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I. GENERAL INFORMATION

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Series letters with serial numbers are used to designate publications of the National Bureau of Standards:

S = "Scientific Paper". S1 to S329 are "Reprints" from the "Bulletin of the Bureau of Standards". S330 to S572 were published as "Scientific Papers of the Bureau of Standards". This series was superseded by the "Bureau of Standards Journal of Research" in 1928.

T = "Technologic Paper". T1 to T370. This series was superseded by the "Bureau of Standards Journal of Research" in 1928.

RP = "Research Paper". RP1 to RP690 are reprints from the "Bureau of Standards Journal of Research". Research papers since July 1934 are reprints from the "Journal of Research of the National Bureau of Standards".

C = Circular.

Circular C24 and supplements give the complete list of the publications of the National Bureau of Standards (1901-1936), and may be purchased for 55 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C. Announcement of new publications is made each month in the Technical News Bulletin of the National Bureau of Standards, which is obtainable from the Superintendent of Documents by subscription at 50 cents per year.

II. PUBLICATIONS OF THE NATIONAL BUREAU OF STANDARDS

The numbers assigned (for example, S352, T349, RP62) are the actual reprint numbers by which the National Bureau of Standards and the Government Printing Office lists and sells, respectively, the separate papers (reprints). In ordering Government publications from the Superintendent of Documents, Government Printing Office, Washington, D. C., please use the letter in connection with the number and title of the publication; for example, "S315, Thermal expansion of tungsten".
1. **SCIENTIFIC PAPERS**

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<td>Production of temperature uniformity in an electric furnace. A. W. Gray. Bul. BS 10, 451 (No. 4, 1914)</td>
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<td>Thermal expansion of alpha and of beta brass between 0 and 600° C, in relation to the mechanical properties of heterogeneous brasses of the huntz metal type. P. D. Merica and L. W. Schad. Bul. BS 14, 571 (No. 4, 1919)</td>
<td>S 321</td>
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<tr>
<td>Thermal expansion of copper and some of its important industrial alloys. P. Hidnert. Sci. Pap. BS 17, 91 (1922)</td>
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* For Quarterly number of the Bulletin in which the Scientific Paper appeared. This paper is not for sale as a separate paper.
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| Thermal expansion of nickel, Monel metal, stellite, stainless steel, and aluminum. | S 426 | 10 ¢ |
| W. H. Souder and P. Hidnert. Sci. Pap. BS 17, 497 (1922) |

| Thermal expansion of a few steels. W. Souder and P. Hidnert. | S 433 | OP |
| Sci. Pap. BS 17, 611 (1922) |


| Thermal expansion of molybdenum. P. Hidnert and W. B. Gero. | S 488 | 10 ¢ |
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| Thermal expansion of aluminum and various important aluminum alloys. P. Hidnert. | S 497 | OP |
| Sci. Pap. BS 19, 697 (1923-24) |

| Thermal expansion of tungsten. P. Hidnert. | S 515 | 5 ¢ |
| Sci. Pap. BS 20, 483 (1924-26) |

| Measurements of the index of refraction of glass at high temperatures. C. G. Peters. | S 521 | 10 ¢ |
| Sci. Pap. BS 20, 635 (1924-26) |

| Pure zinc at normal and elevated temperatures. J. R. Freeman, Jr., F. Sillers, Jr., and P. F. Brandt. | S 522 | OP |
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<td>Porosity and volume changes of clay fire bricks at furnace temperatures. G. A. Loomis. Tech. Pap. BS 13 (1920)</td>
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*Physical properties of dental materials (gold alloys and accessory materials).* R. J. Coleman. BS J. Research 1, 867 (1928)

*Fire resistance of hollow load-bearing wall tile.* S. H. Ingberg and H. D. Foster. BS J. Research 2, 1 (1929)

*Thermal expansion of tantalum.* P. Hidnert. BS J. Research 2, 887 (1929)

*Preparation of experimental sagger bodies according to fundamental properties.* R. A. Heindl and L. E. Hong. BS J. Research 3, 419 (1929)

*Progress report on investigation of fire-clay bricks and the clays used in their preparation.* R. A. Heindl and W. L. Pendergast. BS J. Research 3, 691 (1929)
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Fire clays; some fundamental properties at several temperatures. R. A. Heindl and J. L. Pendergast. BS J. Research 5, 213 (1930)


Dimensional changes in the manufacture of electrolytes. N. Bekkedahl and W. Blum. BS J. Research 6, 329 (1931)

Volume changes in brick masonry materials. L. A. Palmer. BS J. Research 6, 1003 (1931)

The determination of the coefficient of cubical expansion of solid benzoic acid by means of a gas-filled dilatometer. E. R. Smith. BS J. Research 7, 903 (1931)

The life of the sagger as affected by varying certain properties. R. A. Heindl and L. E. Mong. BS J. Research 7, 1017 (1931)


