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Thermophysical Properties of High Temperature Solid Materials

VOLUME 11: ELEMENTS

Thermophysical Properties
Research Center, Purdue University
Y. S. TOULOUKIAN, Editor

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Thermophysical Properties of High Temperature Solid Materials

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Thermophysical Properties of High Temperature Solid Materials

VOLUME 1: ELEMENTS

Thermophysical Properties Research Center
PURDUE UNIVERSITY

Y. S. Touloukian, EDITOR

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PREFACE

The phenomenal growth of science and technology since the early forties has brought about a universal appreciation of the fact that present limitations in many technical developments are often a direct result of the paucity of knowledge on the properties of materials. Engineering developments in the years ahead will be closely linked to the research that is done today to contribute to a better understanding of the properties of matter, of which thermophysical properties constitute a major segment.

With a realization of the seriousness of this situation, a great deal of research effort has been made in recent years on the thermophysical properties of materials with the result that the volume of research literature has increased many fold. In spite of this fact, it is generally agreed that the present level of research on thermophysical properties still falls substantially short of existing needs and anticipated future demands. However, what is even more disturbing is the fact that engineering groups across the nation are using no more than a fraction of the information already available, either because it is in a form not directly useful to them or, often, because its existence is not generally known.

To partially remedy this situation concerning the thermophysical properties of high temperature materials, the Materials Laboratory of the U.S. Air Force at Wright-Patterson Air Force Base sponsored a project in 1957 to bring together a large portion of the then available data in a single work for easy reference. From this compilation, performed by the Armour Research Foundation, a four-volume work entitled *Handbook of Thermophysical Properties of Solid Materials* emerged. It was first published in 1960 as WADC TR58-476; in 1961 it was issued as a hard-bound set by The Macmillan Company.

Because of the favorable reception given to this original work, the Materials Laboratory of the U.S. Air Force requested the Thermophysical Properties Research Center (TPRC), in 1964, to update and revise this reference work in order to increase its usefulness and to put it on a more current basis. The present six-volume work, entitled *Thermophysical Properties of High Temperature Solid Materials*, consists of nine books totaling more than 8,500 pages. It is the result of a two-year project by TPRC. This new encyclopedic reference work cannot be called a revised edition of the earlier publication since nearly every page has been changed through major additions, corrections, and re-evaluation. An effort was made to adhere to the basic format of the earlier work. However, the organization of the material and the index to materials have been completely redesigned for greater ease in locating the information desired.

Inevitably, not all of the properties covered have received the same degree of attention. The material on thermal radiative properties, thermal diffusivity, and specific heat has been totally revised and rewritten. Materials on the coefficient of thermal expansion and thermal conductivity have received major revisions, and those on electrical resistivity, density, and melting point have had moderate revisions. Finally, lesser revisions were made to data concerning vapor pressure and heats of transformation. The new information incorporated into the work covered research conducted primarily during the years 1957 to 1964, although some major references are included from 1965 and some from as far back as 1910.

In processing the large amount of new and old data incorporated in these volumes, it was necessary that some degree of selectivity be exercised both from the standpoint of the references cited and the data extracted from them. It is hoped, however, that no major source of information has been omitted. Whenever possible, an effort was made to suggest recommended values of the properties. In the plots, recommended values are indicated by curves. It should be clear, however, that the designation of "recommended values" in no way implies that a critical analysis has been performed in all cases, nor does it suggest that they repre-

sent definitive values. Because most of the materials covered are not well-defined engineering materials, and because there is often a great paucity of information, any critical evaluation of these data is most difficult—if not impossible.

With a full appreciation of these inherent difficulties it is nevertheless hoped that the present compendia will prove to be of great usefulness to engineers seeking information on thermophysical properties. In spite of the extreme care exercised in processing the data and proofing the manuscript, it is possible that some errors might have been inadvertently overlooked. Should any instance of such oversight be uncovered, the Editor would be most indebted if it is brought to his attention.

The fact that such an enormous undertaking could be accomplished in such a short time is attributable primarily to TPRC's unique resources in the area of thermophysical properties information. Grateful acknowledgment is made to the Electronic Properties Information Center for assistance in providing bibliographic searches on electrical resistivity and to the Air Force Materials Laboratory for general assistance in bibliographic information. Extensive personal inquiries were made to the authors of research papers and reports requesting clarification and original data. The enthusiastic response to these inquiries (in the majority of the cases) is also gratefully acknowledged. The Editor and the contributing staff wish to give a special note of thanks in acknowledging the valuable assistance and cooperation they received individually and collectively from TPRC's Scientific Documentation Division personnel and the supporting staff of graphics and technical typists without whose painstaking and skillful contributions this work would not have been possible.

This work was performed under Contract No. AF33(615)1642, sponsored by the Air Force Materials Laboratory, Research and Technology Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. The personnel directly affiliated with this program were Mr. D. A. Shinn, Chief, Materials Information Branch; Mr. E. Dugger, Technical Manager, Information Processing; and Mr. J. H. Charlesworth, engineer in charge of this project. Their understanding cooperation has contributed much to the success of the program.

It is sincerely hoped that *Thermophysical Properties of High Temperature Solid Materials* will constitute an even more valuable contribution to technology than its predecessor. This work should prove to be an invaluable source of information on an important group of properties of materials to every engineer, providing him with reliable information of a scope that would be impossible for any one individual to master. If we have been able to approach these goals, the results will be highly gratifying.

June 1966

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EXPLANATORY TEXT

I. SCOPE OF COVERAGE

Thermophysical Properties of High Temperature Solid Materials comprises six volumes. Volumes 2, 4, and 6 each consist of two parts because of the large amount of material covered. The general contents of the respective volumes are as follows:

Volume 1—Elements
Volume 2—Nonferrous Alloys
  PART I—Nonferrous Binary Alloys
  PART II—Nonferrous Multiple Alloys
Volume 3—Ferrous Alloys
Volume 4—Oxides and Their Solutions and Mixtures
  PART I—Simple Oxygen Compounds and Their Mixtures
  PART II—Solutions and Their Mixtures of Simple Oxygen Compounds, Including Glasses and Ceramic Materials
Volume 5—Nonoxides and Their Solutions and Mixtures, Including Miscellaneous Ceramic Materials
Volume 6—Intermetallics, Cermets, Polymers, and Composite Systems
  PART I—Intermetallics
  PART II—Cermets, Polymers, and Composite Systems

The specific properties covered in each volume are:

1. Density (ρ)
2. Melting Point (M. P.)
3. Heat of Fusion (Δh_f)
4. Heat of Vaporization (Δh_v)
5. Heat of Sublimation (Δh_s)
6. Electrical Resistivity (r)
7. Specific Heat at Constant Pressure (c_p)
8. Thermal Conductivity (k)
9. Thermal Diffusivity (α)
10. Thermal Linear Expansion ($\Delta L/L$)
11. Thermal Radiative Properties:
    Absorptance (α), Emittance (ϵ), Reflectance (ρ), and Transmittance (τ)
12. Vapor Pressure (p)

Generally, only materials with melting points above 800°K (approximately 1000°F) are included, except for materials within the categories of polymers, plastics, and composites. A detailed discussion of the material classification procedure is presented in the following sections. A Material Index for the entire work is included at the end of each volume.

II. TPRC CLASSIFICATION OF MATERIALS

Materials are classified into the eight categories listed below. Whenever applicable, the compositions are reported in weight percent of the constitutents. For purposes of material classification TPRC considers the following elements as nonmetallic: H, He, C, N, O, F, Ne, P, S, Cl, A, Br, Kr, I, Xe, At, and Rn.

1. *Elements*: For the purpose of classification an element is specified as follows:
   - A. For metallic elements, the limit of impurities is <0.20 percent for each foreign constituent and <0.50 percent total impurities.
   - B. For nonmetallic elements (i.e., carbon including graphite and diamond), the limit of impurities is ≤ 2.0 percent for each foreign constituent and ≤ 5.0 percent total impurities.
2. *Nonferrous Alloys*: This category is for alloys in which the major constituent is other than iron. For the purpose of classification, nonferrous alloys are specified as follows:
   - A. Nonferrous Binary Alloys: The sum of the binary constituents is ≥ 99.50 percent and other constituents ≤ 0.20 percent each.
   - B. Nonferrous Multiple Alloys: The sum of the first two constituents is <99.50 percent and/or any other constituent >0.20 percent. Alternatively, the major constituent is ≤ 99.50 percent and each of the other constituents <0.20 percent (or not given).
3. *Ferrous Alloys*: This category is for alloys in which iron is greater than or equal to any other constituent. For the purpose of classification, ferrous alloys are specified as follows:
   - A. Carbon Steels: Carbon ≤ 2.0 percent and carbon $\geq$ any other alloying constituent.
     - a. Group I: Every other alloying constituent is ≤ 0.20 percent except for Mn, P, S, Si, which may be ≤ 0.60 percent each.
     - b. Group II: At least one other alloying constituent >0.20 percent and/or any of Mn, P, S, Si >0.60 percent.
   - B. Cast Irons: Carbon >2.0 percent and carbon $\geq$ any other alloying constituent.
     - a. Group I: Every other alloying constituent ≤ 0.20 percent except for Mn, P, S, Si, which may be ≤ 0.60 percent each.
     - b. Group II: At least one other alloying constituent >0.20 percent and/or any of Mn, P, S, Si >0.60 percent.
   - C. Alloy Steels (including alloy cast iron): The major alloying constituent is other than carbon.
     - a. Group I: Every other alloying constituent ≤ 0.20 percent except for Mn, P, S, Si, which may be ≤ 0.60 percent each, and C ≤ 2.0 percent.*
     - b. Group II: At least one other alloying constituent >0.20 percent and/or any of Mn, P, S, Si >0.60 percent.*
4. *Nonmetallic Compounds and Their Mixtures and Solutions*: Ceramic materials such as oxides, bromides, carbides, carbonates, nitrides, silicates, etc., are included in this category. For the purpose of classification, they are specified as follows:
   - A. For simple compounds and their solutions, the limit of impurities is ≤ 2.0 percent for each foreign constituent and ≤ 5.0 percent total impurities.

---

* Exception is made when Mn, P, S, or Si is the major alloying constituent. For instance, in the case of Fe + Mn + ΣX_i alloys the specifications corresponding to Groups I and II would be as follows:
  - a. Group I: Every other alloying constituent ≤ 0.20 percent except for P, S, Si, which may be ≤ 0.60 percent each, and C ≤ 2.0 percent.
  - b. Group II: At least one other alloying constituent >0.20 percent and/or any of P, S, Si >0.60 percent.

  In the above example, Mn has a higher weight percentage than any of P, S, or Si but does not necessarily have a weight percentage higher than 0.60 percent. Thus, the limits of Mn percentage may be written:

  Fe $\geq$ Mn $>$ P, S, Si and any other alloying constituent and Mn ≥ 0.20.

  The same guideline is applied to ferrous alloys containing P, S, or Si as major alloying constituents.

B. For mixtures of simple compounds and their solutions, the major constituent is <95.0 percent, or any other constituent is >2.0 percent.

5. *Intermetallics*: An intermetallic is a metal-metal compound formed by metallic elements in a fixed simple atomic ratio. For the purpose of classification, specifications are the same as those for Class 4.
6. *Cermets*: Cermets are ceramic materials such as carbides, oxides, etc., fused with or bonded by one or more pure metals. However, there are also metal-metal cermets, metal-intermetallic cermets, etc., which are also included in this category.
7. *Polymers*: Polymers are chemical compounds or mixtures of compounds formed by polymerization and consisting essentially of repeating molecular structural units.
8. *Composite Systems*: A composite system may consist of materials in combination, with clearly defined boundaries existing between components of the system, or a homogeneous material having a distinct configuration.

For the reader's convenience, the classification scheme for Classes 1 through 4, described above, is summarized in the following table.

SUMMARY TABLE OF TPRC CLASSIFICATION OF MATERIALS

Classification			Limits of Composition (weight percent)			
			X_1	$X_1 + X_2$	X_2	X_3
1. ELEMENTS	A. METALLIC		>99.50	--	<0.20	<0.20
	B. NONMETALLIC		≥95.0	--	≤2.0	≤2.0
2. NONFERROUS ALLOYS (X_1 > Fe)	A. BINARY ALLOYS		--	≥99.50	≥0.20	≤0.20
	B. MULTIPLE ALLOYS		--	≥99.50	>0.20	>0.20
			--	<99.50	≥0.20	≤0.20
			--	<99.50	>0.20	>0.20
			≤99.50	--	<0.20	<0.20
			X_1	X_2	X_3	Mn, P or Si
3. FERROUS ALLOYS (X_1 = Fe ≥ X_2)	A. CARBON STEELS	GROUP	Fe	C ≤2.0	≤0.20	≤0.60
		GROUP II	Fe	C ≤2.0	≤0.20	>0.60
			Fe	C ≤2.0	>0.20	≤0.60
			Fe	C ≤2.0	>0.20	>0.60
	B. CAST IRONS	GROUP I	Fe	C >2.0	≤0.20	≤0.60
		GROUP II	Fe	C >2.0	≤0.20	>0.60
			Fe	C >2.0	>0.20	≤0.60
			Fe	C >2.0	>0.20	>0.60
	C. ALLOYS* STEELS	GROUP I	Fe	≠ C	≤0.20 and C ≤2.0	≤0.60
		GROUP II	Fe	≠ C	≤0.20	>0.60
			Fe	≠ C	>0.20	≤0.60
			Fe	≠ C	>0.20	>0.60

4. NONMETALLIC COMPOUNDS AND THEIR MIXTURES AND SOLUTIONS

	X_1	X_2
A. SIMPLE COMPOUNDS AND THEIR SOLUTIONS	≥95.0	≤2.0
B. MIXTURES OF SIMPLE COMPOUNDS AND THEIR SOLUTIONS	<95.0	≤2.0
	≥95.0	>2.0
	<95.0	>2.0

NOMENCLATURE:

X_1 = Major Constituent

X_2 = Second Highest Constituent

X_3 = Third Highest Constituent

Where: $X_1 \geq X_2 \geq X_3 \geq X_4 \geq \cdots\cdots$

*In case Mn, P, S, or Si represents X_2 this particular element is dropped from the last column.

III. PRESENTATION OF DATA

Each of the six volumes consists of seven sections arranged in the following order:

1. Preface
2. Table of Contents
3. Explanatory Text
4. Conversion Factors
5. Body of Data
6. References
7. Material Index.

In the following paragraphs a detailed description of Sections 5, 6, and 7 is given. The contents of the first four sections are self-explanatory.

BODY OF DATA

Data on each material are presented in graphical or tabular form for selected sets of measurements, and are accompanied by a Reference Information Table with corresponding specifications and remarks. The first five properties listed in Section I of this Explanatory Text are considered as *point values* and are grouped together in a single table in the same manner as the graphs for the other remaining properties. Furthermore, for a given material group, where several properties are reported, data are arranged in accordance with the order of the property list given in Section I of this text.

Graphic Presentation

Data extracted from various references on a given material and property are shown on a single graph by means of distinct plotting symbols, which are identified in the Reference Information Table on the page following the graph. Each set of symbols indicates the data of a given investigator, but does not necessarily imply actual measured points. In numerous instances authors present only smoothed values, either in graphical or tabular form, and it is frequently impossible to distinguish interpolated or smoothed values from actual observed data.

In reporting data on thermal linear expansion, investigators sometimes give a single average value of this property for a considerable temperature range. In such instances it is assumed that a linear relationship is implied. All data on thermal linear expansion were reduced to a datum of 293°K (20°C); i.e., $(\Delta L/L) = 0$ at 293°K (20°C). This point is identified by a cross (+) on each graph.

The definition of $(\Delta L/L)$ used in this work is

$$(\Delta L/L) = \frac{L_T - L_{293}}{L_{293}} \times 100$$

where L_T = length of specimen at temperature T.

L_{293} = length of specimen at 293°K (20°C).

To compute the "coefficient" of thermal linear expansion β from 293°K to any temperature T, the following relation may be used.*

$$\beta = \frac{1}{100\,(T - 293)} \frac{\Delta L}{L}, \text{ in } K^{-1}$$

* It is necessary to divide the right-hand side of this equation by 100 because the graphical presentation of $(\Delta L/L)$ is in percent expansion from 293°K.

In some instances the coefficient of thermal linear expansion is reported in tabular form.

Curves drawn through the plotted points are the "most probable" curves based on the data shown. As additional information becomes available in the future, these recommendations may well be modified.

Point Value Table

Data extracted from various references are identified by distinct symbols in the same manner as data points on a graph. "Most probable" values are given either at the top of the table or are indicated in a footnote. These selections are usually made solely on the basis of the data presented. Sometimes these point values are also reported as a function of temperature or composition, in which case they are shown in graphical form and placed immediately following the tabular values.

Reference Information Table

A table giving the reference information associated with each set of data obtained in the graph immediately follows the graph. The table contains the following information:

1. Symbol. The plotting symbols are identical with and correspond to those used in the graph.
2. Reference. References are identified by hyphenated numbers which serve to locate the bibliographic citation in the section of References at the end of each volume. The initial two digits indicate the year of publication and the last digits identify the specific reference within the given year. In those instances where a reference does not carry a date, the letter symbol ND is used in place of the year of publication. Undated references are listed at the end of the list of References.
3. Temperature Range. Range covered by the data in a given paper or report.
4. Reported Error. The author's estimated accuracy (or precision).
5. Sample Specification. This column contains all pertinent available information about the test sample. This information consists of the following:
   a. Commercial trade name, chemical formula, etc., followed by manufacturer's name, if it is necessary for correct identification.
   b. Composition of the sample, expressed in weight percent. Unless otherwise stated, the percent sign is omitted.
   c. Physical characteristics of the material, such as a single crystal, polycrystalline, density, crystal structures, etc.
   d. Specimen designation by the author is given in brackets at the end of the citation.
6. Remarks. This column contains information on:
   a. Special process used in fabrication of the sample, such as being sintered, chill-cast, etc.
   b. Sample history, such as cold-worked, hot-pressed, annealed, etc.
   c. Conditions under which the specimen was investigated, environment, etc.
   d. Other pertinent remarks.

REFERENCES

The section on Reference gives complete bibliographic citations for all the references from which data were extracted. They are arranged chronologically by year of publication, and in arbitary sequence within any given year.

For the preparation of the references, the following order and convention is used.

Periodicals

1. Author(s) name: Last name first, followed by initials.
2. Journal name: Standard TPRC journal name abbreviations are used.
3. Series, volume, and number.

a. If the series is represented by a letter, it is underlined together with the volume number.
b. If the series is represented by a number, then only the numeral representing the volume is underlined.
c. The numeral for the issue number is shown in parentheses.

4. Pages: Indicate the beginning and ending pages.

Reports

1. Author(s) name is given in the same form as for periodicals.
2. The name of the responsible organization, if any.
3. The name of sponsor.
4. Report, bulletin, or circular designation.
5. Number.
6. Part.
7. Pages (same as for periodicals).
8. AD and PB numbers or equivalents.

Books

The bibliographic citation for books lists: author(s), title, volume, edition, publisher, and page(s).

In general, private communications are not listed as references. However, if TPRC did obtain additional substantive information from an author through private communication, and if this information was used, the remark "additional data obtained from author(s)" is added at the end of the reference citation.

MATERIAL INDEX

The Material Index lists all the materials included in this work by their proper trade or commercial names arranged in alphabetical order and, for materials designated by number codes, the listing is in increasing numerical order. Location of information on a particular property for a particular material is specified by the volume number and page numbers indicated within the appropriate property column of the index. The page number always indicates the starting page of the graphs or point value tables. Chemical formulas are given in parentheses following the proper names of materials which can be chemically identified. However, for materials within a general group, e.g., different oxides of cerium, the entries are only by chemical formulas listed under the material group designation, such as "cerium oxides." Whenever applicable, an effort is made to list commercial materials under their several accepted names. In the case of broad classes of materials, such as steels, glasses, etc., the materials are listed under their common names as well as under the heading of their general class when the designation is merely a letter and number code.

Simpler inorganic compounds (e.g., aluminum oxide, tantalum boride) are named according to the convention given in the *Handbook of Chemistry and Physics* (The Chemical Rubber Co., 45th edition, 1964, and - if not available there—the 43rd edition, 1962). Other inorganic compounds are generally named in accordance with the convention given in the *Chemical Abstracts* by giving the more electropositive part of the name first and the more electronegative part second. For nonferrous and ferrous alloys, only the first two components are listed and ΣX_i is added to designate multiple alloys. An exception is made, however, for chromium-nickel and nickel-chromium ferrous alloys, in which cases, all three major constituents are listed. For other inorganic compounds and their mixtures and solutions, all components with weight percent greater than 2 percent are listed. Finally, for cermets, the name of the ceramic part is given first and the metal part second, each in their respective alphabetical order regardless of their weight percentages, with the exception of beryllium cermet (e.g., Beryllium YB-9052), in which case the name of the metal part is given first.

CONVERSION FACTORS

NOTE: In preparing the conversion factors, the following basic definitions were used:

1 in. = 2.54 cm*

1 lb. = 453.59237 g*

1 cal_{Th} = 4.184 (exactly) Joule*

1 cal_{IT} = 4.1868 (exactly) Joule*

1 $Btu_{IT}lb^{-1}F^{-1}$ = 1 $cal_{IT}g^{-1}C^{-1}$‡

The subscripts "Th" and "IT" denote "Thermochemical" and "International Steam Table" units, respectively.

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* *NBS Technical News Bulletin*, 47(10), 1963.

‡ Mueller, E. F., and Rossini, F. D., *Am. J. Physics*, 12(1), 4, 1944.

CONVERSION FACTORS FOR UNITS OF DENSITY

MULTIPLY by appropriate factor to OBTAIN →	$g\ cm^{-3}$	$g\ in.^{-3}$	$kg\ m^{-3}$	$kg\ ft^{-3}$	$lb\ in.^{-3}$	$lb\ ft^{-3}$
$g\ cm^{-3}$	1	1.63872×10	1.0×10^{3}	2.83170×10	3.61275×10^{-2}	6.24283×10
$g\ in.^{-3}$	6.10234×10^{-2}	1	6.10234×10	1.72800	2.20462×10^{-3}	3.80959
$kg\ m^{-3}$	1.0×10^{3}	1.63872×10^{-2}	1	2.83170×10^{-2}	3.61275×10^{-5}	6.24283×10^{-2}
$kg\ ft^{-3}$	3.51446×10^{-2}	5.78704×10^{-1}	3.53145×10	1	1.27582×10^{-3}	2.20462
$lb\ in.^{-3}$	2.76797×10	4.53592×10^{2}	2.76797×10^{4}	7.83808×10^{2}	1	1.72800×10^{3}
$lb\ ft^{-3}$	1.60184×10^{-2}	2.62496×10^{-1}	1.60184×10	4.53592×10^{-1}	5.78704×10^{-4}	1

CONVERSION FACTORS FOR UNITS OF LATENT HEAT

MULTIPLY by appropriate factor to OBTAIN →	$cal_{Th}g^{-1}$	$cal_{IT}g^{-1}$	W sec g^{-1}	$J_{Int}g^{-1}$	$Btu_{Th}lb^{-1}$	$Btu_{IT}lb^{-1}$
$cal_{Th}g^{-1}$	1	9.99331×10^{-1}	4.184	4.18331	1.8	1.79880
$cal_{IT}g^{-1}$	1.00067	1	4.1868	4.18611	1.80120	1.8
W sec g^{-1}	2.39006×10^{-1}	2.38846×10^{-1}	1	9.99835×10^{-1}	4.30210×10^{-1}	4.29923×10^{-1}
$J_{Int}g^{-1}$	2.39045×10^{-1}	2.38885×10^{-1}	1.00017	1	4.30281×10^{-1}	4.29994×10^{-1}
$Btu_{Th}lb^{-1}$	5.55556×10^{-1}	5.55184×10^{-1}	2.32444	2.32406	1	9.99331×10^{-1}
$Btu_{IT}lb^{-1}$	5.55927×10^{-1}	5.55556×10^{-1}	2.326	2.32562	1.00067	1

CONVERSION FACTORS FOR UNITS OF SPECIFIC HEAT

MULTIPLY by appropriate factor to OBTAIN →	$cal_{Th}g^{-1}C^{-1}$	$cal_{IT}g^{-1}C^{-1}$	W sec $g^{-1}K^{-1}$	$J_{Int}g^{-1}K^{-1}$	$Btu_{Th}lb^{-1}F^{-1}$	$Btu_{IT}lb^{-1}F^{-1}$
$cal_{Th}g^{-1}C^{-1}$	1	9.99331×10^{-1}	4.184	4.18331	1	9.99331×10^{-1}
$cal_{IT}g^{-1}C^{-1}$	1.00067	1	4.1868	4.18611	1.00067	1
W sec $g^{-1}K^{-1}$	2.390006×10^{-1}	2.38846×10^{-1}	1	9.99835×10^{-1}	2.39006×10^{-1}	2.38846×10^{-1}
$J_{Int}g^{-1}K^{-1}$	2.39045×10^{-1}	2.38885×10^{-1}	1.00017	1	2.39045×10^{-1}	2.38885×10^{-1}
$Btu_{Th}lb^{-1}F^{-1}$	1	9.99331×10^{-1}	4.184	4.18331	1	9.99331×10^{-1}
$Btu_{IT}lb^{-1}F^{-1}$	1.00067	1	4.1868	4.18611	1.00067	1

Note: To convert quantities per "gram" to "mol" basis multiply conversion factor by the molecular weight M.

CONVERSION FACTORS FOR UNITS OF THERMAL CONDUCTIVITY

MULTIPLY ↓ by appropriate factor to OBTAIN →	$Btu_{IT}\,hr^{-1}ft^{-1}\,F^{-1}$	$Btu_{IT}\,in.\,hr^{-1}ft^{-2}F^{-1}$	$cal_{IT}\,sec^{-1}cm^{-1}\,C^{-1}$	$cal_{Th}\,sec^{-1}cm^{-1}\,C^{-1}$	$kcal_{Th}\,hr^{-1}\,m^{-1}\,C^{-1}$	$W\,cm^{-1}\,K^{-1}$
$Btu_{IT}\,hr^{-1}ft^{-1}\,F^{-1}$	1	1.2 x 10	4.13379×10^{-3}	4.13656×10^{-3}	1.48916	1.73073×10^{-2}
$Btu_{IT}\,in.\,hr^{-1}ft^{-2}\,F^{-1}$	8.33333×10^{-2}	1	3.44482×10^{-4}	3.44713×10^{-4}	1.24097×10^{-1}	1.44228×10^{-3}
$cal_{IT}\,sec^{-1}cm^{-1}\,C^{-1}$	2.41909×10^{2}	2.90291×10^{3}	1	1.00067	3.60241×10^{2}	4.1868
$cal_{Th}\,sec^{-1}cm^{-1}\,C^{-1}$	2.41747×10^{2}	2.90096×10^{3}	9.99331×10^{-1}	1	3.6×10^{2}	4.184
$kcal_{Th}\,hr^{-1}\,m^{-1}\,C^{-1}$	6.71520×10^{-1}	8.05824	2.77592×10^{-3}	2.77778×10^{-3}	1	1.16222×10^{-2}
$W\,cm^{-1}\,K^{-1}$	5.77789 x 10	6.93347×10^{2}	2.38846×10^{-1}	2.39006×10^{-1}	8.60421 x 10	1

CONVERSION FACTORS FOR UNITS OF THERMAL DIFFUSIVITY

MULTIPLY by appropriate factor to OBTAIN →	cm^2sec^{-1}	cm^2hr^{-1}	m^2hr^{-1}	$in.^2sec^{-1}$	ft^2sec^{-1}	ft^2hr^{-1}
cm^2sec^{-1}	1	3.60×10^{3}	3.60×10^{-1}	1.550×10^{-1}	1.07639×10^{-3}	3.87501
cm^2hr^{-1}	2.77778×10^{-4}	1	1.0×10^{-4}	4.30556×10^{-5}	2.98998×10^{-7}	1.07639×10^{-3}
m^2hr^{-1}	2.77778	1.0×10^{4}	1	4.30556	2.98998×10^{-3}	1.07639×10
$in.^2sec^{-1}$	6.45160	2.322×10^{4}	2.32258	1	6.94444×10^{-3}	2.50×10
ft^2sec^{-1}	9.29030×10^{2}	3.34451×10^{6}	3.34451×10^{2}	1.440×10^{2}	1	3.60×10^{3}
ft^2hr^{-1}	2.58064×10^{-1}	9.29030×10^{2}	9.29030×10^{-2}	4.0×10^{-2}	2.77778×10^{-4}	1

CONVERSION FACTORS FOR UNITS OF VAPOR PRESSURE

MULTIPLY by appropriate factor to OBTAIN →	dyne cm^{-2}	atm	kg cm^{-2}	mm Hg	in. Hg	lb $in.^{-2}$
dyne cm^{-2}	1	9.8690×10^{-7}	1.01970×10^{-6}	7.5010×10^{-4}	2.9530×10^{-5}	1.45040×10^{-5}
atm	1.01330×10^{6}	1	1.03320	7.60×10^{2}	2.9920×10	1.46960×10
kg cm^{-2}	9.8070×10^{5}	9.6780×10^{-1}	1	7.3560×10^{2}	2.8960×10	1.42230×10
mm Hg	1.33320×10^{3}	1.31580×10^{-3}	1.35950×10^{-3}	1	3.9370×10^{-2}	1.93370×10^{-2}
in. Hg	3.3860×10^{4}	3.3420×10^{-2}	3.4530×10^{-2}	2.540×10	1	4.9120×10^{-1}
lb $in.^{-2}$	6.89470×10^{4}	6.80460×10^{-2}	7.0310×10^{-2}	5.1710×10	2.0360	1

BODY OF DATA

ELEMENTS

NOTE: For purposes of classification, metallic elements and the nonmetallic element carbon are specified as follows:

1. For metallic elements, the limit of impurities is < 0.20 percent for each foreign constituent and < 0.50 percent total impurities.
2. For nonmetallic elements (i.e. carbon, including graphite and diamond), the limit of impurities is ≤ 2.0 percent for each foreign constituent and ≤ 5.0 percent total impurities.

PROPERTIES OF ACTINIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density	10.07	628.7
Melting Point	1320	2380
Heat of Vaporization . . .	310	560

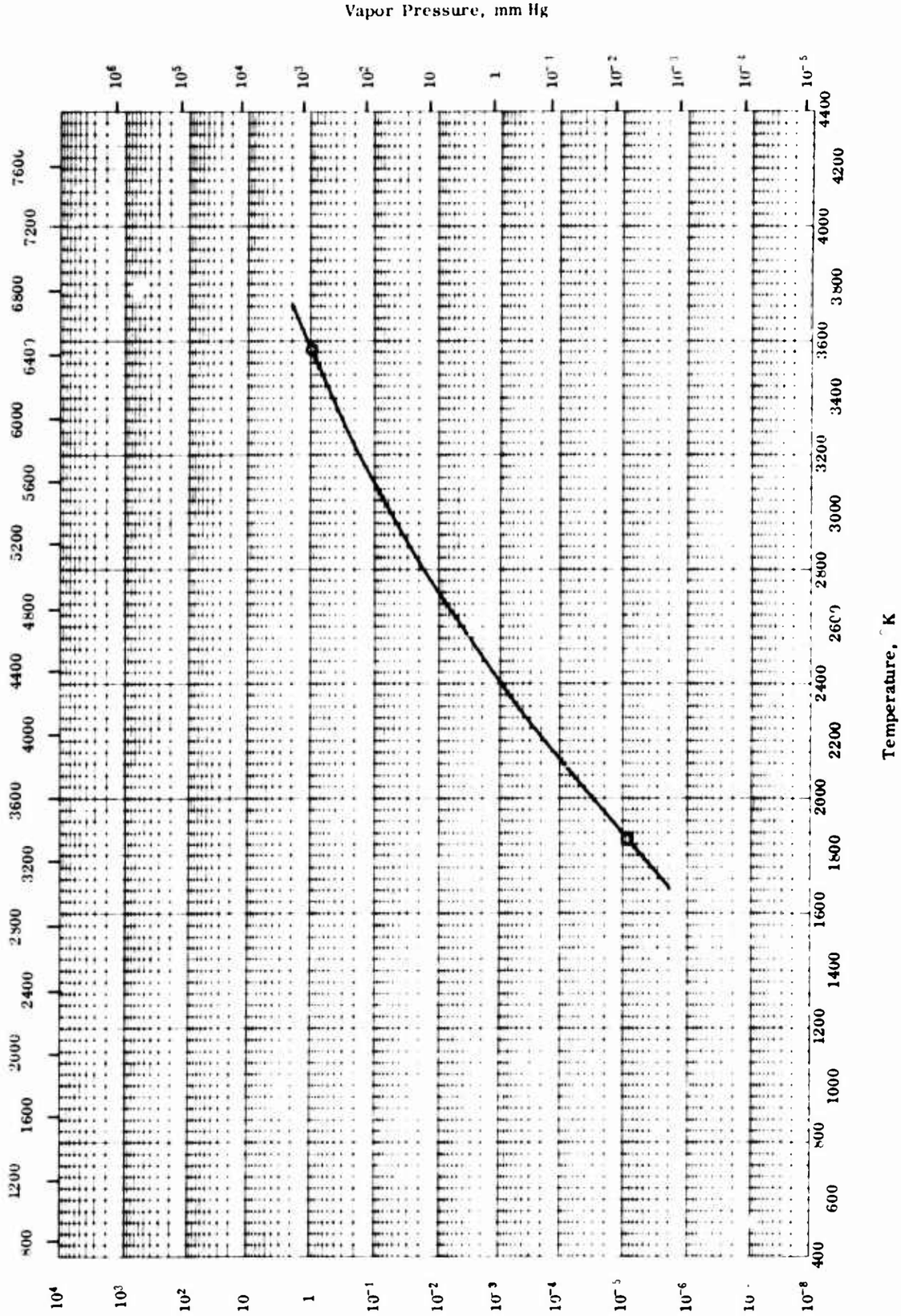
REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	□	10.07	628.7
Melting Point		K	R
	○	< 1470	< 2650
	△	1323 ± 50	2381 ± 90
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▽	11_{1322K}	$^{20}_{2380R}$
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◇	310	560

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-9	1470		Pure.	Author considered good estimate.
□	53-46	298		Not given.	
△	55-46	1272-1372		Ac^{227}. a twenty-year isotope.	
◇	55-46	—			Temperature not given.
▽	55-46	1322			

TPRC



VAPOR PRESSURE -- ACTINIUM

VAPOR PRESSURE -- ACTINIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-9	1873-3573		Pure.	"Good estimate" labeled by author.

TPRC

PROPERTIES OF ALUMINUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	2.71	169
Melting Point	933	1680
Heat of Fusion	90	170
Heat of Vaporization . . .	2720_{1330K}	4900_{2390R}
Heat of Sublimation . . .	2890_{298K}	5200_{537R}

REPORTED VALUES

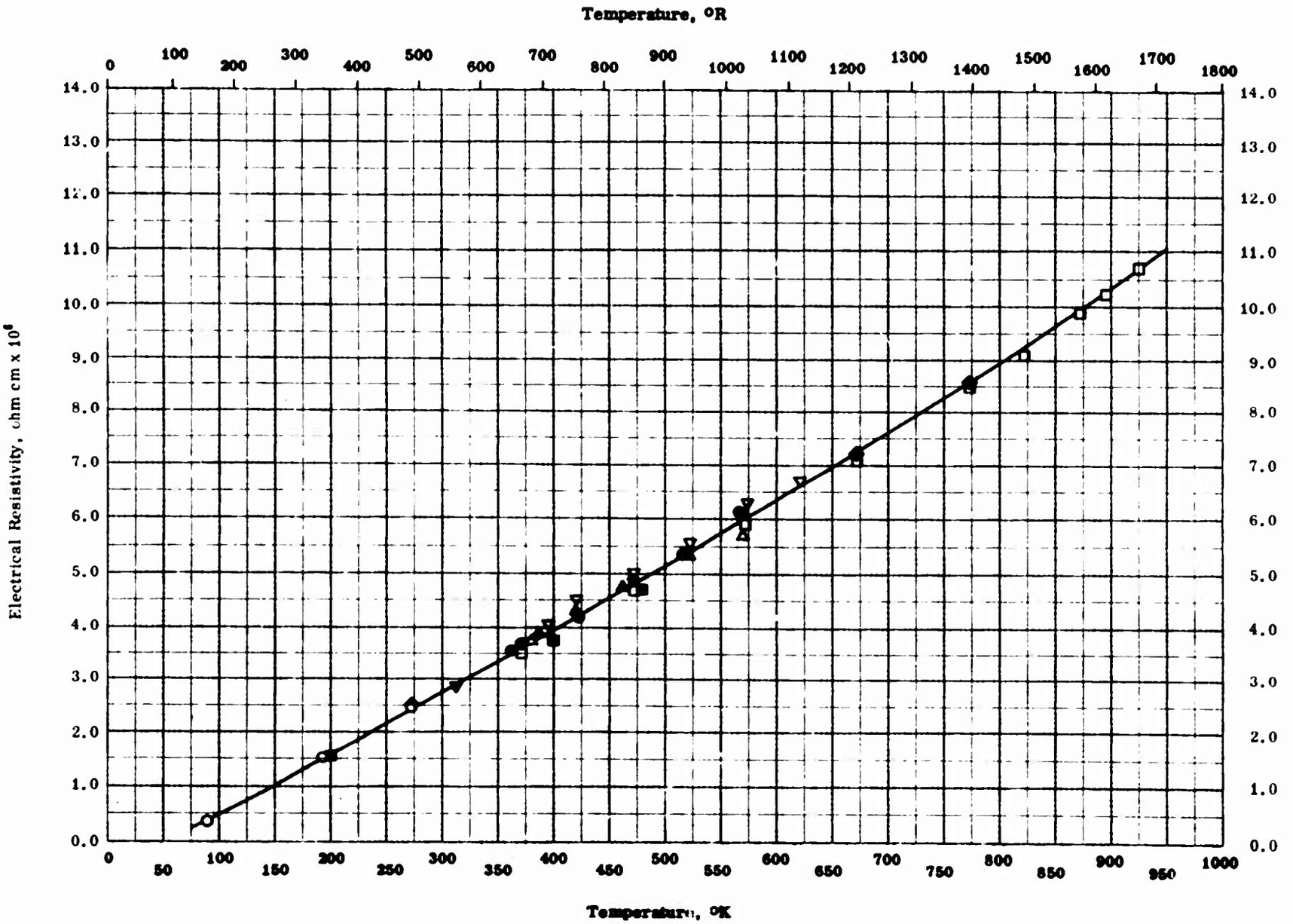
Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	△	2.71	169.1
	▽	2.704 ± 0.002	168.8 ± 0.1
Melting Point		K	R
	□	932	1678
	◀	933.3	1680
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	○	99 ± 2	178 ± 3
	■	92.3	166.1
	●	91.7 ± 1.4	165 ± 2.5
	▲	98 ± 1	176 ± 2
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◇	$2914_{1332K} \pm 15$	$5251_{2398R} \pm 27$
	▼	$2720_{1327K} \pm 15$	$4900_{2389R} \pm 27$
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▷	2910_{298K}	5240_{537R}
	◁	$2910_{298K} \pm 15$	$5240_{537R} \pm 27$
	◆	$2890_{298K} \pm 15$	$5200_{537R} \pm 27$

PROPERTIES OF ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-37	922		Impure.	
□	50-12	773-1100			
■	50-12	—			Δh_f from enthalpy and temperature curve.
△	43-2	295		99.99 pure.	
◇	53-33, 52-21, also 56-48	1332		99.75 pure.	Δh_v from vapor pressure data.
▽	49-15	298	0.5		
●	52-20	—			Δh_f; from data measured of amount heat added to produce smooth curve in thermal analysis.
▷	51-11	298		99.99 Al and 0.01 total Mg, Fe, Bi, Si.	Δh_s from vapor pressure data.
▼	56-40	1327			Δh_v from vapor pressure data.
◁	56-40	298			Δh_s extrapolated from Δh_v.
◆	56-52	298		99.75 pure.	Δh_v from vapor pressure data; authors measured Δh_v but reported Δh_s.
▲	55-48	—			Δh_f from cooling curve in calorimeter.
◀	64-21	932.3		Pure.	

TPRC



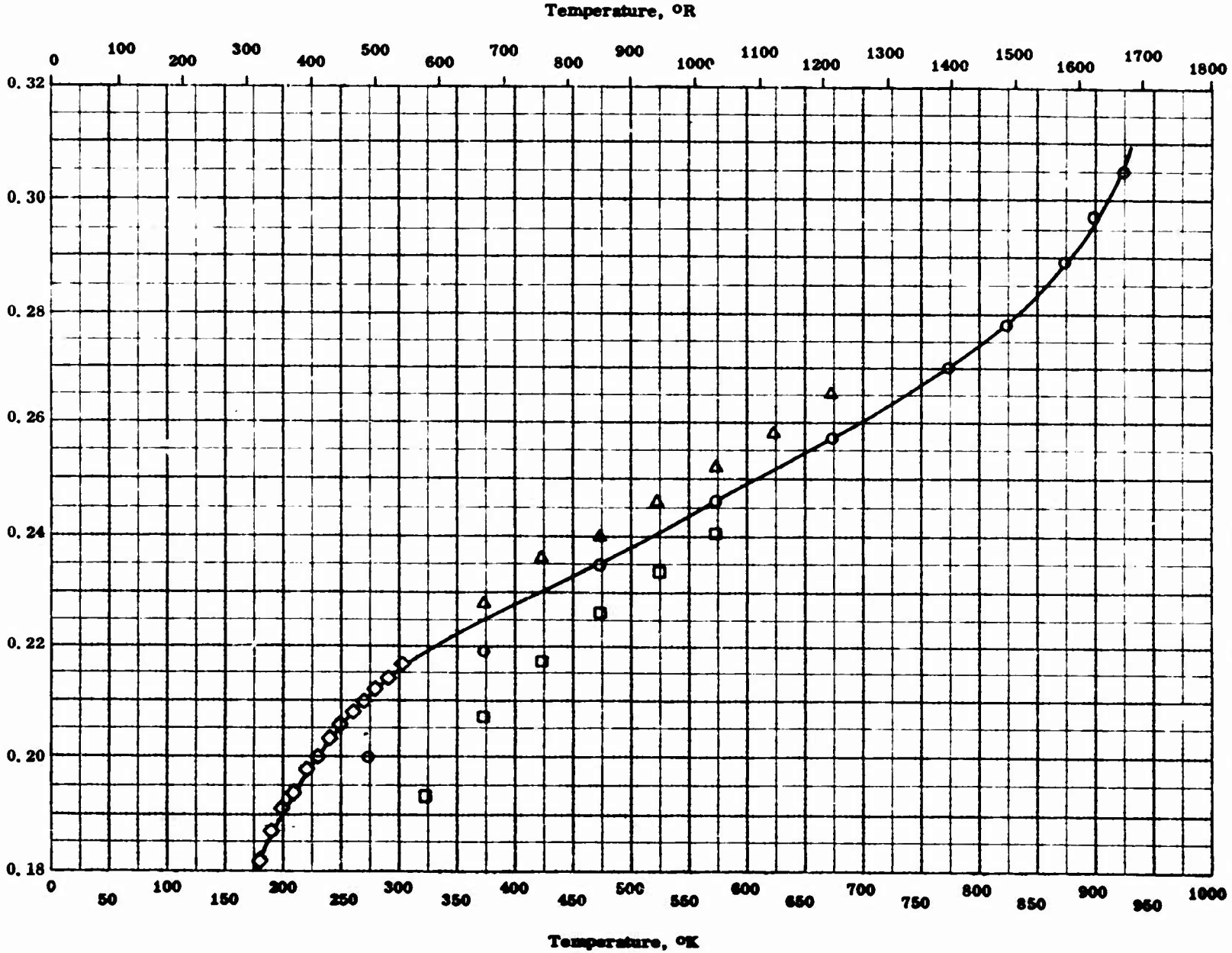
ELECTRICAL RESISTIVITY -- ALUMINUM

TPRC

ELECTRICAL RESISTIVITY -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-8	91-373		0.002 Mg, <0.001 Si, and < 0.0005 Fe and Cu.	
□	53-25	273-923		99.9 Al, 0.05 Si and 0.03 B.	Ann. gives r/r (0 C); plotted data based on above reference as datum.
△	51-2	380-571		0.04 Si, 0.03 Fe, 0.006 Cu, and 0.005 Ti.	Annealed 1 hr. at 450 C; furnace cooled.
◇	43-2	273-373		Not given.	
▽	40-1	393-673		99.5 pure.	Cast at 700 C into molds at 200 C, rolled and drawn, and then turned into rods.
●	40-1	363-623		99.93 pure; 0.038 Fe, 0.03 Si, and 0.0022 Cu.	Same as above.
▲	40-1	388-585		99.992 pure, 0.0030 Fe, 0.0027 Si, and 0.0024 Cu.	Same as above.
▼	65-5	313-673		SP grade.	
◆	65-5	373-773		99.6 Al.	
■	62-39	200-480		Pure.	

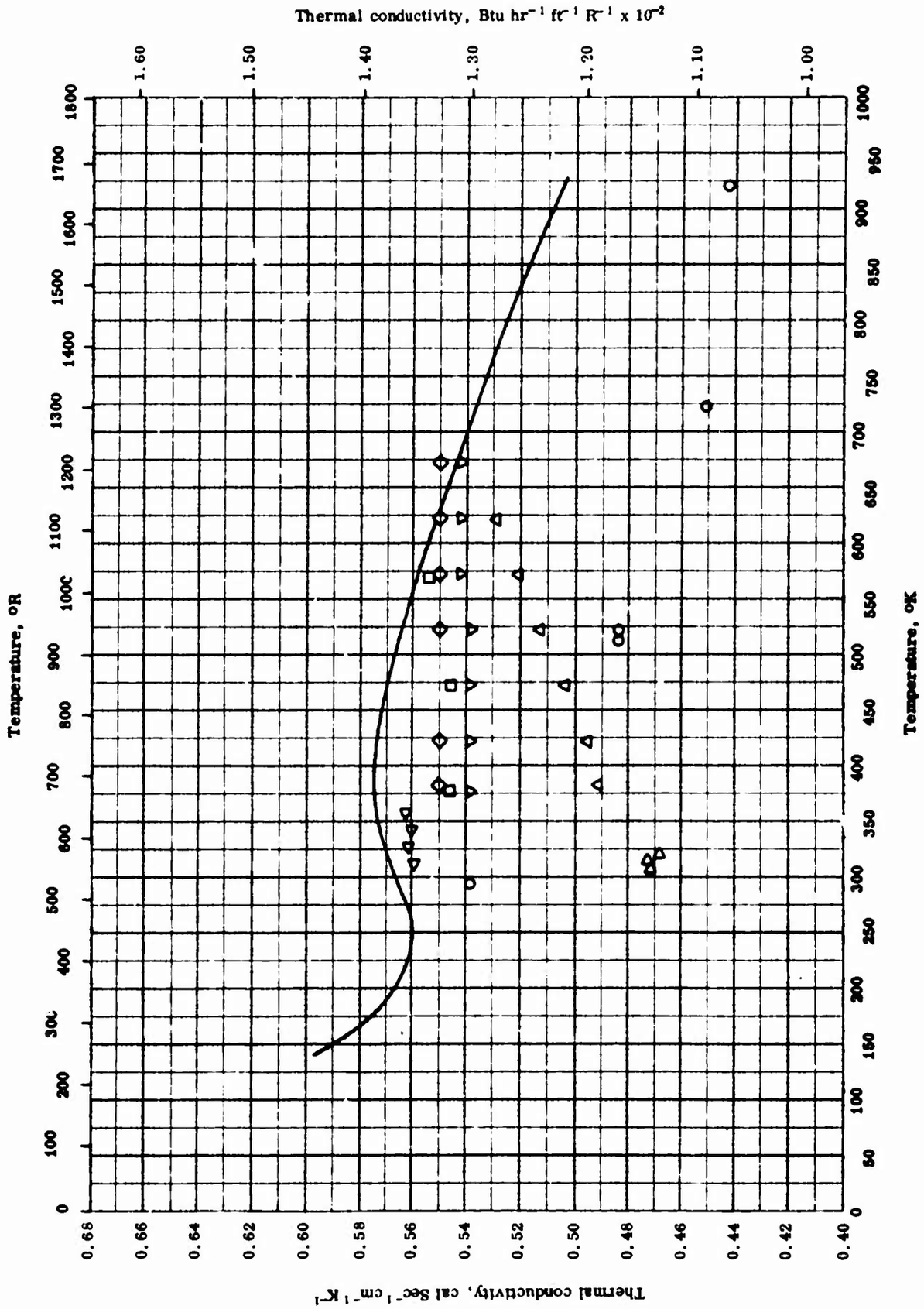


SPECIFIC HEAT -- ALUMINUM

SPECIFIC HEAT -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-17	273-923	± 5.0	99.9 Al, 0.05 SiO_2, and 0.03 B.	
□	62-15	323-573	5.0	Not given.	
△	55-21	373-673	≤ 1.0	99.996 Al.	Average of 2 samples: (1) Water quenched from 600 C; annealed 100 hrs at 130 C. (2) cooled from 600 C at 5 C $min.^{-1}$.
◇	41-6	15-302		99.944 Al; single crystal	Melted and cooled 2 days in vacuum to produce single crystal.



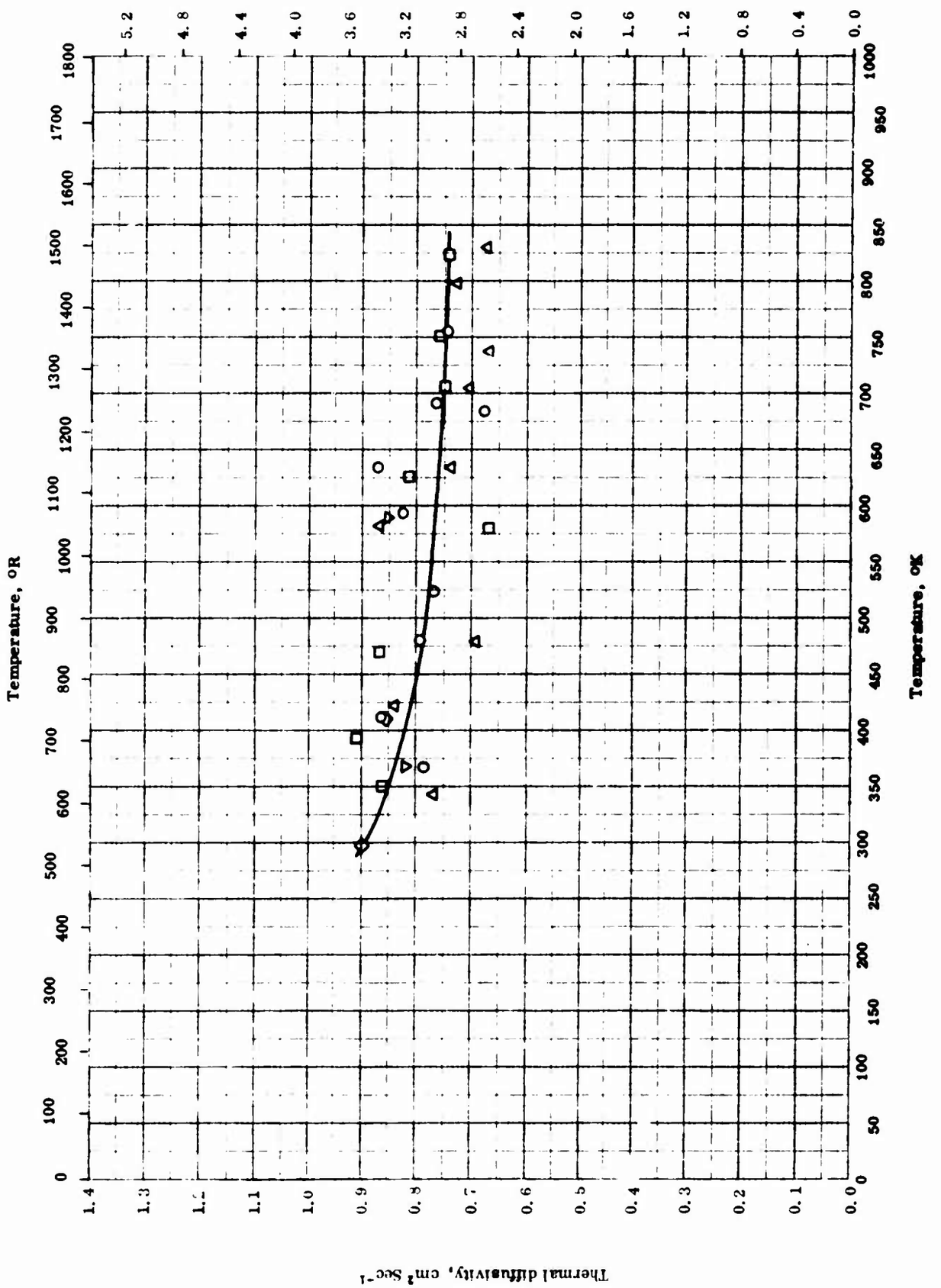
THERMAL CONDUCTIVITY -- ALUMINUM

THERMAL CONDUCTIVITY -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	47-1	298-923		99.95 Al.	Losses evaluated by measuring unsteady state cooling of rod initially at uniform temperature.
□	51-2	379-570	± 3	0.04 Si, 0.03 Fe, 0.006 Cu, 0.005 Ti, and traces of Mn and Mg.	Annealed 1 hr at 450 C and cooled slowly.
△	40-1	384-623		99.5 Al.	Cast at 700 C into molds at 200 C; rolled and drawn, then turn into rods.
▽	40-1	379-673		99.93 Al, 0.038 Fe, 0.03 Si, and 0.0022 Cu.	Same as above.
◇	40-1	379-673		99.992 Al, 0.0030 Fe, 0.0027 Si, and 0.0024 Cu.	Same as above.
◁	58-3	311-357	1	99.986 Al, 0.003 Cu, 0.0045 Fe, 0.0062 Si, 0.0001 Mg.	
▷	60-5	307-321	± 3	Commercially pure; sample 20 mm in dia and 18 mm in length.	

TPRC

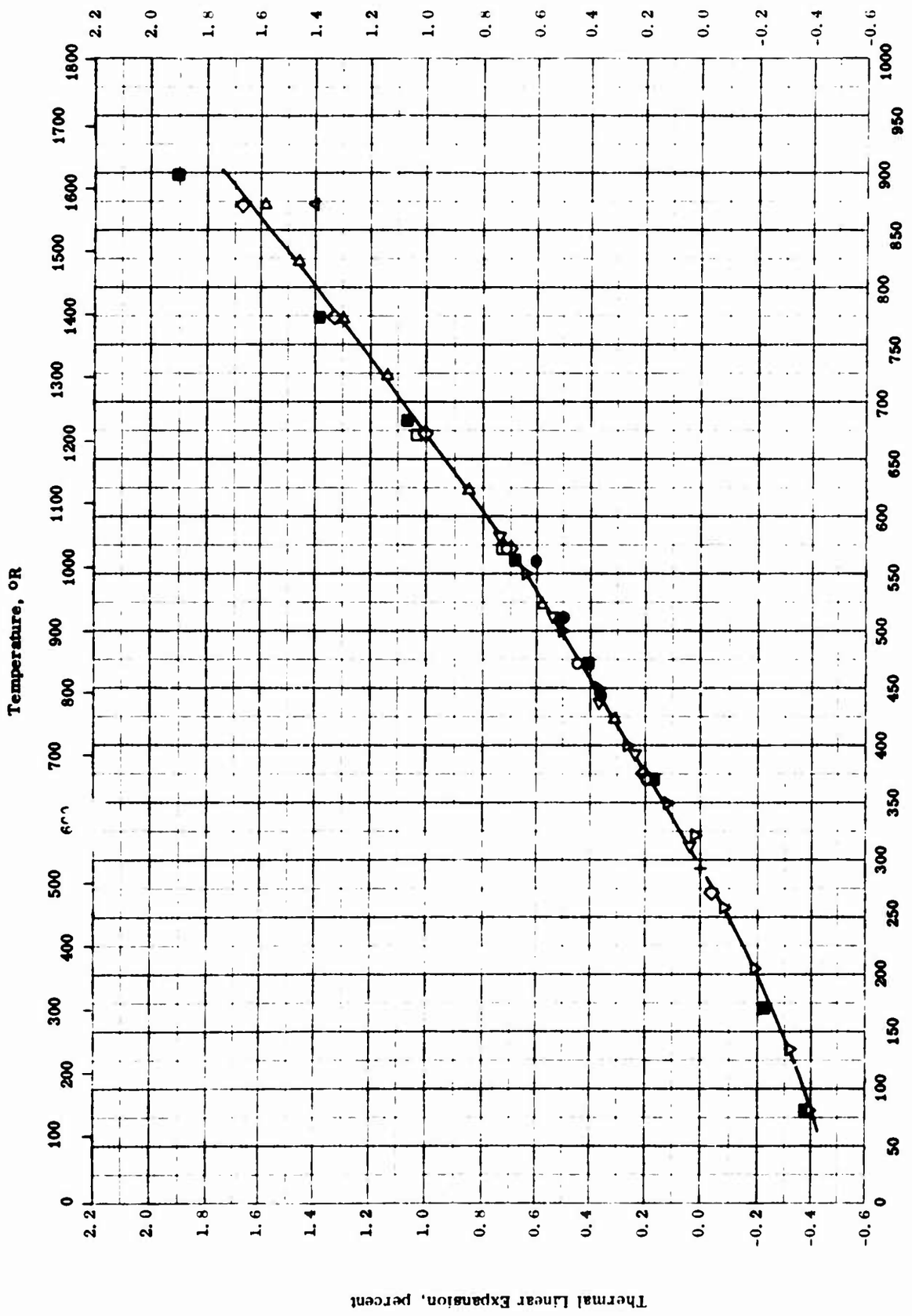


THERMAL DIFFUSIVITY -- ALUMINUM

THERMAL DIFFUSIVITY — ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-1	365-754	11	99.97 Al, 0.01 Cu, 0.01 Fe, and 0.01 Si.	
□	60-1	349-823	11	Same as above.	Second run of the above specimen.
△	60-1	340-829	11	Same as above	Third run of the above specimen.
◇	61-1	295-408	±5	Pure; 19 cm^2 square cross-section and 0.352 cm long.	
▽	61-2	367-589		Pure	

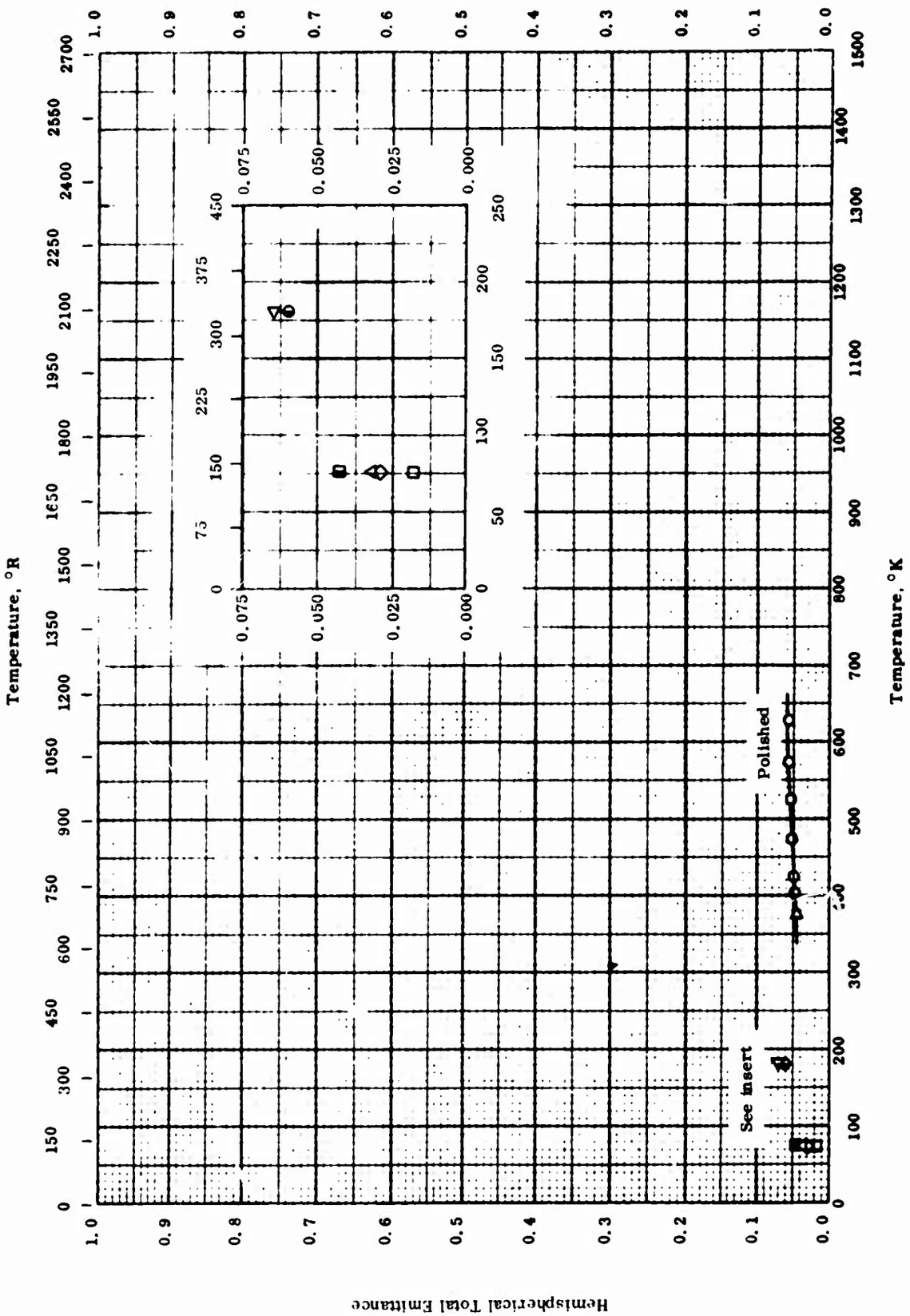


THERMAL LINEAR EXPANSION -- ALUMINUM

THERMAL LINEAR EXPANSION -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	57-64	293-873		Not given.	
◇	42-6	273-873		99.99 pure.	Annealed above 600 C.
▽	41-9	82-667		99.997 pure.	
▷	41-8	293-873		99.87 pure.	Annealed 2 hrs at 620 C and cooled slowly.
◁	52-53	293-673		99.952 Al, 0.019 Cu, 0.015 Fe, and 0.014 Si.	Cast in graphite mold.
●	49-28	295-560		Chemically pure.	X-ray diffraction method.
■	41-10 also 41-11	82-896		99.989 Al, 0.004 each Si and Cu, and 0.003 Fe.	
○	63-46	293-573		Pure.	Pressed rod made of sintered aluminum powder.
□	63-47	293-673		Soft aluminum; 99.5 Al.	

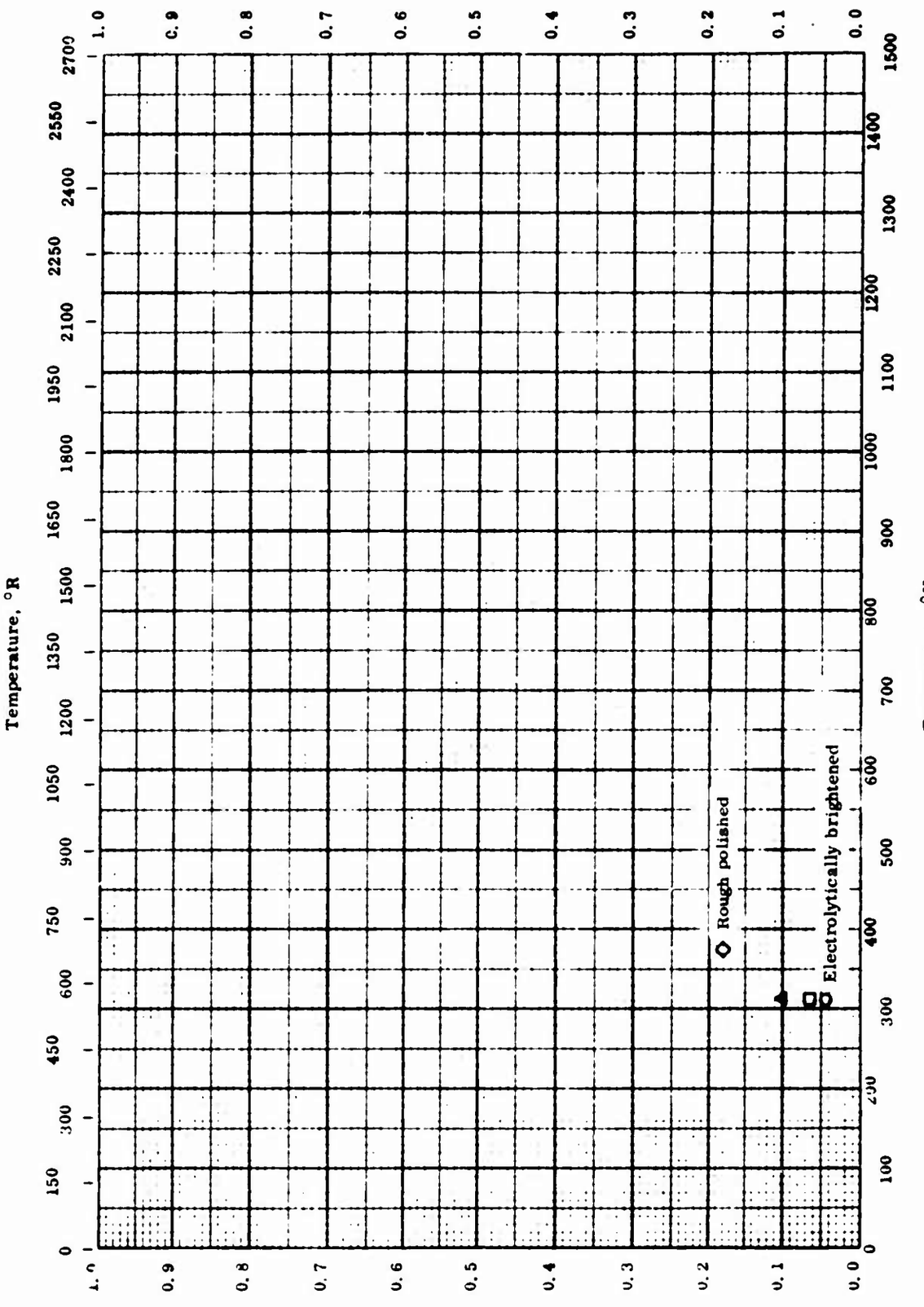


HEMISPHERICAL TOTAL EMITTANCE -- ALUMINUM

HEMISPHERICAL TOTAL EMITTANCE -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	49-12	403-628	< 5	Composition not given.	Polished to approximately 5μ, rinsed with distilled water and alcohol and dried in nitrogen atmosphere; measured in vacuum; data taken from a smooth curve.
□	60-38	76	5	Kaiser aluminum.	0.001 in foil; unannealed.
◇	60-38	76	5	Alcoa aluminum.	0.02 in sheet; cleaned with hot acid.
△	60-38	76	5	Alcoa aluminum.	0.02 in sheet; sanded with fine emery paper.
◧	60-47	77		Household type foil.	Wrapped loosely around G. E. No 7031 surface; cleaned with acetone; measured in vacuum (10^{-5} mm Hg).
▷	63-23	373		Composition not given.	Prefinished with 600 grit aluminum oxide powder on felt and then electropolished; measured in vacuum (10^{-5} mm Hg) after 9.84×10^{20} hydrogen ions cm^{-2} bombardment.
◁	63-26	182	± 2.5	Same as above.	0.00024 in foil; bright side; measured in vacuum ($\sim 0.2 \times 10^{-6}$ mm Hg).
◐	63-26	182	± 2.5	Same as above.	Same as above; 0.001 in foil.



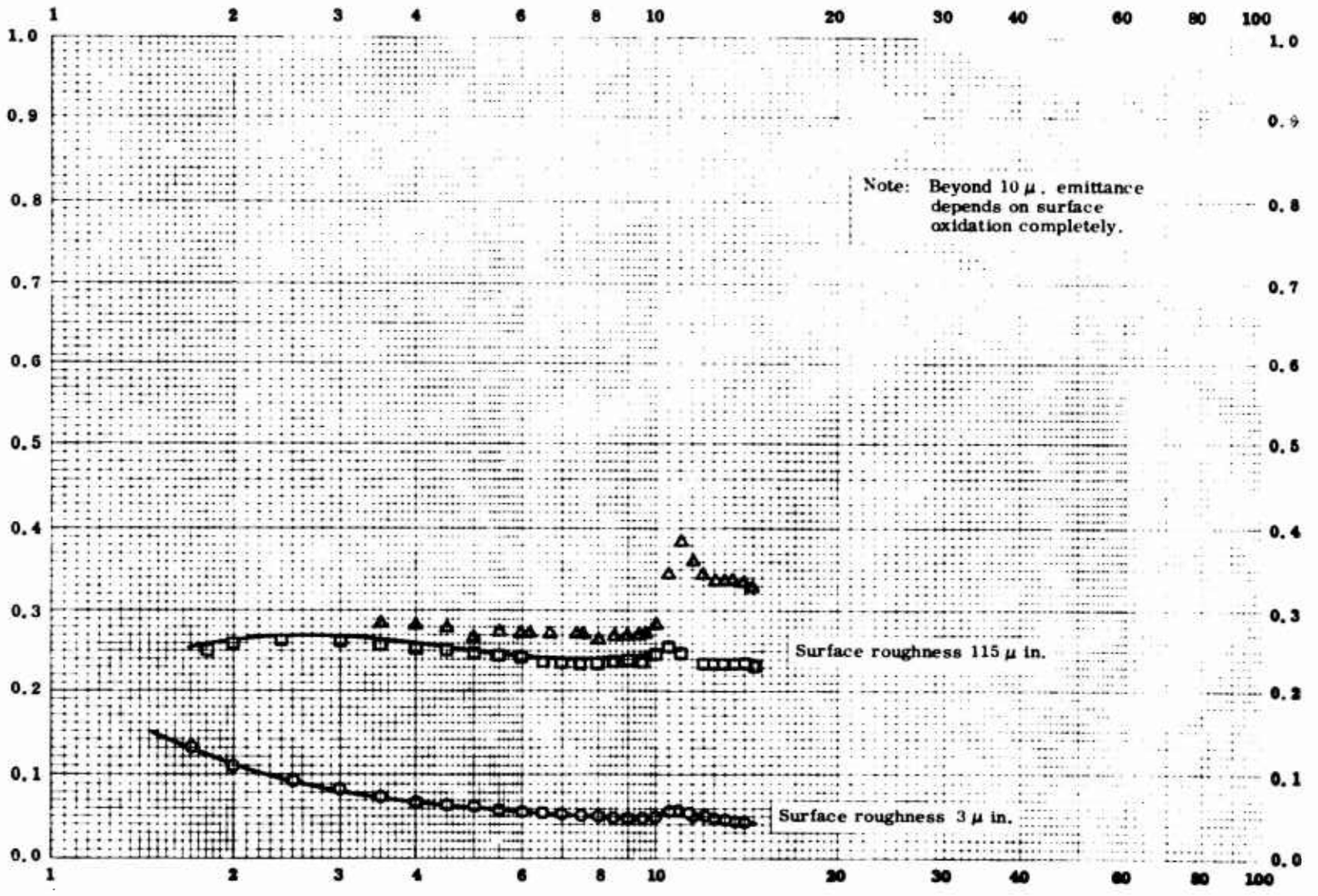
NORMAL TOTAL EMITTANCE -- ALUMINUM

NORMAL TOTAL EMITTANCE -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	38-1	311		0.002 Si, 0.001 Fe, 0.001 Cu, 0.0003 Na, 0.0003 Ca, and 0.003 Mg.	Electrolytically brightened.
△	39-1	311		Composition not given.	Foil, after two years exposure to salt spray and moisture at sea shore.
□	39-1	311		Same as above.	Bright foil, roughened with abrasive cloth.
◇	47-9	373		Same as above.	Sheet; rough polished.

TPRC



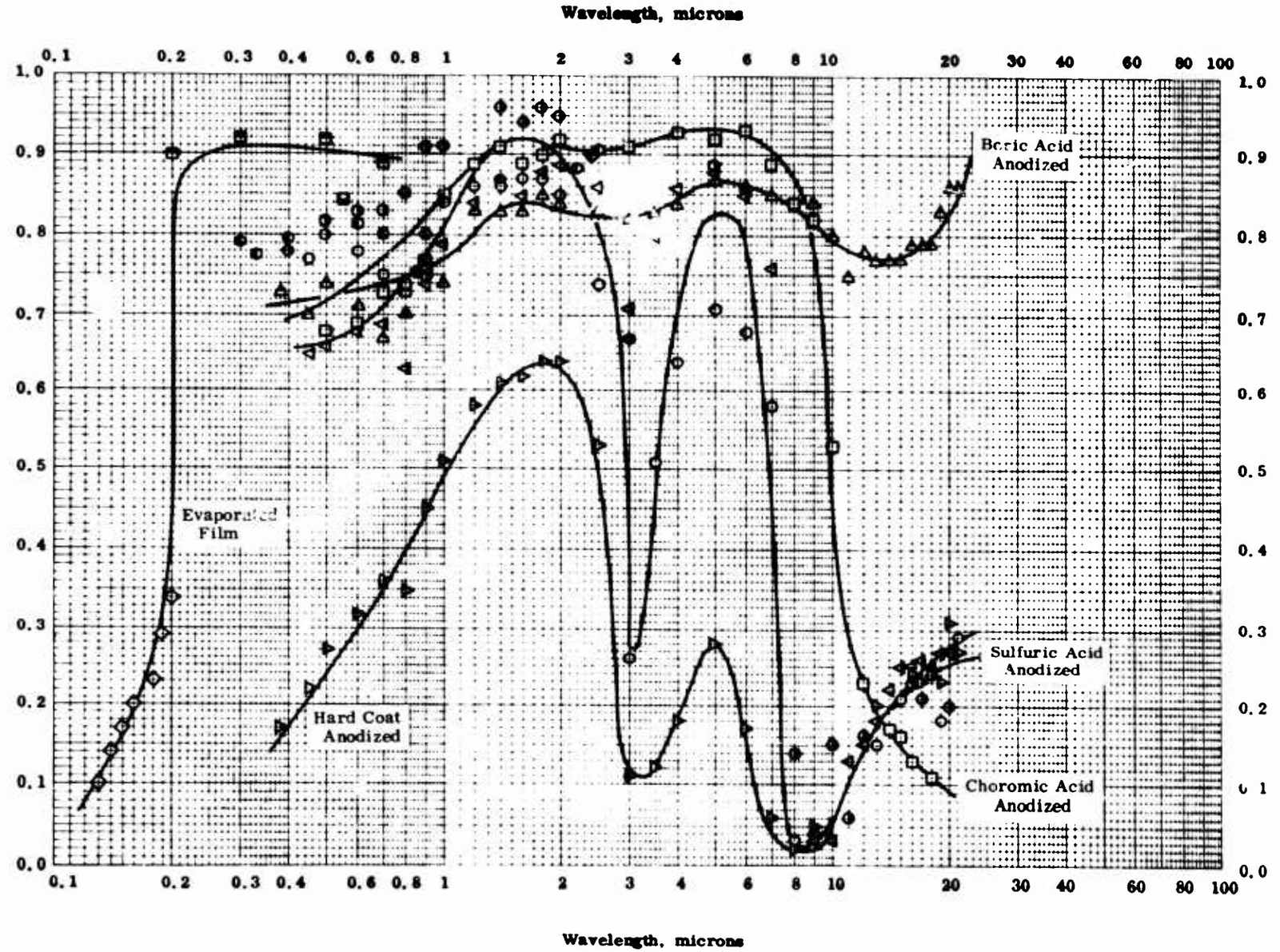
NORMAL SPECTRAL EMITTANCE -- ALUMINUM

NORMAL SPECTRAL EMITTANCE -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	61-33	805	1.7-14	±20	0.11 Fe, 0.11 SiO, 0.01 Cu, 0.01 Mg, < 0.01 Mn, Ni and Zn.	Heated in air at 467 K for 15 hrs, 599 K for 19 hrs, 697 K for 20 hrs, and 805 K for 15 hrs; polished surface roughness 3μ in.; error given over the wavelength range 2 to 10μ; data taken from smooth curve.
□	61-33	462	1.8-14.5	±10	Same as above.	Heated in air at 462 K for 25 hrs; 598 K for 22 hrs, 715 K for 27 hrs and 787 K for 17 hrs; roughened and knurled; surface roughness 115μ in.; error given over the wavelength range 2 to 10μ.
△	61-33	803	3.5-14.5	±10	Same as above.	Same as above.

TPRC



NORMAL SPECTRAL REFLECTANCE -- ALUMINUM

NORMAL SPECTRAL REFLECTANCE -- ALUMINUM

REFERENCE INFORMATION

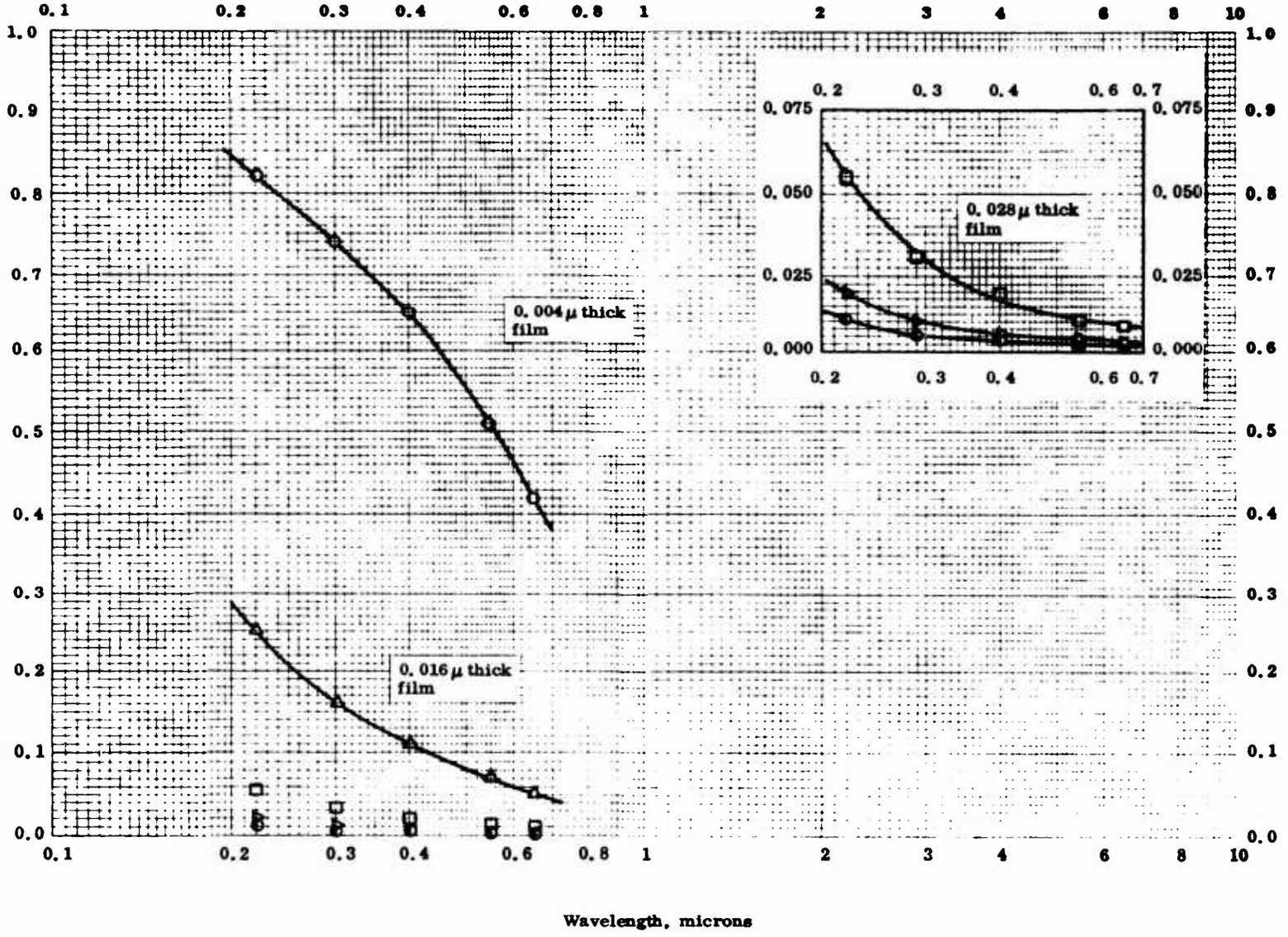
Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	62-47	298	0.45-21.0		Aluminum alloy 1075 (99.75 pure).	Mechanically polished, lapped to roughness < 2 μ in. RMS, electropolished by a patent process U S No. 2,338,321, anodized by sulfuric acid for 30 min., and sealed 15 min. in boiling water; measured in vacuum (10^{-5} mm Hg); hemispherical illumination.
△	62-47	298	0.38-21.0		Same as above.	Same as above except boric acid anodized and not sealed.
□	62-47	298	0.45-18.0		Same as above.	Same as above except chromic acid anodized and not sealed.
▷	62-47	298	0.38-21.0		Same as above.	Same as above except hard coat, anodized 80 min., and sealed.
◁	62-47	298	0.45-20.0		Same as above.	Same as above except sulfuric acid anodized and not sealed.
◑	62-47	298	0.40-20.0		Same as above.	Same as above except sulfuric acid anodized for 10 min. and sealed.
◐	60-46	298	0.30-2.50		Composition not given.	Foil cemented on fiberglass laminate.
◇	41-3	298	0.13-0.20		Same as above.	Opaque film on glass deposited by evaporation process; measured in vacuum (approximately 0.001 mm Hg).

(continued onto next pa)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
▬	64-19	298	0.2-0.7		Same as above.	Evaporated aluminum.
▬	53-29	298	0.55		Commercial grade.	Metallographically polished.

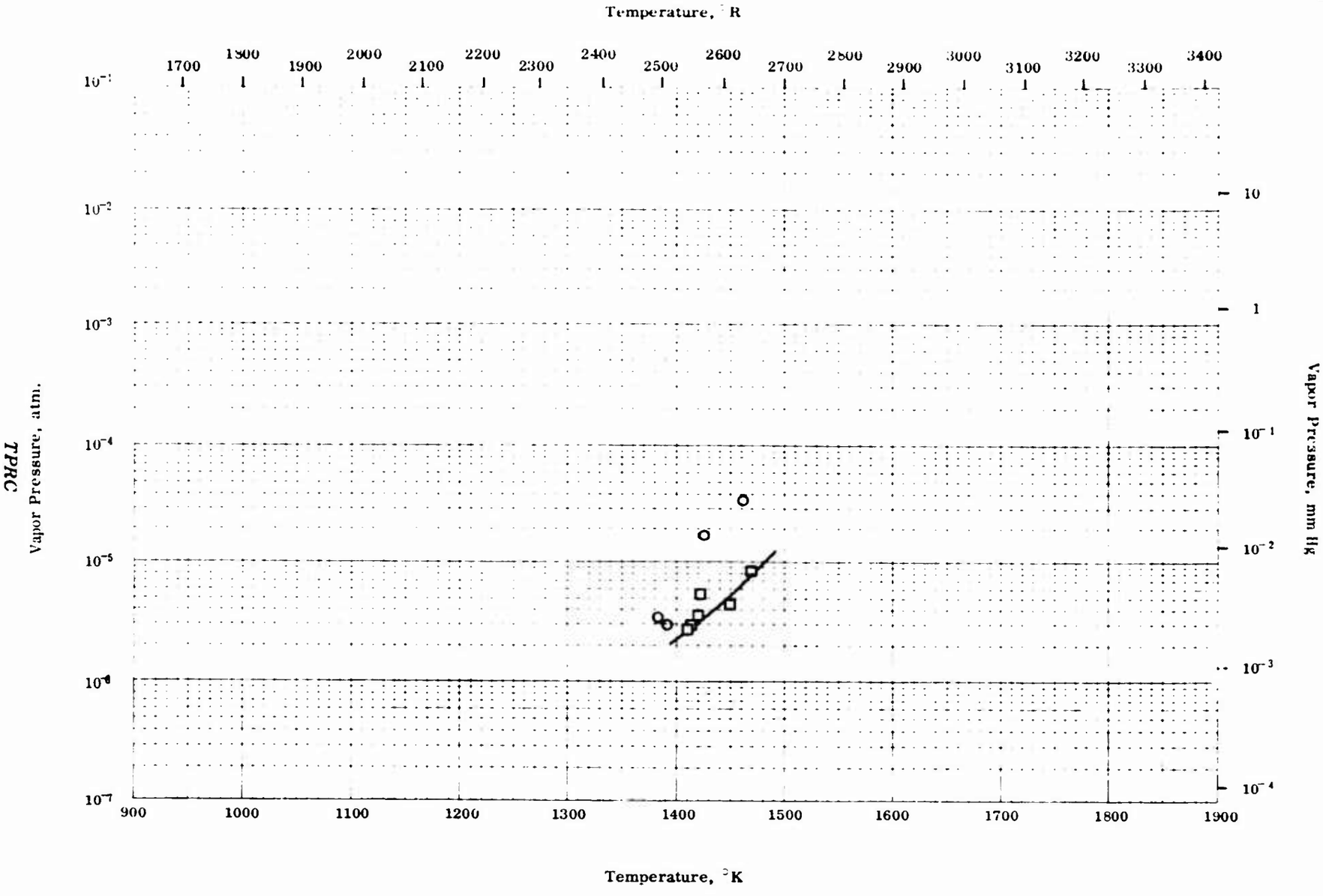


NORMAL SPECTRAL TRANSMITTANCE -- ALUMINUM

NORMAL SPECTRAL TRANSMITTANCE -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	61-36	0.22-0.65	0.3	99.99 purity.	Evaporated aluminum film, 0.004 μ thickness.
△	61-36	0.22-0.65	0.3	Same as above.	Same as above except 0.16 μ thickness.
□	61-36	0.22-0.65	0.3	Same as above.	Same as above except 0.028 μ thickness.
▷	61-36	0.22-0.65	0.3	Same as above.	Same as above except 0.036 μ thickness.
◐	61-36	0.22-0.65	0.3	Same as above.	Same as above except 0.040 μ thickness.



TPRC

VAPOR PRESSURE -- ALUMINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-11	1383-1468		99.99 Al and 0.01 total Mg, Fe, Bi, Si.	TaC crucibles used; diffused material showed 0.1 - 1.0 Mg, 0.01 Fe, 0.01 total Bi, Si (Analysis ± 5%); these impurities dropped out by calculation.
□	51-11	1383-1468		Same as above.	BeO crucibles used, permitting further purification by heating to drive off volatile impurities; thus, above correction not required.

PROPERTIES OF AMERICIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	11.7	730
Melting Point	> 1073*	>1931*
Heat of Sublimation . . .	248_{1250K}	446_{2250R}

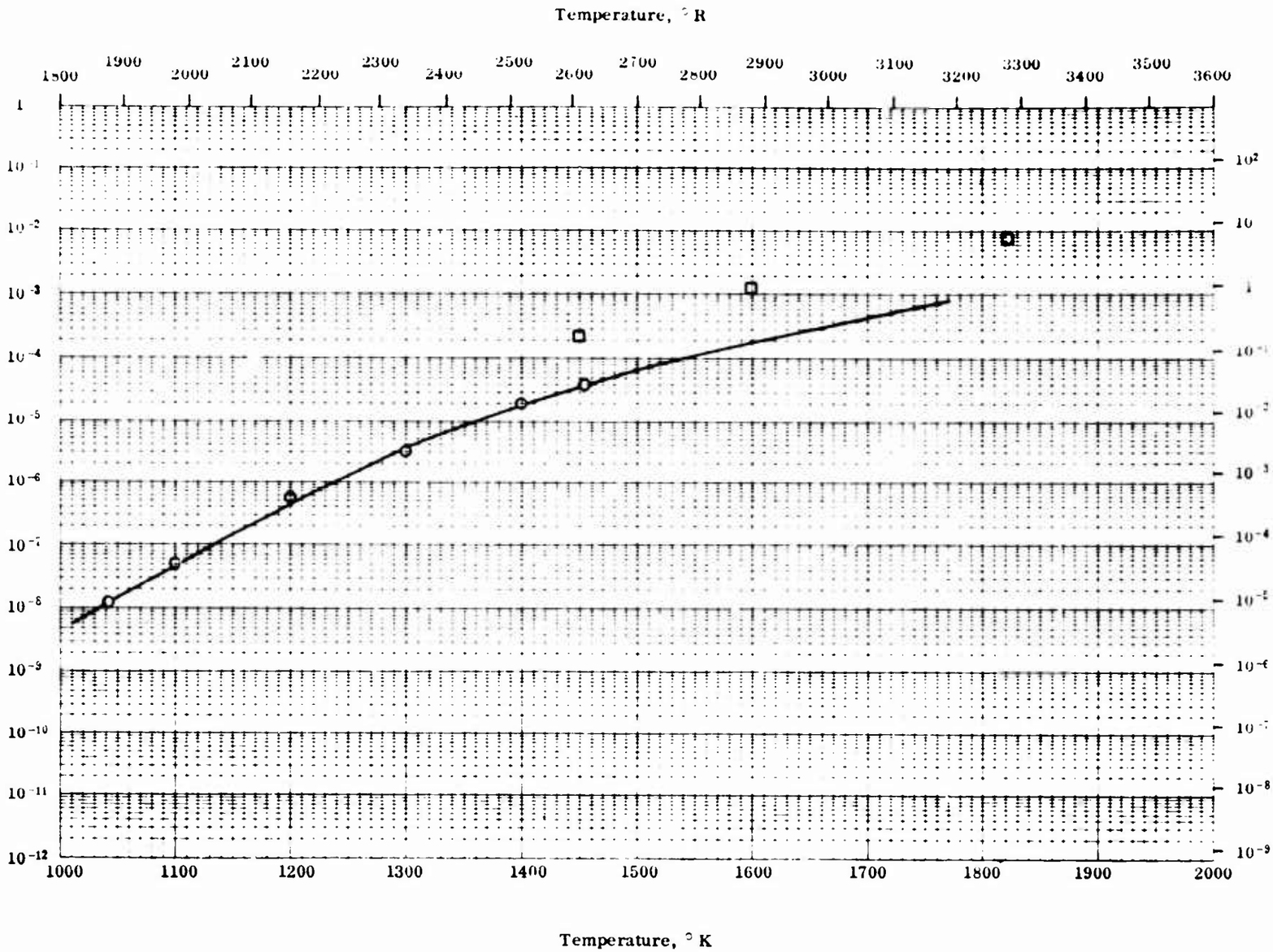
*Handbook of Chemistry and Physics (Ref. 64-28)

REPORTED VALUES

Density	g cm^{-3}	lb ft^{-3}
	□ 11.7 ± 0.3	730 ± 19
Heat of Sublimation	cal g^{-1}	Btu lb^{-1}
	○ 248_{1250K}	446_{2250R}

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-11 also 55-45	1250		99.8 pure, 0.16 Al, 0.02 each Fe, Ca, and Mg.	Δh_s from vapor pressure data.
□	50-14	298		Impurities below limits of spectro-chemical analysis.	Prepared from dioxide by hydrofluorination to AmF_3 and Ba reduction to the metal.



TPRC

VAPOR PRESSURE -- AMERICIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-11	1043-1453	± 10	99.8+ pure; 0.16 Al and 0.02 ea. Ca, Fe, Mg.	Prepared by precipitating AmF_3, wash, dry, reducing with Ba.
□	50-2	1450-1818		Not given.	Accuracy indicated to be a factor of two or three.

TPRC

PROPERTIES OF ANTIMONY

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	6.696*	418*
Melting Point	903.70	1627
Heat of Fusion	40	70

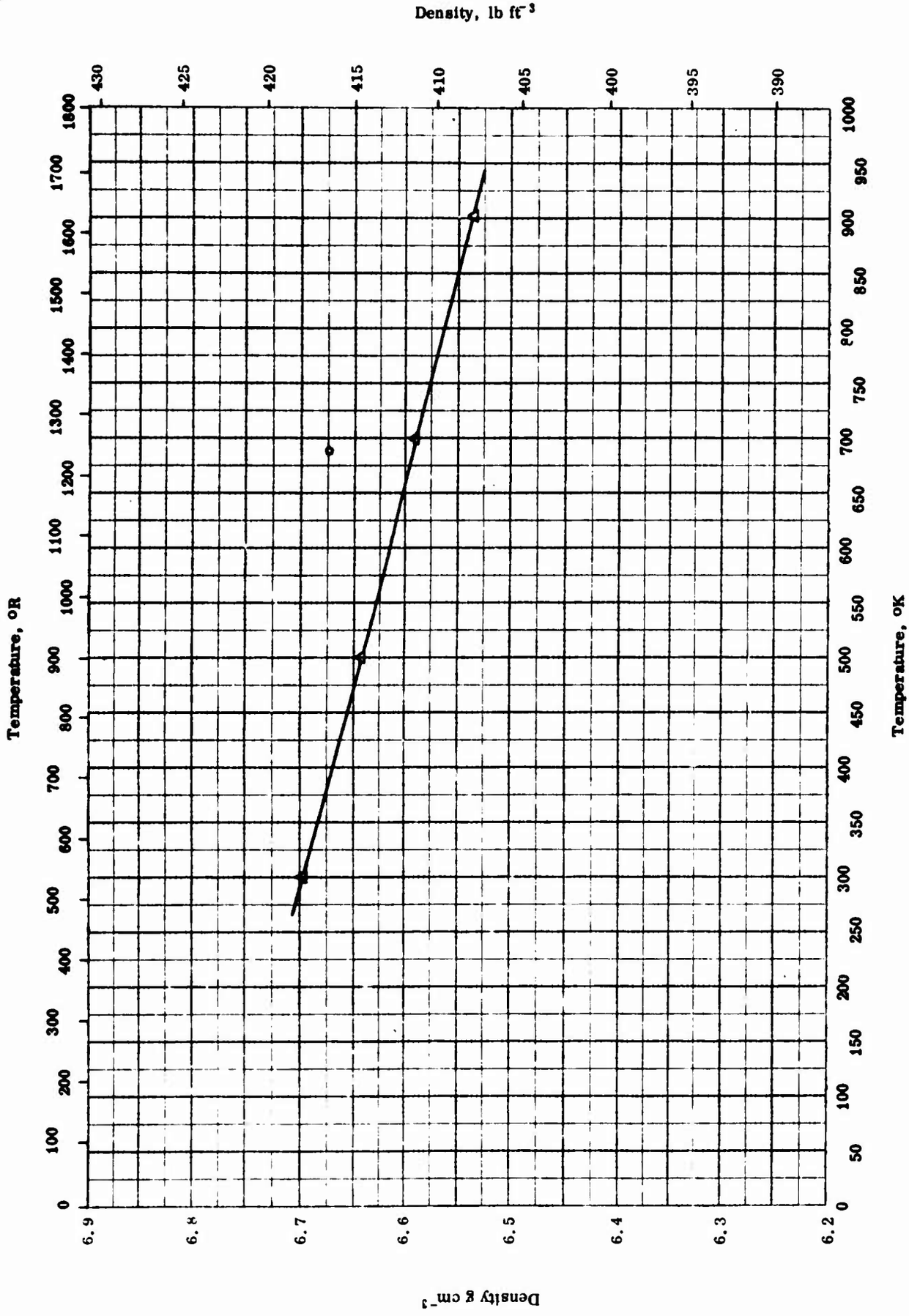
*Room temperature (298 K) value.

REPORTED VALUES

Density		See Figure	
Melting Point		K	R
	○	903.7	1627
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	●	39.0 ± 1	70.2 ± 2
	□	40.1 ± 0.2	72.1 ± 0.3

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	50-11	904		Not given.	
□	55-48	900		Not given.	Δh_f from cooling curve in calorimeter.
●	50-11	904		Not given.	

