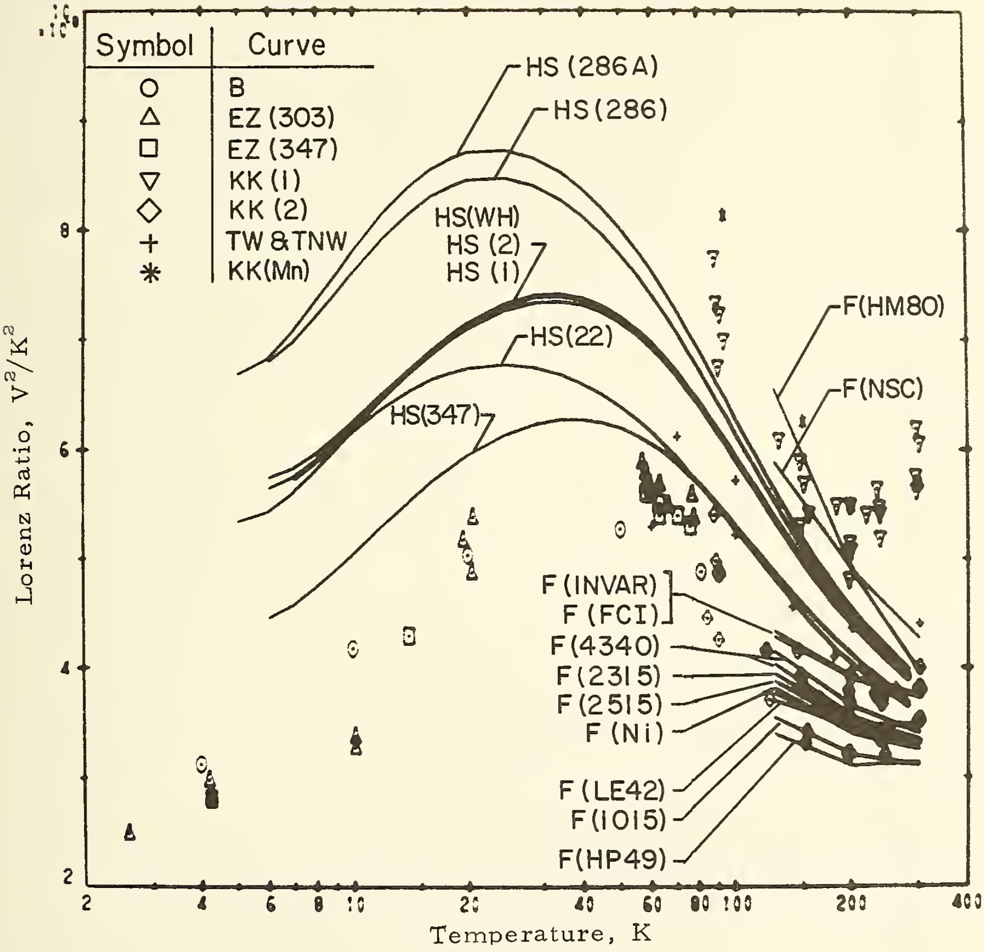

Figure 19. Lorenz ratio of stainless and alloy steels

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
L	Lees (1908)	Fe (99), C (1)	Density = 7.84 g/cm^3 at 24°C

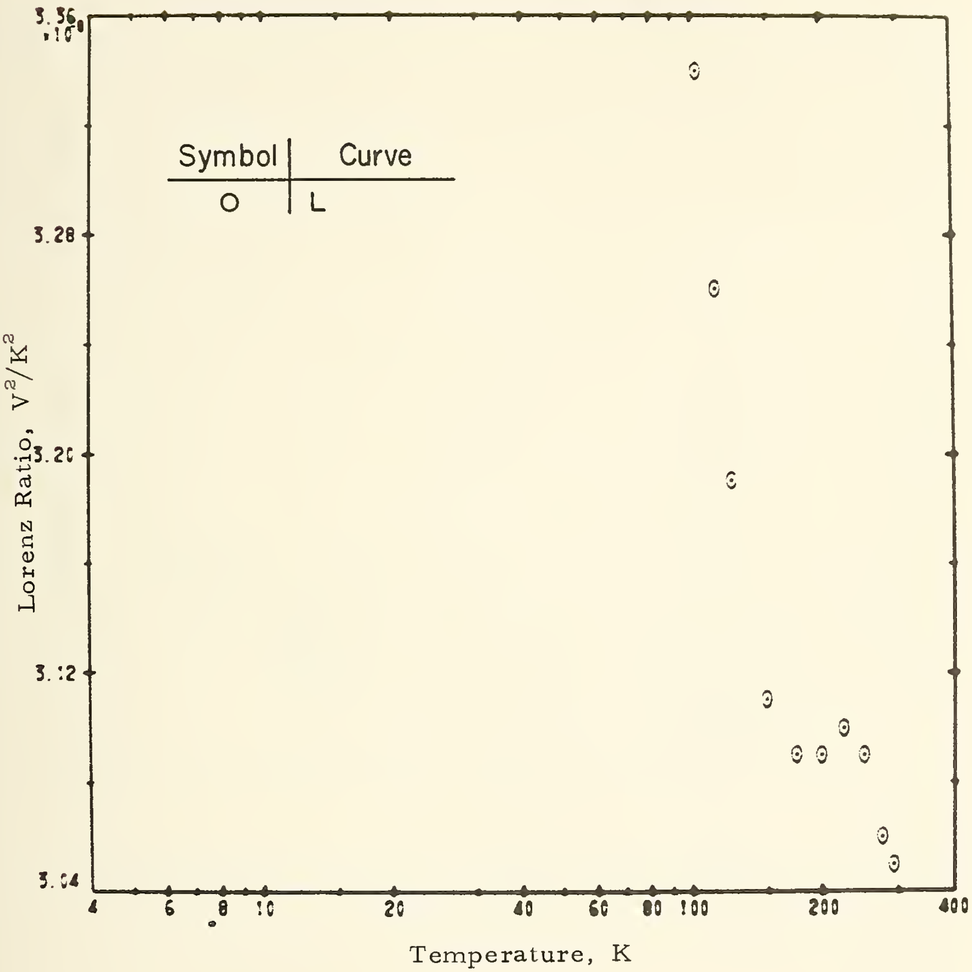

Figure 20. Lorenz ratio of carbon steels

Cobalt

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
RN	Radhakrishna and Nielsen (1965)	Johnson - Matthey Company Co (pure)	3 hours at 1040°C in vacuum RRR ≅ 60
WW	White and Woods (1957b)	Johnson - Matthey Company Co (99.999), Si(0.0002), Fe(0.0005), Al(0.0001)	RRR ≅ 64, 2 hours at 700°C
WPD	Wilkes, Powell, and DeWitt (1969)	Co(99.92), Ni(0.012), Cu(0.001), Fe(0.04), Mn(0.0003), Pb(0.0001), Ca(0.001), Si(0.001), Al(0.0003), Mg(0.0002), S(0.0008), C(0.004)	Density ≅ 8.8 g/cm^3 at 20°C

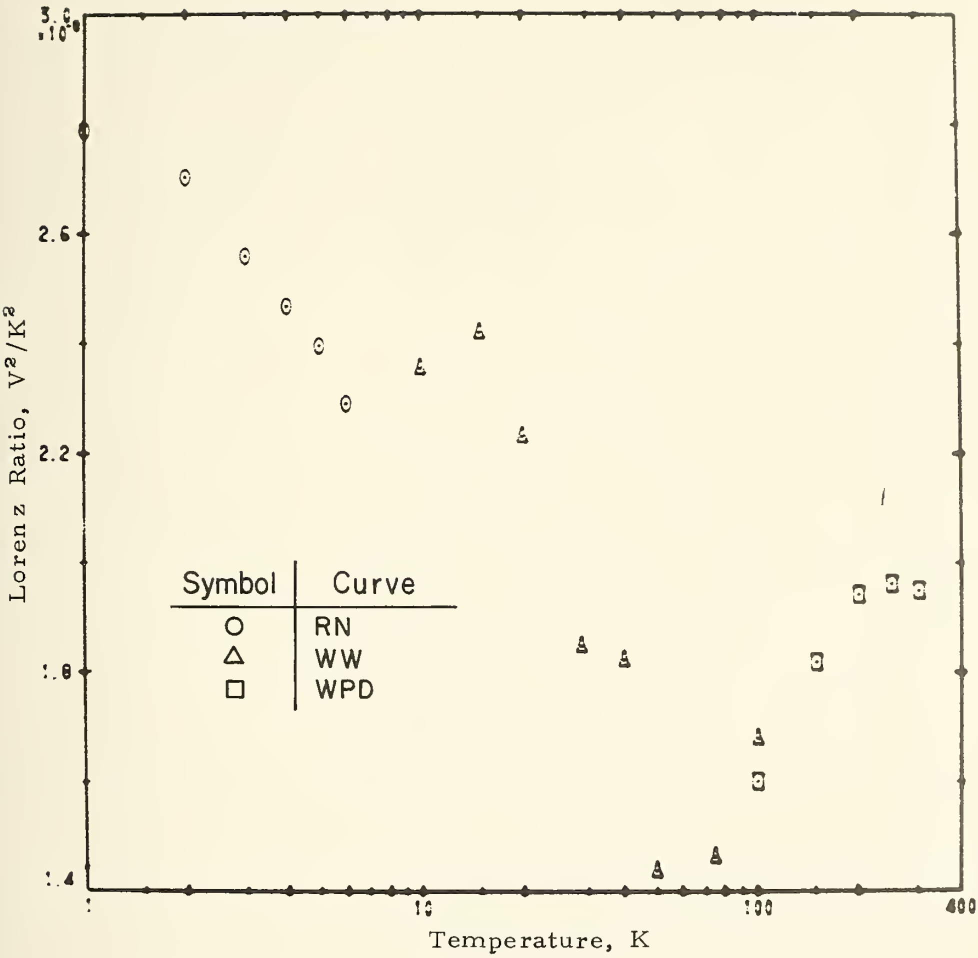

Figure 21. Lorenz ratio of cobalt

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Aoyama (1940)	Ni (electrolytic)	$L = 1.41 \times 10^{-8}\ V^2/K^2$ at 78.15 K
	Eucken and Dittrich (1927)	Ni (electrolytic)	$L = 1.54 \times 10^{-8}\ V^2/K^2$ at 80 K $L = 2.35 \times 10^{-8}\ V^2/K^2$ at 273 K
FG	Farrell and Greig (1969)	Ni	RRR = 650, uncertainty = 5%
GH	Grieg and Harrison (1965)	Johnson - Matthey Company Ni, Fe + Si (16 ppm)	12 hours at 850°C grain size = 2.1 mm Data read from small graph
KKW	Kemp, Klemens, and White (1956)	Johnson - Matthey Company Ni (99.99)	4 hours at 750°C RRR = 208
L	Lees (1908)	Johnson - Matthey Company Ni (99)	Density = 8.80 g/cm^3 at 21°C
WT	White and Tainsh (1967)	Ni (high purity)	RRR = 2500 annealed at 500°C in vacuum

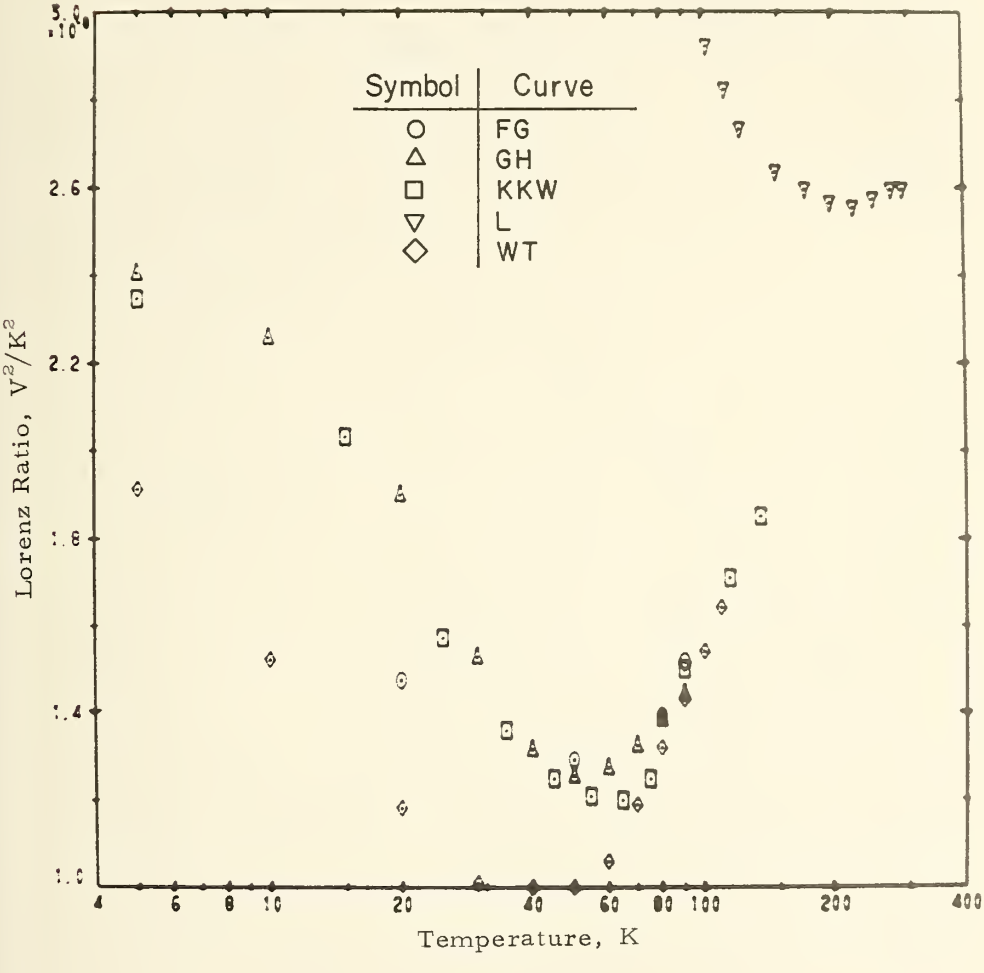

Figure 22. Lorenz ratio of nickel

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
A	Aoyama (1940)	Monel	
EZ (MDT)	Estermann and Zimmerman (1952)	Monel (hard drawn tubing)	
EZ (MAT)	Estermann and Zimmerman (1952)	Monel (annealed Tubing)	
EZ (MDR)	Estermann and Zimmerman (1952)	Monel (Hard drawn rod)	
EZ (IDT)	Estermann and Zimmerman (1952)	Inconel (Hard drawn tubing)	
EZ (IAT)	Estermann and Zimmerman (1952)	Inconel (annealed tubing)	
HPW (X)	Hust, Powell, and Weitzel (1969) and Hust, Weitzel, and Powell (1971)	Hastelloy X Ni(49), Cr(21), Fe(17.58), Mo(9.15), Co(1.45), W(0.65), Mn(0.53), Si(0.43), C(0.12), P, S	Rockwell hardness = B88 grain size = 0.08 mm
HPW (718)	Hust, Powell, and Weitzel (1969) and Hust, Weitzel, and Powell (1971)	Inconel 718 (age hardened) Ni(54.57), Cr(18.06), Fe(17.08), Nb + Ta(5.12), Mo(3.18), Ti(0.85), Al(0.44), Mn(0.29), Si(0.24), Cu, C, S	Rockwell hardness = C39, Density = 8.261 g/cm^3 at 20°C, RRR = 1.06, grain size = 0.06 uncertainty = 2.5%
HPW (718A)	Hust and Sparks (1970)	Inconel 718 full anneal condition Ni(54.57), Cr(18.06), Fe(17.08), Nb + Ta(5.12), Mo(3.18), Ti(0.85), Al(0.44), Mn(0.29), Si(0.24), Cu, C, S	anneal at 1035°C for 1 hour RRR = 1.32, Hardness = B85, Density = 8.261 g/cm^3 at 20°C, Grain size = 0.04 mm

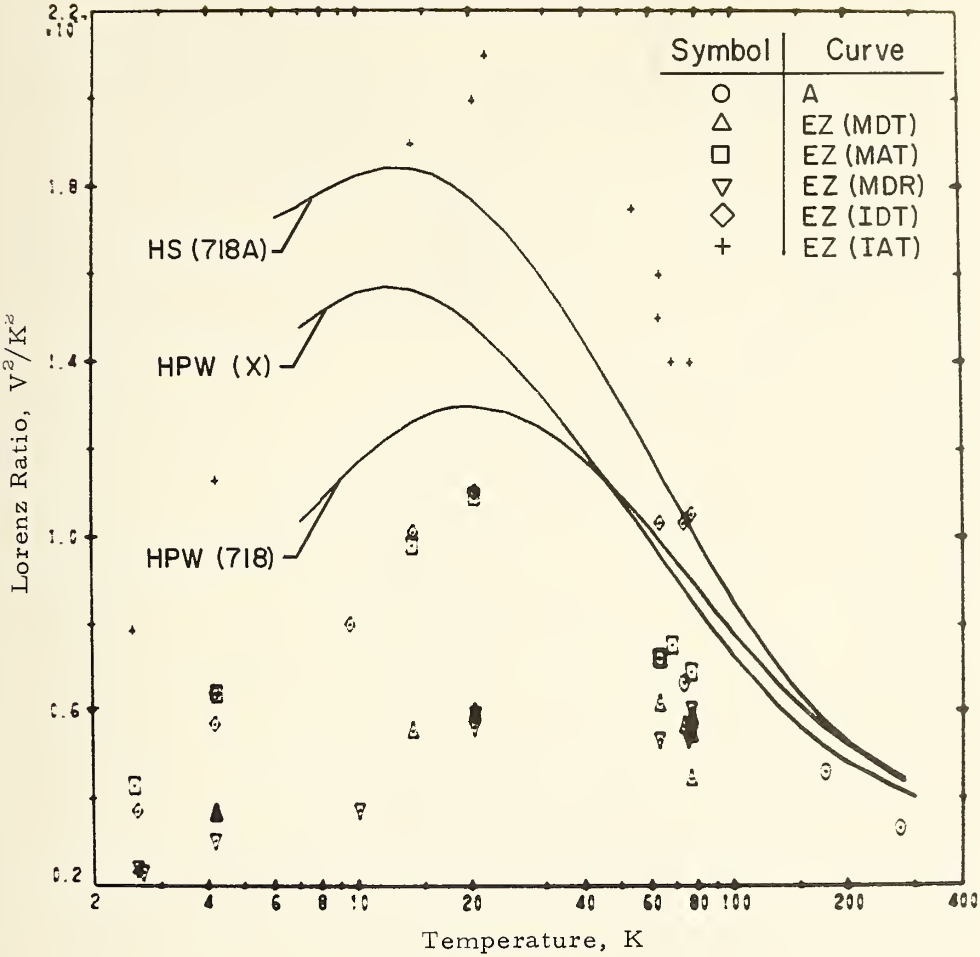

Figure 23. Lorenz ratio of nickel alloys

Platinum

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION · REMARKS
PTW	Powell, Tye and Woodman (1967)	Johnson - Matthey Company Pt, (Ag, Fe, Ni, Pd, and Cu each less than 1 ppm)	Annealed at 1273 K, RRR = 740, Density = 21.5 g/cm^3, uncertainty = 7%
	Powell, Tye and Woodman (1967)	Johnson - Matthey Company Pt, (Ag, Fe, Ni, Pd, and Cu each less than 1 ppm)	annealed at 1250 K, density = 21.5 g/cm^3 $L = 2.66 \times 10^{-8}\ V^2/K^2$ at 300 K
WW	White and Woods (1957)	Baker Platinum Company Pt (99.99)	annealed at 1050°C, RRR = 842 Data read from small graph
	Gruneisen and Goens (1927)	Heraeus Pt (very pure)	annealed $L = 1.13 \times 10^{-8}\ V^2/K^2$ at 21.1 K $L = 83.2 \times 10^{-8}\ V^2/K^2$ at 83.2 K
	Gruneisen and Goens (1927)	Heraeus Pt (pure)	annealed $L = 1.25 \times 10^{-8}\ V^2/K^2$ at 21.2 K
MMB (1)	Moore, McElroy, and Barisoni (1966)	Pt (99.999) Powell, Tye and Woodman's (1967) specimen	RRR = 700, Density = 21.5 g/cm^3 uncertainty = 2%
MMB (2)	Moore, McElroy, and Barisoni (1966)	Pt (99.98) Specimen supplied by D.R. Flynn of NBS, Washington	RRR = 425