A method for determining the volume changes occurring in metals during casting. C. M. Saeger, Jr., and E. J. Ash. BS J. Research 8, 37 (1932)

Kaolins; effect of firing temperatures on some of their physical properties. R. A. Heindl, W. L. Pendergast, and L. E. Long. BS J. Research 8, 199 (1932)
Volume changes of cast irons during casting. E. J. Ash and C. M. Saeger, Jr. BS J. Research 9, 601 (1932)

Thermal expansion of some silicates of elements in Group II of the periodic system. R. F. Geller and H. Insley. BS J. Research 9, 35 (1932)

"Moisture expansion" of ceramic white ware. R. F. Geller and A. S. Creamer. BS J. Research 9, 291 (1932)

A study of some ceramic bodies of low absorption maturing at temperatures below 1000° C. R. F. Geller and D. N. Evans. BS J. Research 9, 473 (1932)

Thermal expansion of lead. P. Hidnert and V. T. Sweeney. BS J. Research 9, 703 (1932)

The interference method of measuring thermal expansion. G. E. Merritt. BS J. Research 10, 59 (1933)

The thermal expansion of refractories to 1800° C. R. A. Heindl. BS J. Research 10, 715 (1933)

Thermal expansion of columbium. P. Hidnert and H. S. Krider. BS J. Research 11, 279 (1933)

Effects of particle size of a potter's "flint" and a feldspar in whiteware. R. F. Geller, D. N. Evans, and A. S. Creamer. BS J. Research 11, 327 (1933)

Effect of heat treatment on the expansivity of a Pyrex glass. J. B. Saunders and A. Q. Tool. BS J. Research 11, 799 (1933)

Olivine as a refractory. R. A. Heindl. BS J. Research 12, 215 (1934)

Thermal expansion of bearing bronzes. P. Hidnert. BS J. Research 12, 391 (1934)

Thermal expansions of some soda-lime-silica glasses as functions of the composition. B. C. Schmid, A. N. Finn, and J. C. Young. BS J. Research 12, 421 (1934)
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<td>Forms of rubber as indicated by the temperature volume relationship. N. Bekkedahl. J. Research NBS 13, 411 (1934)</td>
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<td>Compression tests of structural steel at elevated temperatures. P. D. Sale. J. Research NBS 13, 713 (1934)</td>
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<td>Calibrations of the line standards of length of the National Bureau of Standards. L. V. Judson and B. L. Page. J. Research NBS 13, 757 (1934)</td>
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<td>Young's modulus of elasticity at several temperatures for some refractories of varying silica content. R. A. Heindl and W. L. Pendergast. J. Research NBS 13, 851 (1934)</td>
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<td>Index of refraction, density, and thermal expansion of some soda-alumina-silica glasses as functions of the composition. C. A. Faick, J. C. Young, D. Hubbard, and A. N. Finn. J. Research NBS 14, 133 (1935)</td>
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<td>Thermal expansion of monocrystalline and polycrystalline antimony. P. Hidnert. J. Research NBS 14, 523 (1935)</td>
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Thermal expansion of copper-beryllium alloys. P. Hidnert. J. Research NBS 16, 529 (1936)  
Thermal expansion of lead-antimony alloys. P. Hidnert. J. Research NBS 17, 697 (1936)  
Thermal expansion of cemented tungsten carbide. P. Hidnert. J. Research NBS 18, 47 (1937)  
Some "soft" glazes of low thermal expansion. R. F. Geller, E. N. Bunting, and A. S. Creamer. J. Research NBS 20, 57 (1938)  
Thermal expansion and effects of heat treatments on the growth, density and structure of some heat-resisting alloys. P. Hidnert. J. Research NBS 20, 809 (1938)  
Expansion effects on the inversion of silica crystals in certain devitrified glasses. A. Q. Tool and J. B. Saunders. J. Research NBS 21, 773 (1938)  
Thermal-expansion characteristics of some ground-coat enamel frits. W. N. Harrison, B. J. Sweo and S. M. Shelton. J. Research NBS 22, 127 (1939)  
Improved interferometric procedure with application to expansion measurements. J. B. Saunders. J. Research NBS 23, 179 (1939)  

* For June number of the Journal in which the Research Paper appeared. This paper is not for sale as a separate paper.
Thermal expansion of some chromium-vanadium steels. P. Hidnert. J. Research NBS 24, 25 (1940)

Length changes of whiteware clays and bodies during initial heating, with supplementary data on mica. R. F. Geller and E. N. Bunting. J. Research NBS 25, 15 (1940)

Thermal expansion of electrolytic chromium. P. Hidnert. J. Research NBS 26, 81 (1941)

Some factors affecting the properties of ceramic talcose whiteware. R. F. Geller and A. S. Creamer. J. Research NBS 26, 213 (1941)

Comparative tests of chemical glassware. E. Wichers, A. N. Finn, and W. S. Clabaugh. J. Research NBS 26, 537 (1941). See page 539 for data on thermal expansion by P. Hidnert, L. H. Haxwell, and J. B. Saunders.