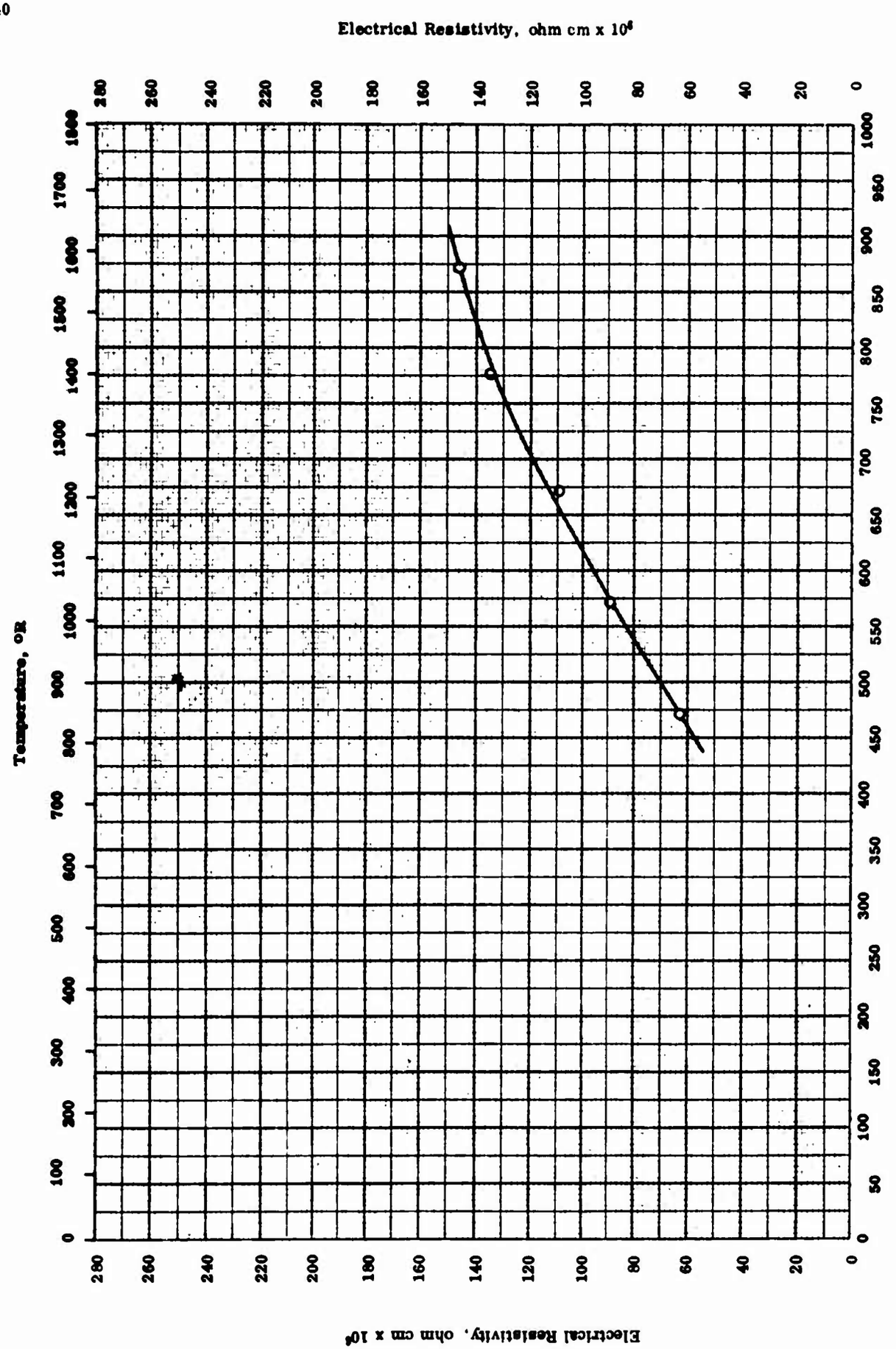


DENSITY -- ANTIMONY

DENSITY -- ANTIMONY

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
Δ	63-36	300-903		Not given.	

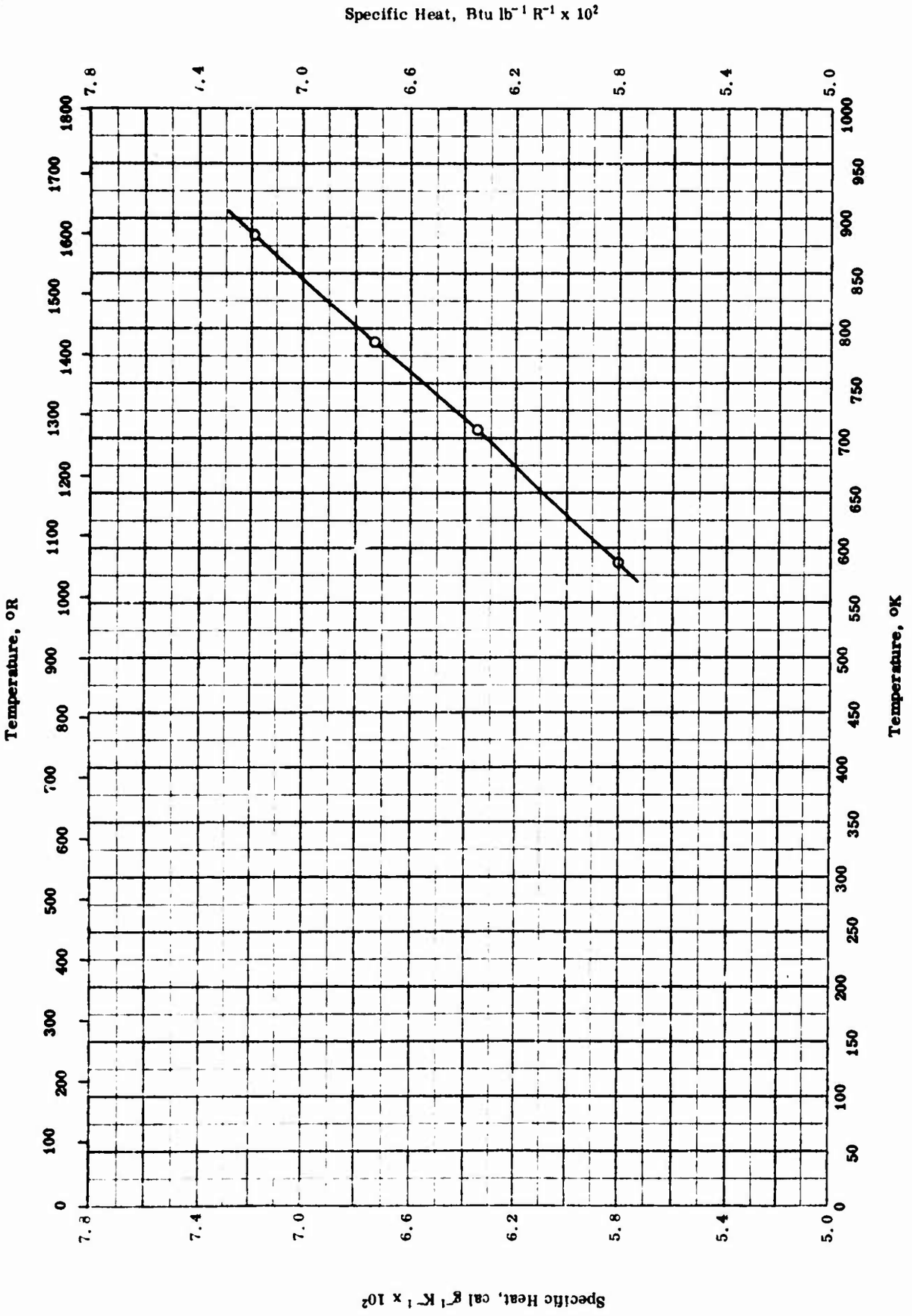


ELECTRICAL RESISTIVITY -- ANTIMONY

ELECTRICAL RESISTIVITY — ANTIMONY

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	54–16	473–873		Spectroscopically pure.	

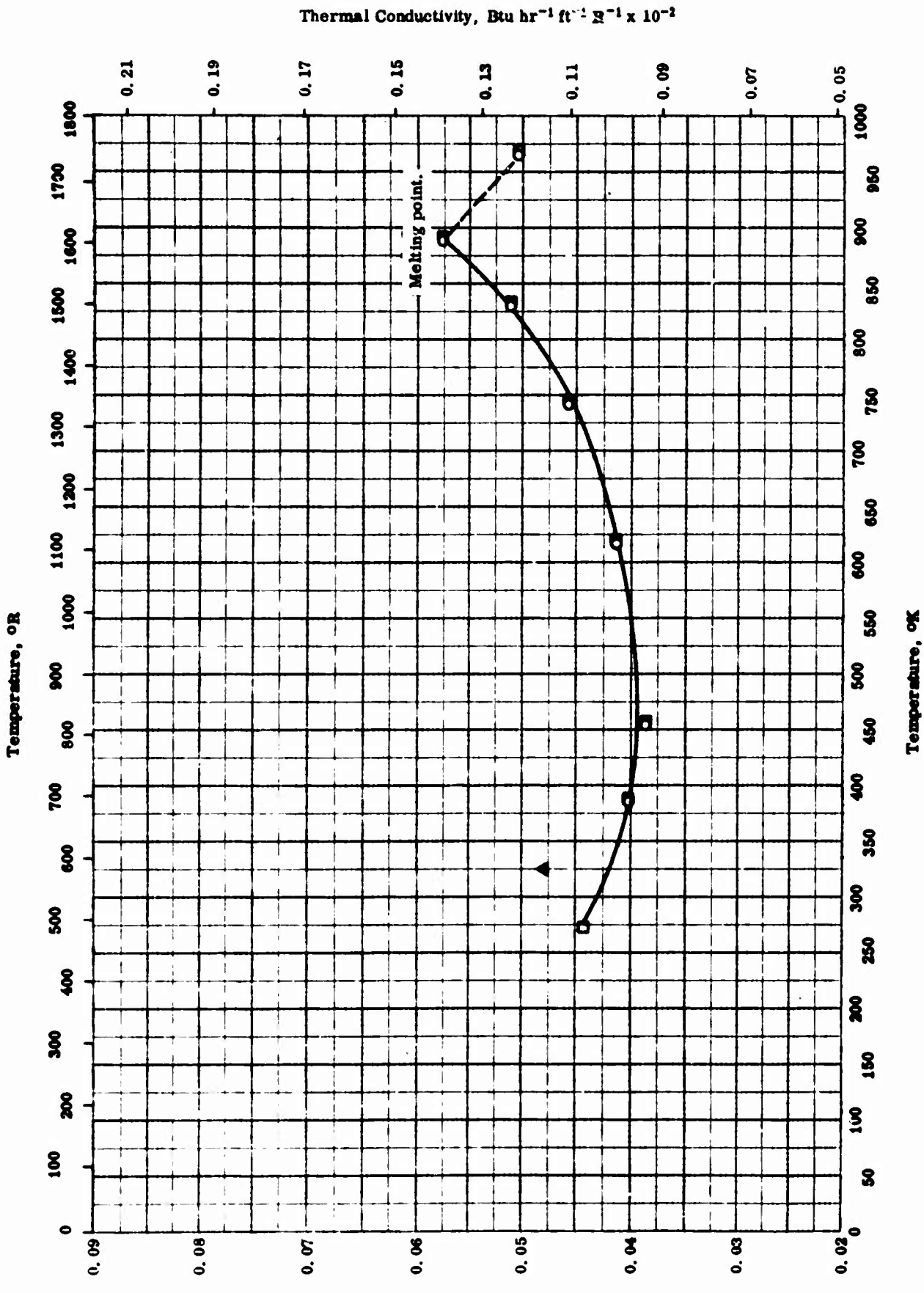


SPECIFIC HEAT -- ANTIMONY

SPECIFIC HEAT -- ANTIMONY

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-25	587-885	≤ 2.0	99.99 Sb.	Purified by zone recrystallization.

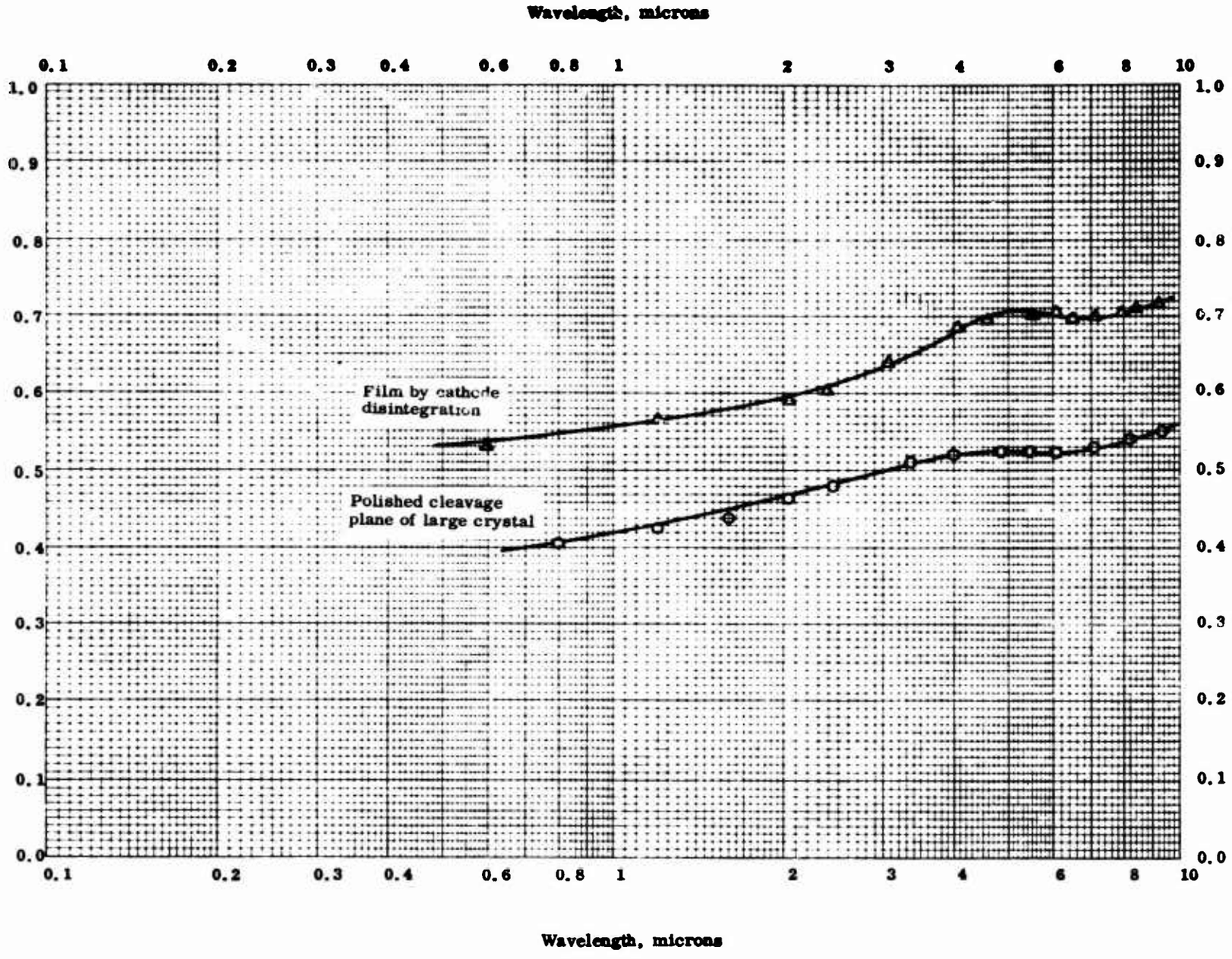


THERMAL CONDUCTIVITY -- ANTIMONY

THERMAL CONDUCTIVITY -- ANTIMONY

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	19-1	386-965		Pure.	
□	20-1	273-965		Pure.	
△	25-1	325		Impurity < 0.03.	



NORMAL SPECTRAL REFLECTANCE -- ANTIMONY

NORMAL SPECTRAL REFLECTANCE -- ANTIMONY

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	11-1	298	0.80-9.35	3	Composition not given.	Polished upon a cleavage plane of a large crystal of the metal; large sized pores apparent.
Δ	11-1	298	0.60-9.00	3	Same as above.	Film formed in vacuo by cathode disintegration, slightly darkened appearance due to carbon contamination.

PROPERTIES OF BERYLLIUM

MOST PROBABLE VALUES

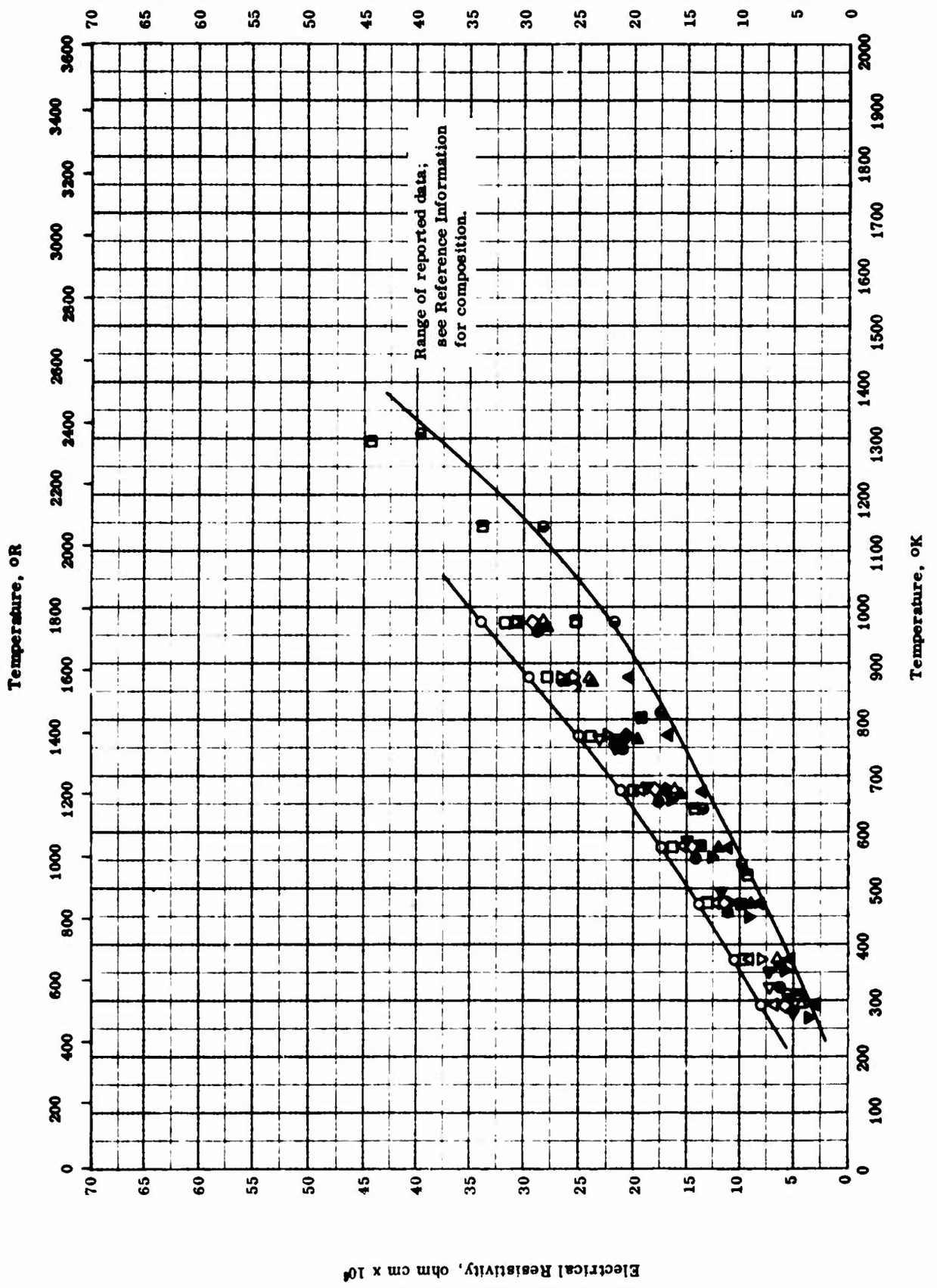
Property	C.G.S. Units	Brit. Eng. Units
Density.	1.86	116
Melting Point	1556	2803
Heat of Fusion	310.7	559.3
Heat of Vaporization. . . .	7816	14068
Heat of Sublimation	8500_{0K}	15300_{0R}

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	◇	1.829	114.2
	△	1.849	115.4
	⊏	1.865	116.4
	■	1.855	116.0
	●	1.84	114.9
Melting Point		K	R
	◆	1558	2804
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▲	310.7	559.3
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▼	7816	14068
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	○	$8496_{0K} \pm 41$	$15290_{0R} \pm 73$

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	48-1	0		0.14 Al, 0.07 Fe, 0.04 Si, 0.02 Mg, 0.01 each Cr, Cu, Na, Ni, and Zn.	Vacuum cast; Δh_s from vapor pressure data.
◇	53-3	298		Containing Mg, Ca, Ba, Si, Fe, Cu, Ti, Al, and Mn; prepared by Am. G.E. Co.	
△	53-3	298		Process Q.	
□	53-3	298		Process Q; with Mg and C as main impurities and traces of Ca, Al, and Mn.	
■	50-21	298		Not given.	Five vacuum cast samples reduced to 200 mesh powder, sintered 10 hrs at 1050 C (compressed at 100 psi).
●	61-46	298		Not given.	
▲	61-46	—			
▼	61-46	—			
◆	45-8	1558		Not given.	



ELECTRICAL RESISTIVITY -- BERYLLIUM

REFERENCE INFORMATION

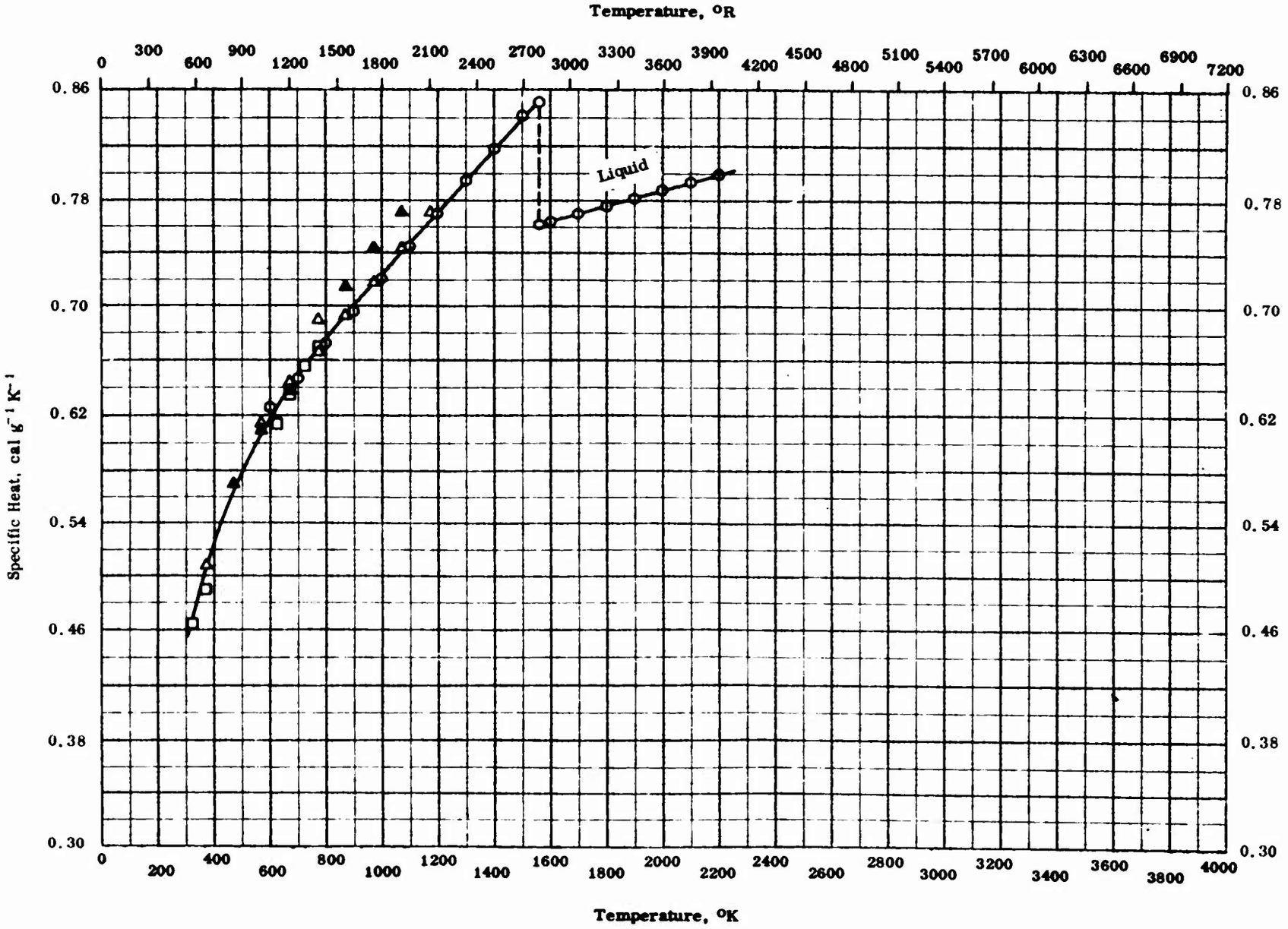
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	53-3	293-973		Density 114.9 lb ft^{-3}.	As received.
■	53-3	293-973		Same as above.	Heat-treated to about 700 C after machined from a chilled cast bar.
△	53-3	293-973		Density 114.8 lb ft^{-3}.	As received.
▲	53-3	293-973		Same as above.	Heat-treated to about 700 C after machined from a chilled cast bar; extruded at 1000 C and heated in vacuum for 1 hr and furnace cooled.
◇	53-3	293-973		Same as above.	As received.
◆	53-3	293-973		Same as above.	Heat-treated to about 700 C after machined from chilled cast bar.
▽	53-3	293-973		Prepared by Am. Gen. Elec. Co.; containing Mg, Ca, Ba, Si, Fe, Cu, Ti, Al, and Mn; density 114.2 lb ft^{-3}.	As received.
▼	53-3	293-973		Same as above.	Heat-treated to about 700 C after sintering.
○	53-3	293-973		German Flake; 98.5 Be, 0.18 Be insoluble in HCl, 0.18 Fe, 0.13 Al, 0.05 Cl, 0.03 Cu, and remainder was insoluble matter of which BeO containing about 3.0 Al_2O_3; density 113.8 lb ft^{-3}.	As received.
●	53-3	293-973		Same as above.	Heat-treated to about 700 C.
◁	53-3	295-972		Process Q; density 115.4 lb ft^{-3}.	As received.
◀	53-3	295-972		Same as above.	Heat-treated to about 700 C.

(Continued onto next page)

ELECTRICAL RESISTIVITY -- BERYLLIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▷	53-3	295-972		Process Q; with Mg and C as main impurities and traces of Ca, Al, and Mn; density 116.4 lb ft^{-3}.	As received.
▶	53-3	295-972		Same as above.	Heat-treated to about 700 C.
◨	51-24	311-1311		Grade QM-V Brush Co.	Tested in vacuum.
◐	51-24	311-1311		Same as above.	Tested in He; author recommends this test.

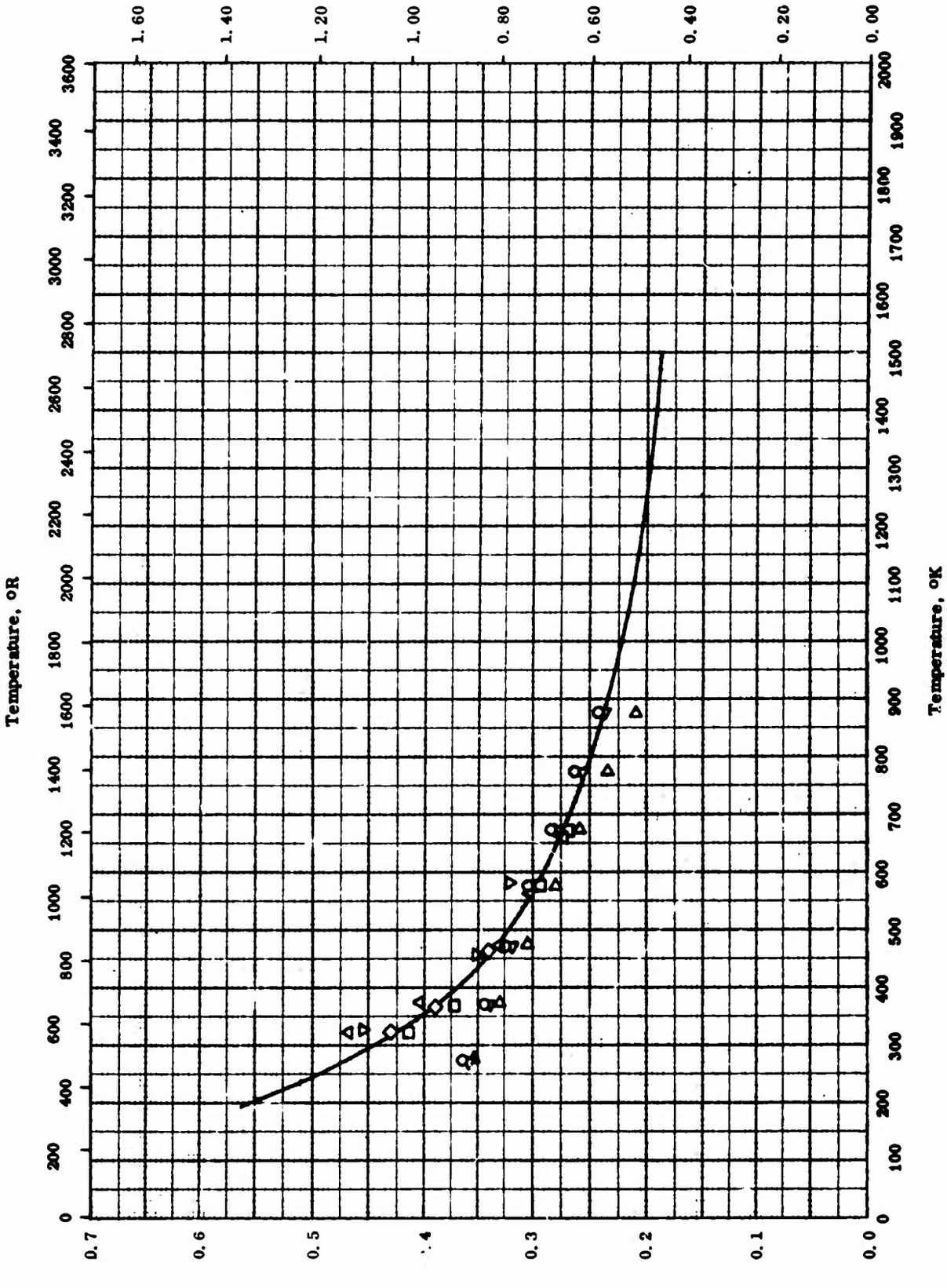


SPECIFIC HEAT -- BERYLLIUM

SPECIFIC HEAT -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-28	600-2200		99.8 Be.	Pulverized and tightly filled into ampules; under 10-15 mm Hg argon atmosphere.
□	59-16	323-773	≤ 2.0	99.8 Be.	
△	51-19	373-1173	1.0	99.5 Be, 0.3 O_2, and 0.3 other metals. [Author's design.:Sample 1]	Corrected for impurities.
▲	51-19	373-1173	1.0	99.5 Be, 0.4 Mg, and 0.1 other. [Author's design. Sample 2]	Corrected for impurities.

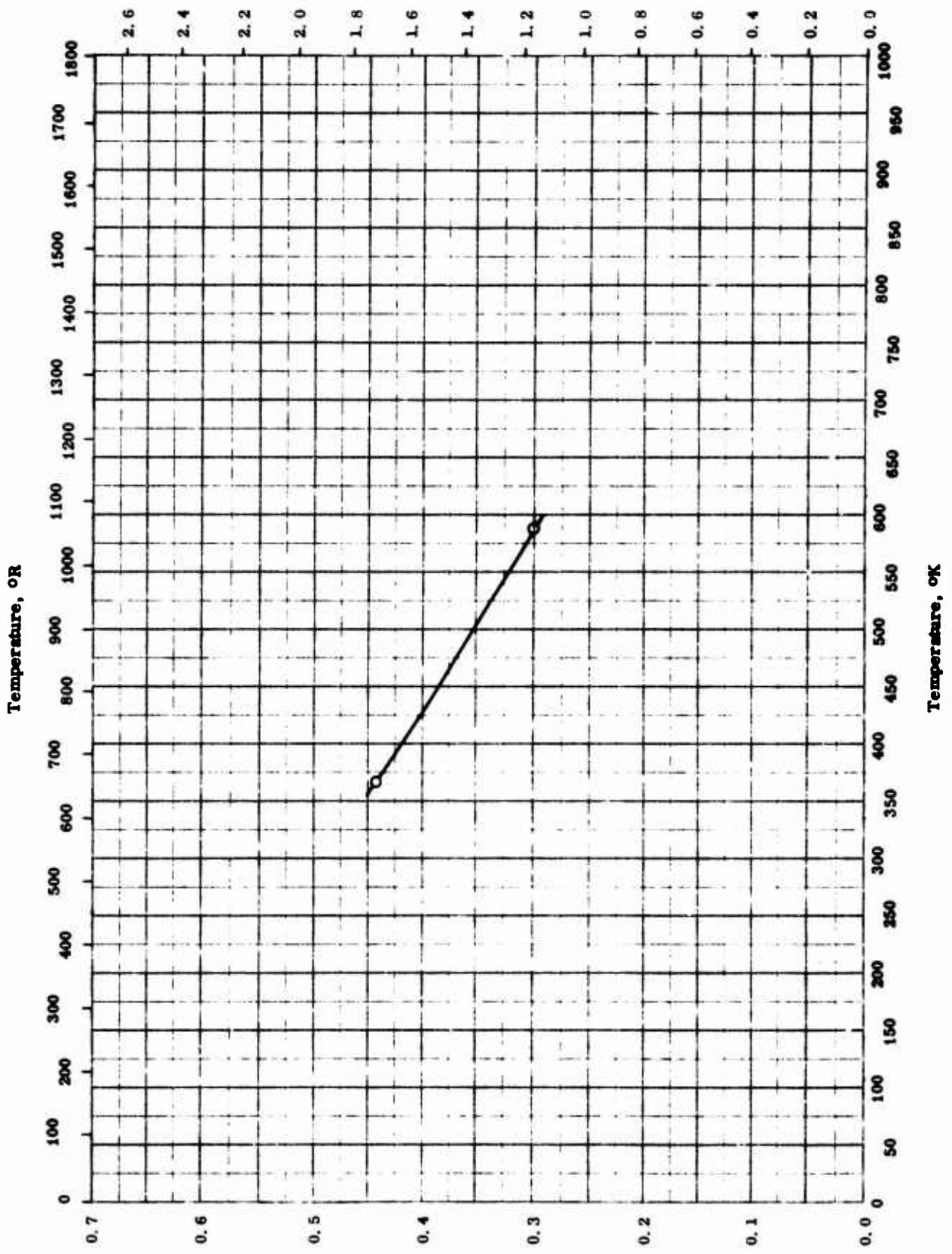


THERMAL CONDUCTIVITY -- BERYLLIUM

THERMAL CONDUCTIVITY -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
⌋	53-3	322-672		Containing Mg, Ca, Ba, Fe, Si, Cu, Ti, Al, and Mn; density 114.2 lb ft^{-3}.	Listed as received.
△	53-3	322-672		Same as the above.	Same as above except heat treated to above 700 C.
◇	53-3	322-672		Process Q; Mg and C main impurities; traces of Ca, Al, Mn; density 116.4 lb ft^{-3}.	As received.
▽	53-3	322-672		Same as above.	Same as above except heat treated to above 700 C.
○	57-3	273-875			
◁	53-1	273-873		Pure.	Vacuum - cast and extruded.
▷	53-1	273-873		Pure.	Flake; extruded.

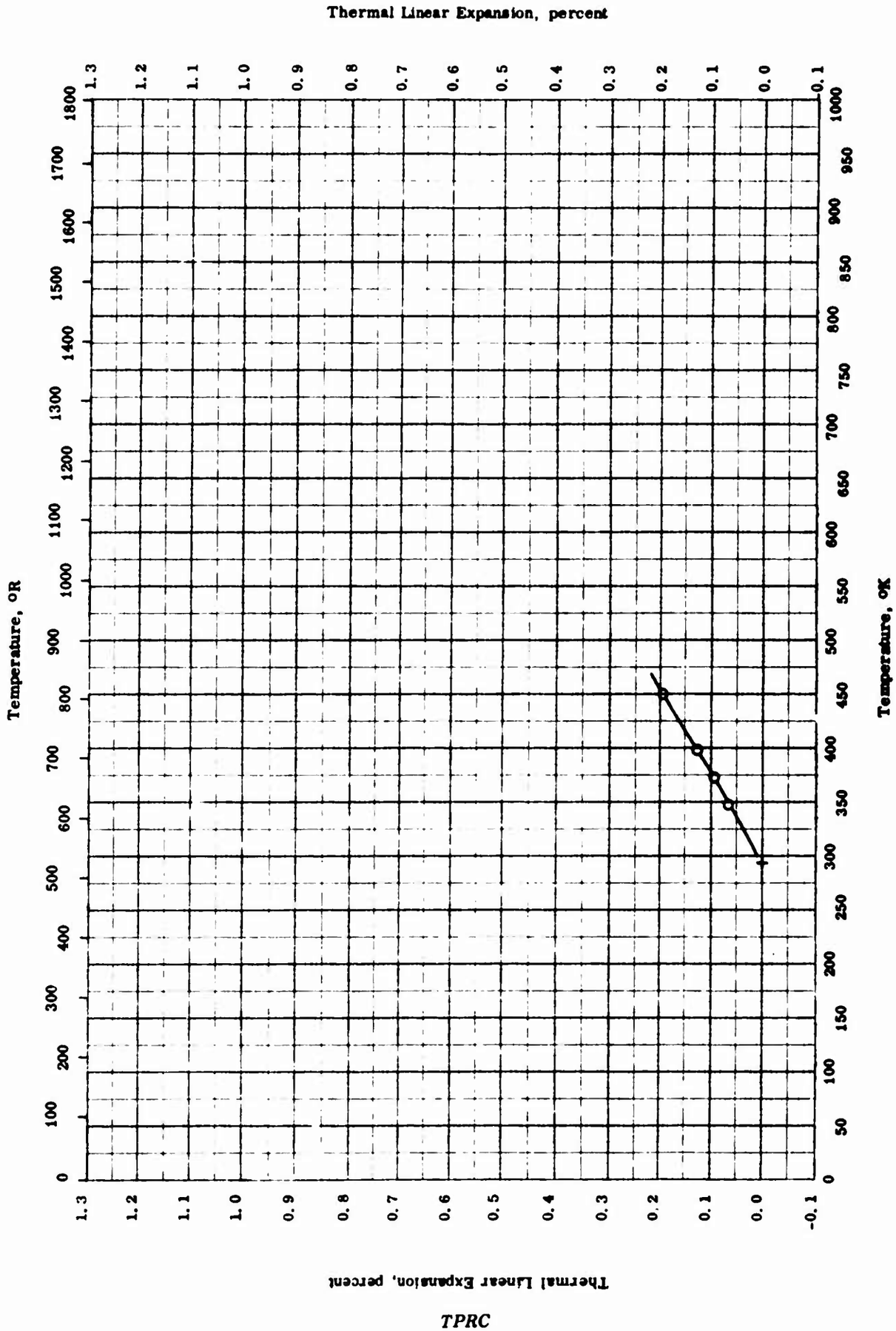


THERMAL DIFFUSIVITY -- BERYLLIUM

THERMAL DIFFUSIVITY -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-2	367-589		Pure	

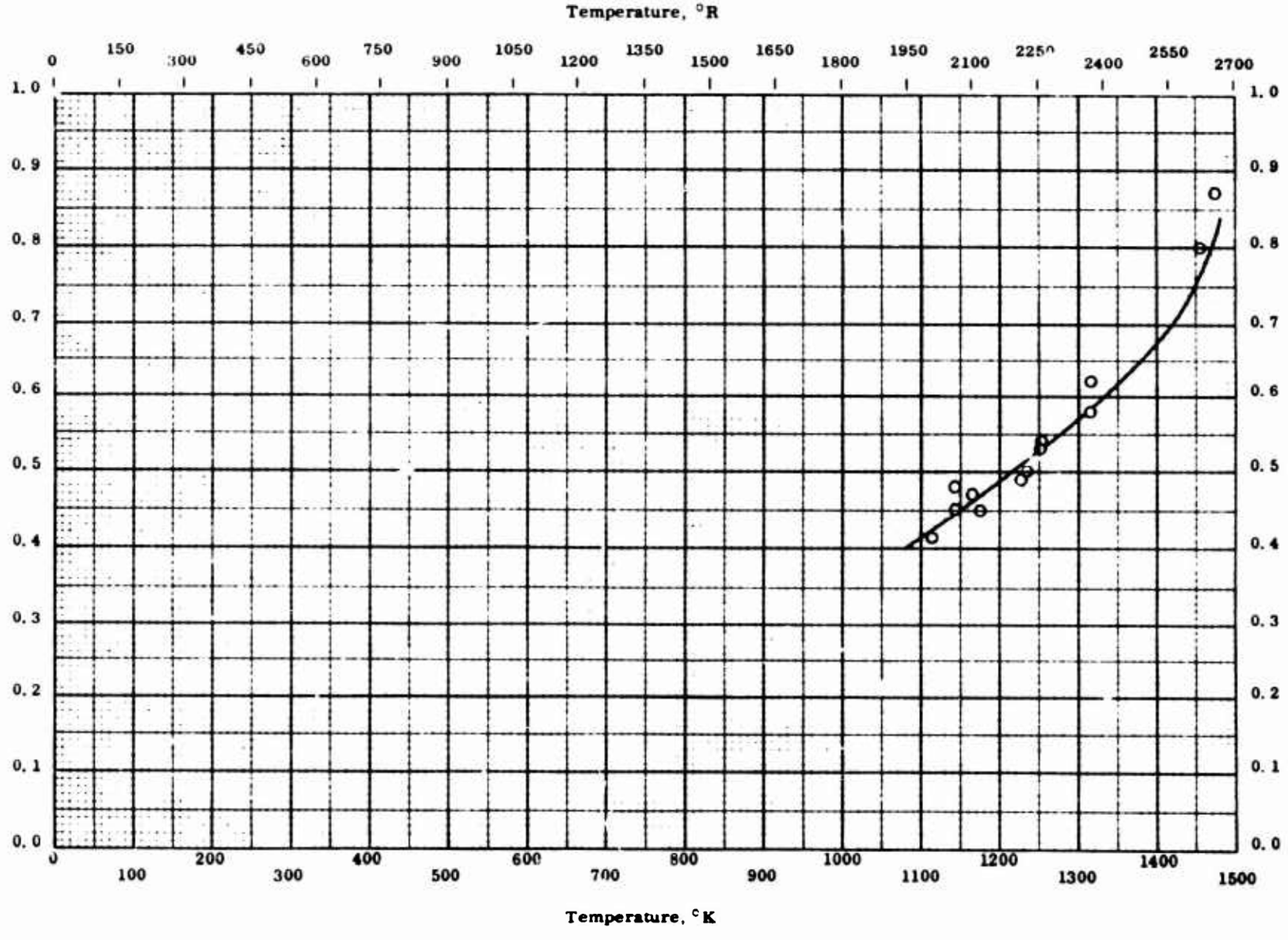


THERMAL LINEAR EXPANSION -- BERYLLIUM

THERMAL LINEAR EXPANSION -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-51	298-448		99.96 pure.	

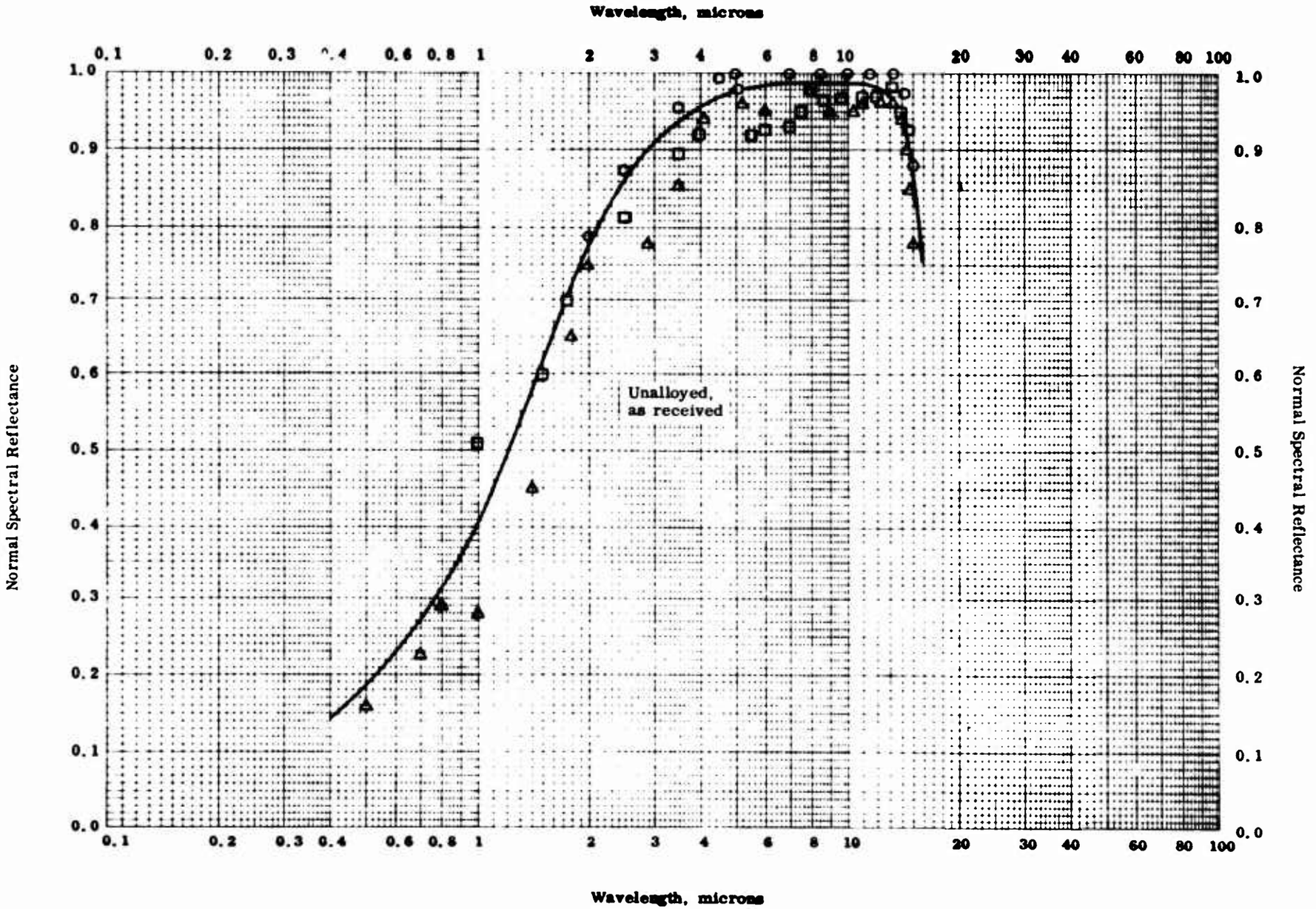


NORMAL TOTAL EMITTANCE -- BERYLLIUM

NORMAL TOTAL EMITTANCE -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-30	1116-1473		Composition not given .	Measured in air.

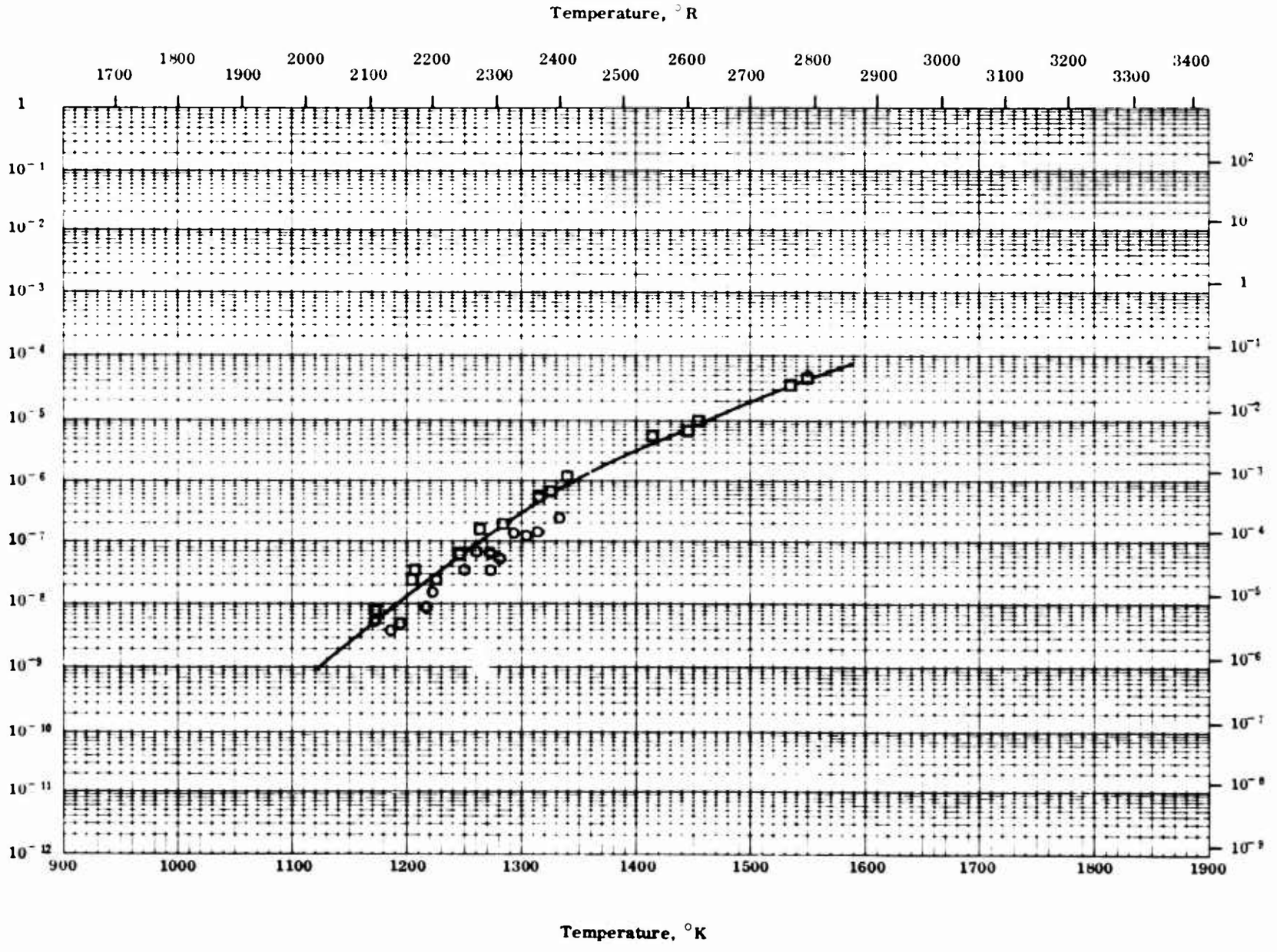


NORMAL SPECTRAL REFLECTANCE -- BERYLLIUM

NORMAL SPECTRAL REFLECTANCE -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	62-45	.322	2.00-15.00	< ±2	Unalloyed, 0.025 in. thick.	As received; washed; hohlraum at 523 K.
□	62-45	.322	1.00-14.00	< ±2	Same as above.	Same as above except hohlraum at 773 K.
△	62-45	.322	0.50-15.00	< ±2	Same as above.	Same as above except hohlraum at 1273 K.



TPRC

VAPOR PRESSURE -- BERYLLIUM

VAPOR PRESSURE -- BERYLLIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_r	Sample Specifications	Remarks
○	44-4	1174-1336		0.03 Fe, 0.022 Si, 0.008 Al, and 0.004 Mg.	
□	48-1	1172-1552		Vacuum cast: 0.14 Al, 0.07 Fe, 0.04 Si, 0.02 Mg, and 0.01 ea. Cr, Cu, Na, Ni, Zn.	

PROPERTIES OF BORON

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	2.50	156
Melting Point	2310	4160
Heat of Vaporization. . . .	11182_{298K}	20128_{536R}
Heat of Sublimation	12613_{298K}	22703_{536R}

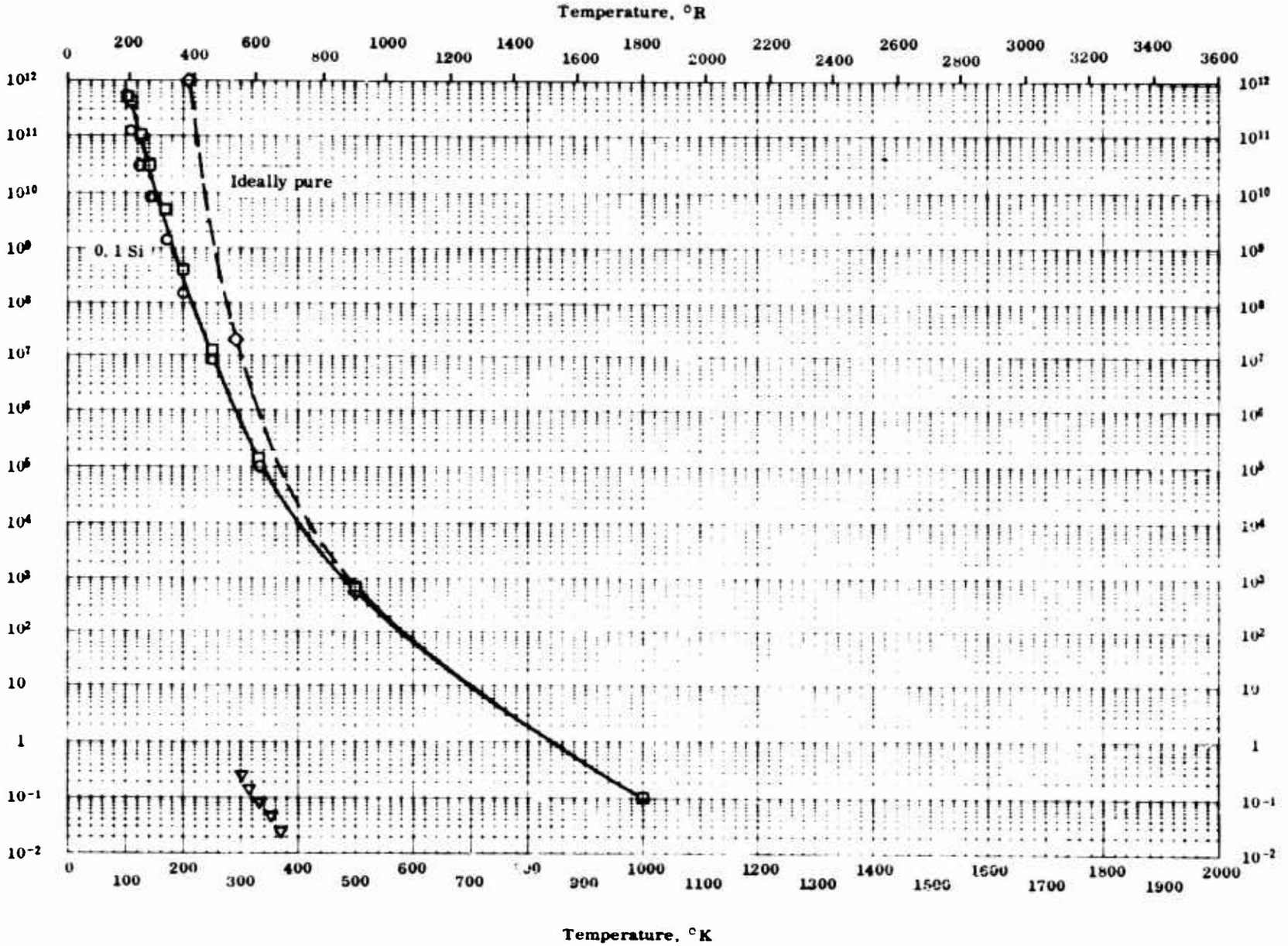
REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	●	2.50	156
	▽	2.31	144
Melting Point		K	R
	□	2310 ± 37	4160 ± 67
	△	2313 ± 30	4164 ± 54
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▲	11182	20128
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	■	12613	22703

PROPERTIES OF BORON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	45-4	2273-2348		Pure.	
▽	51-30	298		Single crystal.	
△	56-57	2313		Not given.	
●	61-46	298		Not given.	
▲	61-46	298		Not given.	
■	63-37	298		Not given.	

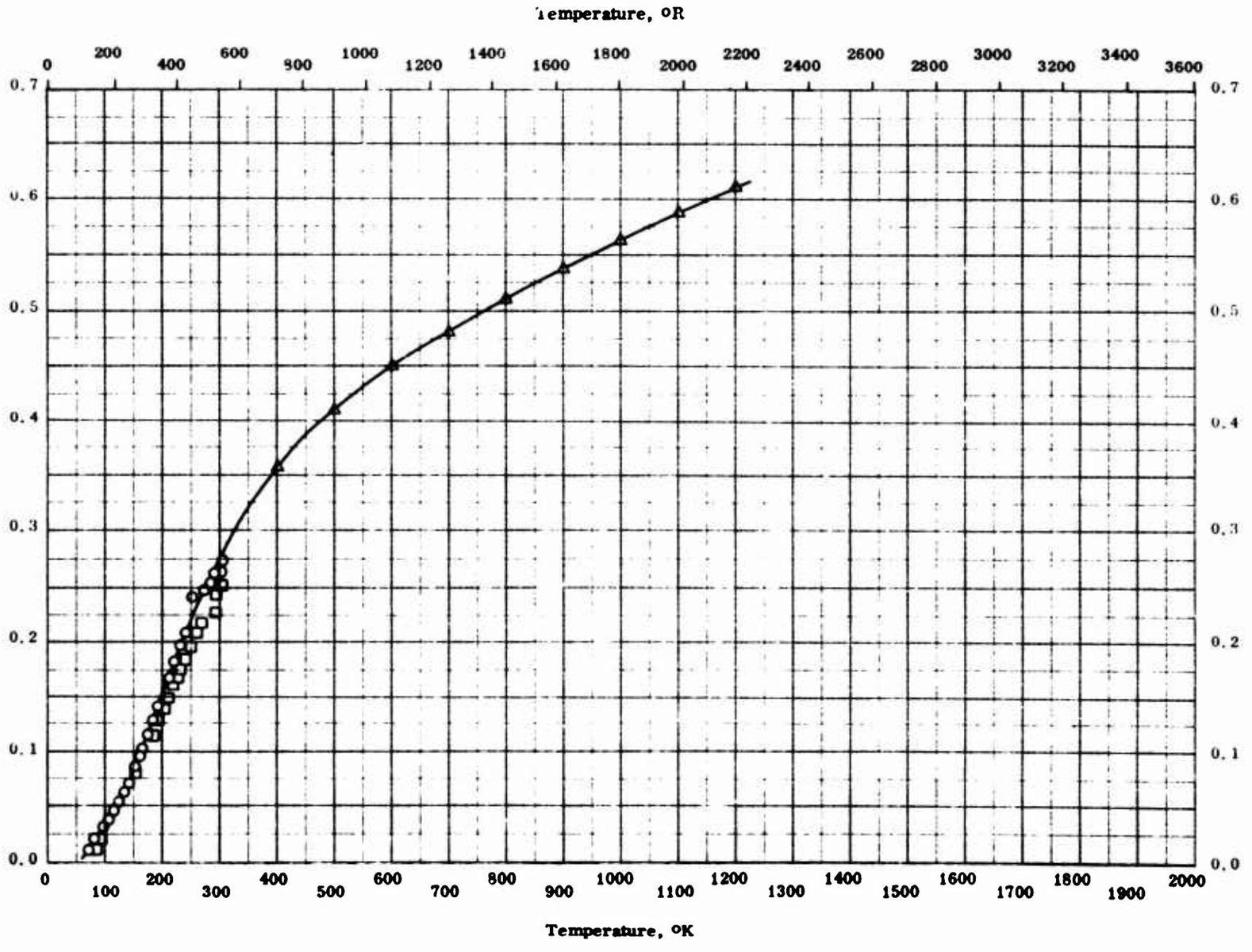


ELECTRICAL RESISTIVITY -- BORON

ELECTRICAL RESISTIVITY -- BORON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-34	111-1000		0.1 Si and 0.005 > others	Prepared by reduction of BCl_3 with H_2 on heated Tungsten at 1380 C.
□	57-34	111-1000		0.1 Si and 0.005 > others, but more pure than sample above.	Same as above.
◇	57-34	206-1000		Estimated value for an ideally pure sample.	
▽	53-24	394-556		Presumably pure.	Author also reports other samples with resistivities lower by a factor of 10.

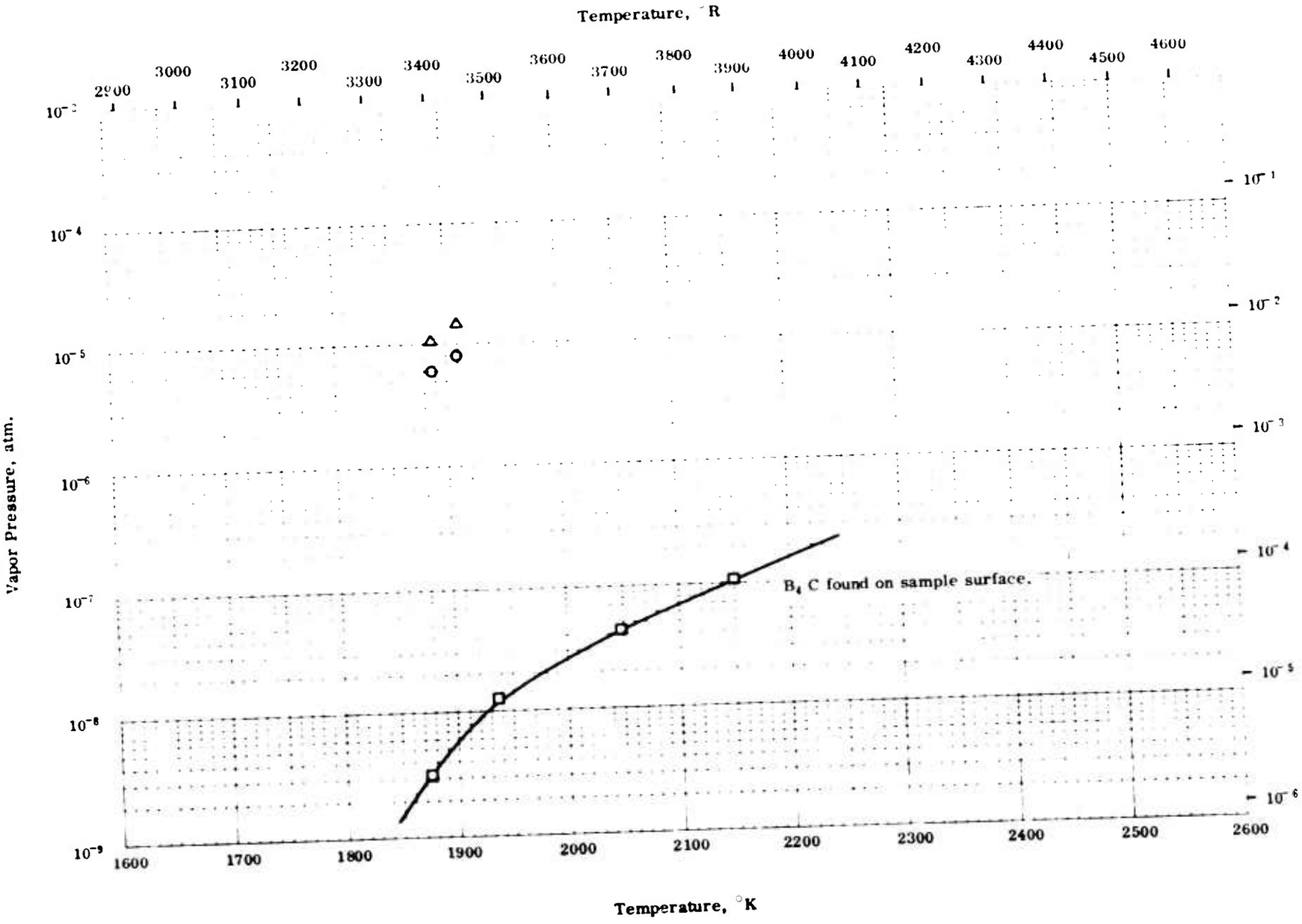


SPECIFIC HEAT -- BORON

SPECIFIC HEAT -- BORON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-18	18-308		Extremely pure; amorphous.	
□	51-18	18-308		Extremely pure; crystalline.	
△	60-34	298-1200		0.08 Si, 0.06 Na, 0.04 Fe and 0.02 Ni. [Author's design: amorphous Boron III].	Sealed in gold ampules.

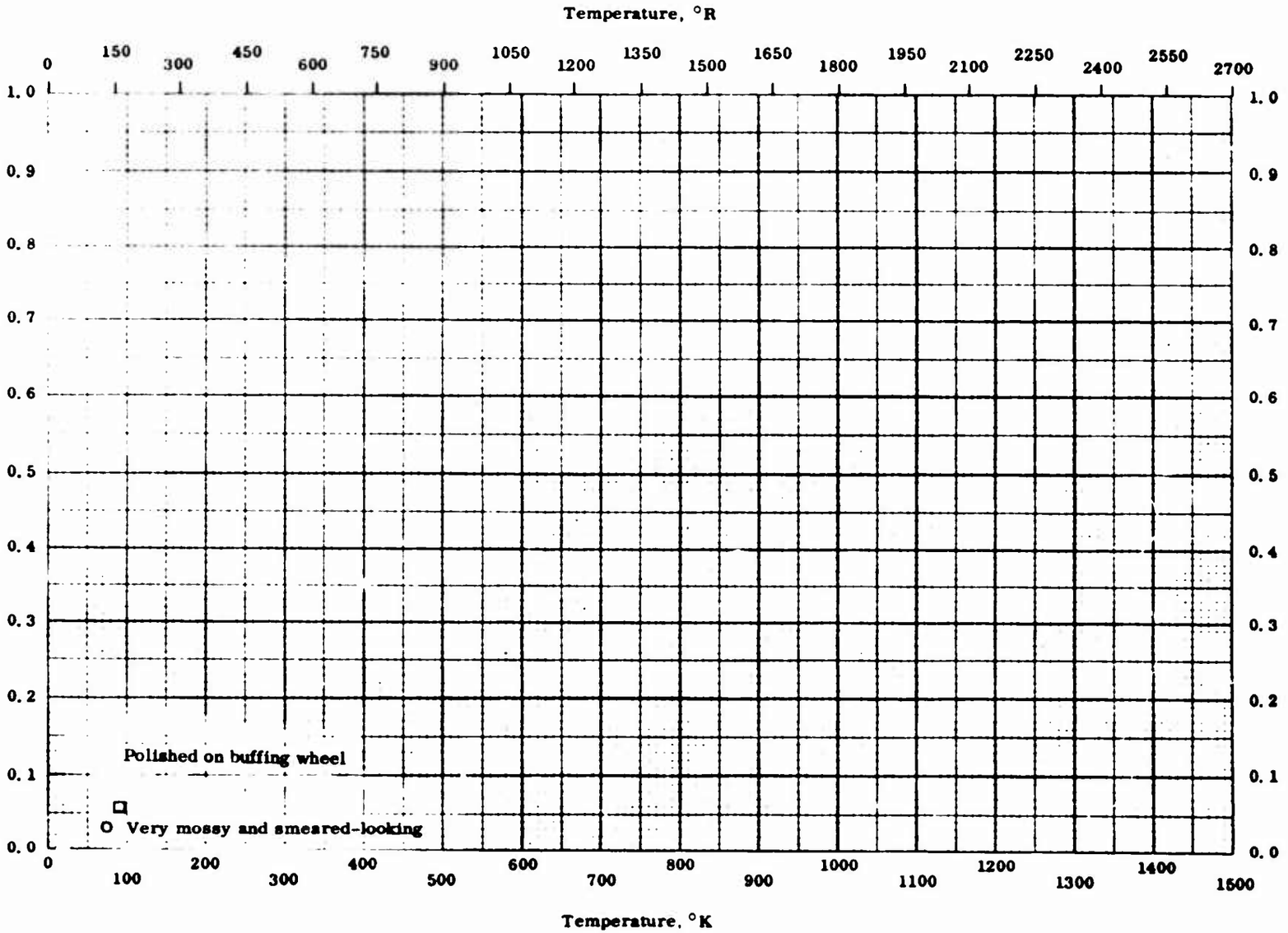


VAPOR PRESSURE -- BORON

VAPOR PRESSURE -- BORON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	51-13	1889-1910		99.5 B, 0.13 C, < 0.1 of any metal except Be; minimized Fe impurity.	Sample in BeO crucible resulting reaction $BeO_{(s)} + B_{(s)} \rightarrow Be_{(g)} + BO_{(g)}$; p of BO.
○	51-13	1889-1910		Same as above.	Same as above; p of Be.
□	61-20	1576-2150		Not given.	B_4C found on surface; B probably reacted with carbon in induction furnace.



HEMISPHERICAL TOTAL EMITTANCE -- CADMIUM

HEMISPHERICAL TOTAL EMITTANCE -- CADMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-38	76	5	Composition not given.	Very mossy and smeared-looking plated surface.
□	48-6	90	<20	Same as above.	Foil; polished on buffing wheel without using any polishing agent; measured in vacuum (10^{-5} mm Hg).

PROPERTIES OF CALCIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	1.54*	96.1*
Melting Point	1123	2022
Heat of Fusion	52_{1123K}	93_{2022R}

*Handbook of Chemistry and Physics. (Ref. 64-28)

REPORTED VALUES

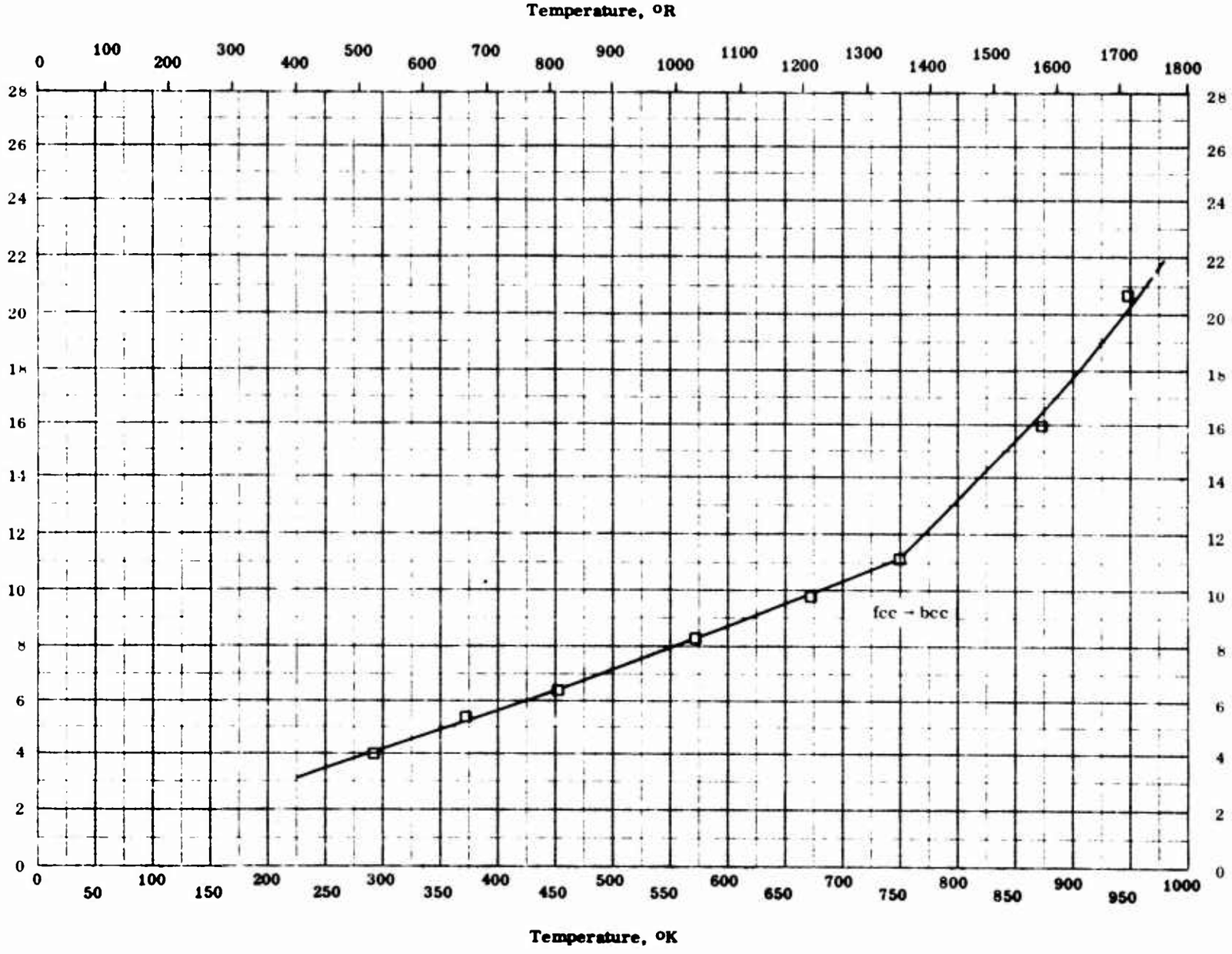
Melting Point	K	R
○	1123	2022

Heat of Fusion	cal g^{-1}	Btu lb^{-1}
□	$51.6_{1123K} \pm 2$	$93_{2022R} \pm 5$

PROPERTIES OF CALCIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	50-12	2022		0.04 Mg, 0.03 Fe, 0.01 each Cu and Mn, and traces of Si.	
□	50-12	2022		Same as above.	Δh_f from enthalpy measured above and below M. P.

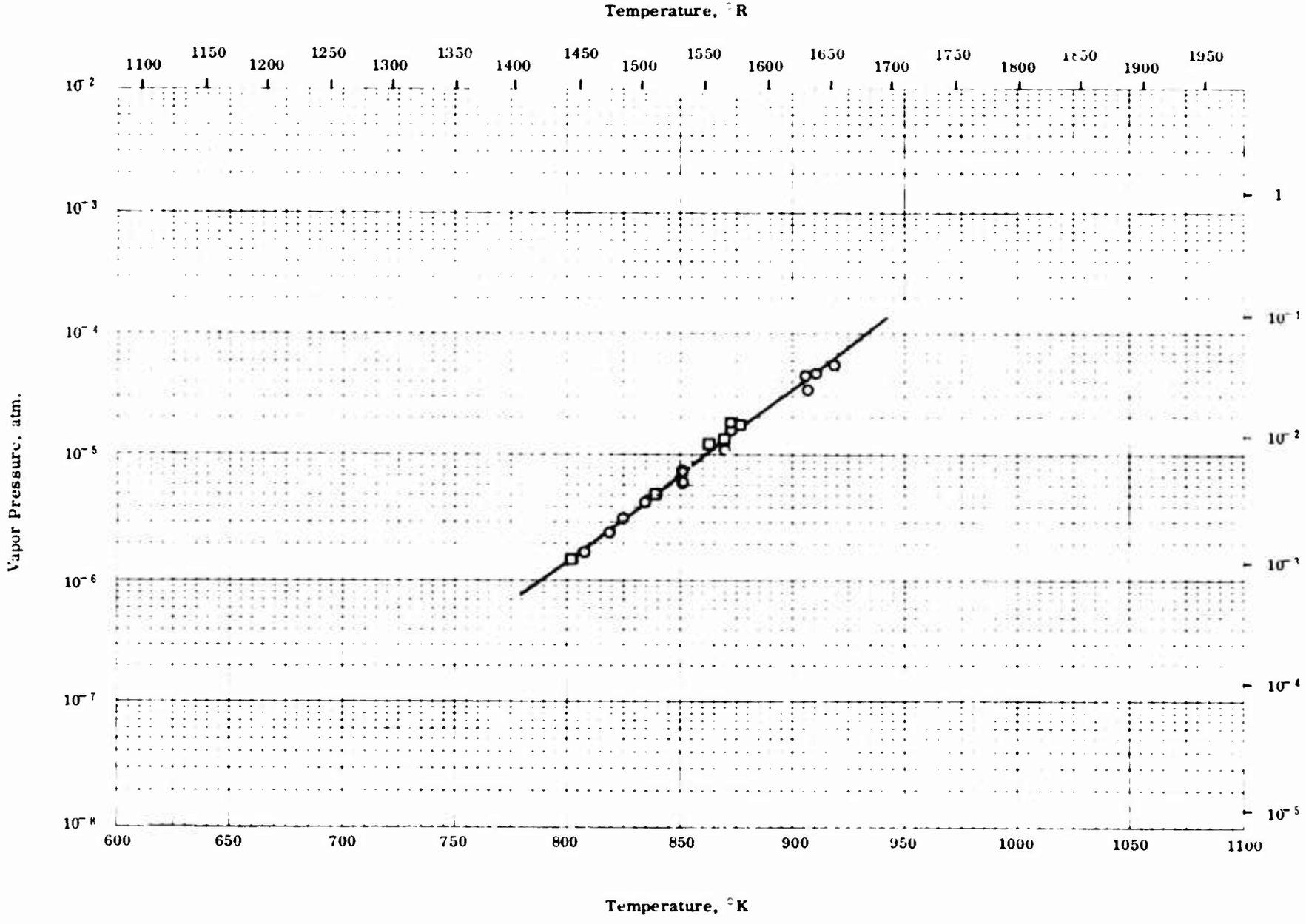


ELECTRICAL RESISTIVITY -- CALCIUM

ELECTRICAL RESISTIVITY -- CALCIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
□	56-37	293-973		99.96 pure, 0.010 ea. Mg, Fe, 0.011 N, 0.005 Mn, and 0.001 Al	Tripie distilled.



VAPOR PRESSURE -- CALCIUM

VAPOR PRESSURE -- CALCIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-9	800-920	±5-±10	Not given.	Nickel crucibles; slots formed by razor blades, evaporating into 10^{-4} mm Hg.
□	54-8	801-877		Not given.	Extension of above work.

PROPERTIES OF CARBON

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	2.24*	140*
Heat of Sublimation	11762_{2730K}	21171_{4910K}

*Pyrolytic carbon

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	△	1.49	93
	○	2.24	140
	□	1.67	104
	▽	2.25	140

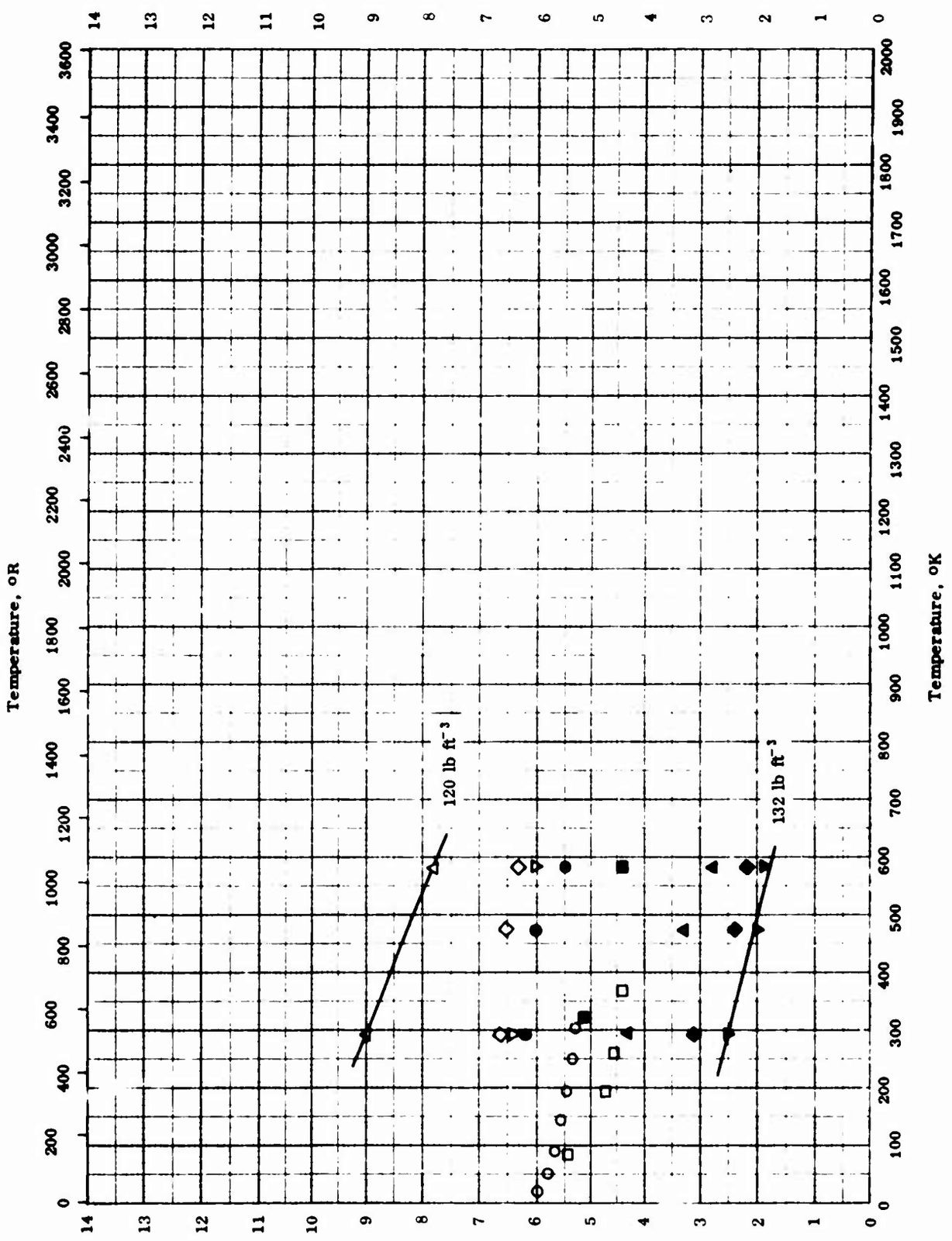
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	●	11762_{2730F}	21171_{4910R}
	■	14704 ± 80	26470 ± 150
	▲	14860 ± 830	26750 ± 1500
	▼	14700 ± 500	26400 ± 900

PROPERTIES OF CARBON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	56-17	298		Carbon; made from 100 parts soft Kendall coke, 42 parts medium grade coal tar pitch, 2 parts Socony Vacwax 80.	Coke calcined at 2290 R; crushed, mixed, extruded, and baked 5 days (up to 1100 C); then graphitized 5 min.
○	55-8	298		Pyrolytic carbon.	Produced by decomposition of Propane vapor at pressure of 30.0 cm Hg and temperature of 2100 C.
□	55-8	298		Pyrolytic carbon.	Produced by decomposition of methane vapor at pressure of 45 cm Hg and temperature of 1800 C.
▽	55-8	298		Pyrolytic carbon.	Produced by decomposition of benzene vapor at temperature of 2100 C.
●	52-24	2722		Carbon.	Δh_s from vapor pressure data.
■	52-25	0		Carbon; spectroscopically pure.	Same as above.
▲	53-39	0		Carbon.	Same as above.
▼	53-40	0		Carbon filament and filament machined from graphite rod.	Same as above.

TPRC



ELECTRICAL RESISTIVITY -- AMORPHOUS CARBON

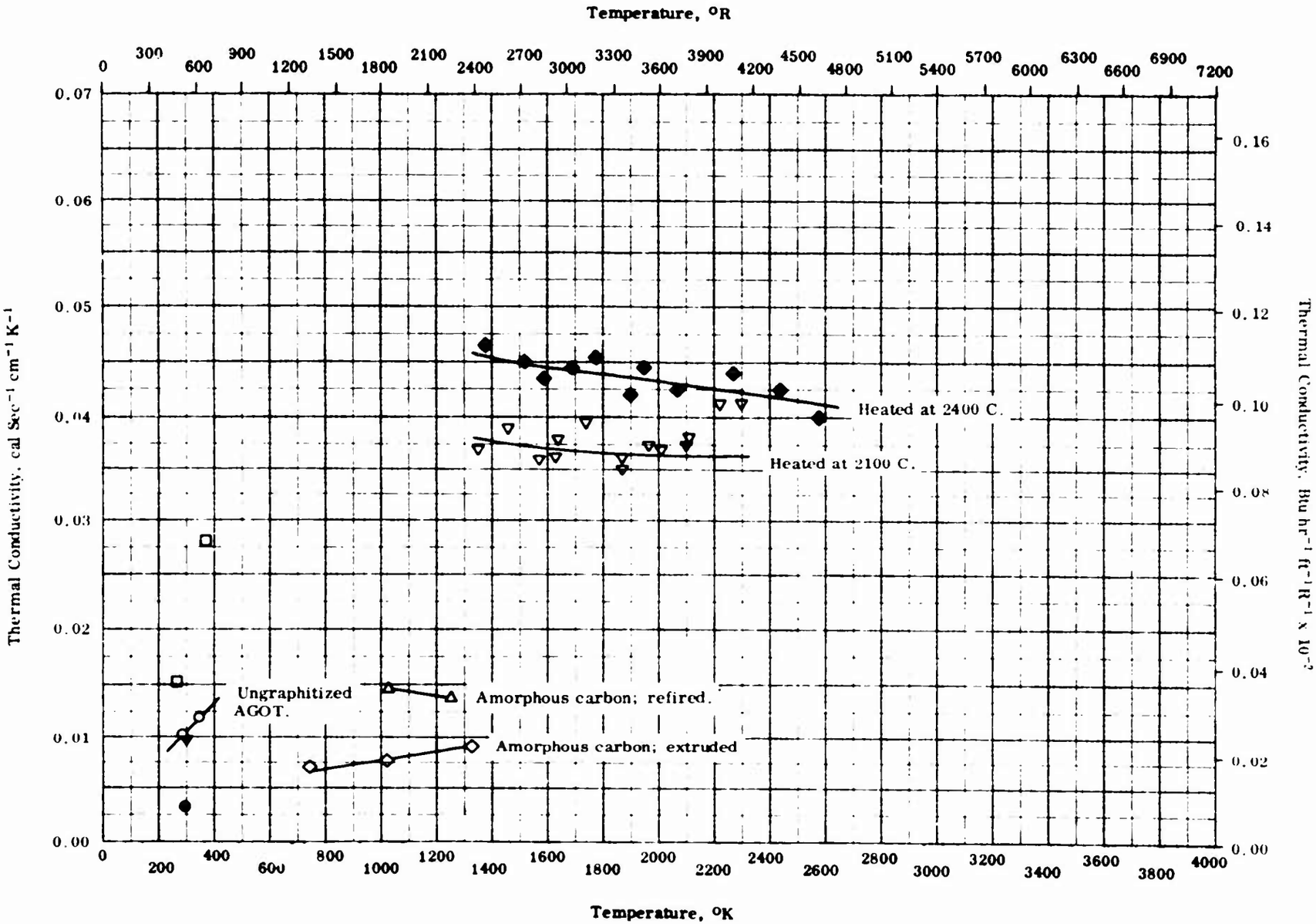
Electrical Resistivity ohm cm x 10^3

ELECTRICAL RESISTIVITY -- AMORPHOUS CARBON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	54-26 also 55-7	5-310	± 3	Gas baked coke (index rod), ungraphitized AGOT, large flour size; density 97.3 lb ft^{-3}.	Extruded; measurements parallel to direction of extrusion.
□	44-3	82-373		Carbon electrodes.	
△	50-1	273-593		Pitch coke with 0.5 ashes; density 119.7 lb ft^{-3}; particles below 45 mesh.	Hot pressed at 300 kg cm^{-2}; heated at 100 C hr^{-1} and held one hr at 1300 C.
◇	50-1	273-593		Same as above; density 126.7 lb ft^{-3}.	Same as above; held 1 hr at 1500 C.
▽	50-1	273-593		Same as above; density 126.5 lb ft^{-3}.	Same as above; held 1 hr at 1700 C.
●	50-1	273-593		Same as above; density 126.9 lb ft^{-3}.	Same as above; held 1 hr at 1900 C.
■	50-1	273-593		Same as above; density 127.9 lb ft^{-3}.	Same as above; held 1 hr at 2100 C.
▲	50-1	273-593		Same as above; density 126.5 lb ft^{-3}.	Same as above; held 1 hr at 2300 C.
◆	50-1	273-593		Same as above; density 128.9 lb ft^{-3}.	Same as above; held 1 hr at 2500 C.
▼	50-1	273-593		Same as above; density 131.8 lb ft^{-3}.	Same as above; held 1 hr at 2700 C.

TPRC



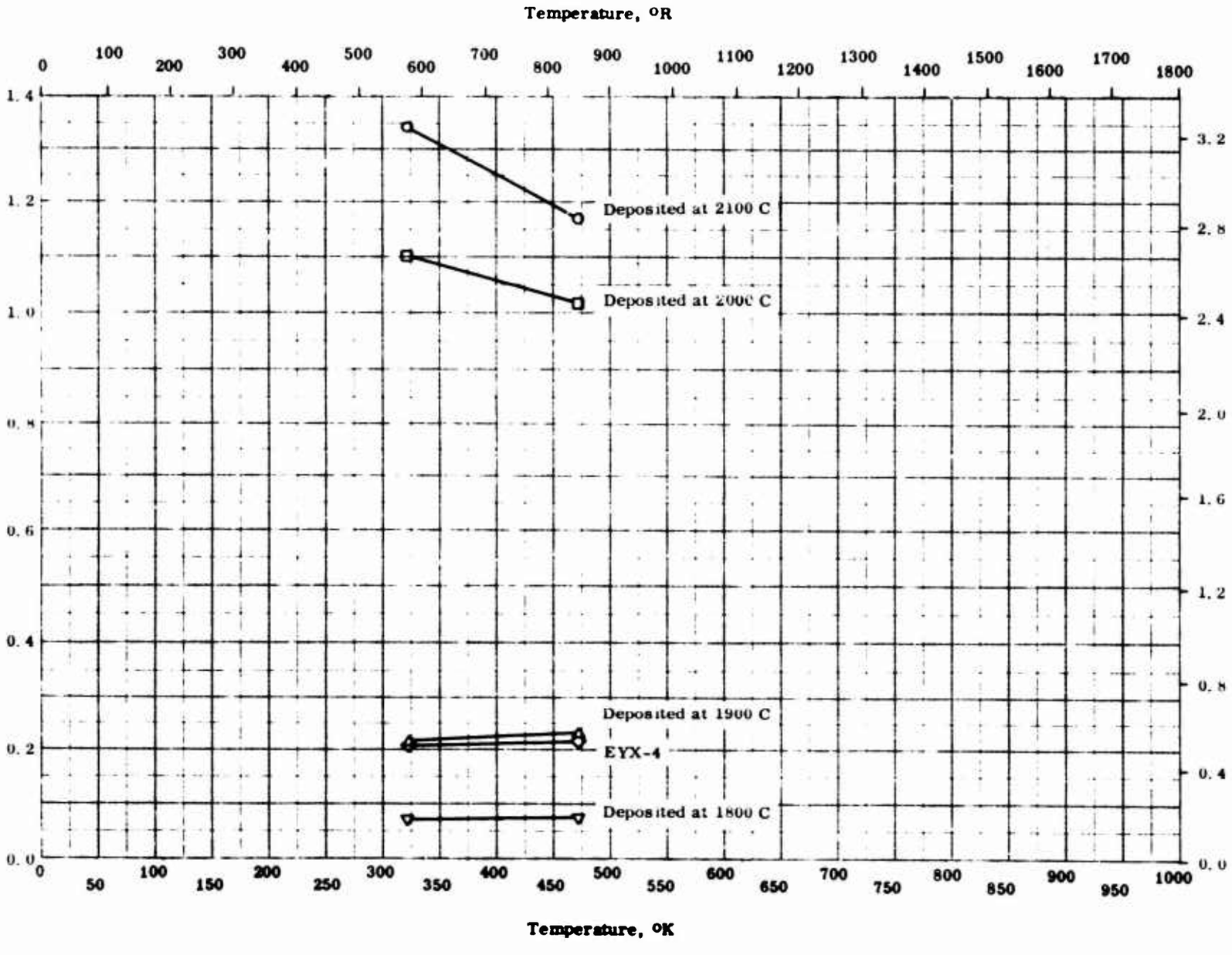
THERMAL CONDUCTIVITY -- CARBON

THERMAL CONDUCTIVITY -- CARBON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-7	292-350		Index rod; gas baked coke; amorphous ungraphitized AGOT; density 97.3 lb ft^{-3}.	Extruded using petroleum coke large flour size; measured parallel to direction of extrusion.
□	44-3	267-373		Carbon electrodes; amorphous.	Extruded.
◇	57-13	743-1333	± 5	Amorphous carbon block; density 91.7 lb ft^{-3}.	Sample as received; extruded.
△	57-13	743-1333	± 5	Same as above; density 93.6 lb ft^{-3}.	Same as above but refired 8.5 hrs at 1500 C.
▼	50-1	293		Amorphous Carbon; pitch coke with 0.5 ashes; density 119.7 lb ft^{-3} and porosity 25%.	Particles below 45 mesh hot pressed at 300 Kg cm^{-2}; heated at 100 C hr^{-1} and held 1 hr at 1300 C.
●	50-1	293		Same as above except density 126.9 lb ft^{-3} and orosity 29%.	Same as above except held 1 hr at 1900 C.
▽	63-9	1350-2300		Soft filler and soft binder.	Heated at 2100 C for 15 min and cooled.
◆	63-9	1380-2580		Same as above.	Heated at 2400 C for 15 min and cooled.

TPRC

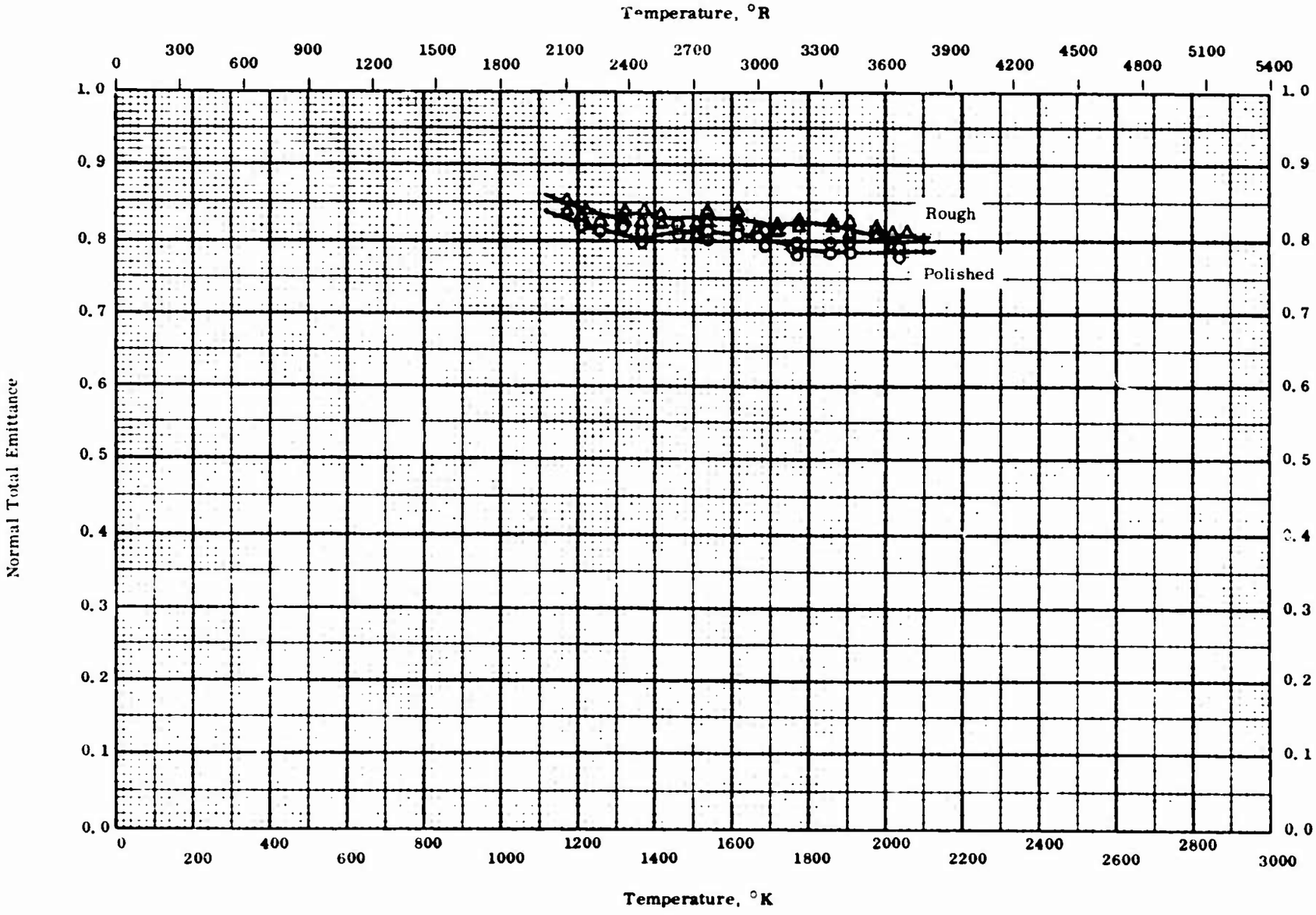


THERMAL CONDUCTIVITY -- PYROLYTIC CARBON

THERMAL CONDUCTIVITY -- PYROLYTIC CARBON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-8	323-473		Density 140 lb ft^{-3}.	Deposited from benzene at 2.5 cm partial pressure at 2100 C: measured parallel to hexagonal layer planes of deposit.
□	55-8	323-473		Density 130 lb ft^{-3}.	Same as above except deposited at 2000 C.
△	55-8	323-473		Density 109 lb ft^{-3}.	Same as above except deposited at 1900 C.
▽	55-8	323-473		Density 79.3 lb ft^{-3}.	Same as above except deposited at 1800 C.
◇	55-8	323-473		EYX4; density 103 lb ft^{-3}.	