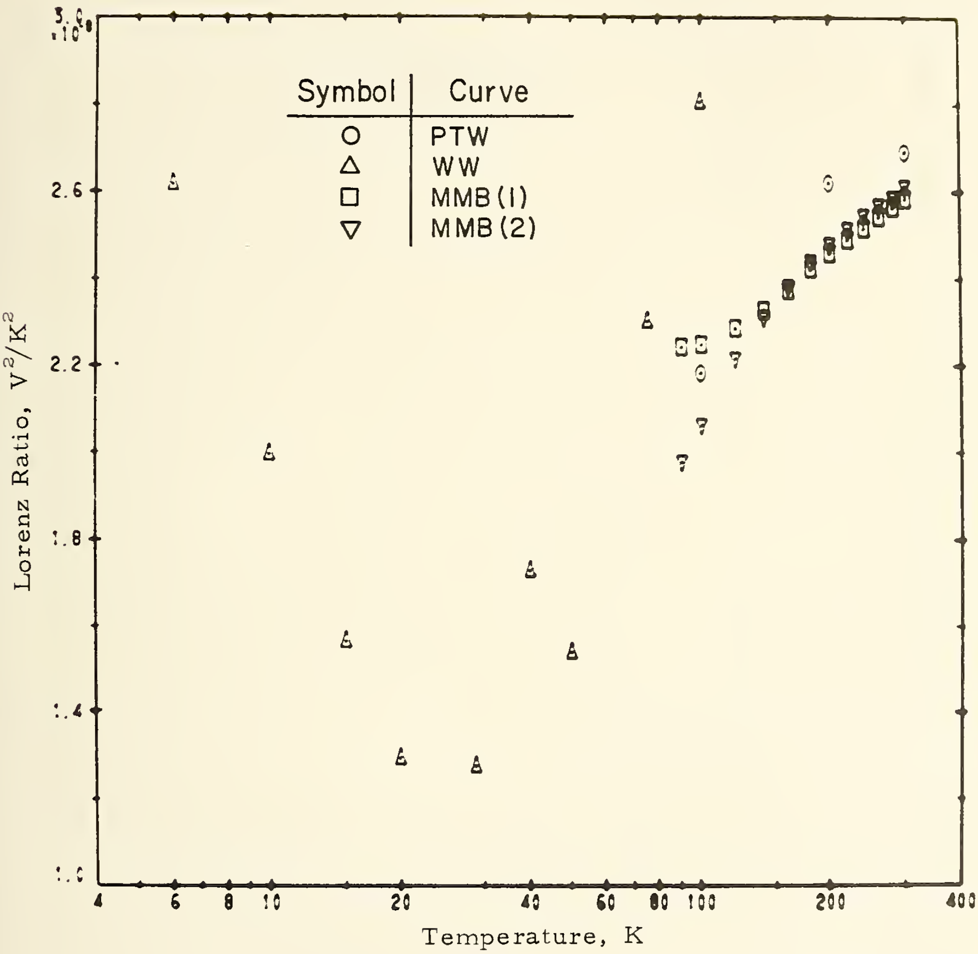

Figure 24. Lorenz ratio of platinum

Palladium

CURVE	INVESTIGATOR(S) (YEAR)	SPECIMEN SOURCE AND COMPOSITION (%)	MISCELLANEOUS SPECIMEN CHARACTERIZATION - REMARKS
	Powell, Tye, and Woodman (1967)	Johnson - Matthey Company Pd, Fe (5 ppm), Au (5 ppm), Ag (<1 ppm), Cu (1ppm), Rh(50 ppm), Pt (2 ppm)	RRR = 69, As received Density = 12.02 g/cm^3, uncertainty = 7% L = 2.73 x 10^{-8} V^2/K^2 at 300 K
KKSW	Lemp, Klemens, Sreedhar, and White (1955)	Johnson - Matthey Company Pd (99.99), Ca, Cu, Si, Mg, Ag	RRR = 500 annealed at 250°C to 1000°C for four hours. Specimen was measured in six differenct physical conditions

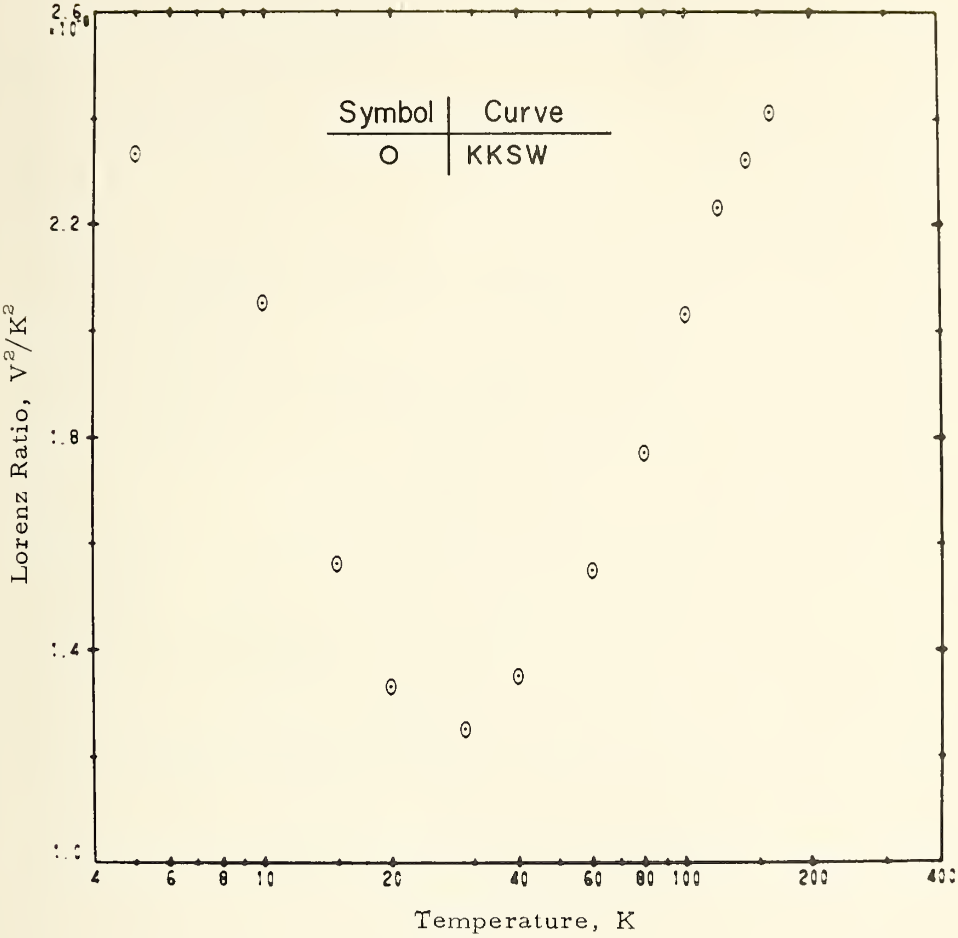

Figure 25. Lorenz ratio of palladium

Appendix II - Data Tabulation

HUST, WEITZEL, AND POWELL(1971), BE-HWP

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
70.0	3.00-008	70.0	3.00-008
75.0	3.01-008	75.0	3.01-008
80.0	3.01-008	80.0	3.01-008
85.0	3.01-008	85.0	3.01-008
90.0	3.01-008	90.0	3.01-008
95.0	3.01-008	95.0	3.01-008
100.0	3.00-008	100.0	3.00-008
110.0	2.99-008	110.0	2.99-008
120.0	2.97-008	120.0	2.97-008
130.0	2.97-008	130.0	2.97-008
140.0	2.97-008	140.0	2.97-008
150.0	2.97-008	150.0	2.97-008
160.0	2.98-008	160.0	2.98-008
170.0	3.00-008	170.0	3.00-008
180.0	3.02-008	180.0	3.02-008
190.0	3.04-008	190.0	3.04-008
200.0	3.06-008	200.0	3.06-008
220.0	3.10-008	220.0	3.10-008
240.0	3.15-008	240.0	3.15-008
260.0	3.19-008	260.0	3.19-008
280.0	3.22-008	280.0	3.22-008

LEWIS(9129),BE-L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	1.72-008	103.0	1.72-008
123.0	1.72-008	123.0	1.72-008
143.0	1.82-008	143.0	1.82-008
163.0	1.98-008	163.0	1.98-008
183.0	2.18-008	183.0	2.18-008
203.0	2.40-008	203.0	2.40-008
223.0	2.67-008	223.0	2.67-008
243.0	2.98-008	243.0	2.98-008
263.0	3.28-008	263.0	3.28-008
273.0	3.46-008	273.0	3.46-008
293.0	3.77-008	293.0	3.77-008

POWELL, HAROEN, AND GIBSON(1960), BE-PHG(PARALLEL)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.2	2.21-008	4.2	2.21-008
10.0	2.32-008	10.0	2.32-008
20.0	2.40-008	20.0	2.40-008
30.0	2.45-008	30.0	2.45-008
40.0	2.50-008	40.0	2.50-008
50.0	2.53-008	50.0	2.53-008
60.0	2.52-008	60.0	2.52-008
70.0	2.50-008	70.0	2.50-008
80.0	2.45-008	80.0	2.45-008
90.0	2.44-008	90.0	2.44-008
100.0	2.44-008	100.0	2.44-008

POWELL, HAROEN, ANO GIBSON(1960), BE-PHG(PERPENOICULAR)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.2	2.12-008	4.2	2.12-008
10.0	2.30-008	10.0	2.30-008
20.0	2.49-008	20.0	2.49-008
30.0	2.62-008	30.0	2.62-008
40.0	2.70-008	40.0	2.70-008
50.0	2.73-008	50.0	2.73-008
60.0	2.78-008	60.0	2.78-008
70.0	2.78-008	70.0	2.78-008
80.0	2.80-008	80.0	2.80-008
90.0	2.80-008	90.0	2.80-008
100.0	2.80-008	100.0	2.80-008

WHITE AND WOOOS(1955), BE-WW(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
10.0	3.30-008	10.0	1.10-006	3.00-001
20.0	2.75-008	20.0	1.10-006	5.00-001
30.0	3.30-008	30.0	1.10-006	9.00-001
40.0	3.05-008	40.0	1.11-006	1.10+000
50.0	3.16-008	50.0	1.13-006	1.40+000
60.0	2.97-008	60.0	1.15-006	1.55+000
70.0	3.12-008	70.0	1.18-006	1.85+000
80.0	3.00-008	80.0	1.20-006	2.00+000
90.0	2.68-008	90.0	1.12-006	2.15+000

WHITE ANO WOOOS(1955), BE-WW(2)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
10.0	3.45-008	10.0	1.15-006	3.00-001
20.0	2.88-008	20.0	1.15-006	5.00-001
30.0	3.45-008	30.0	1.15-006	9.00-001
40.0	3.16-008	40.0	1.15-006	1.10+000
50.0	3.36-008	50.0	1.20-006	1.40+000
60.0	3.20-008	60.0	1.24-006	1.55+000
70.0	3.38-008	70.0	1.28-006	1.85+000
80.0	3.27-008	80.0	1.31-006	2.00+000
90.0	3.22-008	90.0	1.35-006	2.15+000

MAGNESIUM

SEE APPENDIX I - MAGNESIUM

Aluminum

AMUNOSEN, MYHRE, ANO SALTER(1972), AL-AMS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.44-008	2.0	2.44-008
3.0	2.41-008	3.0	2.41-008
4.0	2.37-008	4.0	2.37-008

AMUNOSEN, MYHRE, ANO SALTER(1972), AL-AMS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.42-008	2.0	2.42-008
3.0	2.38-008	3.0	2.38-008
4.0	2.30-008	4.0	2.30-008

AMUNOSEN, MYHRE, ANO SALTER(1972), AL-AMS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.44-008	2.0	2.44-008
3.0	2.44-008	3.0	2.44-008
4.0	2.43-008	4.0	2.43-008

ANOREWS, WEBBER, ANO SPOHR(1951), AL-AWS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.2	2.34-008	4.2	2.34-008
14.5	1.80-008	14.5	1.80-008
20.4	1.40-008	20.4	1.40-008

ANOREWS, WEBBER, ANO SPOHR(1951), AL-AWS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.2	2.41-008	4.2	2.41-008
14.5	1.88-008	14.5	1.88-008
20.4	1.57-008	20.4	1.57-008

FENTON,ROGERS, ANO WOOOS(1963), AL-FRW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.3	2.43-008	2.3	2.43-008
5.0	2.23-008	5.0	2.23-008
10.0	1.55-008	10.0	1.55-008
15.0	1.10-008	15.0	1.10-008
20.0	8.90-009	20.0	8.90-009
25.0	7.90-009	25.0	7.90-009
30.0	8.70-009	30.0	8.70-009
33.4	9.80-009	33.4	9.80-009

FENTON,ROGERS, ANO WOOOS(1963), AL-FRW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.3	2.47-008	2.3	2.47-008
5.0	2.36-008	5.0	2.36-008
10.0	1.77-008	10.0	1.77-008
15.0	1.24-008	15.0	1.24-008
20.0	9.30-009	20.0	9.30-009
22.9	8.40-009	22.9	8.40-009

LEES(1908), AL-L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	1.50-008	103.0	1.50-008
113.0	1.54-008	113.0	1.54-008
123.0	1.61-008	123.0	1.61-008
148.0	1.70-008	148.0	1.70-008
173.0	1.81-008	173.0	1.81-008
198.0	1.90-008	198.0	1.90-008
223.0	1.98-008	223.0	1.98-008
248.0	2.04-008	248.0	2.04-008
273.0	2.09-008	273.0	2.09-008
291.0	2.13-008	291.0	2.13-008

MOORE, MCELROY, ANO BARSONI(1966), AL-MMB

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	1.16-008	100.0	4.41-007	2.63+000
120.0	1.30-008	120.0	6.68-007	2.33+000
140.0	1.43-008	140.0	9.01-007	2.22+000
160.0	1.55-008	160.0	1.13-006	2.19+000
180.0	1.68-008	180.0	1.37-006	2.21+000
200.0	1.80-008	200.0	1.60-006	2.25+000
220.0	1.90-008	220.0	1.83-006	2.28+000
240.0	1.99-008	240.0	2.06-006	2.32+000
260.0	2.07-008	260.0	2.29-006	2.35+000
280.0	2.14-008	280.0	2.52-006	2.37+000
300.0	2.18-008	300.0	2.75-006	2.38+000

POWELL, HALL, ANO ROOER(1960),AL-PHR(SC)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.48-008	2.0	2.48-008
20.0	2.01-008	20.0	2.01-008
40.0	1.65-008	40.0	1.65-008
60.0	1.31-008	60.0	1.31-008
80.0	1.24-008	80.0	1.24-008
85.9	1.22-008	85.9	1.22-008

POWELL, HALL, ANO ROOER(1960),AL-PHR(1100-0)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.44-008	2.0	2.44-008
20.0	2.36-008	20.0	2.36-008
40.0	2.10-008	40.0	2.10-008
60.0	1.78-008	60.0	1.78-008
80.0	1.59-008	80.0	1.59-008
100.0	1.55-008	100.0	1.55-008

POWELL, TYE, ANO WOOOMAN(1965), AL-PTW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
123.1	1.49-008	-150.0	1.49-008
173.1	1.74-008	-100.0	1.74-008
223.1	1.91-008	-50.0	1.91-008
273.1	2.09-008	0.0	2.09-008

Aluminum Alloys

HUST AND SPARKS(1971C), AL-ALLOYS-HS(T86)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.48-008	5.0	2.48-008
6.0	2.50-008	6.0	2.50-008
7.0	2.51-008	7.0	2.51-008
8.0	2.51-008	8.0	2.51-008
9.0	2.51-008	9.0	2.51-008
10.0	2.51-008	10.0	2.51-008
12.0	2.51-008	12.0	2.51-008
14.0	2.51-008	14.0	2.51-008
16.0	2.53-008	16.0	2.53-008
18.0	2.54-008	18.0	2.54-008
20.0	2.54-008	20.0	2.54-008
25.0	2.55-008	25.0	2.55-008
30.0	2.54-008	30.0	2.54-008
35.0	2.51-008	35.0	2.51-008
40.0	2.48-008	40.0	2.48-008
45.0	2.44-008	45.0	2.44-008
50.0	2.40-008	50.0	2.40-008
55.0	2.36-008	55.0	2.36-008
60.0	2.32-008	60.0	2.32-008
65.0	2.29-008	65.0	2.29-008
70.0	2.26-008	70.0	2.26-008
75.0	2.24-008	75.0	2.24-008
80.0	2.22-008	80.0	2.22-008
85.0	2.20-008	85.0	2.20-008
90.0	2.18-008	90.0	2.18-008
95.0	2.17-008	95.0	2.17-008
100.0	2.16-008	100.0	2.16-008
110.0	2.15-008	110.0	2.15-008
120.0	2.14-008	120.0	2.14-008
130.0	2.14-008	130.0	2.14-008
140.0	2.14-008	140.0	2.14-008
150.0	2.15-008	150.0	2.15-008
160.0	2.16-008	160.0	2.16-008
170.0	2.17-008	170.0	2.17-008
180.0	2.18-008	180.0	2.18-008
190.0	2.20-008	190.0	2.20-008
200.0	2.21-008	200.0	2.21-008
220.0	2.24-008	220.0	2.24-008
240.0	2.28-008	240.0	2.28-008
260.0	2.30-008	260.0	2.30-008
280.0	2.33-008	280.0	2.33-008