Thermal expansion of cast and of swaged chromium. P. Hidnert. J. Research NBS 27, 113 (1941)

Thermal expansion of clay building bricks. C. W. Ross. J. Research NBS 27, 197 (1941)

Thermal expansion studies of boric oxide glass and of crystalline boric oxide. J. J. Donoghue and D. Hubbard. J. Research NBS 27, 371 (1941)


Expansivity of a Vycor brand glass. J. B. Saunders. J. Research NBS 28, 51 (1942)

4. CIRCULARS

Invar and related nickel steels (2nd edition). C 58 OP
Circular BS No. 58 (1923)

Testing of line standards of length. L. V. Judson. Circular BS No. 332 (1927)

III. ARTICLES PUBLISHED IN OUTSIDE JOURNALS

The reference numbers (for example, OJ-1, OJ-2, etc.) in the following lists of publications in outside journals, are merely arbitrary numbers assigned here to indicate sequence in this letter circular and for easy reference in the index. They have nothing to do with any designating numbers which may be applied by the publishers.

Bulletin of the American Ceramic Society
(2525 North High St., Columbus, Ohio)

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<td>Effect of repeated heatings on the mechanical strength of high-tension insulator porcelains. R. F. Geller, Bul. Am. Ceramic Soc. 12, 18 (1933)</td>
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<td>The effect of calcined cyanite in porcelain bodies. S. J. McDowell and E. J. Vachuska. J. Am. Ceramic Soc. 10, 64 (1927)</td>
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</table>
Methods for testing crazing of glazes caused by increases in size of ceramic bodies. H. G. Schurecht. J. Am. Ceramic Soc. 11, 271 (1928)


The influence of chemical composition on the physical properties of glazes. F. P. Hall. J. Am. Ceramic Soc. 13, 182 (1930)


Transactions of the American Electrochemical Society (Columbia University, New York, N.Y.)

Methods for determining the volume changes undergone by metals and alloys during casting. C. N. Saeger, Jr., and E. J. Ash. Trans. Am. Foundrymen's Assoc. 38, 107 (1930)

Transactions of the American Institute of Metals
(29 West 39th St., New York, N. Y.)


Transactions of the American Institute of Mining and Metallurgical Engineers
(29 West 39th St., New York, N.Y.)


Austenite and austenitic steels. J. A. Mathews. Trans. Am. Inst. Min. Met. Eng. 71, 568 (1925). See page 575 for data on thermal expansion by P. Hidnert and W. T. Sweeney (Chemical composition of samples C-25-0 and CN-21-7 should be changed to Cr 23.7, Ni 6.8 percent and Cr 26.5, Ni 0.34 percent, respectively).

American Refractories Institute
(Oliver Bldg., Pittsburgh, Pa.)


Transactions of the American Society for Steel Treating
(7016 Euclid Ave., Cleveland, Ohio)

Ceramic bodies of low absorption maturing below 1000 Deg. C. R. F. Geller and D. N. Evans. Ceramic Ind. 20, 32 (1933)

The Chemical News


Industrial and Engineering Chemistry
(American Chemical Society, 20th & Northampton Sts., Easton, Penna.)


Metals and Alloys
(Reinhold Publishing Corp., East Stroudsburg, Pa.)


Metals Handbook of American Society for Metals
(7016 Euclid Ave., Cleveland, Ohio)


The Metal Industry
(The Louis Cassier Co., Ltd., 22 Henrietta St., Covent Garden, London, W.C. 2, England)

Thermal expansion of beryllium and aluminum-beryllium alloys. P. Hidnert and W. T. Sweeney. Metal Ind. 32, pp. 397 and 423 (1928)
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<td>Thermal expansion of copper-beryllium alloys. P. Hidnert. Metal Ind. 49, 212 (1936)</td>
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<tr>
<td>OJ-42</td>
<td>Thermal expansion of &quot;Carboloy&quot;. P. Hidnert. Phys. Rev. 35 (series 2), 120 (1930)</td>
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Rock Products (Tradepress Publishing Corp., 309 W. Jackson Blvd., Chicago, Ill.)


Rubber Chemistry and Technology (20th & Northampton Sts., Easton, Pa.)

Forms of rubber as indicated by the temperature volume relationship. N. Bekkedahl. Rubber Chem. Tech. 8, 5 (1935)


Journal of the Washington Academy of Sciences (450 Ahnaip St., Menasha, Wis.)


Micrometer microscopes. A. W. Gray. J. Wash. Acad. Sciences 4, 45 (1914)
The production of temperature uniformity in an electric furnace. A. W. Gray. J. Wash. Acad. Sciences 4, 134 (1914)

Reference No.  OJ-56

World Engineering Congress
(World Engineering Congress, Kogakkaï, Harunouchi, Tokyo, Japan)


Zeitschrift für Metallkunde
(VDI-Verlag GmbH, Dorotheenstr. 40, Berlin NW 7, Germany)


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