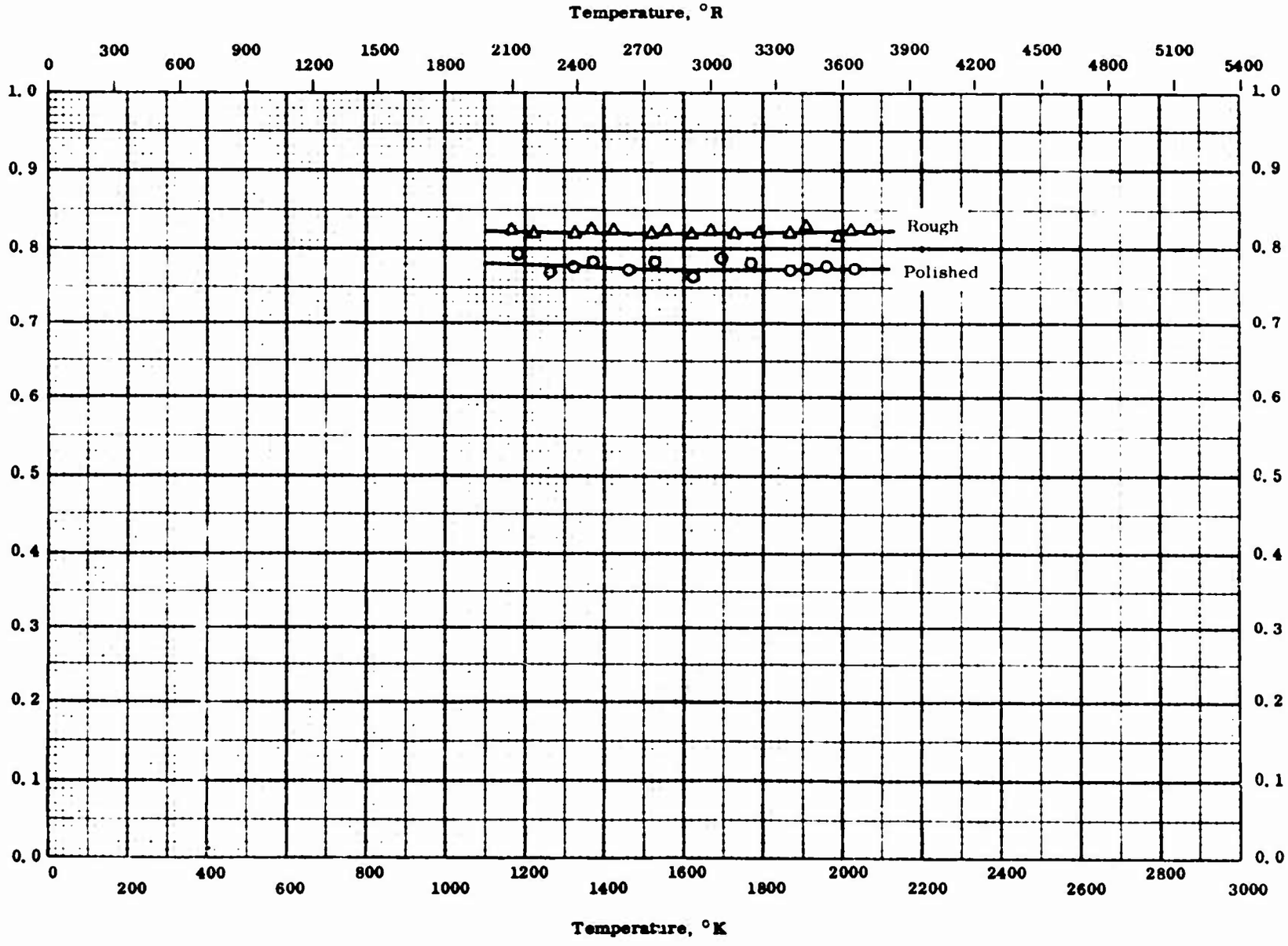


NORMAL TOTAL EMITTANCE -- CARBON

NORMAL TOTAL EMITTANCE -- CARBON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-45	1208-2043		GA carbon.	Polished with 320 grit grade of emery paper; measured in vacuum; integrated over 0.2 - 10.0 μ.
△	60-45	1178-2063		Same as above.	Rough surface; measured in vacuum; integrated over 0.2 - 10.0 μ.

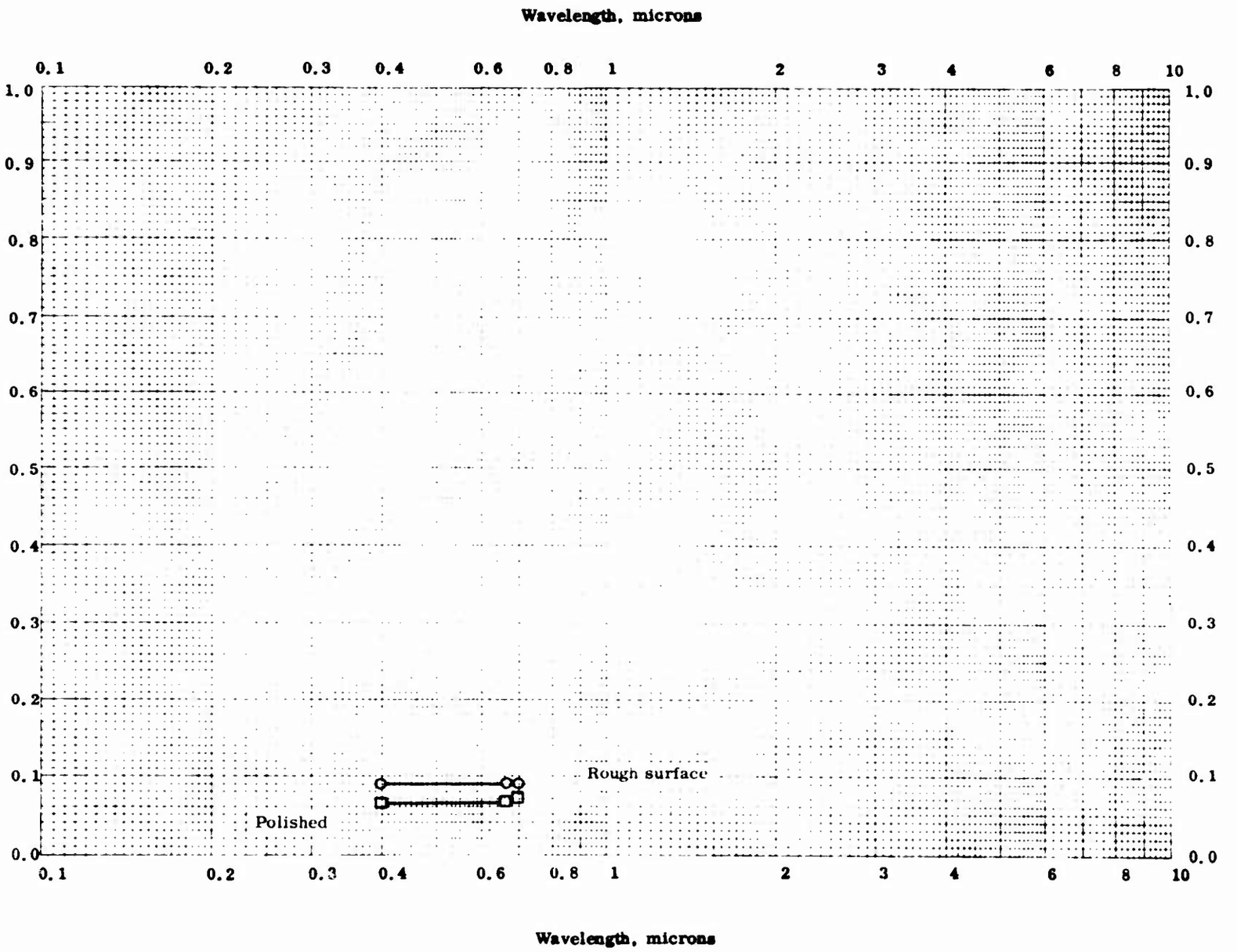


NORMAL SPECTRAL EMITTANCE -- CARBON

NORMAL SPECTRAL EMITTANCE -- CARBON

REFERENCE INFORMATION

Symbol	Ref.	Wavelength u	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-45	0.665	1183-2033		GA carbon.	Polished with 320 grit grade of emery paper; measured in vacuum.
△	60-45	0.665	1173-2073		Same as above.	Rough surface; measured in vacuum.



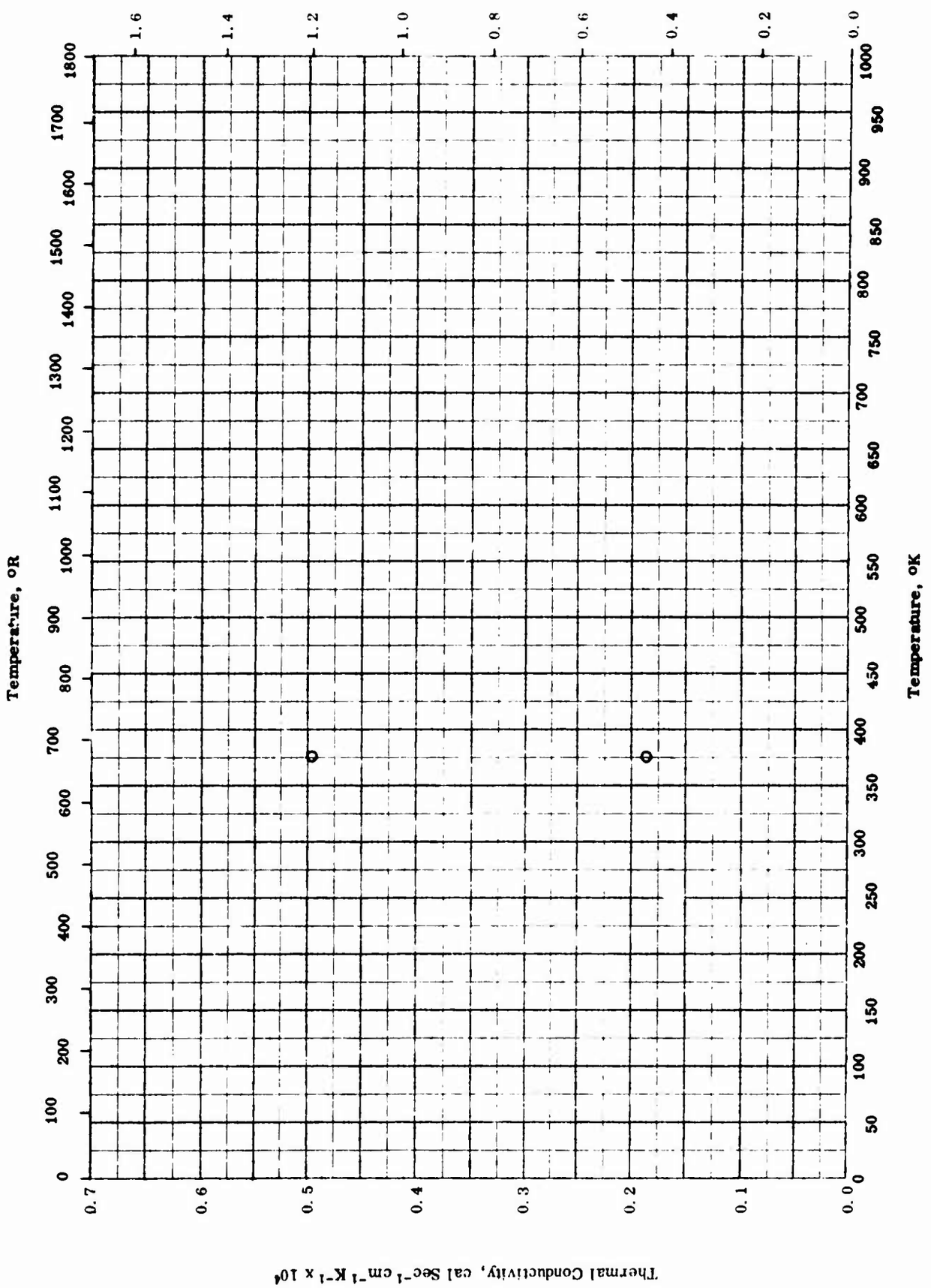
NORMAL SPECTRAL REFLECTANCE -- CARBON

NORMAL SPECTRAL REFLECTANCE -- CARBON

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	60-45	298	0.4-0.7		GA carbon.	Rough surface, 10 mil cut.
□	60-45	298	0.4-0.7		Same as above.	Polished with 325 grit grade of emery paper.

TPRC



THERMAL CONDUCTIVITY -- LAMPBLACK

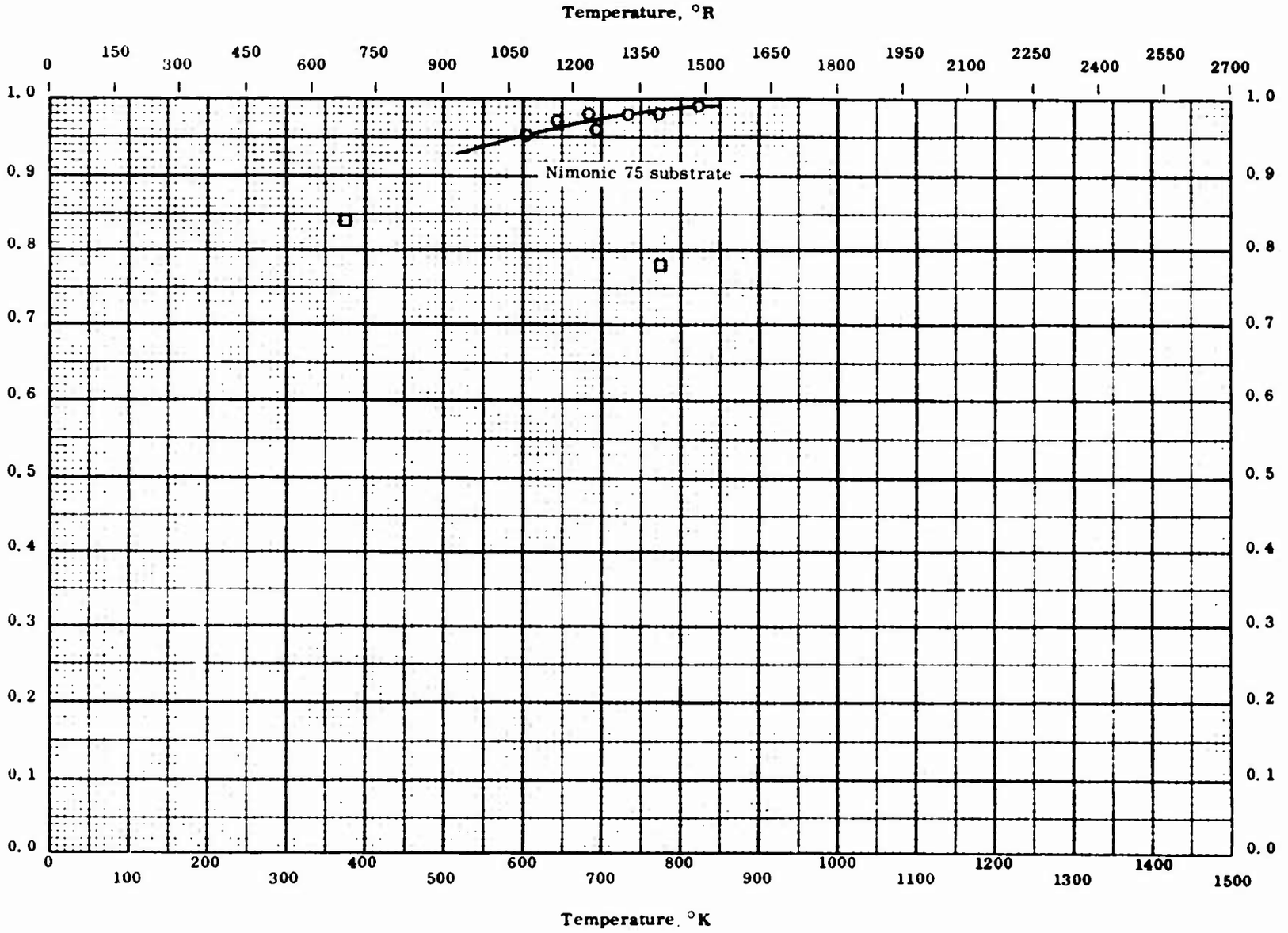
TPRC

THERMAL CONDUCTIVITY -- LAMPBLACK

REFERENCE INFORMATION

Symbol	Ref.	Temp Range °K	Rept. Error %	Sample Specifications	Remarks
O	55-9	373		Lampblack powder.	Compressed at 10 psi; author's recommended value <0.001 cal cm^{-1} Sec^{-1} K^{-1}.

TPRC

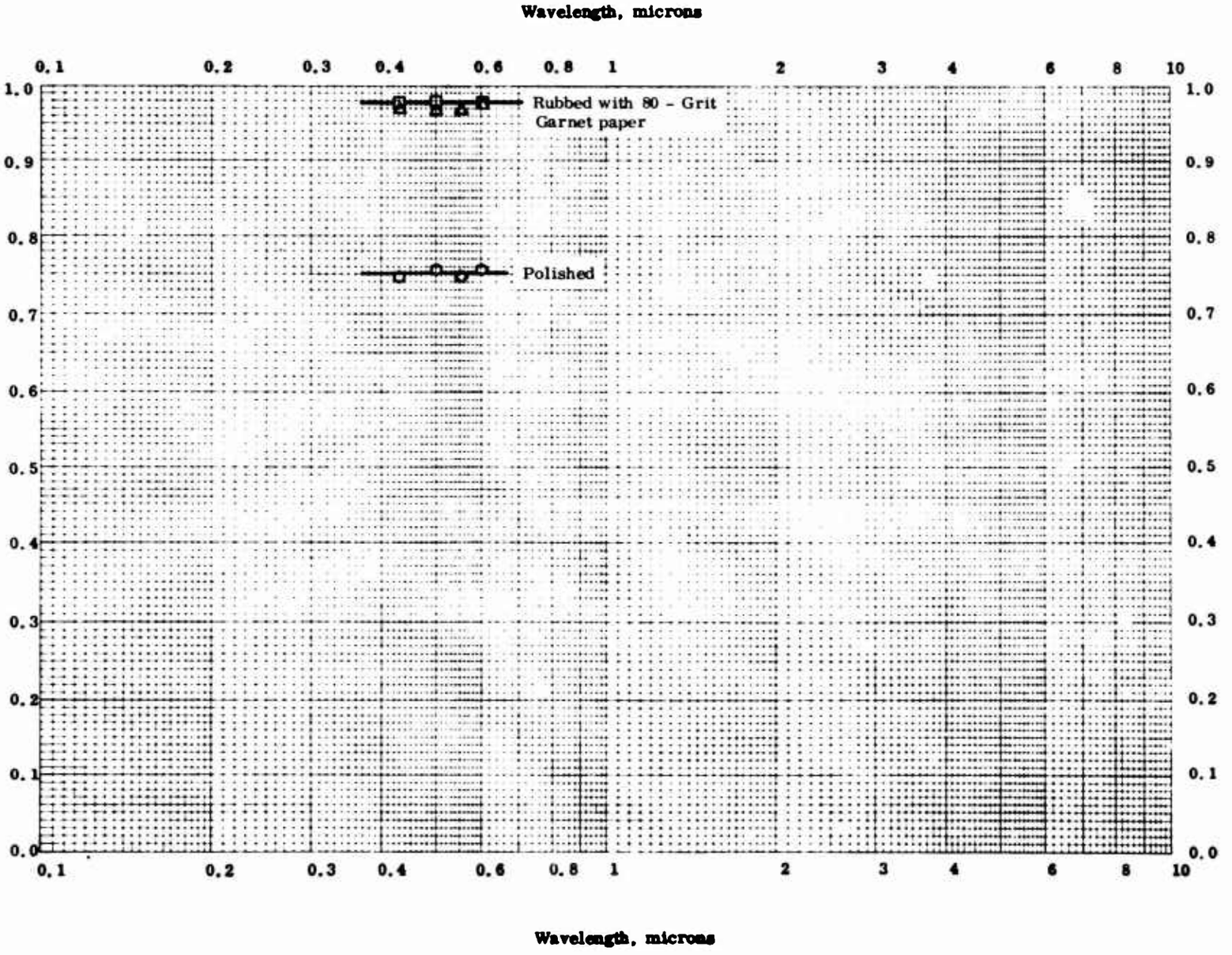


NORMAL TOTAL EMITTANCE -- LAMPBLACK

NORMAL TOTAL EMITTANCE -- LAMPBLACK

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-12	603-823		Lampblack deposite on Nimonic 75.	Measured in air.
□	47-9	373-773		Not given.	Rough deposite.



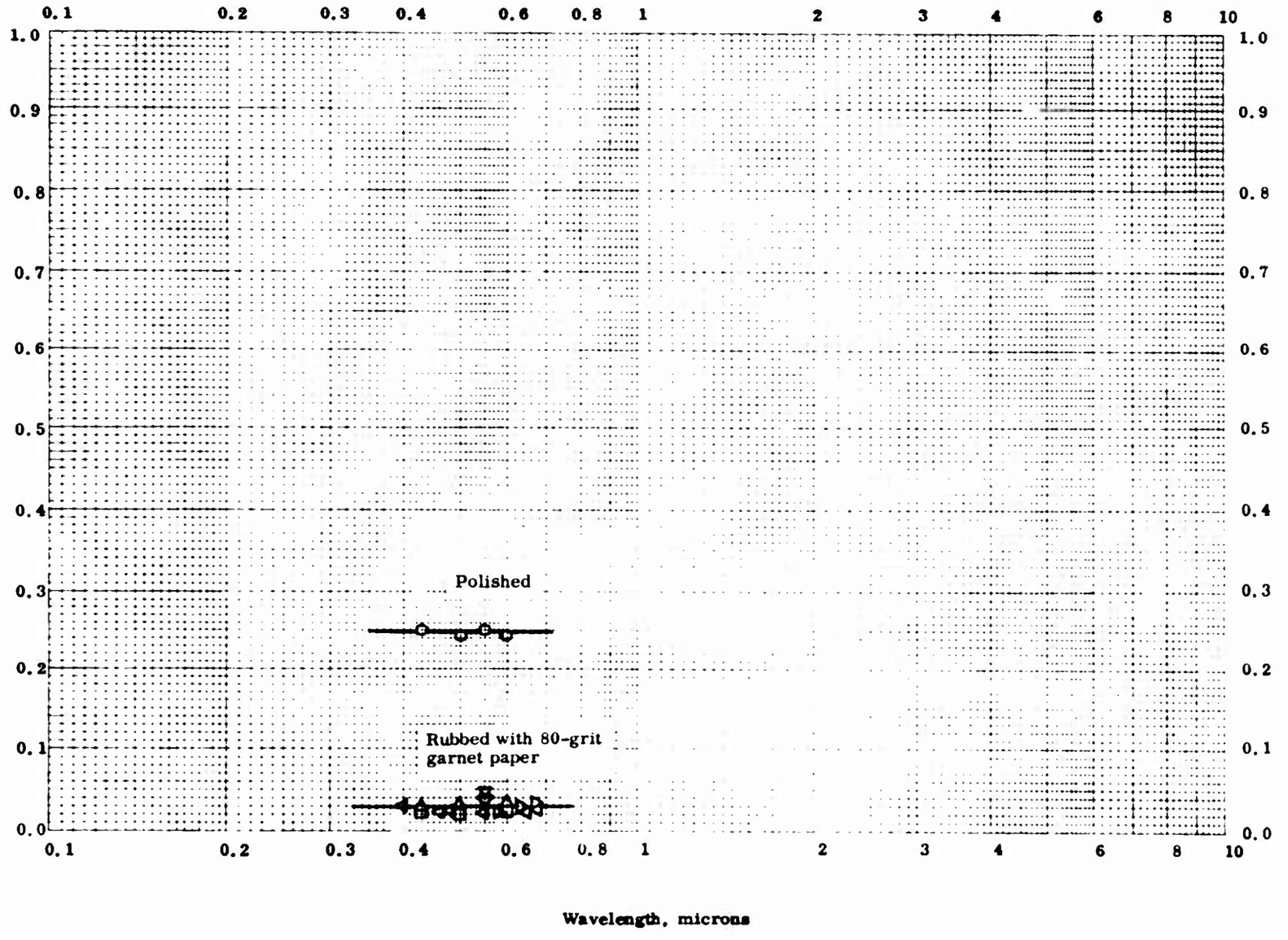
ANGULAR SPECTRAL EMITTANCE -- LAMPBLACK

ANGULAR SPECTRAL EMITTANCE -- LAMPBLACK

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	63-29	1230	0.43-0.61	±10	L113 SP lampblack-base electrode; max. ash 0.0010; density 1.45 g cm^{-3}; resistivity 0.0025 ohm in.	Final polish wit' partially used 4/0 Buehler emery polishing paper; measured in argon atmosphere; calculated from reflectance data; 45 degree from normal.
△	63-29	1250	0.43-0.61	± 10	Same as above.	Rubbing with fresh 80-grit garnet paper; measured in argon atmosphere; calculated from reflectance data; 45 degree from normal.
□	63-29	3800	0.43-0.61	± 0.4	Same as above.	Crater face of the positive electrode of an electric arc; calculated from reflectance data; 45 degree from normal.

TPRC



Angular Spectral Reflectance

TPRC

Angular Spectral Reflectance

ANGULAR SPECTRAL REFLECTANCE -- LAMPBLACK

ANGULAR SPECTRAL REFLECTANCE -- LAMPBLACK

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	63-29	1230	0.43-0.61	±10	L113 SP lampblack-base electrode; max. ash content 0.0010; density 1.45 g cc^{-1}; resistivity 0.0025 ohm in.	Final polish with partially used 4/0 Buehler emery polishing paper; measured in argon atmosphere; MgO as reference standard; hemispherical illumination, 45 degree viewing.
△	63-29	1250	0.43-0.61	±10	Same as above.	Rubbing with fresh 80-grit garnet paper; measured in argon atmosphere; MgO as reference standard; hemispherical illumination, 45 degree viewing.
□	63-29	3800	0.43-0.61	±20	Same as above.	Crater face of the positive electrode of an electric arc; MgO as reference standard; hemispherical illumination, 45 degree viewing.
▽	63-29	2836	0.55		National CEP lampblack; density 1.55 g cc^{-1}; specific resistance, 48×10^{-4} ohm cm; nearly isotropic.	Molded surface prepared on 80-grit garnet paper; hemispherical illumination, 45 degree viewing.
◇	63-29	2810	0.55		Same as above.	Same as above; surface sandblasted.
◁	60-39	550	0.40-0.68	±15	L113 SP lampblack.	Crater; MgO as reference standard; 45 degree from the optical axis.
▷	60-39	~3775	0.40-0.68	±25	RW Spektral II lampblack.	Same as above.

TPRC

PROPERTIES OF CARBON (GRAPHITE)

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	2.25	140
Sublimation Point	4000	7200
Heat of Sublimation . . C_1*	14190_{0K}	25540_{0R}
C_2*	7910_{0K}	14200_{0R}
C_3*	5550_{0K}	9990_{0R}

*Gaseous species

REPORTED VALUES

Density	g cm^{-3}	lb ft^{-3}
○	1.75	109
□	1.71	107
●	1.70	106.2
■	2.26	141
◁	1.24	77.4
◐	1.45	90.5
△	1.52	94.8
◀	1.49	93.0
▼	1.62	101
▶	1.79	123
▲	1.77	110.3
◆	2.2	137.3

Sublimation Point	K	R
◪	5000*	9000*
◩	4000	7200
◈	3773*	6791*

Heat of Sublimation	cal g^{-1}	Btu lb^{-1}
◇	14200_{0K}	25500_{0R}
▽	14100_{0K} ± 170	25300_{0R} ± 300
◀	14590_{0K}	26260_{0R}
◐	14190_{0K}	25540_{0R}
◧	7910_{0K}	14200_{0R}
◨	5550_{0K}	9990_{0R}
◈	14900_{0K} ± 830	26800_{0R} ± 1500

PROPERTIES OF CARBON (GRAPHITE) (continued)

Heat of Sublimation (continued)	cal g^{-1}	Btu lb^{-1}
▷	$8740_{0K} \pm 830$	$15700_{0R} \pm 1500$
◈	$5270_{0K} \pm 280$	$9500_{0R} \pm 500$
◈	$14187_{0K} \pm 17$	$25537_{0R} \pm 30$
◈	15790_{298K}	28430_{537R}
■	15000	27000
■	14120_{0K}	25414_{0R}
●	8170_{0K}	14710_{0R}
●	5120_{2400K}	9210_{4320R}

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3	297		Grade GBH.	Molded.
□	56-3	297		Grade 7087.	Extruded.
◇	55-14	0		Graphite.	Δh_s from vapor pressure data.
▽	49-4	0		Kendall type.	Same as above.
◀	50-5	0		Acheson graphite.	Same as above.
◐	55-13 also 54-36	0		Very pure; vapor species of Acheson graphite: C_1.	Same as above.
◨	55-13	0		Same as above; vapor species: C_2.	Same as above.
◧	55-13	0		Same as above; vapor species: C_3.	Same as above.
◆	54-37	0		Spectroscopically pure; vapor species: C_1.	Same as above.
▷	54-37	0		Same as above; vapor species: C_2.	Same as above.
◆	54-37	0		Same as above; vapor species: C_3.	Same as above.
◆	48-2	0		Graphite.	Same as above.
◪	48-9	5000		Graphite.	M. P. extrapolated.
◆	47-3	298		Kendall Graphite, vapor species: C.	Δh_s from the slope of vapor pressure by effusion from open crucible.
◙	47-12	---		Graphite.	Δh_s correction of results in ANL-4007 by Thorn and Simpson.

(Continued onto next page)

PROPERTIES OF CARBON (GRAPHITE) (continued)

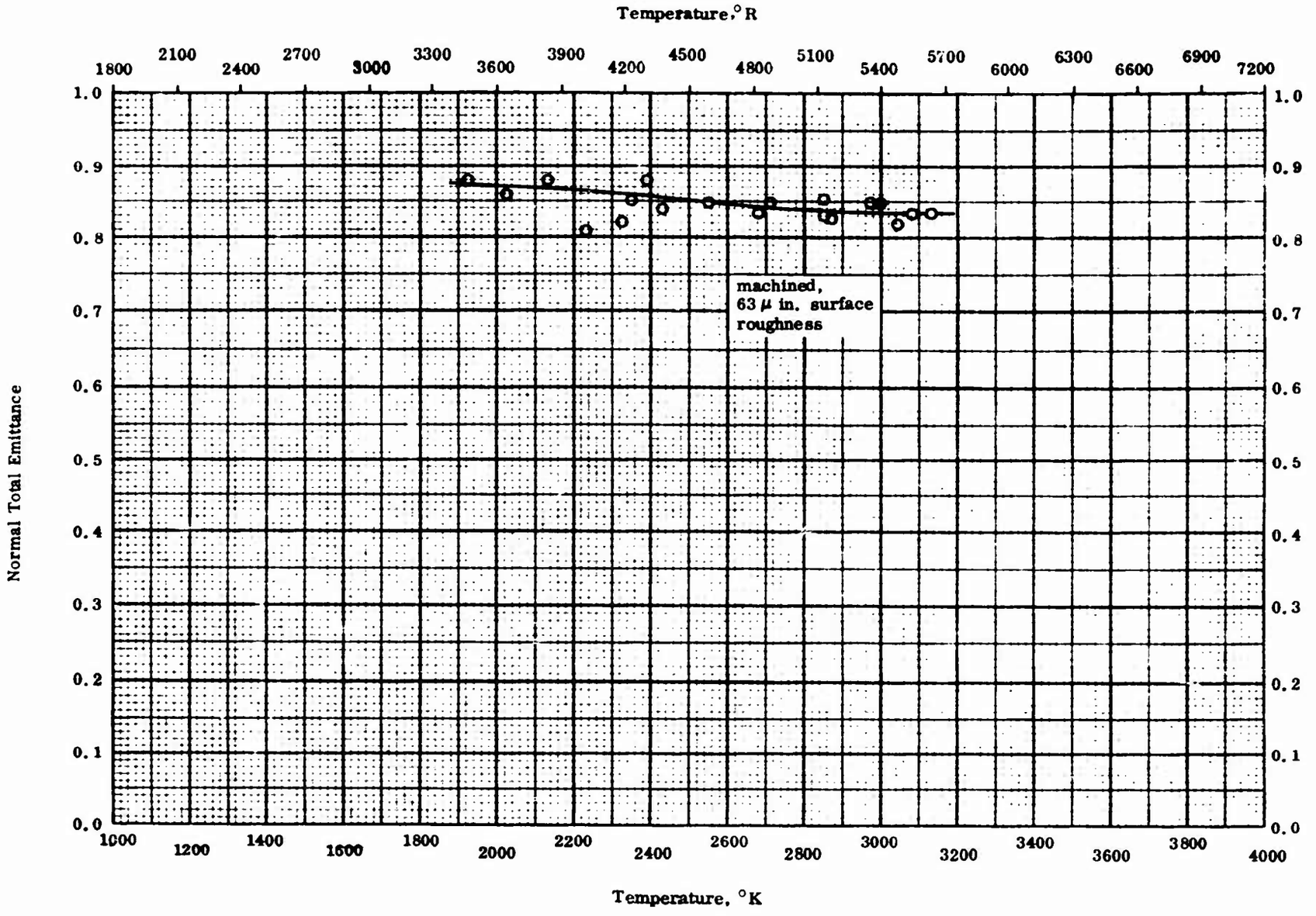
REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◘	57-18	0		Nuclear reactor grade with only small amount of inorganic impurities; vapor species C.	Δh_g from vapor pressure data.
⊖	57-18	0		Same as above; vapor species C_2.	Same as above.
⊖	57-18	2400		Same as above; vapor species C_3.	Same as above.
◁	56-50	298		Graphitized coke; porosity 4.6%.	Heated to 500 C, calcined at 500 C; ground, mixed and extruded; baked at 1100 C and graphitized at 2800 C; data given as apparent density.
◑	56-50	298		Same as above except 13.2% porosity.	Same as above except calcined at 800 C; data given as apparent density.
△	56-50	298		Same as above except porosity 24%.	Same as above except calcined at 1100 C; data given as apparent density.
◀	56-50	298		Same as above except porosity 29%.	Same as above except calcined at 1350 C; data given as apparent density.
▼	50-17	298		Graphite with traces of Mg, Si, and Na.	Author states his value is 0.72 of max.
▶	52-31	298		Base material: 65 calcined petroleum coke, 35 carbon black "Thermax", and coal tar pitch as binder (in a ratio of 26/100 of the base).	Mixed and molded at 100 C and 5000 psi for 1 min.
●	62-12	293		Not given.	
■	61-46	293		Not given.	
▲	62-7	---		ATJ graphite.	Molded and fired; max. exposure temperature 5150 F.

(Continued onto next page)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◆	60-55	---		Not given.	
◪	64-21	4000		Not given.	
◈	62-56	3773		Not given.	

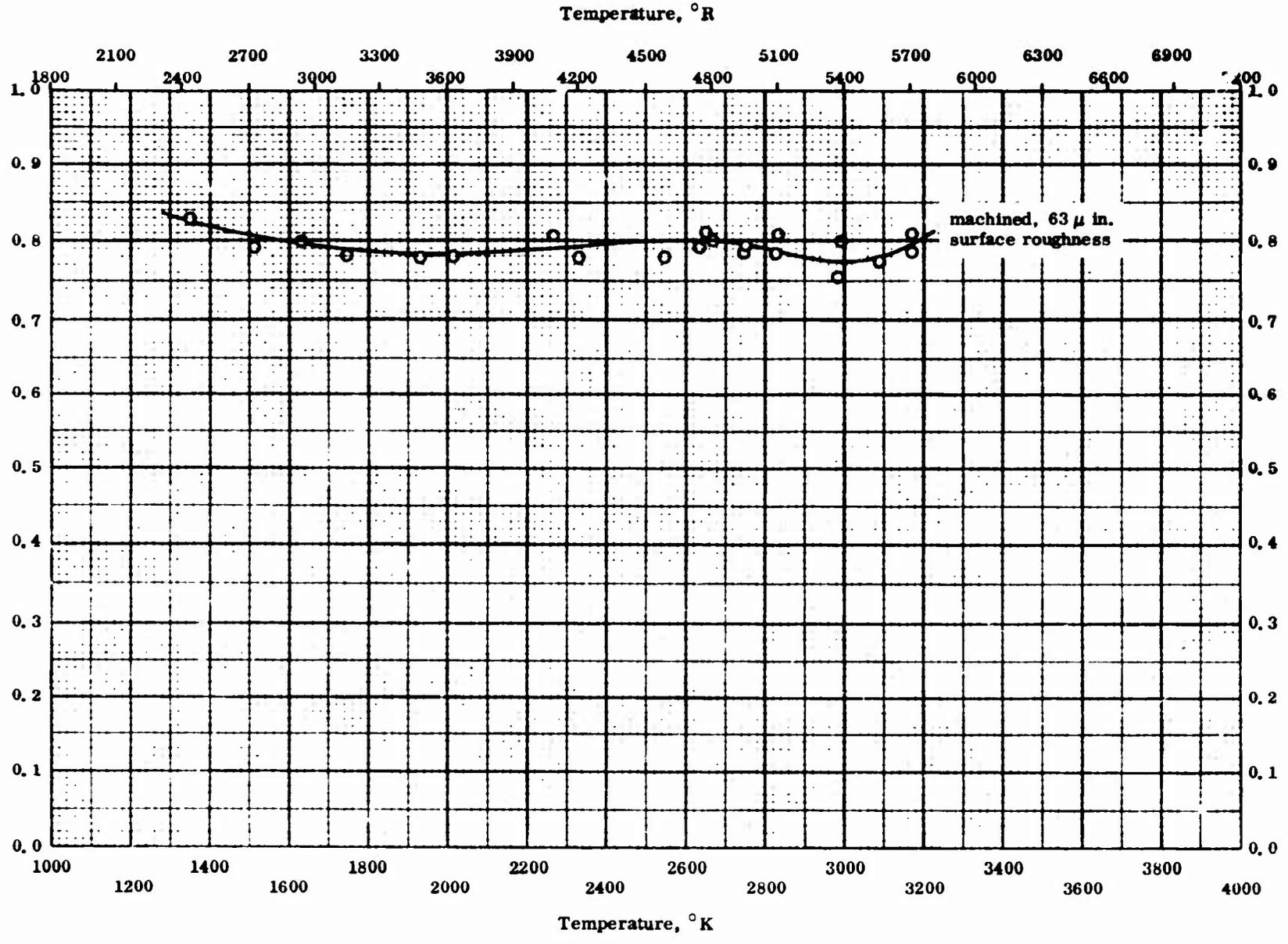


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 580)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 580)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-24	1923-3133		Speer 580; surface 63 μ in. finish.	Surface-machined; measured in vacuum below 2273 K and in argon (1 atm) above 2273 K.

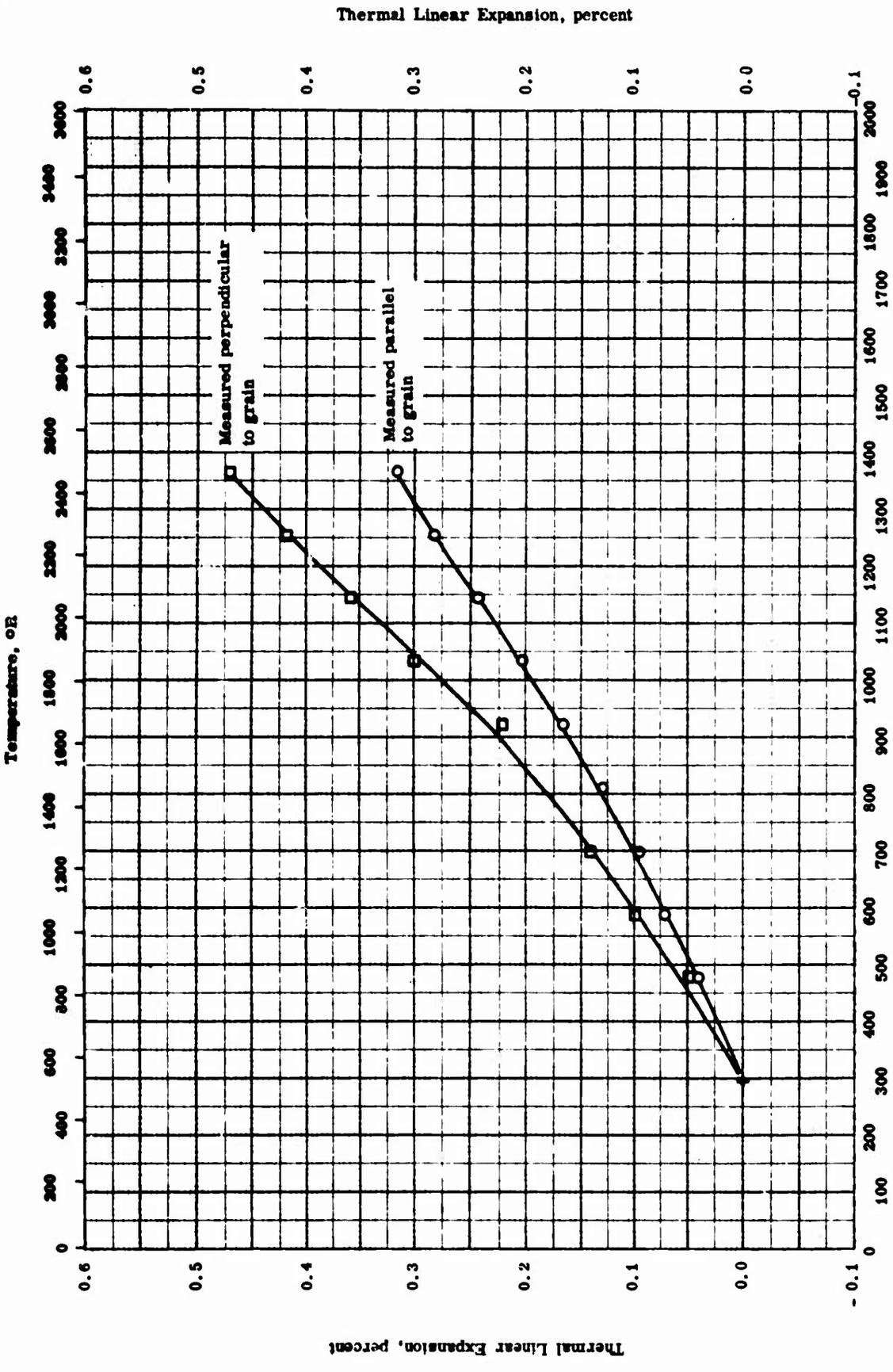


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 580)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 580)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-24	0.65	1353-3173		Speer 580, surface 63 μ in. finish.	Surface-machined; measured in vacuum below 2273 K and in argon (1 atm.) above 2273 K.

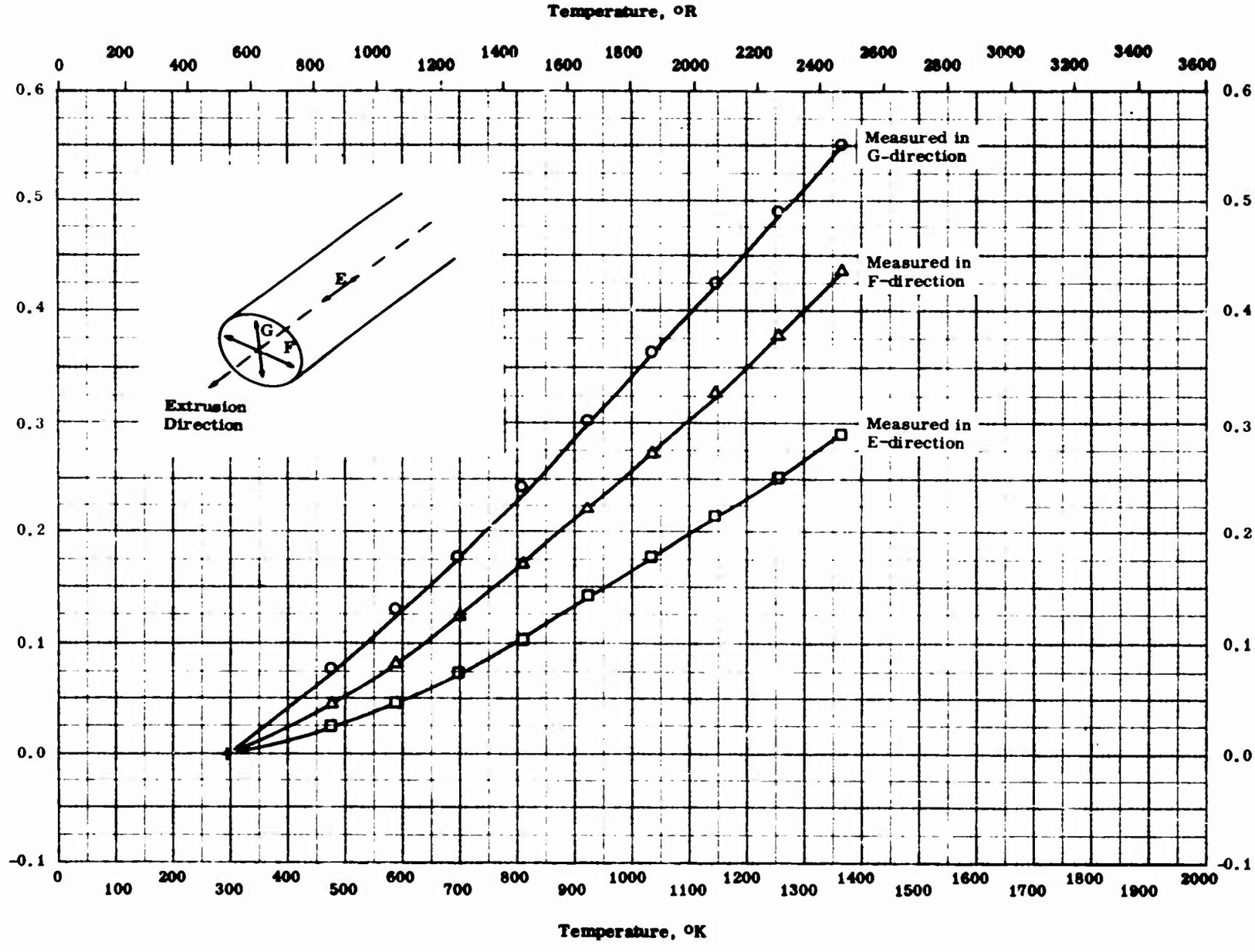


THERMAL LINEAR EXPANSION — GRAPHITE
(Grade 896 G)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 896G)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-23	300-1367		Grade 896G graphite, Speer Carbon Co.; max filler particle size 0.033 in.; dimensions 1/4 in. in diameter and 2 in. long. [Author's design: block no. 0701]	Specimen prepared from petroleum coke and coal tar pitch mixed together, extruded, and graphitized at above 4100 F; heated in an atm of helium with a heating rate of 540 F hr^{-1} and soaked 1/2 hr at 2000 F; measured parallel to grain direction.
□	59-23	300-1367		Same as above.	Same as above except measured perpendicular to grain direction.

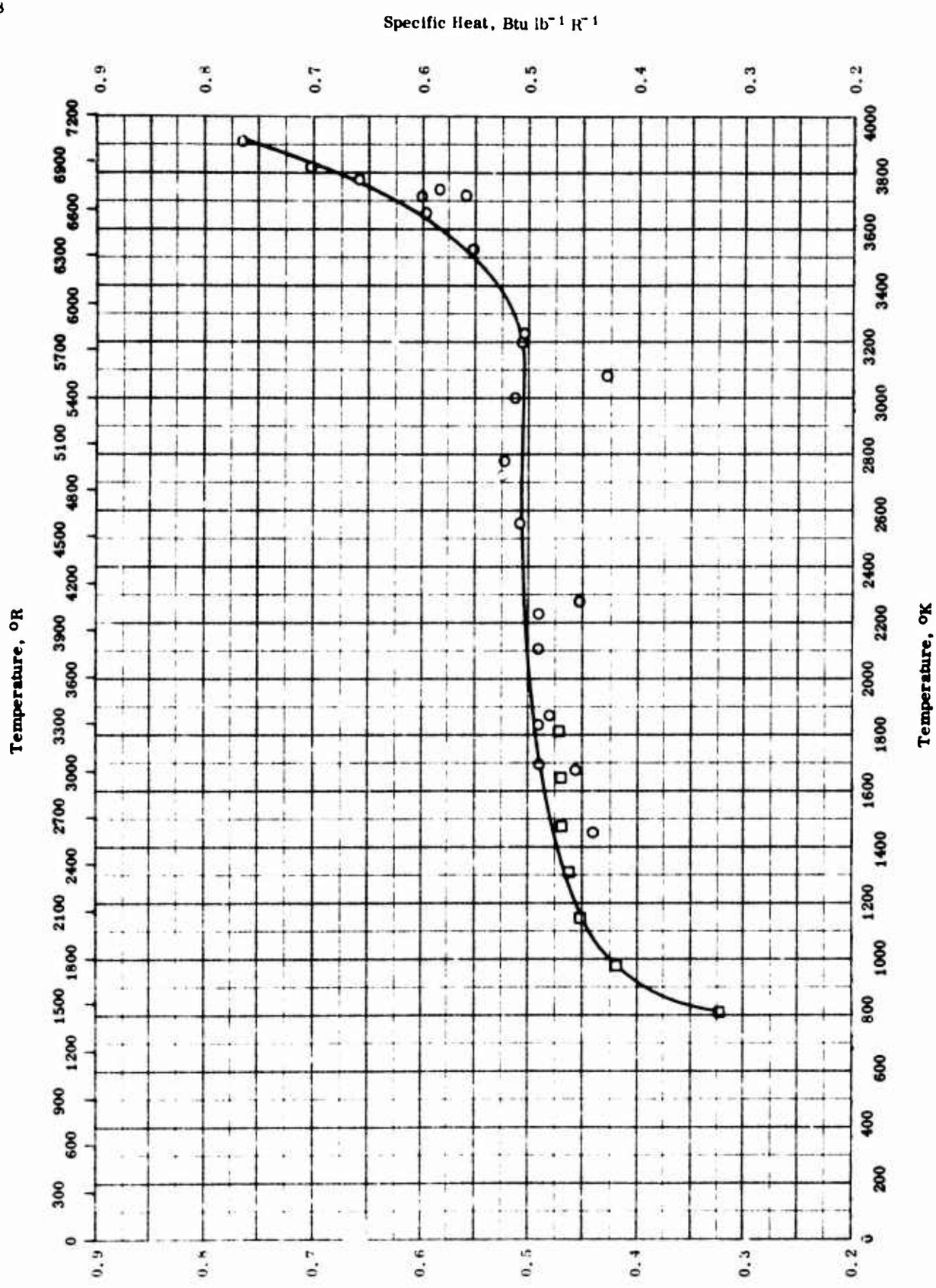


THERMAL LINEAR EXPANSION — GRAPHITE
(Grade 942 S)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 942 S)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	59-23	300-1367		Grade 942 S graphite, Speer Carbon Co.; max filler particle size 0.033 in.; dimensions 1/4 in. in diameter and 2 in. long. [Author's design: block no. 0201]	Specimen prepared from petroleum coke mixed with coal tar pitch, extruded, and graphitized at above 4100 F; heated in a helium atm with a heating rate of 540 F; measured parallel to grain direction.
△	59-23	300-1367		Same as above.	Same as above except measured across grain driection.
○	59-23	300-1367		Same as above.	Same as above except measured perpendicular to grain direction.



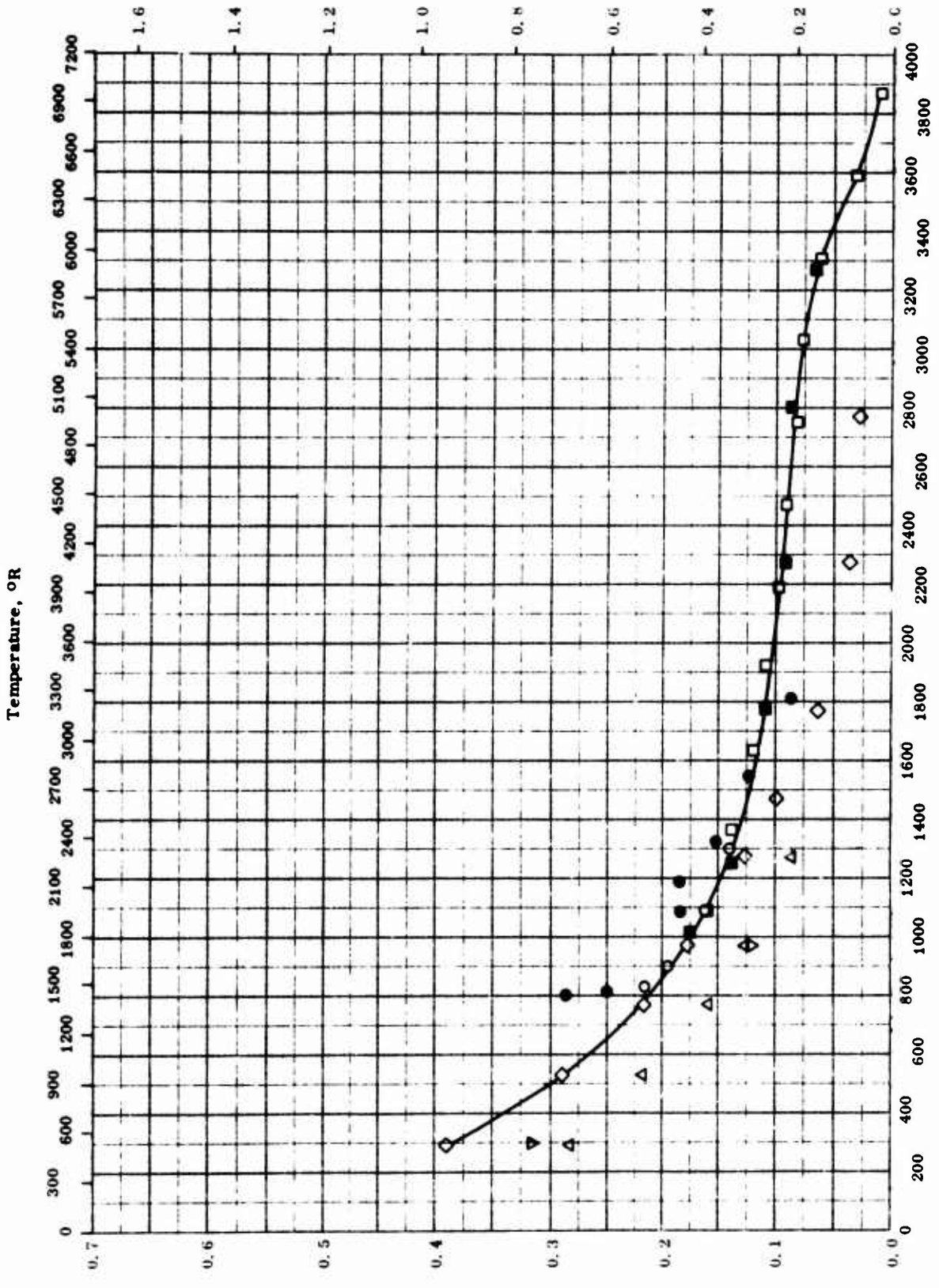
SPECIFIC HEAT -- GRAPHITE
(Grade 3474D)

SPECIFIC HEAT -- GRAPHITE
(Grade 3474D)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-13	1447-3905	±5.0	Grade 3474D; very fine - grained and uniform; density 65.0 lb ft^{-3}; multicrystalline.	Extruded.
□	56-4	811-1811		Grade 3474D; density 100.6 lb ft^{-3}.	Extruded; under helium atmosphere.

TPRC

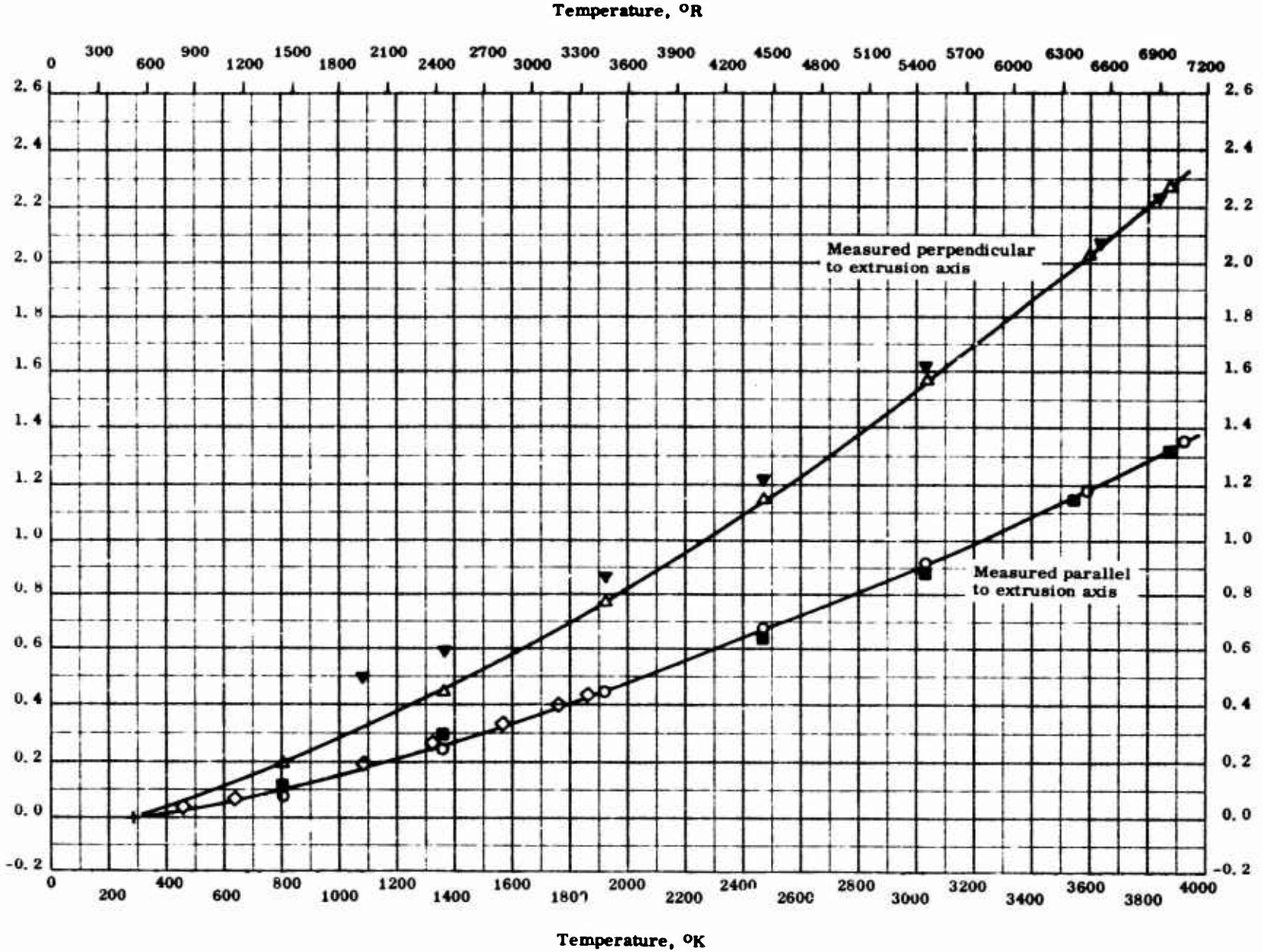


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade 3474 D)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade 3474 D)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-4	798-1809	± 5	Polycrystal; density 101 lb ft^{-3}.	Extruded; measured parallel to axis of extrusion; initial heating.
●	56-4	798-1809	± 5	Polycrystal; density 101 lb ft^{-3}.	Subsequent heating of the above specimen.
□	56-9	1089-3865	± 5- ± 8	Polycrystal; very fine grained and uniform structure; density 104 lb ft^{-3}; electrical resist. ratio of normal to that parallel to extrusion axis 1.08.	Extruded; measured perpendicular to axis of extrusion.
△	45-1	293-1273		Polycrystal.	Extruded.
◇	45-1	293-2774		Polycrystal.	Extruded.
▽	47-1	303-973		Polycrystal.	Extruded.
■	48-11	1019-3267			Extruded; measured parallel to axis of extrusion.

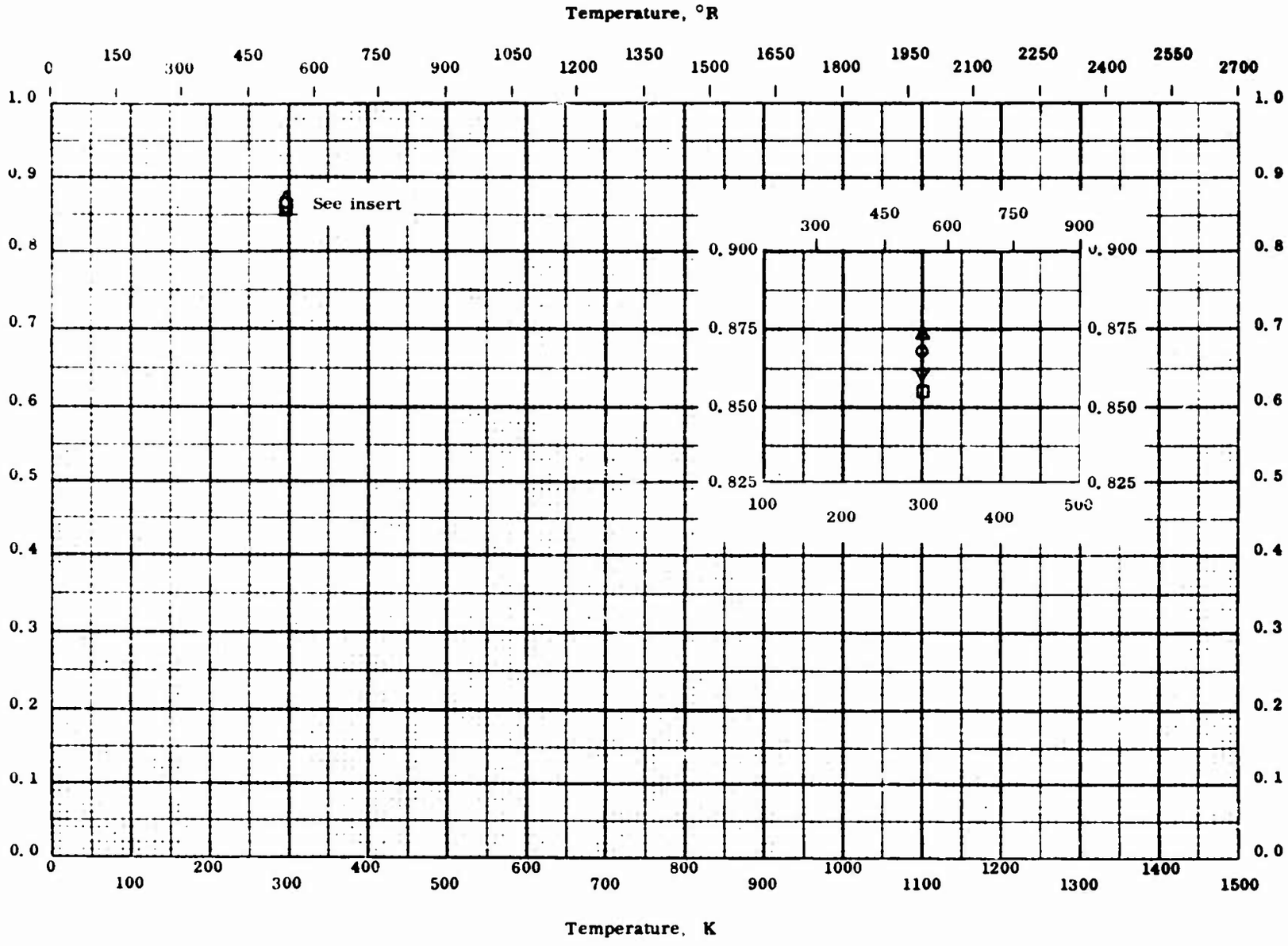


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 3474 D)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 3474 D)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-9	293-3922		Grade 3474 D graphite, National Carbon Co.; multicrystalline; very fine grained and uniform structure; density 104.2 lb ft^{-3}.	Extruded; measured parallel to axis of extrusion; heating cycle.
■	56-9	811-3922		Same as above.	Cooling cycle for above specimen.
△	56-9	293-3867		Same as above.	Extruded; measured perpendicular to axis of extrusion; heating cycle.
▼	56-9	1089-3867		Same as above.	Cooling cycle for above specimen.
◇	56-4	293-1861		Grade 3474 D graphite, National Carbon Co.; multicrystalline; density 100.6 lb ft^{-3}.	Extruded; measured parallel to axis of extrusion.

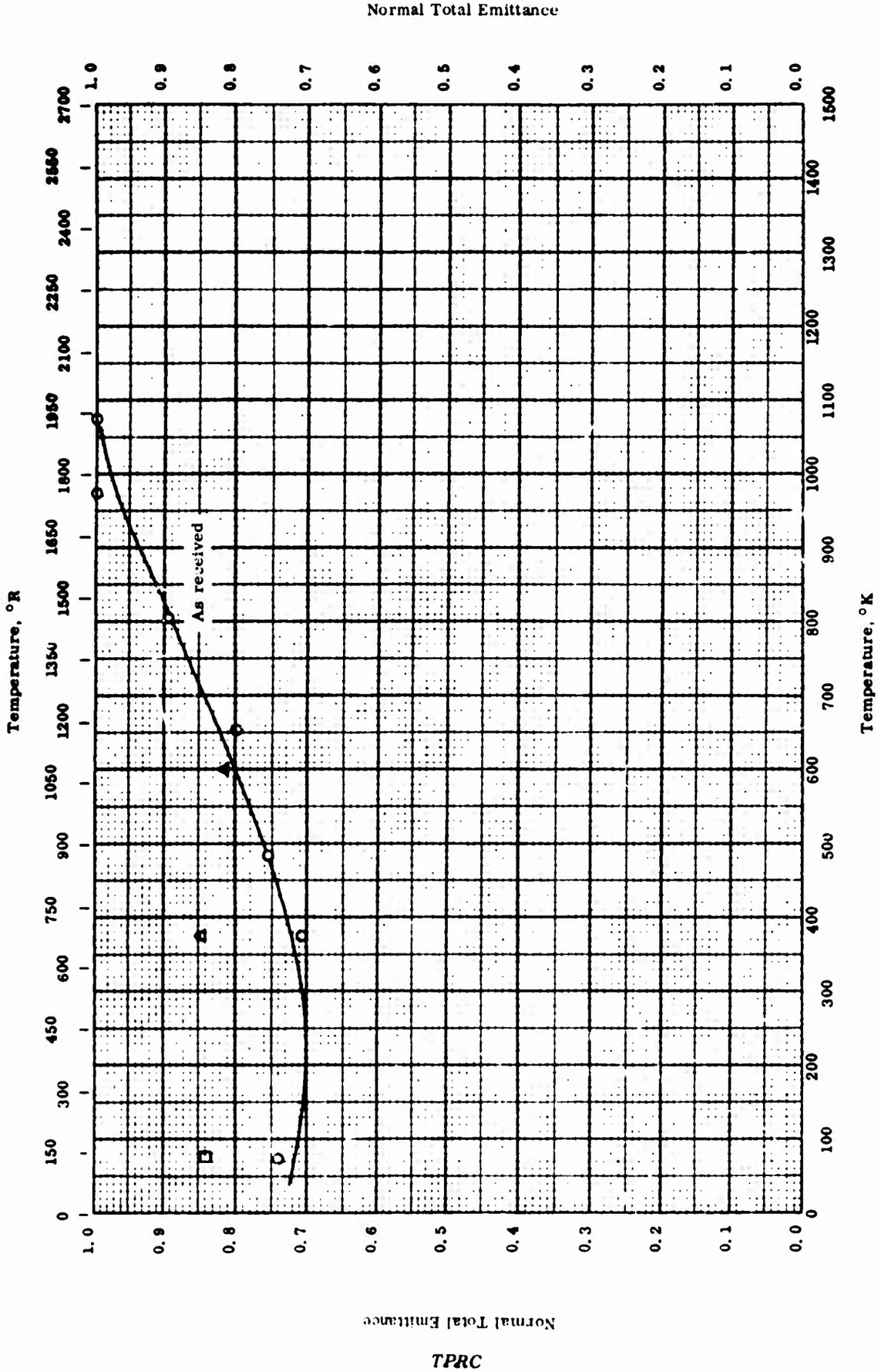


SOLAR ABSORPTANCE -- GRAPHITE
(Grade 3474D)

SOLAR ABSORPTANCE -- GRAPHITE
(Grade 3474D)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_0	Sample Specifications	Remarks
○	57-41	298		From Speer.	As received; calculated from reflectance data; above atmosphere.
△	57-41	298		Same as above.	Same as above; sea level.
□	57-41	298		Same as above.	Milled with a very fine cut; calculated from reflectance data; above atmosphere.
▽	57-41	298		Same as above.	Same as above; sea level.

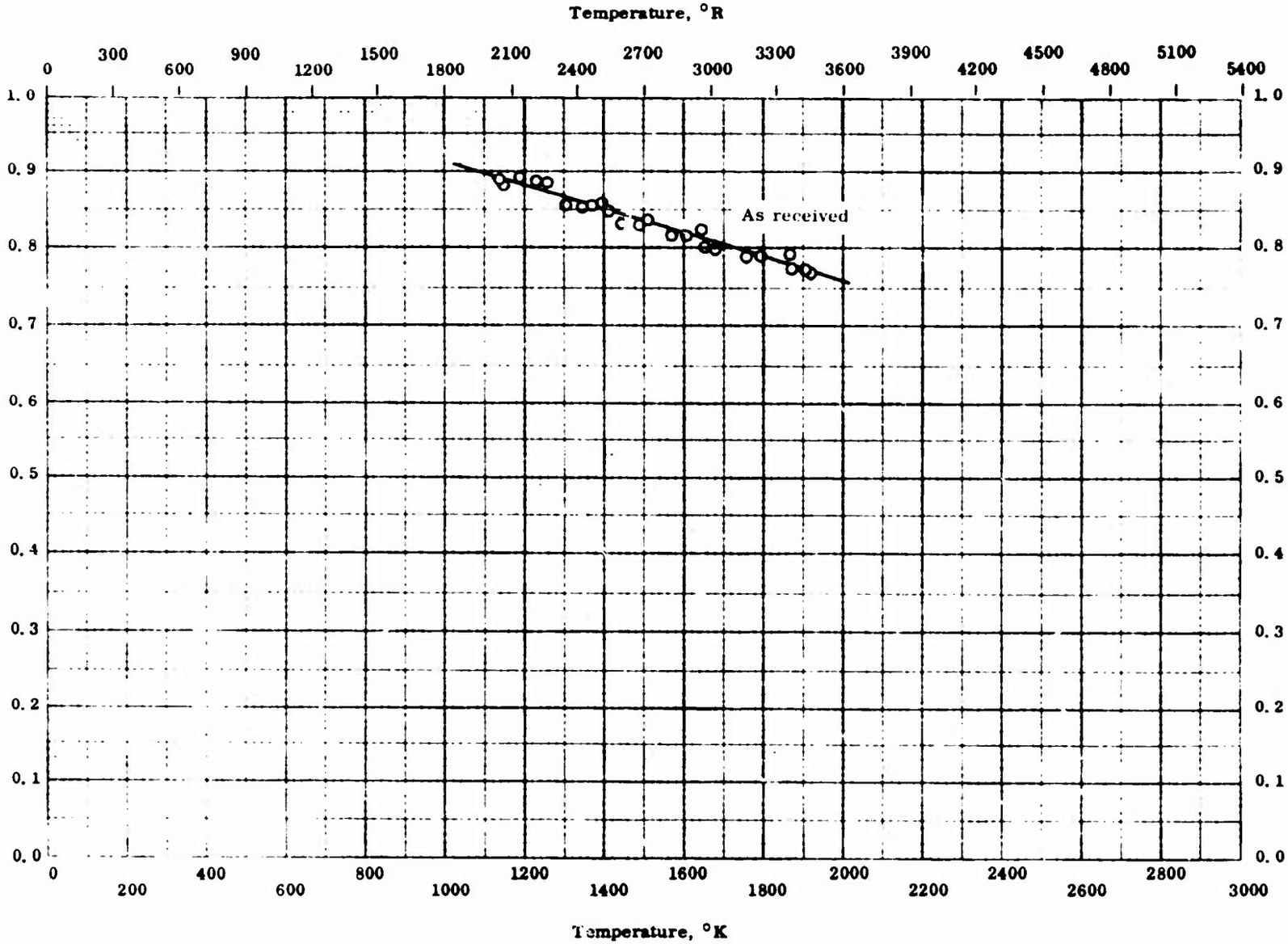


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 3474 D)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 3474D)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-21	75-1075		From Speer.	As received; measured in air; rapid oxidation above 900 K produced unrealistic emittance values; increasing temperature.
△	58-21	375-601		Same as above.	Same as above; decreasing temperature.
□	56-43	77		Same as above.	Not given.



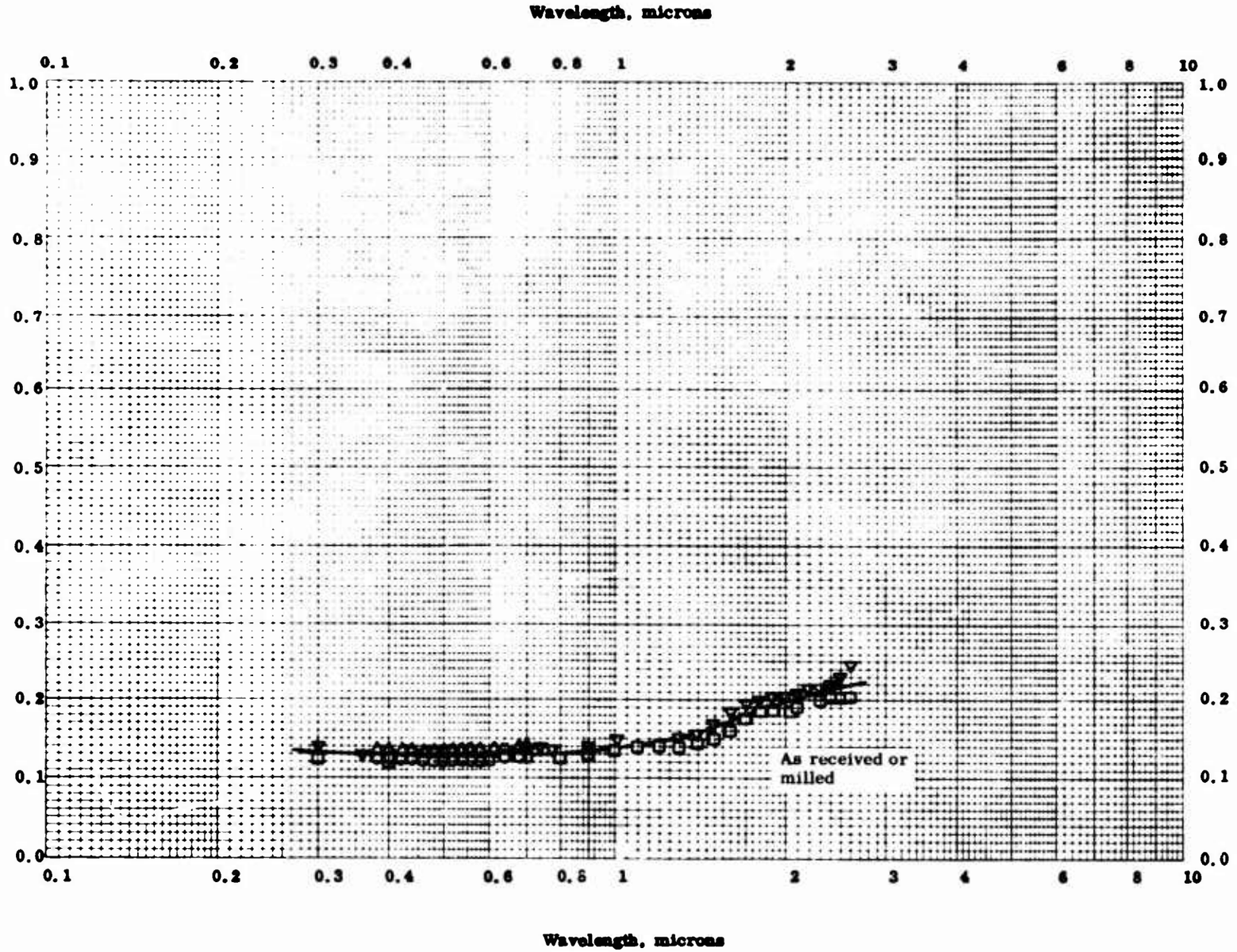
NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 3474D)

TPRC

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 3474D)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
O	57-41	0.665	1144-1922		From Speer.	As received; measured in vacuum.

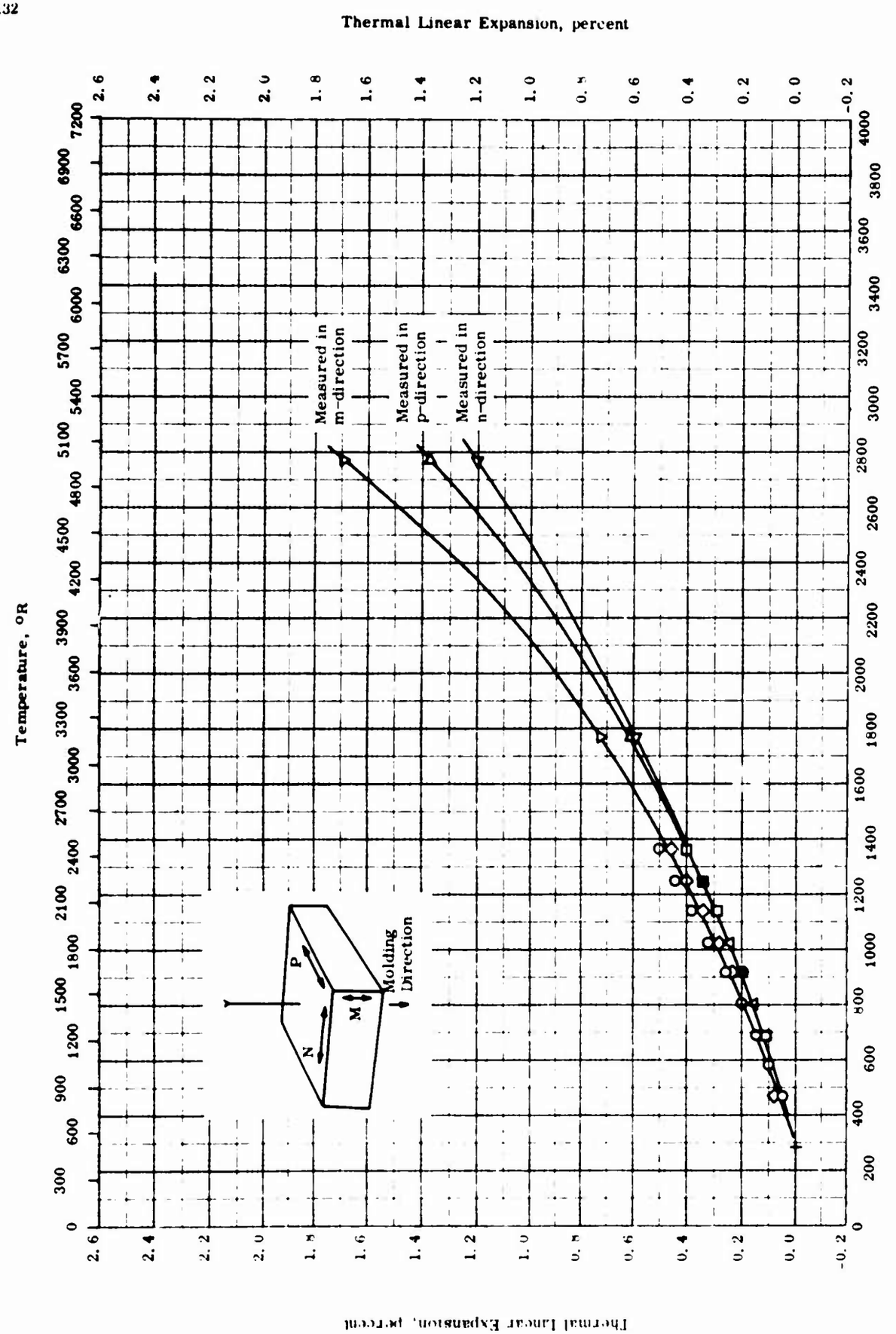


NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade 3474 D)

NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade 3474 D)

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	56-42	298	0.38-0.70		From Speer.	As received; data taken from smooth curve; 9 degrees illumination and hemispherical viewing; MgO as reference standard.
△	56-42	298	0.38-0.70		Same as above.	Same as above; milled.
□	57-41	298	0.3-2.6	±4	Same as above.	As received; data taken from smooth curve; 6-9 degrees illumination and hemispherical viewing; $MgCO_3$ as reference standard.
▽	57-41	298	0.3-2.6	±4	Same as above.	Same as above except milled with a very fine cut.

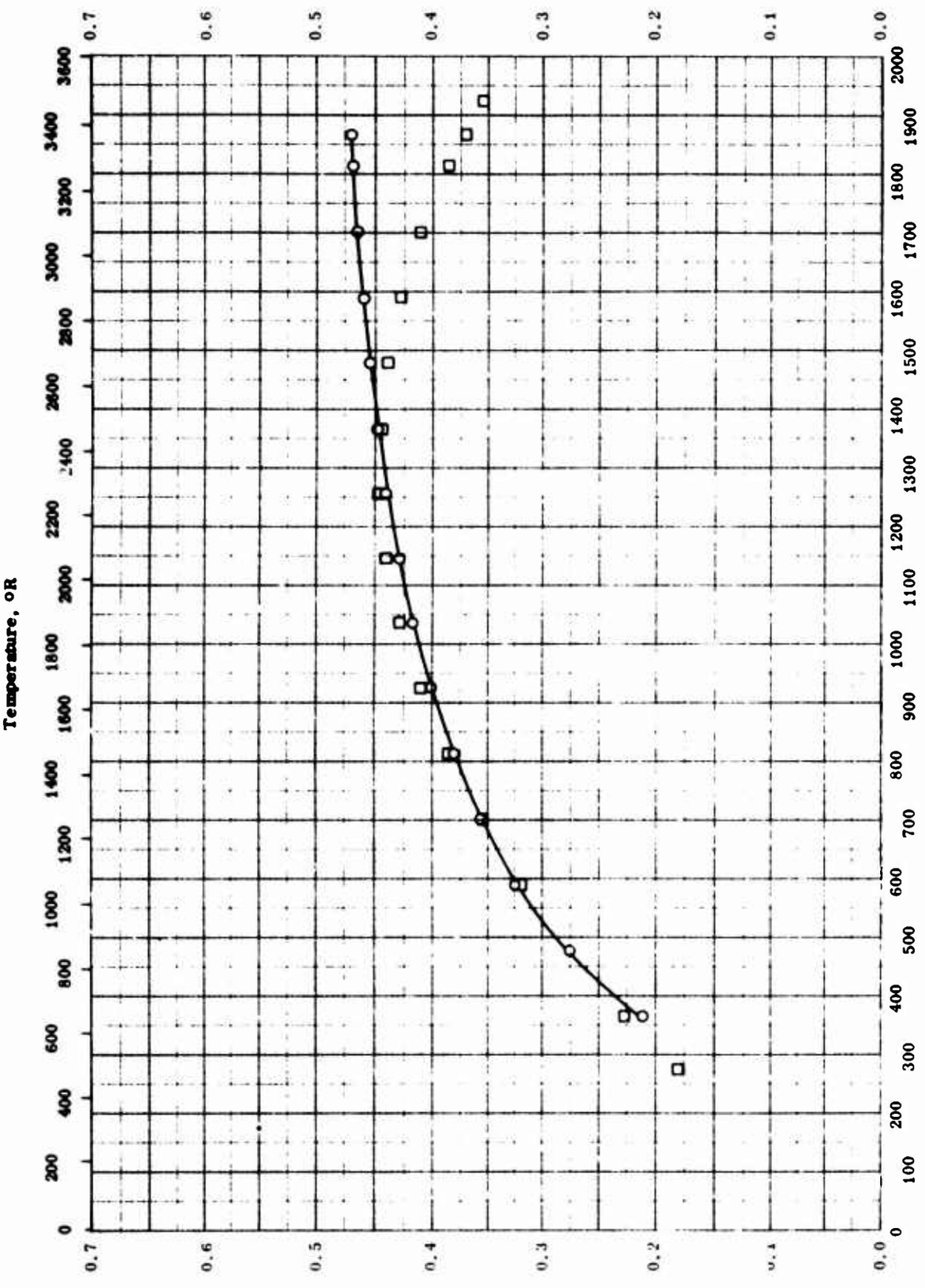


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 3499)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 3499)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range, °K	Reported Error, %	Sample Specifications	Remarks
○	59-23	300-1367		3499 graphite, Speer Carbon Co.; max filler particle size 0.005 in.; dimensions 1/4 in. in diameter and 2 in. in length. [Author's design.; block nos. 104, 105, and 107]	Specimen prepared from petroleum coke mixed with coal tar pitch, impregnated with coal tar pitch, molded in an atm of helium with a heating rate of 540 F hr^{-1}, soaked 1/2 hr at 2000 F; measured perpendicular to grain direction; average of 3 samples.
□	59-23	300-1367		Same as above.	Same as above except measured parallel to grain direction.
△	59-23	300-1367		Same as above.	Same as above.
▽	60-57	273-2773		3499 graphite, Speer Carbon Co.	Molded; non-impregnated; measured across the grain.
◁	60-57	273-2773		Same as above.	Same as above except measured along the grain.
▷	60-57	273-2773		Same as above.	Same as above.
◇	59-23	300-1367		3499 graphite, Speer Carbon Co.; max filler particle size 0.005 in.; specimen dimensions 1/4 in. diameter by 2 in. long. [Author's design.; block no. 0501]	Prepared from petroleum coke mixed with coal tar pitch, impregnated, molded, and graphitized at above 4100 F; heated in helium atm with heated rate of 540 F hr^{-1}, soaked 1/2 hr at 2000 F; measured parallel to grain direction.
●	59-23	300-1367		Same as above.	Same as above except measured perpendicular to grain direction.
■	59-23	300-1367		Same as above.	Same as above.

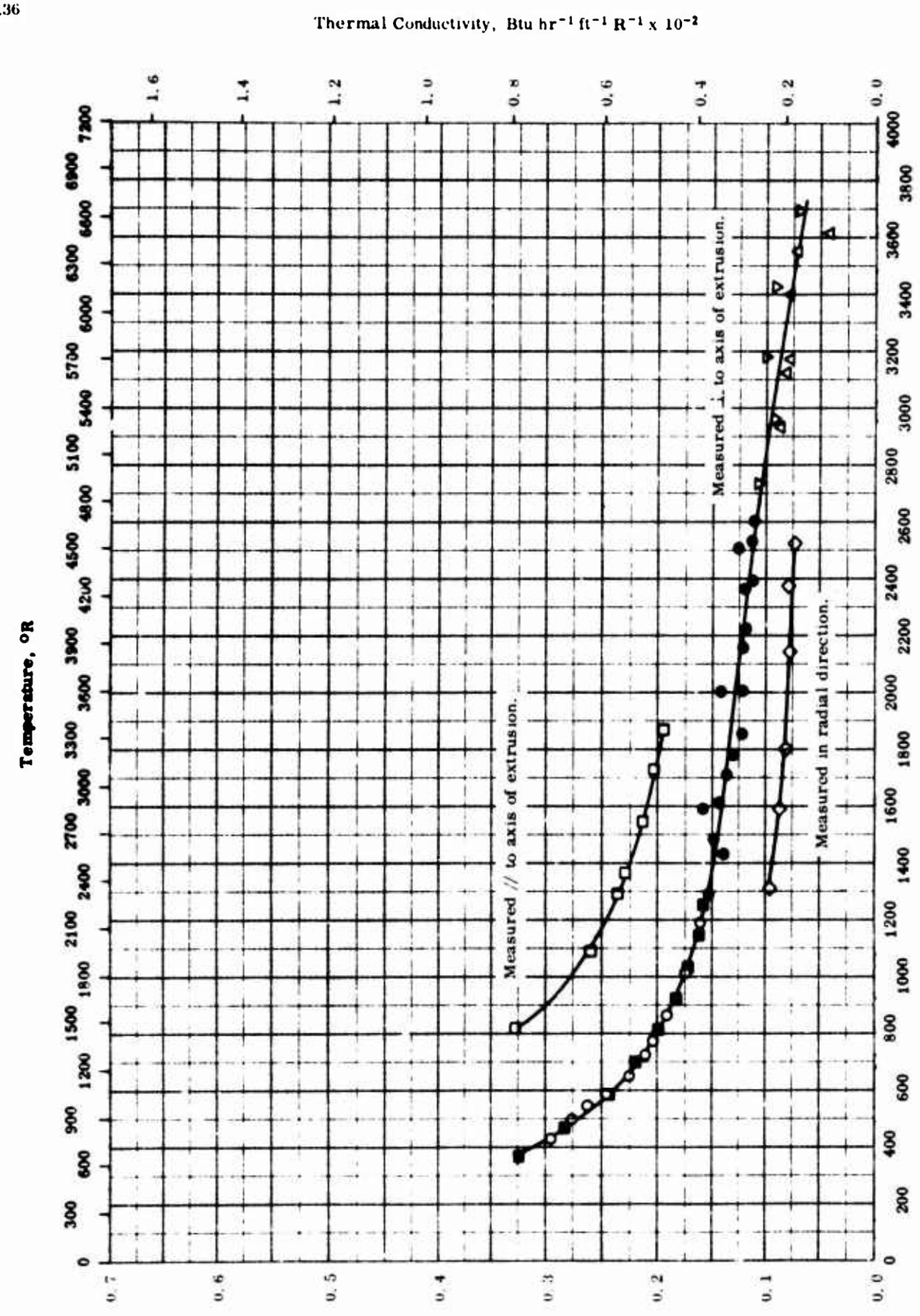


SPECIFIC HEAT -- GRAPHITE
(Grade 7087)

SPECIFIC HEAT -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-18	366-1866	±1.0	Grade 7087; density 1065 lb ft^{-3} at 75 F.	Extruded; sealed under 95% argon - 5% hydrogen
□	56-3	273-1922		Grade 7087.	Under helium atmosphere.



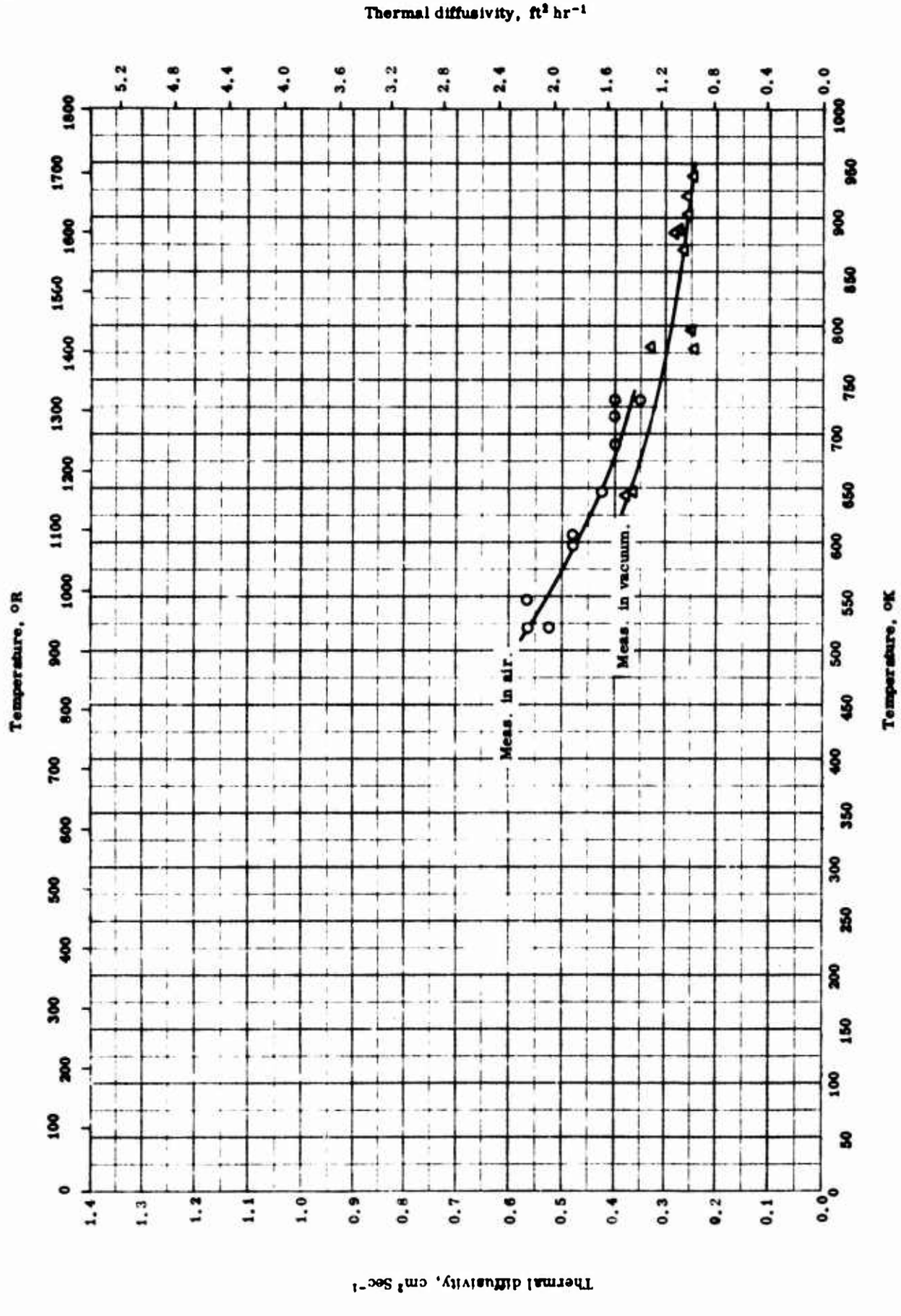
THERMAL CONDUCTIVITY -- GRAPHITE
(Grade 7087)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3	433-1182		Polycrystal; density 1.71 g cm^{-3}.	Extruded; measured perpendicular to the direction of extrusion.
□	56-6	820-1865		Polycrystal; density 106 lb ft^{-3}.	Extruded; measured parallel to the axis of extrusion.
△	56-9	2933-3705	± 5	Coarse grained with small voids and fissures; specific gravity 1.63.	Extruded; measured normal to the axis of extrusion.
▽	56-9	2733-3694	± 5	Same as above.	Same as above.
◇	56-9	1311-2522	± 5	Same as above.	Same as above except measured radially.
●	56-9	1289-2600	± 5	Same as above.	The above sample measured after prolonged heating above 4000 F.
■	60-18	367-1255		By Speer Carbon Co.; density 0.0618 lb in^{-3} at 75 F.	Extruded; measured normal to the direction of extrusion.

TPRC

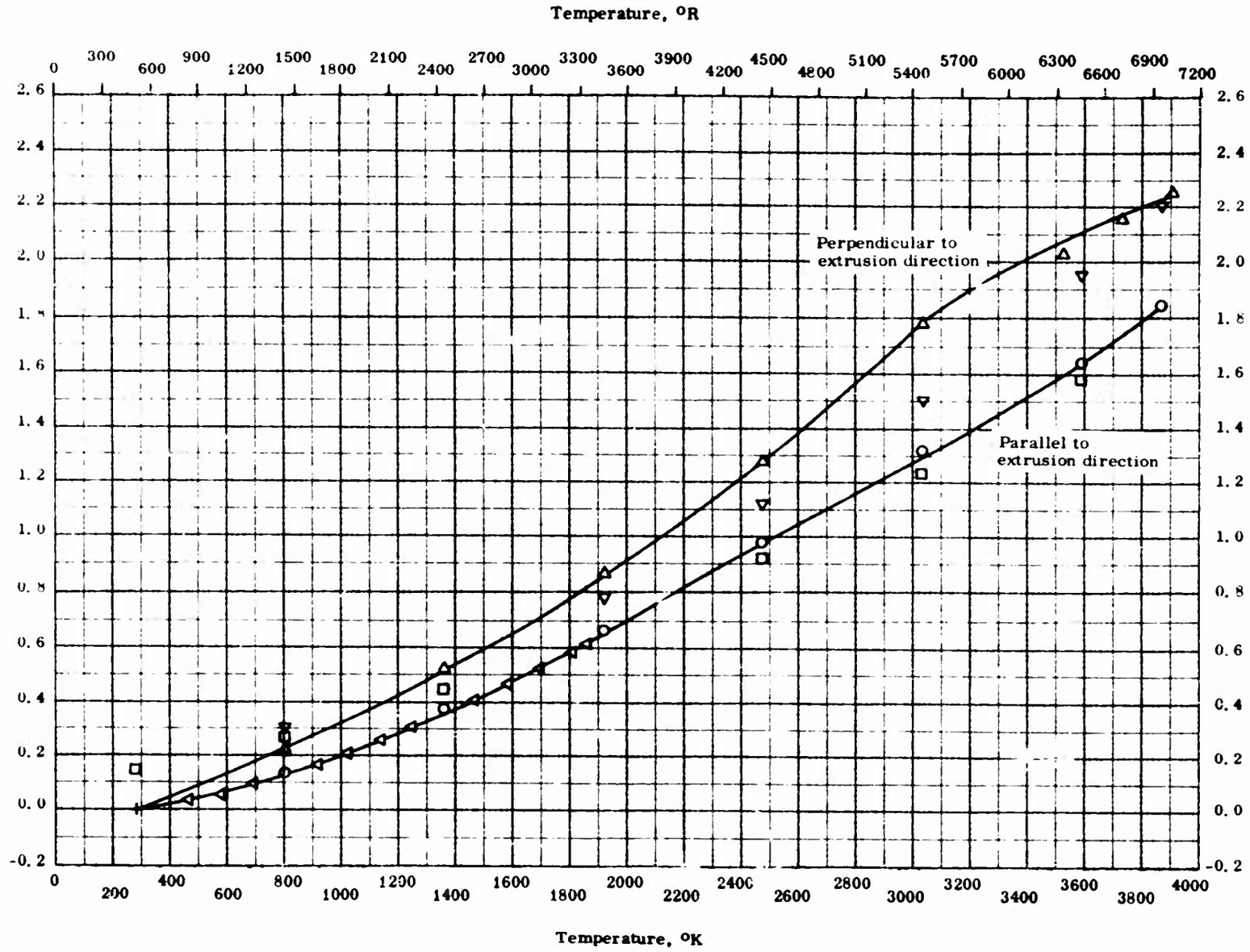


THERMAL DIFFUSIVITY -- GRAPHITES
(Grade 7087)

THERMAL DIFFUSIVITY -- GRAPHITES
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-3	520-730		1/4 in. in dia and 1/4 in. in length.	Measured in air.
Δ	62-3	643-938		Same as above.	The above specimen measured in vacuum.