HUST AND SPARKS(1971C), AL-ALLOYS-HS(ANN)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.44-008	5.0	2.44-008
6.0	2.46-008	6.0	2.46-008
7.0	2.48-008	7.0	2.48-008
8.0	2.50-008	8.0	2.50-008
9.0	2.50-008	9.0	2.50-008
10.0	2.50-008	10.0	2.50-008
12.0	2.50-008	12.0	2.50-008
14.0	2.49-008	14.0	2.49-008
16.0	2.49-008	16.0	2.49-008
18.0	2.48-008	18.0	2.48-008
20.0	2.48-008	20.0	2.48-008
25.0	2.45-008	25.0	2.45-008
30.0	2.41-008	30.0	2.41-008
35.0	2.35-008	35.0	2.35-008
40.0	2.28-008	40.0	2.28-008
45.0	2.21-008	45.0	2.21-008
50.0	2.14-008	50.0	2.14-008
55.0	2.08-008	55.0	2.08-008
60.0	2.03-008	60.0	2.03-008
65.0	1.98-008	65.0	1.98-008
70.0	1.94-008	70.0	1.94-008
75.0	1.91-008	75.0	1.91-008
80.0	1.89-008	80.0	1.89-008
85.0	1.87-008	85.0	1.87-008
90.0	1.85-008	90.0	1.85-008
95.0	1.84-008	95.0	1.84-008
100.0	1.84-008	100.0	1.84-008
110.0	1.83-008	110.0	1.83-008
120.0	1.84-008	120.0	1.84-008
130.0	1.86-008	130.0	1.86-008
140.0	1.88-008	140.0	1.88-008
150.0	1.91-008	150.0	1.91-008
160.0	1.94-008	160.0	1.94-008
170.0	1.97-008	170.0	1.97-008
180.0	2.01-008	180.0	2.01-008
190.0	2.04-008	190.0	2.04-008
200.0	2.06-008	200.0	2.06-008
220.0	2.12-008	220.0	2.12-008
240.0	2.16-008	240.0	2.16-008
260.0	2.19-008	260.0	2.19-008
280.0	2.23-008	280.0	2.23-008

HUST, WEITZEL, AND POWELL(1971), AL ALLOYS-HWP

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
6.0	2.47-008	6.0	2.47-008
7.0	2.50-008	7.0	2.50-008
8.0	2.52-008	8.0	2.52-008
9.0	2.52-008	9.0	2.52-008
10.0	2.52-008	10.0	2.52-008
12.0	2.52-008	12.0	2.52-008
14.0	2.52-008	14.0	2.52-008
16.0	2.53-008	16.0	2.53-008
18.0	2.53-008	18.0	2.53-008
20.0	2.53-008	20.0	2.53-008
25.0	2.53-008	25.0	2.53-008
30.0	2.51-008	30.0	2.51-008
35.0	2.49-008	35.0	2.49-008
40.0	2.45-008	40.0	2.45-008
45.0	2.42-008	45.0	2.42-008
50.0	2.38-008	50.0	2.38-008
55.0	2.35-008	55.0	2.35-008
60.0	2.31-008	60.0	2.31-008
65.0	2.29-008	65.0	2.29-008
70.0	2.26-008	70.0	2.26-008
75.0	2.24-008	75.0	2.24-008
80.0	2.22-008	80.0	2.22-008
85.0	2.21-008	85.0	2.21-008
90.0	2.19-008	90.0	2.19-008
95.0	2.18-008	95.0	2.18-008
100.0	2.18-008	100.0	2.18-008
110.0	2.17-008	110.0	2.17-008
120.0	2.17-008	120.0	2.17-008
130.0	2.17-008	130.0	2.17-008
140.0	2.18-008	140.0	2.18-008
150.0	2.20-008	150.0	2.20-008
160.0	2.21-008	160.0	2.21-008
170.0	2.24-008	170.0	2.24-008
180.0	2.26-008	180.0	2.26-008
190.0	2.28-008	190.0	2.28-008
200.0	2.31-008	200.0	2.31-008
220.0	2.36-008	220.0	2.36-008
240.0	2.40-008	240.0	2.40-008
260.0	2.44-008	260.0	2.44-008
280.0	2.47-008	280.0	2.47-008

POWELL, HALL, AND RODER(1960), AL ALLOYS- PHR(L/LO)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.49-008	2.0	2.49-008
20.0	2.37-008	20.0	2.37-008
40.0	2.17-008	40.0	2.17-008
60.0	1.90-008	60.0	1.90-008
80.0	1.65-008	80.0	1.65-008
100.0	1.61-008	100.0	1.61-008

POWELL, HALL, AND RODER(1960), AL ALLOYS- PHR(5154)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.18-008	2.0	2.18-008
20.0	2.60-008	20.0	2.60-008
40.0	2.51-008	40.0	2.51-008
60.0	2.37-008	60.0	2.37-008
80.0	2.27-008	80.0	2.27-008

POWELL, HALL, AND RODER(1960), AL ALLOYS- PHR(5086)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.22-008	2.0	2.22-008
20.0	2.54-008	20.0	2.54-008
40.0	2.55-008	40.0	2.55-008
60.0	2.41-008	60.0	2.41-008
80.0	2.28-008	80.0	2.28-008
100.0	2.23-008	100.0	2.23-008

POWELL, HALL, AND RODER(1960), AL ALLOYS- PHR(5052)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.32-008	2.0	2.32-008
20.0	2.65-008	20.0	2.65-008
40.0	2.61-008	40.0	2.61-008
60.0	2.46-008	60.0	2.46-008
80.0	2.31-008	80.0	2.31-008
100.0	2.25-008	100.0	2.25-008

POWELL, HALL, AND RODER(1960), AL ALLOYS- PHR(2024)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.46-008	2.0	2.46-008
20.0	2.65-008	20.0	2.65-008
40.0	2.58-008	40.0	2.58-008
60.0	2.48-008	60.0	2.48-008

LEES(1908), PB AND SN-L (PB)

TEMP	LORENZ RATIO
103.0	2.55-008
113.0	2.53-008
123.0	2.52-008
148.0	2.54-008
173.0	2.54-008
198.0	2.51-008
223.0	2.52-008
248.0	2.51-008
273.0	2.53-008
291.0	2.51-008

TEMP	LORENZ RATIO
103.0	2.55-008
113.0	2.53-008
123.0	2.52-008
148.0	2.54-008
173.0	2.54-008
198.0	2.51-008
223.0	2.52-008
248.0	2.51-008
273.0	2.53-008
291.0	2.51-008

LEES(1908), PB AND SN-L (SN)

TEMP	LORENZ RATIO
103.0	2.48-008
113.0	2.49-008
123.0	2.53-008
148.0	2.52-008
173.0	2.51-008
198.0	2.52-008
223.0	2.53-008
248.0	2.51-008
273.0	2.49-008
291.0	2.47-008

TEMP	LORENZ RATIO
103.0	2.48-008
113.0	2.49-008
123.0	2.53-008
148.0	2.52-008
173.0	2.51-008
198.0	2.52-008
223.0	2.53-008
248.0	2.51-008
273.0	2.49-008
291.0	2.47-008

HUST AND SPARKS(1971), AU-HS(2)

TEMP	LORENZ RATIO
6.0	2.35-008
7.0	2.43-008
8.0	2.39-008
9.0	2.33-008
10.0	2.27-008
12.0	2.15-008
14.0	2.04-008
16.0	1.93-008
18.0	1.84-008
20.0	1.76-008
25.0	1.64-008
30.0	1.60-008
35.0	1.61-008
40.0	1.63-008
45.0	1.67-008
50.0	1.71-008
55.0	1.77-008
60.0	1.82-008
65.0	1.87-008
70.0	1.92-008
75.0	1.97-008
80.0	2.01-008
85.0	2.05-008
90.0	2.08-008
95.0	2.11-008
100.0	2.14-008
110.0	2.19-008
120.0	2.22-008
130.0	2.26-008
140.0	2.29-008
150.0	2.32-008
160.0	2.33-008
170.0	2.33-008

TEMP	LORENZ RATIO
6.0	2.35-008
7.0	2.43-008
8.0	2.39-008
9.0	2.33-008
10.0	2.27-008
12.0	2.15-008
14.0	2.04-008
16.0	1.93-008
18.0	1.84-008
20.0	1.76-008
25.0	1.64-008
30.0	1.60-008
35.0	1.61-008
40.0	1.63-008
45.0	1.67-008
50.0	1.71-008
55.0	1.77-008
60.0	1.82-008
65.0	1.87-008
70.0	1.92-008
75.0	1.97-008
80.0	2.01-008
85.0	2.05-008
90.0	2.08-008
95.0	2.11-008
100.0	2.14-008
110.0	2.19-008
120.0	2.22-008
130.0	2.26-008
140.0	2.29-008
150.0	2.32-008
160.0	2.33-008
170.0	2.33-008

HUST AND SPARKS(1971), AU-HS(1)

TEMP	LORENZ RATIO
7.0	2.16-008
8.0	2.15-008
9.0	2.17-008
10.0	2.16-008
12.0	2.07-008
14.0	1.93-008
16.0	1.79-008
18.0	1.69-008
20.0	1.61-008
25.0	1.54-008
30.0	1.53-008
35.0	1.55-008
40.0	1.59-008
45.0	1.63-008
50.0	1.68-008
55.0	1.73-008
60.0	1.79-008
65.0	1.85-008
70.0	1.90-008
75.0	1.95-008
80.0	2.00-008
85.0	2.05-008
90.0	2.09-008
95.0	2.12-008
100.0	2.15-008
110.0	2.20-008
120.0	2.23-008
130.0	2.26-008
140.0	2.28-008
150.0	2.30-008
160.0	2.31-008
170.0	2.33-008
180.0	2.34-008
190.0	2.36-008
200.0	2.37-008
220.0	2.39-008
240.0	2.40-008
260.0	2.41-008
280.0	2.41-008

TEMP	LORENZ RATIO
7.0	2.16-008
8.0	2.15-008
9.0	2.17-008
10.0	2.16-008
12.0	2.07-008
14.0	1.93-008
16.0	1.79-008
18.0	1.69-008
20.0	1.61-008
25.0	1.54-008
30.0	1.53-008
35.0	1.55-008
40.0	1.59-008
45.0	1.63-008
50.0	1.68-008
55.0	1.73-008
60.0	1.79-008
65.0	1.85-008
70.0	1.90-008
75.0	1.95-008
80.0	2.00-008
85.0	2.05-008
90.0	2.09-008
95.0	2.12-008
100.0	2.15-008
110.0	2.20-008
120.0	2.23-008
130.0	2.26-008
140.0	2.28-008
150.0	2.30-008
160.0	2.31-008
170.0	2.33-008
180.0	2.34-008
190.0	2.36-008
200.0	2.37-008
220.0	2.39-008
240.0	2.40-008
260.0	2.41-008
280.0	2.41-008

HUST AND SPARKS(1971), AU-HS(3)

TEMP	LORENZ RATIO
7.0	2.21-008
8.0	1.99-008
9.0	1.90-008
10.0	1.84-008
12.0	1.70-008
14.0	1.53-008
16.0	1.41-008
18.0	1.34-008
20.0	1.32-008
25.0	1.36-008
30.0	1.42-008
35.0	1.46-008
40.0	1.51-008
45.0	1.56-008
50.0	1.62-008
55.0	1.69-008
60.0	1.75-008
65.0	1.82-008
70.0	1.88-008
75.0	1.93-008
80.0	1.98-008
85.0	2.02-008
90.0	2.06-008
95.0	2.10-008
100.0	2.13-008
110.0	2.17-008
120.0	2.21-008
130.0	2.24-008
140.0	2.27-008
150.0	2.29-008
160.0	2.31-008
170.0	2.33-008

TEMP	LORENZ RATIO
7.0	2.21-008
8.0	1.99-008
9.0	1.90-008
10.0	1.84-008
12.0	1.70-008
14.0	1.53-008
16.0	1.41-008
18.0	1.34-008
20.0	1.32-008
25.0	1.36-008
30.0	1.42-008
35.0	1.46-008
40.0	1.51-008
45.0	1.56-008
50.0	1.62-008
55.0	1.69-008
60.0	1.75-008
65.0	1.82-008
70.0	1.88-008
75.0	1.93-008
80.0	1.98-008
85.0	2.02-008
90.0	2.06-008
95.0	2.10-008
100.0	2.13-008
110.0	2.17-008
120.0	2.21-008
130.0	2.24-008
140.0	2.27-008
150.0	2.29-008
160.0	2.31-008
170.0	2.33-008

Gold Cobalt Alloy

POWELL, BUNCH, AND GIBSON(1960), AU CO ALLOY-PBG

TEMP	LORENZ RATIO
4.0	3.01-008
10.0	4.90-008
15.0	5.20-008
20.0	5.08-008
30.0	4.51-008
40.0	4.02-008
50.0	3.70-008
60.0	3.45-008
70.0	3.27-008
80.0	3.12-008
90.0	3.00-008

TEMP	LORENZ RATIO
4.0	3.01-008
10.0	4.90-008
15.0	5.20-008
20.0	5.08-008
30.0	4.51-008
40.0	4.02-008
50.0	3.70-008
60.0	3.45-008
70.0	3.27-008
80.0	3.12-008
90.0	3.00-008

Silver

FENTON, ROGERS, ANO WOOOS(1963), AG -FRW (1)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.2	2.43-008	2.2	2.43-008
4.0	2.34-008	4.0	2.34-008
8.0	1.75-008	8.0	1.75-008
10.9	1.31-008	10.9	1.31-008

FENTON, ROGERS, ANO WOODS(1963), AG -FRW (2)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.41-008	2.0	2.41-008
4.0	2.25-008	4.0	2.25-008
8.0	1.58-008	8.0	1.58-008
14.0	1.01-008	14.0	1.01-008
16.5	1.00-008	16.5	1.00-008

KANNULUIK(1933), AG-K(1)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	2.31-008	0.0	2.31-008
194.6	2.24-008	-78.5	2.24-008
90.1	1.80-008	-183.0	1.80-008

KANNULUIK(1933), AG-K(2)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	2.31-008	0.0	2.31-008
194.6	2.24-008	-78.5	2.24-008
90.1	1.62-008	-183.0	1.62-008

LEES(1908), AG-L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	2.04-008	103.0	2.04-008
113.0	2.09-008	113.0	2.09-008
123.0	2.13-008	123.0	2.13-008
148.0	2.24-008	148.0	2.24-008
173.0	2.29-008	173.0	2.29-008
198.0	2.34-008	198.0	2.34-008
223.0	2.36-008	223.0	2.36-008
248.0	2.35-008	248.0	2.35-008
273.0	2.33-008	273.0	2.33-008
291.0	2.33-008	291.0	2.33-008

MALM ANO WOOOS(1966), AG-MW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
2.0	2.45-008	2.0	4.90-007	1.00-001
3.0	2.51-008	3.0	5.03-007	1.50-001
4.0	2.59-008	4.0	5.10-007	2.03-001
6.0	2.99-008	6.0	5.13-007	3.50-001
8.0	3.57-008	8.0	5.10-007	5.60-001
10.0	3.56-008	10.0	5.08-007	7.00-001
12.0	3.81-008	12.0	5.08-007	9.00-001
14.0	3.69-008	14.0	5.07-007	1.02+000
16.0	3.65-008	16.0	5.08-007	1.15+000
18.0	3.53-008	18.0	5.09-007	1.25+000
20.0	3.44-008	20.0	5.10-007	1.35+000
22.0	3.34-008	22.0	5.14-007	1.43+000
24.0	3.25-008	24.0	5.20-007	1.50+000

MALM ANO WOOOS(1966), AG-MW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
2.0	2.48-008	2.0	1.72-007	2.88-001
3.0	2.69-008	3.0	1.73-007	4.67-001
4.0	2.72-008	4.0	1.73-007	6.30-001
6.0	2.85-008	6.0	1.71-007	1.00+000
8.0	2.93-008	8.0	1.70-007	1.38+000
10.0	2.86-008	10.0	1.69-007	1.69+000
12.0	3.36-008	12.0	1.68-007	2.40+000
16.0	2.85-008	16.0	1.69-007	2.70+000
18.0	2.85-008	18.0	1.70-007	3.02+000
20.0	2.86-008	20.0	1.73-007	3.31+000
22.0	2.82-008	22.0	1.75-007	3.54+000
24.0	2.78-008	24.0	1.80-007	3.71+000

MALM ANO WOOOS(1966), AG-MW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
2.0	2.64-008	2.0	9.60-008	5.49-001
3.0	2.75-008	3.0	9.50-008	8.70-001
4.0	2.82-008	4.0	9.40-008	1.20+000
6.0	2.88-008	6.0	9.30-008	1.86+000
8.0	2.90-008	8.0	9.25-008	2.51+000
10.0	3.05-008	10.0	9.22-008	3.31+000
12.0	2.85-008	12.0	9.23-008	3.71+000
14.0	2.76-008	14.0	9.29-008	4.16+000
16.0	2.74-008	16.0	9.40-008	4.67+000
18.0	2.54-008	18.0	9.56-008	4.79+000
20.0	2.55-008	20.0	9.75-008	5.24+000
22.0	2.46-008	22.0	1.01-007	5.36+000

MALM, AND WOODS(1966), AG-MW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
2.0	2.72-008	2.0	1.14-008	4.78+000
3.0	2.52-008	3.0	1.12-008	6.75+000
4.0	2.66-008	4.0	1.12-008	9.54+000
6.0	2.73-008	6.0	1.11-008	1.48+001
8.0	2.62-008	8.0	1.11-008	1.90+001
10.0	2.42-008	10.0	1.11-008	2.18+001
12.0	2.26-008	12.0	1.13-008	2.40+001
14.0	2.08-008	14.0	1.16-008	2.51+001