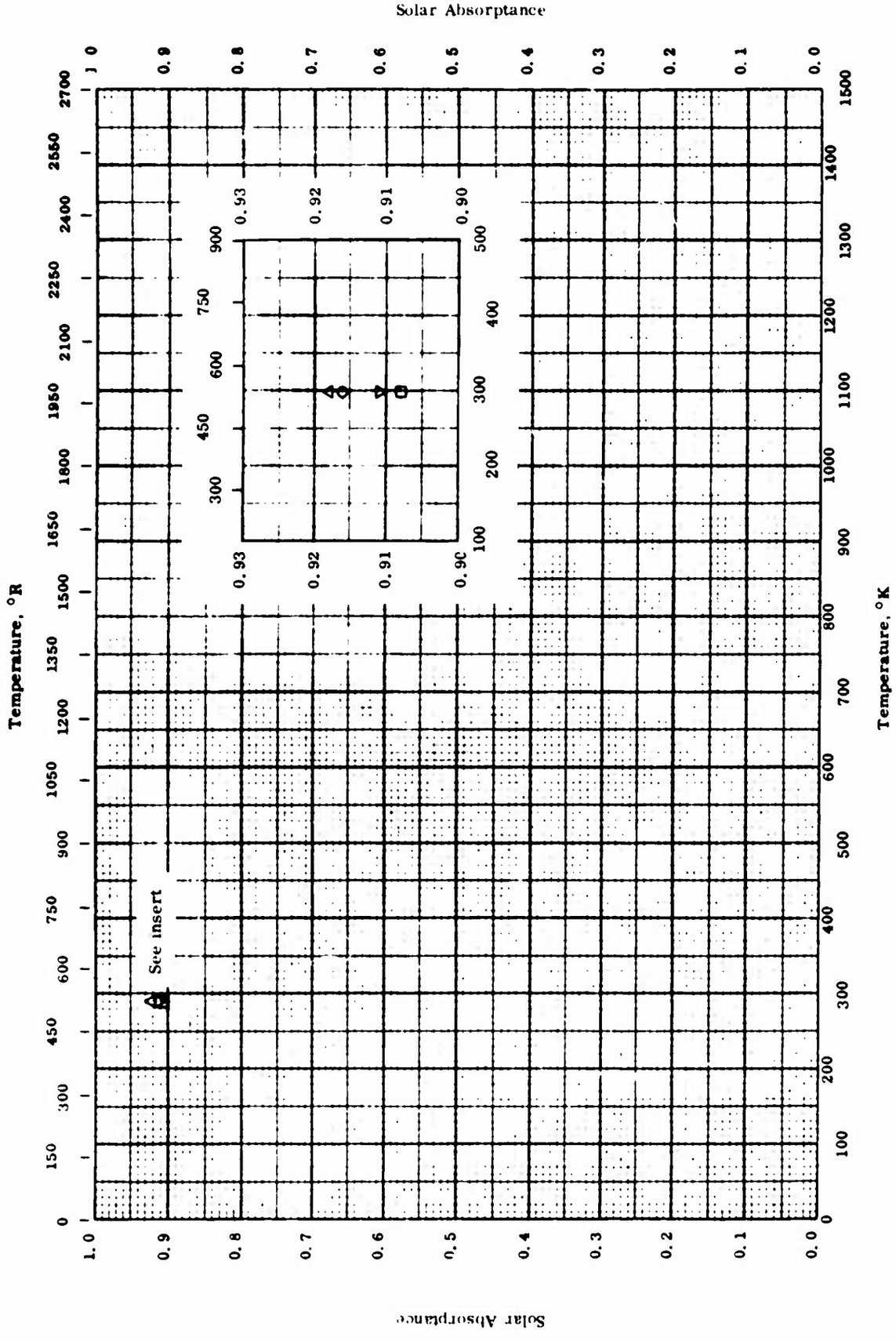


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 7087)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	56-9	293-3867		Grade 7087 graphite; multicrystalline; coarse grained with small voids; density 101.7 lb ft^{-3}; anistropy ratio 1.19.	Extruded; measured parallel to axis of extrusion; data taken during initial heating cycle.
□	56-9	293-3867		Same as above.	Same as above; data taken during first cooling and during second heating and cooling cycle.
△	56-9	293-3900		Same as above.	Extruded; measured perpendicular to axis of extrusion; heating cycle.
▽	56-9	293-3900		Same as above.	Cooling cycle for above specimen.
◁	60-18	293-1867		Grade 7087 graphite, Speer Carbon Co.; specimen dimensions 3/8 in. diameter by 3 in. long; density 0.0618 lb $in.^{-3}$ at 75 F.	Extruded; heated at a rate less than 5 F min^{-1}; measured perpendicular to direction of extrusion.

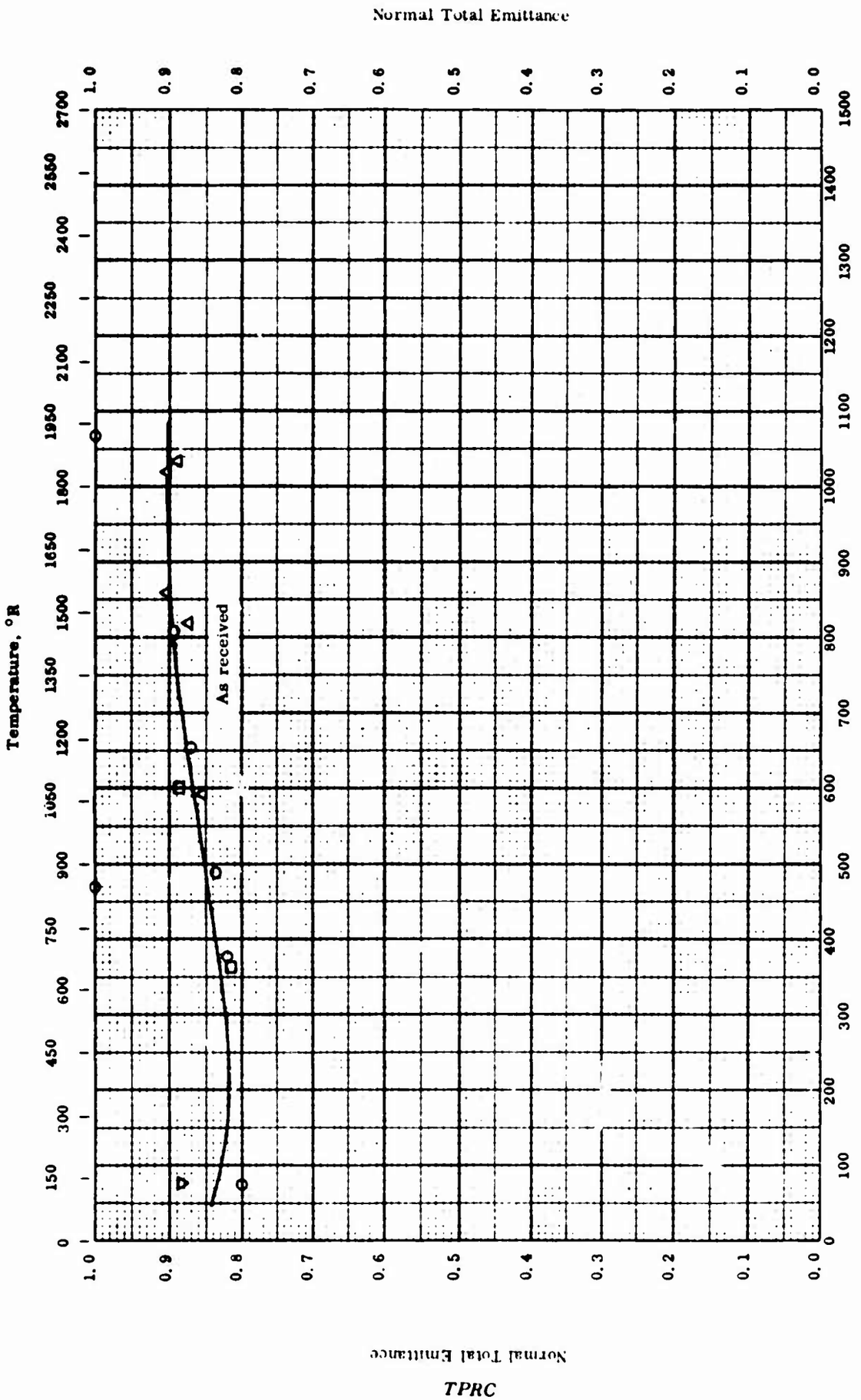


SOLAR ABSORPTANCE -- GRAPHITE
(Grade 7087)

SOLAR ABSORPTANCE -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	298		Speer 7087.	As received; calculated from reflectance data; above atmosphere.
△	57-41	298		Same as above.	Same as above; sea level.
□	57-41	298		Same as above.	Milled with a very fine cut; calculated from reflectance data; above atmosphere.
▽	57-41	298		Same as above.	Same as above; sea level.

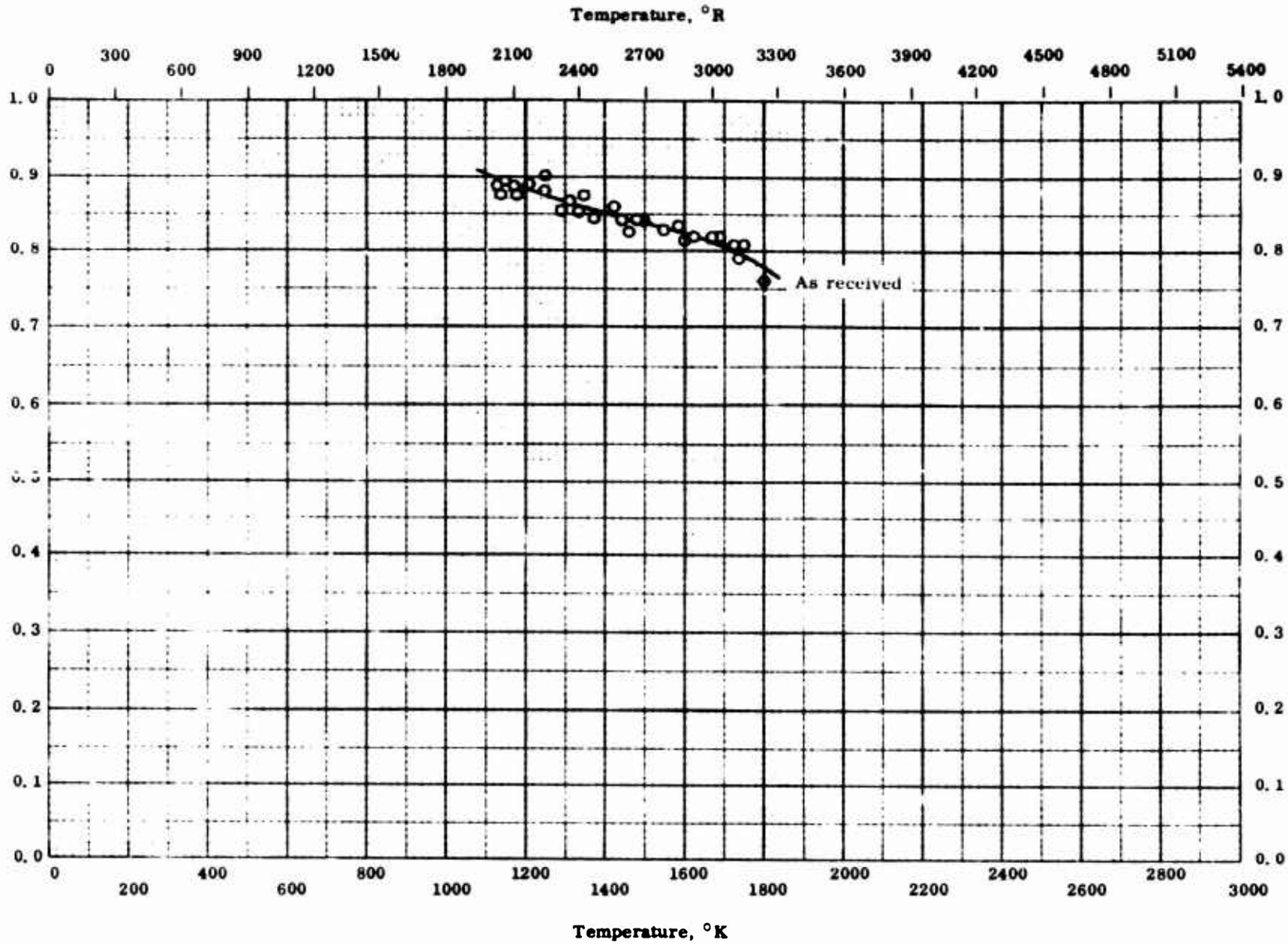


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 7087)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-21	75-1070		Speer 7087.	As received; measured in air; rapid oxidation above 900 K produced unrealistic emittance value, cycle 1 increasing temperature.
□	58-21	364-600		Same as above.	Same as above; cycle 1 decreasing temperature.
△	58-21	593-1033		Same as above.	As received; measured in nitrogen.
▽	56-43	77		Same as above.	Not given.



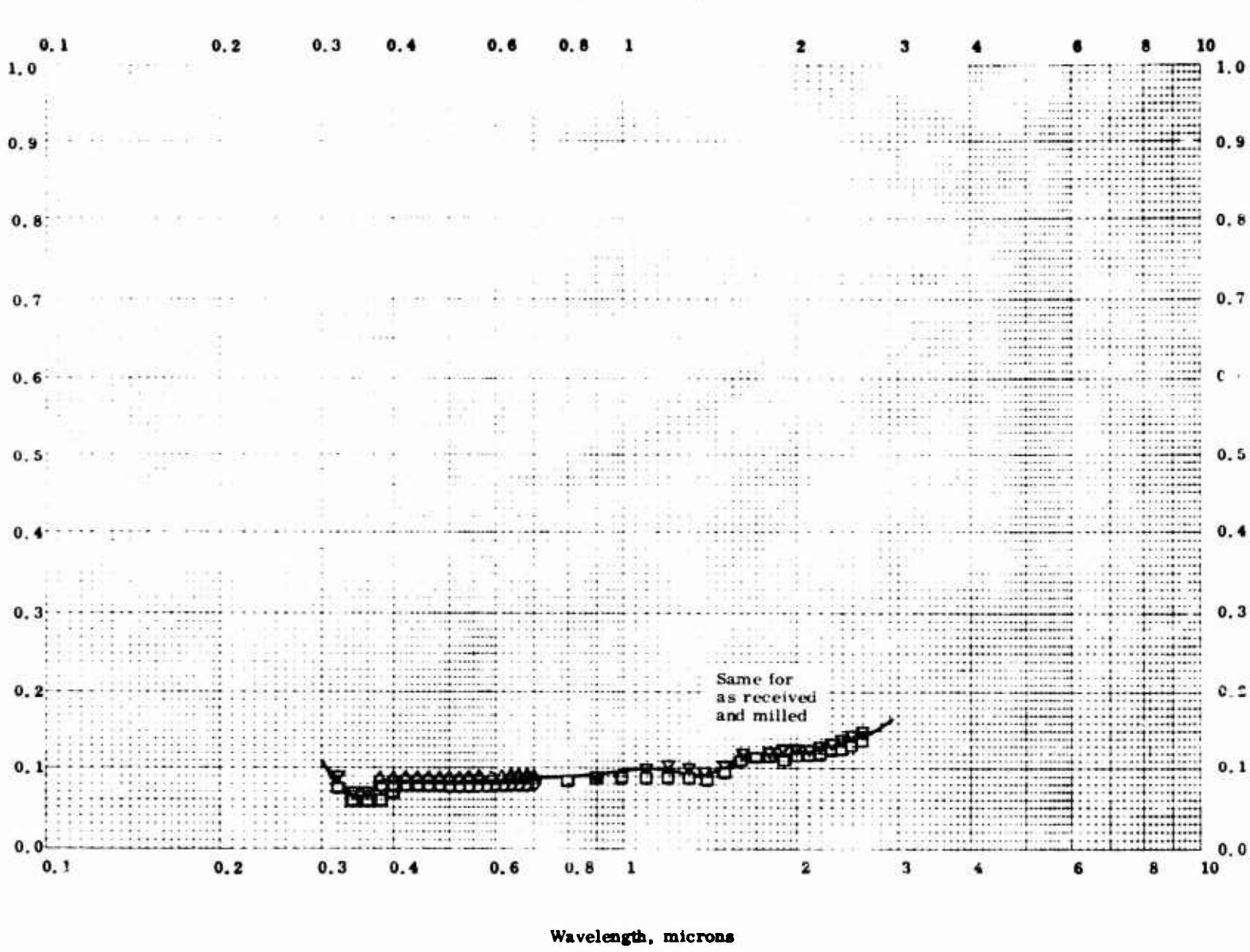
NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 7087)

Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-41	0.665	1133-1799		Speer 7087.	As received; measured in vacuum.

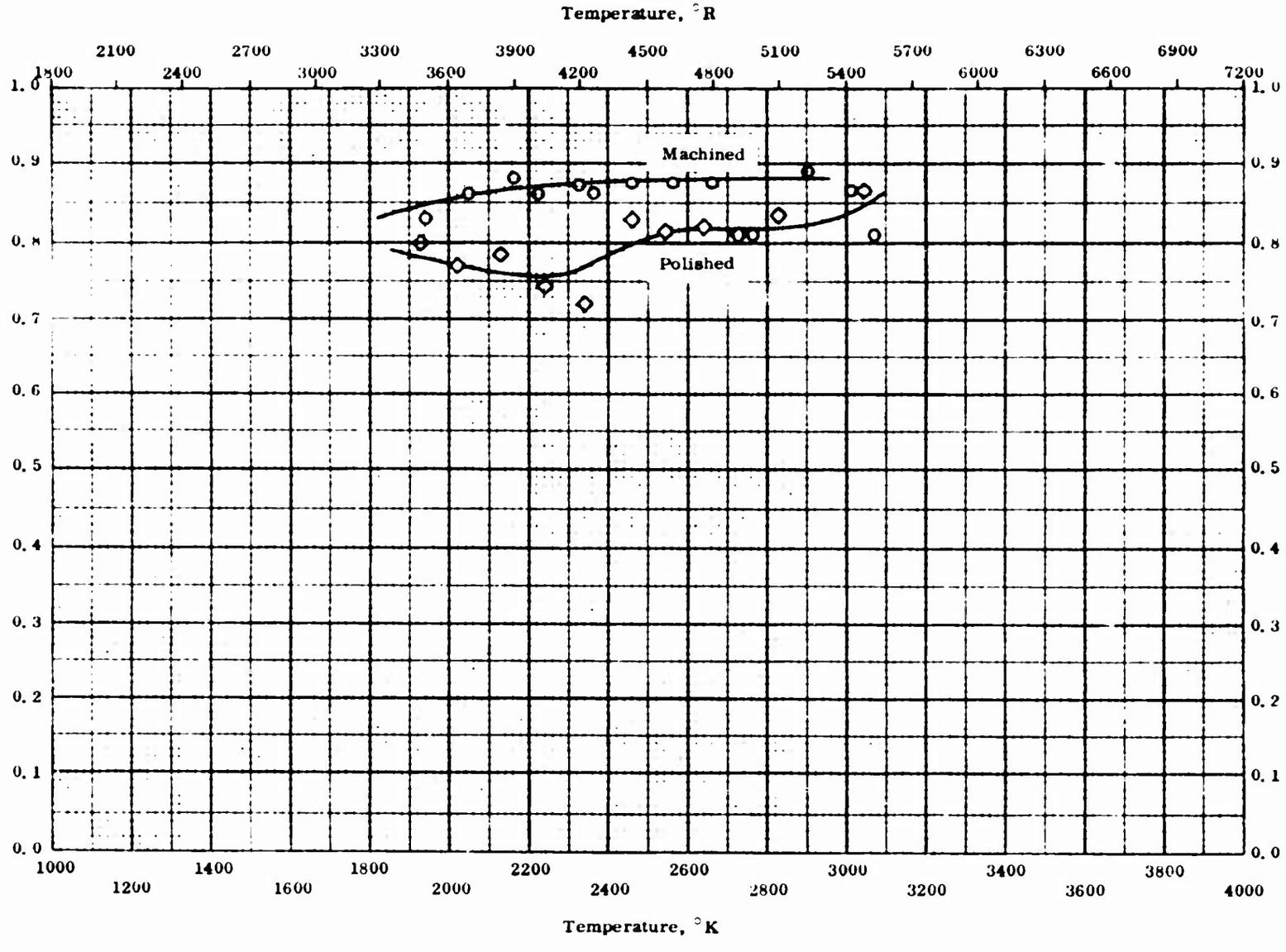


NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade 7087)

NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade 7087)

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	56-42	298	0.38-0.70		Speer 7087.	As received; data taken from smooth curve; 9 degree illumination, hemispherical viewing; MgO as reference standard.
△	56-42	298	0.38-0.70		Same as above.	Same as above; milled.
□	57-41	298	0.32-2.60	±4	Same as above.	As received; data taken from smooth curve; 6 - 9 degree illumination, hemispherical viewing; $MgCO_3$ as reference standard.
▽	57-41	298	0.32-2.60	±4	Same as above.	Same as above; milled with a very fine cut.

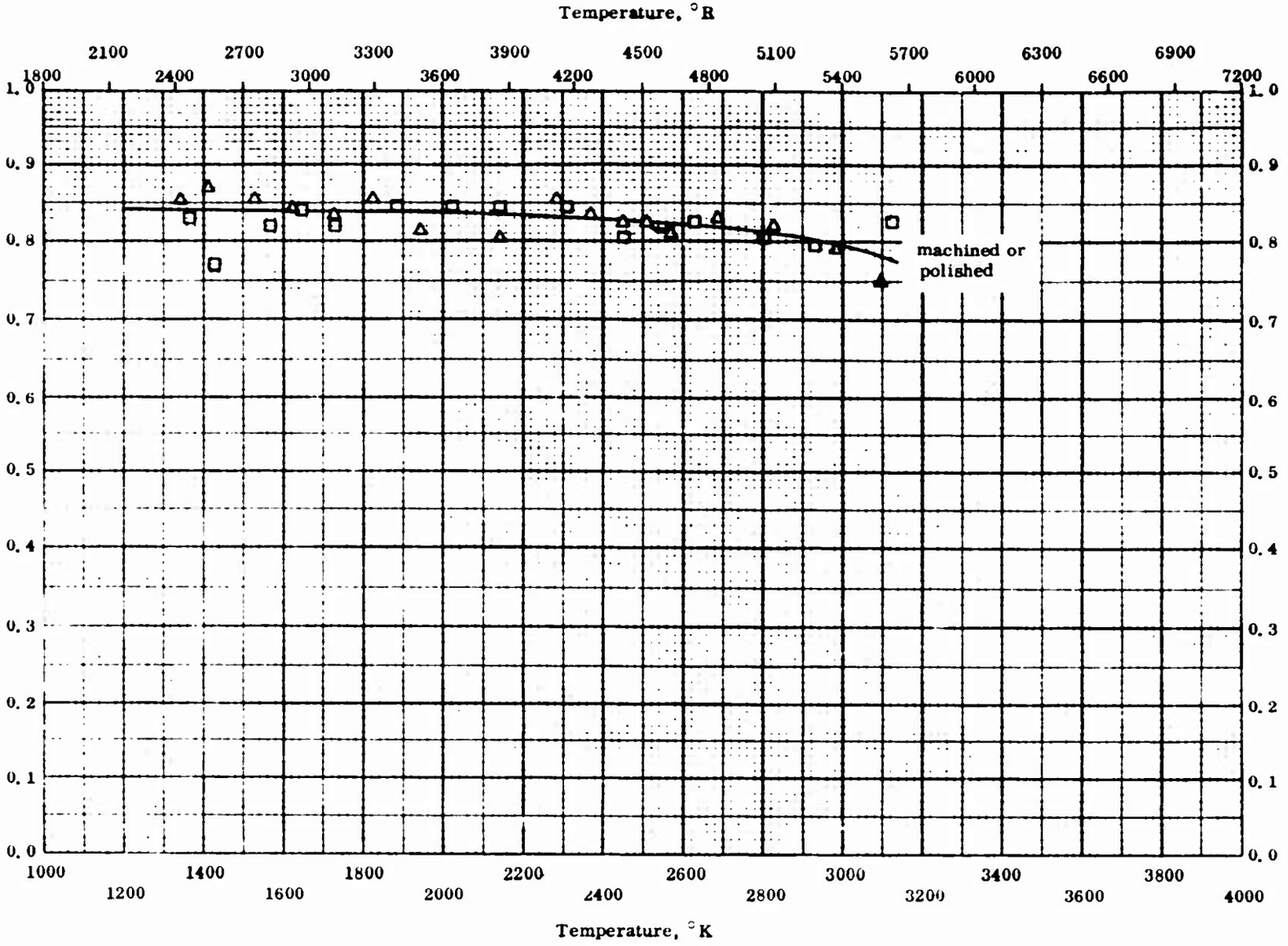


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 7100)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade 7100)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-44	1943-3073		From Speer; first sample.	Machined surface (63μ in.) and washed with alcohol and water; measured in vacuum for T < 2273 K and in argon (1 atm) for T >2273 K.
◇	62-44	1933-3043		Same as above.	Polished with emery paper and silk cloth with a liquid polish (chromic oxide compound), washed, and cleaned in water; measured in vacuum for T < 2273 K and in argon (1 atm) for T >2273 K.

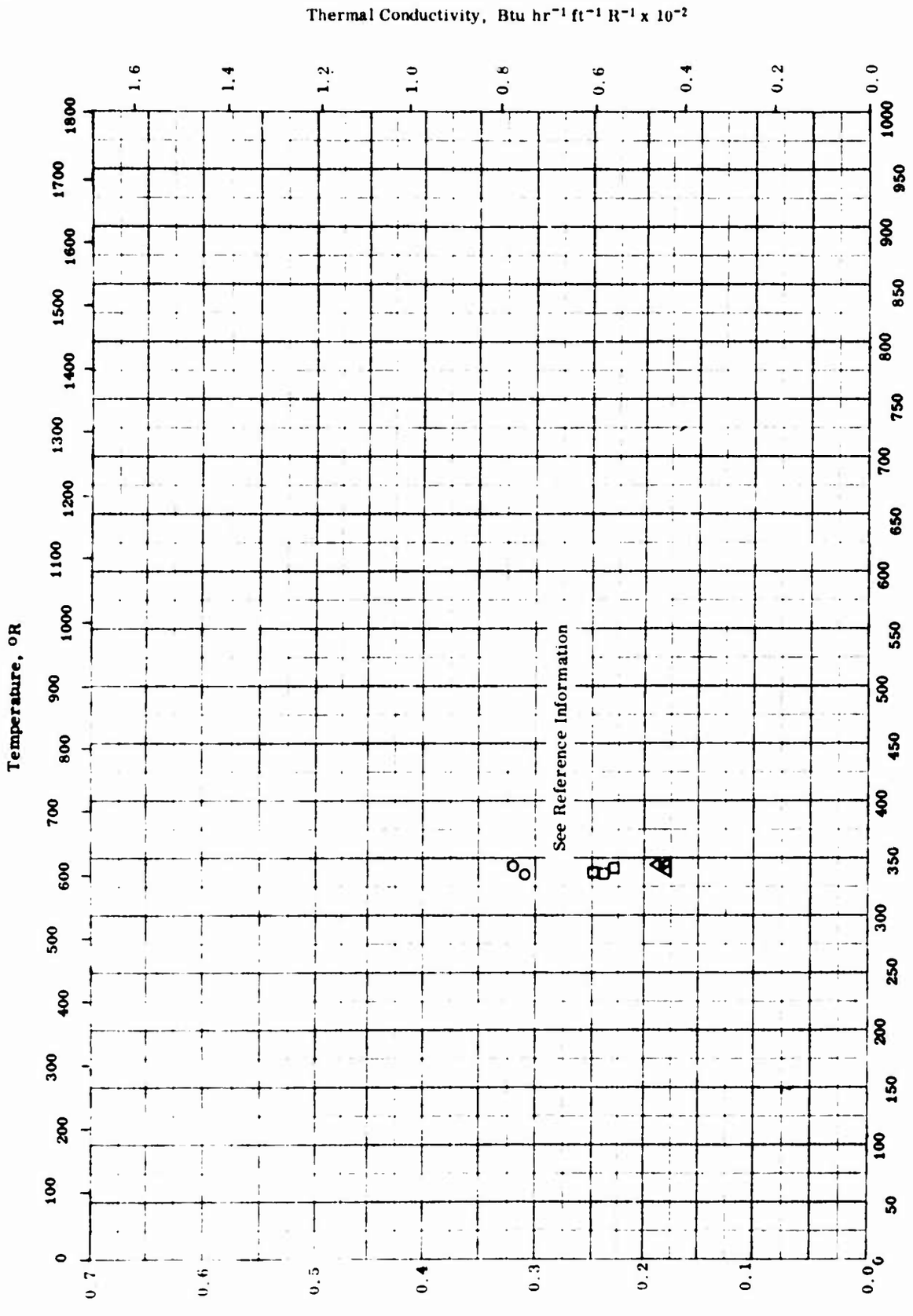


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 7100)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade 7100)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	62-44	0.65	1343-3098		From Speer; first sample.	Machined surface (63μ in.) and washed with alcohol and water; measured in vacuum for T < 2273 K, in argon (1 atm) for T >2273 K.
□	62-44	0.65	1363-3123		Same as above.	Polished with emery paper and silk cloth with a liquid polish (chromic oxide compound) and washed and cleaned in water; measured in vacuum for T < 2273 K, in argon (1 atm) for T >2273 K.

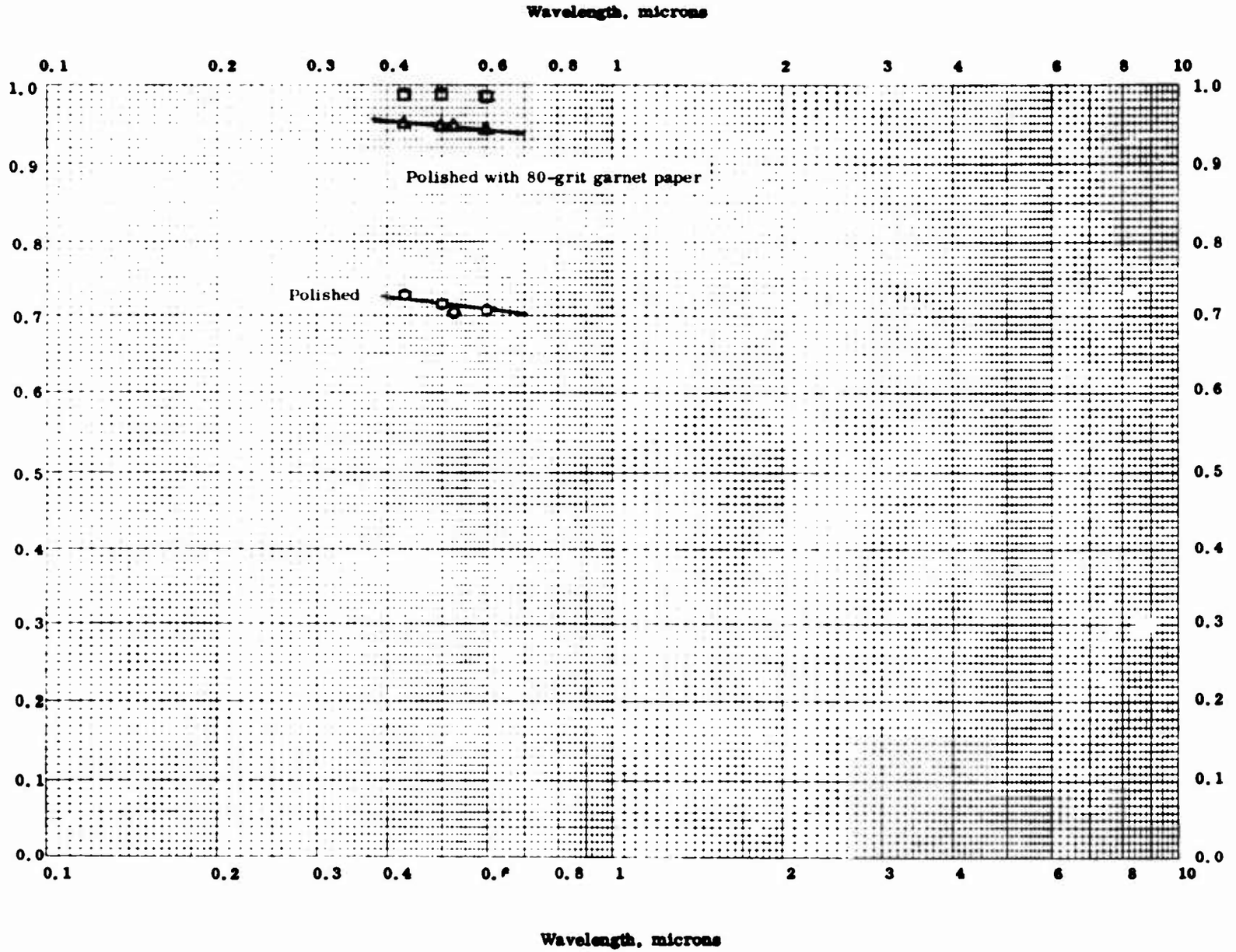


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade AGHT)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade AGHT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-1	336-344		Polycrystal.	Extruded; measured parallel to axis of extrusion.
□	49-1	336-341		Polycrystal.	Cut from a slab 48 x 12 x 4 in. in the direction parallel to 12 in. direction; measured perpendicular to axis of extrusion in 12 in. direction.
△	49-1	339-344		Polycrystal.	Same as above except cut parallel to 4 in direction; measured perpendicular to axis of extrusion in 4 in. direction.

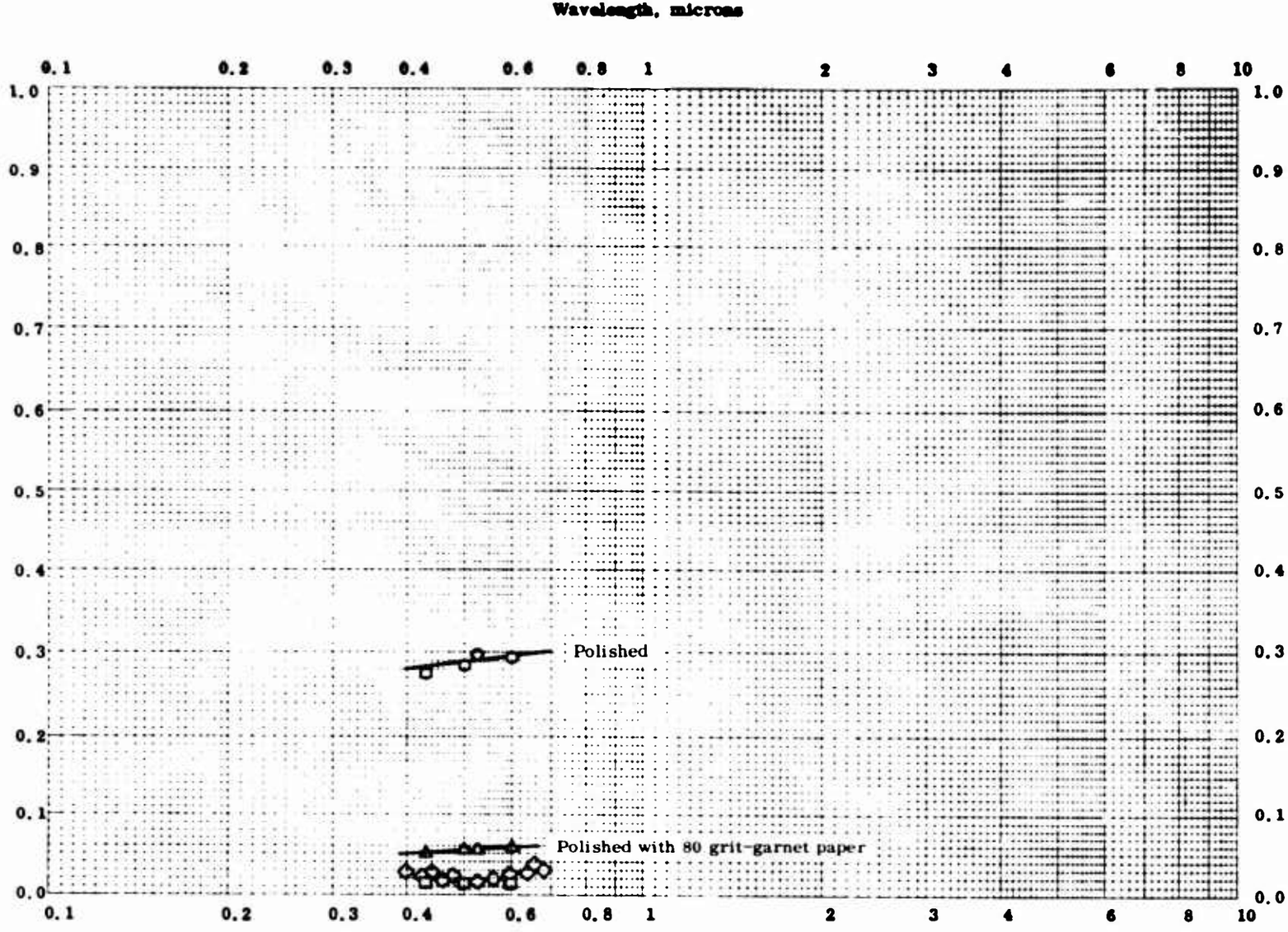


ANGULAR SPECTRAL EMITTANCE -- GRAPHITE
(Grade AGKSP)

ANGULAR SPECTRAL EMITTANCE -- GRAPHITE
(Grade AGKSP)

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	63-29	1180	0.43-0.61	±10	National special spectroscopic grade; max. ash 10 pph; density 1.61 gcc^{-1}; resistivity 0.00025 ohm in.	Final polish with partially used 4/0 Buehler emery polishing paper; measured in argon atmosphere; calculated from reflectance data; 45 degrees from normal.
△	63-29	1220	0.43-0.61	±10	Same as above.	Rubbing with fresh 80-grit garnet paper; measured in argon atmosphere; calculated from reflectance data; 45 degrees from normal.
□	63-29	3800	0.43-0.61	±0.4	Same as above.	Hot crater face of the positive electrode of an electric arc; calculated from reflectance data; 45 degrees from normal.

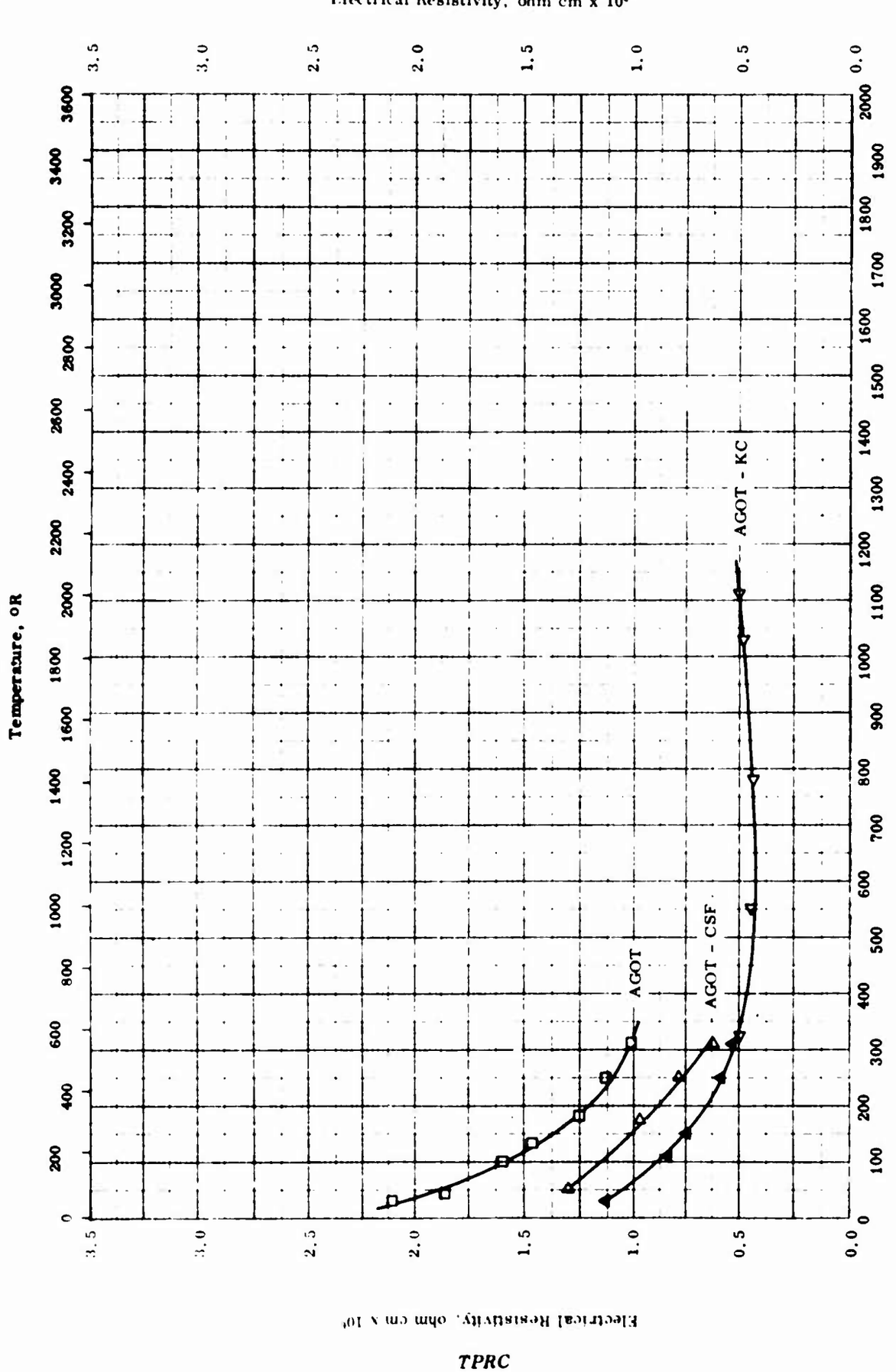


ANGULAR SPECTRAL REFLECTANCE -- GRAPHITE
(Grade AGKSP)

ANGULAR SPECTRAL REFLECTANCE -- GRAPHITE
(Grade AGKSP)

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Repr. Error %	Sample Specifications	Remarks
○	63-29	1180	0.43-0.61	±10	National special spectroscopic grade; max. ash 0.0010; density 1.61 gcc^{-1}; resistivity 0.00025 ohm in.	Final polish with partially used 4/0 Buehler emery polishing paper; measured in argon atmosphere; MgO as reference standard; hemispherical illumination, 45 degree viewing.
△	63-29	122^	0.43-0.61	±10	Same as above.	Rubbing with fresh 80-grit garnet paper; measured in argon atmosphere; MgO as reference standard; hemispherical illumination, 45 degree viewing.
□	63-29	3800	0.43-0.61	±33	Same as above.	Hot crater face of the positive electrode of an electric arc; MgO as a reference standard; hemispherical illumination, 45 degree viewing.
◇	60-39	550	0.42-0.68	±15	Not given.	Crater; MgO as reference standard; 45 degrees from optical axis.

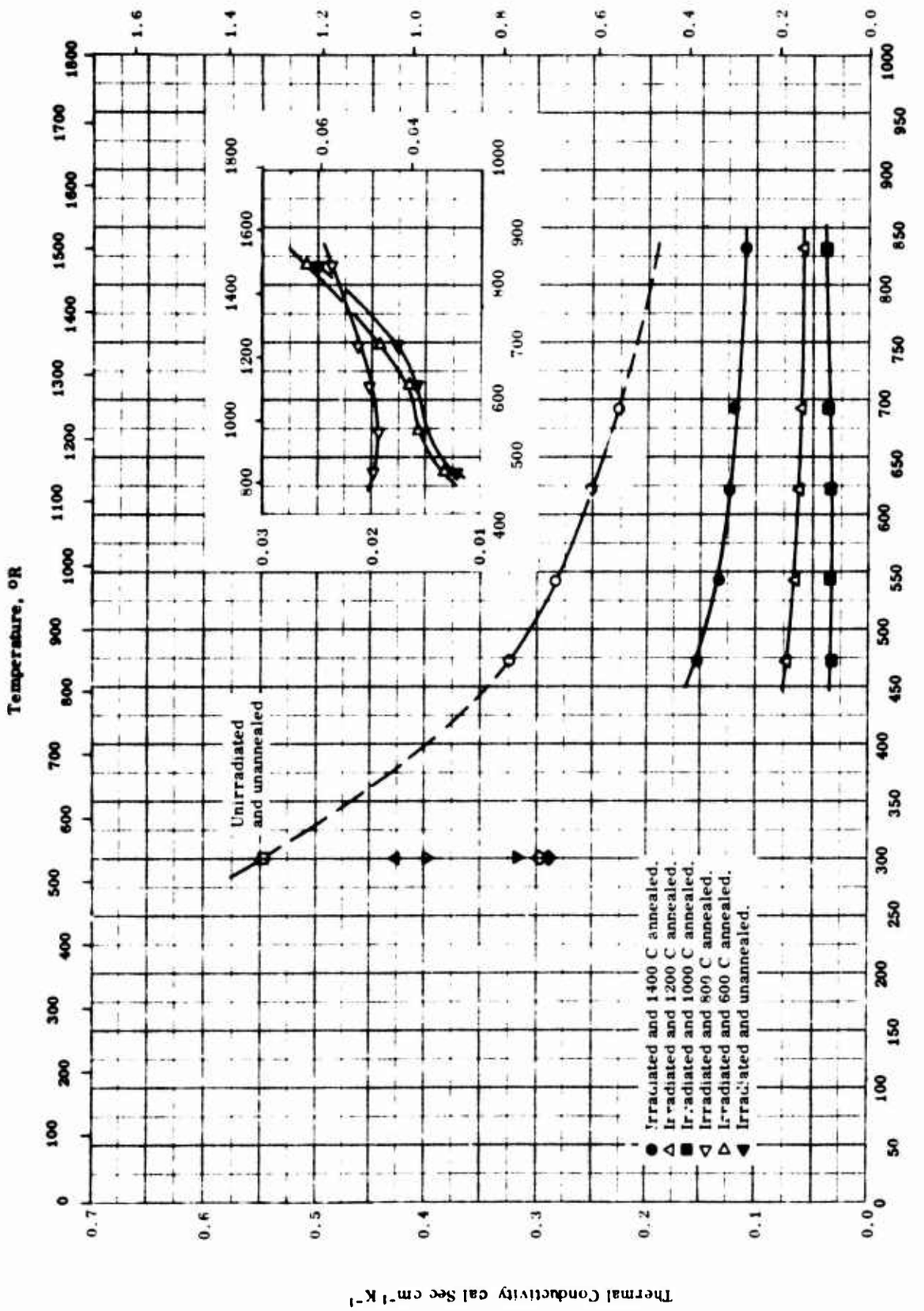


ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade AGOT)

ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade AGOT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	53-27	31-300	±2	From National Carbon.	Extruded; sample axis perpendicular to preferred co-axis orientation.
▲	54-26	10-320		AGOT KC; density 103 lb ft^{-3}.	Extruded.
▷	57-29	80-300		AGOT - CSF.	Measured perpendicular to extrusion axis.
◁	47-3	321-1122		AGOT - Kendall graphite.	Extruded, relative data.



THERMAL CONDUCTIVITY -- GRAPHITE
(Grade AGOT)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade AGOT)

REFERENCE INFORMATION

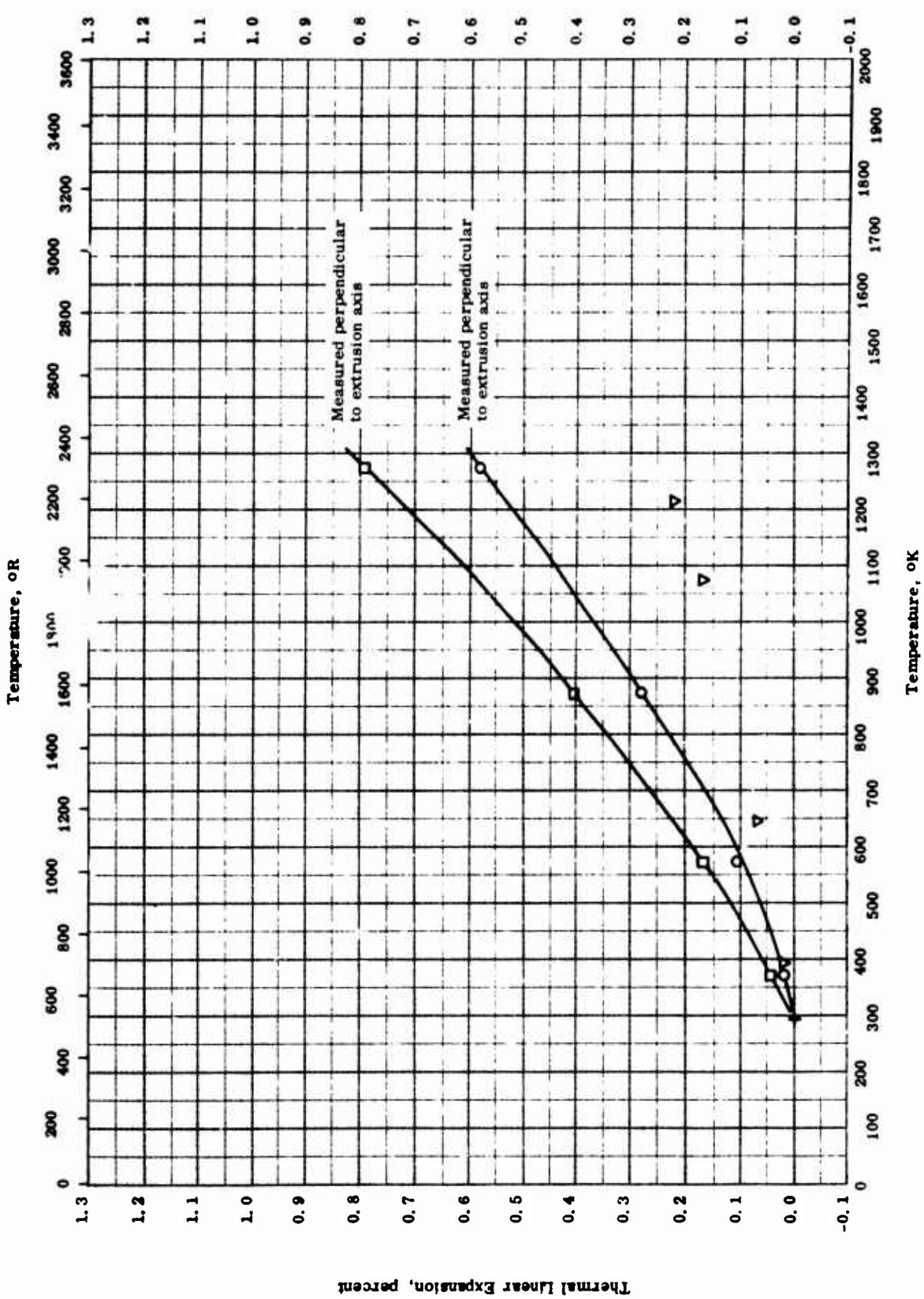
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	56-18	298		AGOT - K; 0.0373 ash, ≈0.0320 H_2, 0.0212 CaO, ≈0.0175 S, 0.0025 Fe_2O_3, 0.0021 TiO_2, 0.0014 V_2O_5, and 0.000048 B; polycrystal with density 107 lb ft^{-3}; made from Kendall coke and Barrett No. 30 pitch.	Extruded; measured parallel to axis of extrusion.
◆	56-18	298		Same as above.	Extruded; measured perpendicular to axis of extrusion.
▽	56-18	298		AGOT - W; 0.084 ash, 0.0369 CaO, 0.0254 V_2O_5, 0.0020 TiO_2, 0.0017 Fe_2O_3, 0.000066 B; polycrystal with density 99.8 lb ft^{-3}; made from Whiting coke and Barrett No. 30 pitch.	Extruded; measured parallel to axis of extrusion.
◇	56-18	298		Same as above.	Extruded; measured perpendicular to axis of extrusion.
▲	56-18	298		AGOT - C; 0.0481 ash, 0.0247 CaO, 0.0048 V_2O_5, 0.0034 TiO_2, 0.0015 Fe_2O_3, and 0.000056 B; polycrystal with density 100 lb ft^{-3}; made from Gulf Cleaves coke and Barrett No. 30 pitch.	Extruded; measured parallel to axis of extrusion.
▼	47-2	298		Same as above.	Extruded; measured perpendicular to axis of extrusion.
◀	61-29	473-833		AGOT.	Irradiated at approx. 1700 M wd/CT over 10 years period.
▷	61-29	473-833		AGOT.	Same as above; annealed for 1 hr at 600 C.
◁	61-29	473-833		AGOT. (continued onto next page)	Same as above; annealed for 1 hr at 800 C.

TPRC

THERMAL CONDUCTIVITY -- GRAPHITE (continued)
(Grade AGOT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
■	61-29	473-833		AGOT.	Same as above; annealed for 1 hr at 1000 C.
△	61-29	473-833		AGOT.	Same as above; annealed for 1 hr at 1200 C.
●	61-29	473-833		AGOT.	Same as above; annealed for 1 hr at 1400 C.
○	61-29	473-833		AGOT.	Unirradiated and unannealed.



THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade AGOT)

Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade AGOT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▽	43-4	393-1213		Grade AGOT graphite; multicrystalline.	Extruded; measured parallel to long axis of block.
○	60-58	294-1272		Grade AGOT graphite; density 1.6 g cm^{-3}.	Measured parallel to extrusion axis.
□	60-58	294-1272		Same as above.	Measured perpendicular to extrusion axis.

TPRC

Thermal Linear Expansion, percent

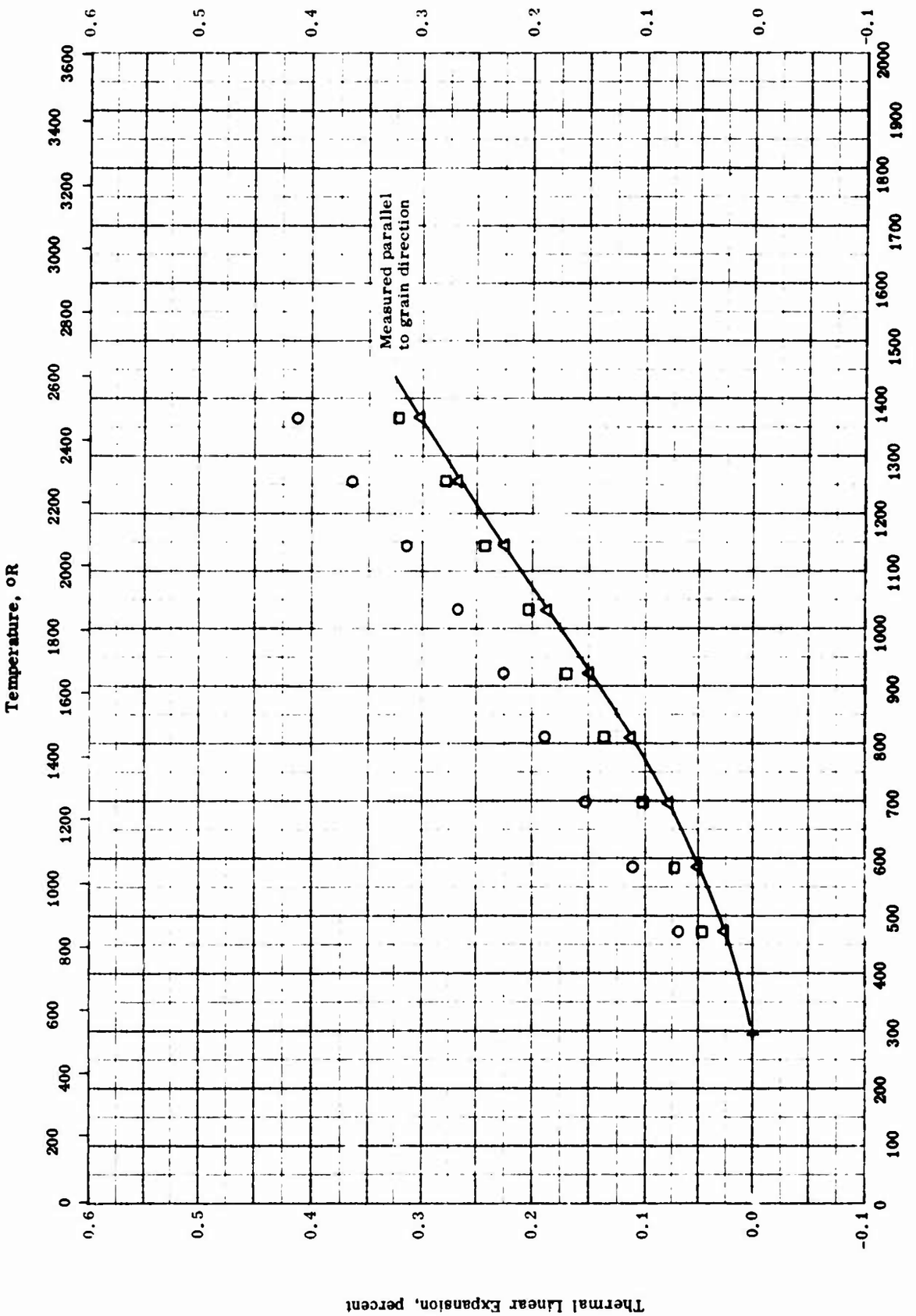
THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade AGR)

Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade AGR)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-23	300-1367		Grade AGR graphite, National Carbon Co.; max filler particle size 0.025 in.; dimensions 1/4 in. in diameter and 2 in. long. [Author's design: block no. 0401]	Specimen prepared from petroleum coke and coal tar pitch mixed together, extruded, and graphitized at 5000 F; heated in an atm of helium with a heating rate of 540 F hr^{-1} and soaked 1 hr at 2000 F; measured parallel to grain direction.
□	59-23	300-1367		Same as above.	Same as above except measured perpendicular to grain direction.
△	59-23	300-1367		Same as above.	Same as above.

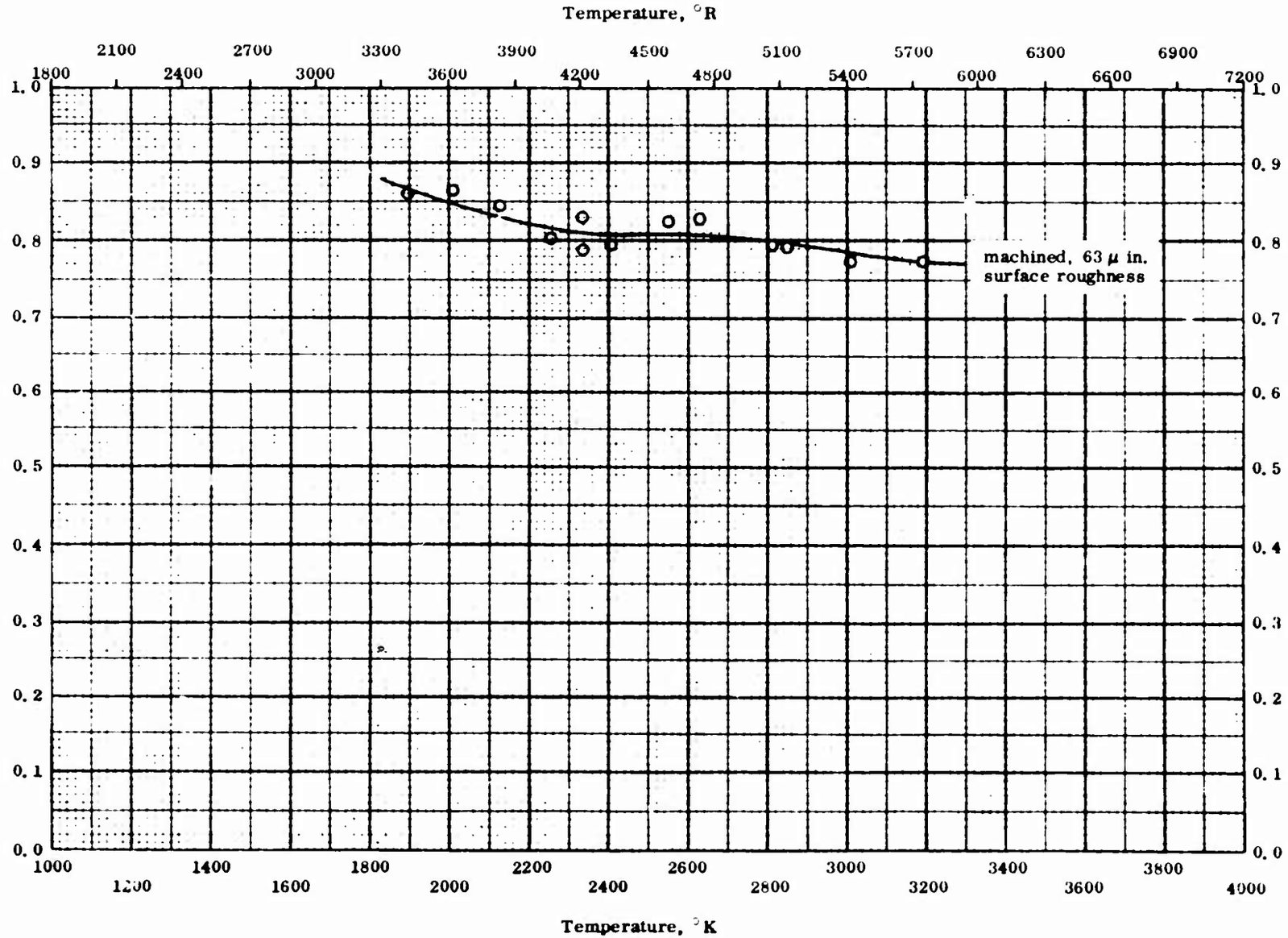


THERMAL LINEAR EXPANSION — GRAPHITE
(Grade AGX)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade AGX)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	59-23	300-1367		Grade AGX graphite, National Carbon Co.; dimensions 1/4 in. in diameter and 2 in. long. [Author's design; block no. 1101, sample 1]	Specimen prepared from coke pitch, extruded, and graphitized at 5000 F; specimen heated in helium atm with a heating rate of 540 F hr^{-1} and soaked 1/2 hr at 2000 F; measured parallel to grain direction; average of 6 runs.
□	59-23	300-1367		Same as above. [Author's design; block no. 1101, sample 2]	Same as above.
△	59-23	300-1367		Same as above. [Author's design; block no. 1101, sample 3]	Same as above except averaged from 15 runs.

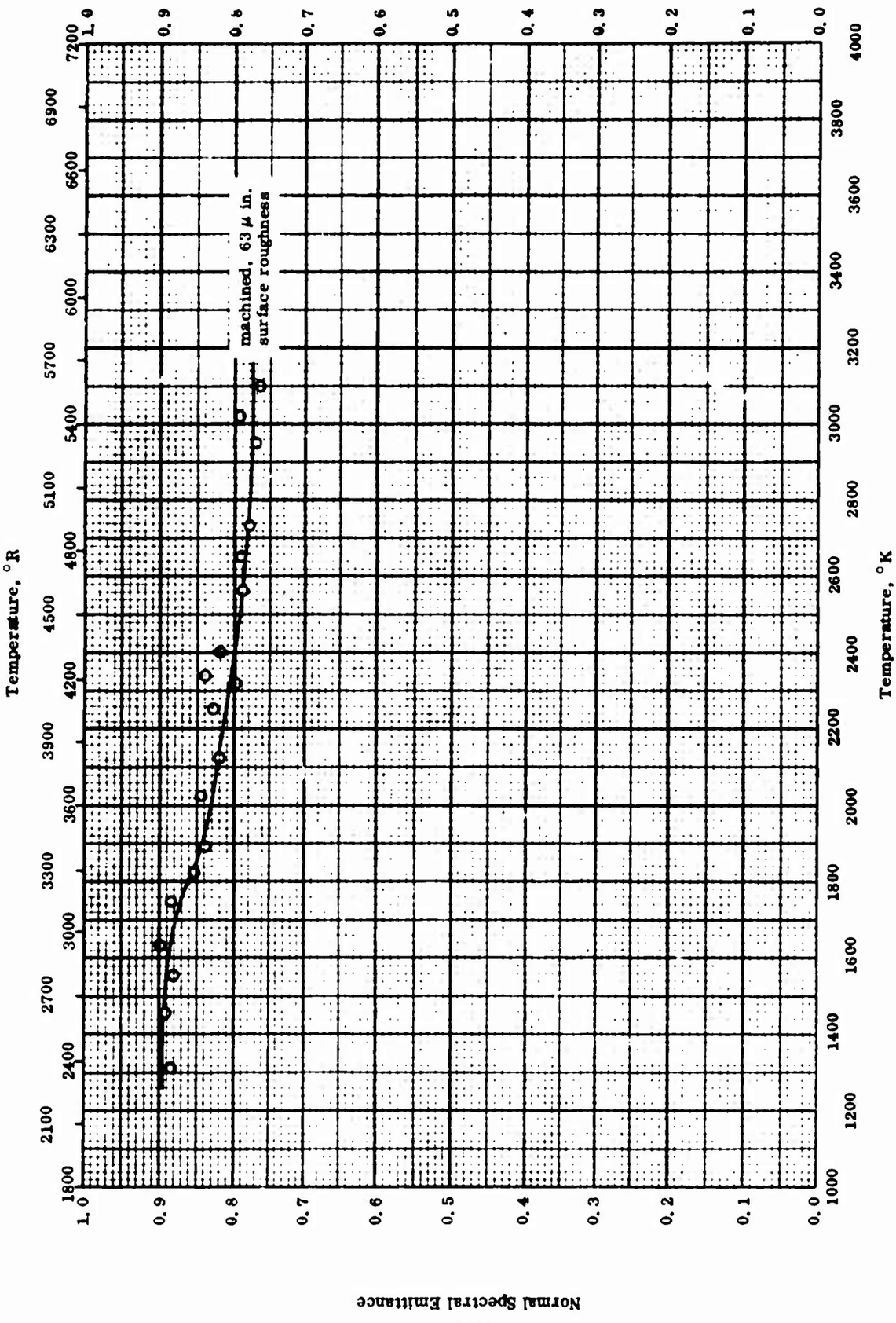


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade AGX)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade AGX)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-24	1888-3193		Surface 63 μ in. finish.	Surface-machined; measured in vacuum below 2273 K and in argon (1 atm) above 2273 K.

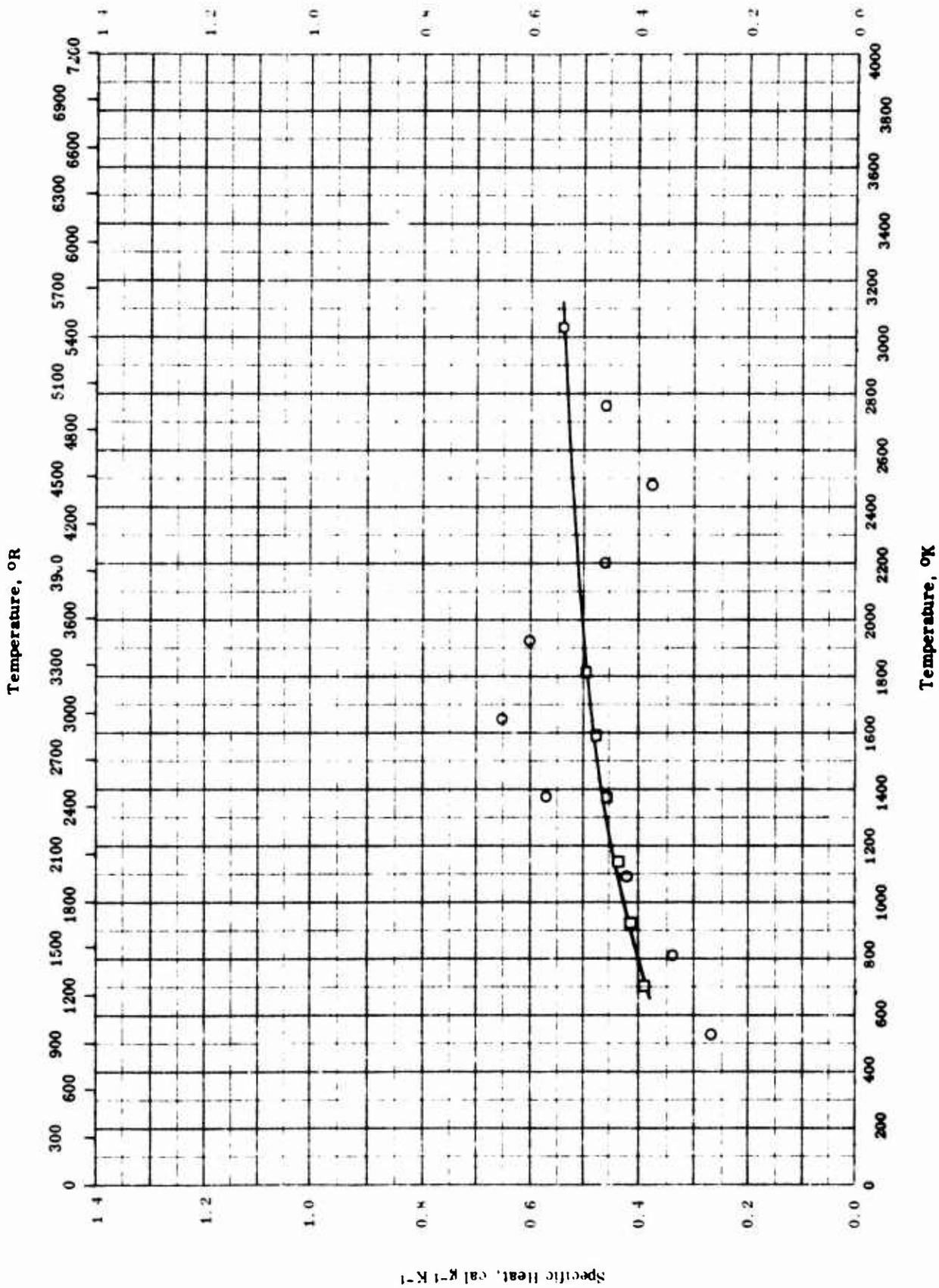


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade AGX)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade AGX)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range K	Rept. Error %	Sample Specifications	Remarks
O	59-24	0.65	1308-3108		Surface 63μ in. finish.	Surface-machined; measured in vacuum below 2273 K and in argon (1 atm.) above 2273 K.

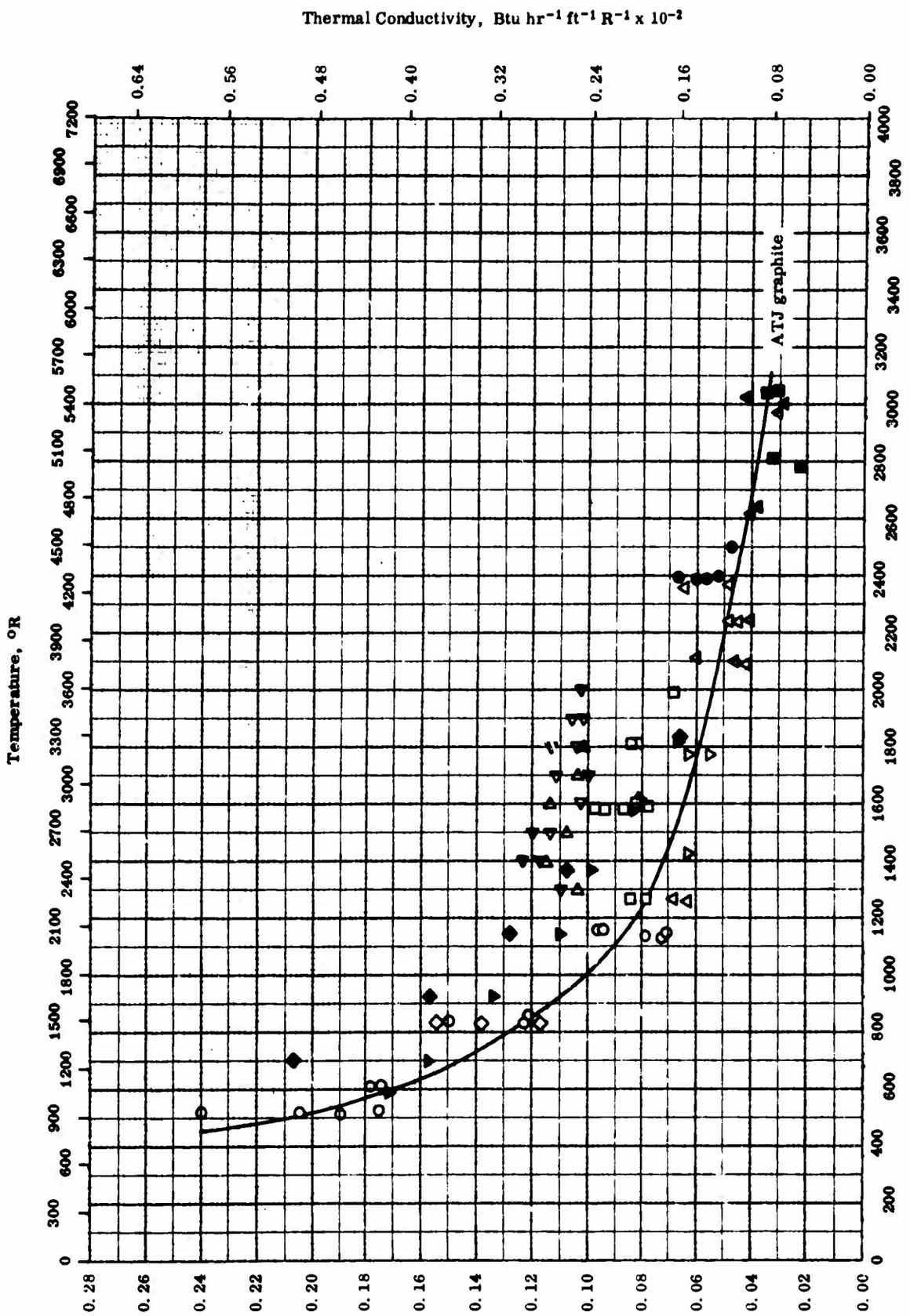


SPECIFIC HEAT -- GRAPHITE
(Grade ATJ)

SPECIFIC HEAT -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-13	533-3033	≤ 5.0	Grade ATJ; 99.5 C, 0.2 Si, 0.1 Fe, and trace Ca, Mg; density 110.3 lb ft^{-3}.	Molded and fired.
□	60-30	699-1811	< 2.9	Grade ATJ.	Sealed under helium atmosphere.

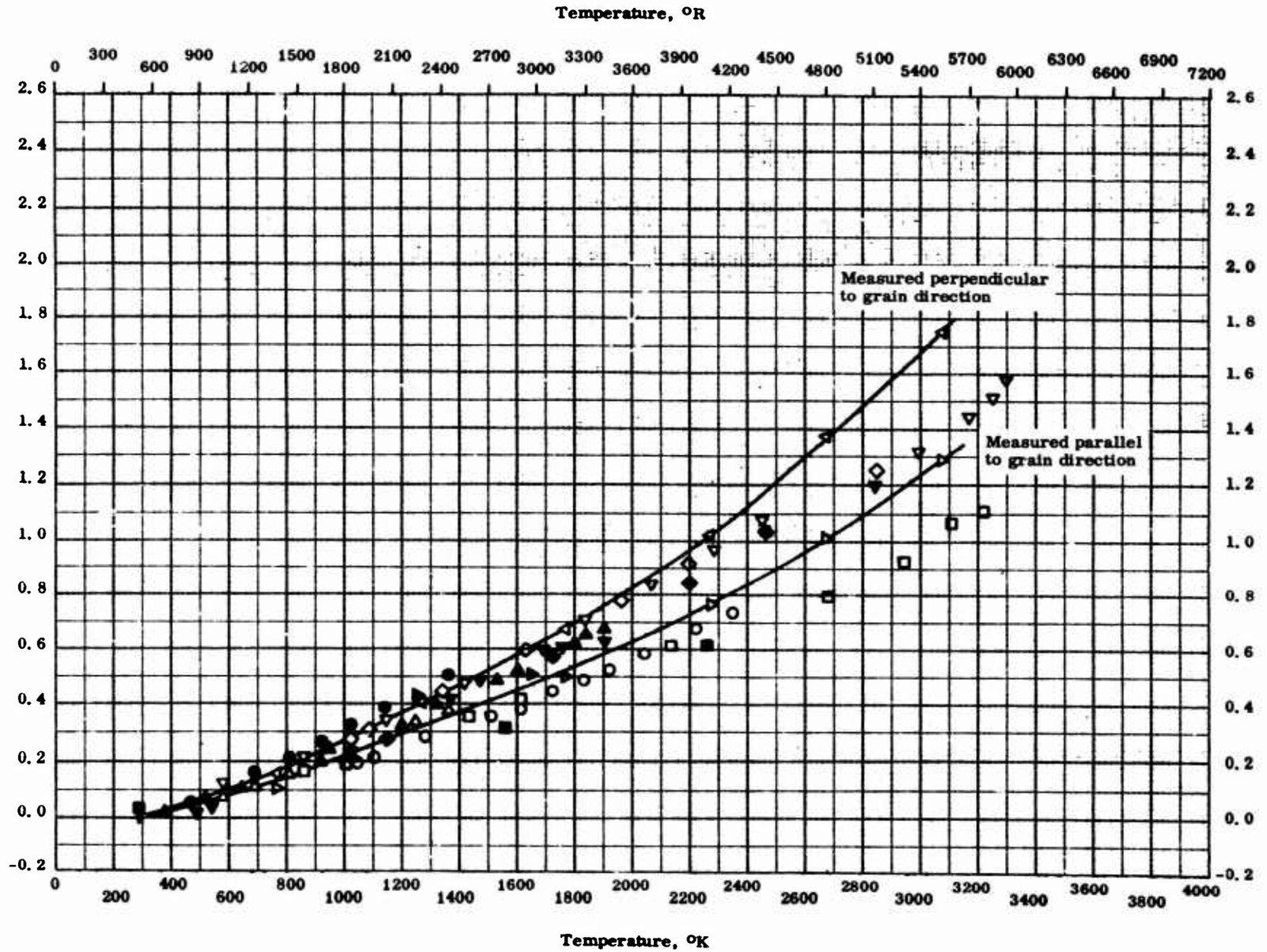


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade ATJ)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-7	515-1160			Molded and fired; specimen found no deterioration after determination.
□	62-7	1269-1900			Same as above.
△	62-7	1260-2370			Same as above.
▽	62-7	1425-1770			Same as above.
◇	62-7	830-835			Same as above.
●	62-7	2385-2500			Same as above.
■	62-7	2780-3050			Same as above.
▲	62-7	2620-3022			Same as above.
▼	61-17	589-1811			Siliconized; measured perpendicular to the grain.
◆	61-17	700-1839			Siliconized; measured parallel to the grain.
◁	61-18	1300-2000			Measured parallel to the grain.
▷	61-18	1300-1900			Measured perpendicular to the grain.



THERMAL LINEAR EXPANSION — GRAPHITE
(Grade ATJ)

THERMAL LINEAR EXPANSION — GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

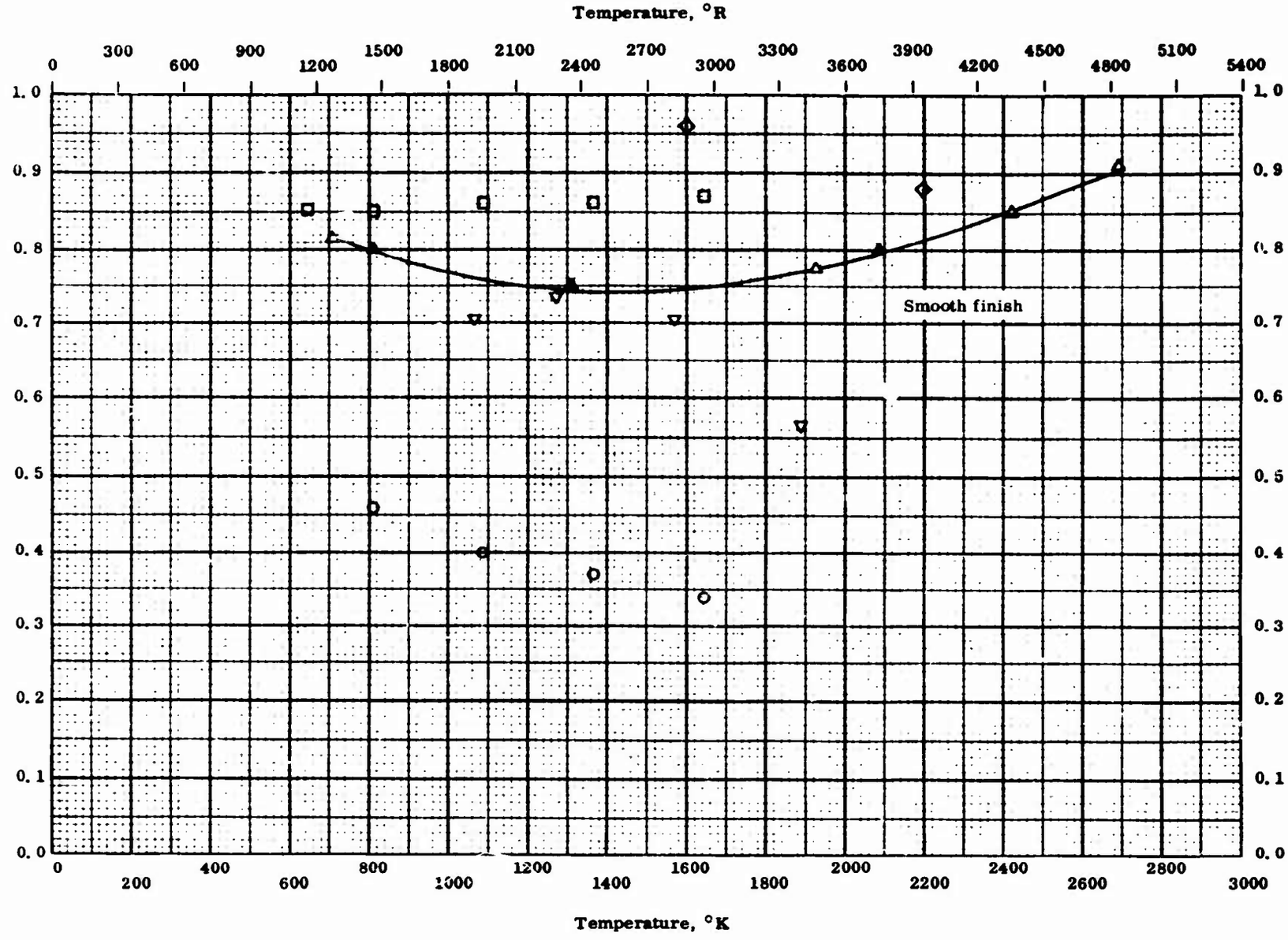
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-7	294-2350	2.5	Grade ATJ graphite, National Carbon Co.; initial length 2.9920 in., final length 2.9940 in.; theoretically sublimes at 6500 F; density 110 lb ft^{-3}. [Author's design: Run SRI-E19]	Molded and fired.
□	62-7	294-3214	2.5	Same as above; initial length 2.9909 in.; [Author's design: Run SRI-E30]	Rerun of above specimen for heating cycle; specimen showed permanent expansion after exposure to 3214 K.
■	62-7	294-3214	2.5	Same as above; final length 2.9953 in.	Cooling cycle for above specimen.
▽	62-7	294-3289	2.5	Same as above; initial length 2.9960 in., final length 2.9972 in. [Author's design: Run SRI-E33]	Third heating cycle for above specimen.
◇	62-7	294-2947	2.5	Same as above; initial length 2.9970 in. [Author's design: Run SRI-E34]	Fourth heating cycle for above specimen.
◆	62-7	294-2947	2.5	Same as above; final length 2.9970 in.	Cooling cycle for above specimen.
▷	64-22	293-3073		Grade ATJ graphite, National Carbon Co.	Measured parallel to grain orientation with optical lever from 20-100 C (0.3-by 3/8-by 5-in. sample) and with telemicroscope for high temp (1/2-by 1/2-by 5-in. sample); data is average of several runs.
◁	64-22	293-3073		Same as above.	Same as above except measured across grain orientation.

(Continued onto next page)

THERMAL LINEAR EXPANSION — GRAPHITE (Continued)
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
●	59-23	300-1367		Grade ATJ graphite, National Carbon Co.; max filler particle size 0.005 in.; dimensions 1/4 in. in diameter and 2 in. long. [Author's design: block no. 0801]	Specimen prepared from petroleum coke mixed with coal tar ptich, impregnated with coal tar pitch, molded, and graphitized at 5000 F; heated in helium atm with heating rate of 540 F hr^{-1} and soaked 1/2 hr at 2000 F; measured perpendicular to grain direction.
△	59-23	300-1367		Same as above.	Same as above except measured parallel to grain direction.
▲	60-30	294-1905	<3	Siliconized ATJ graphite; 0.2 ash; max grain size 0.006 in. [Author's design: sample 1]	Measured parallel to grain orientation.
▼	60-30	294-1802	<3	Same as above specimen. [Author's design: sample 2]	Same as above specimen.
▶	60-41	300-1653	<5	Coated ATJ graphite; max grain size 0.006 in.; ash content 0.2; specimen dimensions 3/8 in. diameter by 3 in. long.	Molded; coating applied is essentially a diffusion deposit of SiC.

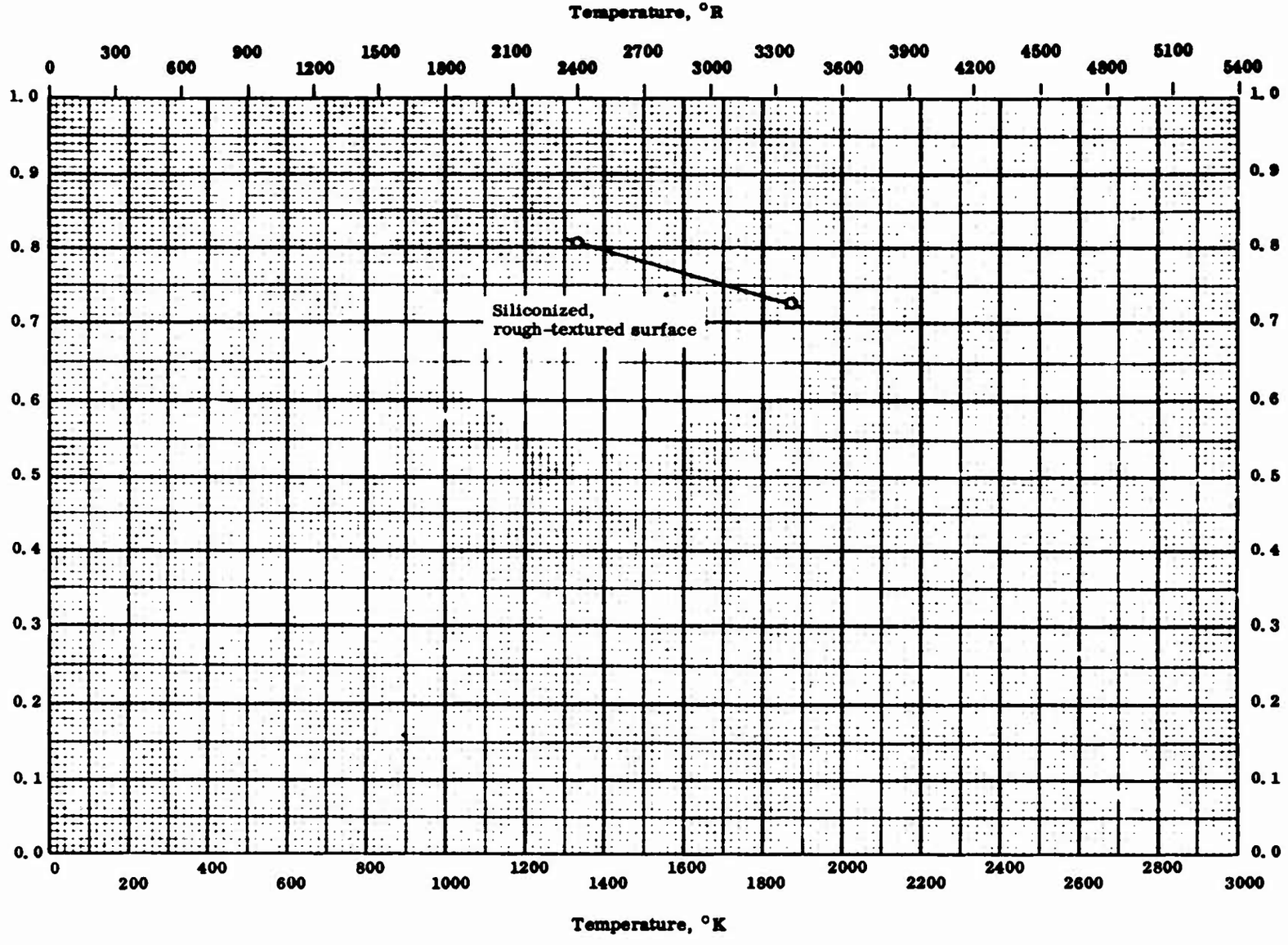


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade ATJ)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-41	811-1644	±20	Siliconized, coating 1 ~ 2 mil, grain size of ATJ graphite 0.006 in., ash content 0.2.	Preoxidized at 1366 K for 1 hr; purged with moisture removed He.
□	60-41	644-1644	±20	Same as above.	As received; purged with moisture removed He.
△	62-42	711-2700		Not given.	Uncoated material ground to a smooth finish; measured in dried argon or helium atmosphere after evacuation; data taken from a smooth curve.
◇	60-40	1600-2200		Siliconized ATJ graphite.	Measured in argon atmosphere (1 1/3 atm.); computed from spectral data.
▽	60-30	1066-1894	± 5	Same as above.	Flat but rough-textured surface; heated to 1366 K in air for 1 hr; measured in 90 Ar 10 H_2 atmosphere (1 atm.); average value for two cycles.

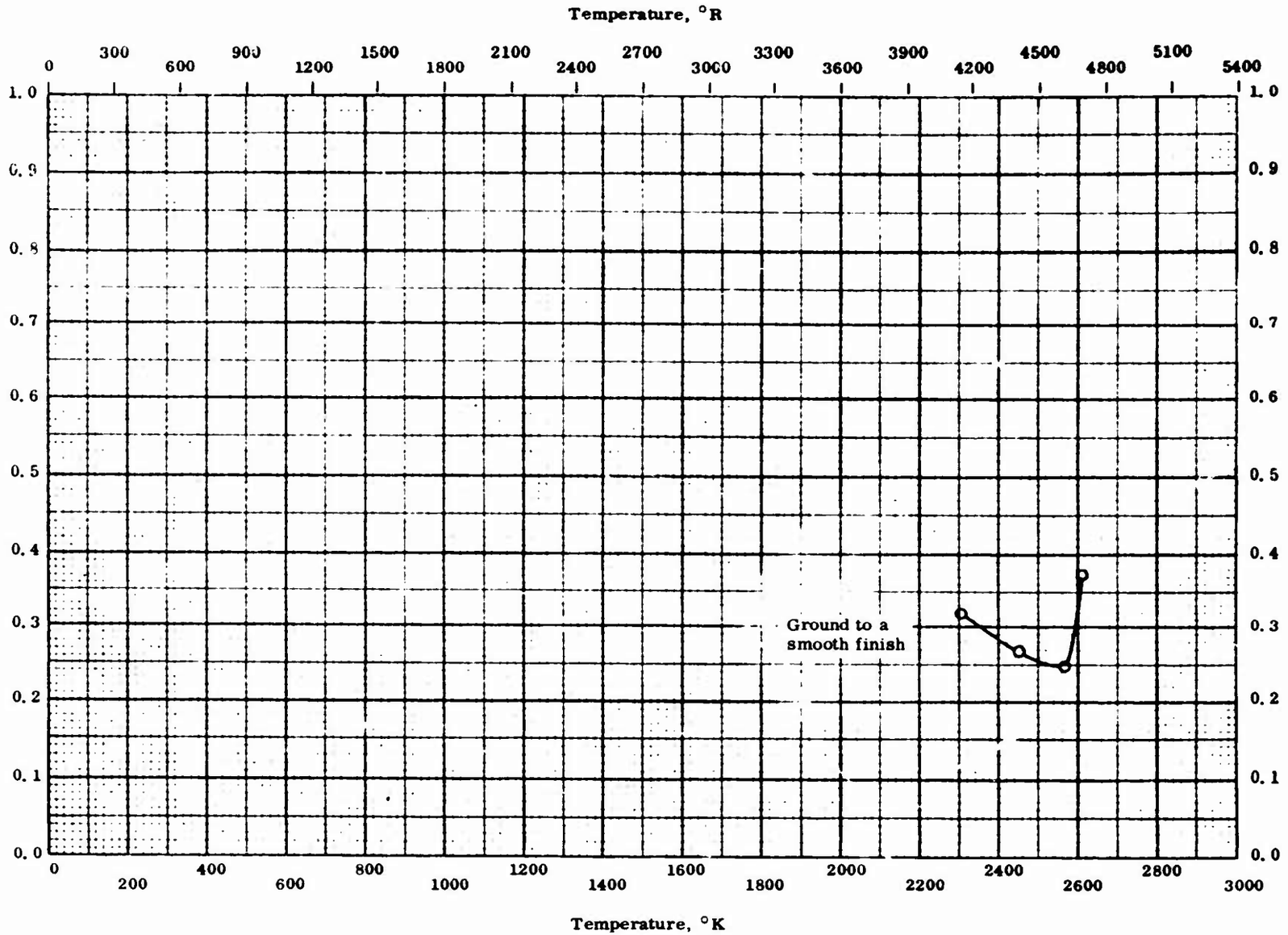


ANGULAR TOTAL EMITTANCE -- GRAPHITE
(Grade ATJ)

ANGULAR TOTAL EMITTANCE -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-30	1339-1878	±5	Siliconized ATJ graphite.	As received; flat but rough-textured surface; measured in argon - hydrogen atmosphere; 45° from normal.

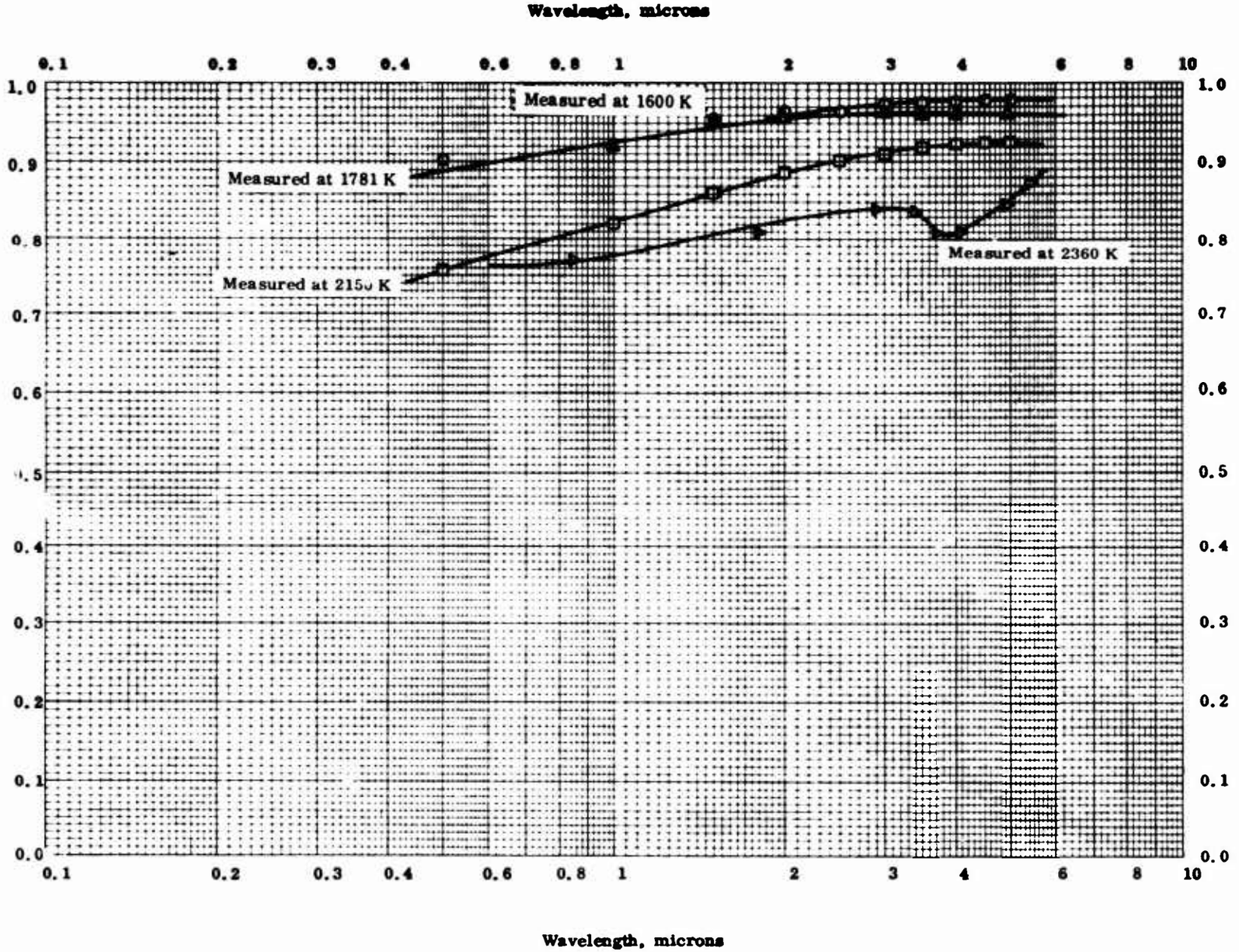


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade ATJ)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range, °K	Rept. Error%	Sample Specifications	Remarks
○	62-42	0.69	2311-2616		Not given.	Uncoated material ground to a smooth finish; measured in dried argon or helium atmosphere after evacuation.

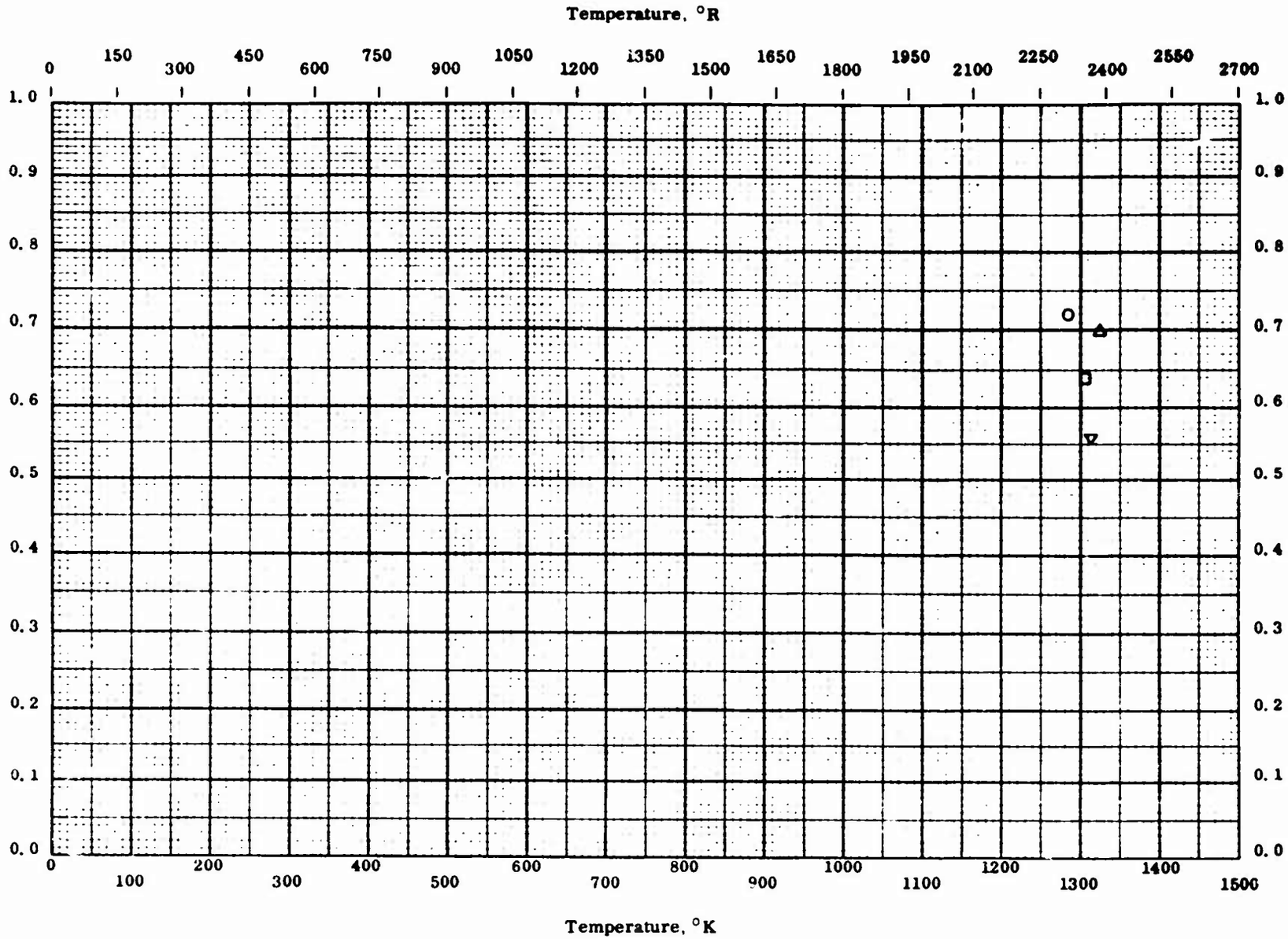


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade ATJ)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	61-35	1600	0.5-5.0		Siliconized ATJ graphite.	Measured in vacuum at low temperature and in argon at high temperature.
□	61-35	2150	0.5-5.0		Same as above.	Same as above.
△	63-24	1781	0.5-4.9		Same as above.	Measured in argon atmosphere (1-1/3 atm); data taken from smooth curve.
▷	63-24	2360	0.85-5.40		Same as above.	Measured in argon atmosphere (1.5 psi); data taken from smooth curve.

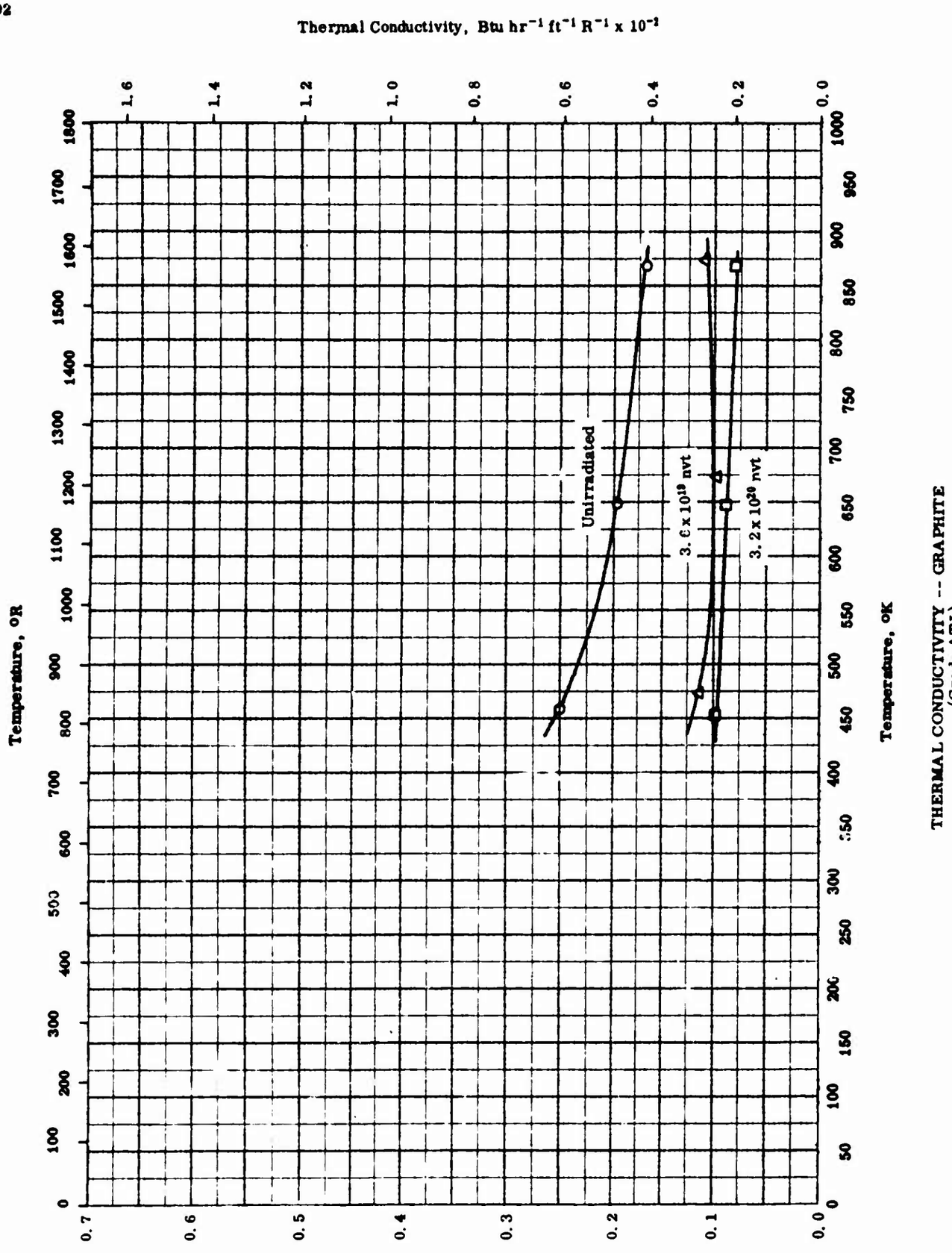


ANGULAR SPECTRAL REFLECTANCE -- GRAPHITE
(Grade ATJ)

ANGULAR SPECTRAL REFLECTANCE -- GRAPHITE
(Grade ATJ)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-29	0.55	2568		National Carbon Co.; density 1.73 g cm^{-3}; specific resistance (with grain) 11.0 x 10^{-4} ohm cm, (across grain) 14.5 x 10^{-4} ohm cm.	Molded; with grain; surface prepared on 80-grit garnet paper; hemispherical illumination, 45° viewing.
□	63-29	0.55	2615		Same as above.	Same as above; surface sandblasted.
△	63-29	0.55	2650		Same as above.	Across grain; surface prepared on 80-grit garnet paper; hemispherical illumination, 45° viewing.
▽	63-29	0.55	2625		Same as above.	Same as above; surface sand blasted.

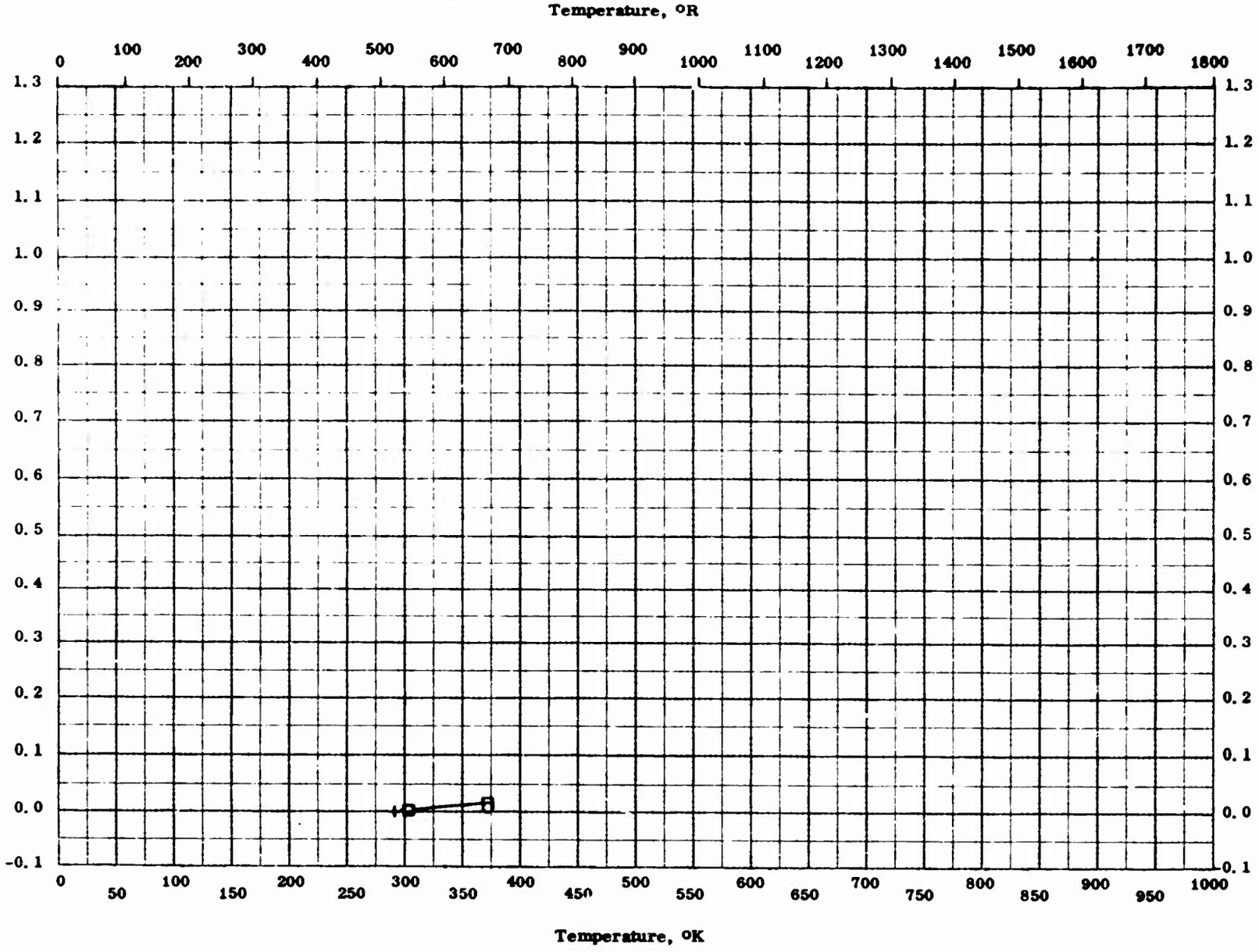


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade ATL)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade ATL)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-30	458-868		ATL-82; grain size 0.016 to 0.03 in.	Unirradiated.
□	61-30	453-868		Same as above.	Irradiated 3.2×10^{20} nvt (905 MWD/AT) at 360 to 420 C.
△	61-30	473-873		Same as above.	Irradiated 3.6×10^{19} nvt at 475 C.

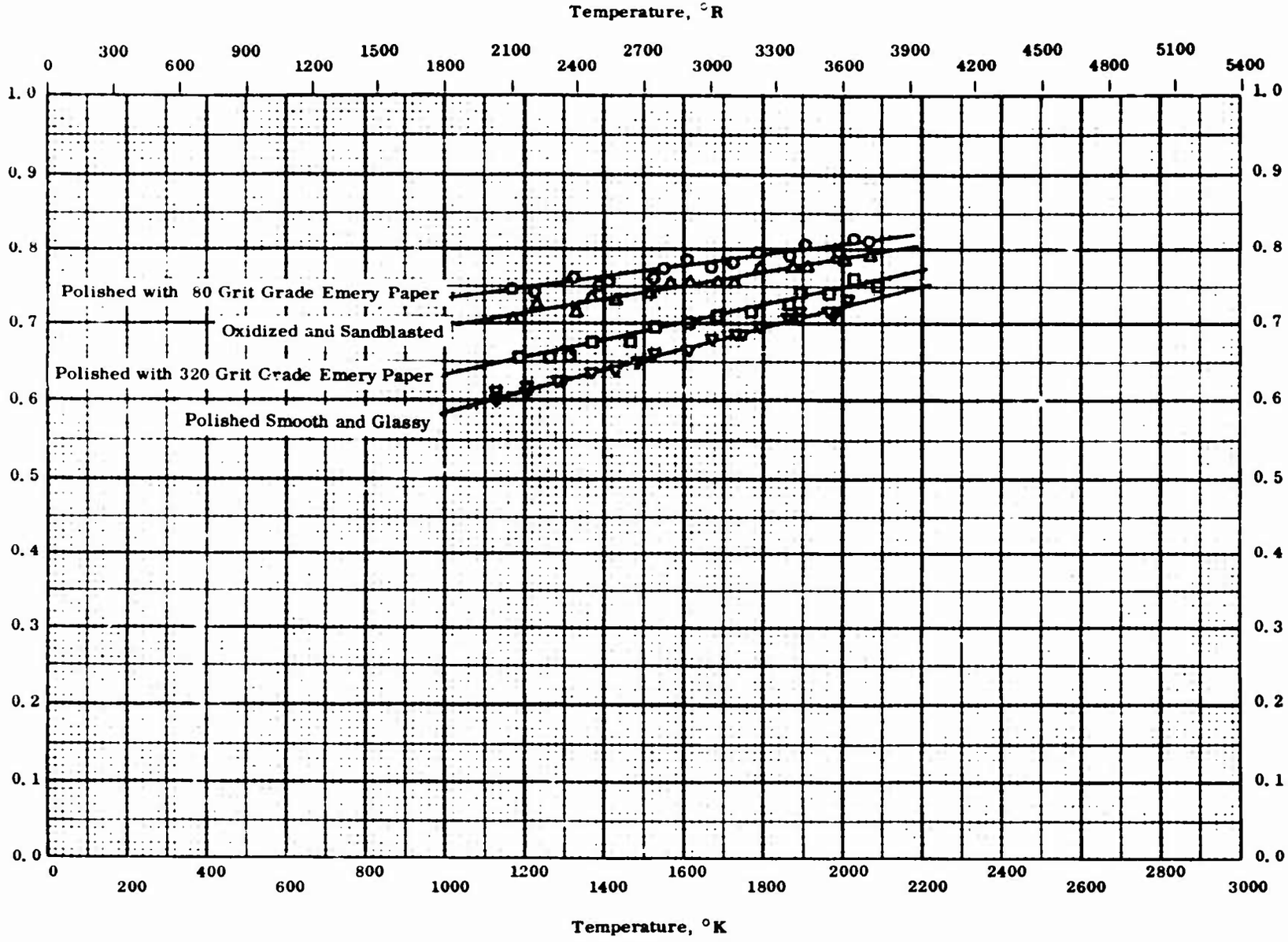


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ATL)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ATL)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-27	303-373		Grade ATL graphite, National Carbon Co.; bulk density 1.78 g cm^{-3}; specific resistance with grain 11.30 x 10^{-4} ohm-cm and across grain 11.80 x 10^{-4} ohm-cm.	Molded; measured parallel to grain.
□	64-27	303-373		Same as above.	Same as above except measured across grain.

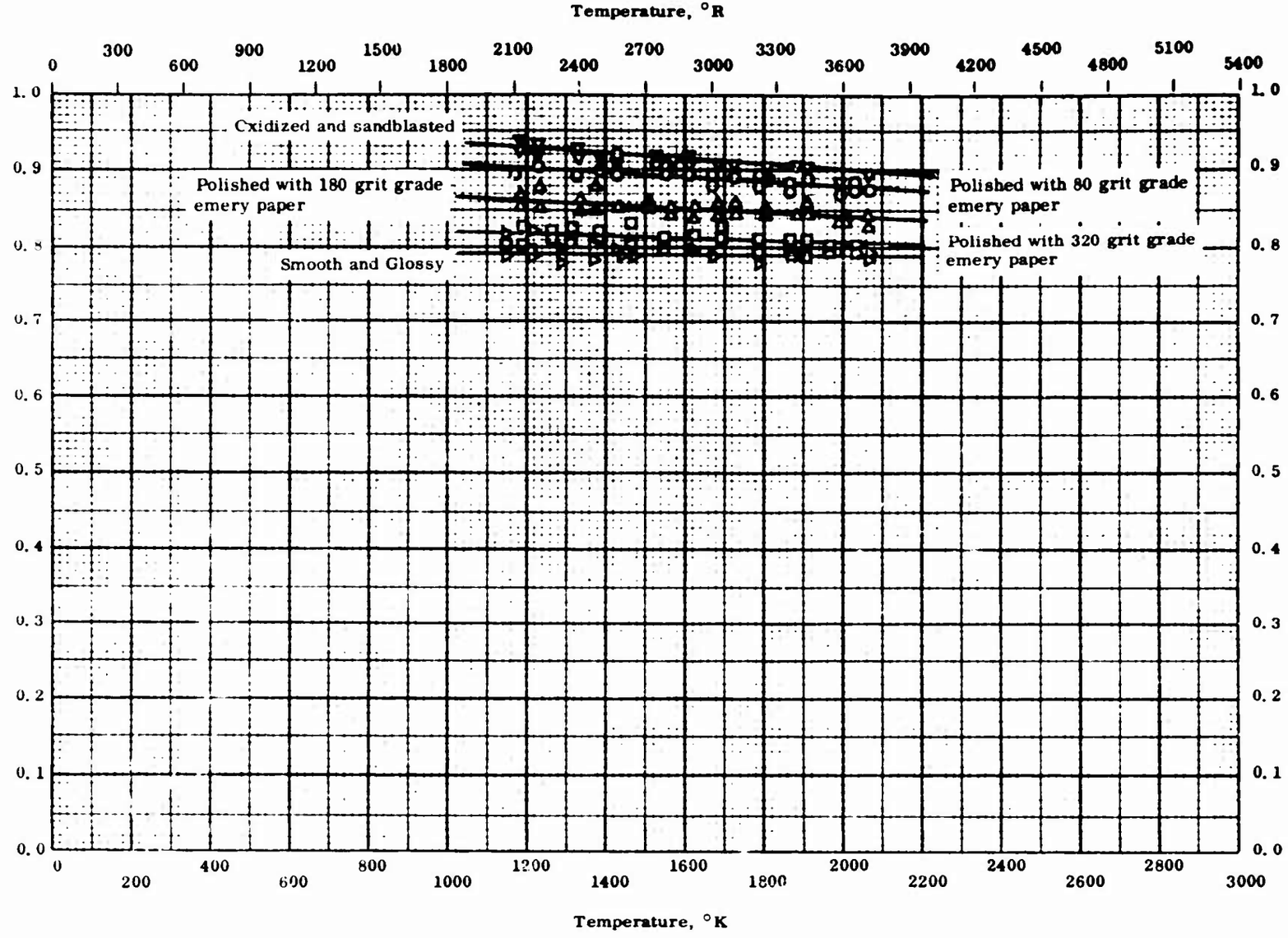


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade AUC)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade AUC)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-45	1173-2068		Not given.	Polished with 80 grit grade of emery cloth; measured in vacuum; integrated over 0.2 - 3.5 μ.
□	60-45	1183-2088		Same as above.	Same as above except polished with 320 girt grade of emery cloth.
△	60-45	1173-2073		Same as above.	Same as above except oxidized at 1173 K for 12 min, sandblasted with 10 mesh abrasive particles.
▽	60-45	1133-2013		Same as above.	Same as above except polished with a water-lubricated-lightly-roughened glass plate until a smooth glossy surface is reached.



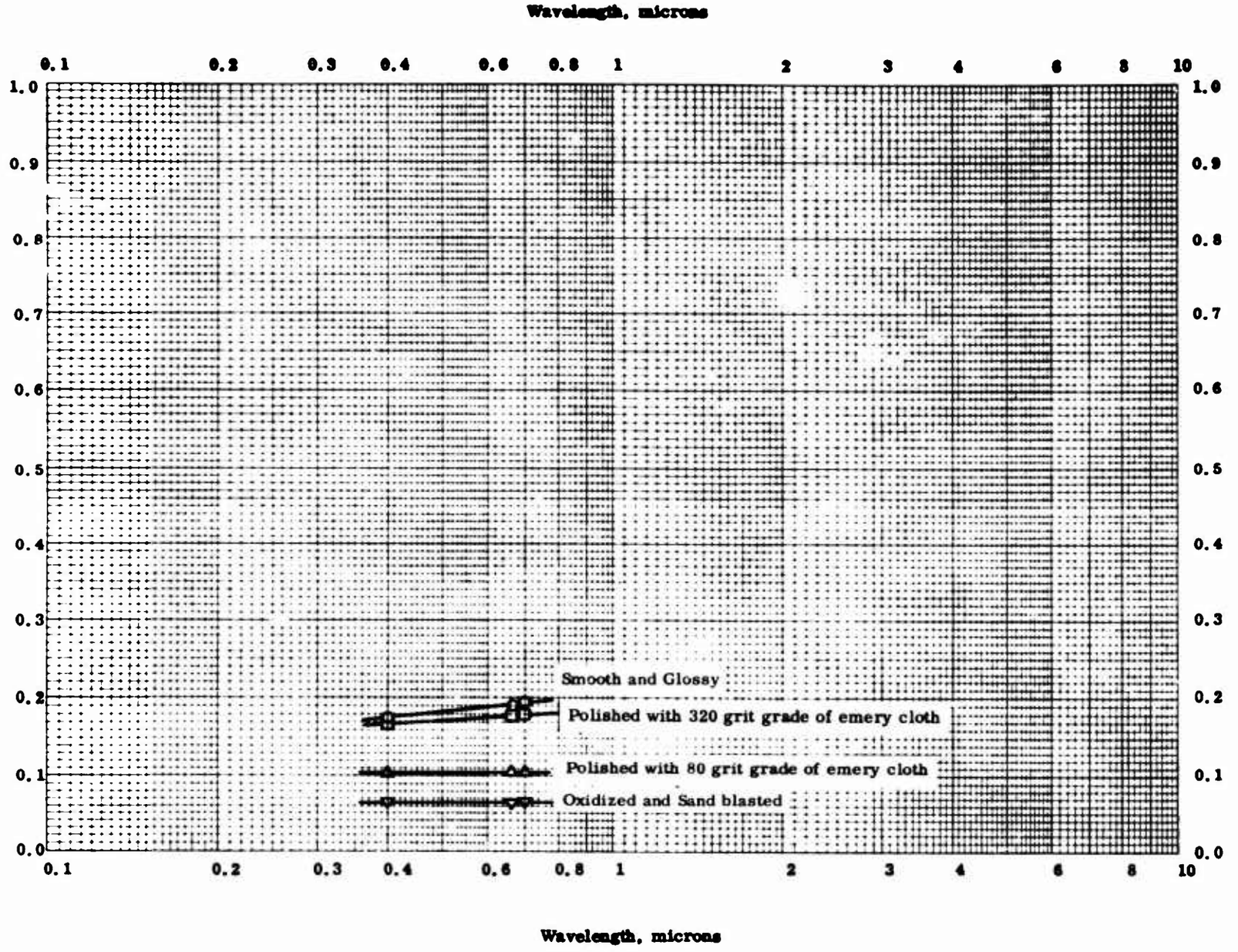
NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade AUC)

TPRC

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade AUC)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range° K	Rept. Range σ_c	Sample Specifications	Remarks
○	60-45	0.665	1173-2066		Not given.	Polished with 80 grit grade of emery cloth; measured in vacuum.
□	60-45	0.665	1153-2033		Same as above.	Polished with 320 grit grade of emery cloth; measured in vacuum.
△	60-45	0.665	1183-2063		Same as above.	Polished with 180 grit grade of emery cloth; measured in vacuum.
▽	60-45	0.665	1183-2063		Same as above.	Oxidized at 1173 K for 12 min., sand blasted with 10 mesh abrasive particles; measured in vacuum.
▷	60-45	0.665	1148-2073		Same as above.	Polished with a water-lubricated-lightly-roughened glass plate until a smooth glossy surface is reached.

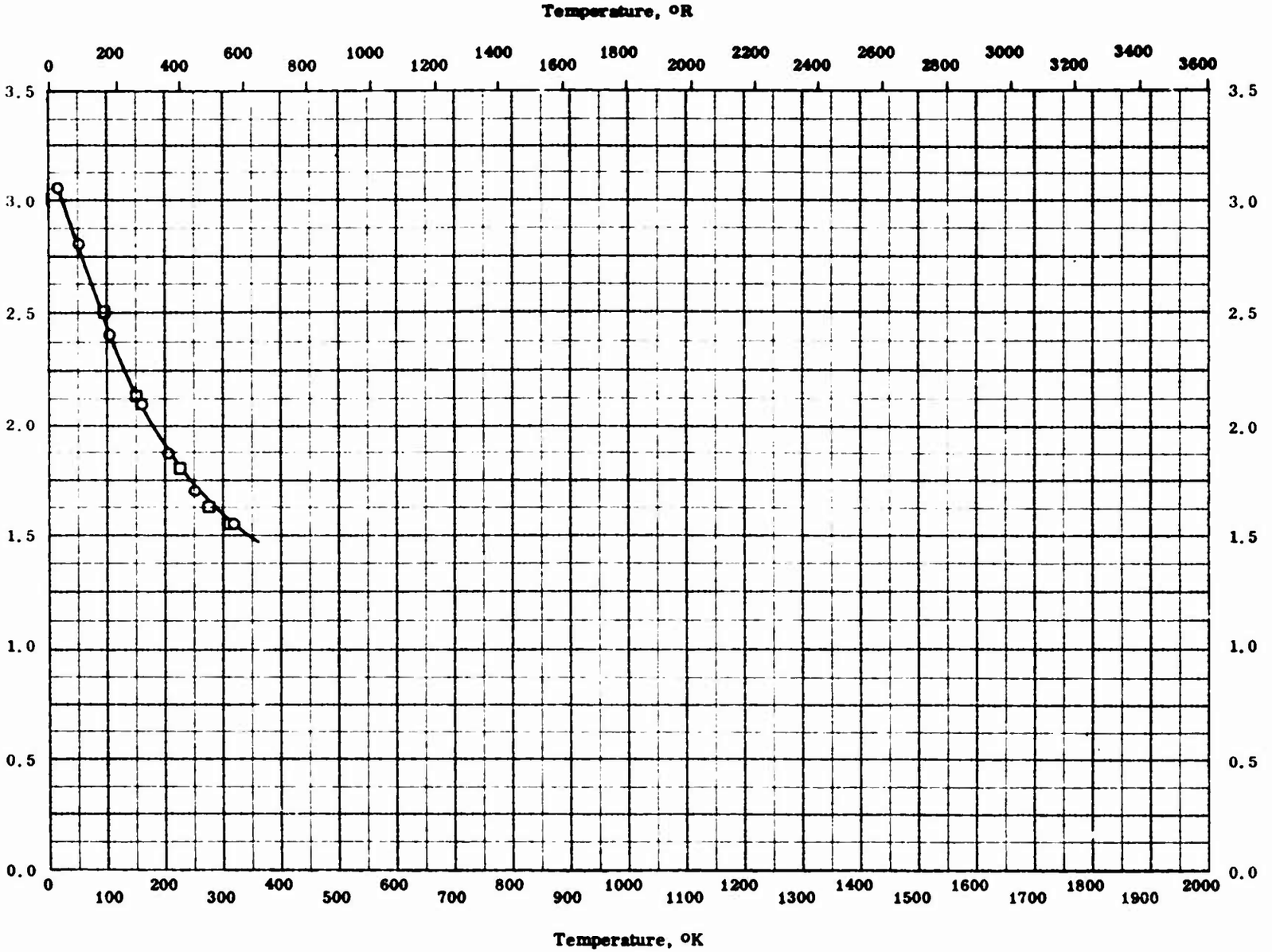


NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade AUC)

NORMAL SPECTRAL REFLECTANCE — GRAPHITE
(Grade AUC)

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error, %	Sample Specifications	Remarks
○	60-45	298	0.4-0.7		Not given.	Polished with a water-lubricated-lightly-roughened glass plate until a smooth glossy surface is reached.
□	60-45	298	0.4-0.7		Same as above.	Polished with 320 grit grade of emery cloth.
△	60-45	298	0.4-0.7		Same as above.	Polished with 80 grit grade of emery cloth.
▽	60-45	298	0.4-0.7		Same as above.	Oxidized at 1173 K for 12 min and sand-blasted with 10 mesh abrasive particles.

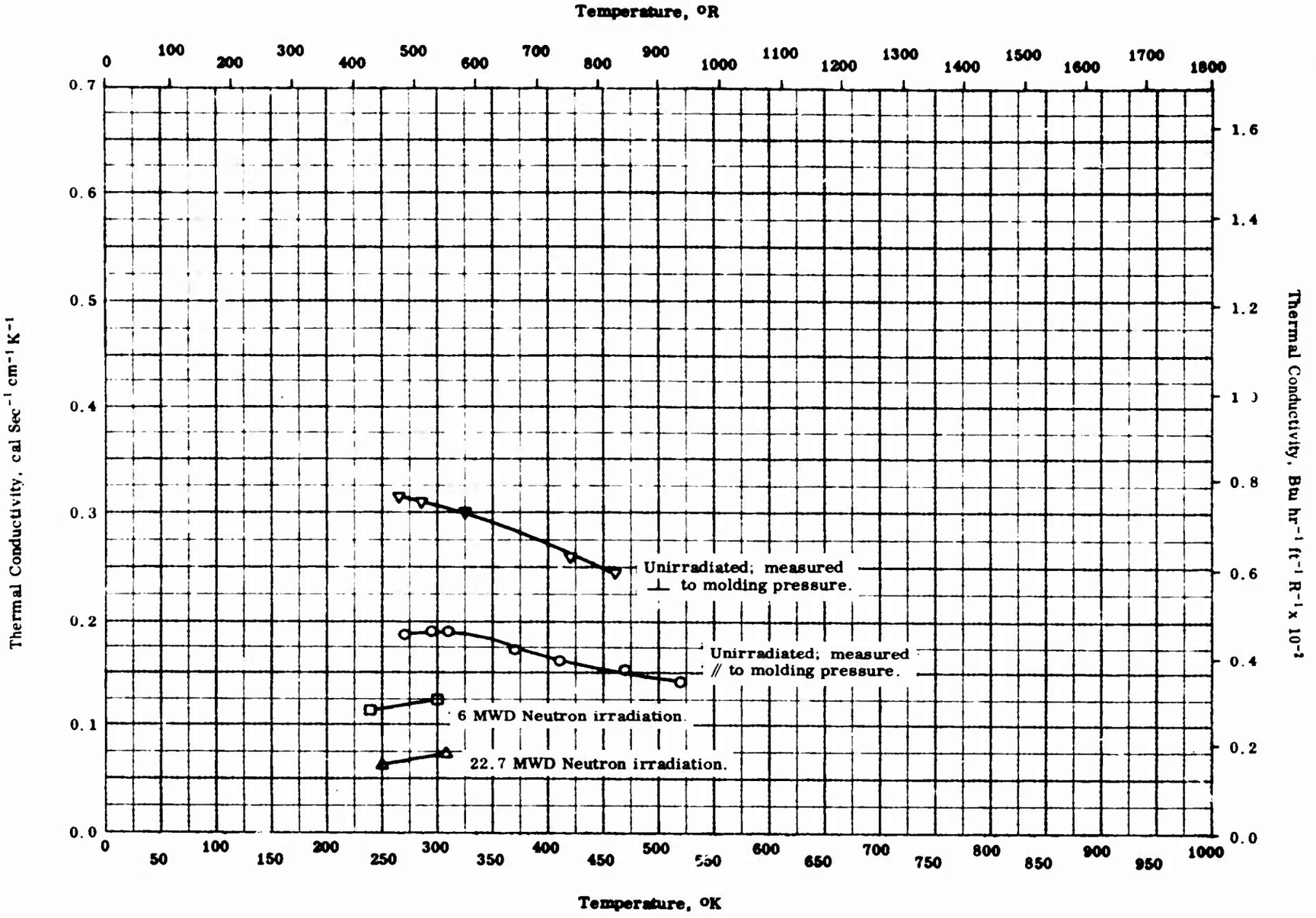


ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade AWG)

ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade AWG)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept Error %	Sample Specifications	Remarks
○	54-26, 55-7, 56-14, also 56-36	20-320	±3	Type AWG (EBP) molded from petroleum coke; medium-large flour size; density 109 lb ft^{-3}.	Measurements made parallel to molding pressure.
□	54-19	80-300		AWG 11.	

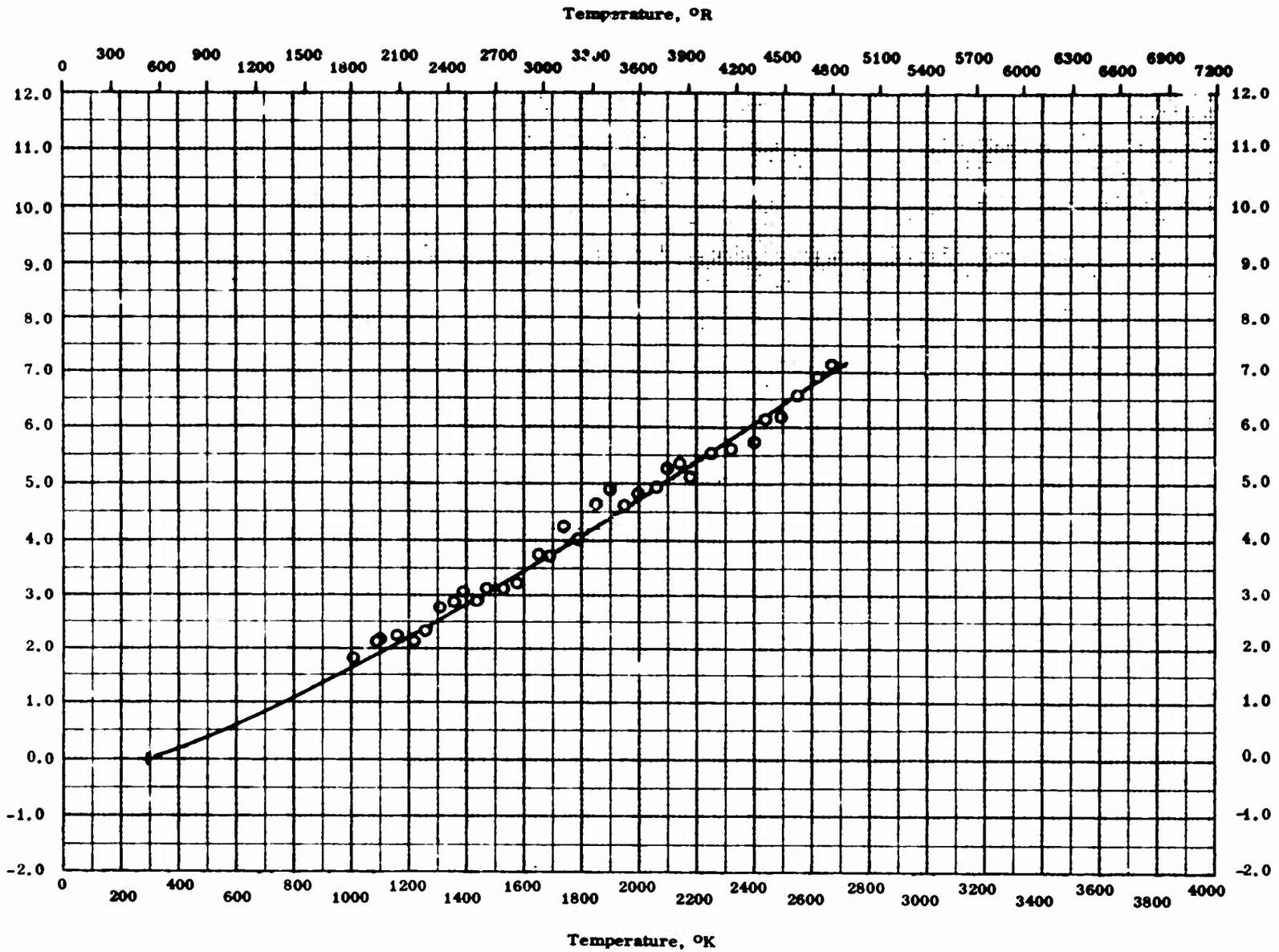


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade AWG)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade AWG)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-14	270-520		Particle size 25 μ and crystallite size 0.2 μ or greater; density 1.75 g cm^{-3} at 25 C.	Molded coke graphite; unirradiated; measured in a direction parallel to molding pressure.
□	56-14	240-300		Same as above.	Same as above except received 6 MWD Neutron irradiation at about 30 C.
△	56-14	250-308		Same as above.	Same as above excpet received 22.7 MWD Neutron irradiation at about 30 C.
▽	55-7	265-460	< 5	Medium large flour size; density 1.75 g cm^{-3} at 25 C; thermoelectric power + 2.3 $\mu v K^{-1}$, Hall coefficient -0.47 emu, magnetoresistivity 1.9×10^{-10} emu, electrical resistivity 14.3×10^{-3} ohm cm, total magnetic susceptibility -20.60×10^{-6} cgs units, and orientation factor (max density over min. density) 1.3.	Measured perpendicular to molding pressure.

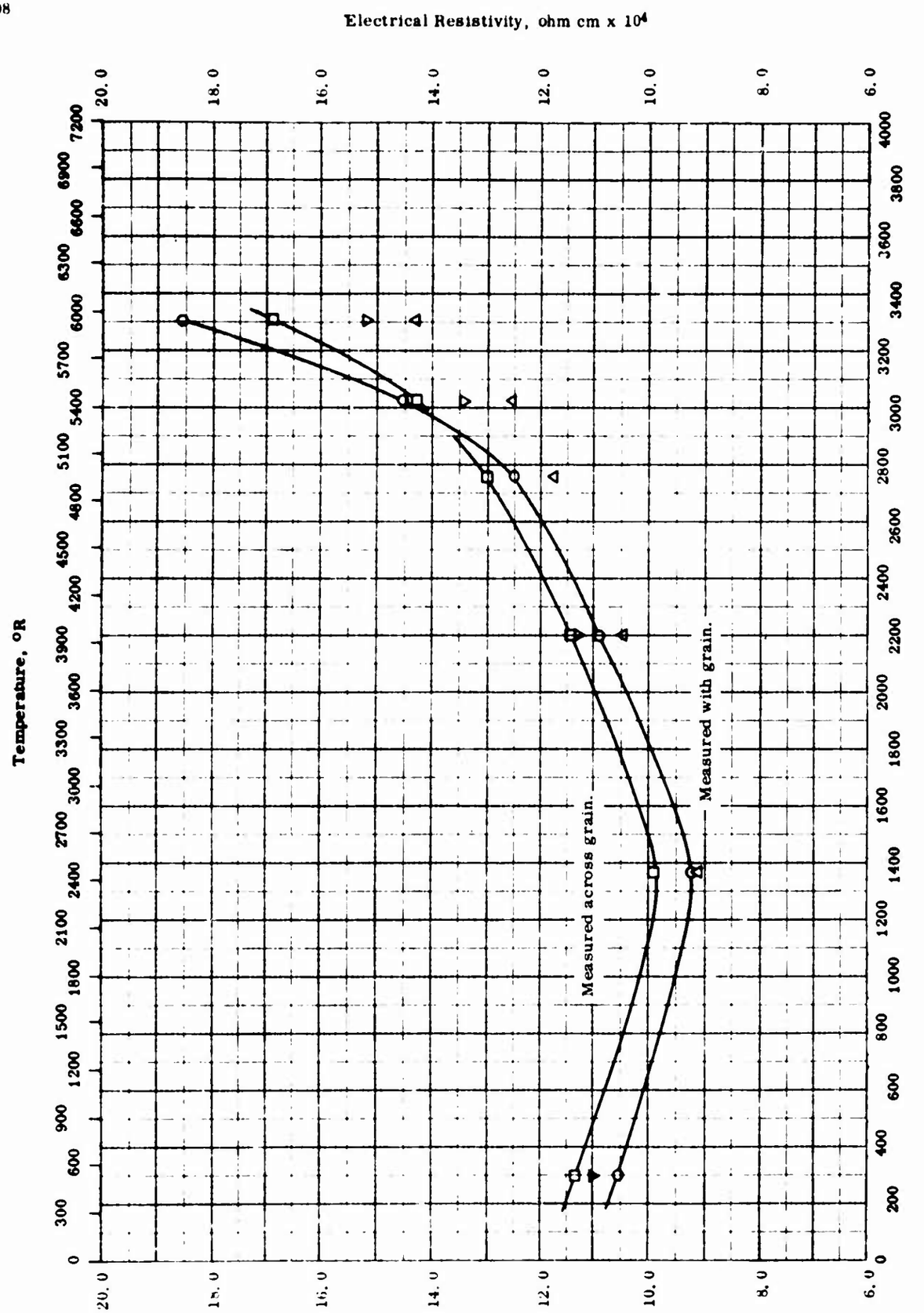


THERMAL LINEAR EXPANSION — GRAPHITE
(Grade CEP)

THERMAL LINEAR EXPANSION — GRAPHITE
(Grade CEP)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	63-39	298-2670		Grade CEP graphite.	Percent expansion calculated from lattice constants measured in c-direction in vacuo; sample self-heated by passing current through it.

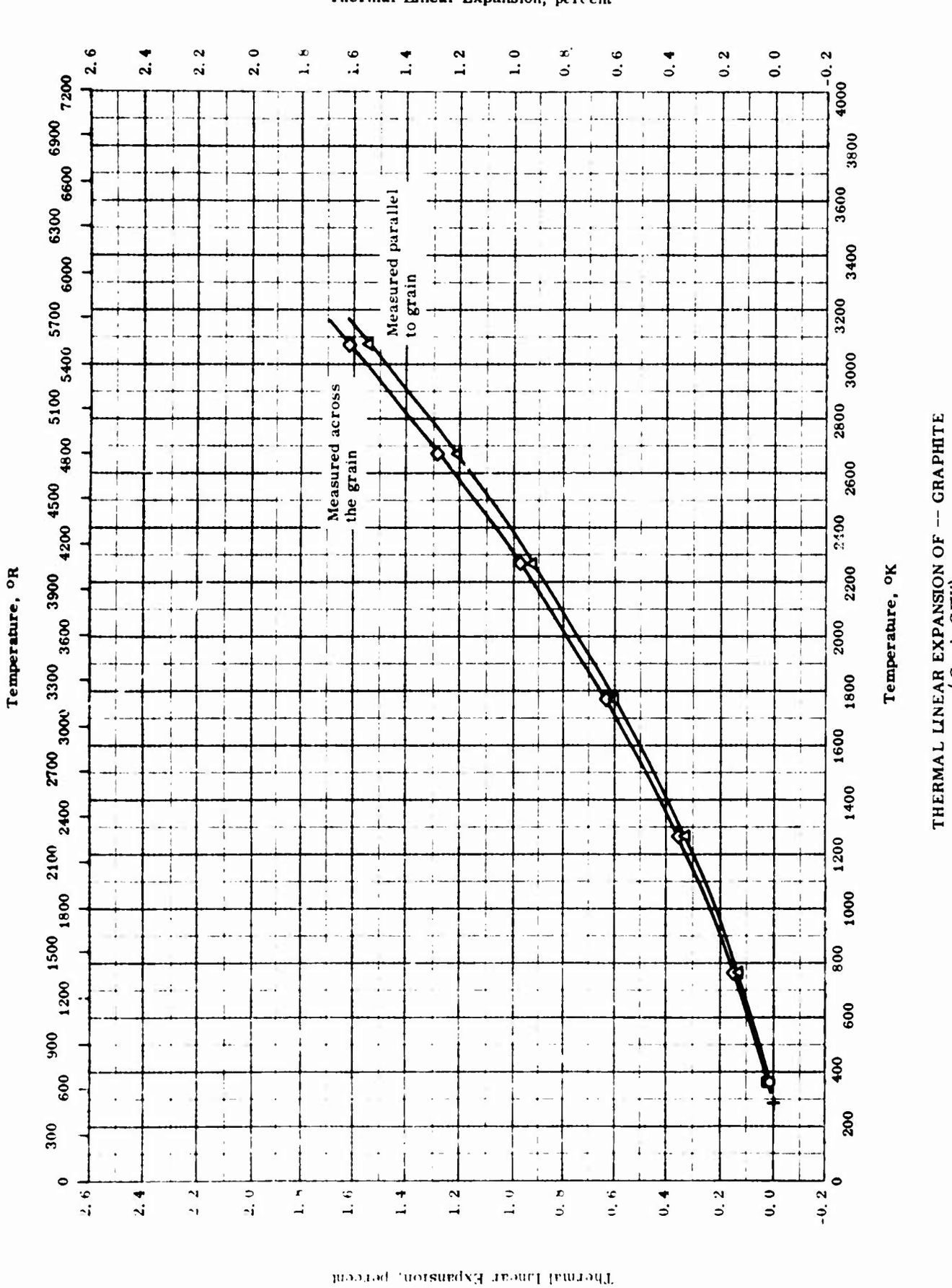


ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade CFW)

ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade CFW)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-13	298-3311		Average bulk density of a total 43 samples 1.867 g cm^{-3}.	Machined and X-rayed, measured with the grain, data average values of 30 specimens for room temperature, and 13 specimens for elevated temperature.
□	64-13	298-3311		Average bulk density 1.866 g cm^{-3} of a total of 50 samples.	Same as above; measured across grain; data average values of 30 specimens at room temperature, and 20 specimens for elevated temperature.
△	64-13	298-3311		Average density 1.860 g cm^{-3} of a total of 37 samples.	Machined and X-rayed; measured with grain; data average values of 30 specimens for room temperature and 7 specimens for elevated temperature.
▽	64-13	298-3311		Average density 1.858 g cm^{-3} of a total of 36 samples.	Machined and measured across grain; data average values of 30 specimens for room temperature and 6 specimens for elevated temperatures.

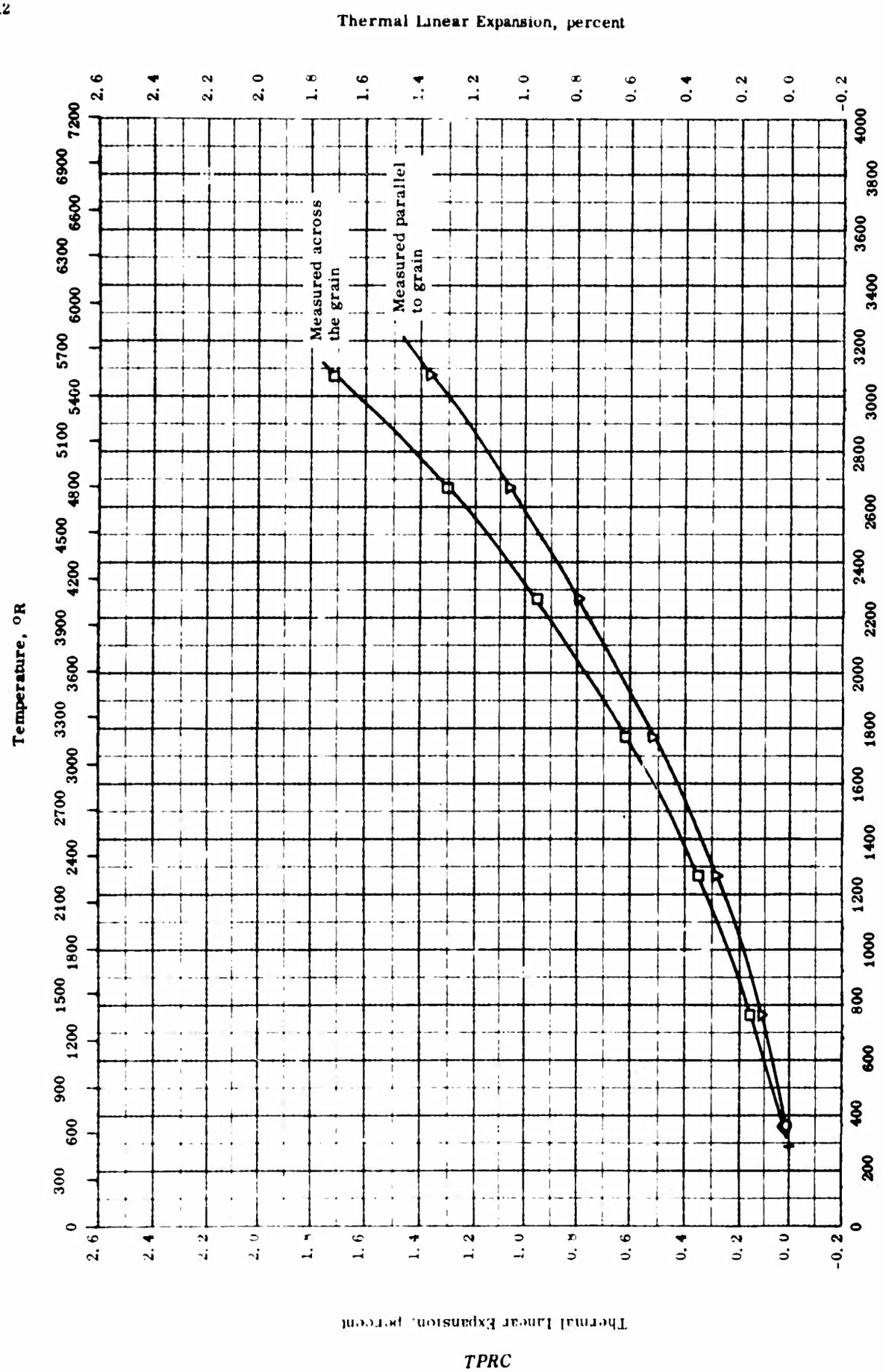


THERMAL LINEAR EXPANSION OF -- GRAPHITE
(Grade CFW)

THERMAL LINEAR EXPANSION OF — GRAPHITE
(Grade CFW)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-22	293-373		Grade CFW graphite, National Carbon Co.; bulk density 1.90 g cm^{-3} at room temperature, specific resistance at room temperature parallel to grain 11.98 x 10^{-4} ohm-cm, across grain 12.60 x 10^{-4} ohm-cm; specimen dimensions 0.3 by 3/8 by 5 in.	Specimen taken from 40 in. outside diameter by 15 in. inside diameter by 20 in. long block; measured parallel to grain; average data over several runs.
△	64-22	293-3073		Same as above specimen except specimen dimensions are 1/2 by 1/2 by 5 in.	Specimen taken from same block as above specimen; measured parallel to grain.
□	64-22	293-373		Same as above specimen except specimen dimensions are 0.3 by 3/8 by 5 in.	Specimen taken from same block as above specimen; measured across grain.
◇	64-22	293-3073		Same as above specimen except specimen dimensions are 1/2 by 1/2 by 5 in.	Specimen taken from same block as above specimen measured across grain.

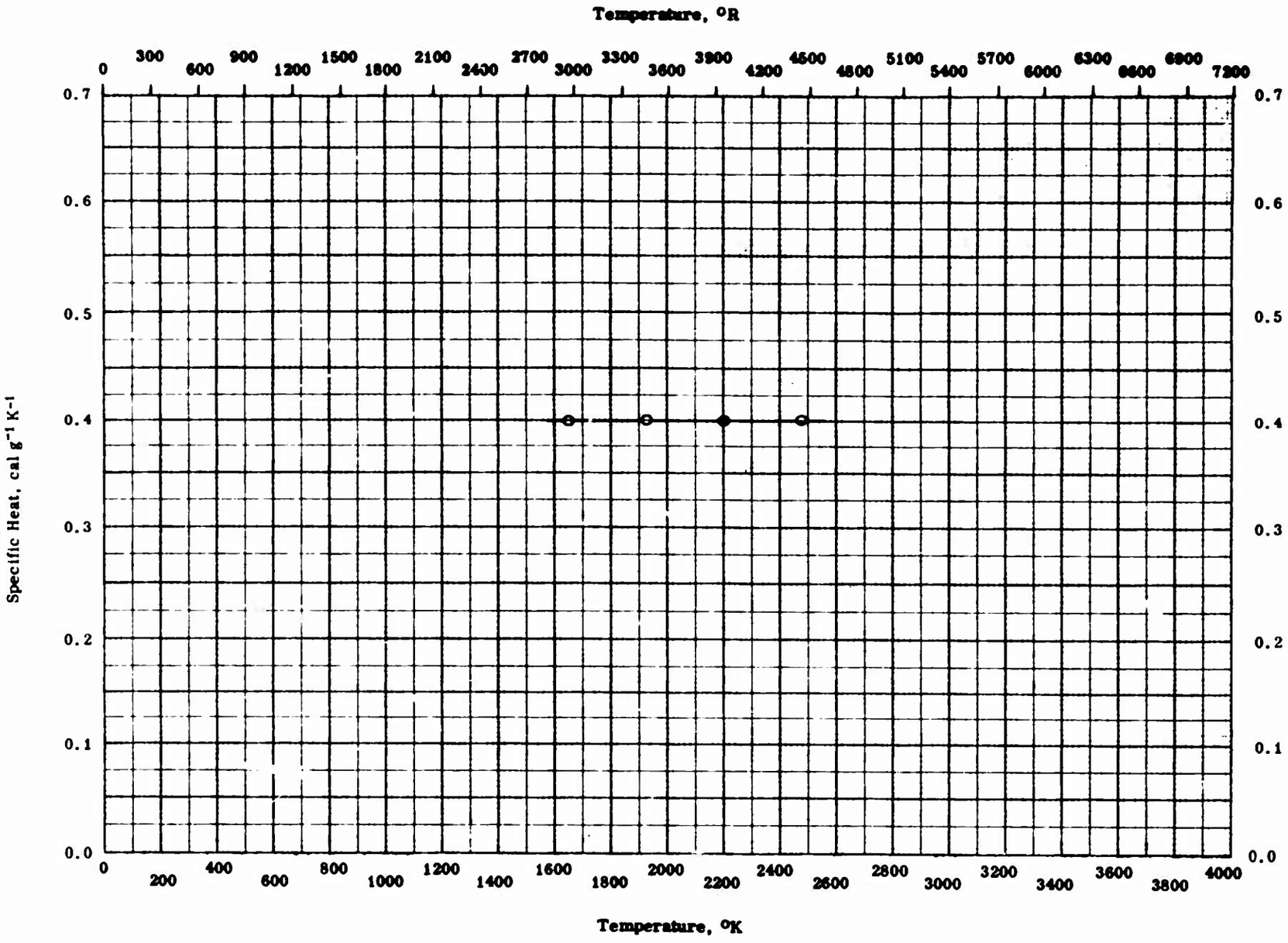


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade CFZ)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade CFZ)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-22	293-373		Grade CFZ graphite, National Carbon Co.; bulk density 1.91 g cm^{-3} at room temperature; specific resistance at room temperature parallel to grain 12.77 x 10^{-4} ohm-cm, across grain 16.08 x 10^{-4} ohm-cm; specimen dimensions 0.3 by 3/8 by 5 in.	Specimen taken from 14 in. diameter by 13 1/2 in. long block; measured parallel to grain; average data over several runs.
▽	64-22	293-3073		Same as above specimen except specimen dimensions are 1/2 by 1/2 by 5 in.	Specimen taken from same block as above specimen; measured parallel to grain.
◇	64-22	293-373		Same as above specimen except specimen dimensions are 0.3 by 3/8 by 5 in.	Specimen taken from same block as above specimen; measured across grain.
□	64-22	293-3073		Same as above specimen except specimen dimensions are 1/2 by 1/2 by 5 in.	Specimen taken from same block as above specimen; measured across grain

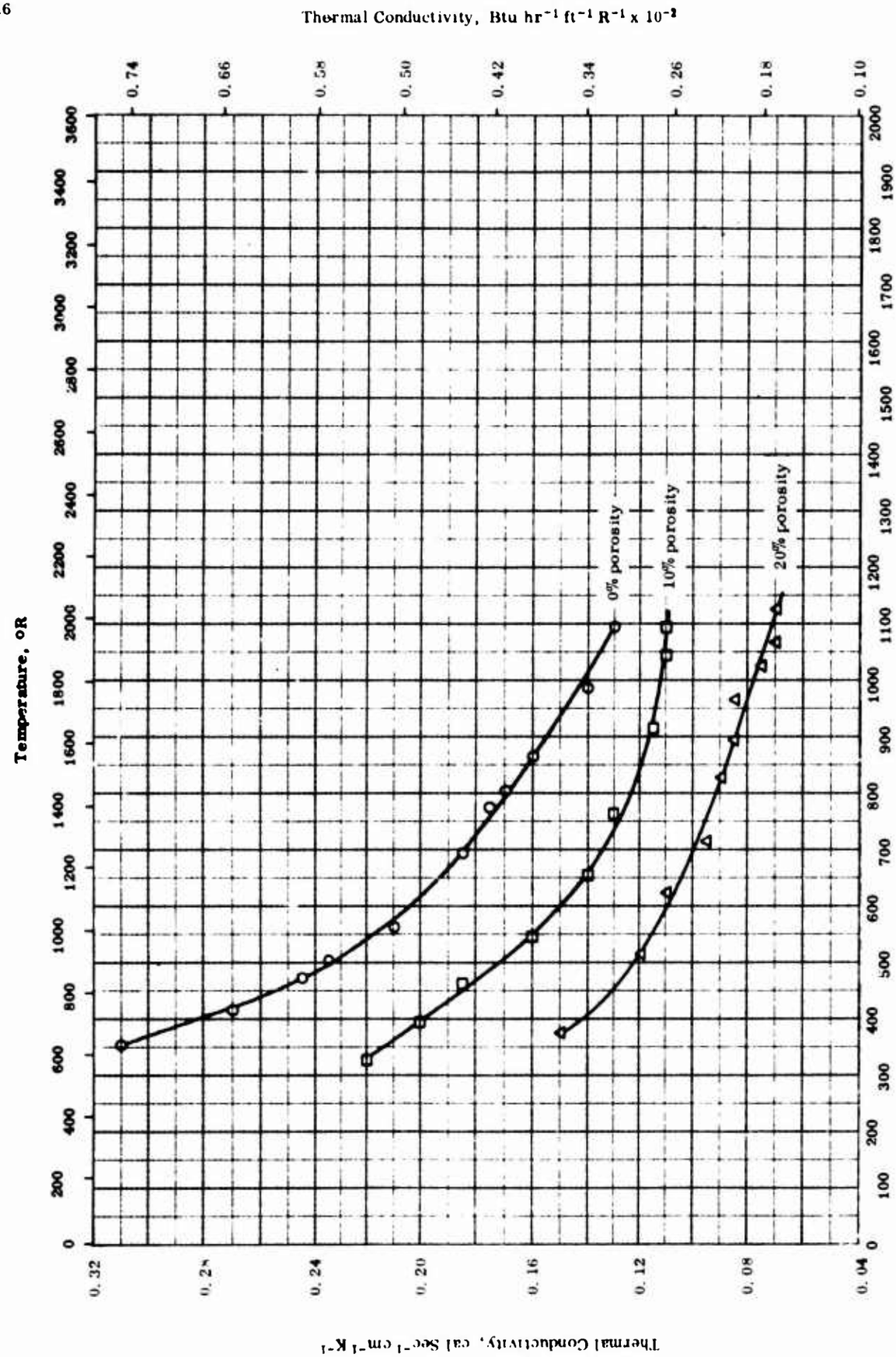


SPECIFIC HEAT -- GRAPHITE
(Grade CS)

SPECIFIC HEAT -- GRAPHITE
(Grade CS)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-7	1644-2477	≤5.0	Grade CS.	

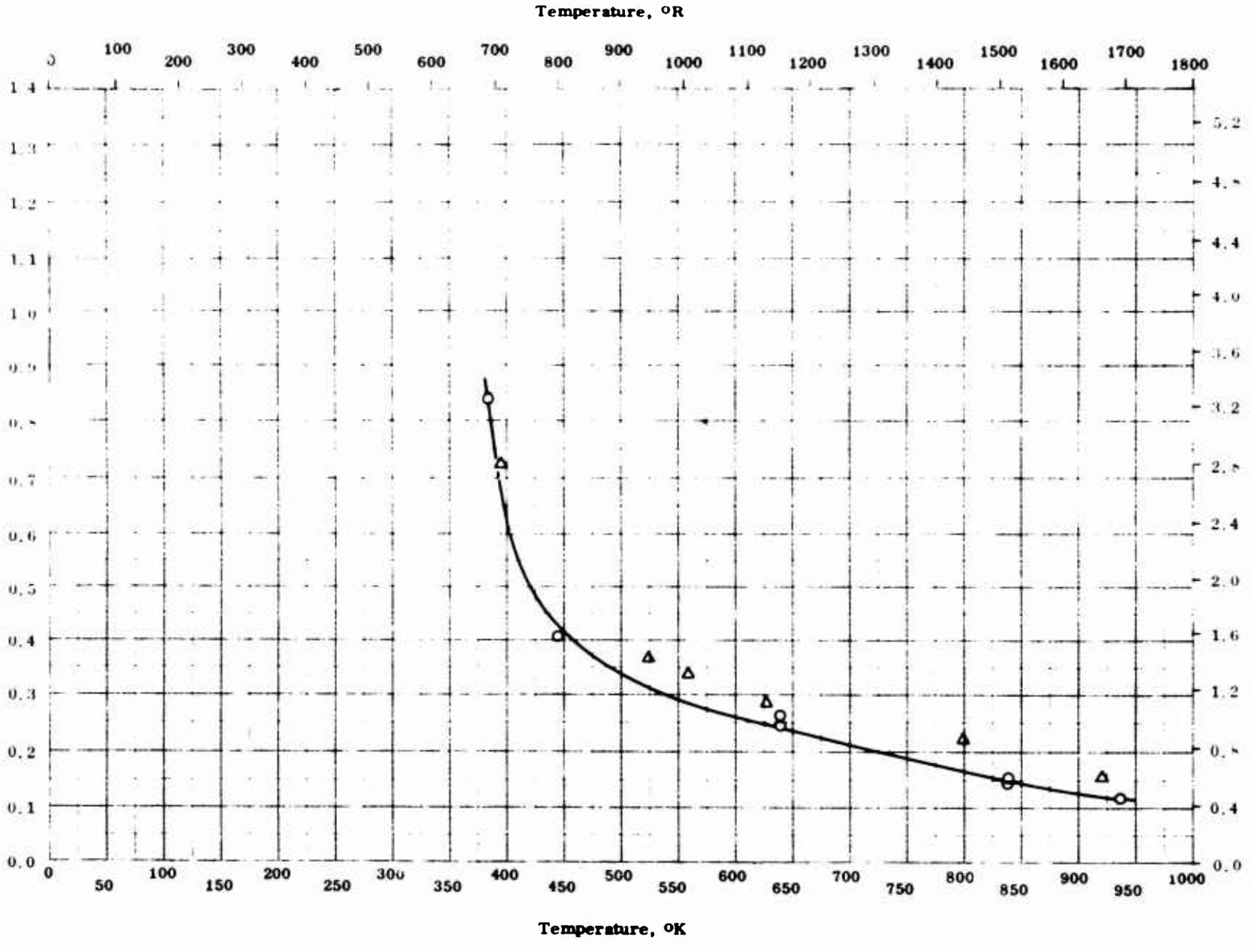


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade CS)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade CS)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-3	353-1093		Polycrystal; density 1.55 g cm^{-3}; 0% porosity.	
□	54-3	328-1073		Same as above; 9.8% porosity.	
△	54-3	378-1123		Same as above; 19.6% porosity.	

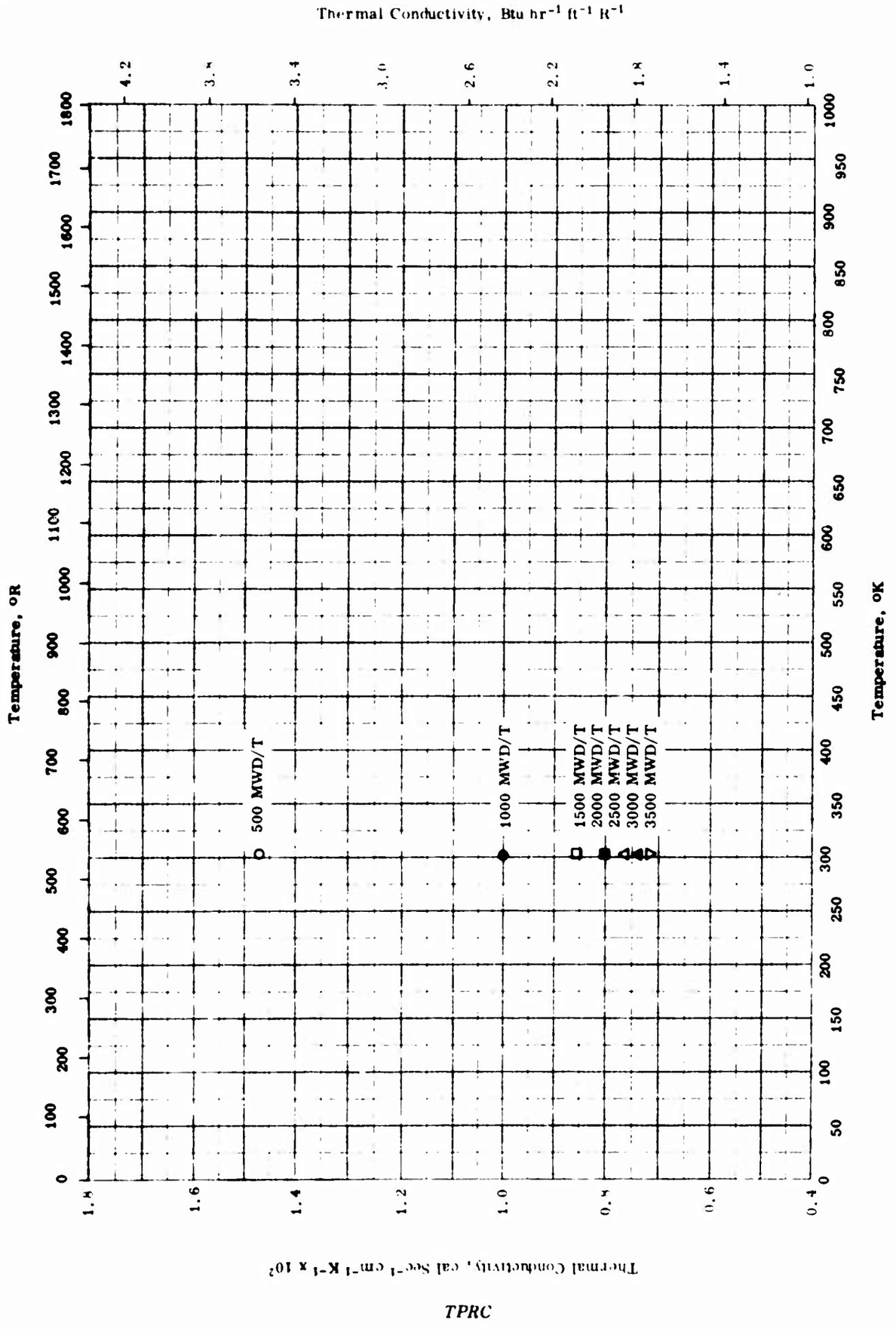


THERMAL DIFFUSIVITY -- GRAPHITE
(Grade CS)

THERMAL DIFFUSIVITY -- GRAPHITE
(Grade CS)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-7	385-936		From National Carbon Co.	Measured parallel to extrusion axis with a period temperature wave of 8.7 min.
△	60-7	394-922		Same as above.	Same as above except measured in a shorter period of temperature wave of 2.5 min.



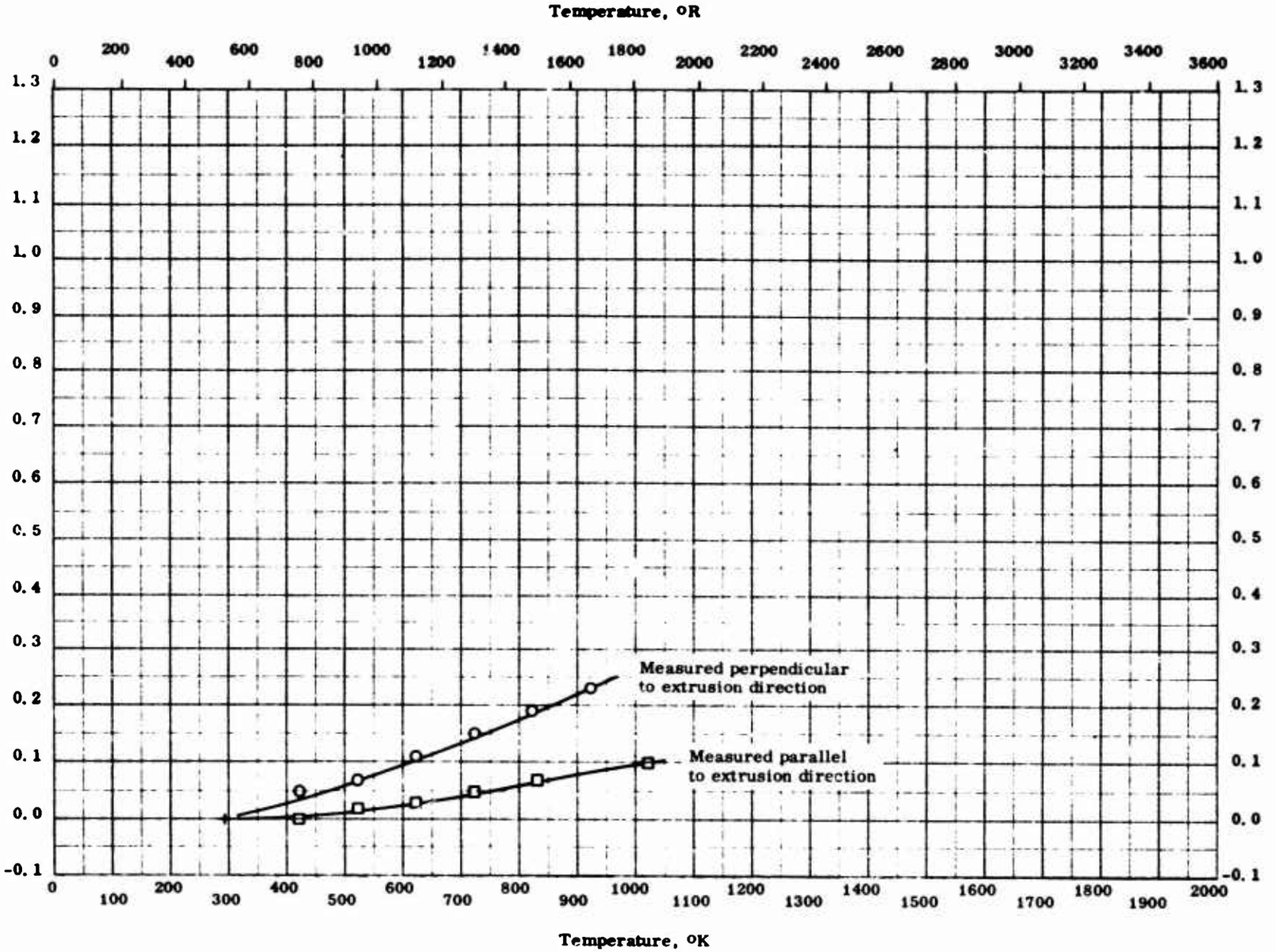
THERMAL CONDUCTIVITY -- GRAPHITE
(Grade CSF)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade CSF)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-12	303		Cleves coke from Gulf Oil Co.; standard pitch (Barrett no. 2 medium hard coal tar pitch).	Purified; irradiated and received 500 MWD/T exposure.
●	57-12	303		Same as above.	Same as above except 1000 MWD/T exposure.
□	57-12	303		Same as above.	Same as above except 1500 MWD/T exposure.
■	57-12	303		Same as above.	Same as above except 2000 MWD/T exposure.
△	57-12	303		Same as above.	Same as above except 2500 MWD/T exposure.
▲	57-12	303		Same as above.	Same as above except 3000 MWD/T exposure.
▽	57-12	303		Same as above.	Same as above except 3500 MWD/T exposure.

TPRC

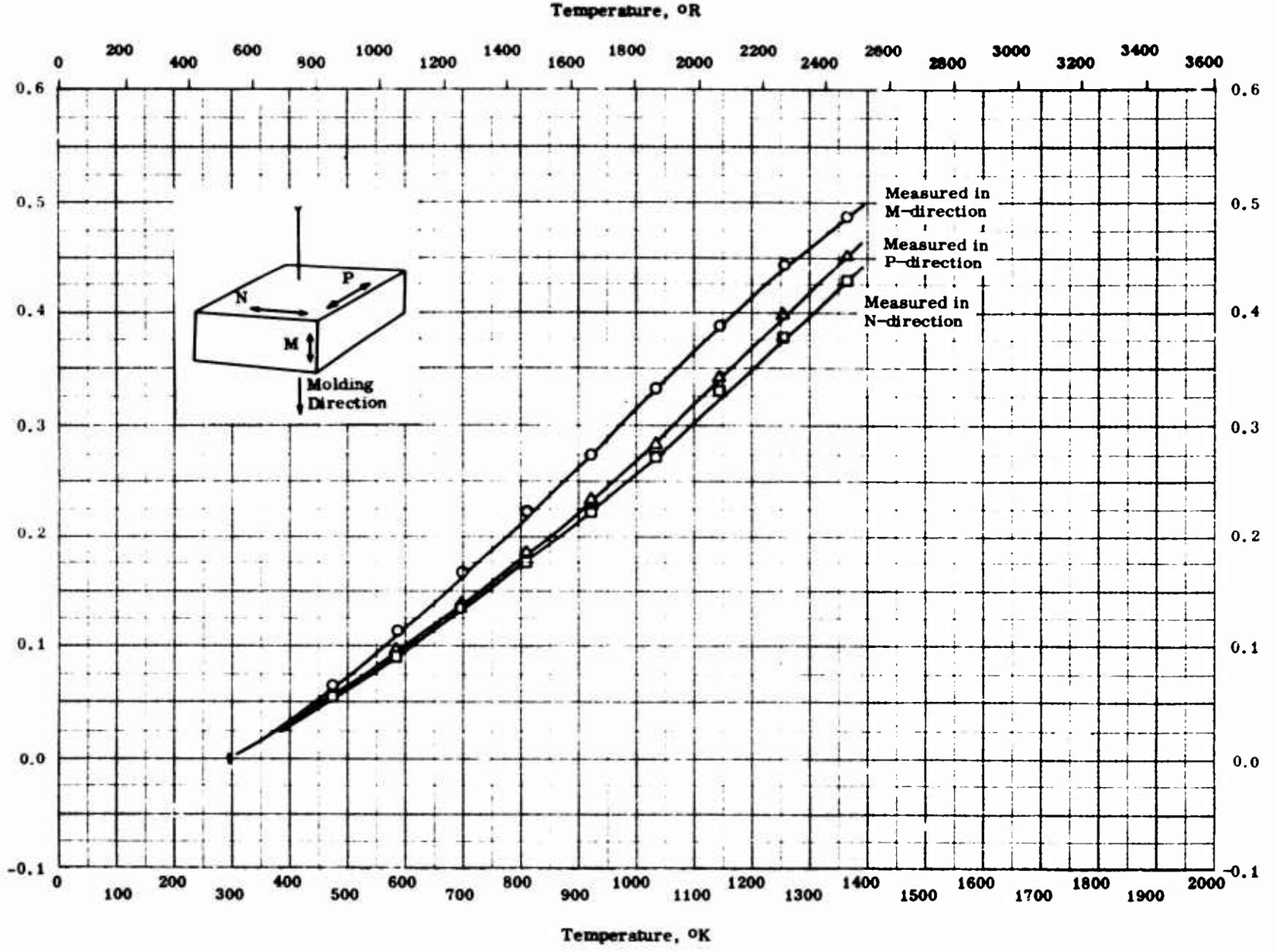


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade CSF)

THERMAL LINEAR EXPANSION — GRAPHITE
(Grade CSF)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	56-58	423-923		Grade CSF graphite; multicrystalline.	Extruded; average of 6 samples measured perpendicular to direction of extrusion.
□	56-58	423-1023		Same as above.	Same as above except measured parallel to direction of extrusion.

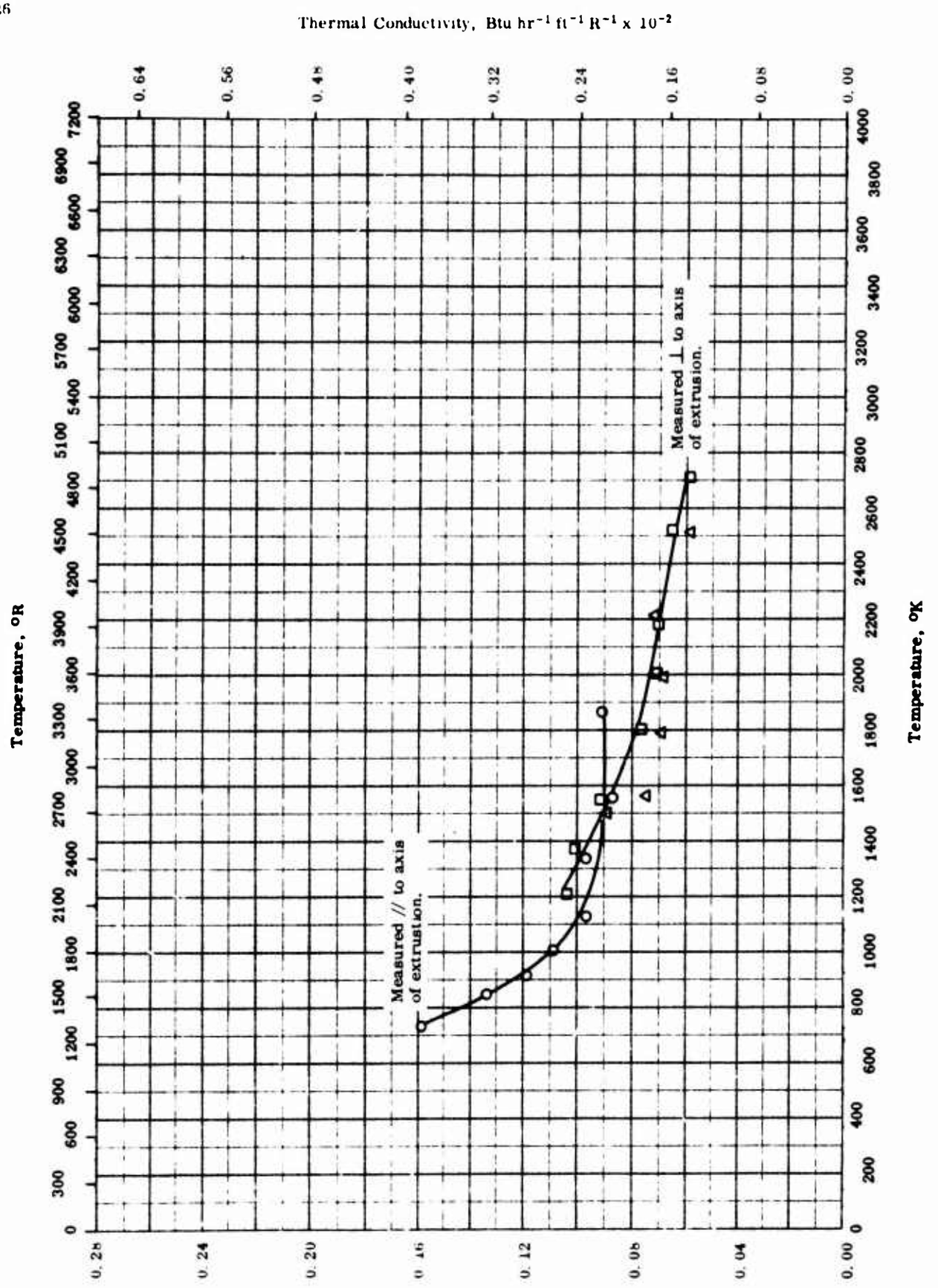


THERMAL LINEAR EXPANSION — GRAPHITE
(Grade EH)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade EH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-23	300-1367		Grade EH graphite, Speer Carbon Co.; specimen dimensions 1/4 in. diameter by 2 in. long; max filler particle size 0.005 in. [Author's design: block no. 0601]	Specimen prepared from graphite flour mixed with coal tar pitch, impregnated with coal tar pitch, molded, and graphitized at above 4100 F; heated in an atm of helium with heating rate of 540 F hr^{-1} and soaked 1/2 hr at 2000 F; measured parallel to grain direction.
□	59-23	300-1367		Same as above specimen.	Same as above specimen except measured perpendicular to grain direction.
△	59-23	300-1367		Same as above specimen.	Same as above specimen.

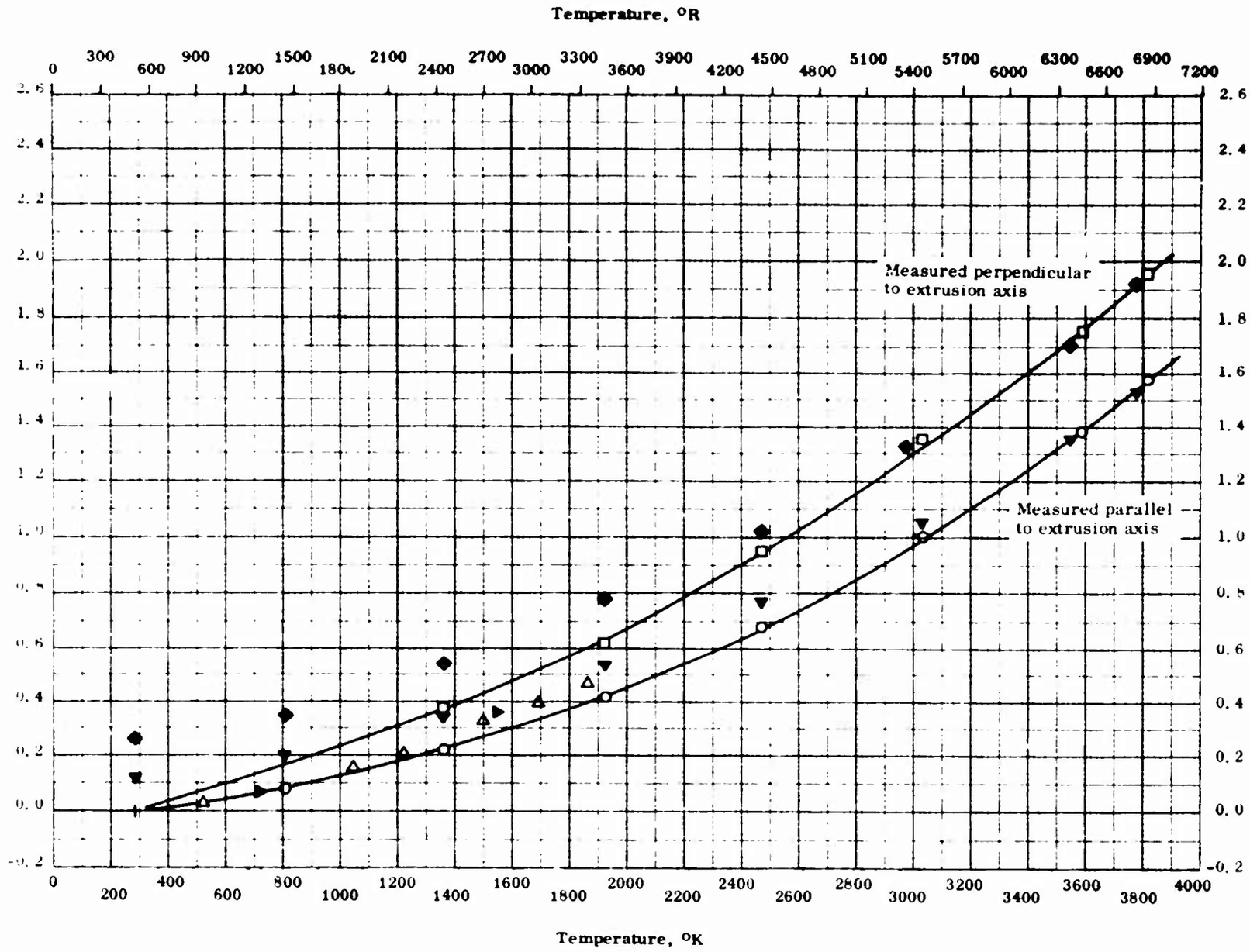


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade GBE)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade GBE)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-4	789-1869	± 5	Type GBE; polycrystal; density 99.6 lb ft^{-3}.	Extruded; measured parallel to axis of extrusion.
□	56-9	1200-2719	± 8	Type GBE; polycrystal; extrememly coarse grained and fragile with voids and fissures up to 1/8 in.; density 98 lb ft^{-3} and ratio of electric resist. normal and parallel to extrusion axis 1.18.	Extruded; measured perpendicular to axis of extrusion; data read from curve with max deviation 8% approximately.
△	56-9	1500-2510	± 8	Same as above.	Subsequent cooling of above sample.



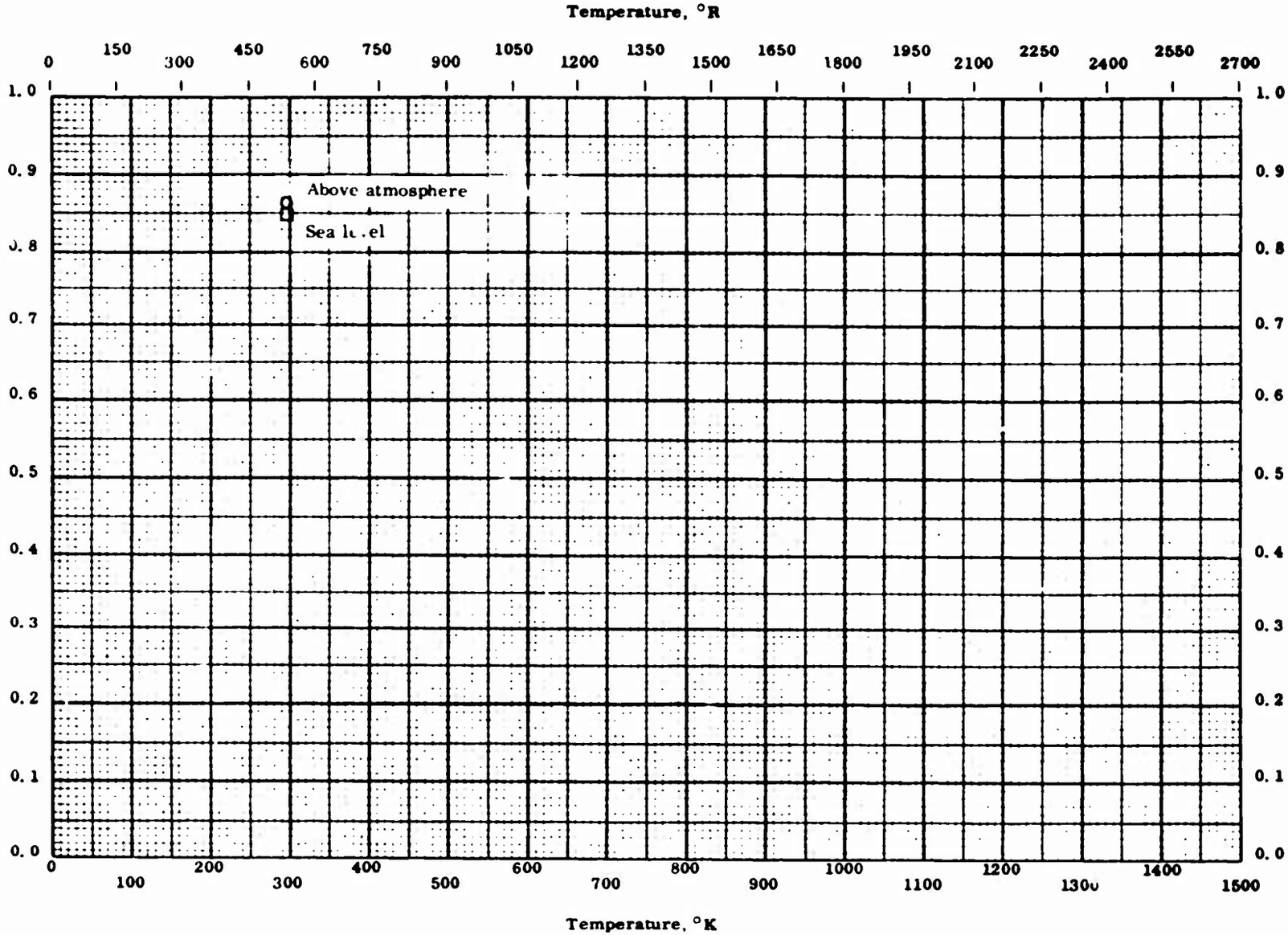
THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade GBE)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade GBE)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ%	Sample Specifications	Remarks
○	56-9	293-3911		Grade GBE graphite, Speer Carbon Co.; extremely coarse grained and fragile structure; voids up to 0.125 in. in dia; density 98 lb ft^{-3}; anistropy ratio 1.18; multicrystalline.	Measured parallel to axis of extrusion; heating cycle.
▼	56-9	811-3811		Same as above.	Cooling data for above specimen.
□	56-9	293-3811		Same as above.	Measured perpendicular to axis of extrusion; heating cycle.
◆	56-9	811-3811		Same as above.	Cooling data for above specimen.
△	56-4	293-1864		Grade GBE graphite, Speer Carbon Co.; density 99.6 lb ft^{-3}.	Heating cycle.
▶	56-4	722-1864		Same as above.	Cooling cycle for above specimen.

TPRC

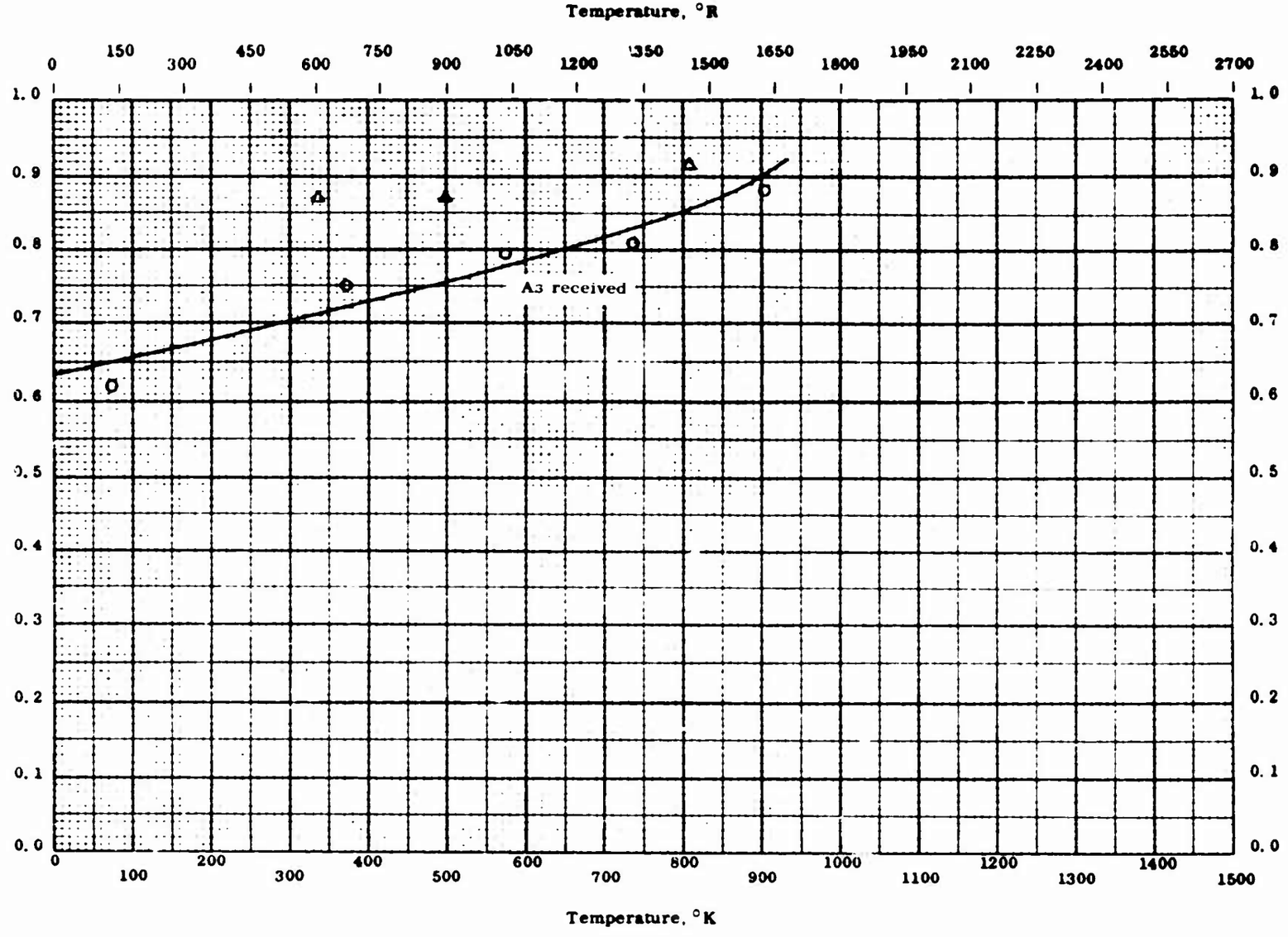


SOLAR ABSORPTANCE -- GRAPHITE
(Grade GBE)

SOLAR ABSORPTANCE -- GRAPHITE
(Grade GBE)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	298		National GBE.	Calculated from reflectance data; above atmosphere
□	57-41	298		Same as above.	Same as above; sea level.