LEES(1908), CU-L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	1.85-008	103.0	1.85-008
113.0	1.92-008	113.0	1.92-008
123.0	1.97-008	123.0	1.97-008
148.0	2.07-008	148.0	2.07-008
173.0	2.17-008	173.0	2.17-008
198.0	2.23-008	198.0	2.23-008
223.0	2.26-008	223.0	2.26-008
248.0	2.28-008	248.0	2.28-008
273.0	2.30-008	273.0	2.30-008
291.0	2.32-008	291.0	2.32-008

MOORE, MCELROY, AND GRAVES(1967), CU-MMG

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
85.0	1.54-008	85.0	2.48-007	5.27+000
90.0	1.59-008	90.0	2.82-007	5.08+000
100.0	1.68-008	100.0	3.50-007	4.81+000
110.0	1.76-008	110.0	4.18-007	4.63+000
120.0	1.83-008	120.0	4.88-007	4.50+000
130.0	1.89-008	130.0	5.58-007	4.41+000
140.0	1.96-008	140.0	6.31-007	4.34+000
150.0	2.00-008	150.0	7.02-007	4.28+000
175.0	2.10-008	175.0	8.76-007	4.19+000
200.0	2.16-008	200.0	1.05-006	4.13+000
225.0	2.22-008	225.0	1.22-006	4.09+000
250.0	2.26-008	250.0	1.39-006	4.06+000
275.0	2.28-008	275.0	1.56-006	4.04+000
300.0	2.31-008	300.0	1.73-006	4.01+000

POWELL,RODER, AND HALL(1959), CU-PRH(CD)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.10-008	5.0	2.10-008
10.0	2.04-008	10.0	2.04-008
15.0	1.92-008	15.0	1.92-008
20.0	1.75-008	20.0	1.75-008
25.0	1.56-008	25.0	1.56-008
35.0	1.28-008	35.0	1.28-008
45.0	1.23-008	45.0	1.23-008
55.0	1.28-008	55.0	1.28-008
60.0	1.32-008	60.0	1.32-008
65.0	1.36-008	65.0	1.36-008
70.0	1.39-008	70.0	1.39-008
75.0	1.43-008	75.0	1.43-008
80.0	1.46-008	80.0	1.46-008
85.0	1.51-008	85.0	1.51-008

POWELL,RODER, AND HALL(1959), CU-PRH(ANN)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	1.83-008	5.0	1.83-008
10.0	1.51-008	10.0	1.51-008
15.0	1.07-008	15.0	1.07-008
20.0	8.80-009	20.0	8.80-009
25.0	8.40-009	25.0	8.40-009
35.0	9.30-009	35.0	9.30-009
45.0	1.04-008	45.0	1.04-008
55.0	1.15-008	55.0	1.15-008
65.0	1.26-008	65.0	1.26-008
75.0	1.37-008	75.0	1.37-008
80.0	1.42-008	80.0	1.42-008

WHITE AND TAINSH(WT), CU-WT

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.36-008	5.0	2.36-008
10.0	1.85-008	10.0	1.85-008
15.0	1.20-008	15.0	1.20-008
20.0	9.20-009	20.0	9.20-009
25.0	8.60-009	25.0	8.60-009
30.0	8.90-009	30.0	8.90-009
35.0	9.90-009	35.0	9.90-009
40.0	1.06-008	40.0	1.06-008
45.0	1.13-008	45.0	1.13-008
50.0	1.20-008	50.0	1.20-008
55.0	1.27-008	55.0	1.27-008
60.0	1.33-008	60.0	1.33-008
65.0	1.39-008	65.0	1.39-008
70.0	1.45-008	70.0	1.45-008
75.0	1.51-008	75.0	1.51-008
80.0	1.57-008	80.0	1.57-008
85.0	1.61-008	85.0	1.61-008
90.0	1.67-008	90.0	1.67-008
95.0	1.71-008	95.0	1.71-008
100.0	1.75-008	100.0	1.75-008

ALLEN AND MENDOZA(1947), CU ALLOYS-AM

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
1.4	3.50-009	1.4	3.27-006	1.50-003
2.0	7.19-009	2.0	3.27-006	4.40-003
3.0	1.56-008	3.0	3.27-006	1.43-002
4.0	2.80-008	4.0	3.27-006	3.43-002

BERMAN(1951),CUALLOYS- B(G-AG)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
4.0	9.18-008	4.0	4.42-005	8.31-003
10.0	1.53-007	10.0	4.42-005	3.46-002
20.0	1.08-007	20.0	2.43-005	8.89-002
50.0	1.51-007	50.0	4.45-005	1.70-001
81.2	1.07-007	81.2	4.55-005	1.90-001

BERMAN(1951),CUALLOYS- B(CON)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
4.0	4.47-008	4.0	2.65-005	6.75-003
10.0	7.29-008	10.0	2.65-005	2.75-002
20.0	9.40-008	20.0	2.66-005	7.07-002
50.0	7.96-008	50.0	2.69-005	1.48-001
81.2	5.75-008	81.2	2.75-005	1.70-001

KARWEIL AND SCHAFER(1939), CU ALLOYS-KS(SB)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	5.40-008	5.0	5.40-008
10.0	6.40-008	10.0	6.40-008
15.0	8.20-008	15.0	8.20-008
20.0	7.20-008	20.0	7.20-008

KARWEIL AND SCHAFER(1939), CU ALLOYS-KS(NS)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
3.0	4.10-008	3.0	4.10-008
5.0	4.90-008	5.0	4.90-008
10.0	7.90-008	10.0	7.90-008
15.0	9.40-008	15.0	9.40-008
20.0	9.90-008	20.0	9.90-008

LEES(1908), CU ALLOYS-L(G-AG)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	6.51-008	103.0	6.51-008
113.0	6.06-008	113.0	6.06-008
123.0	5.69-008	123.0	5.69-008
148.0	4.93-008	148.0	4.93-008
173.0	4.37-008	173.0	4.37-008
198.0	4.02-008	198.0	4.02-008
223.0	3.75-008	223.0	3.75-008
248.0	3.59-008	248.0	3.59-008
273.0	3.41-008	273.0	3.41-008
291.0	3.36-008	291.0	3.36-008

LEES(1908), CU ALLOYS-L(PTD)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	5.13-008	103.0	5.13-008
113.0	4.82-008	113.0	4.82-008
123.0	4.56-008	123.0	4.56-008
148.0	4.00-008	148.0	4.00-008
173.0	3.61-008	173.0	3.61-008
198.0	3.38-008	198.0	3.38-008
223.0	3.21-008	223.0	3.21-008
248.0	3.13-008	248.0	3.13-008
273.0	3.01-008	273.0	3.01-008
291.0	2.96-008	291.0	2.96-008

LEES(1908), CU ALLOYS-L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	2.78-008	103.0	2.78-008
113.0	2.71-008	113.0	2.71-008
123.0	2.65-008	123.0	2.65-008
148.0	2.57-008	148.0	2.57-008
173.0	2.54-008	173.0	2.54-008
198.0	2.51-008	198.0	2.51-008
223.0	2.47-008	223.0	2.47-008
248.0	2.46-008	248.0	2.46-008
273.0	2.45-008	273.0	2.45-008
291.0	2.45-008	291.0	2.45-008

GOENS ANO GRUNEISEN(1932), ZN ANO CO-GG(ZN-PERPENOICULAR)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
293.2	2.56-008	293.2	2.56-008
83.2	2.04-008	83.2	2.04-008
21.2	1.47-008	21.2	1.47-008

GOENS ANO GRUNEISEN(1932), ZN ANO CO-GG(ZN-PARALLEL

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
293.2	2.47-008	293.2	2.47-008
83.2	1.90-008	83.2	1.90-008
21.2	9.70-009	21.2	9.70-009

LEES(1908), ZN ANO CO-L(ZN)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	2.20-008	103.0	2.20-008
113.0	2.25-008	113.0	2.25-008
123.0	2.30-008	123.0	2.30-008
148.0	2.33-008	148.0	2.33-008
173.0	2.39-008	173.0	2.39-008
198.0	2.41-008	198.0	2.41-008
223.0	2.40-008	223.0	2.40-008
248.0	2.44-008	248.0	2.44-008
273.0	2.45-008	273.0	2.45-008
291.0	2.43-008	291.0	2.43-008

GOENS ANO GRUNISEN(1932), ZN ANO CO-GG(CO-PARALLEL)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
293.2	2.37-008	293.2	2.37-008
83.2	2.20-008	83.2	2.20-008
21.2	1.60-008	21.2	1.60-008

GOENS ANO GRUNEISEN(1932), ZN ANO CO-GG(CO-PERPENOICULAR)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
293.2	2.44-008	293.2	2.44-008
83.2	2.21-008	83.2	2.21-008
21.2	1.27-008	21.2	1.27-008

LEES(1908), ZN ANO CO- L(CO)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	2.39-008	103.0	2.39-008
113.0	2.41-008	113.0	2.41-008
123.0	2.42-008	123.0	2.42-008
148.0	2.43-008	148.0	2.43-008
173.0	2.43-008	173.0	2.43-008
198.0	2.42-008	198.0	2.42-008
223.0	2.41-008	223.0	2.41-008
248.0	2.40-008	248.0	2.40-008
273.0	2.40-008	273.0	2.40-008
291.0	2.39-008	291.0	2.39-008

ARAJS ANO COLVIN(1964), SC ANO Y-AC

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.2	7.00-008	4.2	7.00-008
20.0	6.00-008	20.0	6.00-008
40.0	4.20-008	40.0	4.20-u08
60.0	3.30-008	60.0	3.30-u08
80.0	3.10-008	80.0	3.10-008
120.0	3.15-008	120.0	3.15-008
160.0	3.30-008	160.0	3.30-008
200.0	3.60-008	200.0	3.60-008
240.0	3.85-008	240.0	3.85-008
280.0	4.35-008	280.0	4.35-008
300.0	4.65-008	300.0	4.65-008

TAMARIN, CHUPRIKOV, ANO SHALYT(1969), SC ANO Y- TCS(PARALLEL)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	4.20-008	5.0	4.20-008
10.0	4.70-008	10.0	4.70-008
17.0	5.00-008	17.0	5.00-008
20.0	4.90-008	20.0	4.90-008
30.0	4.50-008	30.0	4.50-008
40.0	4.10-008	40.0	4.10-008
50.0	3.95-008	50.0	3.95-008
60.0	3.90-008	60.0	3.90-008
70.0	3.80-008	70.0	3.80-008
80.0	3.77-008	80.0	3.77-008
90.0	3.75-008	90.0	3.75-008
100.0	3.72-008	100.0	3.72-008
110.0	3.70-008	110.0	3.70-008
120.0	3.68-008	120.0	3.68-008
130.0	3.67-008	130.0	3.67-008
140.0	3.66-008	140.0	3.66-008
150.0	3.65-008	150.0	3.65-008

TAMARIN, SHUPRIKOV, ANO SHALYT(1969), SC ANO Y- TCS PERPENOICULAR)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	3.00-008	5.0	3.00-008
10.0	3.05-008	10.0	3.05-u08
14.0	3.10-008	14.0	3.10-u08
20.0	3.00-008	20.0	3.00-008
30.0	2.47-008	30.0	2.47-008
40.0	2.00-008	40.0	2.00-008
50.0	1.95-008	50.0	1.95-008
60.0	1.90-008	60.0	1.90-008
70.0	1.95-008	70.0	1.95-008
80.0	2.00-008	80.0	2.00-008
100.0	2.03-008	100.0	2.03-008
120.0	2.47-008	120.0	2.47-008
140.0	2.50-008	140.0	2.50-008
150.0	2.53-008	150.0	2.53-008

Titanium, Hafnium, and Zirconium

KEMP, KLEMENS, AND WHITE(1956), TI,HF,ANDZR-KKW(TI)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
3.3	2.95-008	3.3	2.95-008
10.0	3.58-008	10.0	3.58-008
20.0	4.30-008	20.0	4.30-008
30.0	4.62-008	30.0	4.62-008
40.0	4.62-008	40.0	4.62-008
50.0	4.47-008	50.0	4.47-008
60.0	4.41-008	60.0	4.41-008
70.0	4.40-008	70.0	4.40-008
80.0	4.38-008	80.0	4.38-008
90.0	4.38-008	90.0	4.38-008

KEMP, KLEMENS, AND WHITE(1956), TI,HF,ANDZR-KKWKKW (ZR)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.1	2.39-008	2.1	2.39-008
10.0	2.39-008	10.0	2.39-008
20.0	2.46-008	20.0	2.46-008
30.0	2.45-008	30.0	2.45-008
40.0	2.31-008	40.0	2.31-008
50.0	2.27-008	50.0	2.27-008
60.0	2.33-008	60.0	2.33-008
70.0	2.45-008	70.0	2.45-008
80.0	2.57-008	80.0	2.57-008
90.0	2.68-008	90.0	2.68-008

WHITE AND WOODS(1957A), TI,HF, AND ZR - WW(HF)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
10.0	4.23-008	10.0	4.23-006	1.00-001
15.0	4.27-008	15.0	4.27-006	1.50-001
20.0	3.92-008	20.0	4.36-006	1.80-001
30.0	3.64-008	30.0	4.97-006	2.20-001
40.0	3.32-008	40.0	5.53-006	2.40-001
50.0	3.20-008	50.0	6.53-006	2.45-001
75.0	3.17-008	75.0	9.43-006	2.52-001
90.0	3.24-008	90.0	1.12-005	2.60-001

HUST, WEITZEL, AND POWELL(1971), TI, ALLOYS - HWP

TEMP	LORENZ RATIO
7.0	1.29-007
8.0	1.32-007
9.0	1.34-007
10.0	1.36-007
12.0	1.38-007
14.0	1.38-007
16.0	1.37-007
18.0	1.35-007
20.0	1.33-007
25.0	1.27-007
30.0	1.20-007
35.0	1.14-007
40.0	1.08-007
45.0	1.03-007
50.0	9.86-008
55.0	9.43-008
60.0	9.04-008
65.0	8.69-008
70.0	8.36-008
75.0	8.06-008
80.0	7.78-008
85.0	7.53-008
90.0	7.30-008
95.0	7.08-008
100.0	6.89-008
110.0	6.54-008
120.0	6.25-008
130.0	6.00-008
140.0	5.78-008
150.0	5.60-008
160.0	5.45-008
170.0	5.32-008
180.0	5.20-008
190.0	5.11-008
200.0	5.02-008
220.0	4.88-008
240.0	4.76-008
260.0	4.66-008
280.0	4.56-008
300.0	4.45-008

TEMP	LORENZ RATIO
7.0	1.29-007
8.0	1.32-007
9.0	1.34-007
10.0	1.36-007
12.0	1.38-007
14.0	1.38-007
16.0	1.37-007
18.0	1.35-007
20.0	1.33-007
25.0	1.27-007
30.0	1.20-007
35.0	1.14-007
40.0	1.08-007
45.0	1.03-007
50.0	9.86-008
55.0	9.43-008
60.0	9.04-008
65.0	8.69-008
70.0	8.36-008
75.0	8.06-008
80.0	7.78-008
85.0	7.53-008
90.0	7.30-008
95.0	7.08-008
100.0	6.89-008
110.0	6.54-008
120.0	6.25-008
130.0	6.00-008
140.0	5.78-008
150.0	5.60-008
160.0	5.45-008
170.0	5.32-008
180.0	5.20-008
190.0	5.11-008
200.0	5.02-008
220.0	4.88-008
240.0	4.76-008
260.0	4.66-008
280.0	4.56-008
300.0	4.45-008

BACKLUNO(1967), W - B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	2.39-008	100.0	1.25-006	1.91+000
150.0	2.79-008	150.0	2.35-006	1.78+000
200.0	2.99-008	200.0	3.50-006	1.71+000
250.0	3.14-008	250.0	4.70-006	1.67+000
300.0	3.12-008	300.0	5.75-006	1.63+000

DEHAAS ANO OENOBLE (1938), W-OO

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
77.4	1.88-008	77.4	5.59-007	2.60+000
74.3	1.81-008	74.3	4.99-007	2.69+000
71.3	1.74-008	71.3	4.46-007	2.77+000
68.2	1.66-008	68.2	3.94-007	2.87+000
65.8	1.60-008	65.8	3.56-007	2.95+000
63.5	1.56-008	63.5	3.23-007	3.07+000
50.6	9.82-009	50.6	1.42-007	3.50+000
90.2	2.17-008	90.2	8.07-007	2.43+000
85.1	2.04-008	85.1	7.04-007	2.47+000
74.9	1.82-008	74.9	5.11-007	2.68+000
69.8	1.71-008	69.8	4.23-007	2.82+000
65.2	1.58-008	65.2	3.47-007	2.96+000
20.4	1.07-008	20.4	4.20-009	5.19+001
20.4	1.05-008	20.4	4.10-009	5.22+001
17.5	1.18-008	17.5	3.10-009	6.69+001

KANNULUIK(1933), W - K

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	3.04-008	0.0	3.04-008
194.6	2.80-008	-78.5	2.80-008
90.1	1.91-008	-183.0	1.91-008

KANNULUIK(1933), W - K

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	3.06-008	0.0	3.06-008
194.6	2.90-008	-78.5	2.90-008
90.1	2.00-008	-183.0	2.00-008

MOORE, MCELROY, ANO BARSONI(1966), W- MMB

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
80.0	1.72-008	80.0	6.00-007	2.29+000
100.0	2.23-008	100.0	1.04-006	2.15+000
120.0	2.54-008	120.0	1.48-006	2.06+000
140.0	2.74-008	140.0	1.92-006	2.00+000
160.0	2.88-008	160.0	2.36-006	1.95+000
180.0	2.99-008	180.0	2.80-006	1.92+000
200.0	3.08-008	200.0	3.24-006	1.90+000
220.0	3.17-008	220.0	3.68-006	1.89+000
240.0	3.23-008	240.0	4.12-006	1.88+000
260.0	3.26-008	260.0	4.56-006	1.86+000
280.0	3.27-008	280.0	5.00-006	1.83+000
300.0	3.25-008	300.0	5.44-006	1.79+000

MOORE, MCELROY, ANO BARSONI(1966), W- MMB

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	2.40-008	100.0	1.20-006	2.00+000
120.0	2.65-008	120.0	1.64-006	1.94+000
140.0	2.83-008	140.0	2.08-006	1.90+000
160.0	2.95-008	160.0	2.52-006	1.87+000
180.0	3.03-008	180.0	2.96-006	1.84+000
200.0	3.09-008	200.0	3.40-006	1.82+000
220.0	3.15-008	220.0	3.84-006	1.80+000
240.0	3.18-008	240.0	4.27-006	1.79+000
260.0	3.19-008	260.0	4.71-006	1.76+000
280.0	3.21-008	280.0	5.16-006	1.74+000
300.0	3.20-008	300.0	5.60-006	1.72+000