TPRC

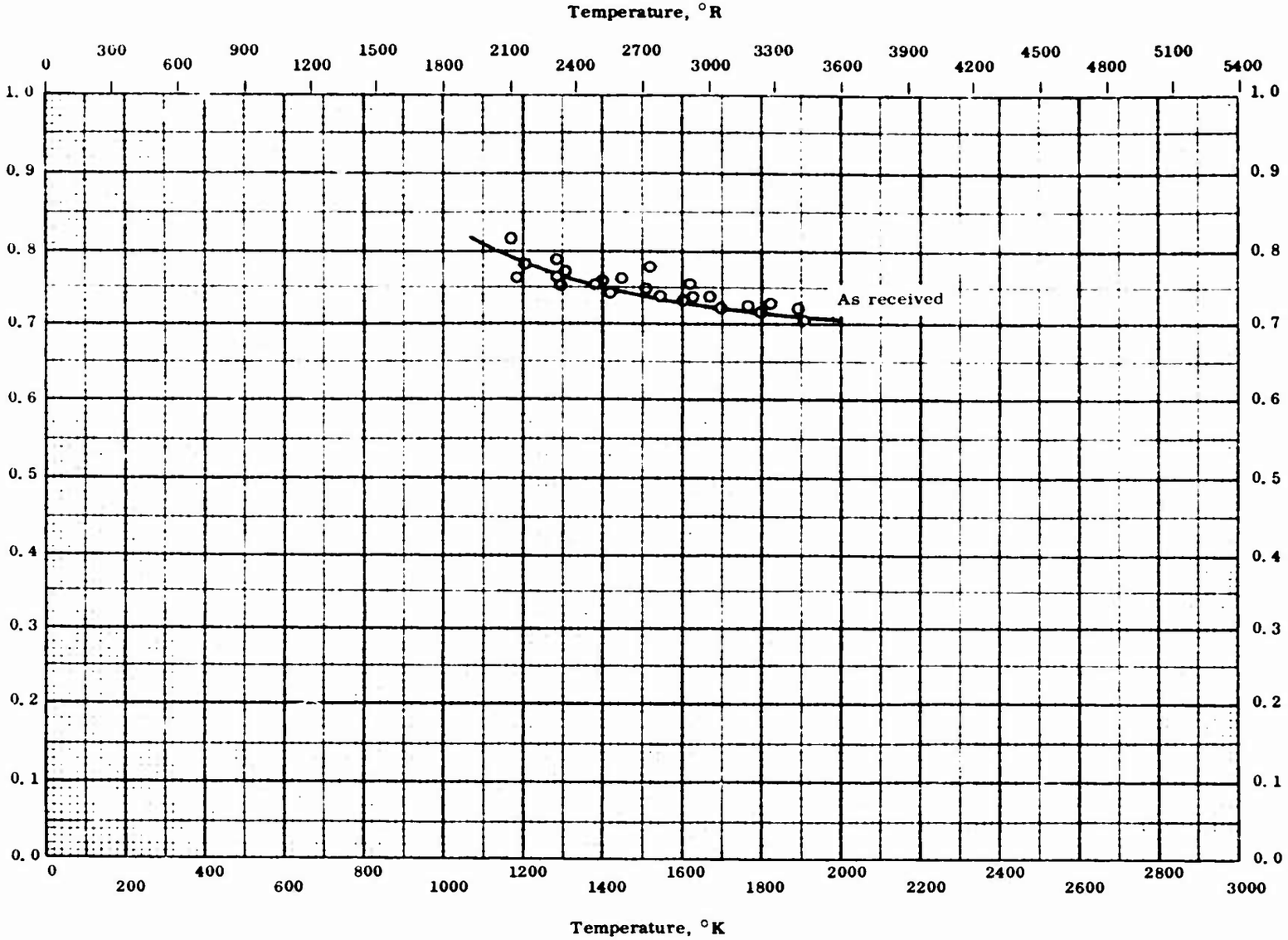
NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade GBE)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade GBE)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	58-21	75-1072		National GBE.	As received; measured in air, rapid oxidation above 900 K produced unrealistic emittance values, increasing temperature.
△	58-21	339-808		Same as above.	Same as above, decreasing temperature.

TPRC



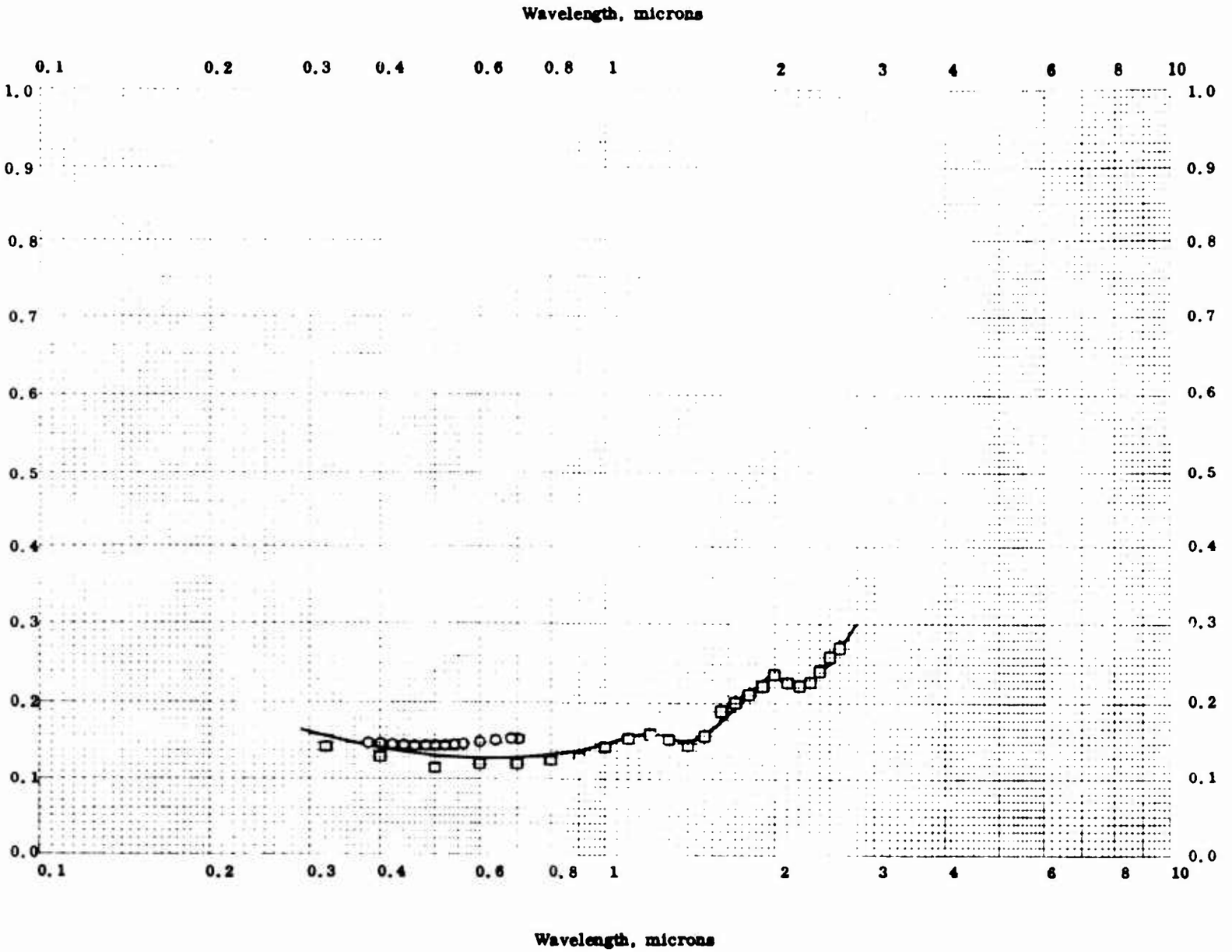
TPRC

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade GBE)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade GBE)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
O	57-41	0.665	1172-1905		National GBE.	As received; measured in vacuum.

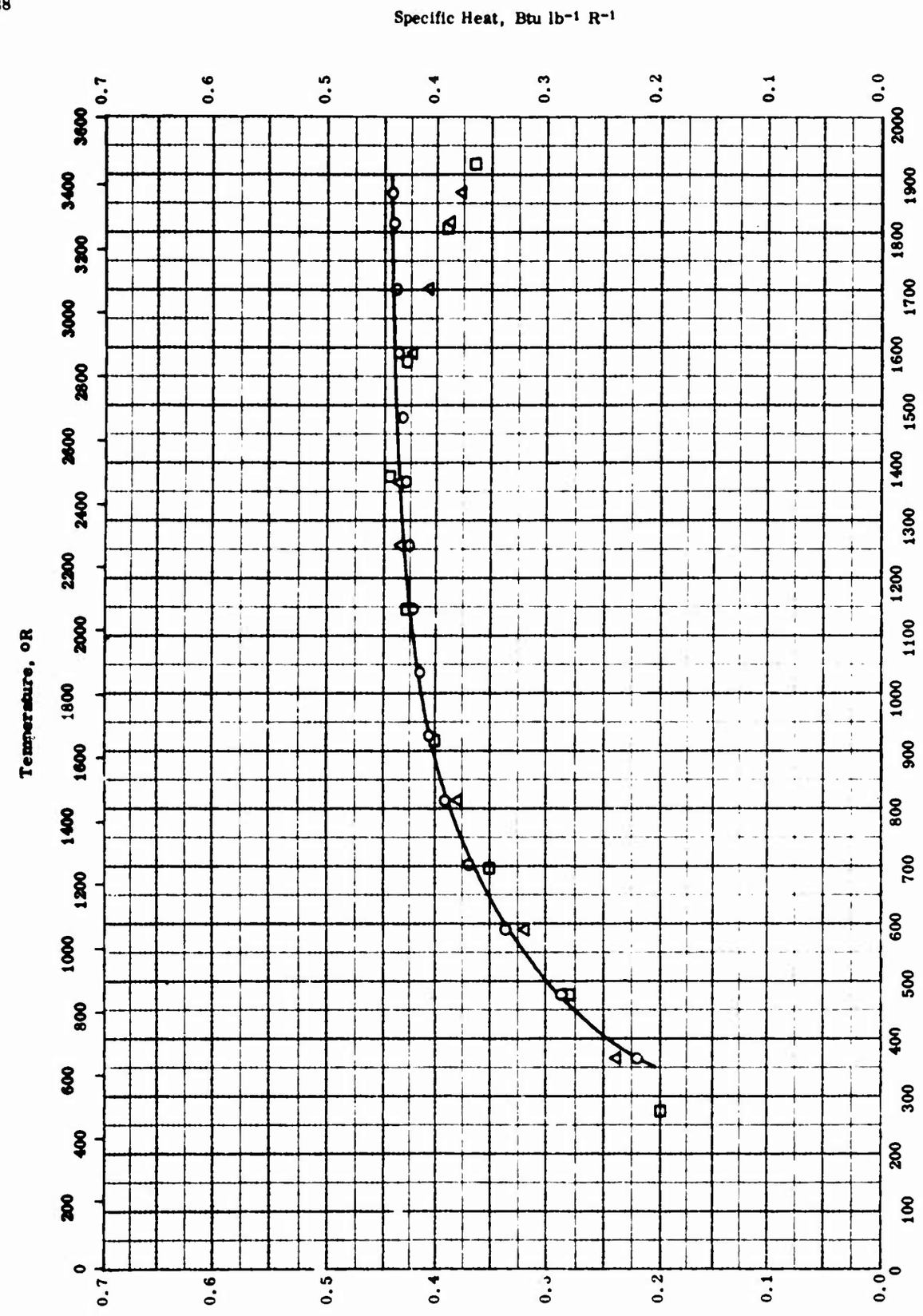


NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade C-1)

NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade GBE)

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	56-42	298	0.38-0.70		National GBE.	Data taken from smooth curve; 9 degrees illumination, hemispherical viewing; MgO as reference standard.
□	57-41	298	0.32-2.6	±4	Same as above.	Data taken from smooth curve; 6-9 degrees illumination, hemispherical viewing; $MgCO_3$ as reference standard.

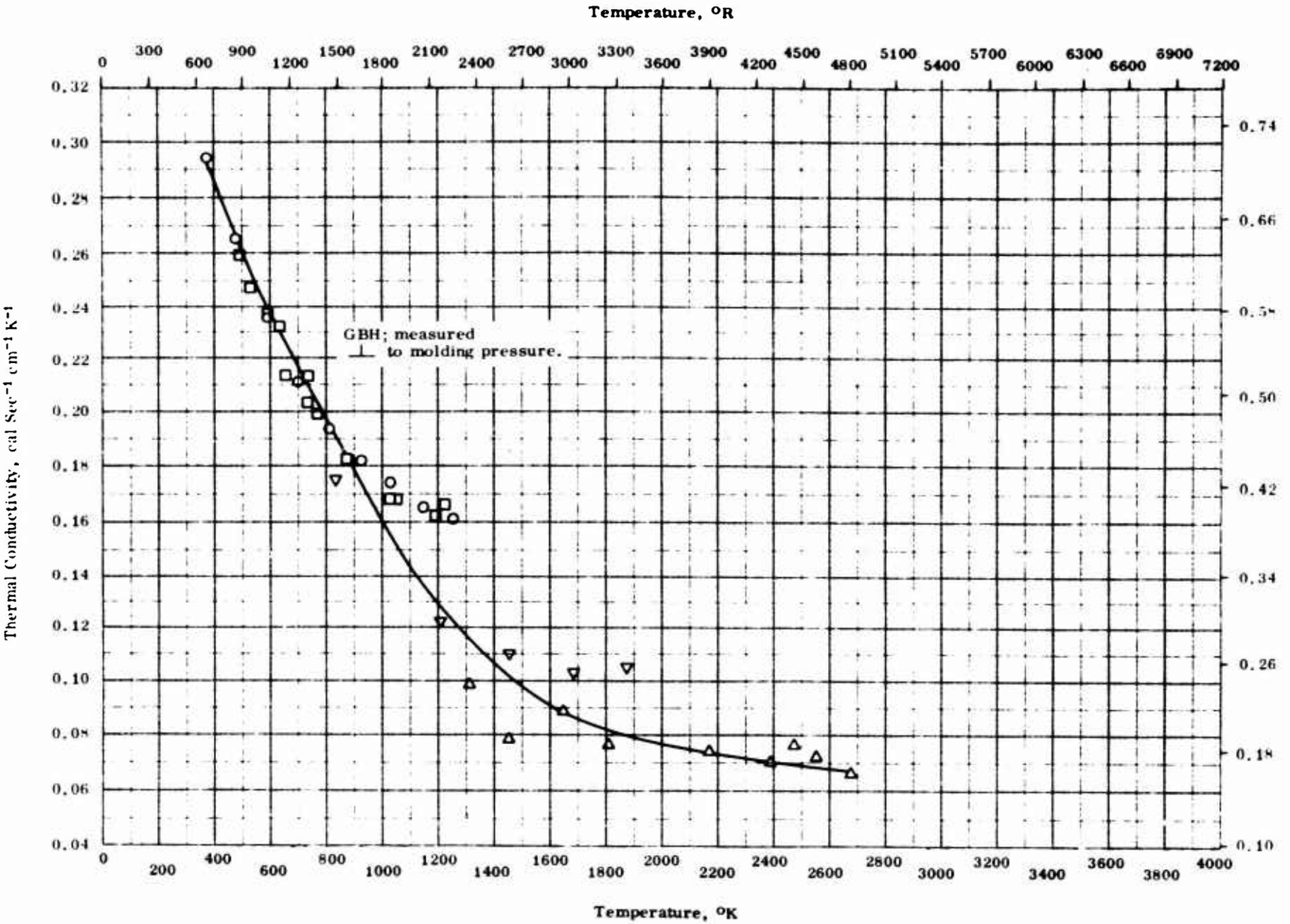


SPECIFIC HEAT -- GRAPHITE
(Grade GBH)

SPECIFIC HEAT -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-18	366-1922	±1.0	Grade GBH; density 109.0 lb ft^{-3} at 75 F.	Sealed under 95% argon - 5% hydrogen.
□	56-9	273-1922		Grade GBH; fine grained and uniform; density 110 lb ft^{-3}; anisotropic ratio 0.78.	
△	56-3	273-1922		Grade GBH.	Under helium atmosphere.

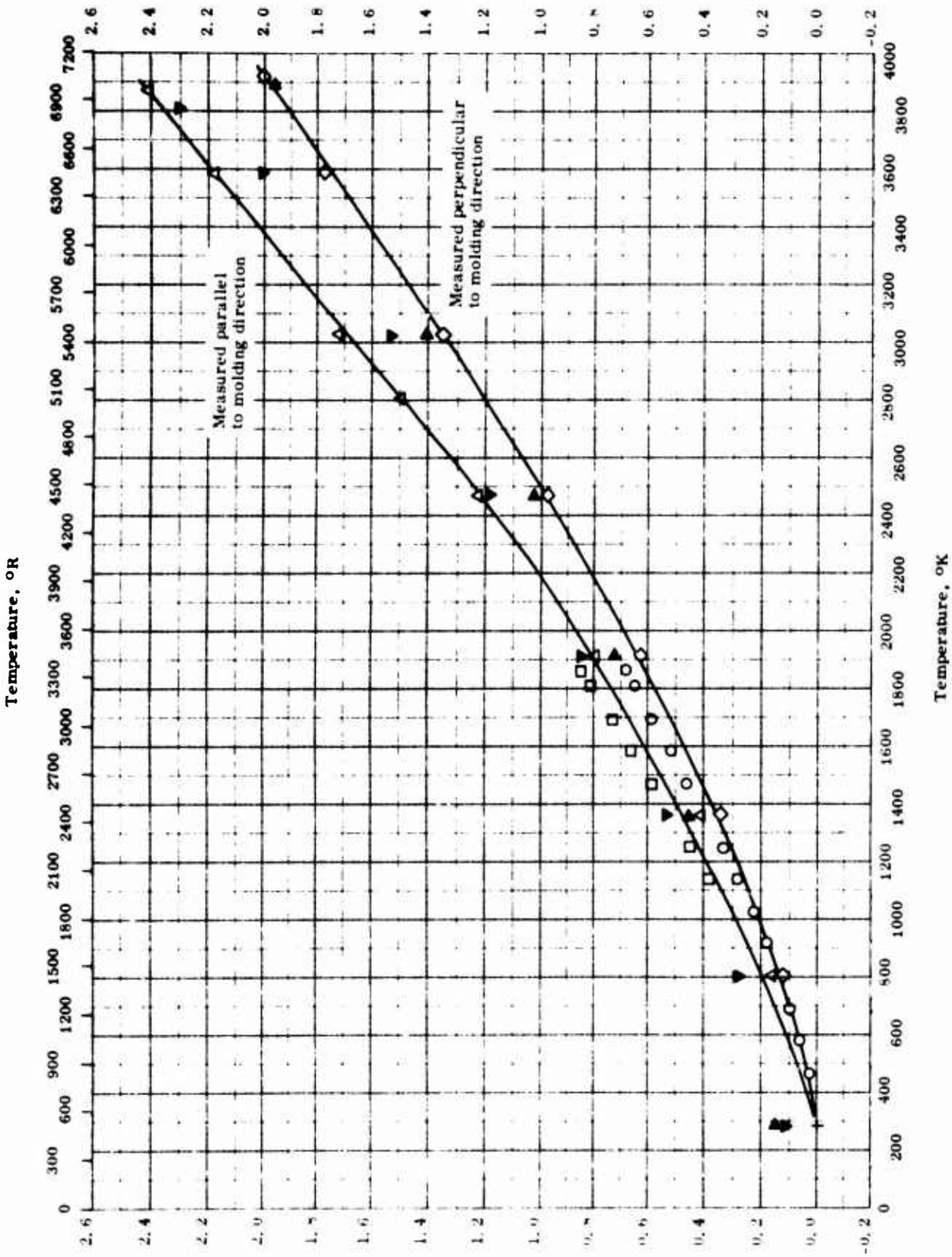


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade GBH)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-18	367-1255		Prepared by National Carbon Co.; density 0.0632 lb in^{-3} at 75 F.	Molded, measured perpendicular to molding direction.
□	56-3	484-1227		Polycrystal; density 1.75 gem^{-3}.	Molded; measured perpendicular to direction of molding.
△	56-9	1311-2672	± 8	Polycrystal; very fine grained and uniform structure; density 110 lb ft^{-3}; ratio of electrical resistivity normal and parallel to molding pressure 0.780.	Molded, measured perpendicular to direction of molding.
▽	56-6	829-1866		Density 110 lb ft^{-3}.	

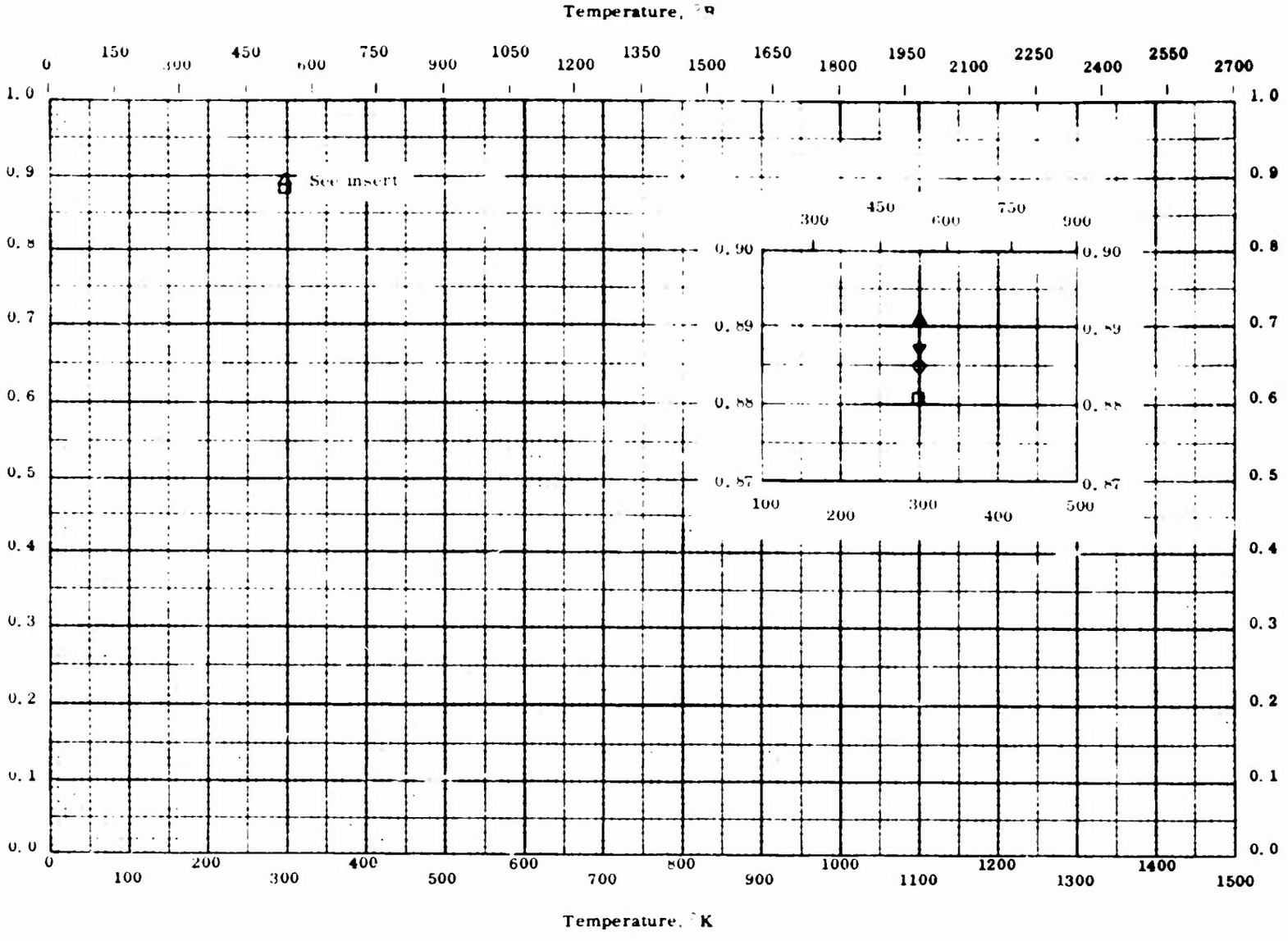


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade GBH)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ	Sample Specifications	Remarks
○	60-18	293-1867		Grade GBH graphite, National Carbon Co.; density 0.0632 lb in.$^{-3}$ at 75 F; specimen dimensions 3/8 in. diameter by 3 in. long.	Molded; heated at a rate less than 5 F min^{-1}; measured perpendicular to direction of molding.
□	60-18	293-1867		Same as above specimen.	Same as above specimen except measured parallel to direction of molding.
△	56-9	293-3867		Grade GBH graphite; fine grained and uniform structure; density 110.4 lb ft^{-3}.	Measured parallel to direction of molding during heating cycle.
▼	56-9	293-3806		Same as above.	Cooling data for above specimen.
◇	56-9	293-3916		Same as above.	Same as above except measured perpendicular to direction of molding for heating cycle.
▶	56-9	293-3889		Same as above.	Cooling data for above specimen.



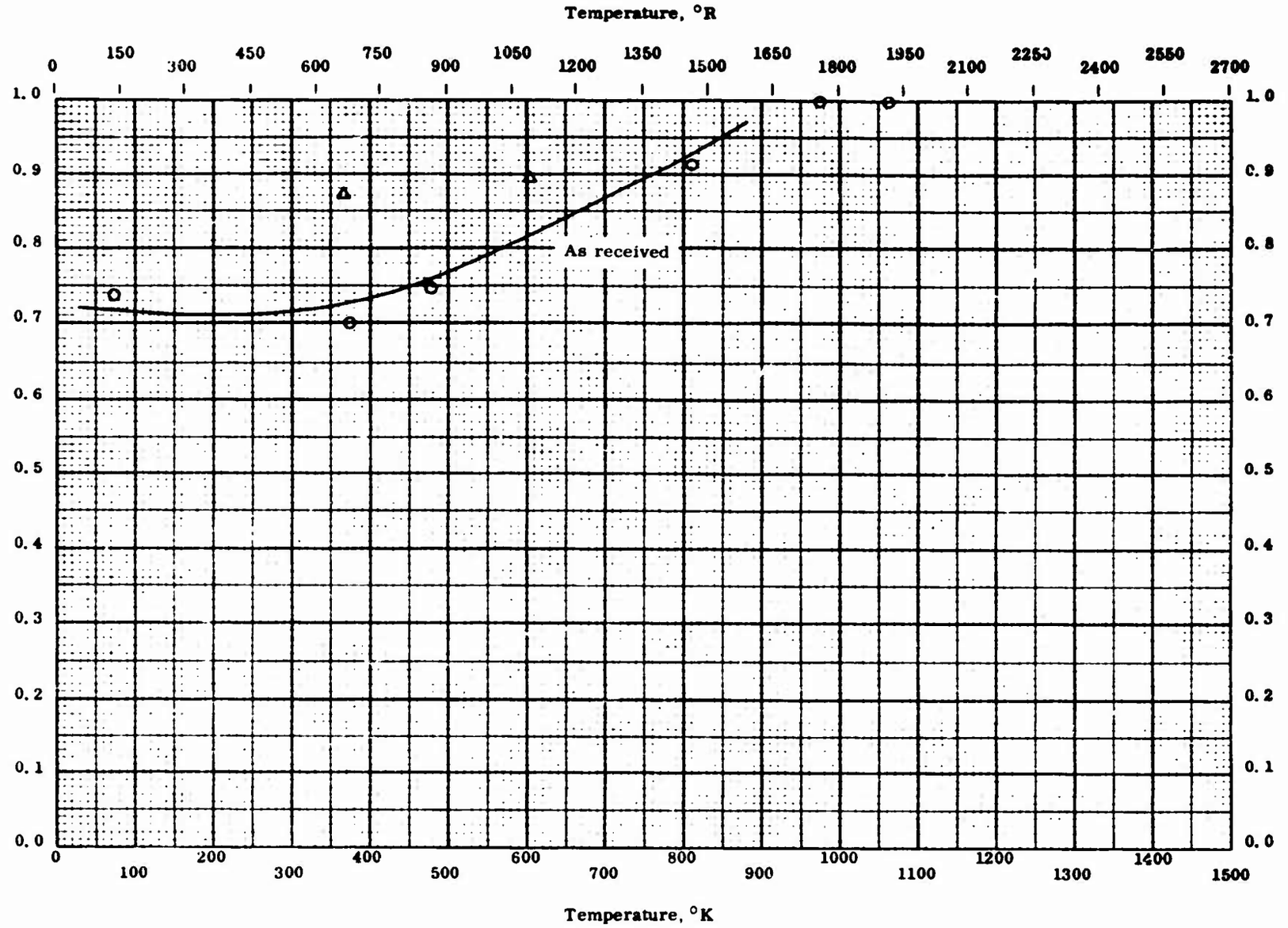
SOLAR ABSORPTANCE -- GRAPHITE
(Grade GBH)

SOLAR ABSORPTANCE -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	298		National GBH.	As received; calculated from reflectance data; above atmosphere.
△	57-41	298		Same as above.	Same as above; sea level.
□	57-41	298		Same as above.	Milled with a very fine cut; calculated from reflectance data; above atmosphere.
▽	57-41	298		Same as above.	Same as above; sea level.

TPRC



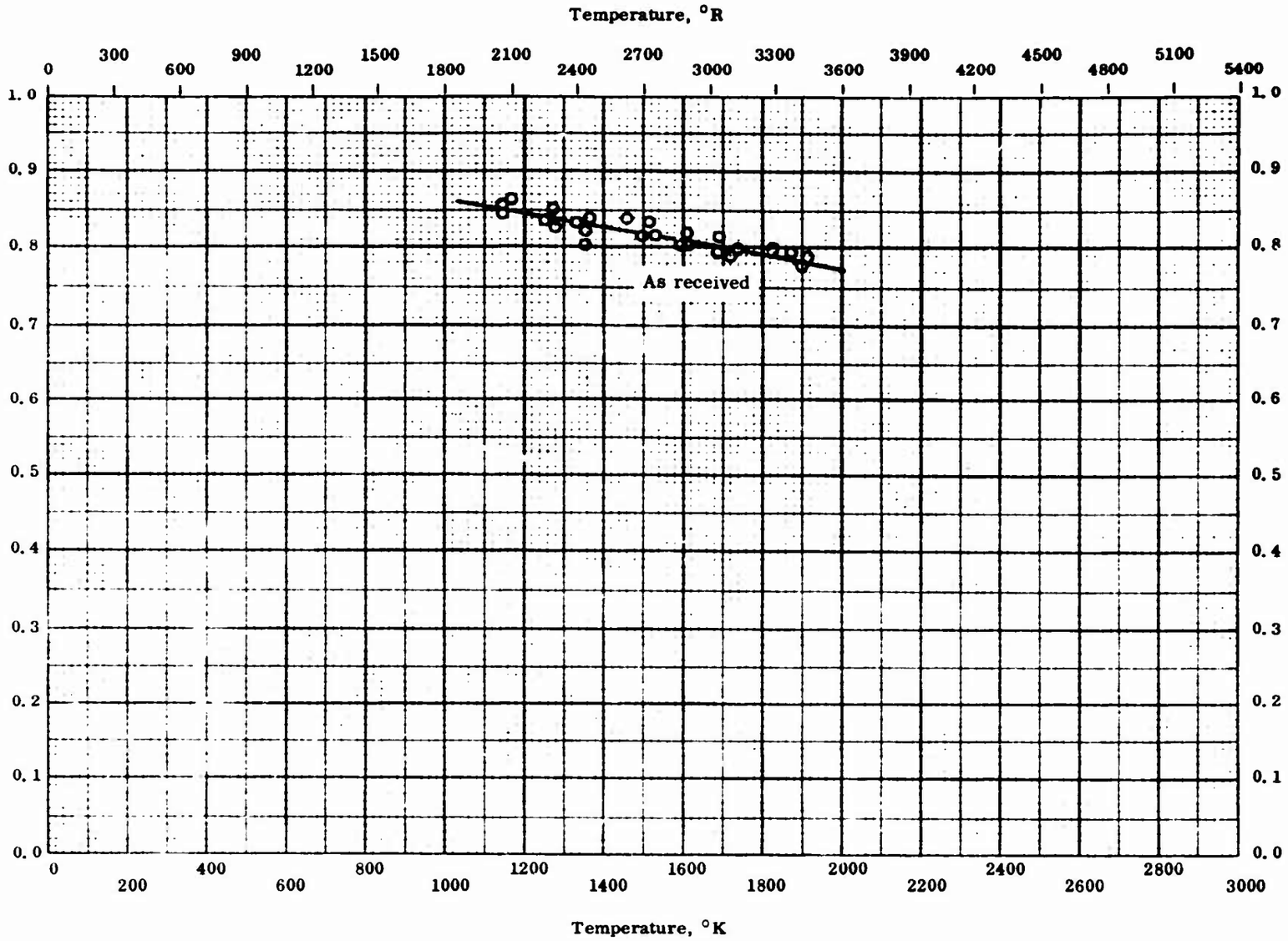
NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade GBH)

TPRC

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	58-21	75-1061		National GBH.	As received; measured in air; rapid oxidation above 900 K produced unrealistic emittance values; cycle 1 increasing temperature.
Δ	58-21	369-603		Same as above.	Same as above; cycle 1 decreasing temperature.

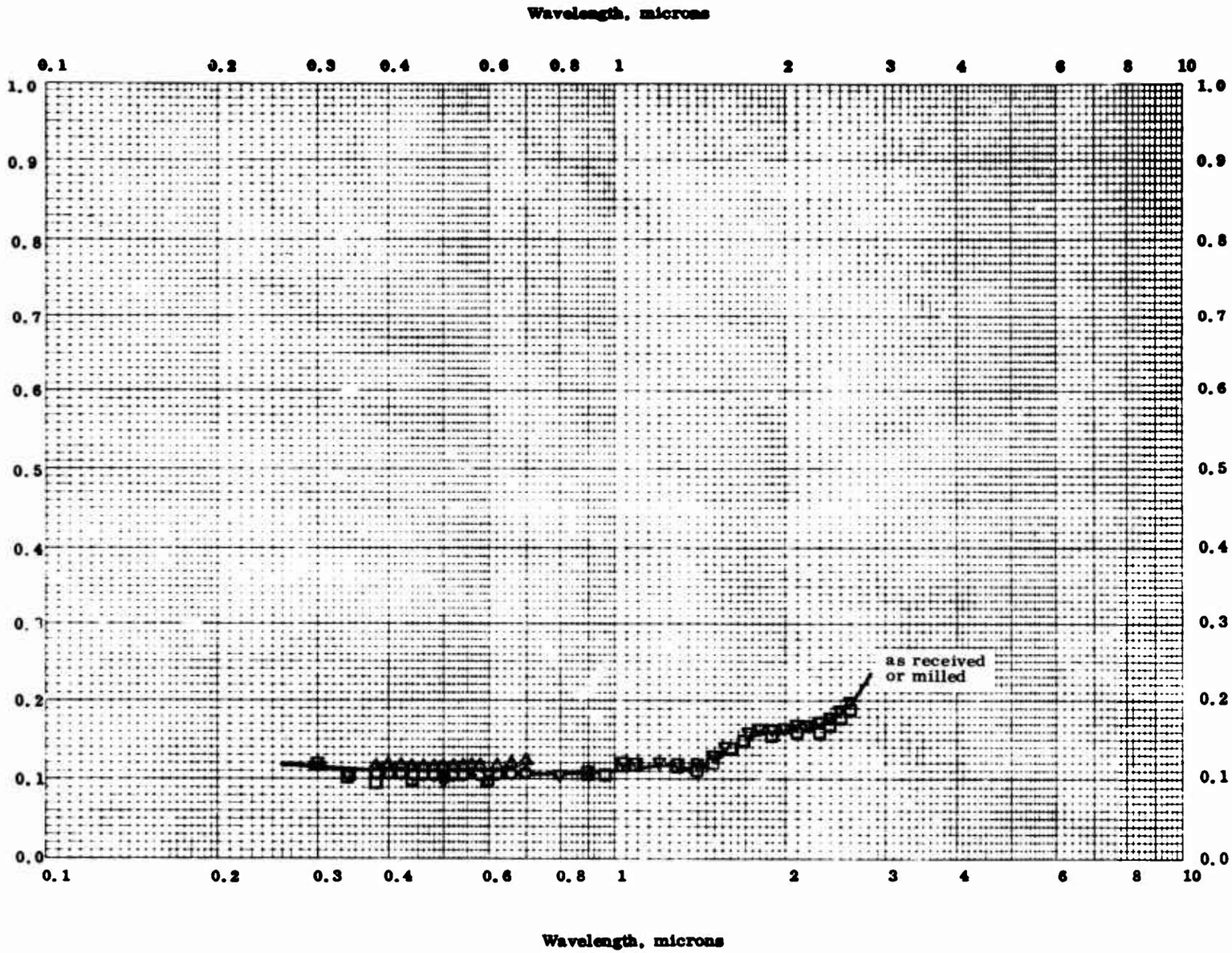


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade GBH)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-41	0.665	1144-1916		National GBH.	As received; measured in vacuum.

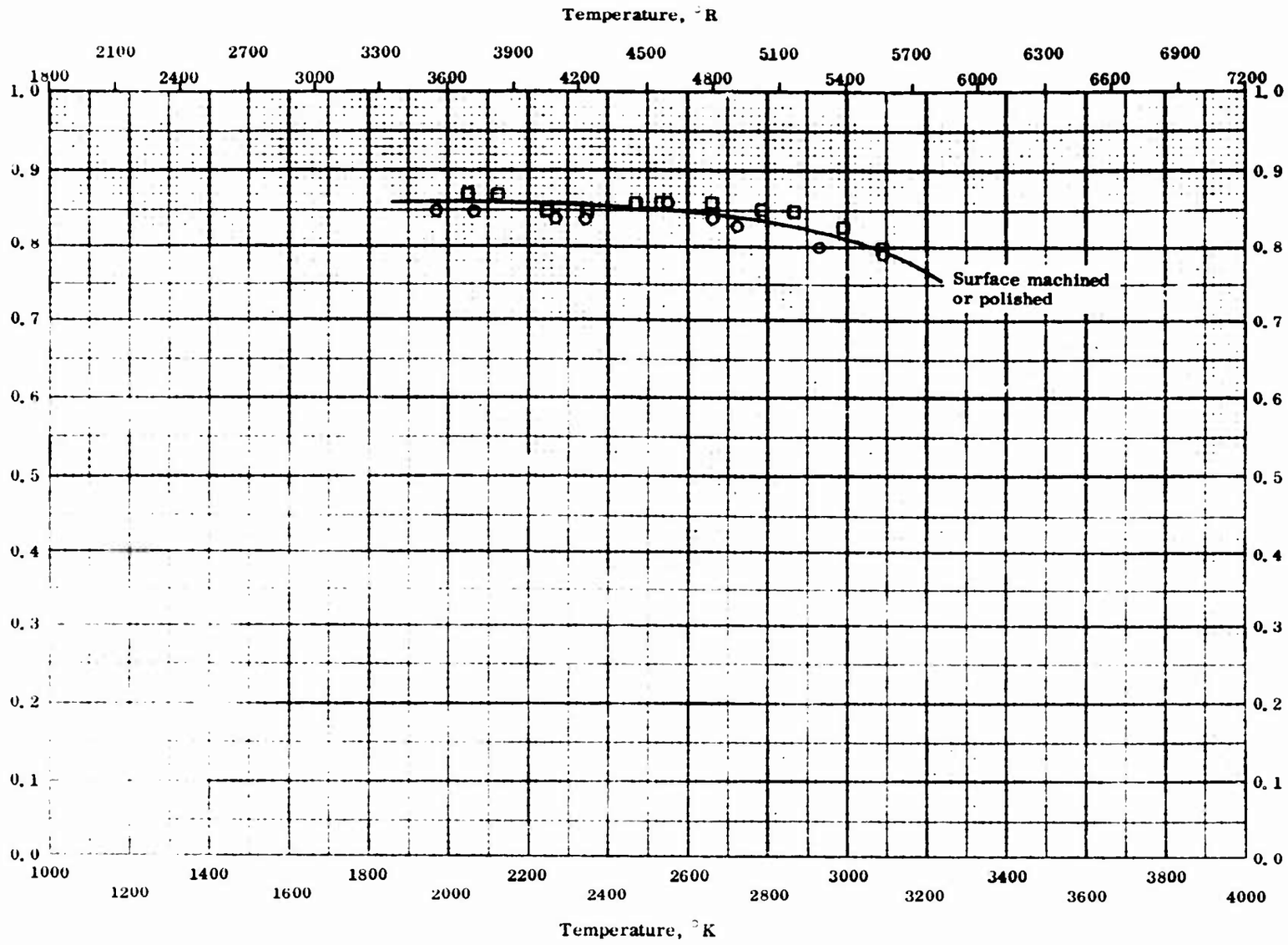


NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade GBH)

NORMAL SPECTRAL REFLECTANCE -- GRAPHITE
(Grade GBH)

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	56-42	298	0.38-0.70		National GBH.	As received; data taken from smooth curve; 9 degrees illumination, hemispherical viewing; MgO as reference standard.
△	56-42	298	0.38-0.70		Same as above.	Same as above; milled.
□	57-41	298	0.3-2.6	±4	Same as above.	As received; data taken from smooth curve; 6-9 degrees illumination, hemispherical viewing; $MgCO_3$ as reference standard.
▽	57-41	298	0.3-2.6	±4	Same as above.	Same as above; milled with a very fine cut.

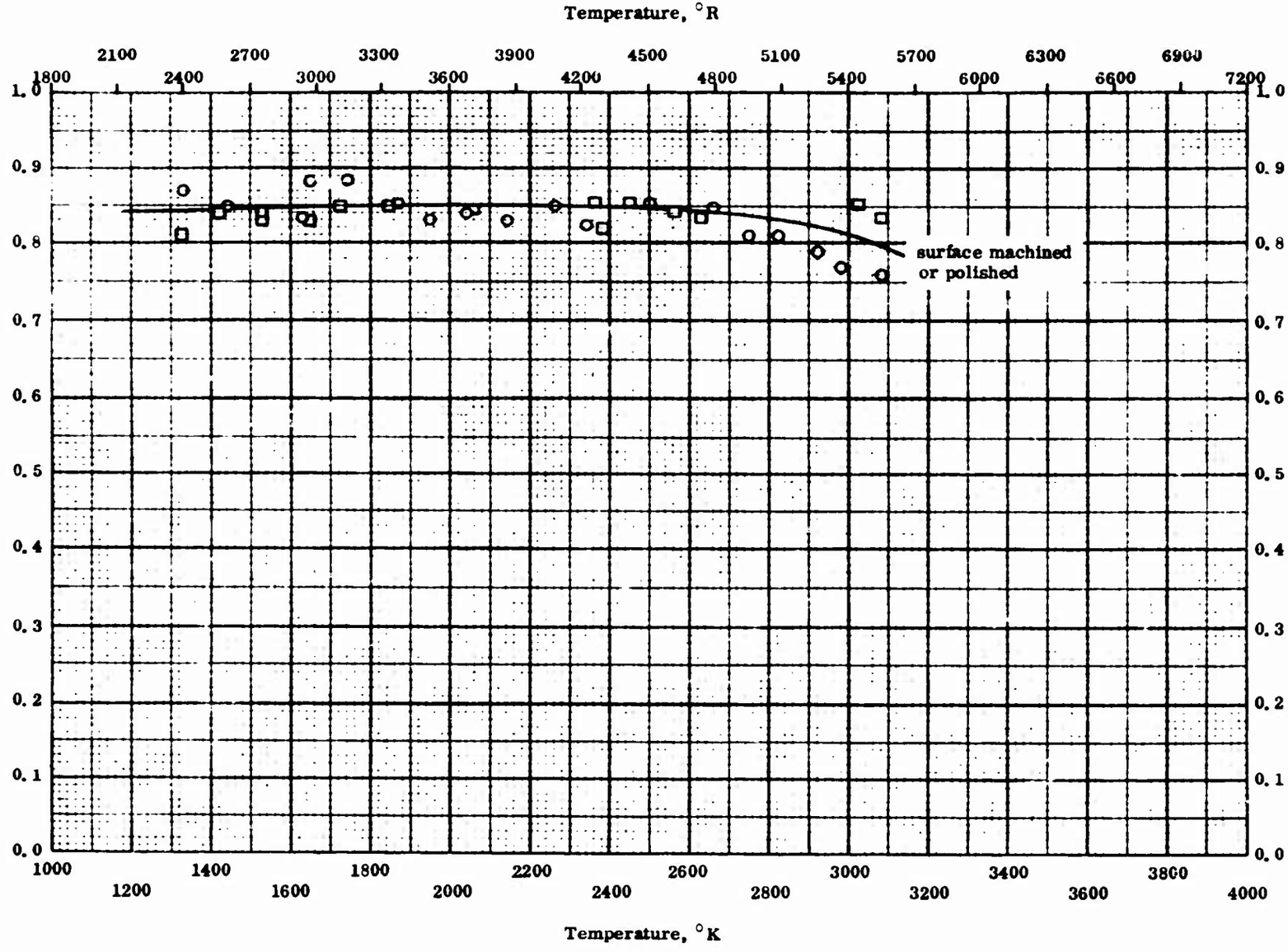


NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade H1LM)

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade H1LM)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-44	1973-3093		Great Lakes Carbon Corp., surface 63 μ in.; first sample.	Surface-machined and washed with alcohol and water; measured in vacuum for T < 2273 K and in argon (1 atm.) for T > 2273 K.
□	62-44	2053-3088		Same as above.	Polished with emery paper and silk cloth with a liquid polish (chromic oxide compound) and washed and cleaned in water; measured in vacuum for T < 2273 K and in argon (1 atm) for T > 2273 K.



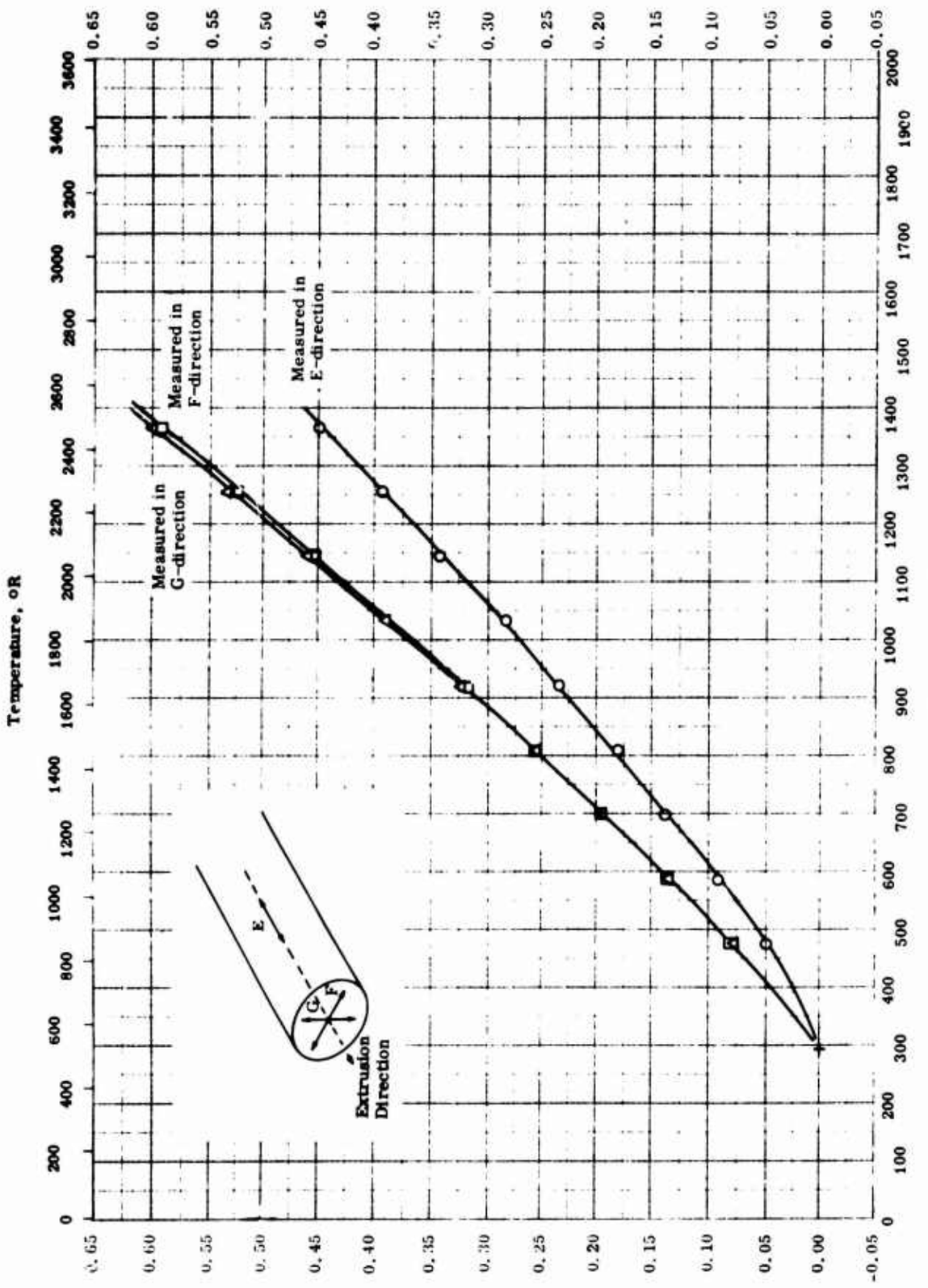
NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade H1LM)

Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade H1LM)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
O	62-44	0.65	1333-3083		Great Lakes Carbon Corp., surface 63μ in.; first sample.	Surface-machined, washed with alcohol and water; measured in vacuum for T < 2273 K and in argon (1 atm) for T > 2273 K.
□	62-44	0.65	1333-3083		Same as above.	Polished with emery papers and silk cloth with a liquid polish (chromic oxide compound) and washed and cleaned in water; measured in vacuum for T < 2273 K and in argon (1 atm) for T > 2273 K.

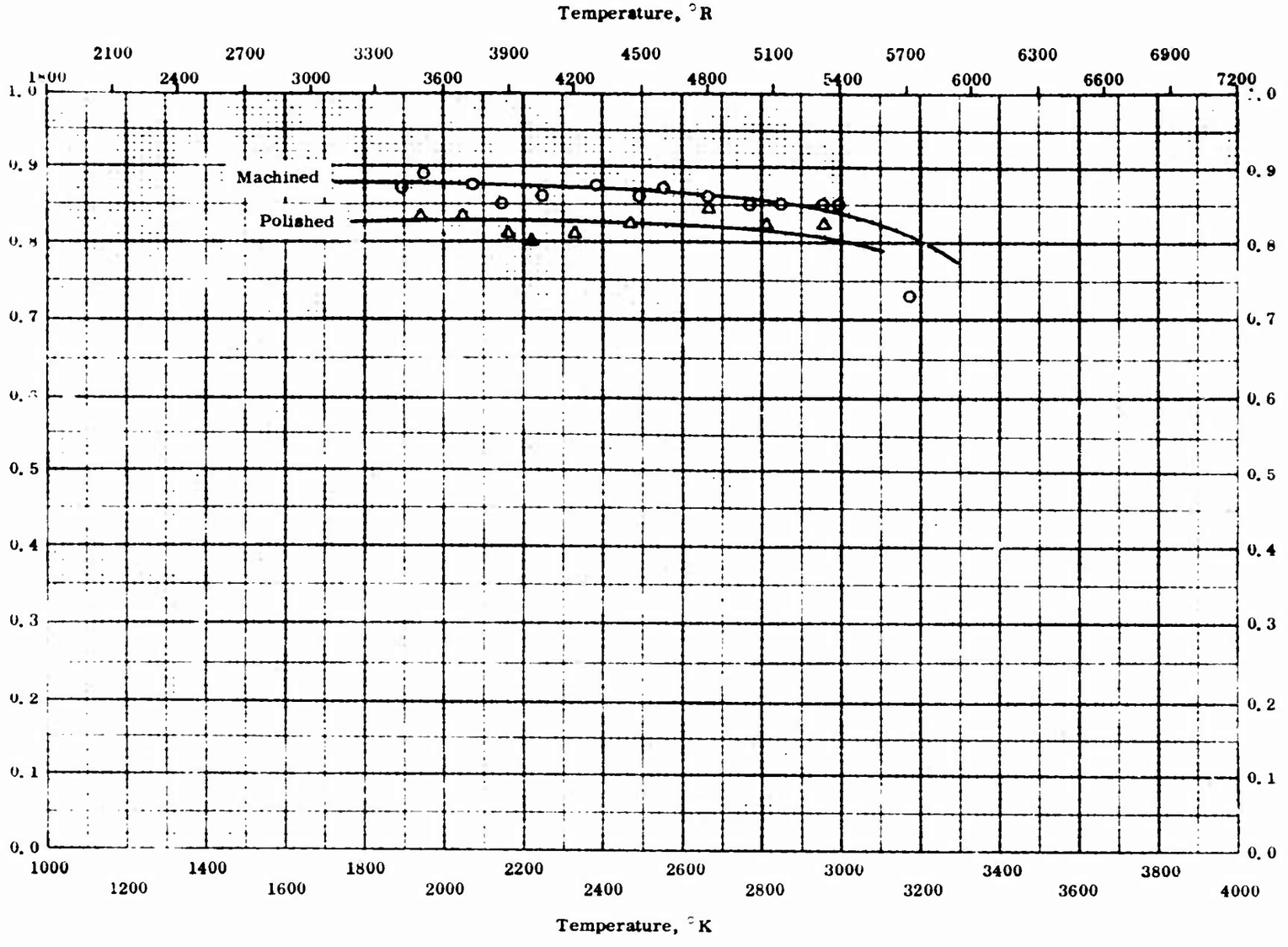


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade H3LM)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade H3LM)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-23	300-1367		Grade H3LM graphite, Great Lakes Carbon Co.; specimen dimensions 1/4 in. diameter by 2 in. long; max. filler particle size 0.06 in. [Author's design; block no. 0401]	Specimen prepared from petroleum coke mixed with coal tar pitch, impregnated with coal tar pitch, extruded, and graphitized at 5075 F; heated in helium atm. with heating rate of 540 F hr^{-1} and soaked 1/2 hr at 2000 F; measured parallel to grain direction.
□	59-23	300-1367		Same as above.	Same as above except measured perpendicular to grain direction.
△	59-23	300-1367		Same as above.	Same as above.



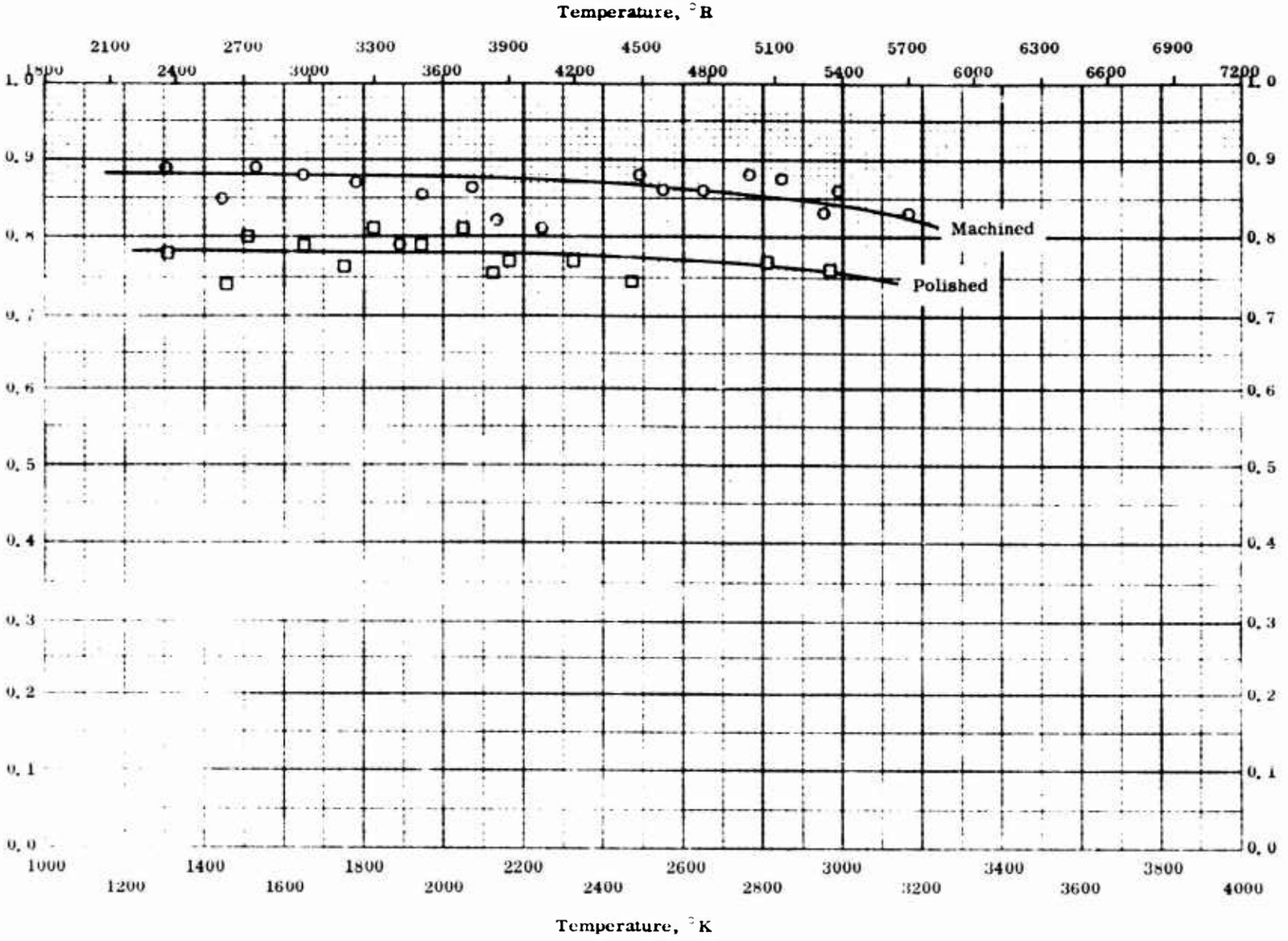
NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade H3LM)

TRRC

NORMAL TOTAL EMITTANCE -- GRAPHITE
(Grade H3LM)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-44	1898-3173		Great Lakes Carbon Corp.; surface 63 μ in.	Surface-machined and washed with alcohol and water; measured in vacuum for T < 2273 K and in argon (1 atm) for T > 2273 K.
△	62-44	1943-2958		Same as above.	Polished with emery paper and silk cloth with a liquid polish (chromic oxide compound) and washed and cleaned in water; measured in vacuum for T < 2273 K and in argon (1 atm) for T > 2273 K.

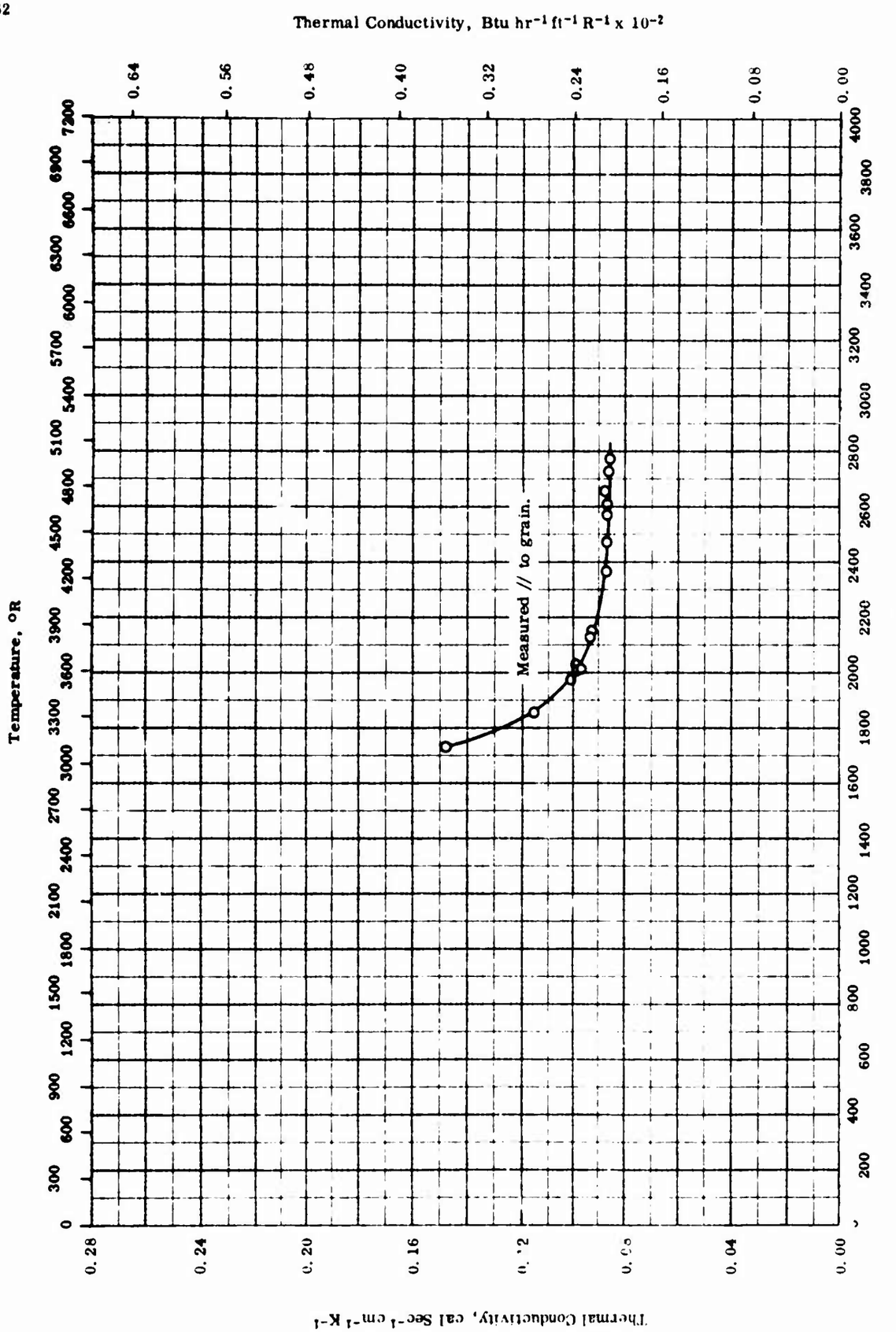


NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade H3LM)

NORMAL SPECTRAL EMITTANCE -- GRAPHITE
(Grade H3LM)

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	62-44	0.65	1303-3163		Great Lakes Carbon Corp.; surface 63μ in.	Surface-machined and washed with alcohol and water; measured in vacuum for T < 2273 K, in argon (1 atm) for T > 2273 K.
□	62-44	0.65	1308-2963		Same as above.	Polished with emery paper and silk cloth with a liquid polish (chromic oxide compound) and washed and cleaned in water; measured in vacuum for T < 2273 K and in argon (1 atm) for T > 2273 K.

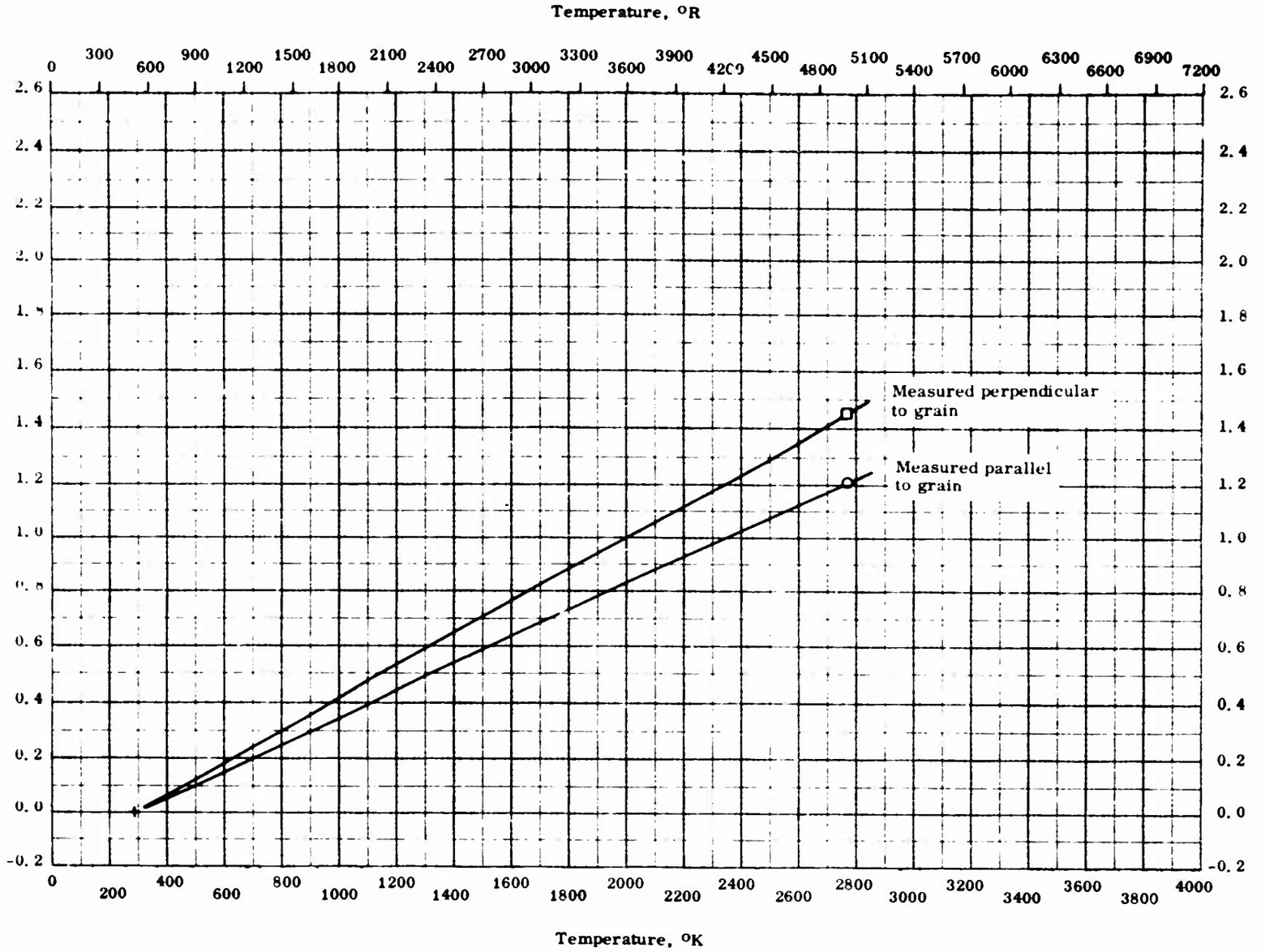


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade H4LM)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade H4LM)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-10	1723-2778			Measured parallel to the grain in He at 1 atm pressure.

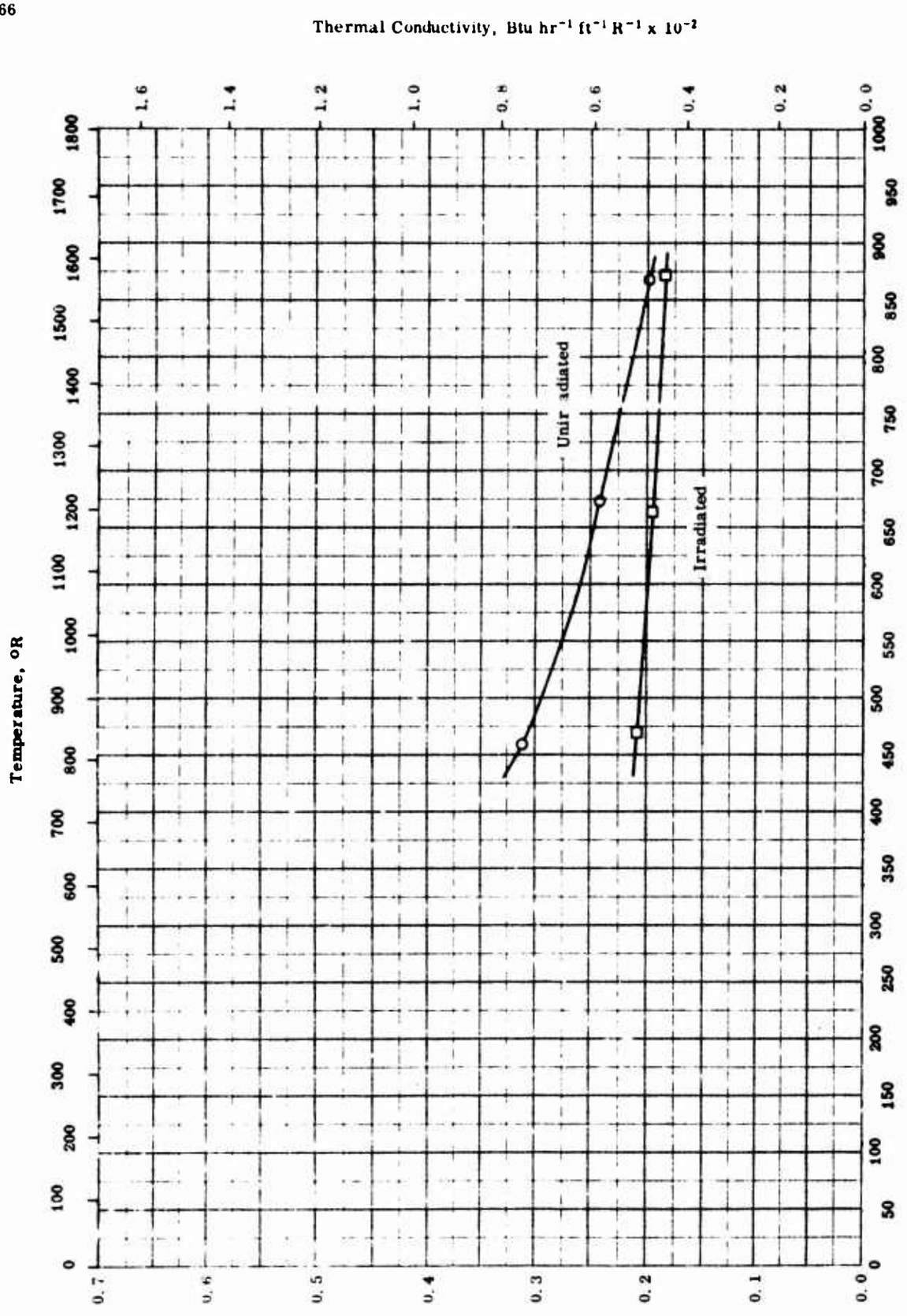


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade H4LM)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade H4LM)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-24	298-2773		Grade H4LM graphite, Great Lakes Carbon Co.; average carbon density 1.72 g cm^{-3}.	Expansion computed by author from measurements on test section length of tensile sample at room temperature and test temperature made parallel to grain.
□	58-24	298-2773		Same as above.	Same as above specimen except computed from measurements made perpendicular to grain.

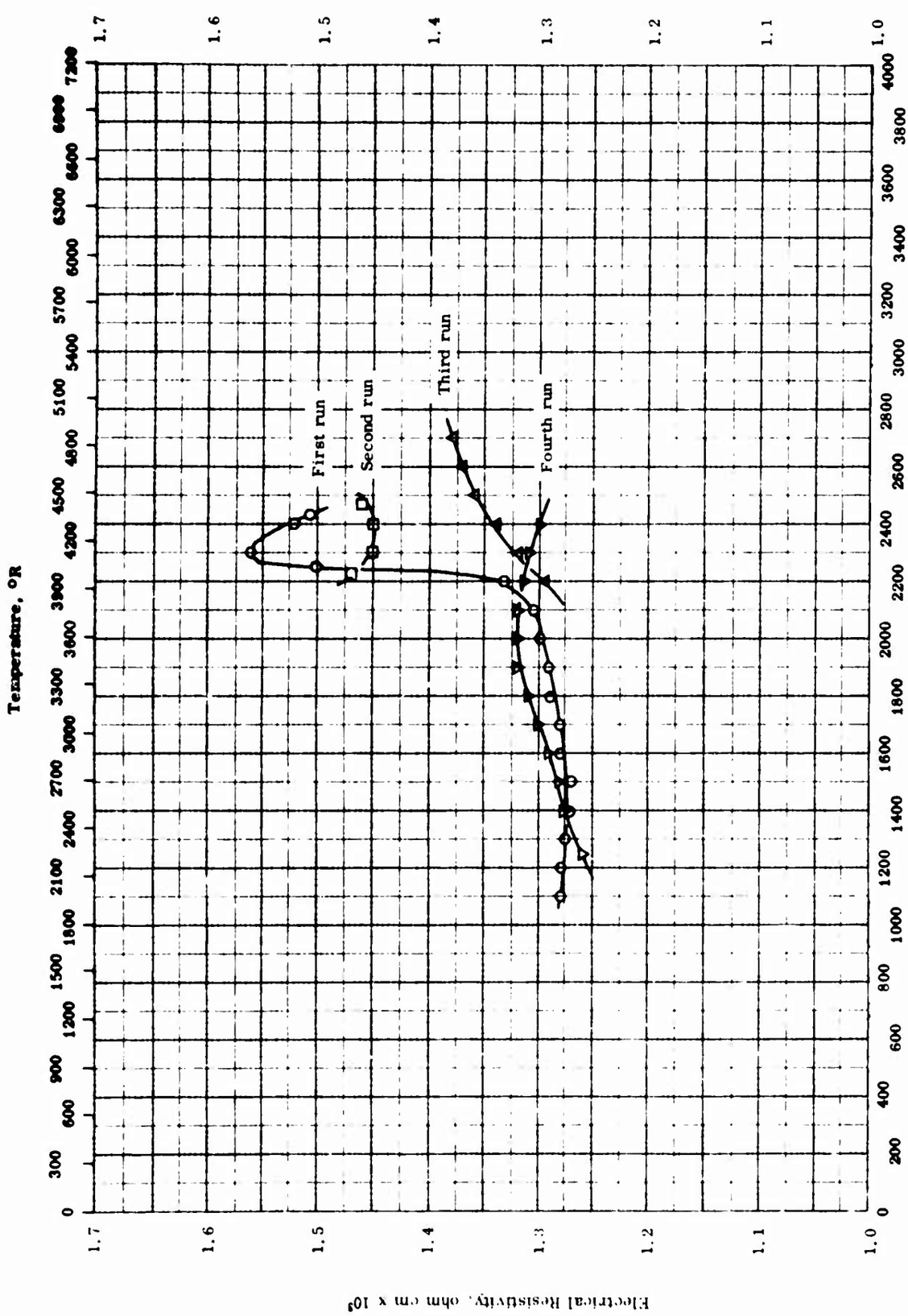


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade MH 4 LM)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade MH 4 LM)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-30	458-868		Grain size < 0.016 in. and density 1.90 g cm^{-3}.	Unirradiated.
□	61-30	468-873		Same as above.	Irradiated 3.5 x 10^{19} nvt at 475 C.

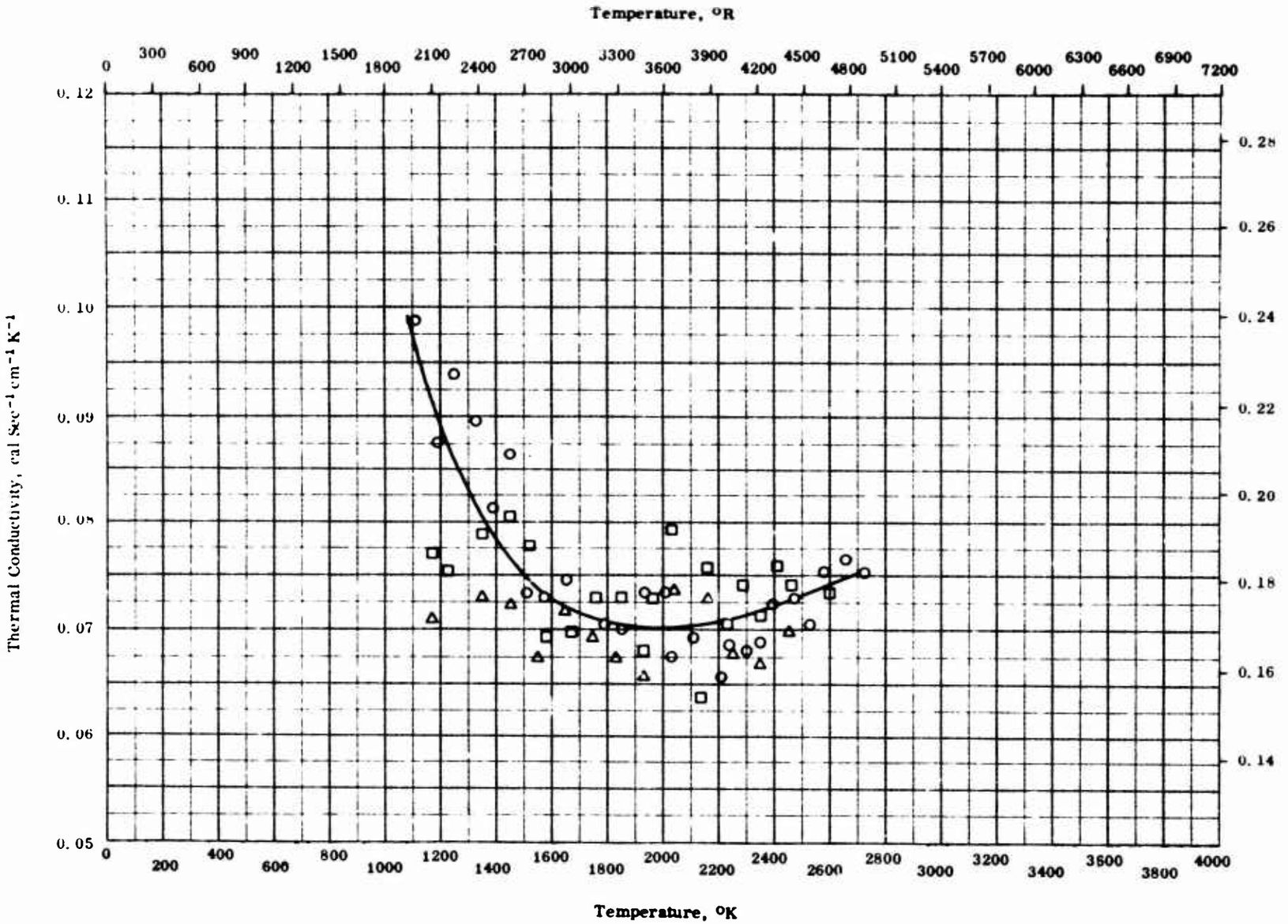


ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade R-0008)

ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade R-0008)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-21	1100-2430		High quality.	First run.
□	60-21	2230-2470		High quality.	Second run.
△	60-21	2200-2700		High quality.	Third run.
▽	60-21	1250-2400		High quality.	Fourth run.

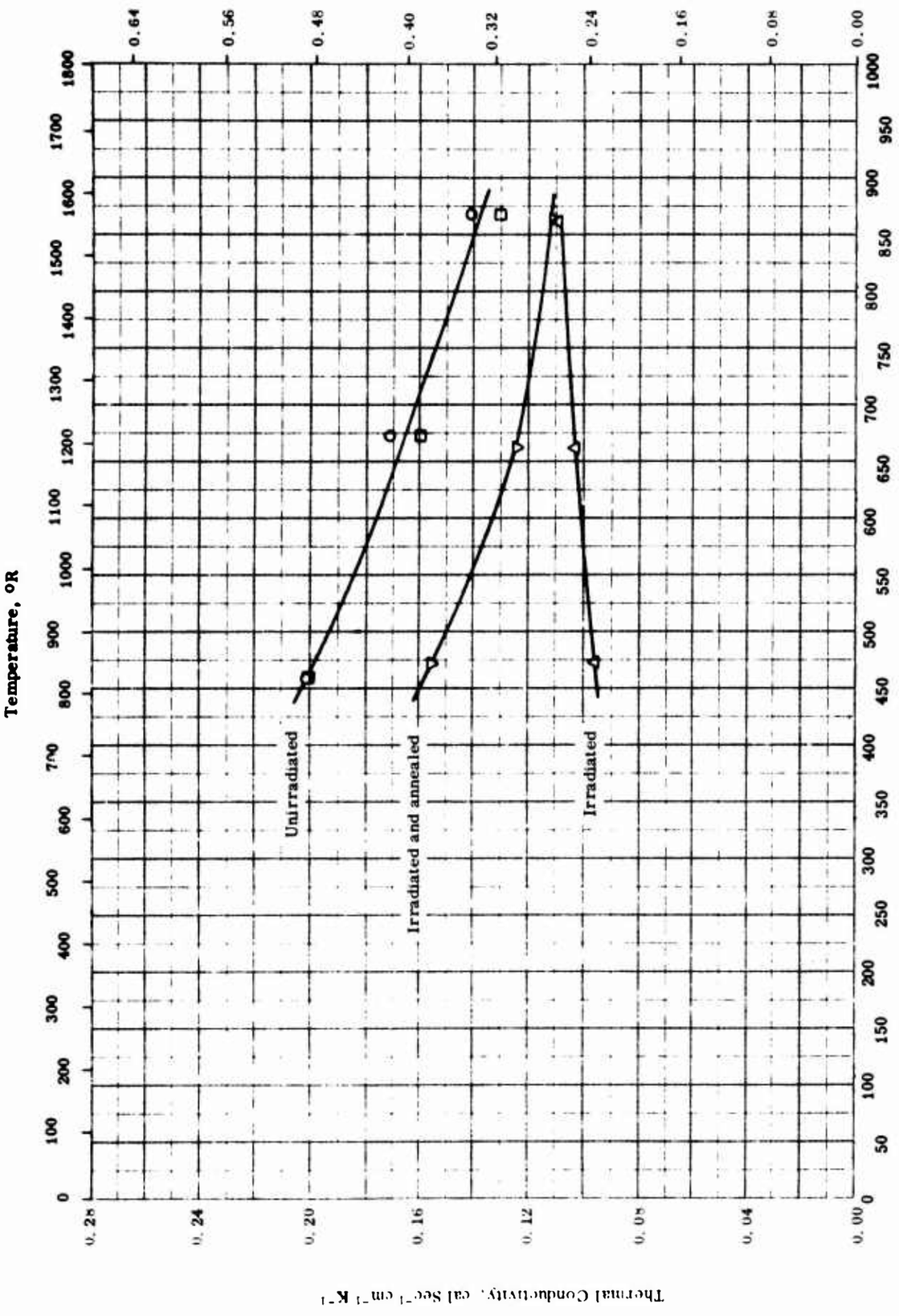


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade R-0008)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade R-0008)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	60-21	1115-2725			Sample 1.
□	60-21	1170-2600			Sample 2.
△	60-21	1170-2450			Sample 3.

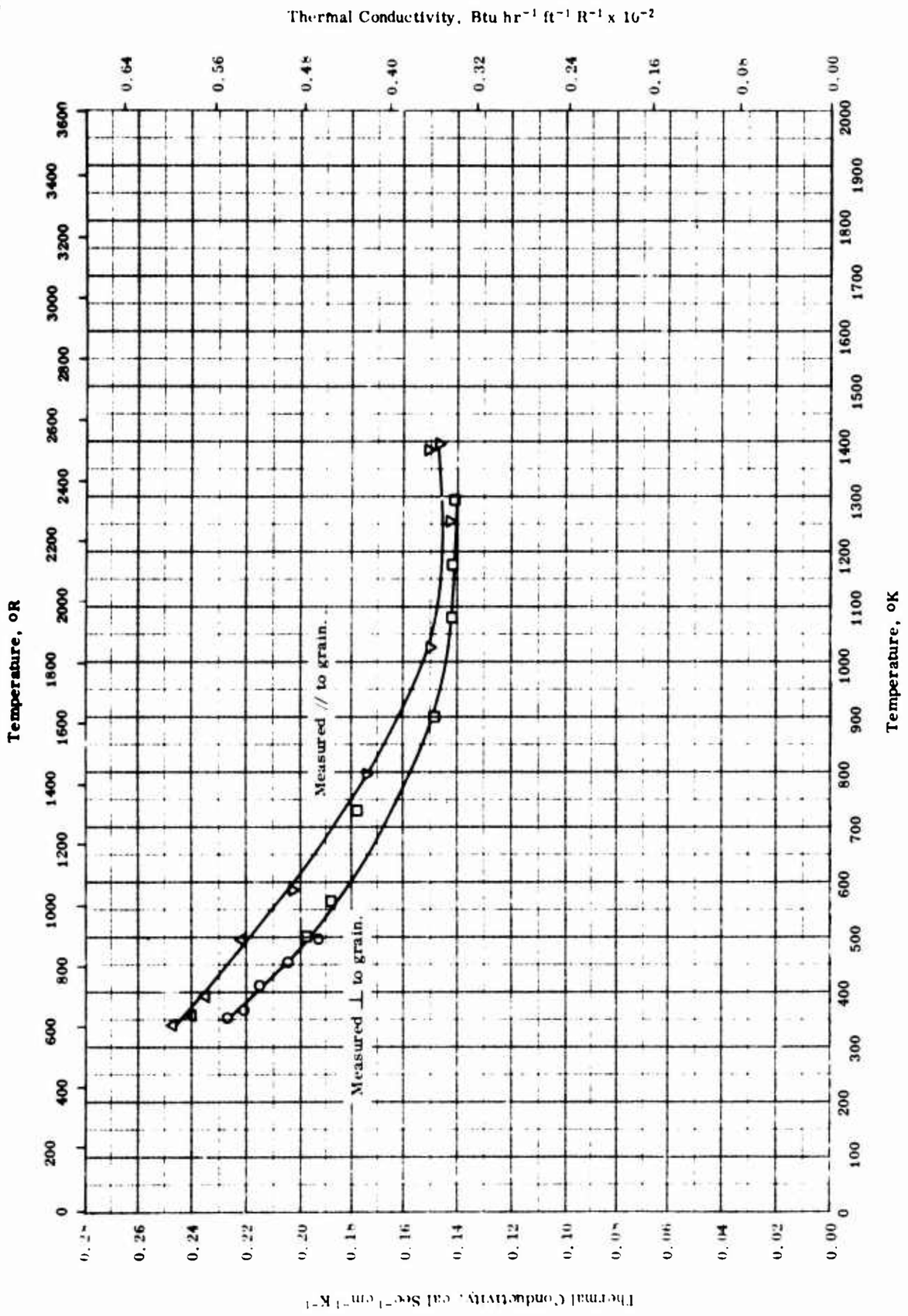


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade R0025)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade R0025)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-30	458-868			Unirradiated.
□	61-30	458-868			Unirradiated.
△	61-30	473-863			Irradiated 3.6×10^{19} nvt at 360 to 420 C.
▽	61-30	473-863			The above sample annealed at 925 C for 16 hrs after irradiation.

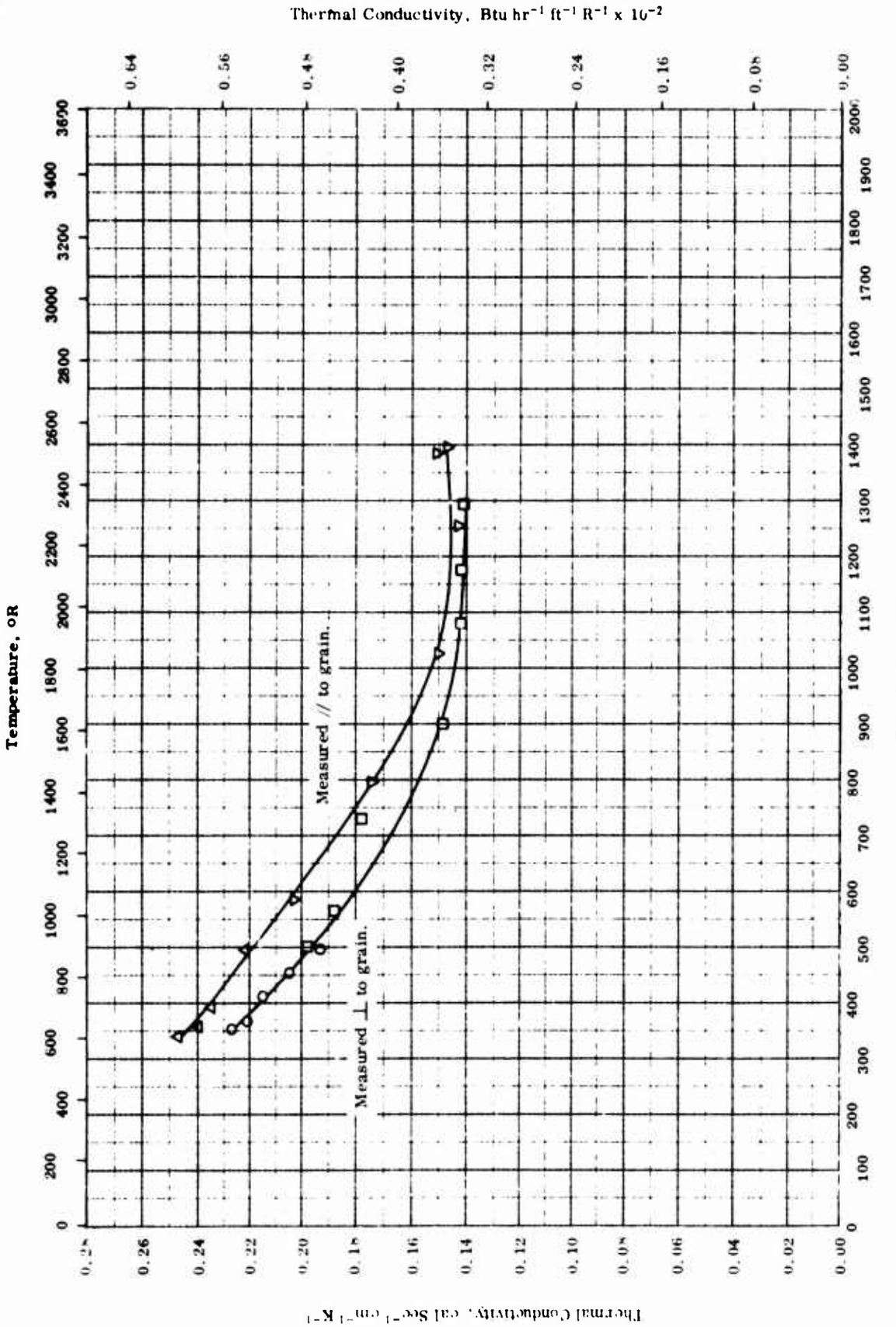


THERMAL CONDUCTIVITY -- GRAPHITE
(Grade RT-0003)

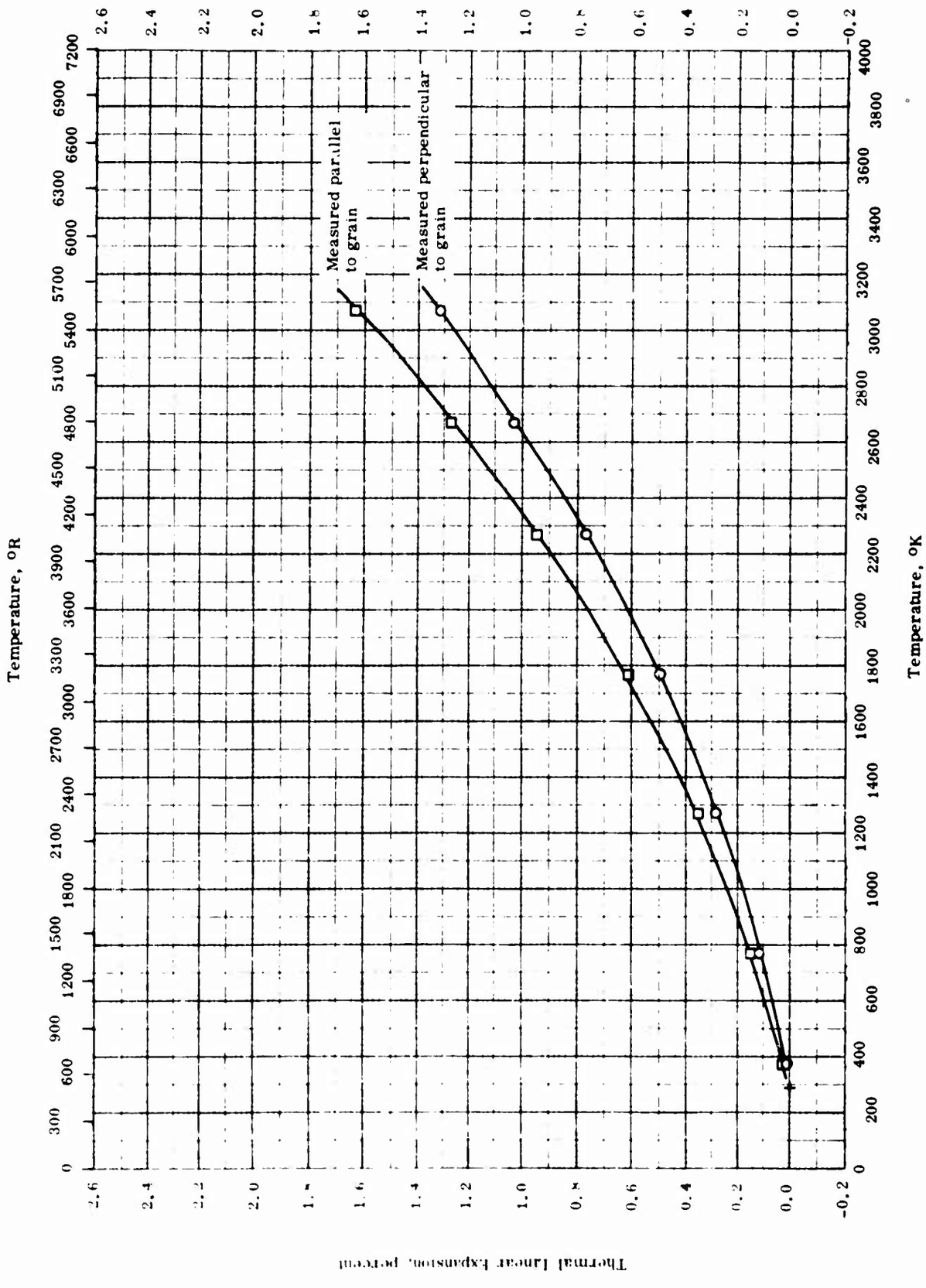
THERMAL CONDUCTIVITY -- GRAPHITE
(Grade RT-0003)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-20	351-497		Density 1.90 g cm^{-3}.	Heat flow perpendicular to grain orientation.
□	60-20	500-1294		Same as above.	Same as above; second run.
△	60-20	339-495		Same as above.	Heat flow parallel to grain direction.
▽	60-20	587-1394		Same as above.	Same as above; average of second and third runs.



THERMAL CONDUCTIVITY -- GRAPHITE
(Grade RT-0003)



THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade RVA)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade RT-0003)

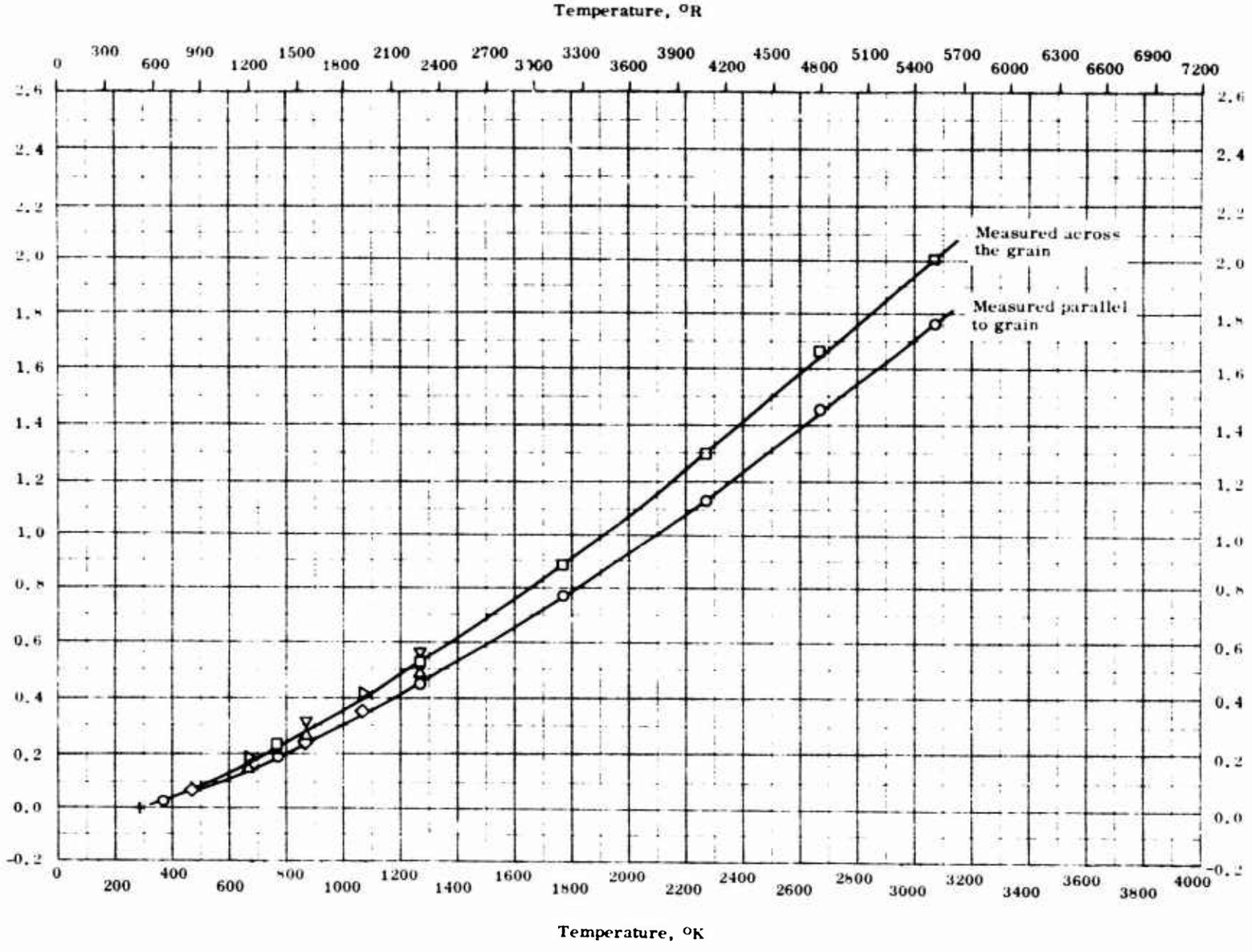
REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-20	351-497		Density 1.90 g cm^{-3}.	Heat flow perpendicular to grain orientation.
□	60-20	500-1294		Same as above.	Same as above; second run.
△	60-20	339-495		Same as above.	Heat flow parallel to grain direction.
▽	60-20	587-1394		Same as above.	Same as above; average of second and third runs.