WHITE ANO WOOOS(1957B),W- WW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
10.0	2.72-008	10.0	3.24-008	8.40+000
15.0	2.47-008	15.0	3.37-008	1.10+001
20.0	2.31-008	20.0	3.72-008	1.24+001
30.0	1.61-008	30.0	5.35-008	9.00+000
40.0	1.41-008	40.0	1.01-007	5.60+000
50.0	1.34-008	50.0	1.81-007	3.70+000
75.0	1.88-008	75.0	5.41-007	2.60+000
100.0	2.55-008	100.0	1.06-006	2.40+000

WAGNER, GARLANO, ANO BOWERS(1971), W- WGB

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
1.5	2.43-008	1.5	2.43-008
2.0	2.39-008	2.0	2.39-008
2.5	2.33-008	2.5	2.33-008
3.0	2.29-008	3.0	2.29-008
3.5	2.20-008	3.5	2.20-008
4.0	2.15-008	4.0	2.15-008
4.5	2.09-008	4.5	2.09-008
5.0	2.00-008	5.0	2.00-008
5.5	1.91-008	5.5	1.91-008
6.0	1.82-008	6.0	1.82-008

WAGNER, GARLANO, AND BOWERS(1971), W- WGB

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
1.5	2.32-008	1.5	2.32-008
2.0	2.21-008	2.0	2.21-008
2.5	2.10-008	2.5	2.10-008
3.0	1.97-008	3.0	1.97-008
3.5	1.82-008	3.5	1.82-008
4.0	1.69-008	4.0	1.69-008
4.5	1.58-008	4.5	1.58-008
5.0	1.50-008	5.0	1.50-008
5.5	1.40-008	5.5	1.40-008
6.0	1.33-008	6.0	1.33-008

WAGNER, GARLANO, ANO BOWERS(1971), W- WGB

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
1.5	2.28-008	1.5	2.28-008
2.0	2.12-008	2.0	2.12-008
2.5	1.98-008	2.5	1.98-008
3.0	1.80-008	3.0	1.80-008
3.5	1.62-008	3.5	1.62-008
4.0	1.53-008	4.0	1.53-008
4.5	1.41-008	4.5	1.41-008
5.0	1.32-008	5.0	1.32-008
5.5	1.22-008	5.5	1.22-008
6.0	1.18-008	6.0	1.18-008

WAGNER, GARLANO, ANO BOWERS(1971), W- WGB

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
1.5	2.17-008	1.5	2.17-008
2.0	2.07-008	2.0	2.07-008
2.5	1.93-008	2.5	1.93-008
3.0	1.80-008	3.0	1.80-008
3.5	1.60-008	3.5	1.60-008
4.0	1.50-008	4.0	1.50-008
4.5	1.38-008	4.5	1.38-008
5.0	1.27-008	5.0	1.27-008
5.5	1.17-008	5.5	1.17-008
6.0	1.09-008	6.0	1.09-008

WAGNER, GARLANO, ANO BOWERS(1971), W- WGB

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
1.5	2.18-008	1.5	2.18-008
2.0	1.99-008	2.0	1.99-008
2.5	1.74-008	2.5	1.74-008
3.0	1.55-008	3.0	1.55-008
3.5	1.40-008	3.5	1.40-008
4.0	1.28-008	4.0	1.28-008
4.5	1.13-008	4.5	1.13-008
5.0	1.04-008	5.0	1.04-008
5.5	9.70-009	5.5	9.70-009
6.0	9.10-009	6.0	9.10-009

WAGNER, GARLANO, ANO BOWERS(1971), W- WGB

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
1.5	1.92-008	1.5	1.92-008
2.0	1.78-008	2.0	1.78-008
2.5	1.60-008	2.5	1.60-008
3.0	1.49-008	3.0	1.49-008
3.5	1.35-008	3.5	1.35-008
4.0	1.22-008	4.0	1.22-008
4.5	1.13-008	4.5	1.13-008
5.0	1.07-008	5.0	1.07-008
5.5	1.00-008	5.5	1.00-008
6.0	9.70-009	6.0	9.70-009

BACKLUND(1967),MO - B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
100.0	1.74-008	100.0	1.05-006	1.66+000
150.0	2.24-008	150.0	2.30-006	1.46+000
200.0	2.36-008	200.0	3.35-006	1.41+000
250.0	2.53-008	250.0	4.55-006	1.39+000
300.0	2.54-008	300.0	5.60-006	1.36+000

KANNULUIK(1933), MO- K(1)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	2.63-008	0.0	2.63-008
194.6	2.38-008	-78.5	2.38-008
90.1	1.94-008	-183.0	1.94-008

KANNULUIK(1933), MO- K(2)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	2.61-008	0.0	2.61-008
194.6	2.35-008	-78.5	2.35-008
90.1	1.76-008	-183.0	1.76-008

GOFF(1970), CR-G

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.40-008	2.0	2.40-008
5.0	2.30-008	5.0	2.30-008
10.0	2.15-008	10.0	2.15-008
20.0	2.00-008	20.0	2.00-008
50.0	1.85-008	50.0	1.85-008
100.0	2.65-008	100.0	2.65-008
200.0	3.82-008	200.0	3.82-008

GOFF(1970), CR-G

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.0	2.44-008	2.0	2.44-008
5.0	2.44-008	5.0	2.44-008
10.0	2.47-008	10.0	2.47-008
20.0	2.47-008	20.0	2.47-008
50.0	1.90-008	50.0	1.90-008
100.0	2.75-008	100.0	2.75-008
200.0	4.05-008	200.0	4.05-008

HARPER, KEMP, KLEMENS, TAINSH, ANO WHITE(1957), CR -HKKTW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
5.0	2.45-008	5.0	2.55-007	4.80-001
15.0	2.32-008	15.0	2.58-007	1.35+000
20.0	2.27-008	20.0	2.62-007	1.73+000
25.0	2.14-008	25.0	2.72-007	1.97+000
30.0	2.04-008	30.0	2.84-007	2.15+000
35.0	1.92-008	35.0	3.00-007	2.24+000
45.0	1.73-008	45.0	3.60-007	2.16+000
55.0	1.66-008	55.0	4.75-007	1.92+000
75.0	1.89-008	75.0	8.75-007	1.62+000
100.0	2.49-008	100.0	1.75-006	1.42+000
150.0	4.12-008	150.0	4.75-006	1.30+000

HARPER, KEMP, KLEMENS, TAINSH, AND WHITE(1957), CR -HKKTW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
5.0	2.43-008	5.0	1.81-007	6.70-001
15.0	2.18-008	15.0	1.84-007	1.78+000
20.0	2.03-008	20.0	1.88-007	2.16+000
25.0	1.90-008	25.0	1.98-007	2.40+000
30.0	1.75-008	30.0	2.10-007	2.50+000
35.0	1.60-008	35.0	2.26-007	2.48+000
45.0	1.44-008	45.0	2.91-007	2.22+000
55.0	1.42-008	55.0	4.01-007	1.95+000
75.0	1.73-008	75.0	8.01-007	1.62+000
100.0	2.39-008	100.0	1.68-006	1.42+000
150.0	4.06-008	150.0	4.68-006	1.30+000

HARPER, KEMP, KLEMENS, TAINSH, ANO WHITE(1957), CR -HKKTW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
5.0	2.38-008	5.0	1.25-007	9.50-001
15.0	2.32-008	15.0	1.28-007	2.72+000
20.0	2.18-008	20.0	1.32-007	3.30+000
25.0	2.07-008	25.0	1.42-007	3.64+000
30.0	1.95-008	30.0	1.54-007	3.79+000
35.0	1.81-008	35.0	1.70-007	3.73+000
45.0	1.62-008	45.0	2.35-007	3.11+000
55.0	1.63-008	55.0	3.45-007	2.60+000
75.0	1.87-008	75.0	7.45-007	1.88+000
100.0	2.58-008	100.0	1.62-006	1.59+000
150.0	4.00-008	150.0	4.62-006	1.30+000

HARPER, KEMP, KLEMENS, TAINSH, ANO WHITE(1957), CR -HKKTW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
5.0	2.36-008	5.0	9.00-008	1.31+000
15.0	2.28-008	15.0	9.30-008	3.67+000
20.0	2.00-008	20.0	9.70-008	4.12+000
25.0	1.89-008	25.0	1.07-007	4.42+000
30.0	1.78-008	30.0	1.19-007	4.48+000
35.0	1.64-008	35.0	1.35-007	4.24+000
45.0	1.46-008	45.0	2.00-007	3.28+000
55.0	1.47-008	55.0	3.10-007	2.60+000
75.0	1.76-008	75.0	7.10-007	1.86+000
100.0	2.42-008	100.0	1.59-006	1.52+000
150.0	3.98-008	150.0	4.59-006	1.30+000

HARPER, KEMP, KLEMENS, TAINSH, ANO WHITE(1957), CR -HKKTW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
5.0	2.20-008	5.0	5.50-008	2.00+000
15.0	1.96-008	15.0	5.80-008	5.08+000
20.0	1.78-008	20.0	6.20-008	5.73+000
25.0	1.68-008	25.0	7.20-008	5.84+000
30.0	1.55-008	30.0	8.40-008	5.52+000
35.0	1.43-008	35.0	1.00-007	5.00+000
45.0	1.36-008	45.0	1.65-007	3.72+000
55.0	1.40-008	55.0	2.75-007	2.80+000
75.0	1.73-008	75.0	6.75-007	1.92+000
100.0	2.46-008	100.0	1.56-006	1.58+000
150.0	4.13-008	150.0	4.56-006	1.36+000

Chromium (cont.)

MOORE, WILLIAMS, ANO MCELROY(1968), CR- MWM(68)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.0	2.45-008	90.0	1.49-008	1.48+002
100.0	2.71-008	100.0	1.93-008	1.40+002
110.0	2.95-008	110.0	2.41-008	1.34+002
120.0	3.16-008	120.0	2.93-008	1.29+002
130.0	3.38-008	130.0	3.52-008	1.25+002
140.0	3.62-008	140.0	4.19-008	1.21+002
150.0	3.81-008	150.0	4.87-008	1.17+002
160.0	3.93-008	160.0	5.51-008	1.14+002
170.0	4.02-008	170.0	6.17-008	1.11+002
180.0	4.09-008	180.0	6.83-008	1.08+002
190.0	4.13-008	190.0	7.48-008	1.05+002
200.0	4.17-008	200.0	8.13-008	1.02+002
210.0	4.21-008	210.0	8.80-008	1.00+002
220.0	4.23-009	220.0	9.46-009	9.83+001
320.0	3.05-008	320.0	1.01-007	9.64+001
240.0	4.24-008	240.0	1.08-007	9.47+001
250.0	4.22-008	250.0	1.13-007	9.32+001
260.0	4.20-008	260.0	1.19-007	9.17+001
270.0	4.15-008	270.0	1.24-007	9.05+001
280.0	4.10-008	280.0	1.28-007	8.93+001
290.0	4.02-008	290.0	1.32-007	8.82+001
300.0	3.93-008	300.0	1.35-007	8.75+001

MOORE, WILLIAMS, ANO MCELROY(1967), CR- MWM(67)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.0	2.31-008	90.0	1.23-008	1.70+002
100.0	2.60-008	100.0	1.63-008	1.59+002
120.0	3.12-008	120.0	2.60-008	1.44+002
140.0	3.56-008	140.0	3.76-008	1.33+002
160.0	3.88-008	160.0	5.00-008	1.24+002
180.0	4.11-008	180.0	6.31-008	1.17+002
200.0	4.19-008	200.0	7.55-008	1.11+002
220.0	4.24-008	220.0	8.79-008	1.06+u02
240.0	4.25-008	240.0	1.00-007	1.02+u02
260.0	4.20-008	260.0	1.11-007	9.84+001
280.0	4.11-008	280.0	1.20-007	9.57+001
300.0	3.96-008	300.0	1.27-007	9.35+001

MOORE, WILLIAMS, ANO MCELROY(1967), CR- MWM(67)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.0	2.44-008	90.0	1.45-008	1.52+002
100.0	2.70-008	100.0	1.86-008	1.45+002
120.0	3.20-008	120.0	2.86-008	1.34+002
140.0	3.64-008	140.0	4.05-008	1.26+002
160.0	3.93-008	160.0	5.30-008	1.19+002
180.0	4.10-008	180.0	6.57-008	1.12+002
200.0	4.17-008	200.0	7.83-008	1.07+002
220.0	4.22-008	220.0	9.10-008	1.02+002
240.0	4.22-008	240.0	1.03-007	9.83+001
260.0	4.18-008	260.0	1.14-007	9.54+001
280.0	4.08-008	280.0	1.23-007	9.30+001
300.0	3.93-008	300.0	1.29-007	9.15+001

REOOEMANN(1935), MN AND RE- R

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
79.6	6.41-008	79.6	6.41-008
83.2	6.41-008	83.2	6.41-008
91.5	6.39-008	91.5	6.39-008

WHITE AND WOOOS(1957C), MN AND RE - WW(MN)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
5.0	3.18-008	5.0	1.59-005	1.00-002
10.0	4.85-008	10.0	3.03-005	1.60-002
20.0	1.03-007	20.0	8.60-005	2.40-002
30.0	1.11-007	30.0	1.11-004	3.00-002
40.0	1.14-007	40.0	1.30-004	3.50-002
50.0	1.25-007	50.0	1.56-004	4.00-002
60.0	1.17-007	60.0	1.56-004	4.50-002
70.0	1.11-007	70.0	1.56-004	5.00-002
80.0	1.07-007	80.0	1.56-004	5.50-002

POWELL, TYE, AND WOODMAN(1963), RE-PTW(RE)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
83.0	2.17-008	83.0	2.17-008
123.0	2.64-008	123.0	2.64-008
173.0	2.94-008	173.0	2.94-008
223.0	3.04-008	223.0	3.04-008
273.0	3.09-008	273.0	3.09-008
293.0	3.08-008	293.0	3.08-008

WHITE AND WOODS (1957B), MN AND RE - WW(RE1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
10.0	3.07-008	10.0	7.87-007	3.90-001
15.0	2.78-008	15.0	7.87-007	5.30-001
20.0	2.69-008	20.0	8.03-007	6.70-001
30.0	2.29-008	30.0	9.17-007	7.50-001
40.0	2.15-008	40.0	1.20-006	7.20-001
50.0	1.91-008	50.0	1.54-006	6.20-001
75.0	2.15-008	75.0	3.04-006	5.30-001
100.0	2.44-008	100.0	4.79-006	5.10-001

WHITE AND WOODS (1957B), MN AND RE - WW(RE2)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
10.0	2.81-008	10.0	4.69-007	6.00-001
15.0	2.72-008	15.0	4.69-007	8.70-001
20.0	2.57-008	20.0	4.85-007	1.06+000
30.0	2.04-008	30.0	5.99-007	1.02+000
40.0	1.98-008	40.0	8.79-007	9.00-001
50.0	1.83-008	50.0	1.22-006	7.50-001
75.0	2.32-008	75.0	2.72-006	6.40-001
100.0	2.55-008	100.0	4.47-006	5.70-001

WHITE AND WOODS (1957B), MN AND RE - WW(RE3)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
10.0	1.95-008	10.0	1.39-008	1.40+001
15.0	1.20-008	15.0	1.39-008	1.30+001
20.0	1.29-008	20.0	2.99-008	8.60+000
30.0	1.27-008	30.0	1.44-007	2.65+000
40.0	1.48-008	40.0	4.23-007	1.40+000
50.0	1.46-008	50.0	7.63-007	9.60-001
75.0	1.99-008	75.0	2.26-006	6.60-001
100.0	2.41-008	100.0	4.01-006	6.00-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	2.49-008	100.0	3.50-006	7.10-001
150.0	2.71-008	150.0	5.50-006	7.40-001
200.0	2.74-008	200.0	7.50-006	7.30-001
250.0	2.84-008	250.0	1.00-005	7.10-001
280.0	2.90-008	280.0	1.16-005	7.00-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	2.51-008	100.0	3.80-006	6.60-001
150.0	2.75-008	150.0	5.90-006	7.00-001
200.0	2.78-008	200.0	8.00-006	6.95-001
250.0	2.93-008	250.0	1.06-005	6.90-001
280.0	2.98-008	280.0	1.21-005	6.90-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	2.92-008	100.0	5.50-006	5.30-001
150.0	3.05-008	150.0	7.50-006	6.10-001
200.0	3.03-008	200.0	9.70-006	6.25-001
250.0	3.07-008	250.0	1.22-005	6.30-001
280.0	3.13-008	280.0	1.37-005	6.40-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	2.84-008	100.0	5.80-006	4.90-001
150.0	2.99-008	150.0	8.00-006	5.60-001
200.0	3.04-008	200.0	1.03-005	5.90-001
250.0	3.07-008	250.0	1.30-005	5.90-001
280.0	3.11-008	280.0	1.45-005	6.00-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	3.44-008	100.0	8.70-006	3.95-001
150.0	3.46-008	150.0	1.08-005	4.80-001
200.0	3.32-008	200.0	1.30-005	5.10-001
250.0	3.35-008	250.0	1.55-005	5.40-001
280.0	3.34-008	280.0	1.70-005	5.50-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	4.51-008	100.0	2.05-005	2.20-001
150.0	4.29-008	150.0	2.26-005	2.85-001
200.0	3.97-008	200.0	2.48-005	3.20-001
250.0	3.81-008	250.0	2.72-005	3.50-001
280.0	3.73-008	280.0	2.86-005	3.65-001

BACKLUNO(1961), FE-B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	1.64-008	100.0	1.40-006	1.17+000
150.0	2.13-008	150.0	3.30-006	9.70-001
200.0	2.43-008	200.0	5.40-006	9.00-001
250.0	2.62-008	250.0	7.80-006	8.40-001
280.0	2.69-008	280.0	9.30-006	8.10-001

BEITCHMAN, TRUSSEL, ANO COLEMAN(1970), FE- BE

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.48-008	5.0	2.48-008
10.0	2.08-008	10.0	2.08-008
15.0	1.75-008	15.0	1.75-008
20.0	1.55-008	20.0	1.55-008
25.0	1.35-008	25.0	1.35-008
30.0	1.25-008	30.0	1.25-008
35.0	1.15-008	35.0	1.15-008
40.0	1.10-008	40.0	1.10-008
45.0	1.05-008	45.0	1.05-008
50.0	1.02-008	50.0	1.02-008
55.0	1.00-008	55.0	1.00-008
60.0	9.75-009	60.0	9.75-009
65.0	9.25-009	65.0	9.25-009
70.0	8.75-009	70.0	8.75-009
74.4	8.50-009	74.4	8.50-009
2.1	2.53-008	2.1	2.53-008

HUST, POWELL, ANO WEITZEL(1970), FE - HPW(2)

TEMP	LORENZ RATIO
6.0	2.50-008
7.0	2.51-008
8.0	2.49-008
9.0	2.49-008
10.0	2.50-008
12.0	2.50-008
14.0	2.50-008
16.0	2.48-008
18.0	2.46-008
20.0	2.44-008
25.0	2.36-008
30.0	2.25-008
35.0	2.13-008
40.0	2.01-008
45.0	1.91-008
50.0	1.83-008
55.0	1.77-008
60.0	1.74-008
65.0	1.72-008
70.0	1.72-008
75.0	1.73-008
80.0	1.75-008
85.0	1.78-008
90.0	1.81-008
95.0	1.84-008
100.0	1.88-008
110.0	1.96-008
120.0	2.04-008
130.0	2.12-008
140.0	2.19-008
150.0	2.26-008
160.0	2.32-008
170.0	2.37-008
180.0	2.42-008
190.0	2.46-008
200.0	2.49-008
220.0	2.56-008
240.0	2.63-008
260.0	2.69-008
280.0	2.74-008

TEMP	LORENZ RATIO
6.0	2.50-008
7.0	2.51-008
8.0	2.49-008
9.0	2.49-008
10.0	2.50-008
12.0	2.50-008
14.0	2.50-008
16.0	2.48-008
18.0	2.46-008
20.0	2.44-008
25.0	2.36-008
30.0	2.25-008
35.0	2.13-008
40.0	2.01-008
45.0	1.91-008
50.0	1.83-008
55.0	1.77-008
60.0	1.74-008
65.0	1.72-008
70.0	1.72-008
75.0	1.73-008
80.0	1.75-008
85.0	1.78-008
90.0	1.81-008
95.0	1.84-008
100.0	1.88-008
110.0	1.96-008
120.0	2.04-008
130.0	2.12-008
140.0	2.19-008
150.0	2.26-008
160.0	2.32-008
170.0	2.37-008
180.0	2.42-008
190.0	2.46-008
200.0	2.49-008
220.0	2.56-008
240.0	2.63-008
260.0	2.69-008
280.0	2.74-008

HUST, POWELL, ANO WEITZEL(1970), FE - HPW(2A)

TEMP	LORENZ RATIO
6.0	2.52-008
7.0	2.53-008
8.0	2.54-008
9.0	2.55-008
10.0	2.54-008
12.0	2.54-008
14.0	2.54-008
16.0	2.54-008
18.0	2.54-008
20.0	2.54-008
25.0	2.49-008
30.0	2.41-008
35.0	2.31-008
40.0	2.21-008
45.0	2.11-008
50.0	2.04-008
55.0	1.98-008
60.0	1.94-008
65.0	1.92-008
70.0	1.91-008
75.0	1.91-008
80.0	1.91-008
85.0	1.93-008
90.0	1.95-008
95.0	1.97-008
100.0	1.99-008
110.0	2.05-008
120.0	2.10-008
130.0	2.16-008
140.0	2.22-008
150.0	2.28-008
160.0	2.33-008
170.0	2.38-008
180.0	2.42-008
190.0	2.46-008
200.0	2.50-008
220.0	2.56-008
240.0	2.60-008
260.0	2.64-008
280.0	2.68-008

TEMP	LORENZ RATIO
6.0	2.52-008
7.0	2.53-008
8.0	2.54-008
9.0	2.55-008
10.0	2.54-008
12.0	2.54-008
14.0	2.54-008
16.0	2.54-008
18.0	2.54-008
20.0	2.54-008
25.0	2.49-008
30.0	2.41-008
35.0	2.31-008
40.0	2.21-008
45.0	2.11-008
50.0	2.04-008
55.0	1.98-008
60.0	1.94-008
65.0	1.92-008
70.0	1.91-008
75.0	1.91-008
80.0	1.91-008
85.0	1.93-008
90.0	1.95-008
95.0	1.97-008
100.0	1.99-008
110.0	2.05-008
120.0	2.10-008
130.0	2.16-008
140.0	2.22-008
150.0	2.28-008
160.0	2.33-008
170.0	2.38-008
180.0	2.42-008
190.0	2.46-008
200.0	2.50-008
220.0	2.56-008
240.0	2.60-008
260.0	2.64-008
280.0	2.68-008

Iron (cont.)

HUST, POWELL, AND WEITZEL(1970), FE - HPW(4)

TEMP	LORENZ RATIO
6.0	2.49-008
7.0	2.52-008
8.0	2.52-008
9.0	2.52-008
10.0	2.52-008
12.0	2.51-008
14.0	2.50-008
16.0	2.50-008
18.0	2.50-008
20.0	2.49-008
25.0	2.45-008
30.0	2.36-008
35.0	2.25-008
40.0	2.14-008
45.0	2.05-008
50.0	1.97-008
55.0	1.92-008
60.0	1.88-008
65.0	1.86-008
70.0	1.85-008
75.0	1.86-008
80.0	1.87-008
85.0	1.88-008
90.0	1.90-008
95.0	1.92-008
100.0	1.95-008
110.0	2.00-008
120.0	2.06-008
130.0	2.12-008
140.0	2.18-008
150.0	2.24-008
160.0	2.29-008
170.0	2.34-008
180.0	2.39-008
190.0	2.44-008
200.0	2.48-008
220.0	2.55-008
240.0	2.60-008
260.0	2.65-008
280.0	2.68-008
300.0	2.71-008

TEMP	LORENZ RATIO
6.0	2.49-008
7.0	2.52-008
8.0	2.52-008
9.0	2.52-008
10.0	2.52-008
12.0	2.51-008
14.0	2.50-008
16.0	2.50-008
18.0	2.50-008
20.0	2.49-008
25.0	2.45-008
30.0	2.36-008
35.0	2.25-008
40.0	2.14-008
45.0	2.05-008
50.0	1.97-008
55.0	1.92-008
60.0	1.88-008
65.0	1.86-008
70.0	1.85-008
75.0	1.86-008
80.0	1.87-008
85.0	1.88-008
90.0	1.90-008
95.0	1.92-008
100.0	1.95-008
110.0	2.00-008
120.0	2.06-008
130.0	2.12-008
140.0	2.18-008
150.0	2.24-008
160.0	2.29-008
170.0	2.34-008
180.0	2.39-008
190.0	2.44-008
200.0	2.48-008
220.0	2.55-008
240.0	2.60-008
260.0	2.65-008
280.0	2.68-008
300.0	2.71-008

HUST AND SPARKS(1970A), FE - HS

TEMP	LORENZ RATIO
6.0	2.51-008
7.0	2.52-008
8.0	2.52-008
9.0	2.53-008
10.0	2.53-008
12.0	2.53-008
14.0	2.53-008
16.0	2.53-008
18.0	2.53-008
20.0	2.52-008
25.0	2.48-008
30.0	2.40-008
35.0	2.30-008
40.0	2.20-008
45.0	2.11-008
50.0	2.04-008
55.0	1.98-008
60.0	1.95-008
65.0	1.92-008
70.0	1.91-008
75.0	1.91-008
80.0	1.92-008
85.0	1.93-008
90.0	1.95-008
95.0	1.97-008
100.0	1.99-008
110.0	2.04-008
120.0	2.10-008
130.0	2.16-008
140.0	2.22-008
150.0	2.28-008
160.0	2.33-008
170.0	2.38-008
180.0	2.43-008
190.0	2.47-008
200.0	2.51-008
220.0	2.58-008
240.0	2.62-008
260.0	2.65-008
280.0	2.68-008
300.0	2.71-008

TEMP	LORENZ RATIO
6.0	2.51-008
7.0	2.52-008
8.0	2.52-008
9.0	2.53-008
10.0	2.53-008
12.0	2.53-008
14.0	2.53-008
16.0	2.53-008
18.0	2.53-008
20.0	2.52-008
25.0	2.48-008
30.0	2.40-008
35.0	2.30-008
40.0	2.20-008
45.0	2.11-008
50.0	2.04-008
55.0	1.98-008
60.0	1.95-008
65.0	1.92-008
70.0	1.91-008
75.0	1.91-008
80.0	1.92-008
85.0	1.93-008
90.0	1.95-008
95.0	1.97-008
100.0	1.99-008
110.0	2.04-008
120.0	2.10-008
130.0	2.16-008
140.0	2.22-008
150.0	2.28-008
160.0	2.33-008
170.0	2.38-008
180.0	2.43-008
190.0	2.47-008
200.0	2.51-008
220.0	2.58-008
240.0	2.62-008
260.0	2.65-008
280.0	2.68-008
300.0	2.71-008

KANNULUIK(1933), FE-K

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
273.1	2.47-008	0.0	2.47-008
194.6	2.11-008	-78.5	2.11-008
90.1	1.60-008	-183.0	1.60-008

KARWEIL AND SCHAFER(1939),FE-KS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.70-008	5.0	2.70-008
10.0	2.40-008	10.0	2.40-008
15.0	2.40-008	15.0	2.40-008
20.0	2.40-008	20.0	2.40-008

KARWEIL ANO SCHAFER(1939),FE-KS

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
3.0	2.50-008	3.0	2.50-008
5.0	3.30-008	5.0	3.30-008
10.0	3.30-008	10.0	3.30-008
15.0	4.30-008	15.0	4.30-008
20.0	5.00-008	20.0	5.00-008

KEMP, KLEMENS, AND WHITE(1956), FE -KKW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.49-008	5.0	2.49-008
15.0	2.53-008	15.0	2.53-008
25.0	2.40-008	25.0	2.40-008
35.0	2.04-008	35.0	2.04-008
45.0	1.71-008	45.0	1.71-008
55.0	1.52-008	55.0	1.52-008
65.0	1.51-008	65.0	1.51-008
75.0	1.57-008	75.0	1.57-008
90.0	1.70-008	90.0	1.70-008
115.0	1.98-008	115.0	1.98-008
130.0	2.16-008	130.0	2.16-008

KEMP, KLEMENS, AND TAINSH(1959),FE - KKT

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
4.0	2.53-008	4.0	9.20-008	1.10+000
10.0	2.49-008	10.0	9.40-008	2.65+000
20.0	2.30-008	20.0	1.01-007	4.55+000
26.0	1.95-008	26.0	1.07-007	4.75+000
32.0	1.62-008	32.0	1.15-007	4.50+000
40.0	1.33-008	40.0	1.40-007	3.79+000
50.0	1.11-008	50.0	2.01-007	2.75+000
60.0	1.26-008	60.0	3.60-007	2.10+000
70.0	1.31-008	70.0	5.40-007	1.70+000
90.0	1.50-008	90.0	1.04-006	1.30+000

KOLHAAS AND KIERSPE(1965), FE - KK

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
88.1	2.22-008	-185.0	1.40-006	1.40+000
90.1	2.27-008	-183.0	1.48-006	1.38+000
95.1	2.22-008	-178.0	1.66-006	1.27+000
106.1	2.23-008	-167.0	2.04-006	1.16+000
123.1	2.33-008	-150.0	2.68-006	1.07+000
137.1	2.35-008	-136.0	3.19-006	1.01+000
167.1	2.39-008	-106.0	4.29-006	9.30-001
203.1	2.48-008	-70.0	5.60-006	9.00-001
225.1	2.52-008	-48.0	6.59-006	8.60-001
300.1	2.82-008	27.0	1.05-005	8.10-001

LEES(1908),FE-L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	3.10-008	103.0	3.10-008
113.0	3.05-008	113.0	3.05-008
123.0	3.04-008	123.0	3.04-008
148.0	3.03-008	148.0	3.03-008
173.0	2.98-008	173.0	2.98-008
198.0	2.95-008	198.0	2.95-008
223.0	2.93-008	223.0	2.93-008
248.0	2.94-008	248.0	2.94-008
273.0	2.97-008	273.0	2.97-008
291.0	2.99-008	291.0	2.99-008

MOORE, MCELROY, AND BARSONI(1966),FE-MMB

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.0	1.47-008	90.0	9.70-007	1.36+000
100.0	1.59-008	100.0	1.27-006	1.25+000
120.0	1.80-008	120.0	1.95-006	1.11+000
140.0	1.93-008	140.0	2.67-006	1.01+000
160.0	2.09-008	160.0	3.47-006	9.63-001
180.0	2.21-008	180.0	4.31-006	9.22-001
200.0	2.31-008	200.0	5.20-006	8.87-001
220.0	2.39-008	220.0	6.11-006	8.59-001
240.0	2.46-008	240.0	7.04-006	8.38-001
260.0	2.52-008	260.0	8.00-006	8.19-001
280.0	2.57-008	280.0	8.99-006	8.02-001
300.0	2.61-008	300.0	1.00-005	7.82-001

BERMAN(1951), ALLOY AND STAINLESS STEELS -B

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
4.0	3.12-008	4.0	4.75-005	2.63-003
10.0	4.18-008	10.0	4.80-005	8.71-003
20.0	5.04-008	20.0	4.82-005	2.09-002
50.0	5.27-008	50.0	5.03-005	5.24-002
81.2	4.88-008	81.2	5.22-005	7.59-002

ESTERMANN AND ZIMMERMAN(1952), ALLOY AND STAINLESS STEELS-EZ(303)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.2	3.00-008	4.2	3.00-008
10.1	3.30-008	10.1	3.30-008
20.4	4.90-008	20.4	4.90-008
20.6	5.40-008	20.6	5.40-008
56.9	5.90-008	56.9	5.90-008
58.0	5.80-008	58.0	5.80-008
59.7	5.60-008	59.7	5.60-008
63.3	5.70-008	63.3	5.70-008
66.8	5.50-008	66.8	5.50-008
77.0	5.60-008	77.0	5.60-008
2.6	2.50-008	2.6	2.50-008
4.3	2.85-008	4.3	2.85-008
10.1	3.40-008	10.1	3.40-008
19.4	5.20-008	19.4	5.20-008
58.3	5.70-008	58.3	5.70-008
59.5	5.70-008	59.5	5.70-008
77.8	5.40-008	77.8	5.40-008

ESTERMANN AND ZIMMERMAN(1952), ALLOY AND STAINLESS STEELS-EZ(347)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
4.3	2.80-008	4.3	2.80-008
14.0	4.30-008	14.0	4.30-008
58.5	5.60-008	58.5	5.60-008
63.2	5.40-008	63.2	5.40-008
63.3	5.50-008	63.3	5.50-008
70.7	5.40-008	70.7	5.40-008
76.2	5.30-008	76.2	5.30-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(1015)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.55-008	125.0	3.55-008
200.0	3.21-008	200.0	3.21-008
300.0	3.11-008	300.0	3.11-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(NI)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.82-008	125.0	3.82-008
200.0	3.40-008	200.0	3.40-008
300.0	3.25-008	300.0	3.25-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(2315)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.96-008	125.0	3.96-008
200.0	3.52-008	200.0	3.52-008
300.0	3.34-008	300.0	3.34-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(4340)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	4.04-008	125.0	4.04-008
200.0	3.55-008	200.0	3.55-008
300.0	3.32-008	300.0	3.32-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(2515)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	4.16-008	125.0	4.16-008
200.0	3.65-008	200.0	3.65-008
300.0	3.40-008	300.0	3.40-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(NI)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.89-008	125.0	3.89-008
200.0	3.49-008	200.0	3.49-008
300.0	3.33-008	300.0	3.33-008

FLYNN(1971), ALLOY AND STAINLESS STEELS - F(HP49)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.77-008	125.0	3.77-008
200.0	3.45-008	200.0	3.45-008
300.0	3.30-008	300.0	3.30-008

FLYNN(1971), ALLOY ANO STAINLESS STEELS - F(HM80)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.40-008	125.0	3.40-008
200.0	3.10-008	200.0	3.10-008
300.0	3.14-008	300.0	3.14-008

FLYNN(1971), ALLOY ANO STAINLESS STEELS - F(LE42)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	6.57-008	125.0	6.57-008
200.0	4.88-008	200.0	4.88-008
300.0	3.96-008	300.0	3.96-008

FLYNN(1971), ALLOY ANO STAINLESS STEELS - F(INVAR)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	3.70-008	125.0	3.70-008
200.0	3.46-008	200.0	3.46-008
300.0	3.49-008	300.0	3.49-008

FLYNN(1971), ALLOY ANO STAINLESS STEELS - F(FCI)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	4.29-008	125.0	4.29-008
200.0	3.90-008	200.0	3.90-008
300.0	3.75-008	300.0	3.75-008

FLYNN(1971), ALLOY ANO STAINLESS STEELS - F(NSC)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
125.0	4.34-008	125.0	4.34-008
200.0	3.91-008	200.0	3.91-008
300.0	3.73-008	300.0	3.73-008

HUST ANO SPARKS(1971A), ALLOY AND STAINLESS STEELS - HS(1)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
6.0	5.74-008	6.0	5.74-008
7.0	5.83-008	7.0	5.83-008
8.0	5.96-008	8.0	5.96-008
9.0	6.10-008	9.0	6.10-008
10.0	6.24-008	10.0	6.24-008
12.0	6.50-008	12.0	6.50-008
14.0	6.71-008	14.0	6.71-008
16.0	6.89-008	16.0	6.89-008
18.0	7.03-008	18.0	7.03-008
20.0	7.14-008	20.0	7.14-008
25.0	7.32-008	25.0	7.32-008
30.0	7.39-008	30.0	7.39-008
35.0	7.40-008	35.0	7.40-008
40.0	7.37-008	40.0	7.37-008
45.0	7.30-008	45.0	7.30-008
50.0	7.20-008	50.0	7.20-008
55.0	7.09-008	55.0	7.09-008
60.0	6.96-008	60.0	6.96-008
65.0	6.83-008	65.0	6.83-008
70.0	6.70-008	70.0	6.70-008
75.0	6.56-008	75.0	6.56-008
80.0	6.42-008	80.0	6.42-008
85.0	6.29-008	85.0	6.29-008
90.0	6.16-008	90.0	6.16-008
95.0	6.04-008	95.0	6.04-008
100.0	5.91-008	100.0	5.91-008
110.0	5.69-008	110.0	5.69-008
120.0	5.48-008	120.0	5.48-008
130.0	5.29-008	130.0	5.29-008
140.0	5.12-008	140.0	5.12-008
150.0	4.96-008	150.0	4.96-008
160.0	4.83-008	160.0	4.83-008
170.0	4.70-008	170.0	4.70-008
180.0	4.59-008	180.0	4.59-008
190.0	4.49-008	190.0	4.49-008
200.0	4.40-008	200.0	4.40-008
220.0	4.24-008	220.0	4.24-008
240.0	4.11-008	240.0	4.11-008
260.0	4.00-008	260.0	4.00-008
280.0	3.89-008	280.0	3.89-008

Stainless and Alloy Steels (cont.)