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade RVA)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-22	293-3073		RVA graphite, National Carbon Co.; density of 3 samples used 1.825, 1.842, and 1.844 g cm^{-3}.	Average data of 3 samples taken from 33 in. diameter by 42 in. long blocks; measured parallel to grain.
□	64-22	293-3073		Same as above.	Same as above, except measured across the grain.



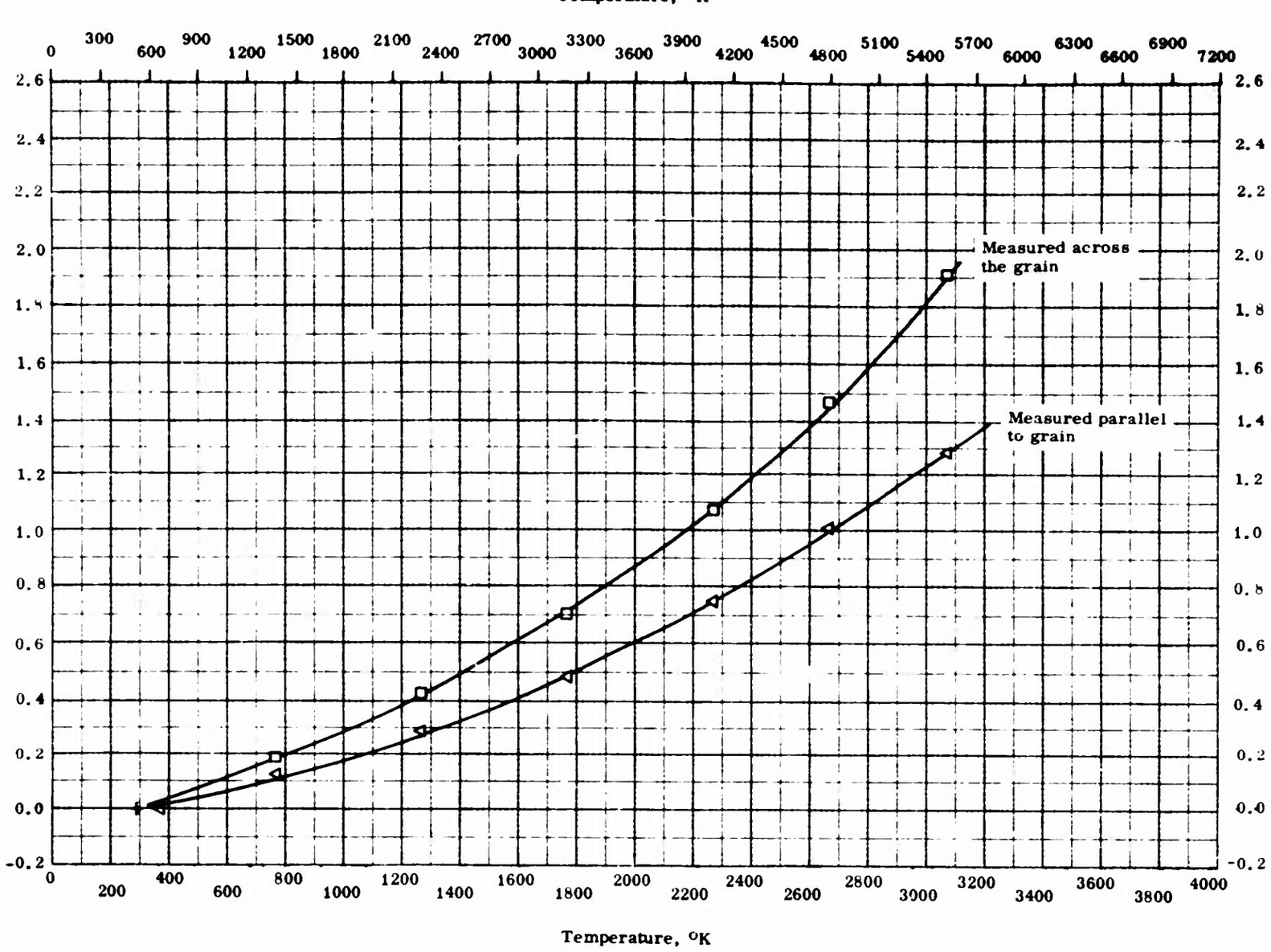
THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade RVC)

THERMAL LINEAR EXPANSION -- GRAP. 'E
(Grade RVC)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error*	Sample Specifications	Remarks
○	64-22	293-3073		RVC graphite, National Carbon Co.; density of 2 samples used 1.84 and 1.85 g cm^{-3}.	Average data of 2 samples taken from 18 in. diameter by 17 in. long; measured parallel to grain.
□	64-22	293-3073		Same as above.	Same as above, except measured across the grain.
△	64-25	293-1273		RVC graphite, National Carbon Co.	Precompacted; measured parallel to grain.
▽	64-25	293-1273		RVC graphite, National Carbon Co.	Precompacted; measured across the grain.
◇	64-25	293-1273		RVC graphite, National Carbon Co.	Measured parallel to grain.
▷	64-25	293-1273		RVC graphite, National Carbon Co.	Measured across the grain.

TPRC

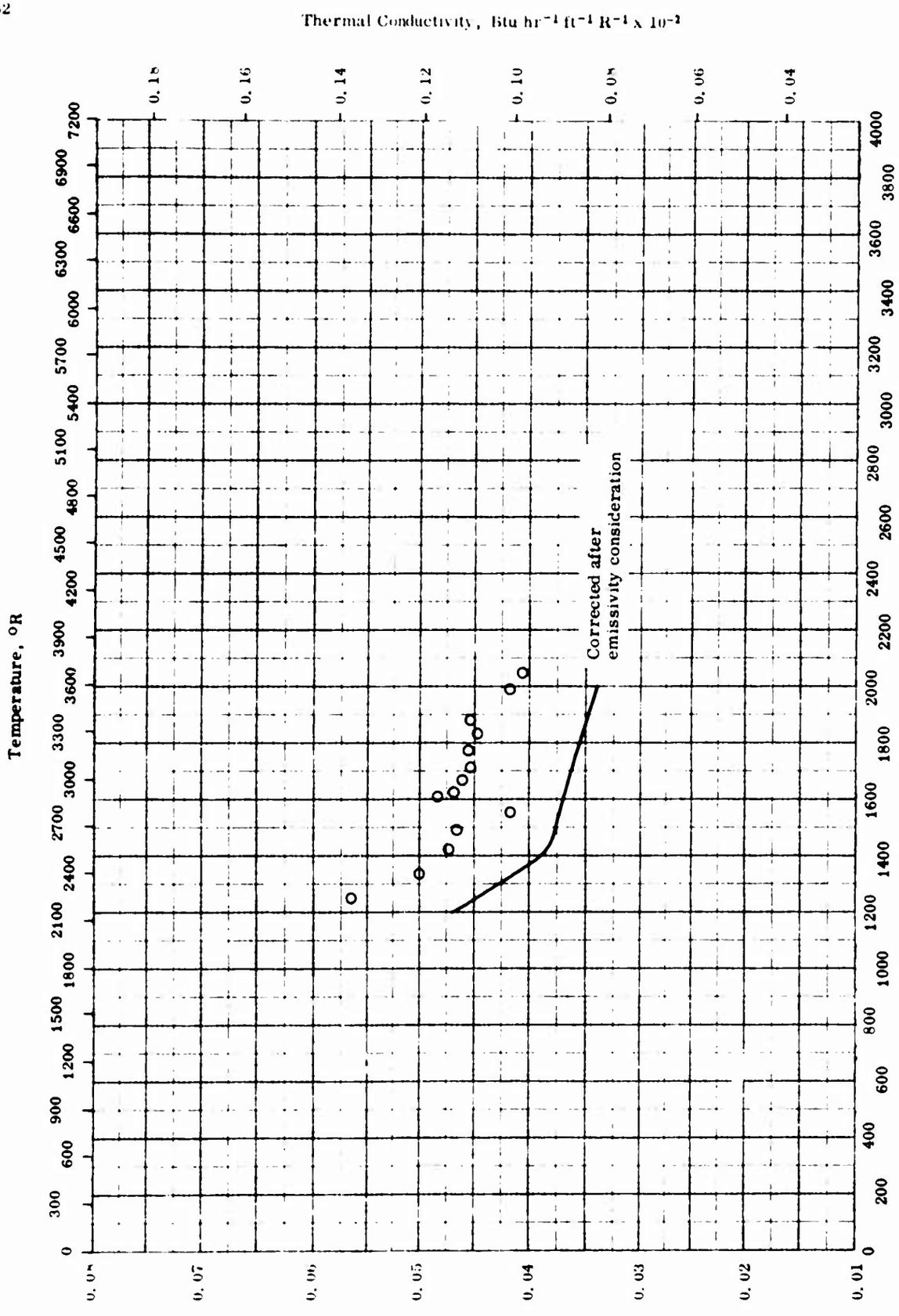


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade RVD)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade RVD)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◁	64-22	293-3073		RVD graphite, National Carbon Co.; density of 2 samples used 1.87 g cm^{-3}.	Average data of 2 samples taken from 18 in. diameter by 17 in. long blocks; measured parallel to grain.
□	64-22	293-3073		Same as above.	Same as above, except measured across the grain.



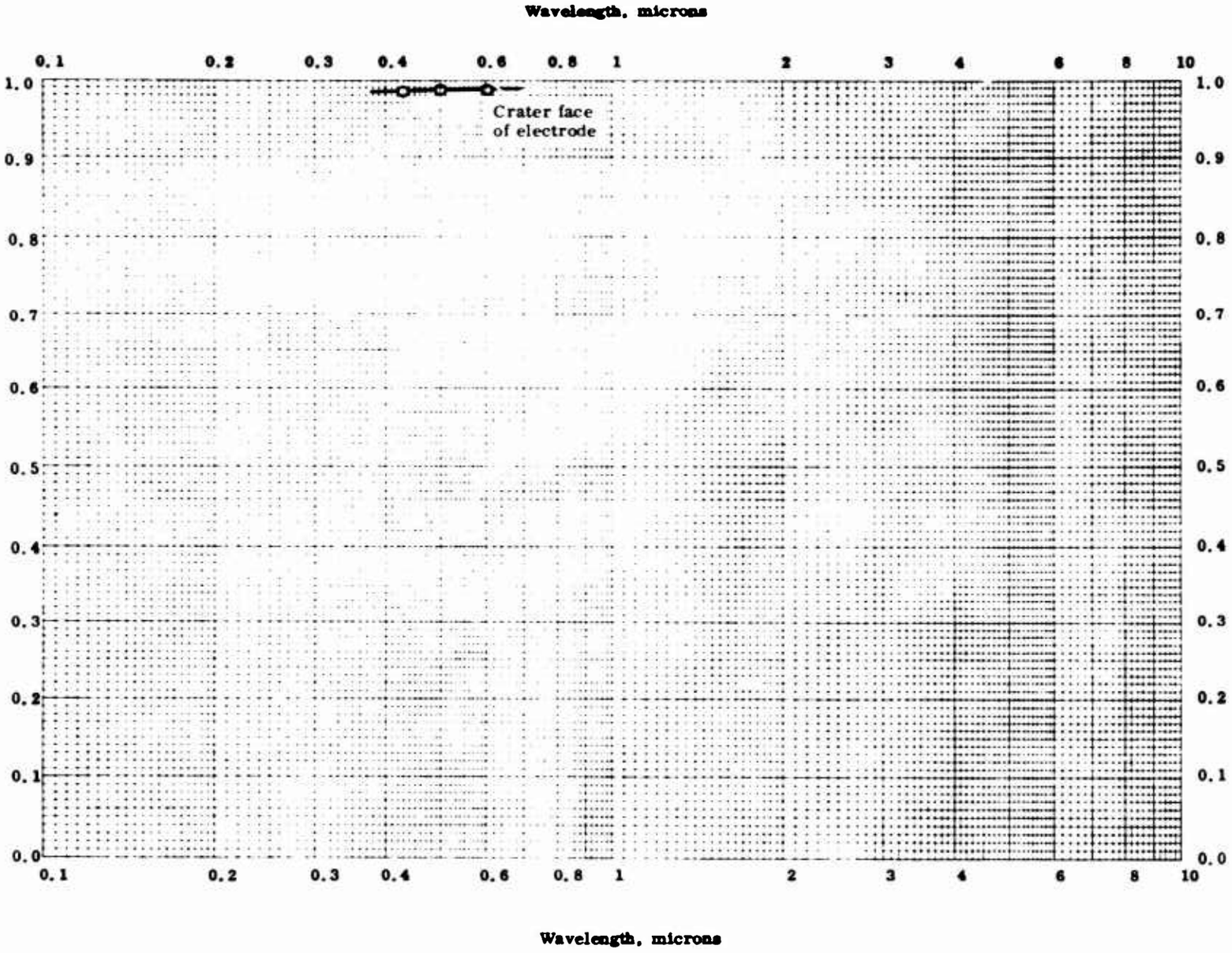
THERMAL CONDUCTIVITY -- GRAPHITE
(Grade SA-25)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade SA-25)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-13	1246-2045			Values 20% high before emissivity consideration.

TPRC

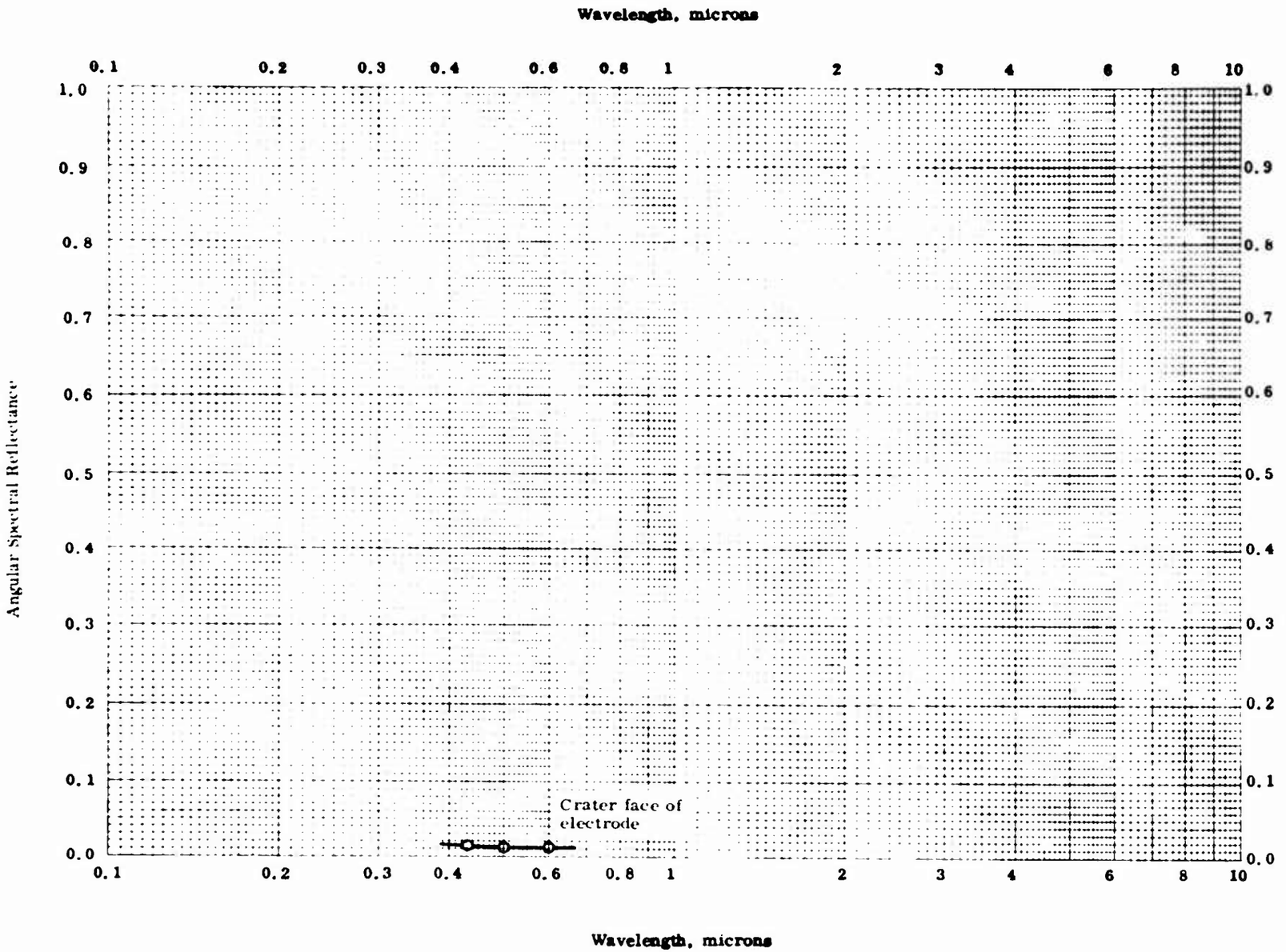


ANGULAR SPECTRAL EMITTANCE -- GRAPHITE
(Grade SPK)

ANGULAR SPECTRAL EMITTANCE -- GRAPHITE
(Grade SPK)

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	63-29	3800	0.43-0.61	± 0.4	Max. ash 10 pph; density 1.90 g cm^{-3}; resistivity 0.00045 ohm in.	Crater face of the positive electrode of an electric arc; calculated from reflectance data; 45 degrees from normal.

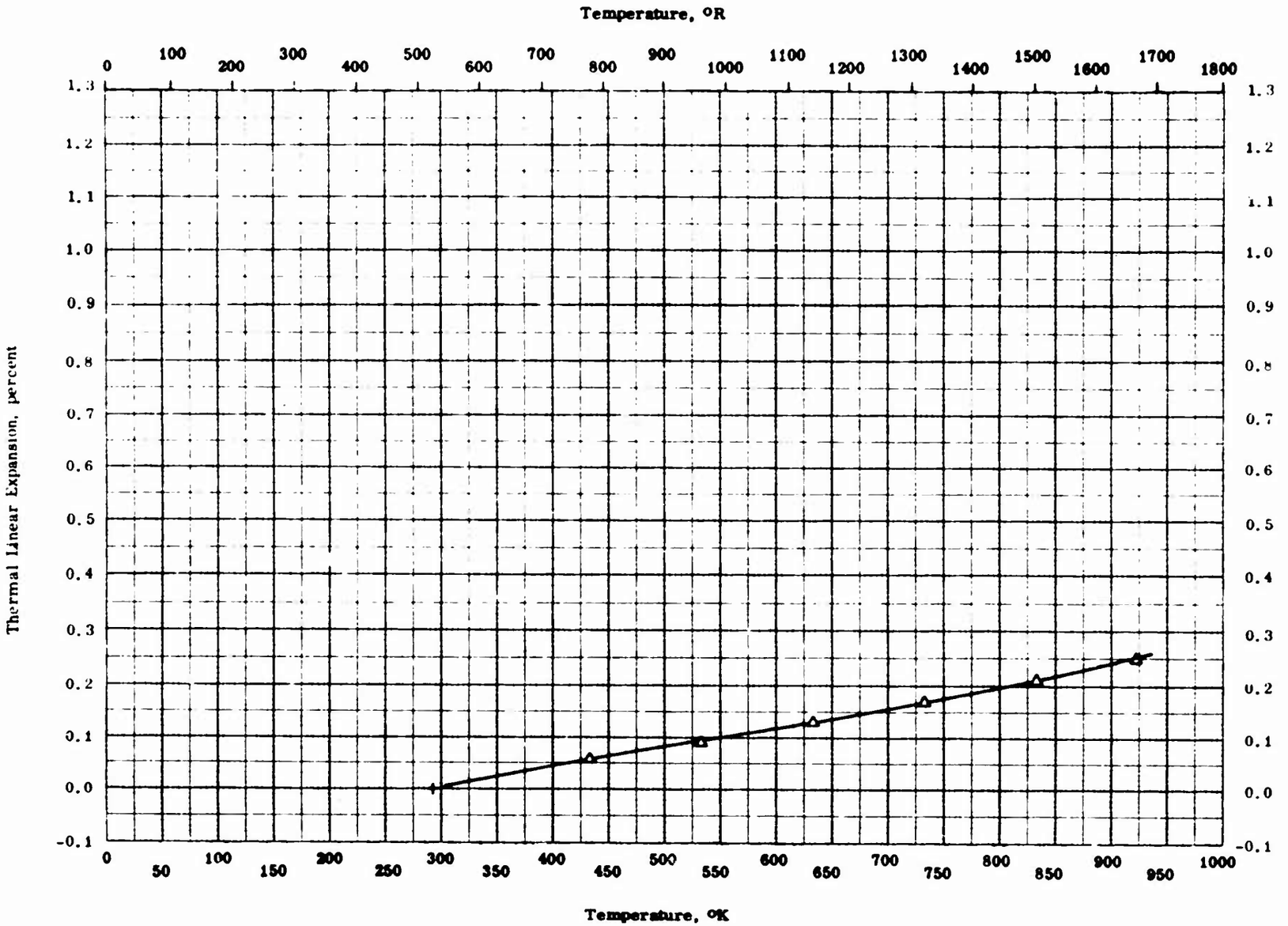


ANGULAR SPECTRAL REFLECTANCE -- GRAPHITE
(Grade SPK)

ANGULAR SPECTRAL REFLECTANCE -- GRAPHITE
(Grade SPK)

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	63-29	3800	0.43-0.61	±36	Max. ash 10 pph; density 1.90 g cm^{-3}; resistivity 0.0045 ohm in.	Crater face of the positive electrode of an electric arc; MgO as reference standard, hemispherical illumination, 45 degree viewing.

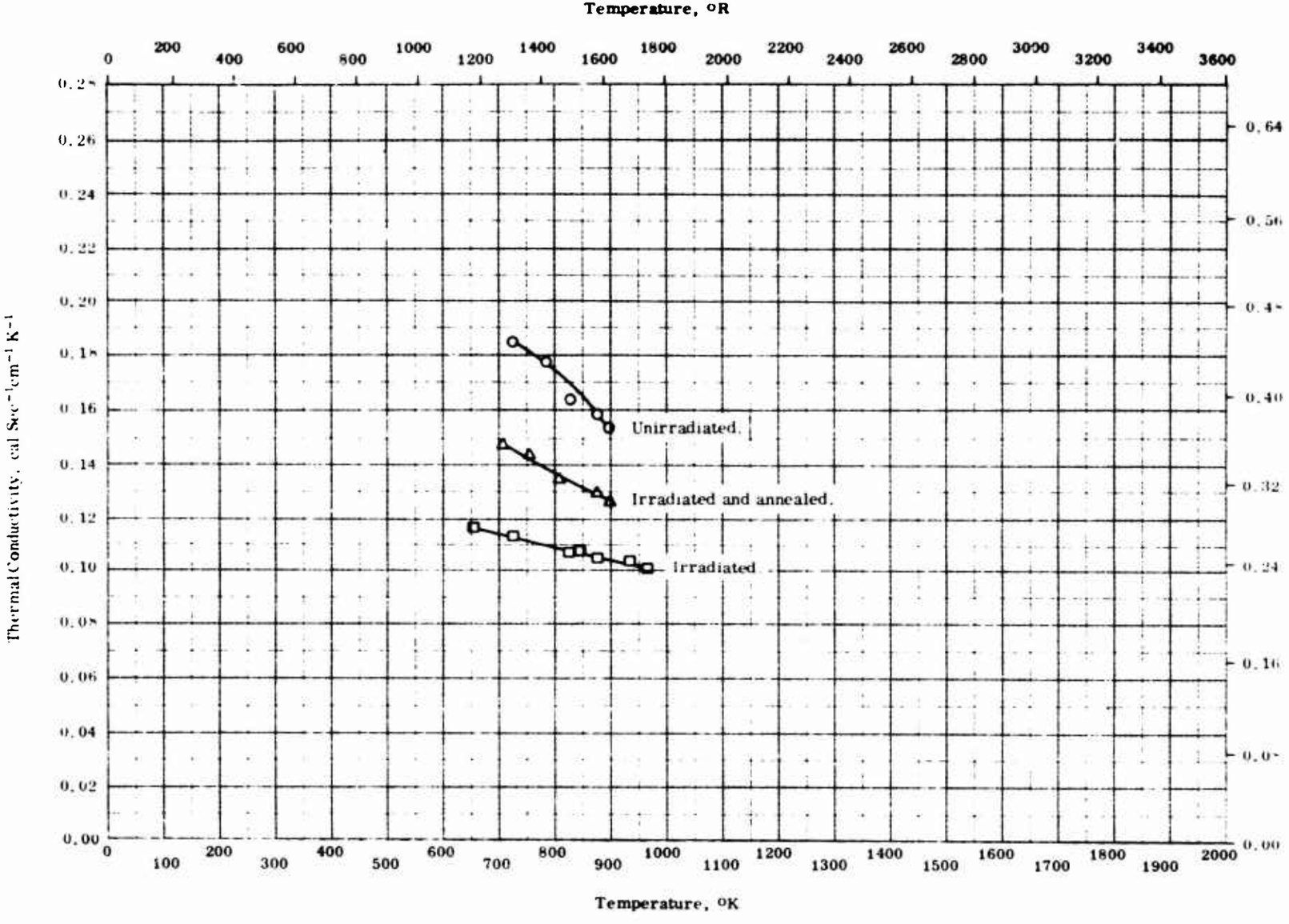


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade TS)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade TS)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error "	Sample Specifications	Remarks
Δ	56-58	433-923		Grade TS graphite; multicrystalline.	Extruded; average of 6 samples; measured perpendicular to direction of extrusion.

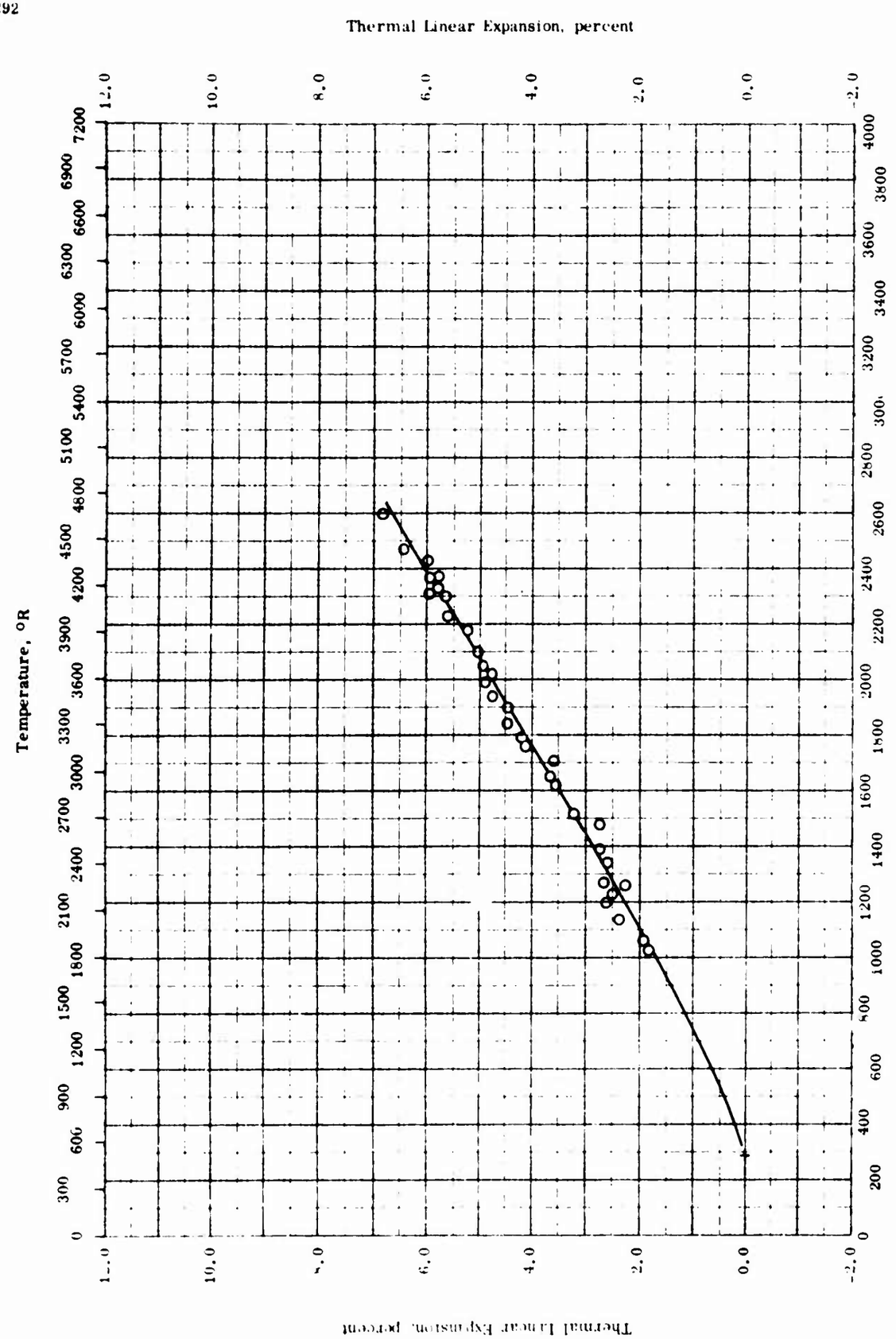


THERMAL CONDUCTIVITY -- GRAPHITE
(Nuclear grade TSP)

THERMAL CONDUCTIVITY -- GRAPHITE
(Nuclear grade TSP)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-19	723-898			Unirradiated.
□	60-19	653-963			Irradiated at 5×10^{20} nvt and about 315 C.
△	60-19	703-898			Irradiated at 5×10^{20} nvt and about 315 C and then annealed at 1000 C for 1 hr in vacuum.

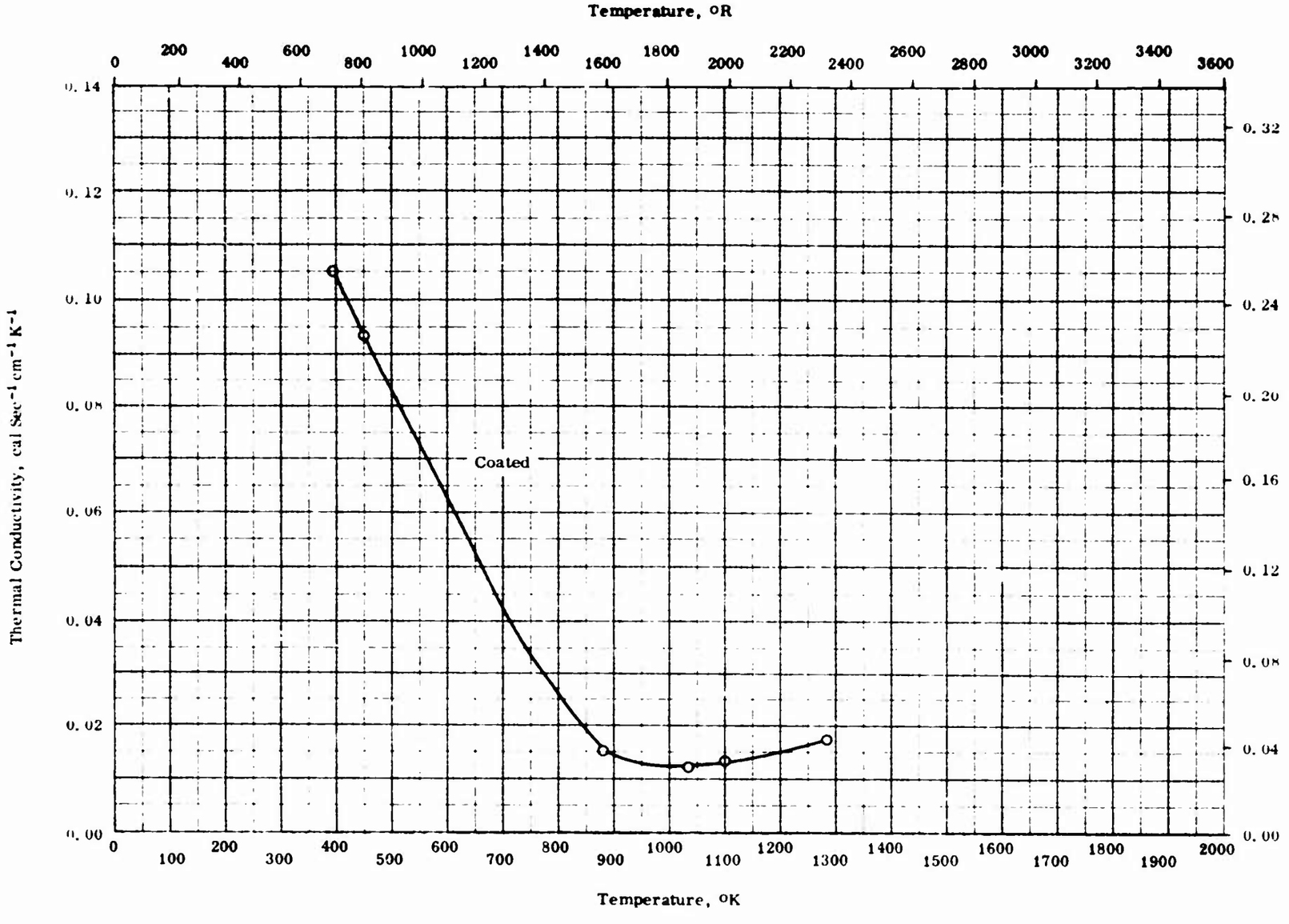


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade TSX)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade TSX)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	63-39	298-2605	0.1	TSX graphite.	Percent expansion calculated from lattice constants measured in c-direction in vacuo; sample self-heated by passing current through it.



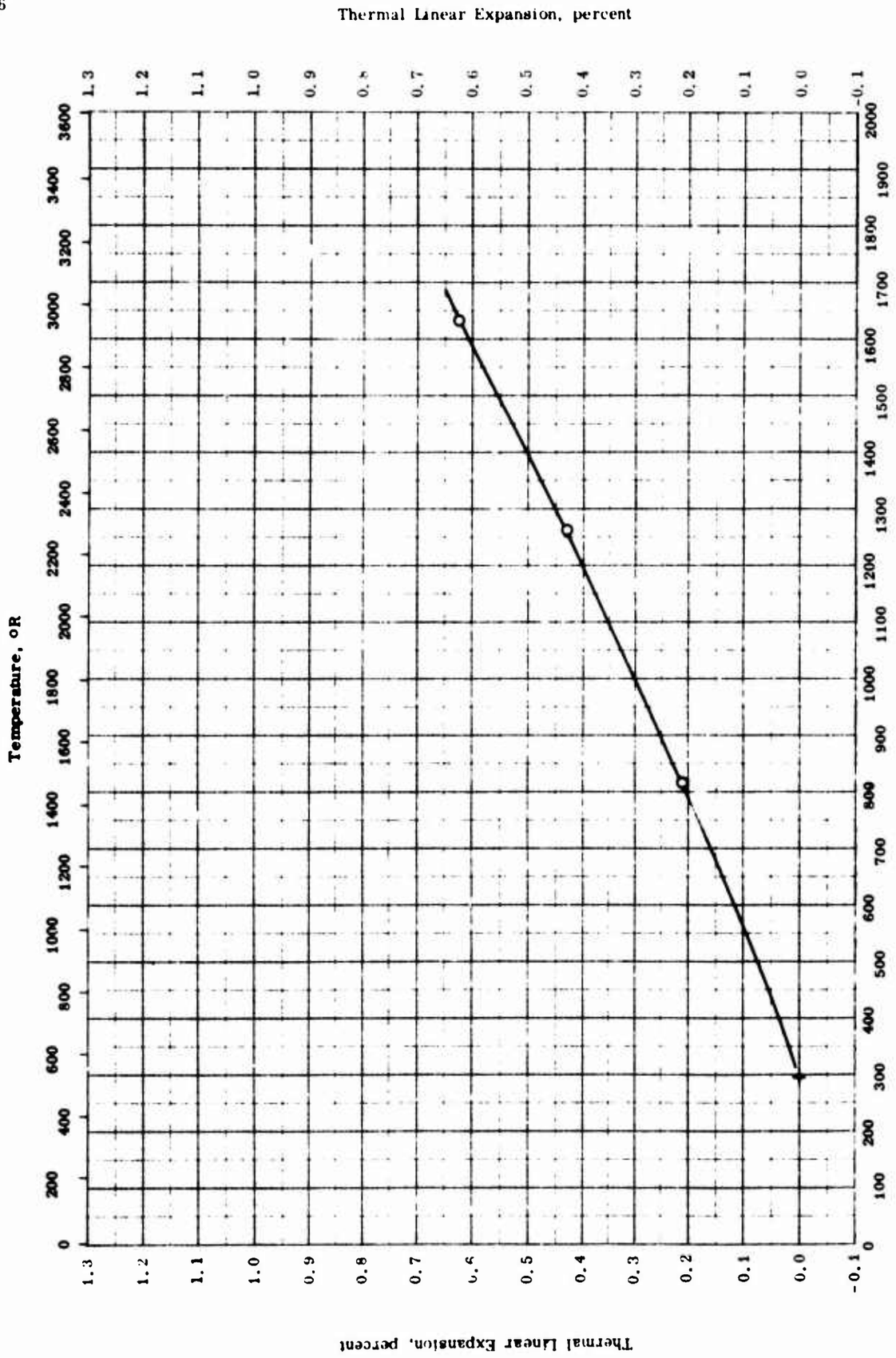
THERMAL CONDUCTIVITY -- GRAPHITE
(Grade W)

TPRC

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade W)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-9	394-1283			Coated.

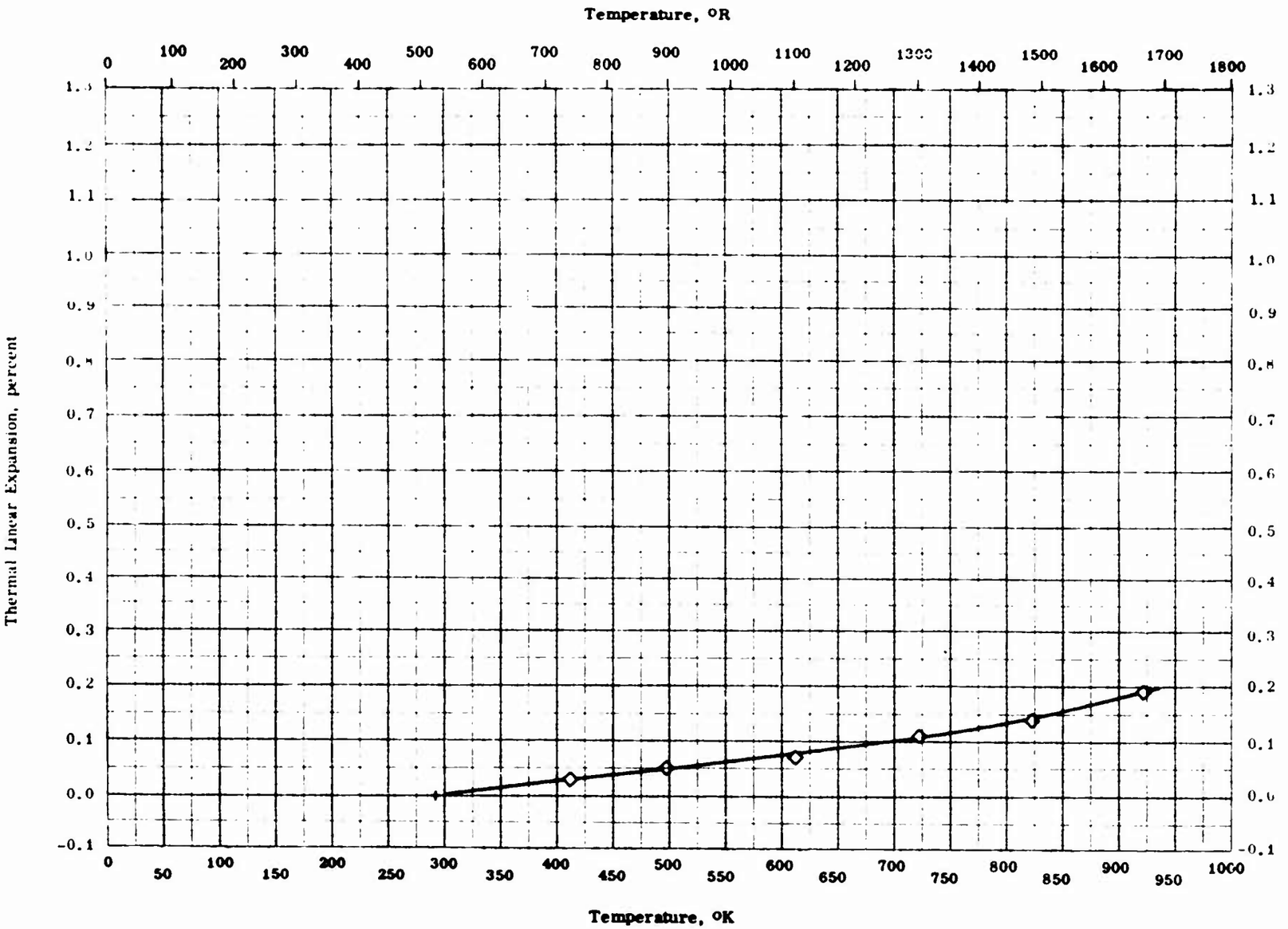


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade W)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade W)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-41	300-1633	< 5	Silicon carbide coated grade W graphite; supplied by Graphite Specialties Corp. of Niagara Fall and coated by Am. Lava Corp.; fine grain, high density, nearly isotropic, and impervious grade graphite; specimen dimensions 3/8 in. diameter by 3 in. long.	Extruded.

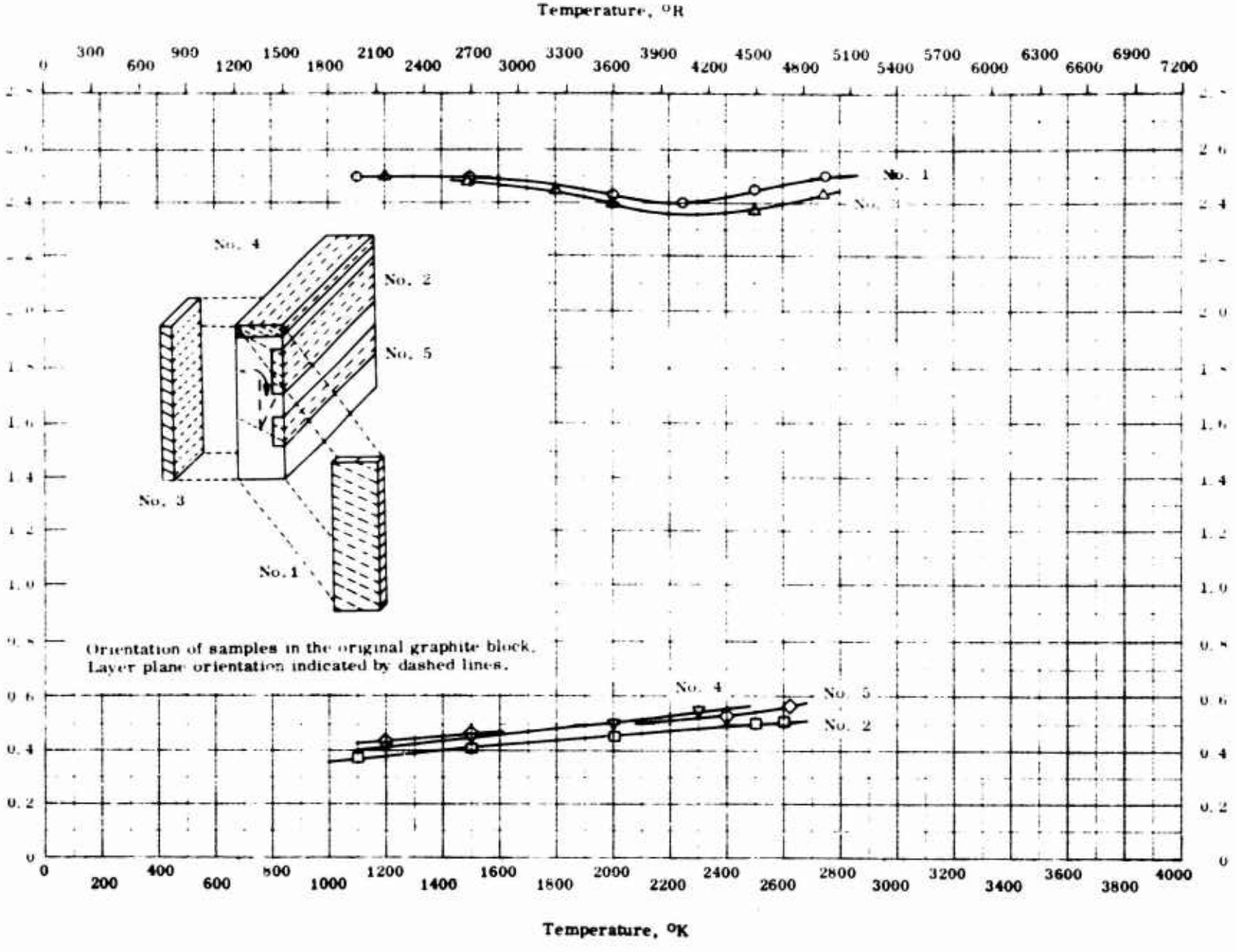


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade WSF)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade WSF)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◇	56-58	473-923		Grade WSF graphite; multicrystalline.	Extruded; average of 6 samples; measured perpendiuclar to direction of extrusion.



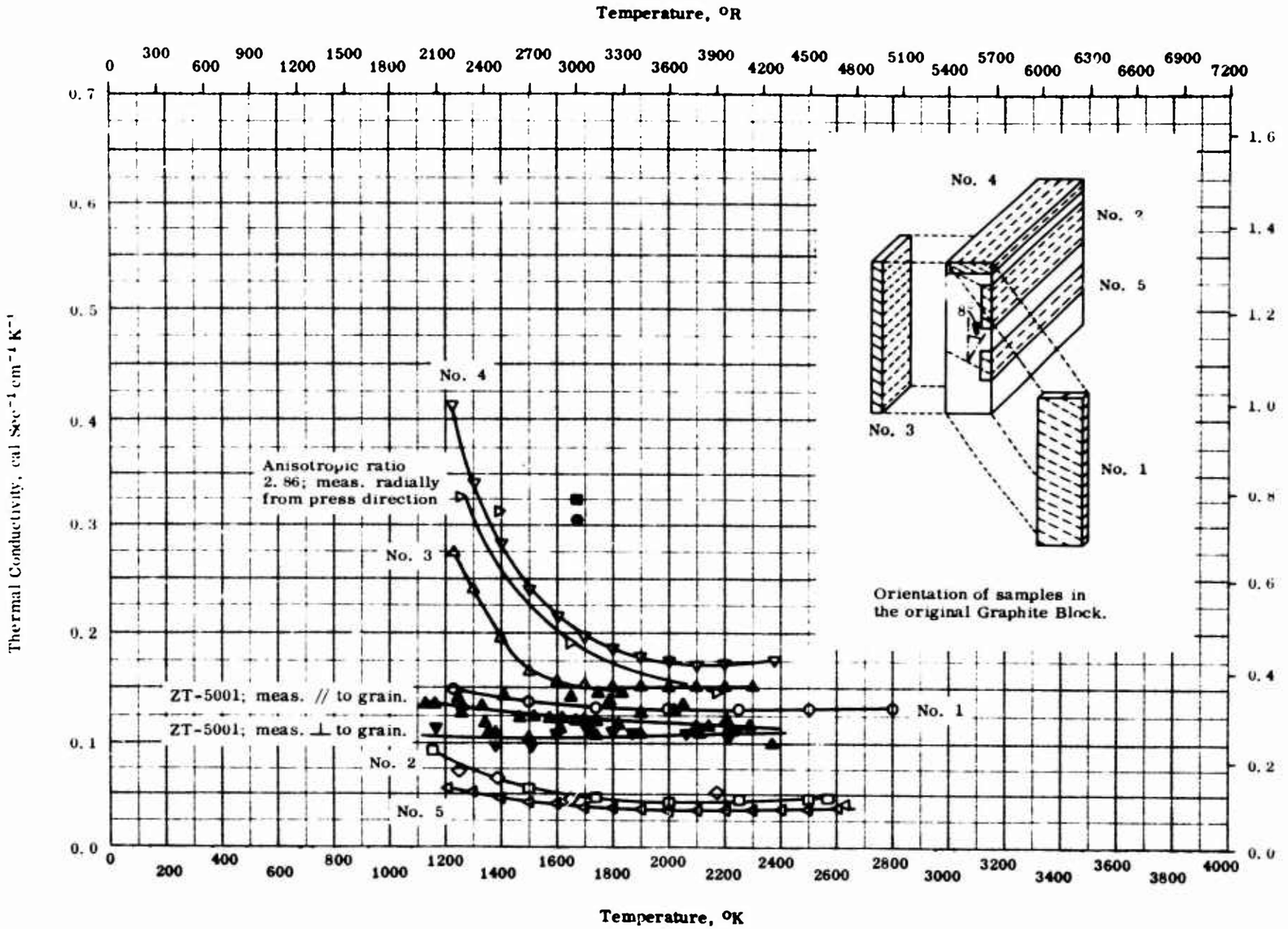
ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade ZT)

ELECTRICAL RESISTIVITY -- GRAPHITE
(Grade ZT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-11	1100-2750		Highly anisotropic with controlled orientation; bulk density 2.15 g cm^{-3}.	No. 1; see figure for sample orientation.
□	63-11	1100-2600		Same as above.	No. 2, same as above.
△	63-11	1200-2740		Same as above.	No. 3, same as above.
▽	63-11	1200-2300		Same as above.	No. 4, same as above.
◇	63-11	1200-2620		Same as above.	No. 5; same as above.

TPRC



THERMAL CONDUCTIVITY -- GRAPHITE
(Grade ZT)

THERMAL CONDUCTIVITY -- GRAPHITE
(Grade ZT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specific	Remarks
○	63-11	1225-2800		From National Carbon Co.; highly anisotr ; bulk density 2.15 g cm^{-3}. [Author's design.: No. 1]	Molded selected coke base mixture; cut across the average grain layer planes at an angle of about 8° from Block no. 7.
□	63-11	1160-2570		Same as above. [Author's design.: No. 2]	From the same block as the above sample; cut with the grain with average grain layer planes oriented 8° angle with the height of the sample.
△	63-11	1230-2300		Same as above. [Author's design. : No. 3]	From the same block as the above sample; cut across the grain with average grain layer planes oriented 8° angle with the width of the sample.
▽	63-11	1220-2380		Same as above. [Author's design. : No. 4]	From the same block; cut with average grain layer planes oriented 8° angle with the width of the sample.
◁	63-11	1210-2630		Same as above. [Author's design. : No. 5]	From the same block; cut with average grain layer planes oriented 8° angle with the height of the sample.
▷	64-3	1254-2173		From National Carbon Co. ; density 2.000 g cm^{-3}; anisotropic ratio of electrical resistivity normal to and parallel to the pressing direction 2.86.	Molded; measured radially from the pressing direction.
◇	64-3	1254-2173		Same as above.	Molded; measured perpendicular to the pressing direction.

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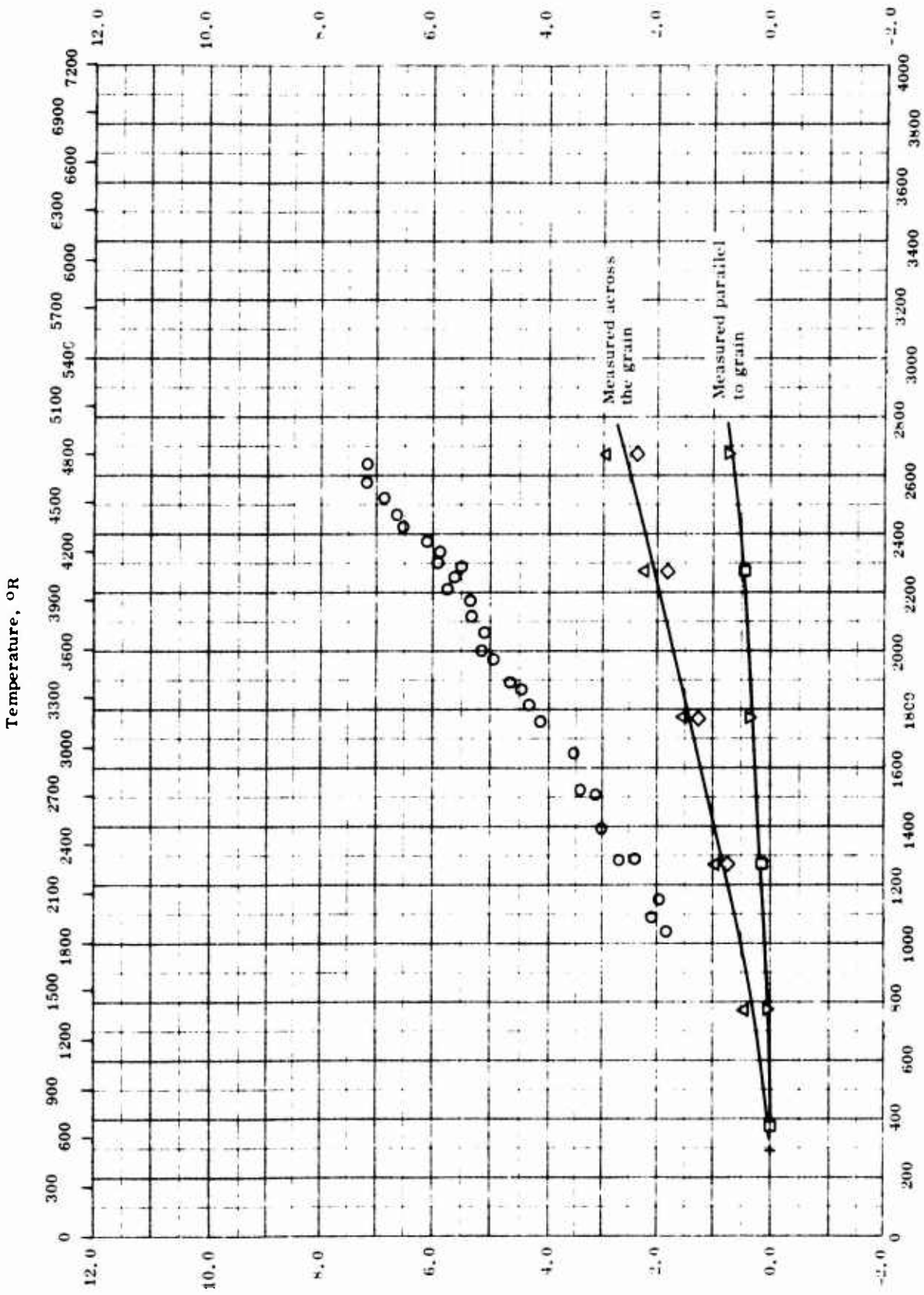
TPRC

THERMAL CONDUCTIVITY -- GRAPHITE (continued)
(Grade ZT)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
●	62-8	1671		Same as above except density 1.98 g cm^{-3} and anisotropic ratio 2.50.	Molded; measured normal to the pressing direction.
■	62-8	1671		Same as above.	Molded; measured parallel to the molding direction.
▲	61-18	1130-2370		ZT-5001.	Measured parallel to the grain.
▼	61-18	1170-2240		ZT-5001.	Measured normal to the grain.

Thermal Linear Expansion, percent



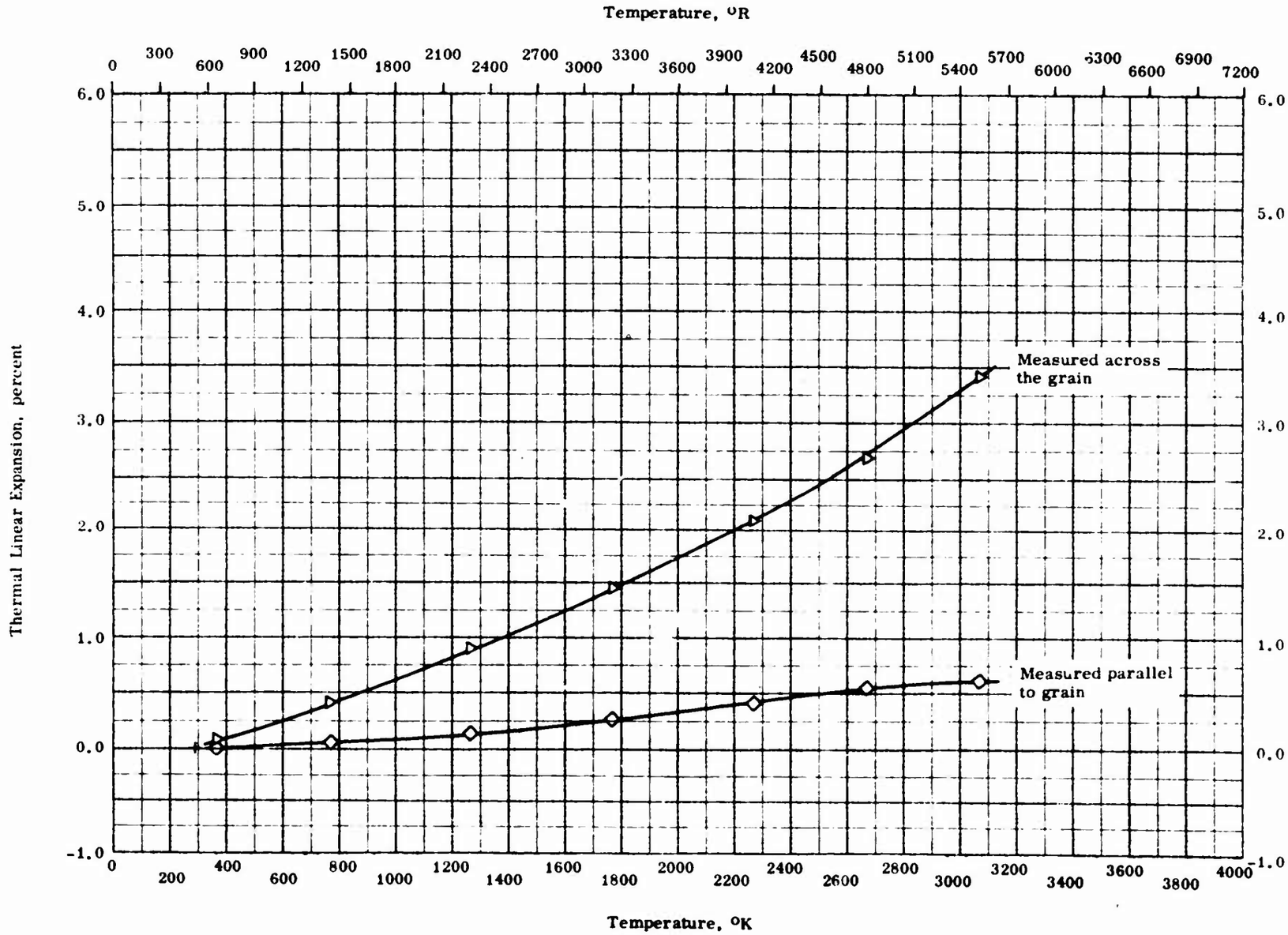
THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTA)

Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION — GRAPHITE
(Grade ZTA)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-39	298-2640	0.1	ZTA graphite.	Percent expansion calculated from lattice constants measured in c-direction in vacuo; sample self-heated by passing current through it.
□	64-22	293-2673		ZTA graphite, National Carbon Co.; bulk density range for samples used 1.923 - 1.955 g cm^{-3}.	Average data for 5 samples taken from 14 in. diameter by 10 in. long blocks; measured parallel to grain.
△	64-22	293-2673		Same as above.	Same as above except measured across the grain.
▽	64-22	293-2673		ZTA graphite, National Carbon Co.; bulk density range for samples used 1.92 - 1.94 g cm^{-3}.	Average data for 5 samples taken from 8 1/2 in. diameter by 11 in. long blocks; measured parallel to grain.
◇	64-22	293-2673		Same as above.	Same as above except measured across the grain.

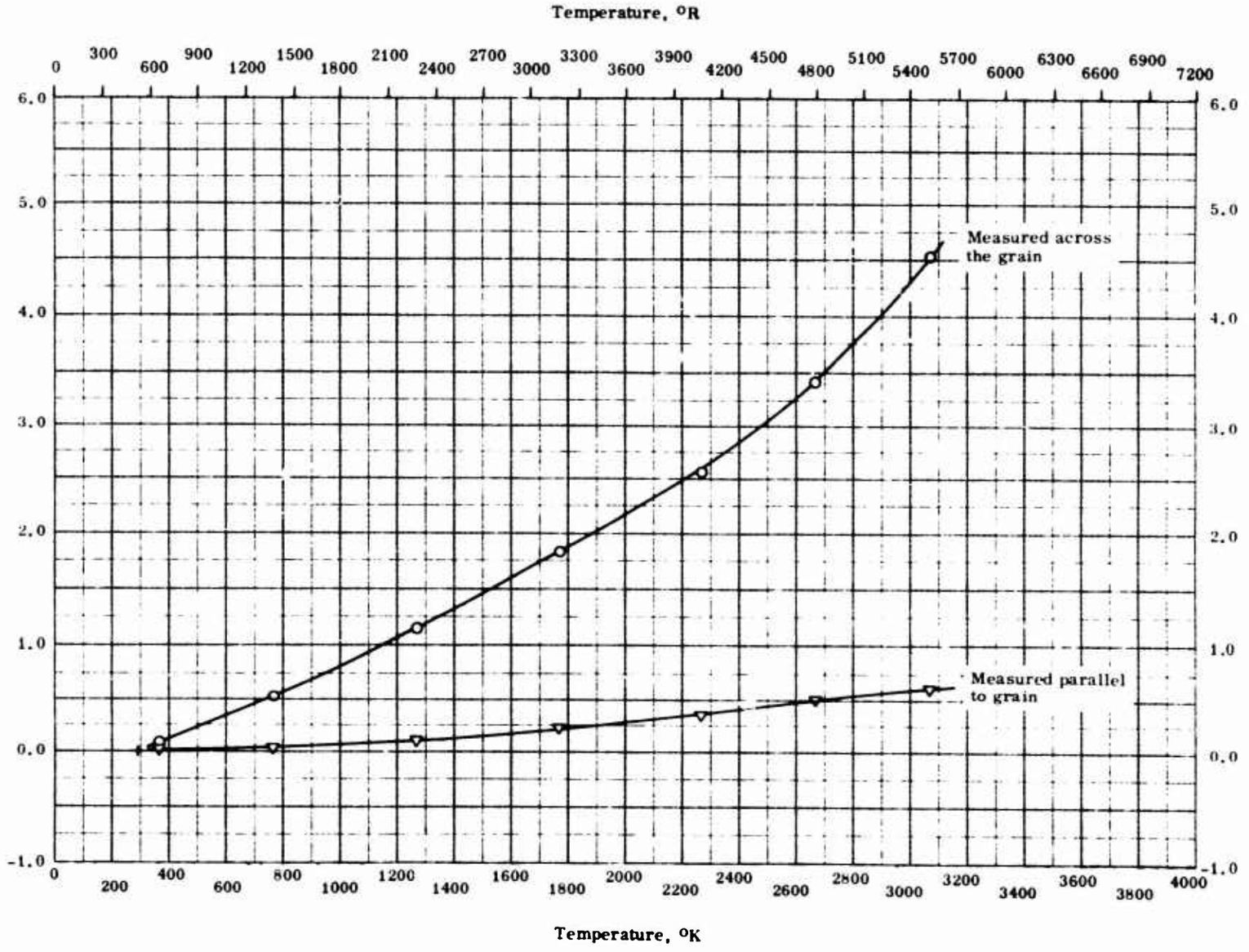


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTB)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTB)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
◇	64-22	293-3073		ZTB graphite, National Carbon Co.; bulk density of samples used 1.97 and 1.99 g cm^{-3}.	Average data for 2 samples taken from 8 1/2 in. diameter by 11 in. long blocks; measured parallel to grain.
▷	64-22	293-3073		Same as above.	Same as above except measured across the grain.



THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTC)

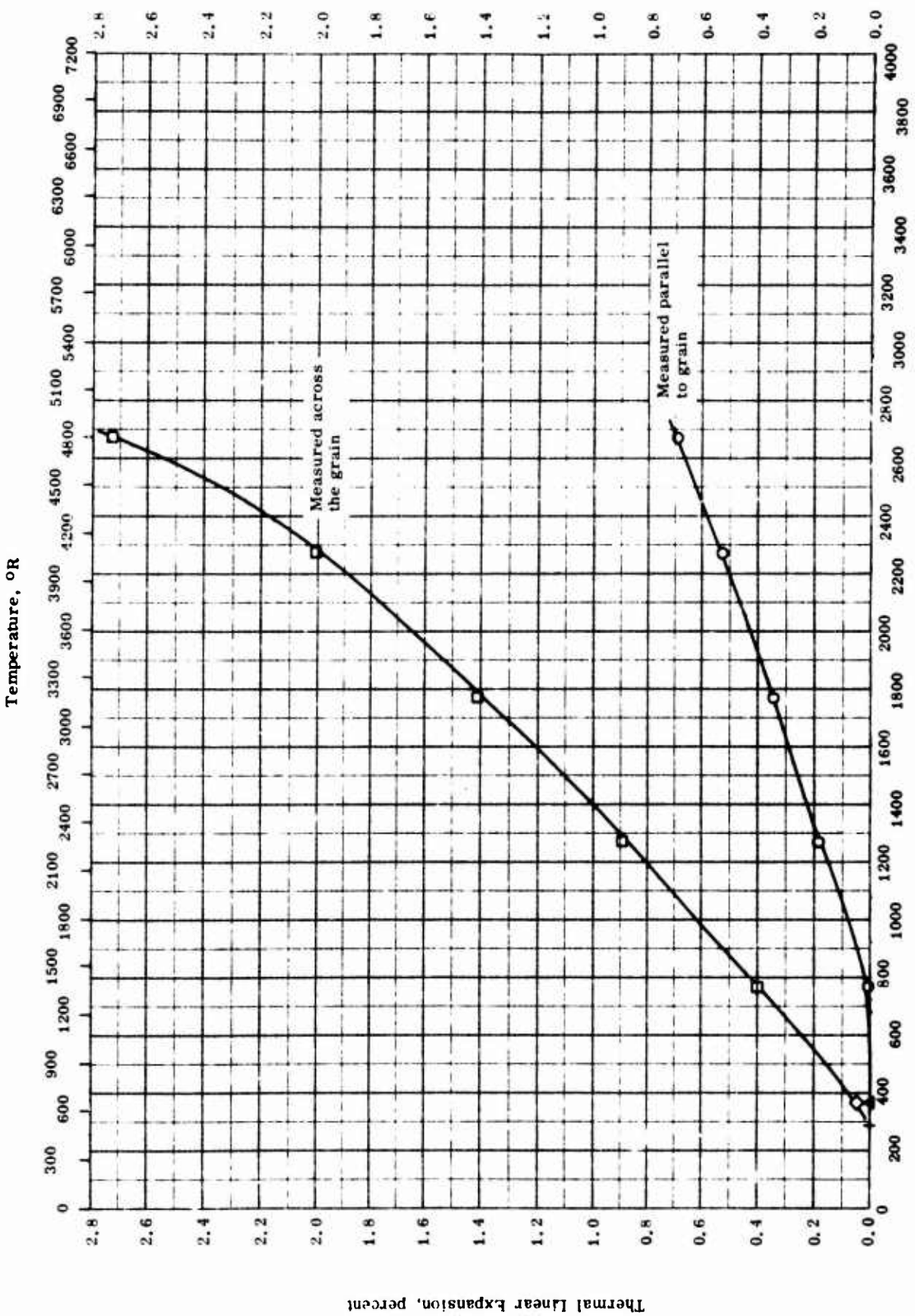
Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTC)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▽	64-22	293-3073		ZTC graphite, National Carbon Co.; bulk density of samples used 1.92 and 1.94 g cm^{-3}.	Average data for 2 samples taken from 8 1/2 in. diameter by 11 in. long blocks; measured parallel to grain.
○	64-22	293-3073		Same as above.	Same as above except measured across the grain.

TPRC

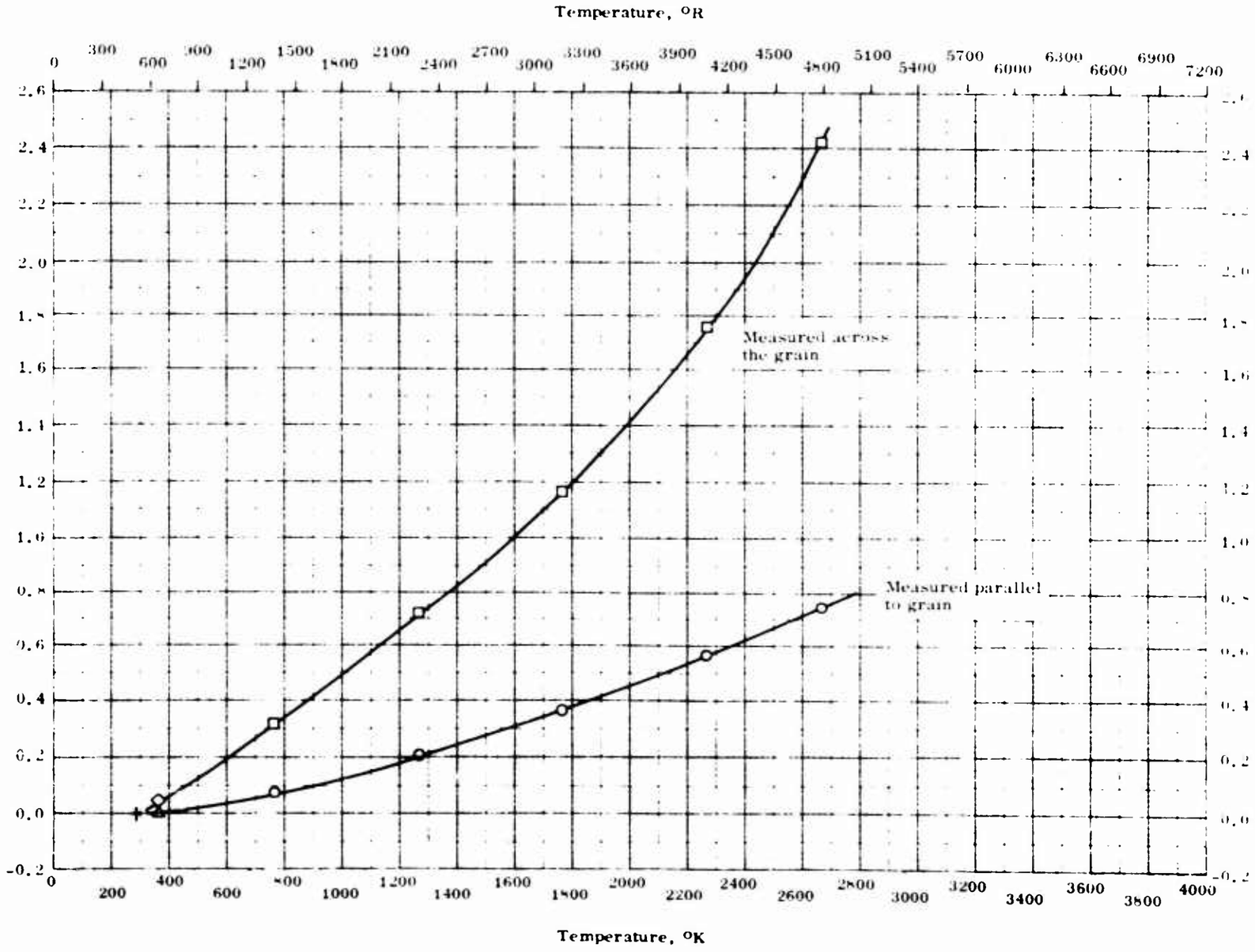


THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTD)

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTD)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
△	64-22	293-373		ZTD graphite, National Carbon Co.; bulk density 2.01 g cm^{-3} at room temperature; specific resistance at room temperature 5.41 x 10^{-4} ohm-cm and across grain 7.88 x 10^{-4} ohm-cm; specimen dimensions 0.3 by 3/8 by 5 in.	Specimen taken from 14 in. diameter by 10 in. long block; measured parallel to grain; average data over several runs.
○	64-22	293-2673		Same as above except specimen dimensions 1/2 by 1/2 by 5 in.	Same as above.
◇	64-22	293-373		Same as above except specimen dimensions 0.3 by 3/8 by 5 in.	Same as above except measured across the grain.
□	64-22	293-2673		Same as above except specimen dimensions 1/2 by 1/2 by 5 in.	Same as above.



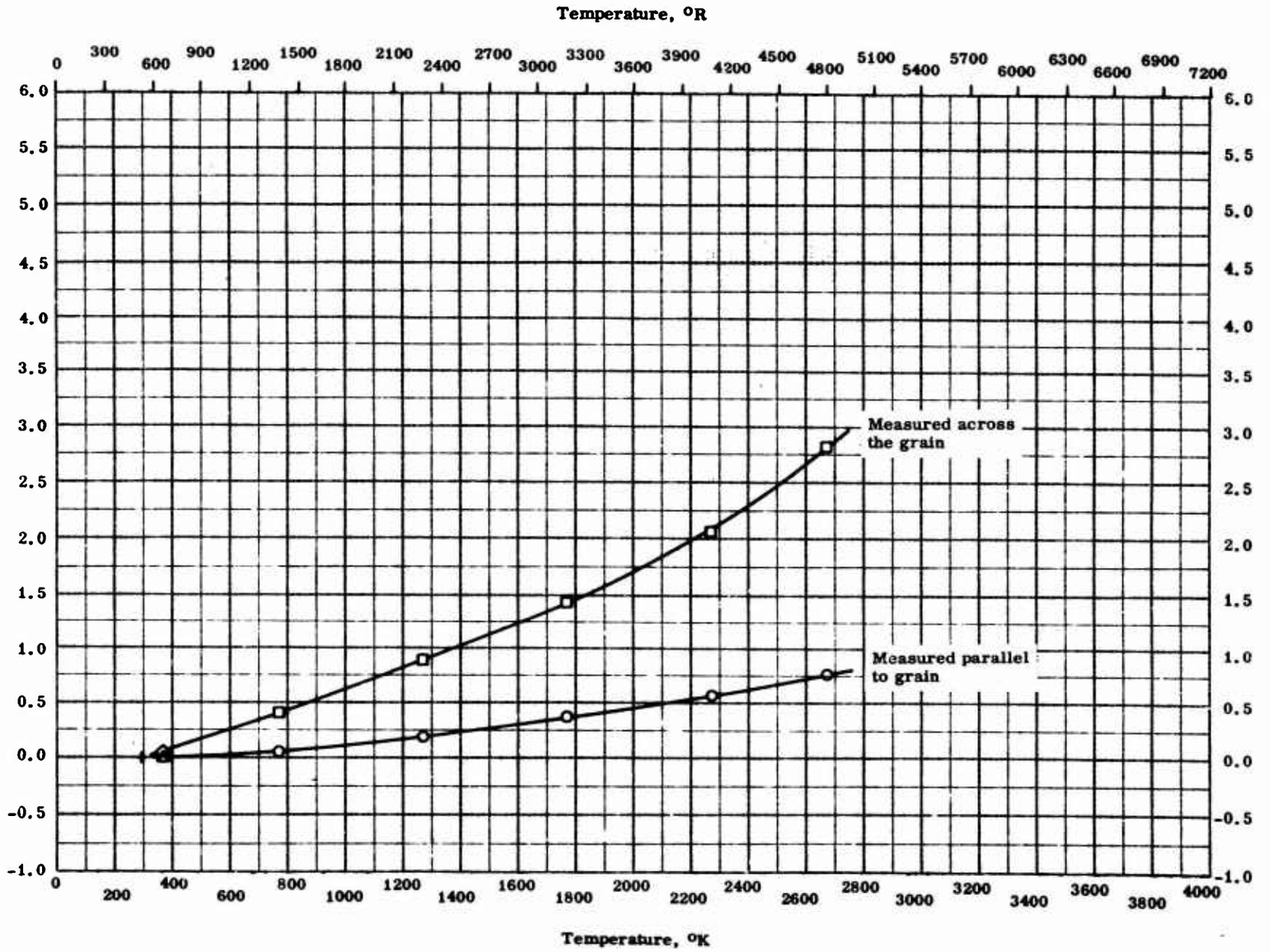
THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTE)

Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION — GRAPHITE
(Grade ZTE)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	64-22	293-373		ZTE graphite, National Carbon Co.; bulk density 1.96 g cm^{-3} at room temperature; specific resistance at room temperature parallel to grain 8.94 x 10^{-4} ohm-cm and across grain 20.40 x 10^{-4} ohm-cm; specimen dimensions 0.3 by 3/8 by 5 in.	Specimen taken from 30 in. diameter by 23 1/2 in. long block; measured parallel to grain; average data over several runs.
○	64-22	293-2673		Same as above except specimen dimensions 1/2 by 1/2 by 5 in.	Same as above.
◇	64-22	293-373		Same as above except specimen dimensions 0.3 by 3/8 by 5 in.	Same as above except measured across the grain.
□	64-22	293-2673		Same as above except specimen dimensions 1/2 by 1/2 by 5 in.	Same as above.



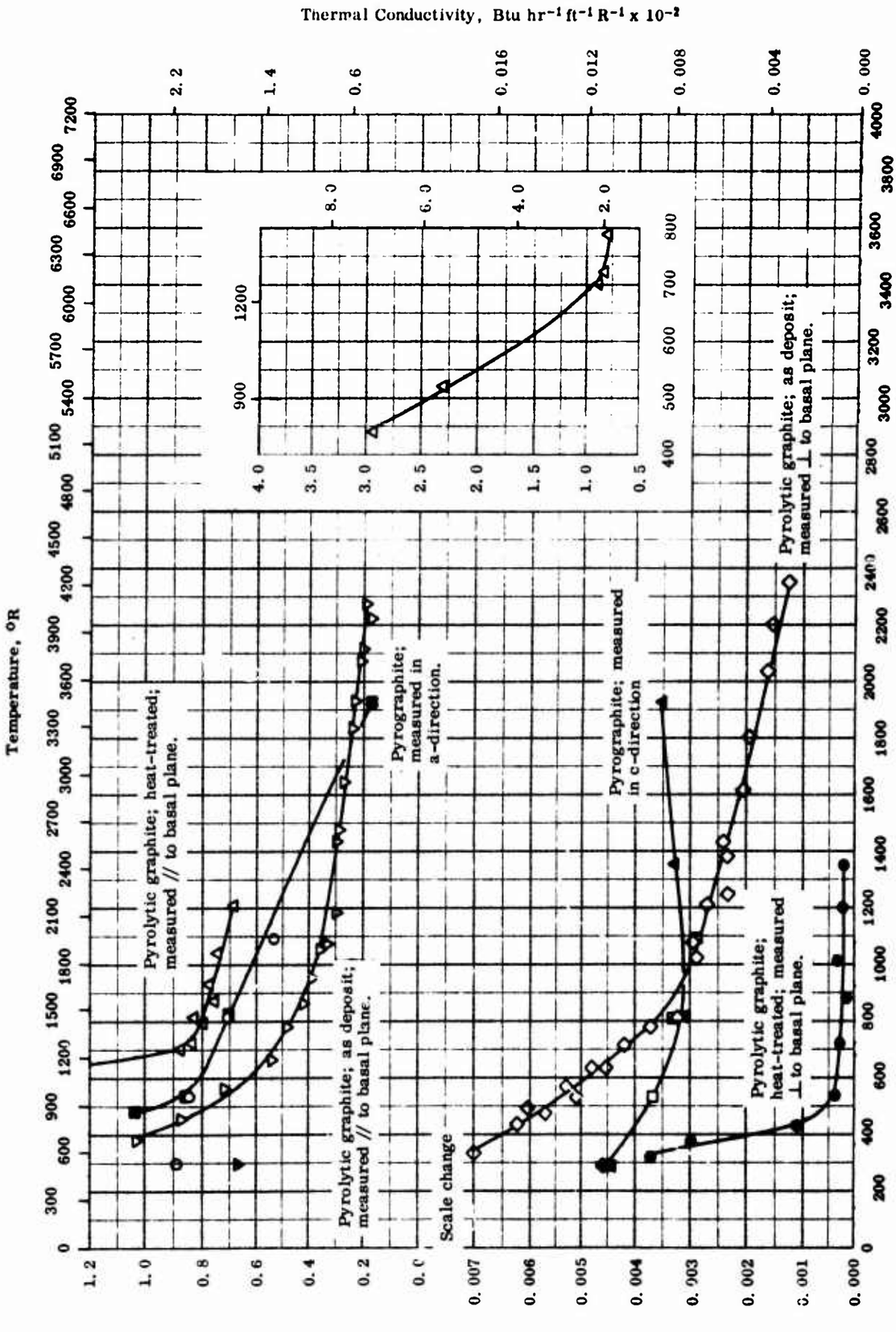
THERMAL LINEAR EXPANSION — GRAPHITE
(Grade ZTF)

Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION -- GRAPHITE
(Grade ZTF)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	64-22	293-373		ZTF graphite, National Carbon Co.; bulk density 1.99 g cm^{-3} at room temperature; specific resistance at room temperature parallel to grain 7.24 x 10^{-4} ohm-cm and across grain 21.48 x 10^{-4} ohm-cm; specimen dimensions 0.3 by 3/8 by 5 in. [Author's design: block no. 137 A]	Specimen taken from 14 in. diameter by 11 in. long block; measured parallel to grain; average data over several runs.
○	64-22	293-2673		Same as above except specimen dimensions 1/2 by 1/2 by 5 in.	Same as above.
◇	64-22	293-373		Same as above except specimen dimensions 0.3 by 3/8 by 5 in.	Same as above except measured across the grain.
□	64-22	293-2673		Same as above except specimen dimensions 1/2 by 1/2 by 5 in.	Same as above.

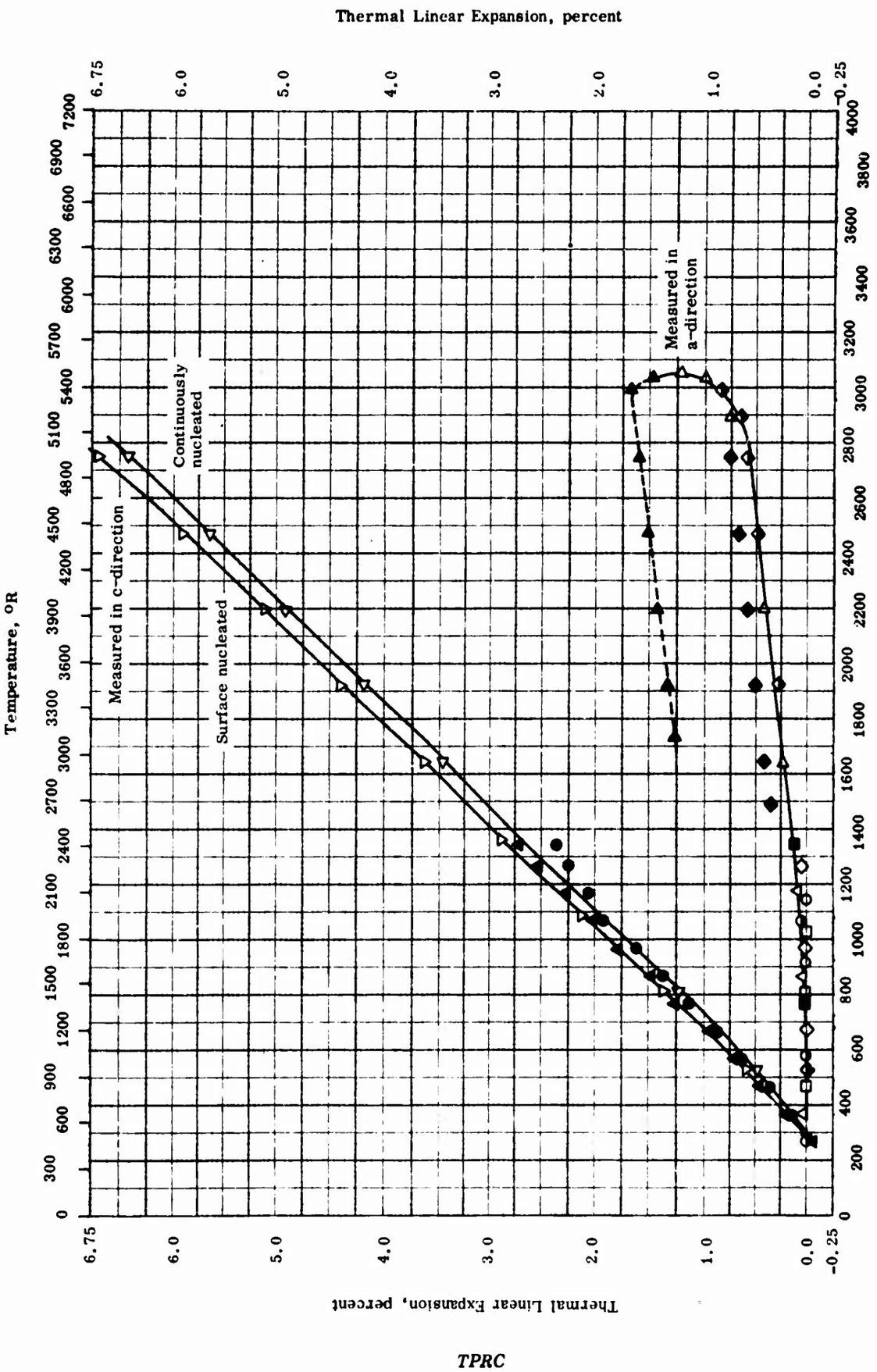


THERMAL CONDUCTIVITY -- PYROLYTIC GRAPHITE

THERMAL CONDUCTIVITY -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-9	294-1089		Density 137 lb ft^{-3}.	Measured in a-direction.
□	62-9	294-1089		Same as above.	Measured in c-direction.
△	61-19	440-1210		Highly regenerative micro-structure material.	Heat treated at 2900 C for 1 hr; measured parallel to basal planes.
▽	61-19	380-2270		Same as above.	As deposit; measured parallel to basal planes.
◇	61-19	330-2345		Same as above.	As deposit; measured perpendicular to basal planes.
●	61-19	320-1345		Same as above.	Heat treated at 2900 C for 3 hrs; measured perpendicular to basal planes.
■	63-10	294-1922		Pyrographite; density 2.26 g cm^{-3}.	Measured in a-direction.
▲	63-10	294-1922		Same as above.	Measured in c-direction.
▼	63-10	294		Pyrographite with 1 Boron.	Measured in a-direction.
◆	63-10	294		Same as above.	Measured in c-direction.

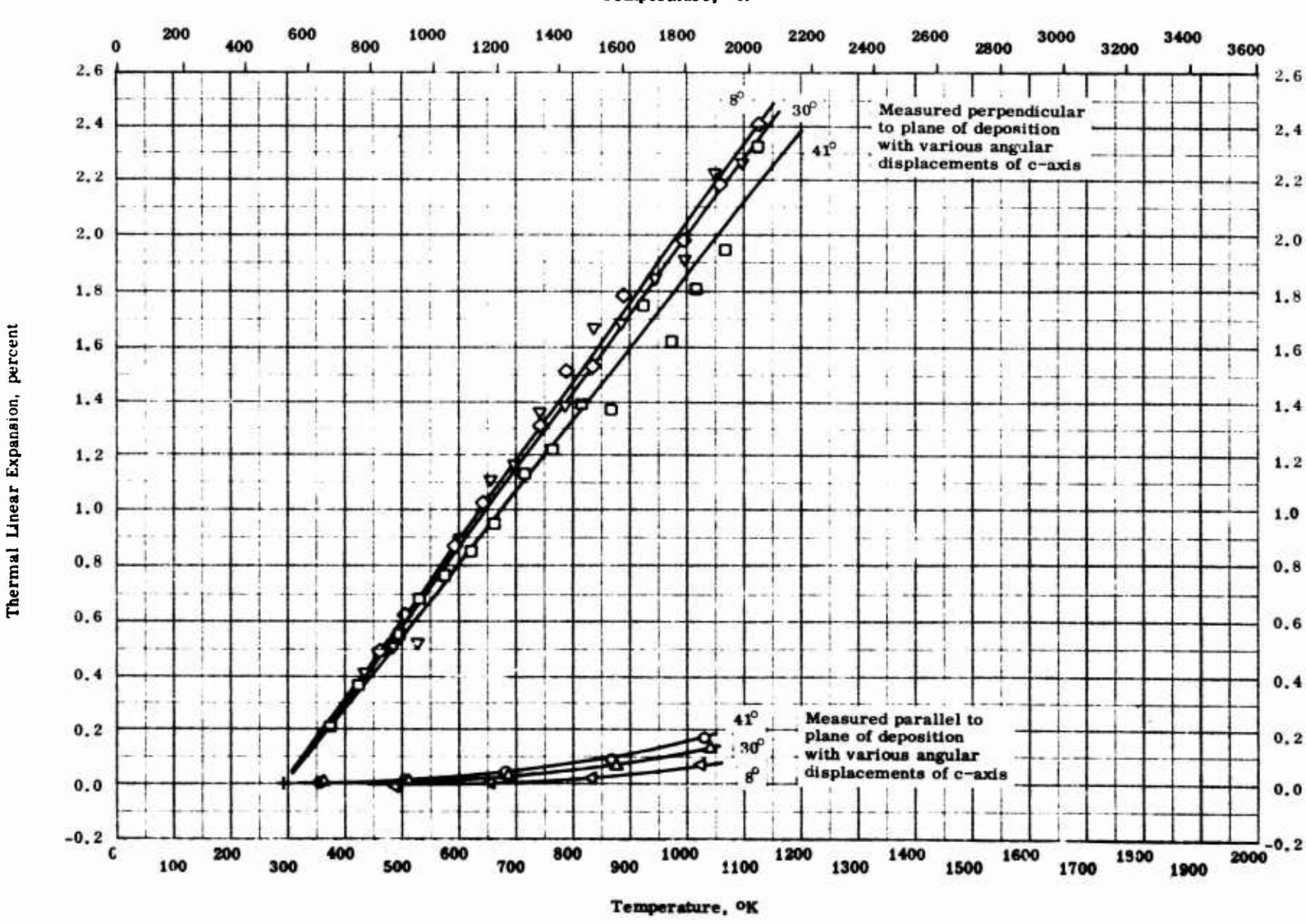


THERMAL LINEAR EXPANSION -- PYROLYTIC GRAPHITE
(Nucleated and regenerative microstructure)

THERMAL LINEAR EXPANSION -- PYROLYTIC GRAPHITE (Continued)
(Nucleated and regenerative microstructure)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◆	64-24	293-2989		Pyrolytic graphite from Metallurgical Products Dept., General Electric Co.; surface nucleated; density by immersion in alcohol 2.20 g cm^{-3}.	Deposited at 4000 F; specimen cut from flat plate. raw stock and all surfaces finished by grinding; measured in a-direction.
◆	64-24	1489-2756		Same as above.	Cooling data for above specimen.
▽	64-24	293-2756		Same as above.	Same as heating cycle for above specimen, except measured in c-direction.
▷	64-24	293-3050		Pyrolytic graphite from Raytheon Manufacturing Co.; continuously nucleated; density by immersion in alcohol 2.206 g cm^{-3}.	Deposited at 4000 F; specimen cut from flat plate raw stock and all surfaces finished by grinding; measured in a-direction.
▶	64-24	1733-3033		Same as above.	Cooling data for above specimen.
◁	64-24	293-2756		Same as above.	Same as heating cycle for above specimen, except measured in c-direction.

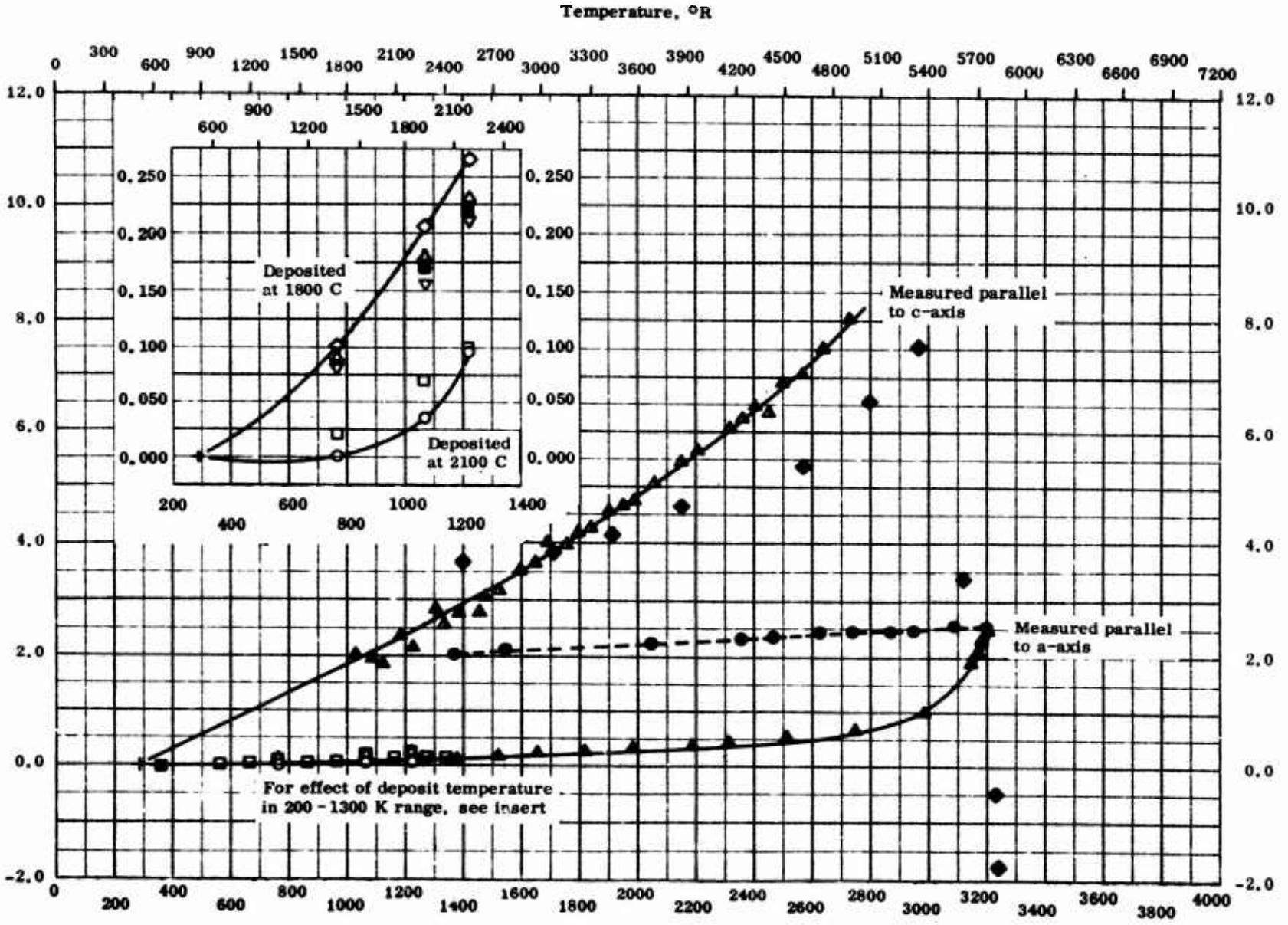


THERMAL LINEAR EXPANSION — PYROLYTIC GRAPHITE
(Various angular displacement of c-axis)

THERMAL LINEAR EXPANSION -- PYROLYTIC GRAPHITE
(Various angular displacements of c-axis)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-26	293-1061		Pyrolytic graphite from High Temperature Materials Inc.; limiting angular displacement of crystallite c-axis from normal to plane of deposition 41°.	Manufactured at 2150 C; measured parallel to plane of deposition with dilatometer.
□	64-26	293-1123		Same as above.	Same as above, except measured perpendicular to plane of deposition.
△	64-26	293-1081		Same as above, except limiting angular displacement of crystallite c-axis from normal to plane of deposition is 30°.	Manufactured at 2150 C and heat treated to 2700 C for 1/2 hr in argon atm; measured parallel to plane of deposition with dilatometer.
▽	64-26	293-1099		Same as above.	Same as above, except measured perpendicular to plane of deposition.
◁	64-26	293-1025		Same as above, except limiting angular displacement of crystallite c-axis from normal to plane of deposition is 8°.	Manufactured at 2150 C and heat treated to 2900 C for 1/2 hr in argon atm; measured parallel to plane of deposition with dilatometer.
◇	64-26	293-1125		Same as above.	Same as above, except measured perpendicular to planes of deposition.