HUST AND SPARKS(1971A), ALLOY AND STAINLESS STEELS - HS(WH)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
6.0	6.79-008	6.0	6.79-008
7.0	6.99-008	7.0	6.99-008
8.0	7.20-008	8.0	7.20-008
9.0	7.41-008	9.0	7.41-008
10.0	7.61-008	10.0	7.61-008
12.0	7.92-008	12.0	7.92-008
14.0	8.14-008	14.0	8.14-008
16.0	8.29-008	16.0	8.29-008
18.0	8.38-008	18.0	8.38-008
20.0	8.44-008	20.0	8.44-008
25.0	8.46-008	25.0	8.46-008
30.0	8.39-008	30.0	8.39-008
35.0	8.27-008	35.0	8.27-008
40.0	8.12-008	40.0	8.12-008
45.0	7.95-008	45.0	7.95-008
50.0	7.77-008	50.0	7.77-008
55.0	7.59-008	55.0	7.59-008
60.0	7.41-008	60.0	7.41-008
65.0	7.24-008	65.0	7.24-008
70.0	7.06-008	70.0	7.06-008
75.0	6.89-008	75.0	6.89-008
80.0	6.73-008	80.0	6.73-008
85.0	6.57-008	85.0	6.57-008
90.0	6.41-008	90.0	6.41-008
95.0	6.27-008	95.0	6.27-008
100.0	6.13-008	100.0	6.13-008
110.0	5.87-008	110.0	5.87-008
120.0	5.64-008	120.0	5.64-008
130.0	5.43-008	130.0	5.43-008
140.0	5.24-008	140.0	5.24-008
150.0	5.07-008	150.0	5.07-008
160.0	4.92-008	160.0	4.92-008
170.0	4.79-008	170.0	4.79-008
180.0	4.67-008	180.0	4.67-008
190.0	4.56-008	190.0	4.56-008
200.0	4.47-008	200.0	4.47-008
220.0	4.30-008	220.0	4.30-008
240.0	4.16-008	240.0	4.16-008
260.0	4.04-008	260.0	4.04-008
280.0	3.93-008	280.0	3.93-008

HUST AND SPARKS(1971E), ALLOY AND STAINLESS STEELS - HS(2)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	5.34-008	5.0	5.34-008
6.0	5.43-008	6.0	5.43-008
7.0	5.60-008	7.0	5.60-008
8.0	5.80-008	8.0	5.80-008
9.0	5.99-008	9.0	5.99-008
10.0	6.16-008	10.0	6.16-008
12.0	6.45-008	12.0	6.45-008
14.0	6.68-008	14.0	6.68-008
16.0	6.85-008	16.0	6.85-008
18.0	6.99-008	18.0	6.99-008
20.0	7.09-008	20.0	7.09-008
25.0	7.26-008	25.0	7.26-008
30.0	7.33-008	30.0	7.33-008
35.0	7.34-008	35.0	7.34-008
40.0	7.31-008	40.0	7.31-008
45.0	7.24-008	45.0	7.24-008
50.0	7.15-008	50.0	7.15-008
55.0	7.04-008	55.0	7.04-008
60.0	6.92-008	60.0	6.92-008
65.0	6.80-008	65.0	6.80-008
70.0	6.67-008	70.0	6.67-008
75.0	6.53-008	75.0	6.53-008
80.0	6.40-008	80.0	6.40-008
85.0	6.27-008	85.0	6.27-008
90.0	6.14-008	90.0	6.14-008
95.0	6.01-008	95.0	6.01-008
100.0	5.89-008	100.0	5.89-008
110.0	5.66-008	110.0	5.66-008
120.0	5.45-008	120.0	5.45-008
130.0	5.26-008	130.0	5.26-008
140.0	5.10-008	140.0	5.10-008
150.0	4.94-008	150.0	4.94-008
160.0	4.81-008	160.0	4.81-008
170.0	4.69-008	170.0	4.69-008
180.0	4.58-008	180.0	4.58-008
190.0	4.49-008	190.0	4.49-008
200.0	4.40-008	200.0	4.40-008
220.0	4.26-008	220.0	4.26-008
240.0	4.13-008	240.0	4.13-008
260.0	4.02-008	260.0	4.02-008
280.0	3.91-008	280.0	3.91-008

HUST AND SPARKS(1971B), ALLOY AND STAINLESS STEELS - HS(286)

TEMP	LORENZ RATIO
7.0	5.71-008
8.0	5.87-008
9.0	6.02-008
10.0	6.16-008
12.0	6.37-008
14.0	6.52-008
16.0	6.62-008
18.0	6.69-008
20.0	6.73-008
25.0	6.76-008
30.0	6.73-008
35.0	6.67-008
40.0	6.59-008
45.0	6.49-008
50.0	6.38-008
55.0	6.27-008
60.0	6.15-008
65.0	6.03-008
70.0	5.92-008
75.0	5.80-008
80.0	5.68-008
85.0	5.57-008
90.0	5.46-008
95.0	5.36-008
100.0	5.26-008
110.0	5.07-008
120.0	4.90-008
130.0	4.75-008
140.0	4.61-008
150.0	4.48-008
160.0	4.37-008
170.0	4.27-008
180.0	4.19-008
190.0	4.11-008
200.0	4.04-008
220.0	3.92-008
240.0	3.82-008
260.0	3.73-008
280.0	3.64-008

TEMP	LORENZ RATIO
7.0	5.71-008
8.0	5.87-008
9.0	6.02-008
10.0	6.16-008
12.0	6.37-008
14.0	6.52-008
16.0	6.62-008
18.0	6.69-008
20.0	6.73-008
25.0	6.76-008
30.0	6.73-008
35.0	6.67-008
40.0	6.59-008
45.0	6.49-008
50.0	6.38-008
55.0	6.27-008
60.0	6.15-008
65.0	6.03-008
70.0	5.92-008
75.0	5.80-008
80.0	5.68-008
85.0	5.57-008
90.0	5.46-008
95.0	5.36-008
100.0	5.26-008
110.0	5.07-008
120.0	4.90-008
130.0	4.75-008
140.0	4.61-008
150.0	4.48-008
160.0	4.37-008
170.0	4.27-008
180.0	4.19-008
190.0	4.11-008
200.0	4.04-008
220.0	3.92-008
240.0	3.82-008
260.0	3.73-008
280.0	3.64-008

HUST AND SPARKS(1971B), ALLOY AND STAINLESS STEELS - HS(286A)

TEMP	LORENZ RATIO
5.0	6.68-008
6.0	6.83-008
7.0	7.08-008
8.0	7.34-008
9.0	7.58-008
10.0	7.80-008
12.0	8.15-008
14.0	8.38-008
16.0	8.54-008
18.0	8.64-008
20.0	8.70-008
25.0	8.72-008
30.0	8.64-008
35.0	8.52-008
40.0	8.36-008
45.0	8.19-008
50.0	8.01-008
55.0	7.82-008
60.0	7.63-008
65.0	7.44-008
70.0	7.26-008
75.0	7.08-008
80.0	6.90-008
85.0	6.74-008
90.0	6.57-008
95.0	6.42-008
100.0	6.27-008
110.0	6.00-008
120.0	5.75-008
130.0	5.53-008
140.0	5.34-008
150.0	5.16-008
160.0	5.01-008
170.0	4.87-008
180.0	4.75-008
190.0	4.64-008
200.0	4.54-008
220.0	4.37-008
240.0	4.22-008
260.0	4.10-008
280.0	3.99-008

TEMP	LORENZ RATIO
5.0	6.68-008
6.0	6.83-008
7.0	7.08-008
8.0	7.34-008
9.0	7.58-008
10.0	7.80-008
12.0	8.15-008
14.0	8.38-008
16.0	8.54-008
18.0	8.64-008
20.0	8.70-008
25.0	8.72-008
30.0	8.64-008
35.0	8.52-008
40.0	8.36-008
45.0	8.19-008
50.0	8.01-008
55.0	7.82-008
60.0	7.63-008
65.0	7.44-008
70.0	7.26-008
75.0	7.08-008
80.0	6.90-008
85.0	6.74-008
90.0	6.57-008
95.0	6.42-008
100.0	6.27-008
110.0	6.00-008
120.0	5.75-008
130.0	5.53-008
140.0	5.34-008
150.0	5.16-008
160.0	5.01-008
170.0	4.87-008
180.0	4.75-008
190.0	4.64-008
200.0	4.54-008
220.0	4.37-008
240.0	4.22-008
260.0	4.10-008
280.0	3.99-008

Stainless and Alloy Steels (cont.)

HUST ANO SPARKS(1971D), ALLOY ANO STAINLESS STEELS - HS(22)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
6.0	5.63-008	6.0	5.63-008
7.0	5.74-008	7.0	5.74-008
8.0	5.89-008	8.0	5.89-008
9.0	6.05-008	9.0	6.05-008
10.0	6.20-008	10.0	6.20-008
12.0	6.47-008	12.0	6.47-008
14.0	6.69-008	14.0	6.69-008
16.0	6.86-008	16.0	6.86-008
18.0	7.00-008	18.0	7.00-u08
20.0	7.11-008	20.0	7.11-u08
25.0	7.29-008	25.0	7.29-008
30.0	7.38-008	30.0	7.38-008
35.0	7.39-008	35.0	7.39-008
40.0	7.35-008	40.0	7.35-008
45.0	7.29-008	45.0	7.29-008
50.0	7.19-008	50.0	7.19-008
55.0	7.08-008	55.0	7.08-008
60.0	6.96-008	60.0	6.96-008
65.0	6.83-008	65.0	6.83-008
70.0	6.69-008	70.0	6.69-008
75.0	6.56-008	75.0	6.56-008
80.0	6.42-008	80.0	6.42-008
85.0	6.29-008	85.0	6.29-008
90.0	6.16-008	90.0	6.16-008
95.0	6.03-008	95.0	6.03-008
100.0	5.91-008	100.0	5.91-008
110.0	5.68-008	110.0	5.68-008
120.0	5.47-008	120.0	5.47-008
130.0	5.28-008	130.0	5.28-008
140.0	5.11-008	140.0	5.11-008
150.0	4.96-008	150.0	4.96-008
160.0	4.82-008	160.0	4.82-008
170.0	4.70-008	170.0	4.70-008
180.0	4.59-008	180.0	4.59-008
190.0	4.50-008	190.0	4.50-008
200.0	4.41-008	200.0	4.41-008
220.0	4.26-008	220.0	4.26-008
240.0	4.13-008	240.0	4.13-008
260.0	4.01-008	260.0	4.01-008
280.0	3.91-008	280.0	3.91-008

HUST(1970A), ALLOY AND STAINLESS STEELS - H(347)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
6.0	4.46-008	6.0	4.46-008
7.0	4.58-008	7.0	4.58-008
8.0	4.74-008	8.0	4.74-008
9.0	4.89-008	9.0	4.89-008
10.0	5.04-008	10.0	5.04-008
12.0	5.30-008	12.0	5.30-008
14.0	5.52-008	14.0	5.52-008
16.0	5.69-008	16.0	5.69-008
18.0	5.82-008	18.0	5.82-008
20.0	5.93-008	20.0	5.93-008
25.0	6.12-008	25.0	6.12-008
30.0	6.22-008	30.0	6.22-008
35.0	6.26-008	35.0	6.26-008
40.0	6.26-008	40.0	6.26-008
45.0	6.24-008	45.0	6.24-008
50.0	6.19-008	50.0	6.19-008
55.0	6.12-008	55.0	6.12-008
60.0	6.04-008	60.0	6.04-008
65.0	5.96-008	65.0	5.96-008
70.0	5.87-008	70.0	5.87-008
75.0	5.77-008	75.0	5.77-008
80.0	5.68-008	80.0	5.68-008
85.0	5.58-008	85.0	5.58-008
90.0	5.48-008	90.0	5.48-u08
95.0	5.39-008	95.0	5.39-u08
100.0	5.30-008	100.0	5.30-008
110.0	5.13-008	110.0	5.13-008
120.0	4.97-008	120.0	4.97-008
130.0	4.82-008	130.0	4.82-008
140.0	4.69-008	140.0	4.69-008
150.0	4.56-008	150.0	4.56-008
160.0	4.46-008	160.0	4.46-008
170.0	4.36-008	170.0	4.36-008
180.0	4.27-008	180.0	4.27-008
190.0	4.19-008	190.0	4.19-008
200.0	4.12-008	200.0	4.12-008
220.0	3.99-008	220.0	3.99-008
240.0	3.88-008	240.0	3.88-008
260.0	3.78-008	260.0	3.78-008
280.0	3.68-008	280.0	3.68-008

KOLHAAS ANO KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.0	6.73-008	90.0	5.41-005	1.12-001
147.0	5.28-008	147.0	5.93-005	1.31-001
197.0	4.79-008	197.0	6.38-005	1.48-001
237.0	5.17-008	237.0	6.73-005	1.82-001
294.0	5.60-008	294.0	7.32-005	2.25-001

KOLHAAS ANO KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
89.0	7.32-008	89.0	5.57-005	1.17-001
91.0	7.21-008	91.0	5.61-005	1.17-001
129.0	6.06-008	129.0	5.97-005	1.31-001
150.0	5.67-008	150.0	6.16-005	1.38-001
183.0	5.47-008	183.0	6.46-005	1.55-001
198.0	5.12-008	198.0	6.55-005	1.55-001
219.0	5.39-008	219.0	6.78-005	1.74-001
235.0	5.46-008	235.0	6.93-005	1.85-001
299.0	6.03-008	299.0	7.58-005	2.38-001

KOLHAAS ANO KIERSPE(1965), ALLOY AND STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
93.0	6.97-008	93.0	5.69-005	1.14-001
155.0	5.39-008	155.0	6.23-005	1.34-001
199.0	5.06-008	199.0	6.62-005	1.52-001
237.0	5.39-008	237.0	6.94-005	1.84-001
293.0	5.73-008	293.0	7.53-005	2.23-001

KOLHAAS ANO KIERSPE(1965), ALLOY AND STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
88.0	7.73-008	88.0	6.36-005	1.07-001
147.0	5.87-008	147.0	6.84-005	1.26-001
198.0	5.47-008	198.0	7.27-005	1.49-001
233.0	5.62-008	233.0	7.57-005	1.73-001
295.0	6.17-008	295.0	8.28-005	2.20-001

KOLHAAS ANO KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
84.1	4.46-008	-189.0	8.24-006	4.55-001
122.1	3.71-008	-151.0	9.70-006	4.67-001
153.1	3.42-008	-120.0	1.09-005	4.80-001
195.1	3.21-008	-78.0	1.25-005	5.00-001
235.1	3.35-008	-38.0	1.46-005	5.40-001
296.1	3.51-008	23.0	1.81-005	5.75-001

KOLHAAS ANO KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.1	4.27-008	-183.0	9.05-006	4.25-001
151.1	3.31-008	-122.0	1.15-005	4.36-001
197.1	3.22-008	-76.0	1.33-005	4.78-001
244.1	3.20-008	-29.0	1.57-005	4.97-001
300.1	3.53-008	27.0	1.90-005	5.57-001

KOLHAAS AND KIERSPE(1965), ALLOY AND STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
87.1	5.41-008	-186.0	1.45-005	3.25-001
144.1	4.15-008	-129.0	1.68-005	3.56-001
198.1	3.93-008	-75.0	1.90-005	4.10-001
238.1	3.75-008	-35.0	2.10-005	4.25-001
299.1	4.01-008	26.0	2.45-005	4.90-001

KOLHAAS ANO KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.1	4.87-008	-183.0	1.71-005	2.57-001
149.1	3.81-008	-124.0	1.96-005	2.90-001
197.1	3.69-008	-76.0	2.16-005	3.37-001
238.1	3.67-008	-35.0	2.37-005	3.69-001
298.1	3.82-008	25.0	2.74-005	4.16-001

KOLHAAS AND KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
90.1	4.87-008	-183.0	1.86-005	2.36-001
119.1	4.15-008	-154.0	1.98-005	2.50-001
164.1	3.70-008	-109.0	2.17-005	2.80-001
195.1	3.55-008	-78.0	2.31-005	3.00-001
230.1	3.77-008	-43.0	2.49-005	3.48-001
298.1	3.81-008	25.0	2.91-005	3.90-001

KOLHAAS AND KIERSPE(1965), ALLOY ANO STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
88.1	4.99-008	-185.0	2.29-005	1.92-001
147.1	3.93-008	-126.0	2.56-005	2.26-001
196.1	3.80-008	-77.0	2.79-005	2.67-001

Stainless and Alloy Steels (cont.)

TYLER AND WILSON(1952), ALLOY AND STAINLESS STEELS - TW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
60.0	5.32-008	60.0	5.32-008
100.0	5.24-008	100.0	5.24-008
140.0	4.58-008	140.0	4.58-008
180.0	4.12-008	180.0	4.12-008
220.0	3.91-008	220.0	3.91-008
260.0	3.84-008	260.0	3.84-008

TYLER, NESBITT, AND WILSON(1953), ALLOY AND STAINLESS STEELS - TNW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
70.0	5.31-008	70.0	5.88-005	1.51-002
100.0	4.96-008	100.0	5.95-005	1.99-002
200.0	3.80-008	200.0	6.60-005	2.75-002
300.0	3.83-008	300.0	8.12-005	3.38-002

KOLHAAS AND KIERSPE(1965), ALLOY AND STAINLESS STEELS - KK(1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
93.0	8.15-008	93.0	6.59-005	1.15-001
149.0	6.25-008	149.0	6.85-005	1.36-001
199.0	5.49-008	199.0	7.09-005	1.54-001
298.0	5.69-008	298.0	7.43-005	2.28-001

LEES(1908), CARBON STEEL - L

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
103.0	3.34-008	103.0	3.34-008
113.0	3.26-008	113.0	3.26-008
123.0	3.19-008	123.0	3.19-008
148.0	3.11-008	148.0	3.11-008
173.0	3.09-008	173.0	3.09-008
198.0	3.09-008	198.0	3.09-008
223.0	3.10-008	223.0	3.10-008
248.0	3.09-008	248.0	3.09-008
273.0	3.06-008	273.0	3.06-008
291.0	3.05-008	291.0	3.05-008

RAOHAKRISHNA ANO NIELSEN(1965), CO - RN

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
1.0	2.79-008	1.0	8.71-008	3.20-001
2.0	2.70-008	2.0	8.72-008	6.20-001
3.0	2.56-008	3.0	8.72-008	8.80-001
4.0	2.47-008	4.0	8.73-008	1.13+000
5.0	2.39-008	5.0	8.74-008	1.37+000
6.0	2.29-008	6.0	8.75-008	1.57+000

WHITE ANO WOOOS (1957B), CO - WW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
10.0	2.36-008	10.0	9.07-008	2.60+000
15.0	2.42-008	15.0	9.32-008	3.90+000
20.0	2.23-008	20.0	9.92-008	4.50+000
30.0	1.85-008	30.0	1.21-007	4.60+000
40.0	1.83-008	40.0	1.90-007	3.85+000
50.0	1.44-008	50.0	2.40-007	3.00+000
75.0	1.47-008	75.0	5.50-007	2.00+000
100.0	1.68-008	100.0	9.90-007	1.70+000

WILKES,POWELL, ANO OEWITT (1969), CO - WPO

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
100.0	1.60-008	100.0	1.05-008	1.52+002
150.0	1.82-008	150.0	2.10-008	1.30+002
200.0	1.94-008	200.0	3.35-008	1.16+002
250.0	1.96-008	250.0	4.65-008	1.05+002
300.0	1.95-008	300.0	6.00-008	9.75+001

FARRELL ANO GREIG(1969), NI - FG

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONOUCTIVITY
20.0	1.47-008	20.0	1.85-008	1.59+001
50.0	1.29-008	50.0	1.60-007	4.05+000
80.0	1.39-008	80.0	5.59-007	1.99+000
90.0	1.52-008	90.0	7.89-007	1.73+000

GRIEG AND HARRISON(1965), NI - GH

TEMP	LORENZ RATIO
5.0	2.41-008
10.0	2.26-008
20.0	1.90-008
30.0	1.53-008
40.0	1.32-008
50.0	1.26-008
60.0	1.28-008
70.0	1.33-008
80.0	1.39-008
90.0	1.45-008

TEMP	LORENZ RATIO
5.0	2.41-008
10.0	2.26-008
20.0	1.90-008
30.0	1.53-008
40.0	1.32-008
50.0	1.26-008
60.0	1.28-008
70.0	1.33-008
80.0	1.39-008
90.0	1.45-008

KEMP,KLEMENS, AND WHITE (1956), NI - KKW

TEMP	LORENZ RATIO
5.0	2.35-008
15.0	2.03-008
25.0	1.57-008
35.0	1.36-008
45.0	1.25-008
55.0	1.21-008
65.0	1.20-008
75.0	1.25-008
90.0	1.50-008
115.0	1.71-008
135.0	1.85-008

TEMP	LORENZ RATIO
5.0	2.35-008
15.0	2.03-008
25.0	1.57-008
35.0	1.36-008
45.0	1.25-008
55.0	1.21-008
65.0	1.20-008
75.0	1.25-008
90.0	1.50-008
115.0	1.71-008
135.0	1.85-008

LEES(1908), NI - L

TEMP	LORENZ RATIO
103.0	2.92-008
113.0	2.82-008
123.0	2.73-008
148.0	2.63-008
173.0	2.59-008
198.0	2.56-008
223.0	2.55-008
248.0	2.57-008
273.0	2.59-008
291.0	2.59-008

TEMP	LORENZ RATIO
103.0	2.92-008
113.0	2.82-008
123.0	2.73-008
148.0	2.63-008
173.0	2.59-008
198.0	2.56-008
223.0	2.55-008
248.0	2.57-008
273.0	2.59-008
291.0	2.59-008

WHITE AND TAINSH(1967), NI - WT

TEMP	LORENZ RATIO
5.0	1.91-008
10.0	1.52-008
20.0	1.18-008
30.0	1.01-008
40.0	1.00-008
50.0	1.00-008
60.0	1.06-008
70.0	1.19-008
80.0	1.32-008
90.0	1.43-008
100.0	1.54-008
110.0	1.64-008

TEMP	LORENZ RATIO
5.0	1.91-008
10.0	1.52-008
20.0	1.18-008
30.0	1.01-008
40.0	1.00-008
50.0	1.00-008
60.0	1.06-008
70.0	1.19-008
80.0	1.32-008
90.0	1.43-008
100.0	1.54-008
110.0	1.64-008

AOYAMA(1940), NI ALLOYS - A

TEMP	LORENZ RATIO
73.1	6.66-008
173.1	4.60-008
273.1	3.31-008

TEMP	LORENZ RATIO
-200.0	1.59-008
-100.0	1.10-008
0.0	7.90-009

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(MOT)

TEMP	LORENZ RATIO
4.2	3.70-008
63.3	6.20-008
77.3	5.50-008
77.3	5.90-008
4.2	3.70-008
14.0	5.60-008
20.4	6.00-008
73.7	5.70-008
77.0	4.50-008
77.0	5.80-008

TEMP	LORENZ RATIO
4.2	3.70-008
63.3	6.20-008
77.3	5.50-008
77.3	5.90-008
4.2	3.70-008
14.0	5.60-008
20.4	6.00-008
73.7	5.70-008
77.0	4.50-008
77.0	5.80-008

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(MAT)

TEMP	LORENZ RATIO
2.6	4.30-008
4.3	6.40-008
14.0	9.80-008
20.5	1.09-007
63.0	7.20-008
63.7	7.20-008
68.4	7.50-008
77.0	6.90-008

TEMP	LORENZ RATIO
2.6	4.30-008
4.3	6.40-008
14.0	9.80-008
20.5	1.09-007
63.0	7.20-008
63.7	7.20-008
68.4	7.50-008
77.0	6.90-008

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(MOR)

TEMP	LORENZ RATIO
2.6	2.35-008
2.7	2.27-008
4.2	3.00-008
10.1	3.70-008
20.4	5.60-008
20.6	5.90-008
63.3	5.30-008
75.5	5.30-008
77.0	6.00-008

TEMP	LORENZ RATIO
2.6	2.35-008
2.7	2.27-008
4.2	3.00-008
10.1	3.70-008
20.4	5.60-008
20.6	5.90-008
63.3	5.30-008
75.5	5.30-008
77.0	6.00-008

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(IOT)

TEMP	LORENZ RATIO
14.0	1.01-007
20.4	1.10-007
63.3	1.03-007
73.4	1.03-007
77.0	1.05-007
2.6	3.70-008
4.2	6.40-008
4.2	5.70-008
9.6	8.00-008

TEMP	LORENZ RATIO
14.0	1.01-007
20.4	1.10-007
63.3	1.03-007
73.4	1.03-007
77.0	1.05-007
2.6	3.70-008
4.2	6.40-008
4.2	5.70-008
9.6	8.00-008

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(IAT)

TEMP	LORENZ RATIO
2.6	7.90-008
4.3	1.13-007
14.0	1.90-007
20.5	2.00-007
22.1	2.10-007
54.0	1.75-007
63.3	1.50-007
63.7	1.60-007
68.4	1.40-007
77.0	1.40-007

TEMP	LORENZ RATIO
2.6	7.90-008
4.3	1.13-007
14.0	1.90-007
20.5	2.00-007
22.1	2.10-007
54.0	1.75-007
63.3	1.50-007
63.7	1.60-007
68.4	1.40-007
77.0	1.40-007

Nickel Alloys (cont.)

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(IOT)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
14.0	1.01-007	14.0	1.01-007
20.4	1.10-007	20.4	1.10-007
63.3	1.03-007	63.3	1.03-007
73.4	1.03-007	73.4	1.03-007
77.0	1.05-007	77.0	1.05-007
2.6	3.70-008	2.6	3.70-008
4.2	6.40-008	4.2	6.40-008
4.2	5.70-008	4.2	5.70-008
9.6	8.00-008	9.6	8.00-008

ESTERMANN ANO ZIMMERMAN(1952), NI ALLOY - EZ(IAT)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
2.6	7.90-008	2.6	7.90-008
4.3	1.13-007	4.3	1.13-007
14.0	1.90-007	14.0	1.90-007
20.5	2.00-007	20.5	2.00-007
22.1	2.10-007	22.1	2.10-007
54.0	1.75-007	54.0	1.75-007
63.3	1.50-007	63.3	1.50-007
63.7	1.60-007	63.7	1.60-007
68.4	1.40-007	68.4	1.40-007
77.0	1.40-007	77.0	1.40-007

HUST AND SPARKS(1970), NI ALLOYS - HPW(718A)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
6.0	1.73-007	6.0	1.73-007
7.0	1.75-007	7.0	1.75-007
8.0	1.78-007	8.0	1.78-007
9.0	1.80-007	9.0	1.80-007
10.0	1.82-007	10.0	1.82-007
12.0	1.84-007	12.0	1.84-007
14.0	1.84-007	14.0	1.84-007
16.0	1.82-007	16.0	1.82-007
18.0	1.80-007	18.0	1.80-007
20.0	1.77-007	20.0	1.77-007
25.0	1.69-007	25.0	1.69-007
30.0	1.61-007	30.0	1.61-007
35.0	1.52-007	35.0	1.52-007
40.0	1.44-007	40.0	1.44-007
45.0	1.37-007	45.0	1.37-007
50.0	1.30-007	50.0	1.30-007
55.0	1.24-007	55.0	1.24-007
60.0	1.18-007	60.0	1.18-007
65.0	1.13-007	65.0	1.13-007
70.0	1.08-007	70.0	1.08-007
75.0	1.03-007	75.0	1.03-007
80.0	9.87-008	80.0	9.87-008
85.0	9.47-008	85.0	9.47-008
90.0	9.11-008	90.0	9.11-008
95.0	8.77-008	95.0	8.77-008
100.0	8.46-008	100.0	8.46-008
110.0	7.90-008	110.0	7.90-008
120.0	7.43-008	120.0	7.43-008
130.0	7.01-008	130.0	7.01-008
140.0	6.66-008	140.0	6.66-008
150.0	6.34-008	150.0	6.34-008
160.0	6.07-008	160.0	6.07-008
170.0	5.83-008	170.0	5.83-008
180.0	5.62-008	180.0	5.62-008
190.0	5.44-008	190.0	5.44-008
200.0	5.27-008	200.0	5.27-008
220.0	4.99-008	220.0	4.99-008
240.0	4.75-008	240.0	4.75-008
260.0	4.55-008	260.0	4.55-008
280.0	4.37-008	280.0	4.37-008

HUST, POWELL, AND WEITZEL(1971), NI ALLOYS - HPW(X)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
7.0	1.47-007	7.0	1.47-007
8.0	1.51-007	8.0	1.51-007
9.0	1.53-007	9.0	1.53-007
10.0	1.55-007	10.0	1.55-007
12.0	1.57-007	12.0	1.57-007
14.0	1.56-007	14.0	1.56-007
16.0	1.54-007	16.0	1.54-007
18.0	1.51-007	18.0	1.51-007
20.0	1.48-007	20.0	1.48-007
25.0	1.41-007	25.0	1.41-007
30.0	1.33-007	30.0	1.33-007
35.0	1.26-007	35.0	1.26-007
40.0	1.19-007	40.0	1.19-007
45.0	1.13-007	45.0	1.13-007
50.0	1.08-007	50.0	1.08-007
55.0	1.03-007	55.0	1.03-007
60.0	9.83-008	60.0	9.83-008
65.0	9.41-008	65.0	9.41-008
70.0	9.02-008	70.0	9.02-008
75.0	8.66-008	75.0	8.66-008
80.0	8.32-008	80.0	8.32-008
85.0	8.02-008	85.0	8.02-008
90.0	7.73-008	90.0	7.73-008
95.0	7.47-008	95.0	7.47-008
100.0	7.23-008	100.0	7.23-008
110.0	6.79-008	110.0	6.79-008
120.0	6.42-008	120.0	6.42-008
130.0	6.10-008	130.0	6.10-008
140.0	5.83-008	140.0	5.83-008
150.0	5.59-008	150.0	5.59-008
160.0	5.39-008	160.0	5.39-008
170.0	5.21-008	170.0	5.21-008
180.0	5.05-008	180.0	5.05-008
190.0	4.92-008	190.0	4.92-008
200.0	4.80-008	200.0	4.80-008
220.0	4.59-008	220.0	4.59-008
240.0	4.42-008	240.0	4.42-008
260.0	4.28-008	260.0	4.28-008
280.0	4.14-008	280.0	4.14-008
300.0	4.01-008	300.0	4.01-008

HUST, POWELL, AND WEITZEL(1971), NI ALLOYS - HPW(718)

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
7.0	1.03-007	7.0	1.03-007
8.0	1.08-007	8.0	1.08-007
9.0	1.12-007	9.0	1.12-007
10.0	1.16-007	10.0	1.16-007
12.0	1.22-007	12.0	1.22-007
14.0	1.26-007	14.0	1.26-007
16.0	1.28-007	16.0	1.28-007
18.0	1.29-007	18.0	1.29-007
20.0	1.29-007	20.0	1.29-007
25.0	1.28-007	25.0	1.28-007
30.0	1.25-007	30.0	1.25-007
35.0	1.21-007	35.0	1.21-007
40.0	1.17-007	40.0	1.17-007
45.0	1.13-007	45.0	1.13-007
50.0	1.09-007	50.0	1.09-007
55.0	1.05-007	55.0	1.05-007
60.0	1.01-007	60.0	1.01-007
65.0	9.75-008	65.0	9.75-008
70.0	9.41-008	70.0	9.41-008
75.0	9.08-008	75.0	9.08-008
80.0	8.77-008	80.0	8.77-008
85.0	8.49-008	85.0	8.49-008
90.0	8.22-008	90.0	8.22-008
95.0	7.96-008	95.0	7.96-008
100.0	7.73-008	100.0	7.73-008
110.0	7.30-008	110.0	7.30-008
120.0	6.93-008	120.0	6.93-008
130.0	6.60-008	130.0	6.60-008
140.0	6.32-008	140.0	6.32-008
150.0	6.07-008	150.0	6.07-008
160.0	5.86-008	160.0	5.86-008
170.0	5.67-008	170.0	5.67-008
180.0	5.50-008	180.0	5.50-008
190.0	5.35-008	190.0	5.35-008
200.0	5.22-008	200.0	5.22-008
220.0	4.98-008	220.0	4.98-008
240.0	4.79-008	240.0	4.79-008
260.0	4.61-008	260.0	4.61-008
280.0	4.44-008	280.0	4.44-008

Platinum

POWELL, TYE, AND WOODMAN(1967), PT - PTW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
100.0	2.18-008	100.0	2.18-008
200.0	2.62-008	200.0	2.62-008
300.0	2.69-008	300.0	2.69-008

WHITE AND WOODS (1957), PT - WW

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
6.0	2.62-008	6.0	1.31-008	1.20+001
10.0	2.00-008	10.0	1.56-008	1.28+001
15.0	1.57-008	15.0	2.80-008	8.40+000
20.0	1.30-008	20.0	5.65-008	4.60+000
30.0	1.28-008	30.0	1.93-007	2.00+000
40.0	1.73-008	40.0	4.63-007	1.50+000
50.0	1.54-008	50.0	7.72-007	1.00+000
75.0	2.31-008	75.0	1.73-006	1.00+000
100.0	2.81-008	100.0	2.81-006	1.00+000

MOORE, MCELROY, AND BARSONI(1966), PT - MMB (1)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
90.0	2.24-008	90.0	2.74-006	7.36-001
100.0	2.25-008	100.0	3.08-006	7.30-001
120.0	2.29-008	120.0	3.80-006	7.22-001
140.0	2.33-008	140.0	4.55-006	7.16-001
160.0	2.37-008	160.0	5.34-006	7.11-001
180.0	2.42-008	180.0	6.18-006	7.06-001
200.0	2.46-008	200.0	6.99-006	7.04-001
220.0	2.49-008	220.0	7.79-006	7.03-001
240.0	2.52-008	240.0	8.59-006	7.03-001
260.0	2.54-008	260.0	9.39-006	7.04-001
280.0	2.56-008	280.0	1.02-005	7.04-001
300.0	2.59-008	300.0	1.10-005	7.05-001

MOORE, MCELROY, AND BARSONI(1966), PT - MMB (2)

TEMP	LORENZ RATIO	TEMP	ELECTRICAL RESISTIVITY	THERMAL CONDUCTIVITY
90.0	1.97-008	90.0	2.35-006	7.55-001
100.0	2.06-008	100.0	2.76-006	7.45-001
120.0	2.21-008	120.0	3.62-006	7.33-001
140.0	2.30-008	140.0	4.45-006	7.25-001
160.0	2.38-008	160.0	5.29-006	7.19-001
180.0	2.43-008	180.0	6.12-006	7.16-001
200.0	2.47-008	200.0	6.93-006	7.14-001
220.0	2.51-008	220.0	7.73-006	7.14-001
240.0	2.54-008	240.0	8.53-006	7.15-001
260.0	2.56-008	260.0	9.30-006	7.17-001
280.0	2.58-008	280.0	1.01-005	7.19-001
300.0	2.61-008	300.0	1.09-005	7.21-001

Palladium

KEMP, KLEMENS, SPEEDHAR, AND WHITE(1955), PD- KKSW

TEMP	LORENZ RATIO	TEMP	LORENZ RATIO
5.0	2.33-008	5.0	2.33-008
10.0	2.05-008	10.0	2.05-008
15.0	1.56-008	15.0	1.56-008
20.0	1.33-008	20.0	1.33-008
30.0	1.25-008	30.0	1.25-008
40.0	1.35-008	40.0	1.35-008
60.0	1.55-008	60.0	1.55-008
80.0	1.77-008	80.0	1.77-008
100.0	2.03-008	100.0	2.03-008
120.0	2.23-008	120.0	2.23-008
140.0	2.32-008	140.0	2.32-008
160.0	2.41-008	160.0	2.41-008

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A comprehensive review and compilation of the world literature on Lorenz ratio of technically important metals and alloys is presented. Lorenz ratio, electrical resistivity, thermal conductivity and characterization data are compiled in tabular form and the Lorenz ratio data are presented in graphical form as well. Data are included here only if the research reported both thermal conductivity and electrical resistivity of the specimens. No attempt has been made to smooth data or present recommended values.

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