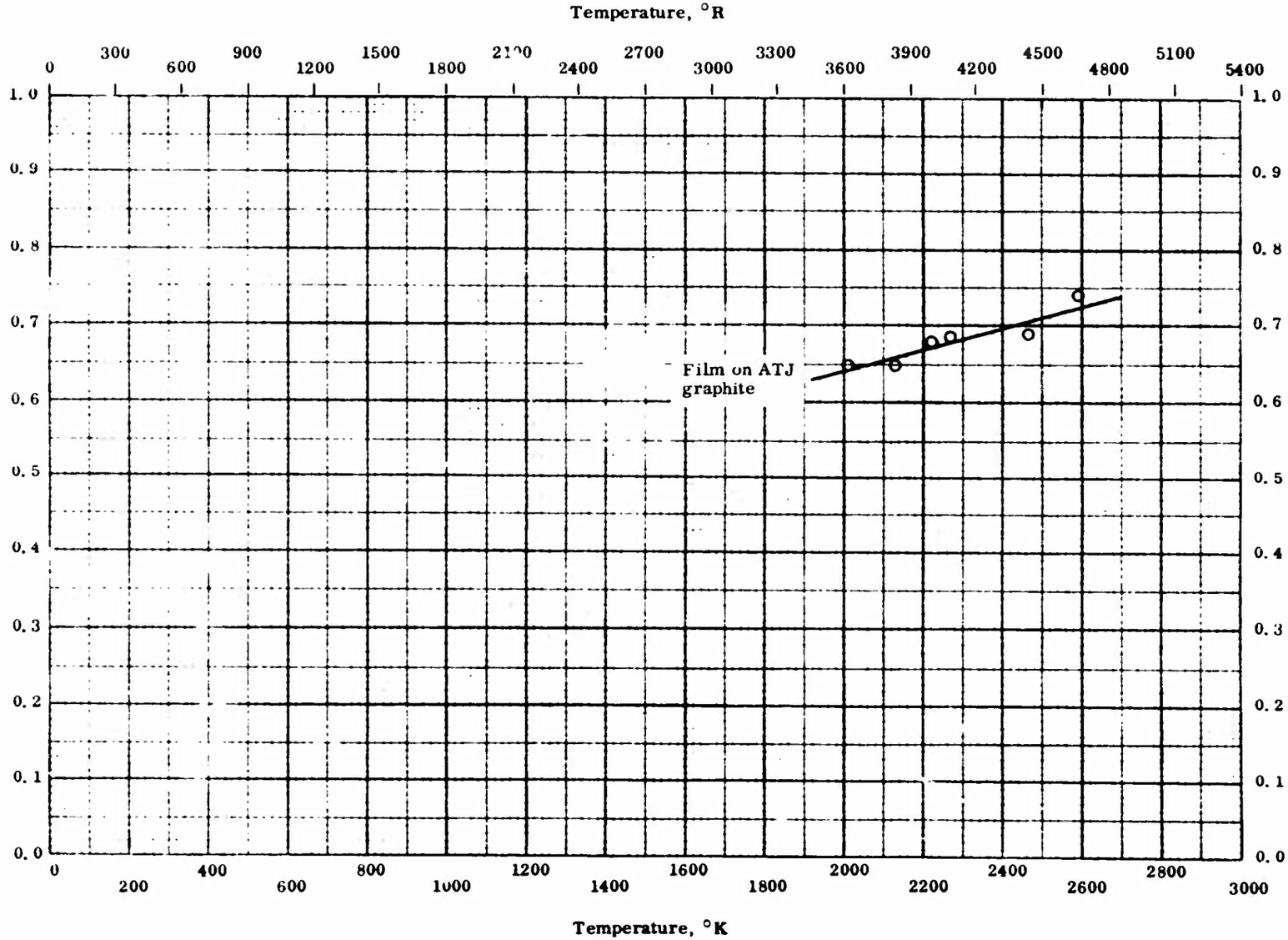
THERMAL LINEAR EXPANSION — PYROLYTIC GRAPHITE

THERMAL LINEAR EXPANSION -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-8	293-1223		Pyrolytic graphite.	Deposited from benzene at 2.5 cm partial pressure and at a temperature of 2100 C; average of 2 tests.
□	55-8	293-1223		Pyrolytic graphite.	Same as above except deposited at 2000 C.
△	55-8	293-1223		Pyrolytic graphite.	Same as above except deposited at 1900 C.
◇	55-8	293-1223		Pyrolytic graphite.	Same as above except deposited at 1800 C.
▽	55-8	293-1223		Pyrolytic graphite.	Same as above except deposited at 1700 C.
■	55-8	293-1223		Pyrolytic graphite.	Same as above except deposited at 1600 C.
▲	63-41	293-3203		Pyrolytic graphite fabricated by High Temperature Materials Co., Boston, Mass.	Formed at 2150 ± 25 C with a deposition time of 200 hrs; specimen prepared from 1/8 in. thick central zone of a 3/4 in. thick block; measured parallel to a-axis of basal plane with average heating rate of 10 C min^{-1}.
●	63-41	1374-3203		Same as above.	Cooling data for above specimen.
◆	63-41	293-3241		Same as above.	Same as heating cycle for above specimen except measured along c-axis perpendicular to basal plane.
▬	62-58	283-1348		Pyrographite.	Measured along "a" direction parallel to basal plane.
▲	63-39	298-2735	0.1	Pyrolytic graphite.	Deposited at 2400 K and rebaked at 3400 K; expansion calculated from lattice constants measured in c-direction in vacuo; sample self-heated by passing current through it.

TPRC

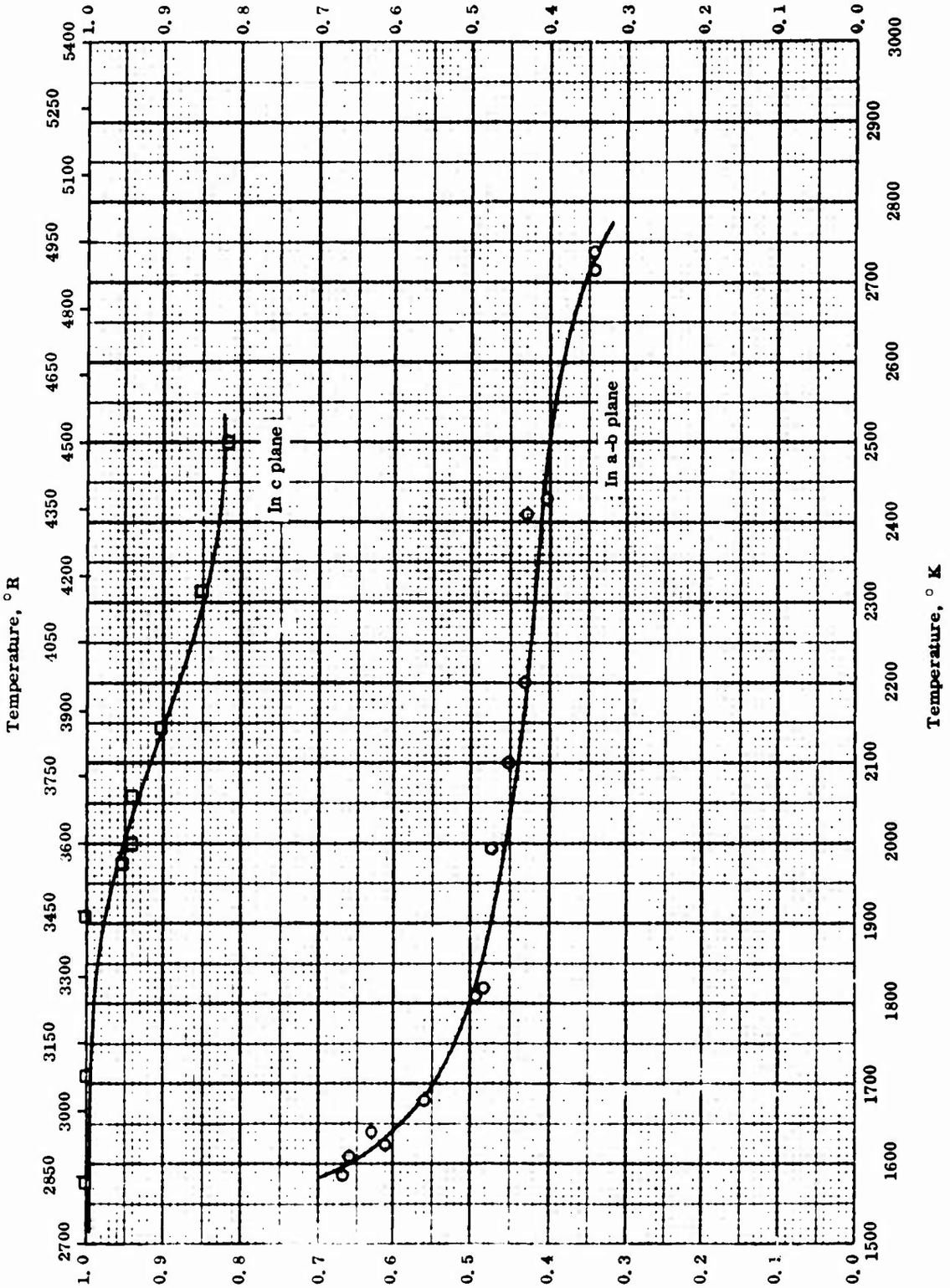


HEMISPHERICAL TOTAL EMITTANCE -- PYROLYTIC GRAPHITE

HEMISPHERICAL TOTAL EMITTANCE -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-20	2018-2593		Film (~ 100μ thickness) on ATJ graphite.	Measured in vacuum.



NORMAL TOTAL EMITTANCE -- PYROLYTIC GRAPHITE

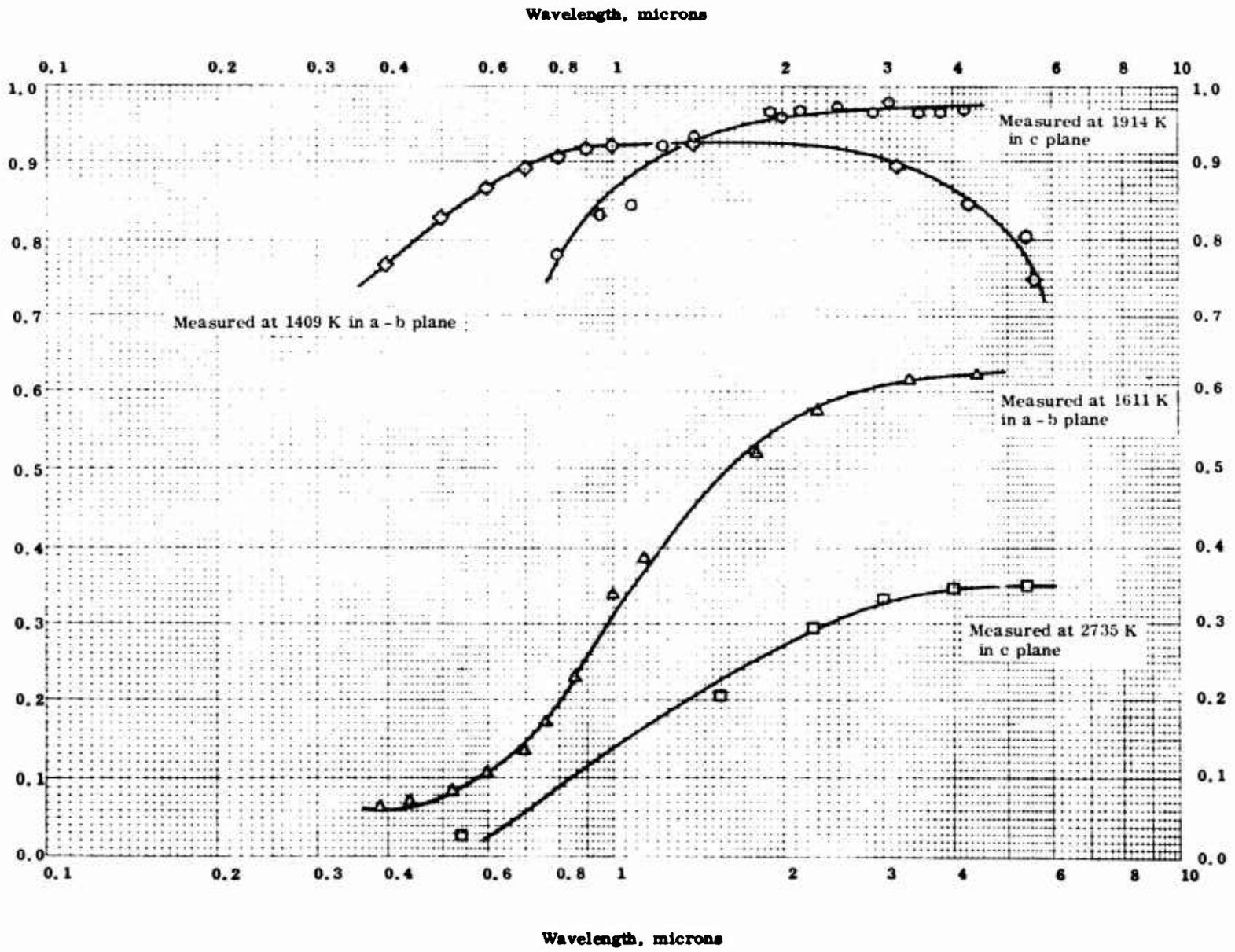
Normal Total Emittance

TPRC

NORMAL TOTAL EMITTANCE -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-27	1587-2737			Polished; measured a-b plane in a vacuum of 5×10^{-6} mm Hg.
□	63-27	1580-2500			Polished; specimen directly heated; measured on c-plane in a vacuum of 5×10^{-6} mm Hg.

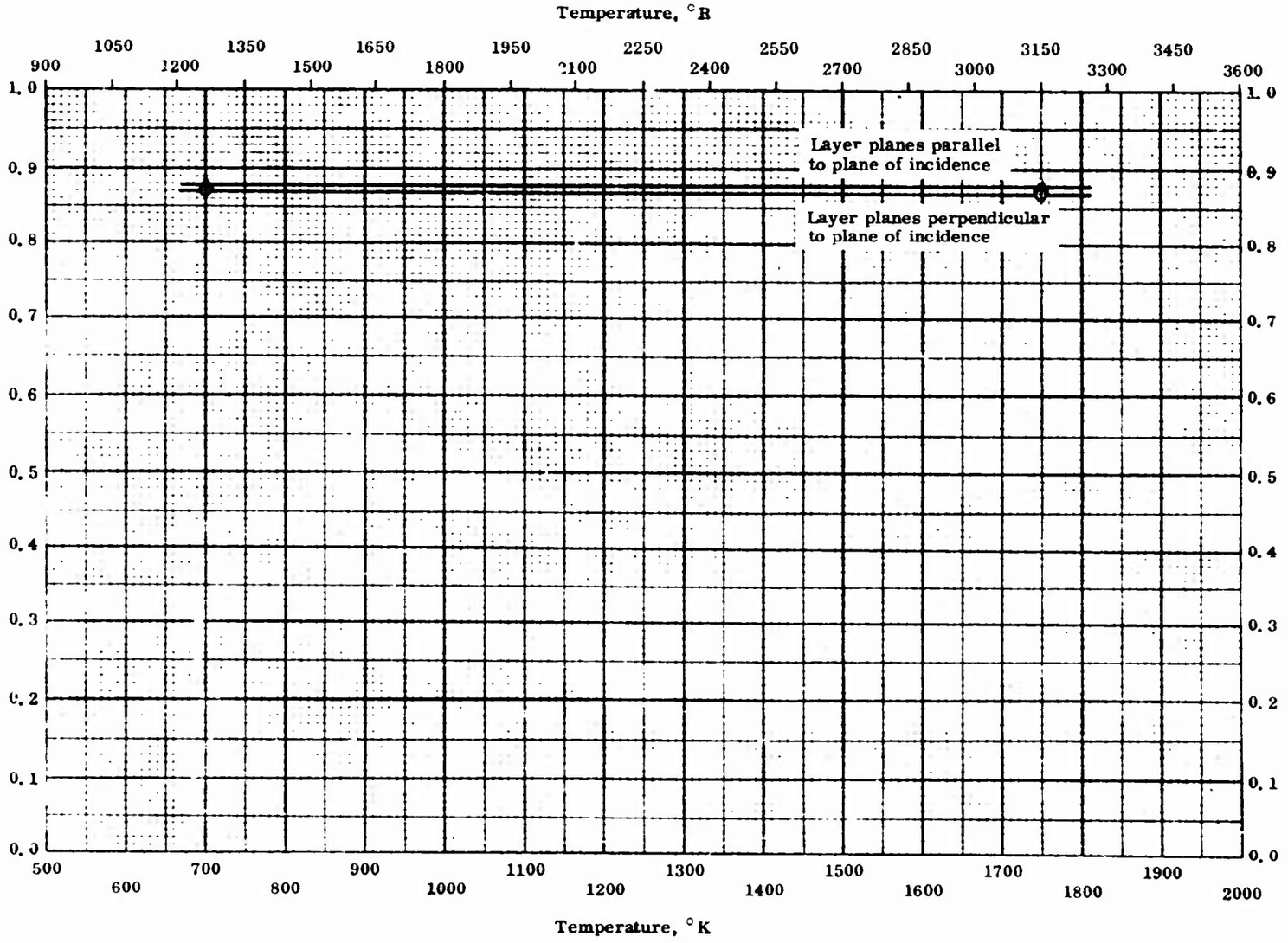


NORMAL SPECTRAL EMITTANCE -- PYROLYTIC GRAPHITE

NORMAL SPECTRAL EMITTANCE -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	64-18	1914	0.8-4.2			Polished; measured in c plane in a vacuum of 2×10^{-5} mm Hg.
△	64-18	1611	0.39-4.4			Polished; measured in a-b plane in an argon atmosphere of 1.5 atm.
□	64-18	2735	0.54-5.4			Same as above.
◇	63-27	1409	0.4-5.6			Polished; measured in c plane in a vacuum of 5×10^{-6} mm Hg.

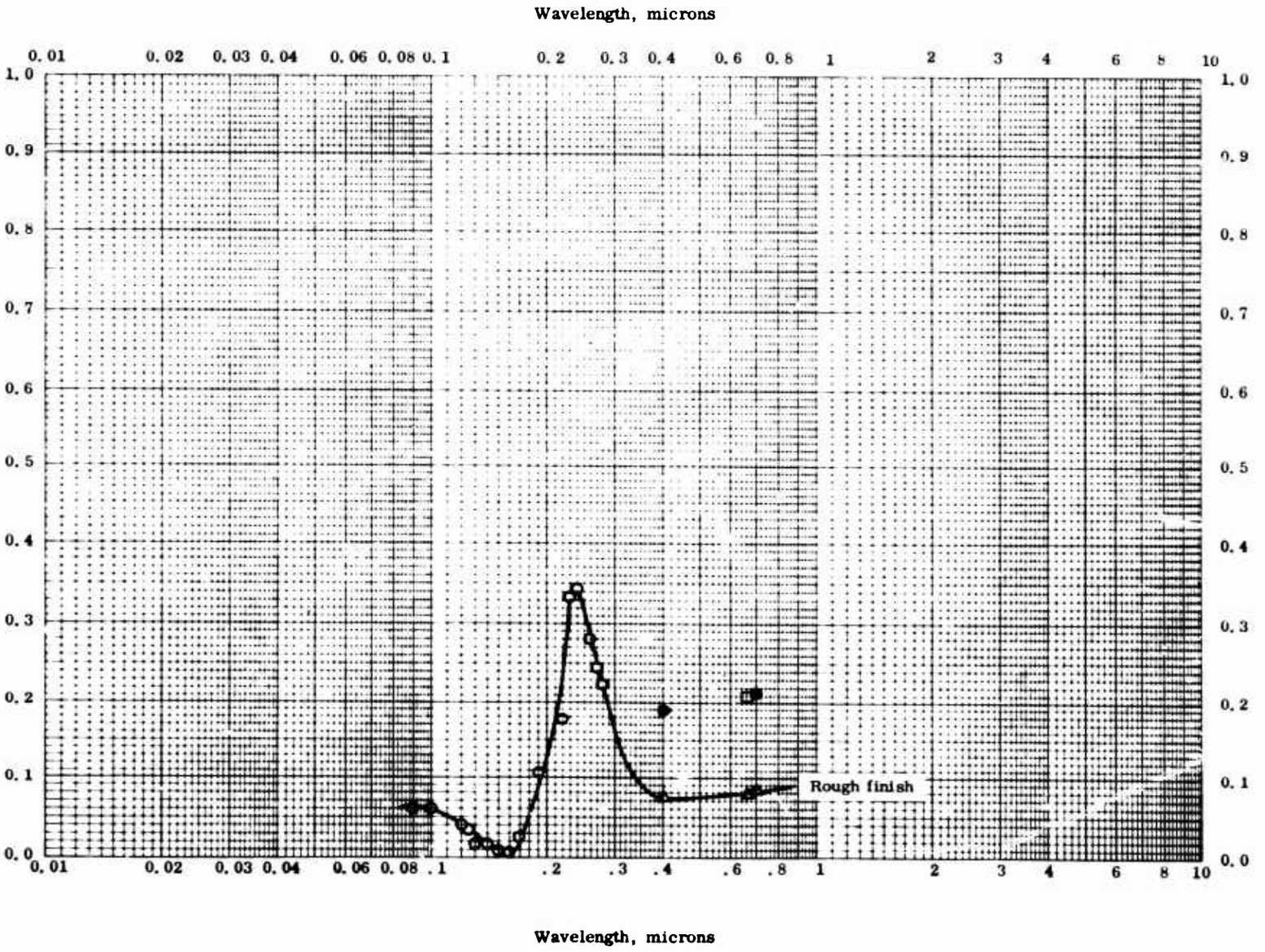


ANGULAR SPECTRAL EMITTANCE -- PYROLYTIC GRAPHITE

ANGULAR SPECTRAL EMITTANCE -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	63-29	0.55	700-1750		Density > 2.2 g cm^{-3}.	Layer planes perpendicular to plane of incidence; metallographically polished and cathodically etched; measured in argon atmosphere; average value of four specimens; 45° from normal.
△	63-29	0.55	700-1750		Same as above.	Same as above except layer planes parallel to plane of incidence.

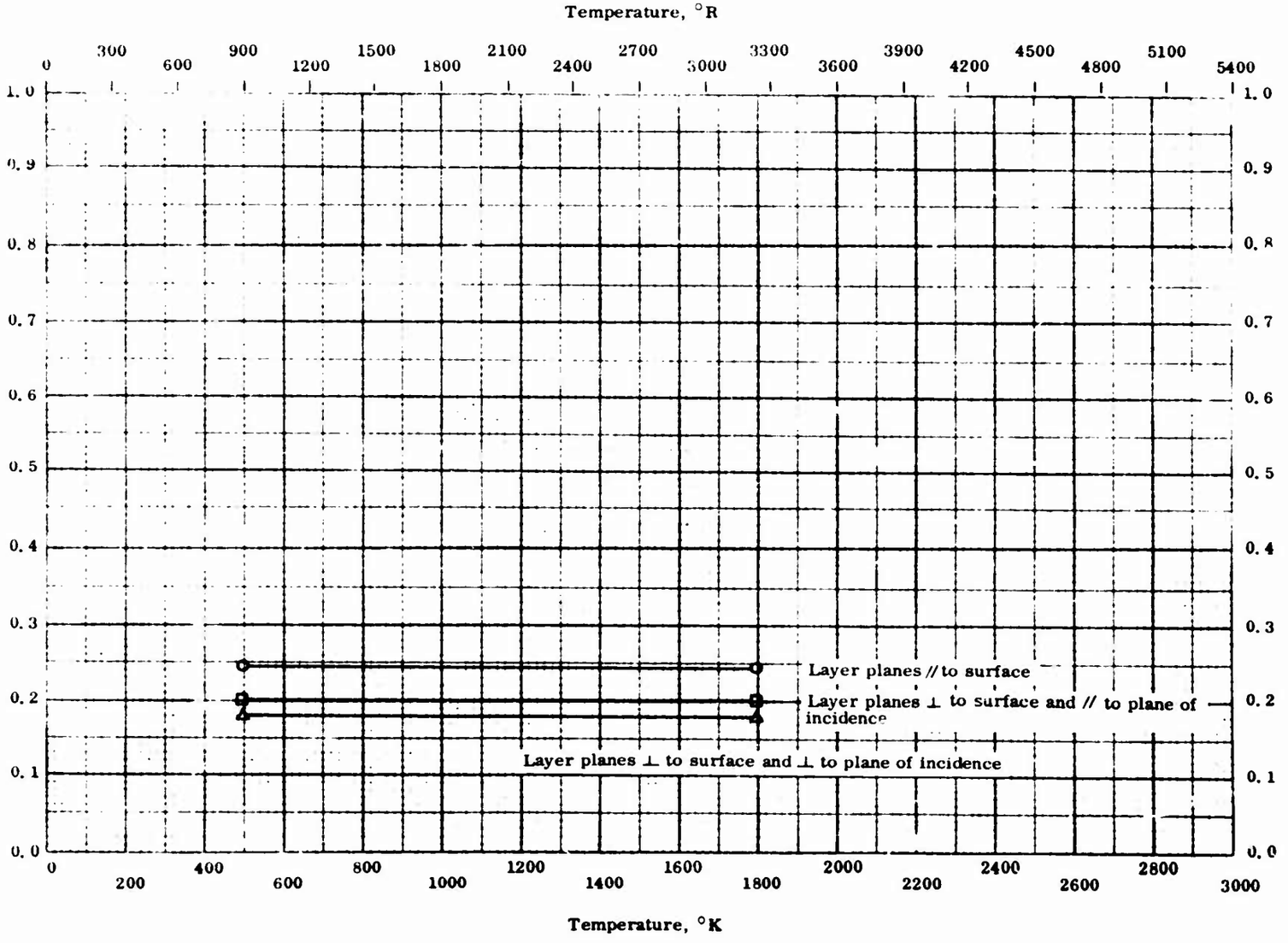


NORMAL SPECTRAL REFLECTANCE -- PYROLYTIC GRAPHITE

NORMAL SPECTRAL REFLECTANCE -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
●	60-45	298	0.4-0.7		Deposit on AUC graphite disc under identical condition at 2373 K; 200 - 300 μ in. surface roughness.	As deposited.
□	60-45	298	0.4-0.7		Not given; surface 30 - 70 μ in. finish.	Surface-ground.
△	60-45	298	0.4-0.7		Not given; surface 4 - 6 μ in. finish.	Surface-ground.
○	60-44	298	0.09-0.28		Single crystal.	Rather poor finish; incidence 5 degrees from normal; measured with face perpendicular to z-axis.



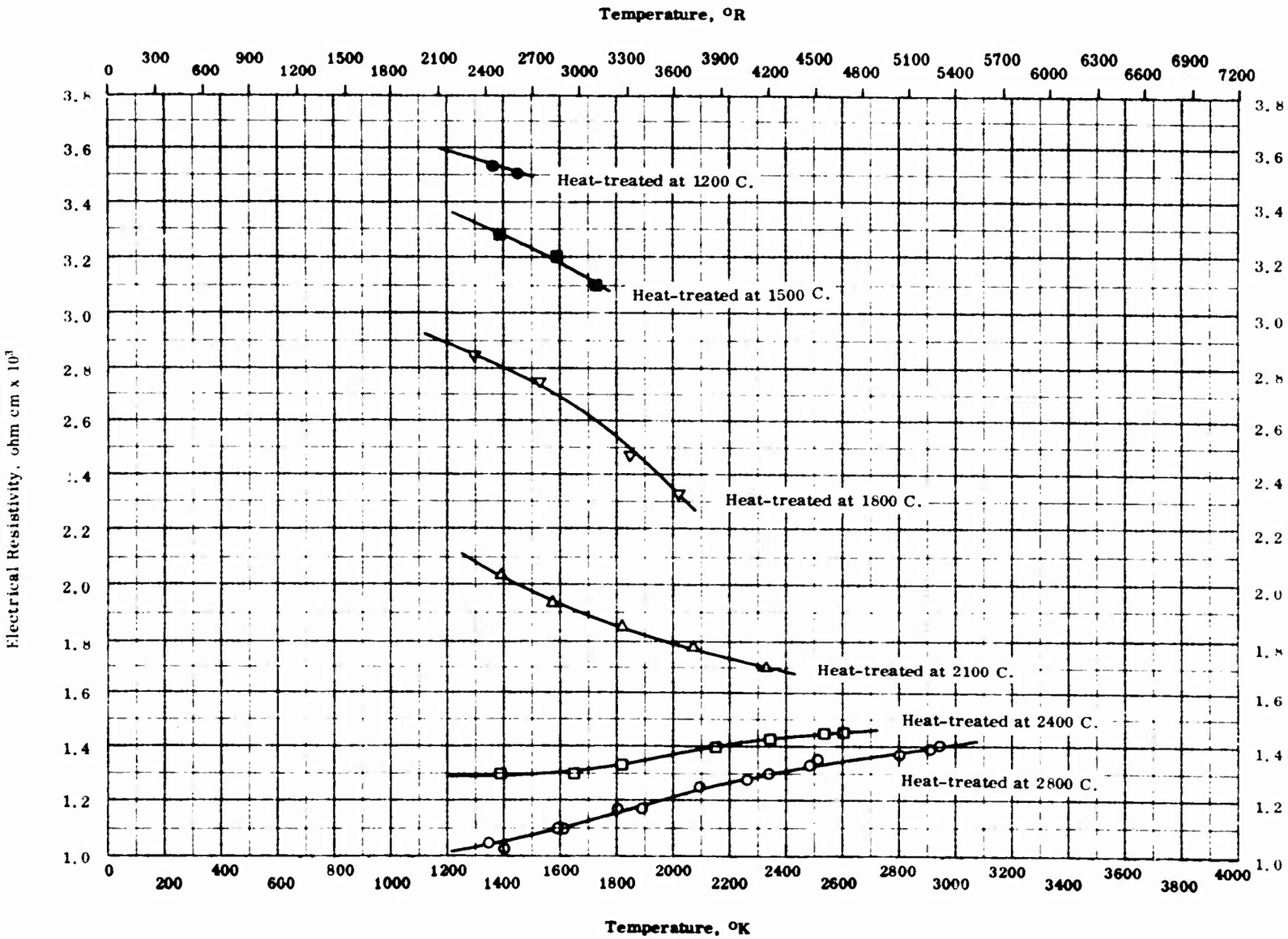
ANGULAR SPECTRAL REFLECTANCE -- PYROLYTIC GRAPHITE

ANGULAR SPECTRAL REFLECTANCE -- PYROLYTIC GRAPHITE

REFERENCE INFORMATION

Symbol	Ref	Wavelength μ	Temp. Range °K	Repd. Error%	Sample Specifications	Remarks
○	63-29	0.55	500-1800		Density >2.2 g cc^{-1}.	Layer planes parallel to surface; metallographically polished and ultrasonically cleaned; measured in argon atmosphere; average value of 3 measurements; hemispherical illumination, 45° viewing.
△	63-29	0.55	500-1800		Same as above.	Same as above; layer planes perpendicular to surface and parallel to plane of incidence.
□	63-29	0.55	500-1800		Same as above.	Same as above; layer planes perpendicular to surface and to plane of incidence.

TPRC



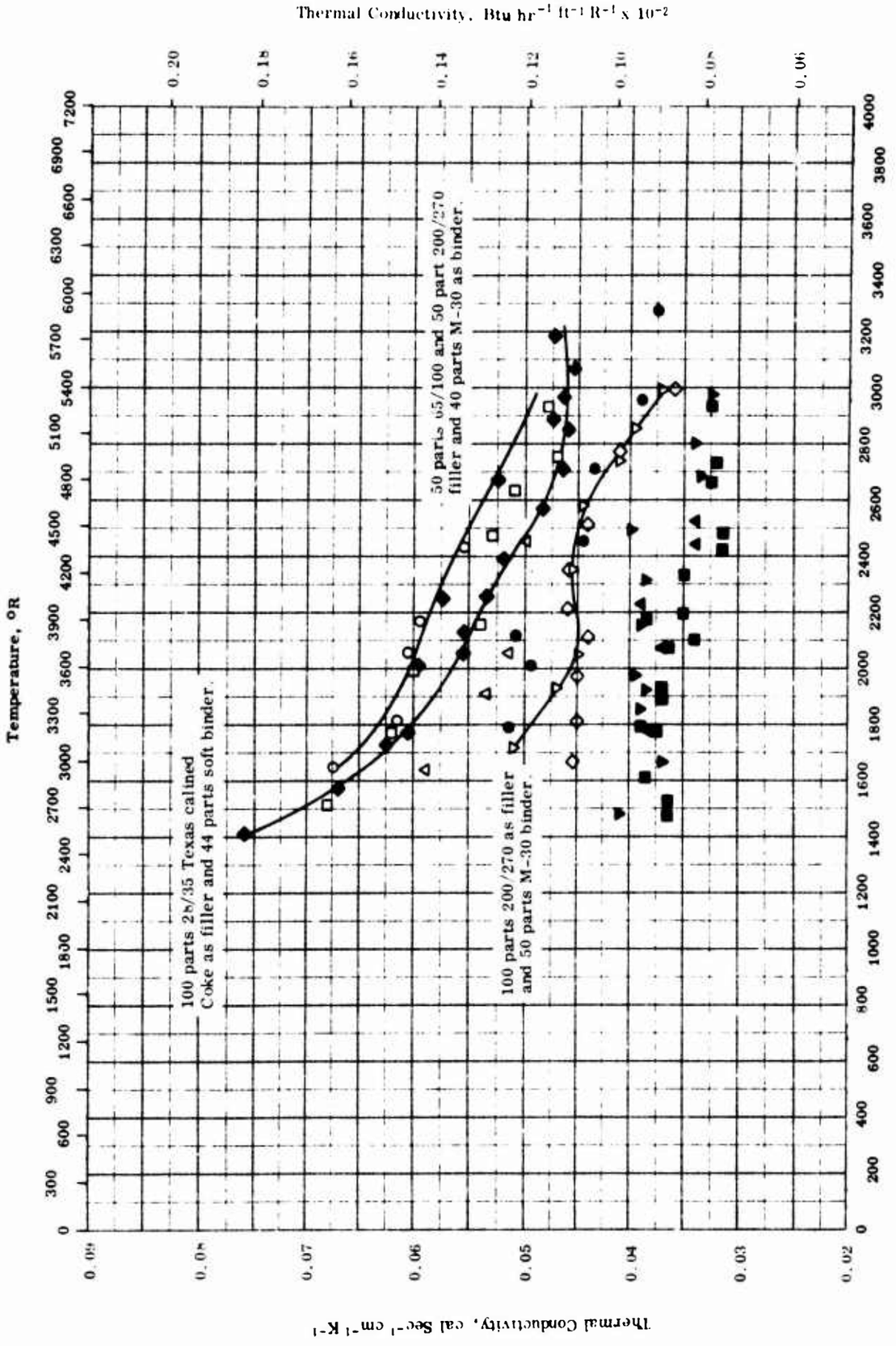
ELECTRICAL RESISTIVITY -- EXPERIMENTAL GRAPHITE
(Soft filler and soft binder)

ELECTRICAL RESISTIVITY -- EXPERIMENTAL GRAPHITE
(Soft filler and soft binder)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
●	62-4	1363-1448		Mixture of 100 parts of soft filler coke particles (200/270 mesh size) and 50 parts of M-30 soft binder.	Extruded and baked to 1000 C and heated at 1200 C.
■	62-4	1393-1733		Same as above.	The above sample heat-treated at 1500 C after cooled to room temperature.
▽	62-4	1298-2018		Same as above.	The above sample heat-treated at 1800 C after cooled to room temperature.
△	62-4	1388-2333		Same as above.	The above sample heat-treated at 2100 C after cooled to room temperature.
□	62-4	1393-2598		Same as above.	The above sample heat-treated at 2400 C after cooled to room temperature.
○	62-4	1348-2943		Same as above.	The above sample finally heat-treated at 2890 C after cooled to room temperature.

TPRC



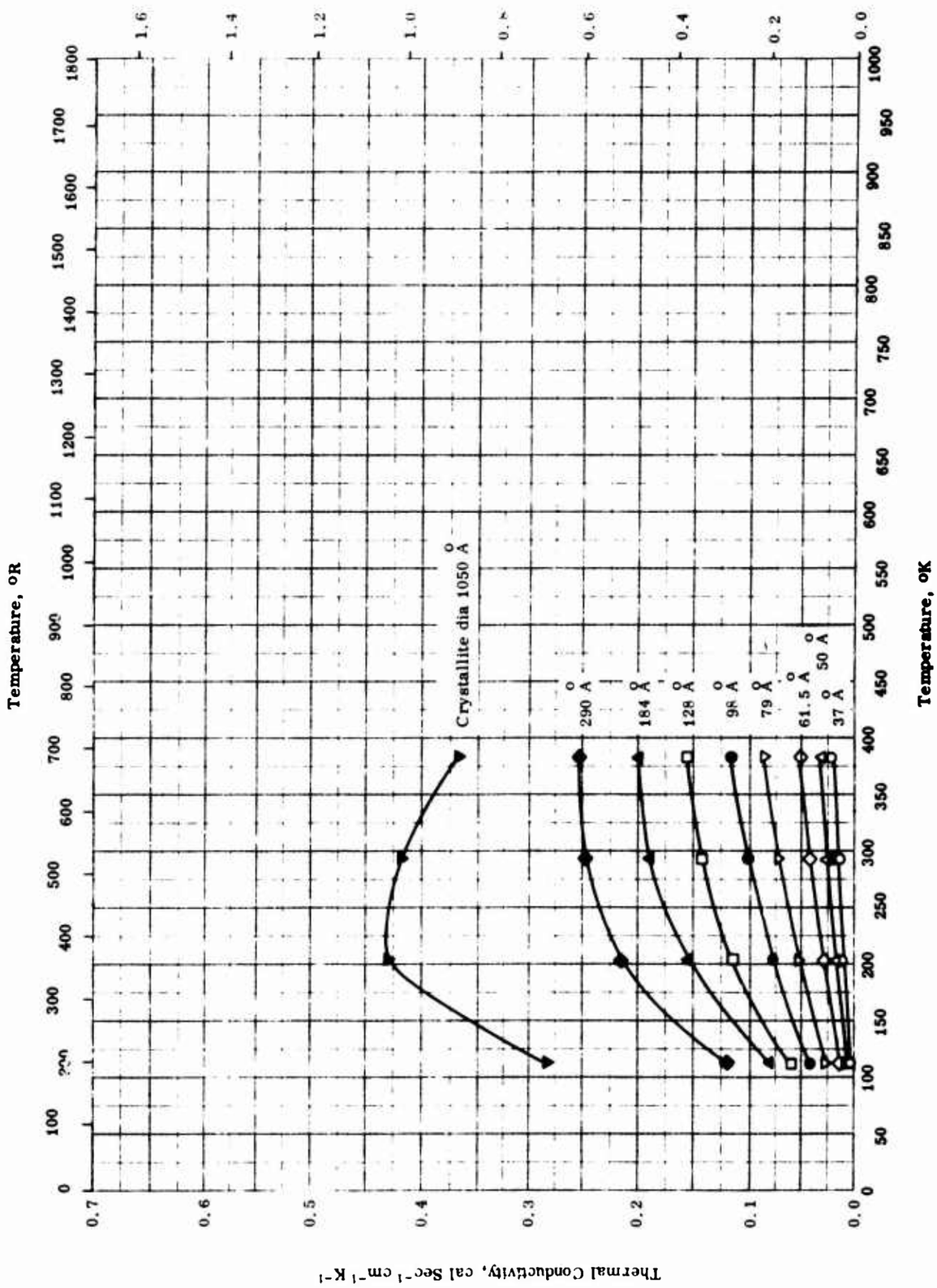
THERMAL CONDUCTIVITY -- EXPERIMENTAL GRAPHITE
(Carbon filler and carbon binder)

THERMAL CONDUCTIVITY -- EXPERIMENTAL GRAPHITE
(Carbon filler and carbon binder)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-5	1643-2433		Made from 50 part 65/100 and 50 parts 200/270 as filler and 40 parts M-30 as binder; apparent density 1.53 g cm^{-3}.	Graphitized at 3000 C; measured in argon 1-2 in Hg above atm pressure.
□	61-5	1513-2933		Same as above.	Second run of the above sample.
△	61-5	1638-2448		Same as above.	Fourth run of the above sample.
▽	61-5	1713-2983		Made from 100 parts 200/270 as filler and 50 parts M-30 as binder; apparent density 1.57 g cm^{-3}.	Same measuring condition as above sample.
◇	61-5	1663-2993		Same as above.	Second run of above sample.
●	61-5	1783-3270		Same as above.except density 1.58 g cm^{-3}.	Same measuring condition as above sample.
■	61-5	1473-2930		Soft filler and soft binder from National Carbon Co.	Graphitized at 3000 C; measured 1-2 in. Hg above atm pressure.
▲	61-5	1773-2520		Same as above.	Second run of above sample.
▼	61-5	1480-2970		Same as above.	Third run of above sample.
◆	60-22	1413-3183		From National Carbon Co.; made from 100 parts Texas calcined coke of 28/35 mesh as soft filler and 44 parts soft binder; density 1.24 g cm^{-3}.	Baked and graphitized at 3000 C; measured in argon at 1 atm.

TPRC



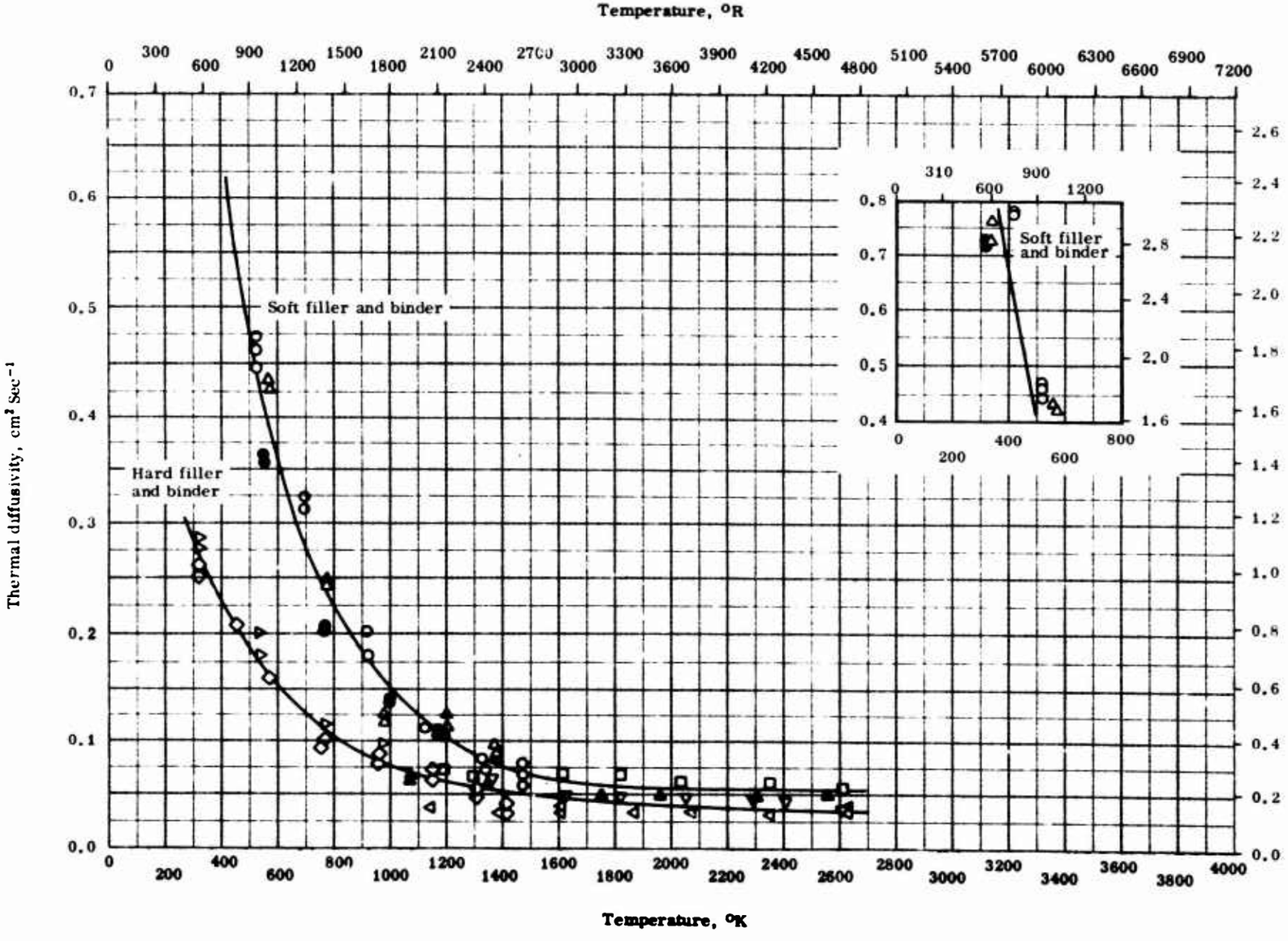
THERMAL CONDUCTIVITY -- EXPERIMENTAL GRAPHITE
(Coke filler and coal tar pitch binder)

THERMAL CONDUCTIVITY -- EXPERIMENTAL GRAPHITE
(Coke filler and coal tar pitch binder)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-17	115-385		Made from 100 parts Kendall coke, 42 parts medium grade coal tar pitch, and 2 parts Socony Vacwax 80 as extrusion oil; crystal dia 37 Å; density 93 lb ft^{-3}.	Extruded after being ground to pass No. 50 Tyler sieve; heated to 1100 C in 5 days and graphitized in N_2 atm for 5 min at 1200 C.
■	56-17	115-385		Same as above except crystal dia 42 Å.	Same as above except graphitized at 1350 C.
△	56-17	115-385		Same as above except crystal dia 50 Å	Same as above except graphitized at 1500 C.
◇	56-17	115-385		Same as above except crystal dia 61.5 Å.	Same as above except graphitized at 1750 C.
▽	56-17	115-385		Same as above except crystal dia 79 Å.	Same as above except graphitized at 1950 C.
●	56-17	115-385		Same as above except crystal dia 98 Å.	Same as above except graphitized at 2100 C.
□	56-17	115-385		Same as above except crystal dia 128 Å.	Same as above except graphitized at 2200 C.
▲	56-17	115-385		Same as above except crystal dia 184 Å.	Same as above except graphitized at 2300 C.
◆	56-17	115-385		Same as above except crystal dia 290 Å.	Same as above except graphitized at 2430 C.
▼	56-17	115-385		Same as above except crystal dia 1050 Å.	Same as above except graphitized at 3100 C; estimated by extrapolation.

TPRC



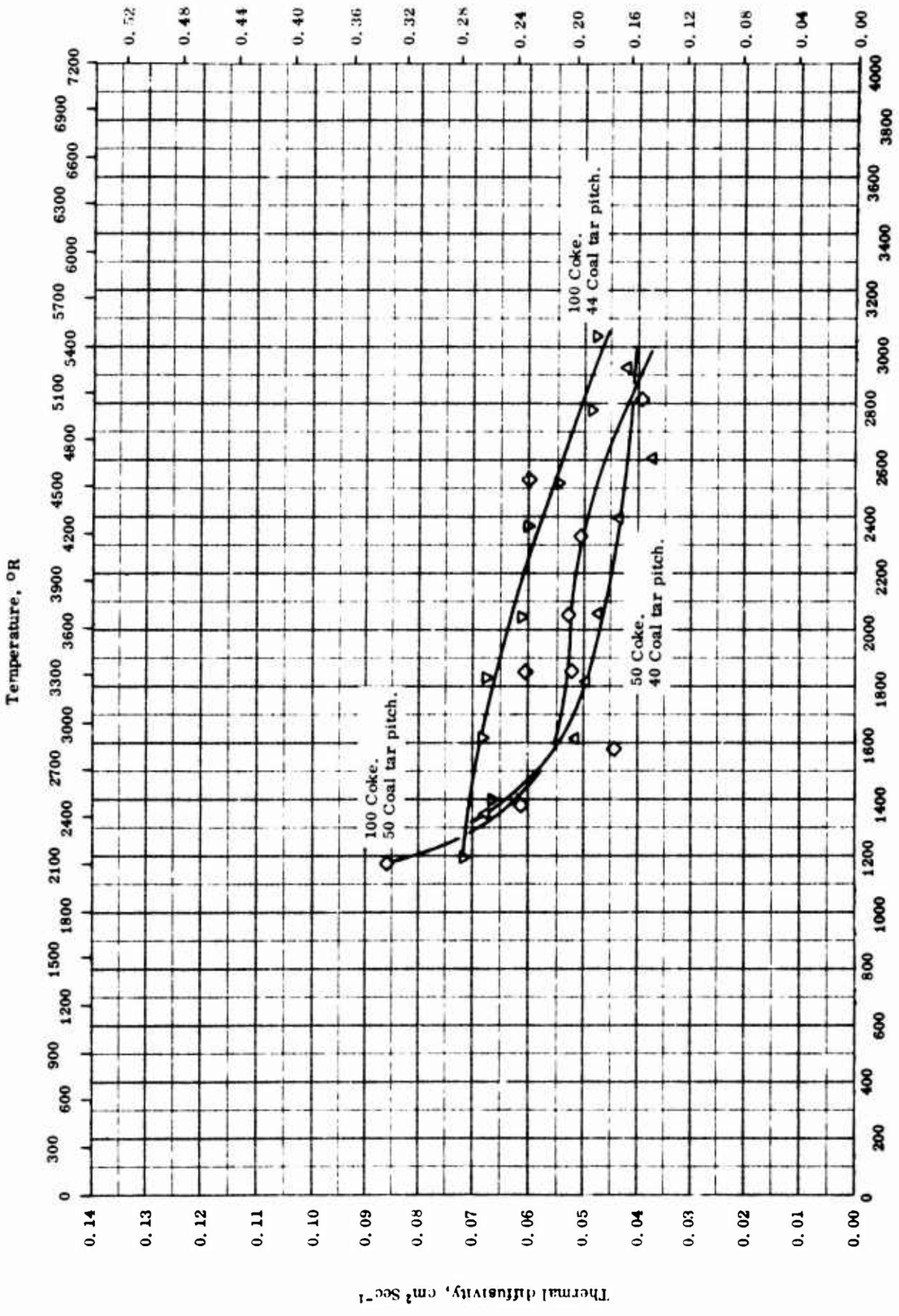
THERMAL DIFFUSIVITY -- EXPERIMENTAL GRAPHITE
(Carbon filler and carbon binder)

THERMAL DIFFUSIVITY -- EXPERIMENTAL GRAPHITE
(Carbon filler and carbon binder)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-5	411-1466		Soft carbon sample.	Extruded; heat treated at 3000 C; measured in the direction parallel to the axis of extrusion.
●	63-6	314-1378		Soft filler and soft binder anisotropic highly graphitized carbon rod; density 1.20 g cm^{-3}. [Author's design.: U. B. carbon A]	Extruded and heat treated at 2800 C; measured in the direction parallel to the extrusion axis.
□	63-6	1188-2608		Same as above.	The above sample measured in the direction perpendicular to the extrusion axis.
△	63-6	328-1378		Same description as the above sample; density 1.49 g cm^{-3}. [Author's design.: U. B. carbon R].	Same as above; measured in the direction parallel to the extrusion axis.
▽	63-6	1363-2603		Same as above.	The above sample measured in the direction perpendicular to the extrusion axis.
▷	63-6	315-1390		Hard filler and hard binder anisotropic poorly graphitized carbon rod; density 1.23 g cm^{-3}. [Author's design.: U. B. carbon Z]	Extruded; heat treated at 2800 C; measured in the direction parallel to the extrusion axis.
◁	63-6	1143-2633		Same as above.	The above sample measured in the direction perpendicular to the extrusion axis.
◇	63-6	318-1415		Thermax W; same description as above; density 1.84 g cm^{-3}.	Same as above; measured in the direction parallel to the extrusion axis.
▲	63-6	1068-2558		Same as above.	The above sample measured in the direction perpendicular to the extrusion axis.
▼	62-4	1703-2568		From Graphite Specialties Corp.; Thermax as filler; density 1.86 g cm^{-3} after heat treatment.	Extruded; heat treated at 3000 C; measured in a direction perpendicular to extrusion axis and in a agron pressure exceeding atmospheric by 3 Cm Hg

TPRC



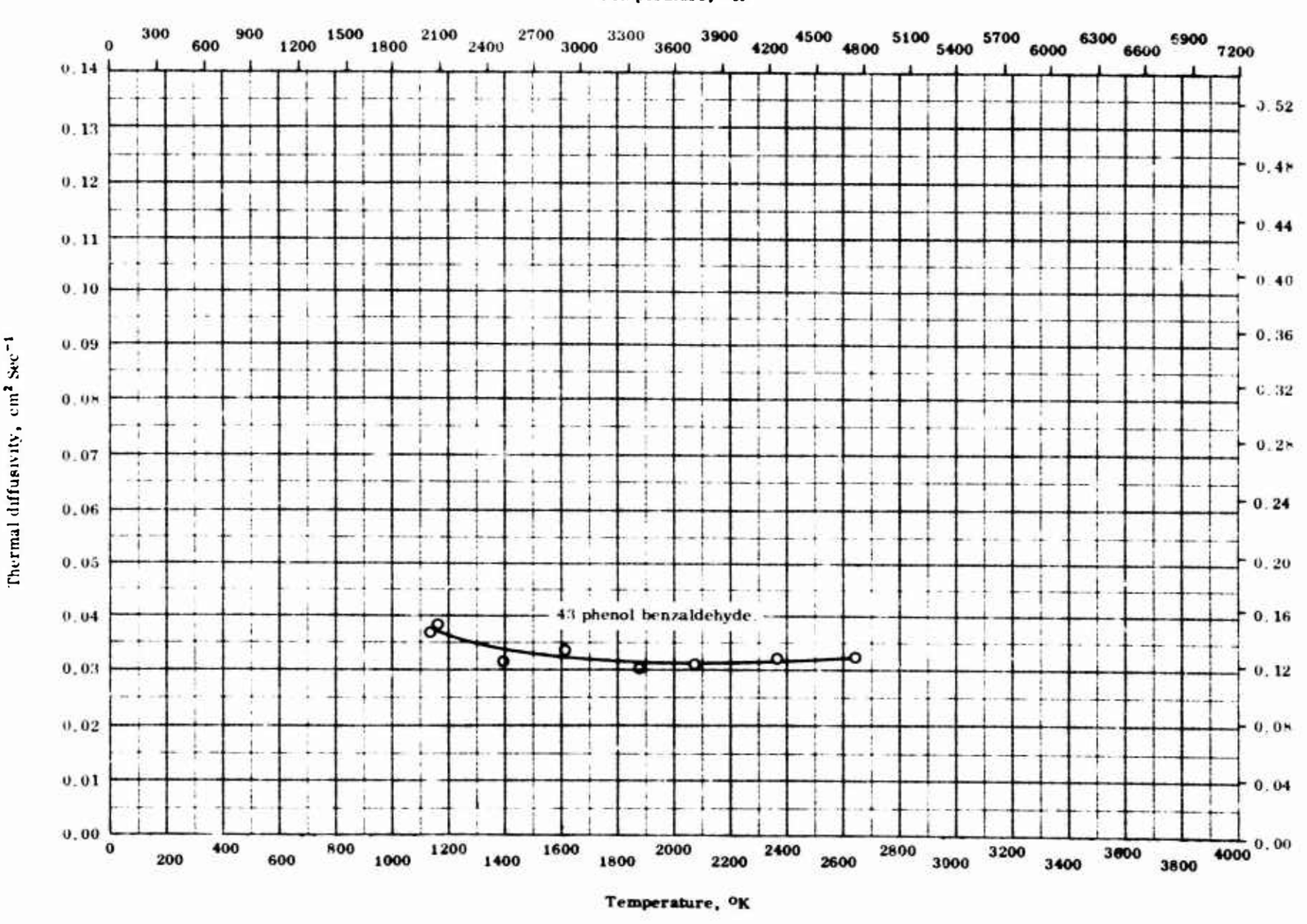
THERMAL DIFFUSIVITY -- EXPERIMENTAL GRAPHITE
(Coke filler and coal tar pitch binder)

THERMAL DIFFUSIVITY -- EXPERIMENTAL GRAPHITE
(Coke filler and coal tar pitch binder)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	62-4	1348-2928		Composition before heat treatment: 50 parts 65/100 and 50 parts 200/270 Texas coke as filler and 40 parts M-30 coal tar pitch as binder; density 1.55 g cm^{-3} after heat treatment. [Author's design.: U. B. Graphite R].	Extruded; heat treated at 3000 C; measured in a direction perpendicular to extrusion axis and in an argon pressure exceeding atmospheric by 3 cm Hg.
▽	62-4	1188-3038		Composition before heat treatment: 100 parts 28/35 Texas coke as filler and 44 parts of M-30 coal tar pitch as binder; density 1.33 g cm^{-3} after heat treatment. [Author's design.: U. B. Graphite A].	Same as above.
◇	62-4	1168-2818		Composition before heat treatment: 100 parts 200/270 Texas coke as filler and 50 parts M-30 coal tar pitch as binder; density 1.55 g cm^{-3} after heat treatment. [Author's design.: U. B. Graphite G].	Same as above.

TPRC

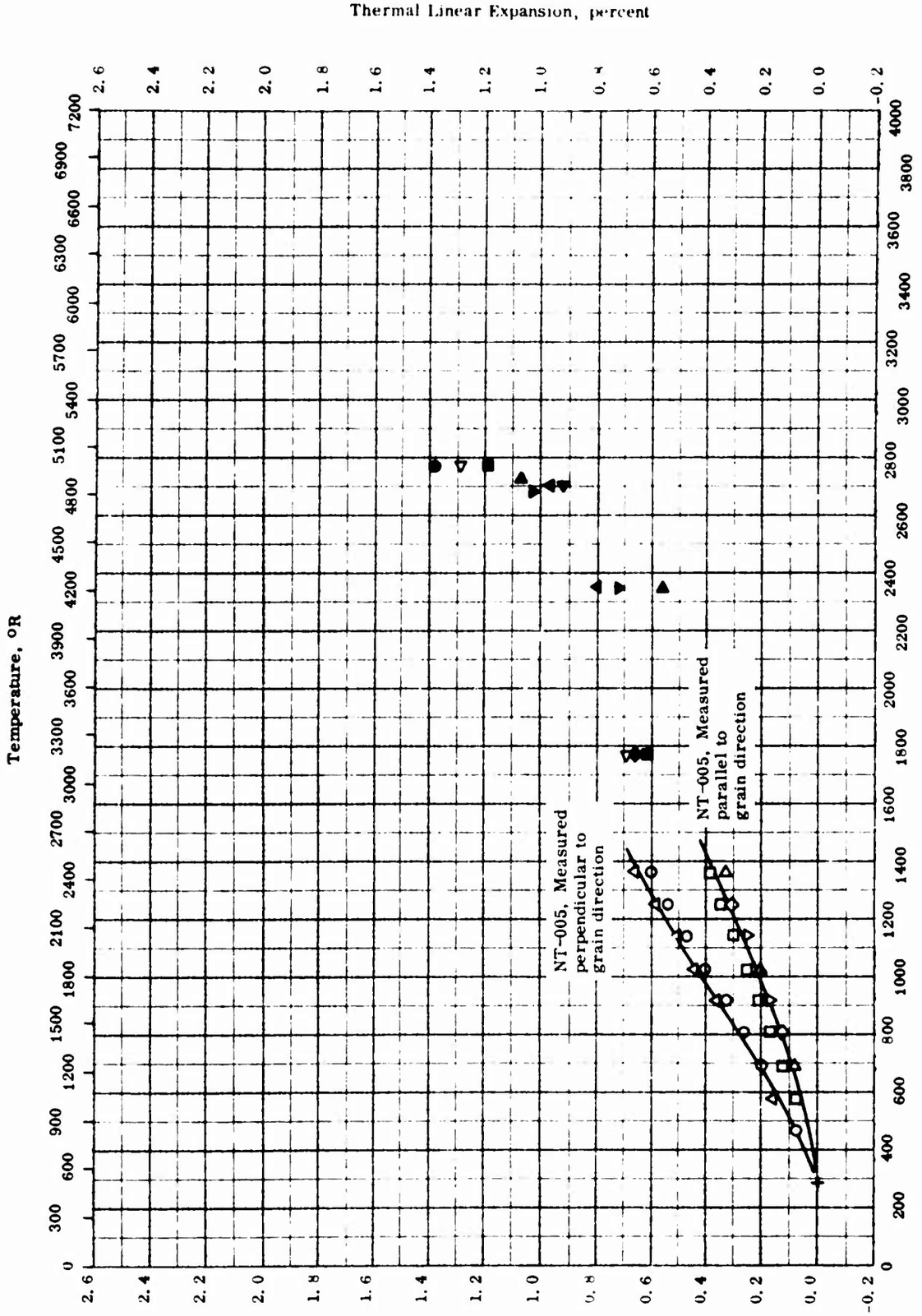


THERMAL DIFFUSIVITY -- EXPERIMENTAL GRAPHITE
(Phenol formaldehyde filler and phenol benzaldehyde binder)

THERMAL DIFFUSIVITY -- EXPERIMENTAL GRAPHITE
(Phenol formaldehyde filler and phenol benzaldehyde binder)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-4	1138-2638		Composition before heat treatment: 50 parts 100/150 and 50 parts 270 phenol formaldehyde as filler and 43 parts of phenol benzaldehyde as binder; density 1.32 g cm^{-3} after heat treatment. [Author's design.: U. B. Graphite Z].	Extruded; heat treated at 3000 C; measured in a direction prependicular to extrusion axis and in an argon pressure exceeding atmospheric by 3 cm Hg.



THERMAL LINEAR EXPANSION -- EXPERIMENTAL GRAPHITE

THERMAL LINEAR EXPANSION -- EXPERIMENTAL GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	59-23	300-1367		NT-0005 graphite, National Carbon Co. [Author's design: block no. 1001]	Molded and baked under pressure; not graphitized; measured perpendicular to grain direction.
□	59-23	300-1367		Same as above specimen.	Same as above specimen except measured parallel to grain direction.
◇	59-23	300-1367		Same as above specimen.	Same as above specimen.
△	59-23	300-1367		NT-0005 graphite, National Carbon Co. [Author's design: block no. 1002]	Molded and baked under pressure; not graphitized; measured perpendicular to grain direction.
▽	59-23	300-1367		Same as above specimen.	Same as above specimen except measured parallel to grain direction.
▷	59-23	300-1367		Same as above specimen.	Same as above specimen.
◁	60-57	273-2773		37 parts Barrett No. 30 medium coal tar pitch (natural pitch binder) mixed with 100 parts Texas-Lockport No. 90 calcined petroleum coke; density 1.556 g cm^{-3}; volume (DC) resistance 13.686 x 10^{-4} ohm-cm. [Author's design: specimen 2-7]	Molded and graphitized.
●	60-57	273-2773		39 parts Barrett No. 30 medium coal tar pitch (natural pitch binder) mixed 10 parts of thermax added to 90 parts Texas-Lockport No. 90 calcined petroleum coke; density 1.642 g cm^{-3} volume (DC) resistance 14.961 x 10^{-4} ohm-cm. [Author's design: specimen 2-17]	Molded and graphitized.

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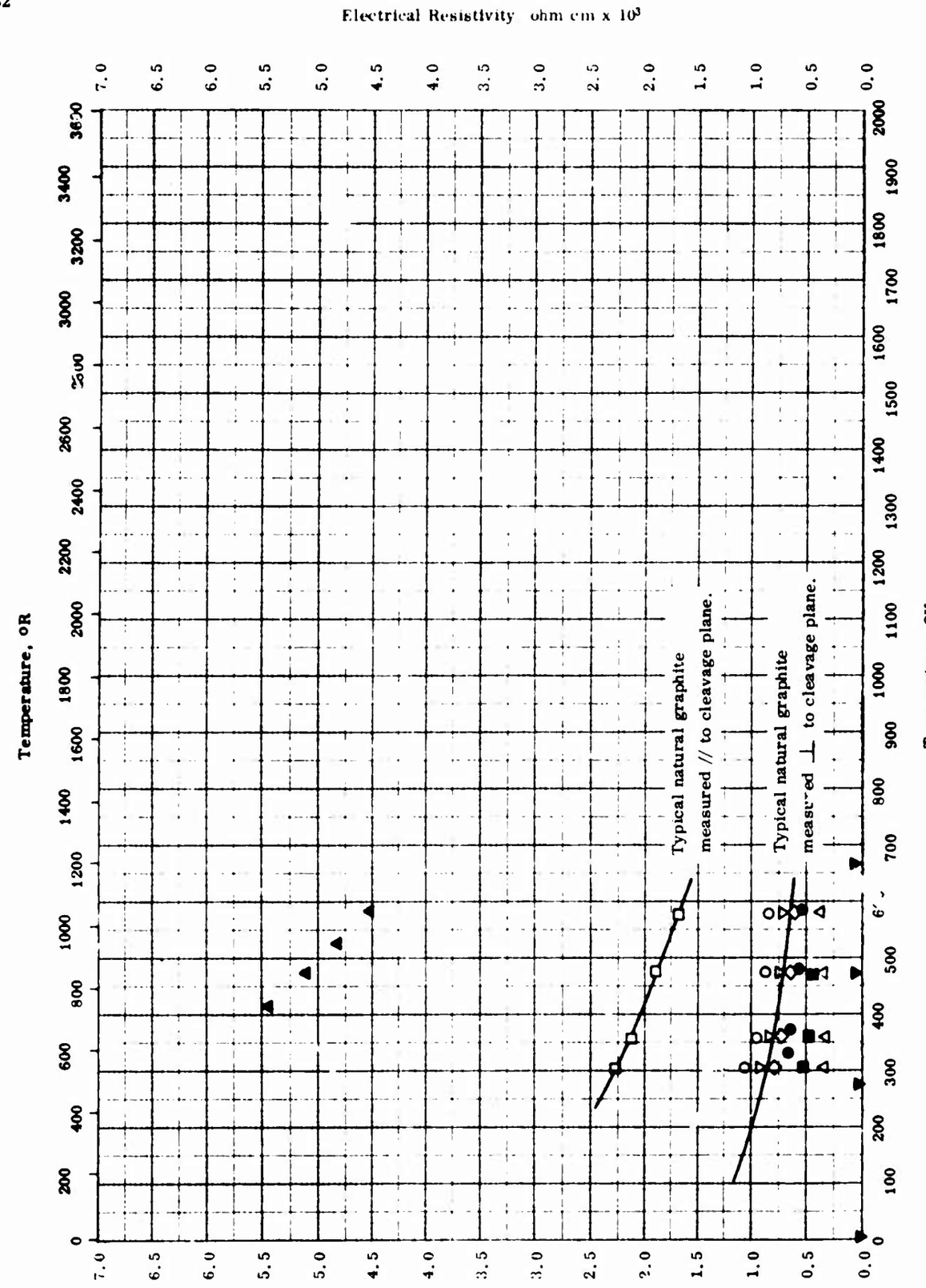
TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
■	60-57	273-2773		20 parts Barrett No. 30 medium coal tar pitch (natural pitch binder) mixed with 100 parts Texas-Lockport No. 90 calcined petroleum coke; density 1.804 g cm^{-3}; volume (DC) resistance 13.39 x 10^{-4} ohm-cm. [Author's design: specimen 8-6 FA + pitch]	Molded, graphitized at 2800 C for 4 hrs, and regraphitized at 2870 C for 2 hrs.
◆	60-57	273-2773		20 parts Quaker Oats commercial furfuryl alcohol mixed with 100 parts Texas-Lockport No. 90 calcined petroleum coke; density 1.751 g cm^{-3}; volume (DC) resistance 11.638 x 10^{-4} ohm-cm. [Author's design: specimen 2-23]	Molded, graphitized at 2800 C for 4 hrs, and regraphitized at 2870 C for 2 hrs.
▲	58-24	298-2703		CK graphite, Los Alamos Scientific Laboratory; average carbon density 1.71 g cm^{-3}.	Expansion computed by author from measurements on test section length of tensile sample at room temp and test temp measured parallel to grain.
▼	58-24	298-2683		LDH graphite, Los Alamos Scientific Laboratory; contains 1/8 g cm^{-3} U; average carbon density 1.73 g cm^{-3}.	Same as above specimen.
▶	58-24	298-2728		LDC graphite, Los Alamos Scientific Laboratory; contains 1/4 g cm^{-3} U; average carbon density 1.66 g cm^{-3}.	Same as above specimen.
◀	58-24	298-2703		LDP graphite, Los Alamos Scientific Laboratory; contains 0.35 g cm^{-3} U.	Same as above specimen.

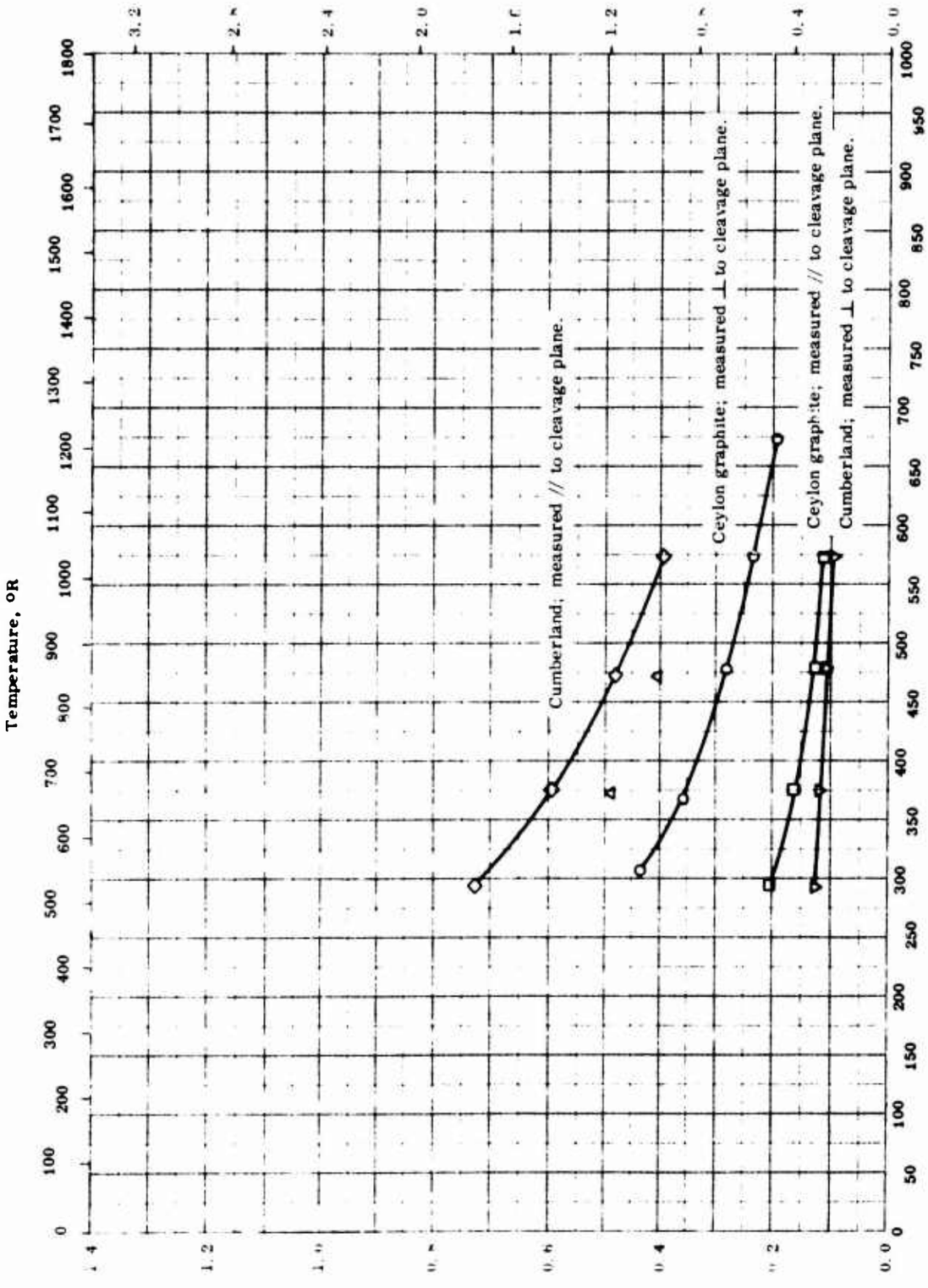


ELECTRICAL RESISTIVITY -- NATURAL GRAPHITE - BASE GRAPHITE

ELECTRICAL RESISTIVITY -- NATURAL GRAPHITE - BASE GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	45-1	293-673		Ceylon graphite.	Measured parallel to cleavage plane.
◇	45-1	293-673		Same as above.	Measured perpendicular to cleavage plane.
▽	45-1	293-673		Same as above.	Same as above.
○	45-1	293-673		Same as above.	Measured inclined to cleavage plane.
□	45-1	293-673		Same as above.	Measured parallel to cleavage plane.
●	45-1	293-673		Cumberland Graphite.	Same as above.
▲	45-1	293-673		Same as above.	Measured probably perpendicular to cleavage plane.
■	45-1	293-673		Hilger H.S. Graphite, elemental purity ≈ 0.001.	
▼	53-22	4-673		Single crystal.	



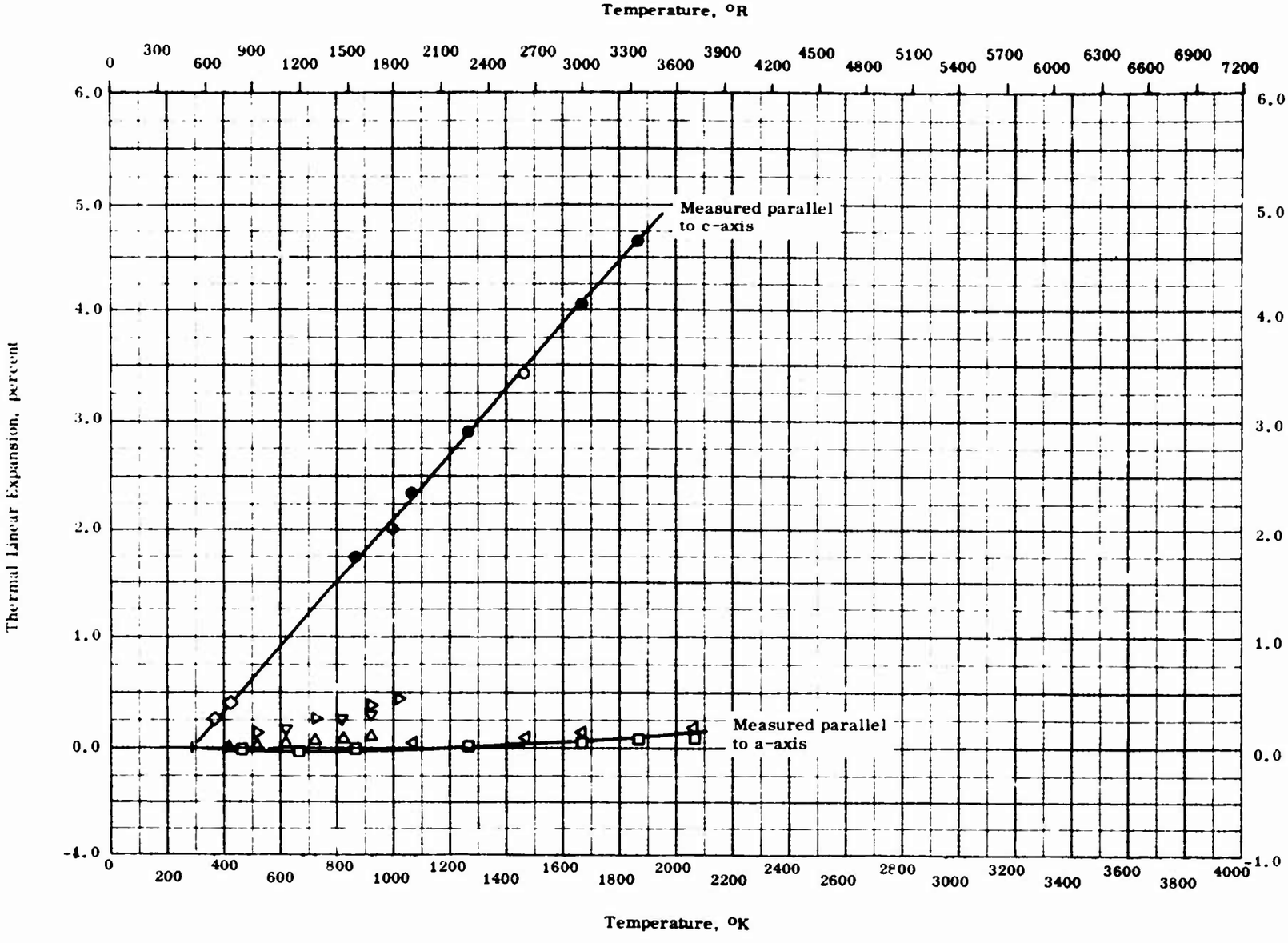
THERMAL CONDUCTIVITY -- NATURAL GRAPHITE

THERMAL CONDUCTIVITY -- NATURAL GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Repr. Error %	Sample Specifications	Remarks
△	45-1	373-473		Hilger H. S. Graphite (Cumberland Graphite); elemental purity ~0.001.	
◇	45-1	293-573		Cumberland Graphite.	Measured parallel to cleavage plane.
▽	45-1	293-573		Same as above.	Measured perpendicular to cleavage plane.
○	45-1	293-673		Ceylon Graphite.	Measured perpendicular to cleavage plane.
□	45-1	293-573		Same as above.	Measured parallel to cleavage plane.

TPRC

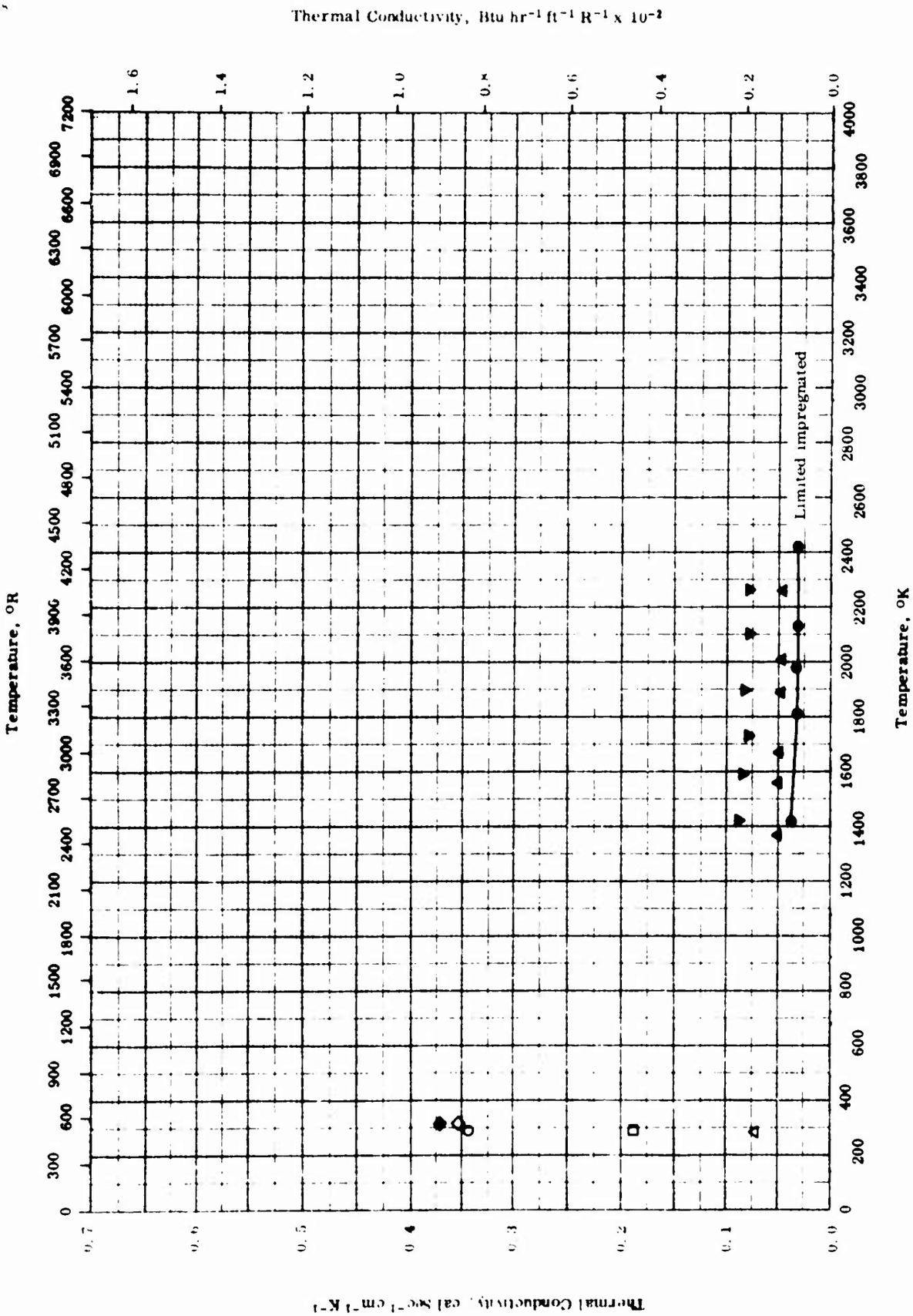


THERMAL LINEAR EXPANSION -- NATURAL GRAPHITE

THERMAL LINEAR EXPANSION -- NATURAL GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-59	288-1461	≤ 3	Natural Ceylon graphite.	Measured perpendicular to basal plane; calculated from interlayer spacings.
□	60-61	293-2073		Natural Ceylon graphite.	Measured along a-axis by x-ray method.
◇	60-61	293-435		Natural Ceylon graphite.	Measured along c-axis by x-ray method.
△	56-58	373-923		Graphite type KC.	Average of 6 samples measured parallel to direction of extrusion.
▽	56-58	373-923		Same as above.	Average of 6 samples measured perpendicular to direction of extrusion.
▷	56-58	393-1023			Same as above.
◁	55-52	872-1872		Natural Ceylon graphite flake.	Measured perpendicular to axis of hexagonal symmetry by x-ray diffraction.
●	55-52	872-2072		Same as above.	Same as above except measured parallel to axis of hexagonal symmetry.



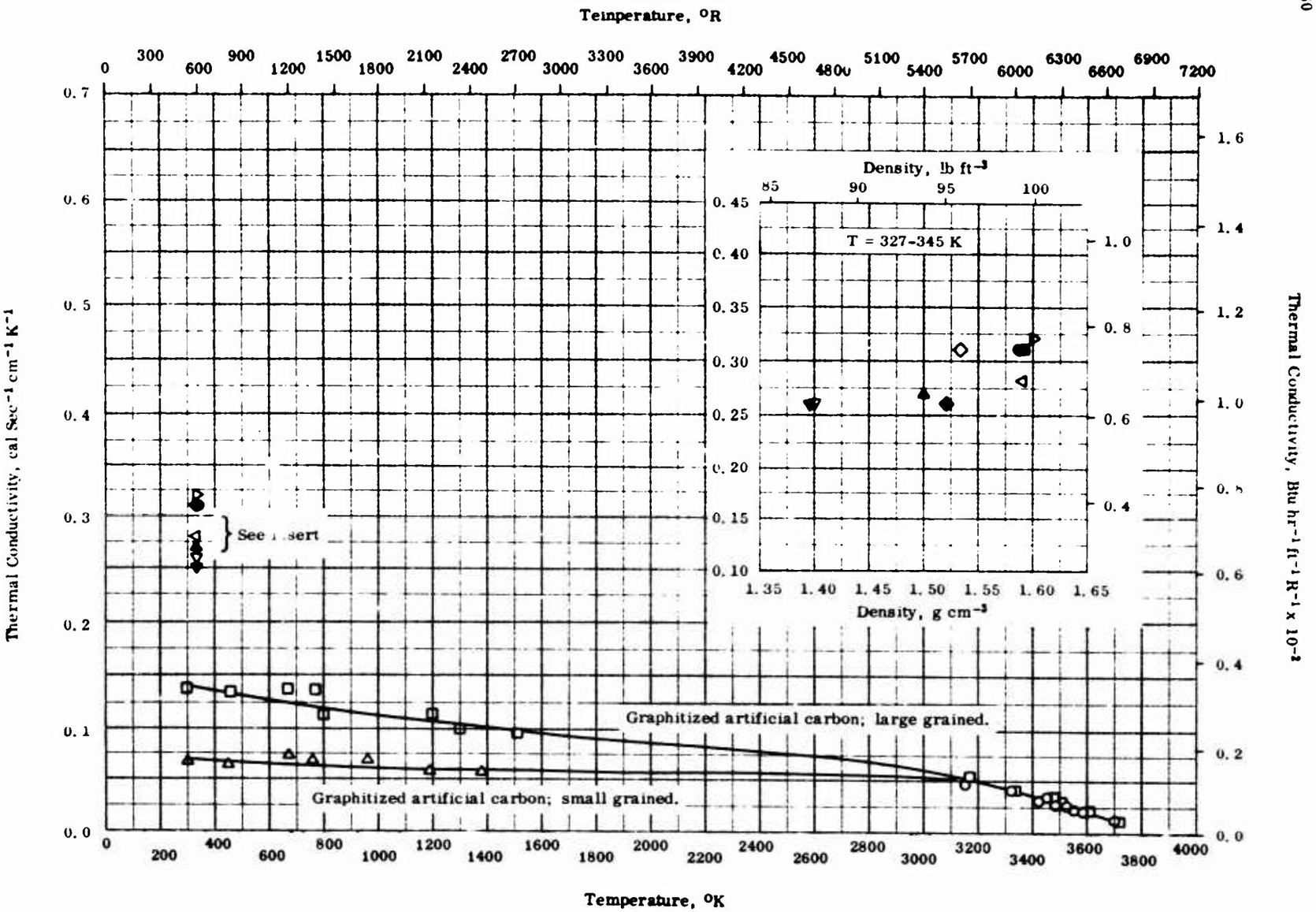
THERMAL CONDUCTIVITY -- CARBON IMPREGNATED GRAPHITE

THERMAL CONDUCTIVITY -- CARBON IMPREGNATED GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	47-2	298		Density 93.6 lb ft^{-3}.	Made from Whiting coke and Barrett no. 30 pitch; extruded in long bars and re-impregnated with pitch; heated to 3000 C; typical of completely graphitized product.
□	47-2	298		Density 92.4 lb ft^{-3}.	Same as above except heated to 2400 C; typical of partially graphitized product.
△	47-2	298		Density 93.0 lb ft^{-3}.	Same as above except heated to 2100 C; typical of product in which graphitization process has barely begun.
◇	55-10	323		Karbate graphite.	
◆	55-10	323		Karbate graphite.	Another sample.
●	61-16	1422-2422		Limited impregnated. (Author's design: sample A).	Measured normal to extrusion axis.
▲	61-16	1367-2255		Impregnated. (Author's design: sample B).	Same as above.
▼	61-16	1417-2255		Impregnated. (Author's design: sample C).	Same as above.

TPRC



THERMAL CONDUCTIVITY -- ARTIFICIAL GRAPHITE

THERMAL CONDUCTIVITY -- ARTIFICIAL GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-4	3150-3700			Artificially manufactured graphite rod.
□	56-16	300-3710		Spektralkohle; large grain.	Graphitized artificial carbon.
△	56-16	300-3710		Spektralkohle; small grain.	Same as above.
▽	56-15	337		Acheson 16 in. ball material; artificial graphite electrode; apparent density 1.400 g cm^{-3} and specific resistance 0.00123 ohm cm.	
▼	56-15	334		Same as above except 1.399 g cm^{-3} density and 0.00121 ohm cm specific resistance.	
▲	56-15	329		Domestic (Japan) artificial graphite electrode; apparent density 1.501 g cm^{-3} and specific resistance 0.00108 ohm cm.	
◆	56-15	330		Same as above except 1.520 g cm^{-3} density and 0.00118 ohm cm specific resistance.	
◇	56-15	327		Same as above except 1.533 g cm^{-3} density and 0.00093 ohm cm specific resistance.	
◁	56-15	332		Same as above except 1.590 g cm^{-3} density and 0.00085 ohm cm specific resistance.	
●	56-15	337		Same as above except 1.586 g cm^{-3} density and 0.00094 ohm cm specific resistance.	
■	56-15	345		Same as above except 1.591 g cm^{-3} density and 0.00094 ohm cm specific resistance.	

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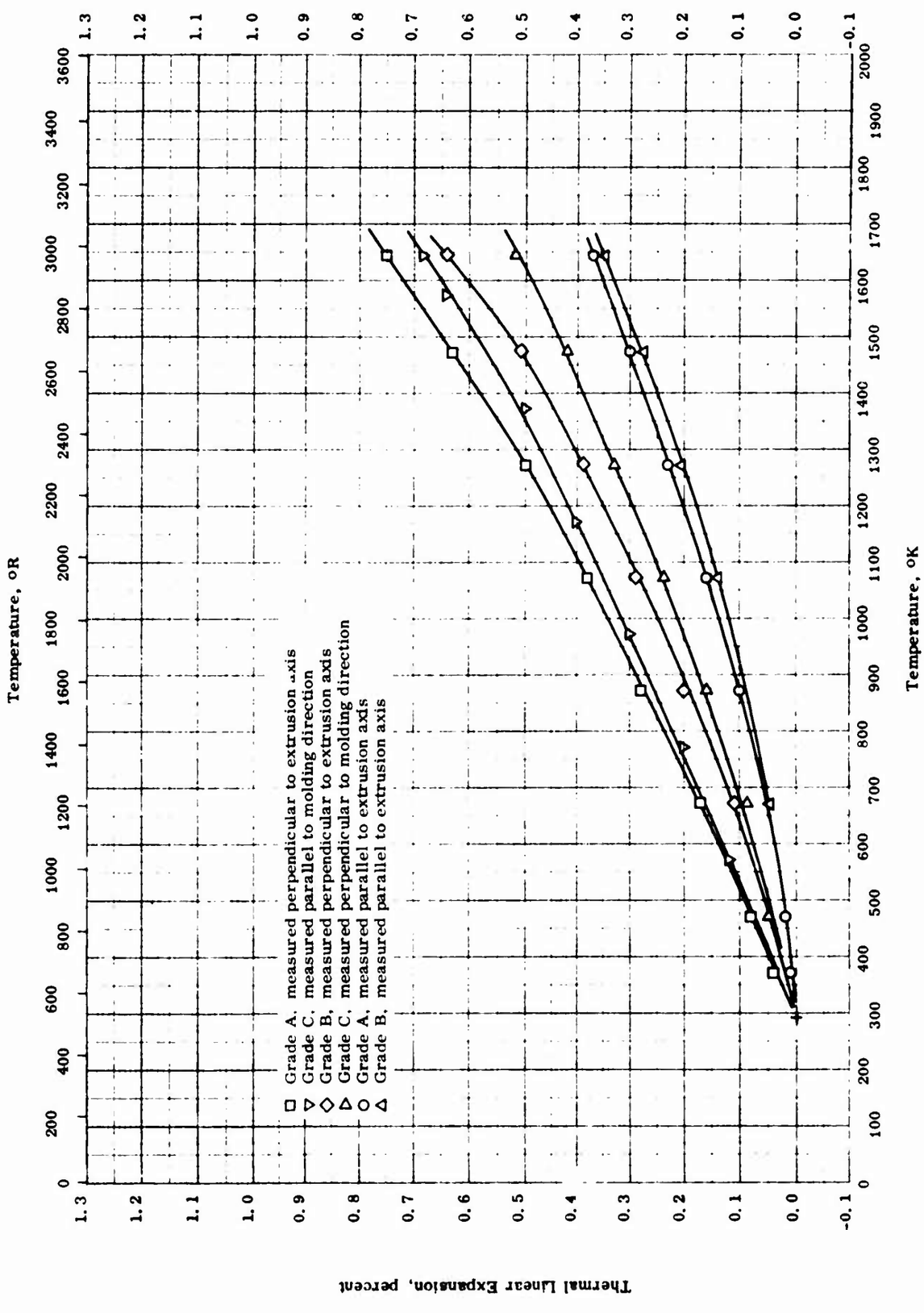
THERMAL CONDUCTIVITY -- ARTIFICIAL GRAPHITE (Continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▷	56-15	337		Same as above except 1.600 g cm^{-3} density and 0.00099 ohm cm specific resistance.	



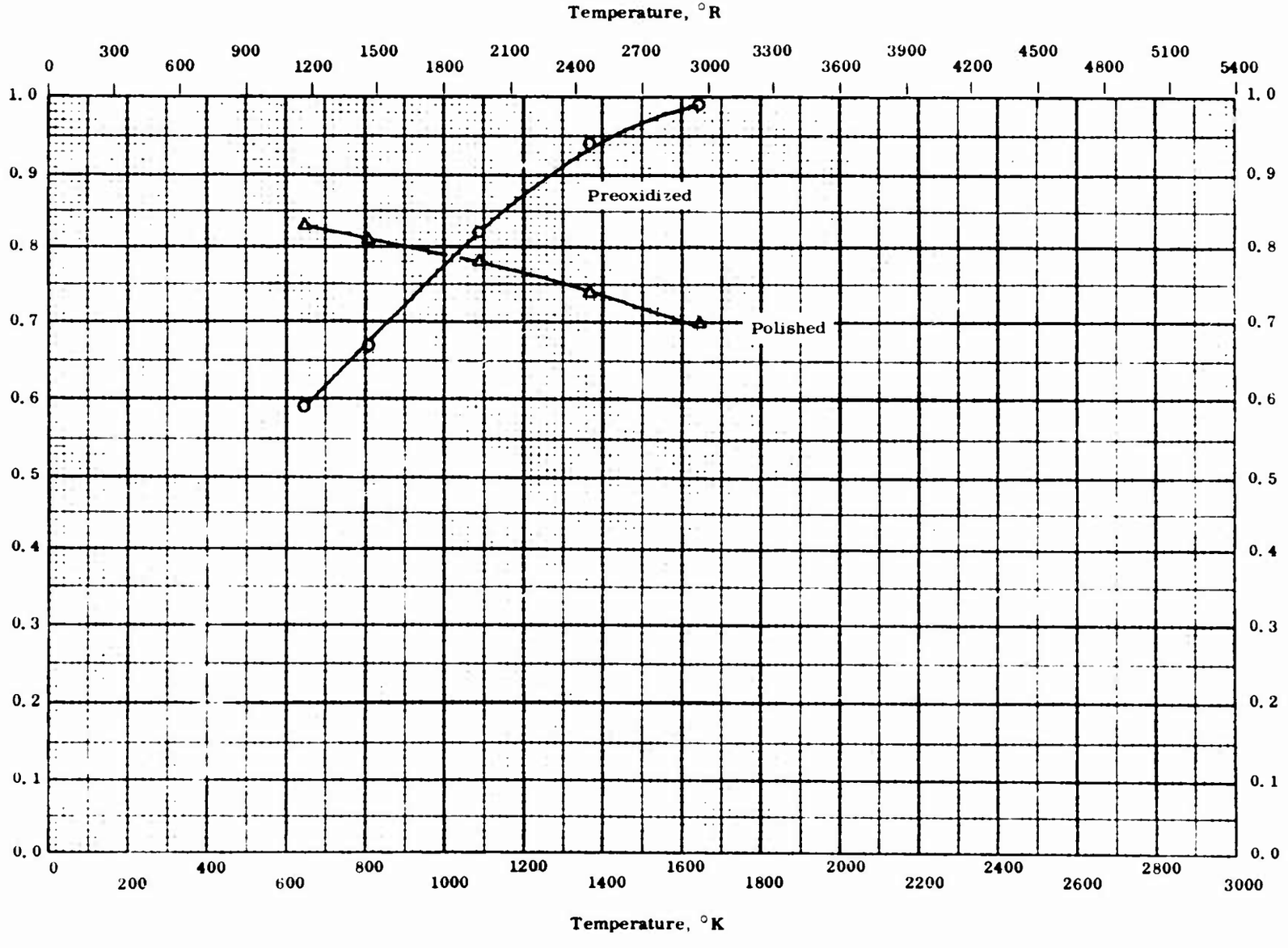
THERMAL LINEAR EXPANSION -- ARTIFICIAL GRAPHITE

THERMAL LINEAR EXPANSION -- ARTIFICIAL GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	51-39	373-1643		Grade A; multicrystalline.	Extruded; measured parallel to axis of extrusion; tested with $< 2 \times 10^{-4}$ mm Hg and heating rate of 3 C min^{-1}.
□	51-39	373-1643		Same as above.	Same as above except measured perpendicular to axis of extrusion.
◇	51-39	373-1643		Grade B; multicrystalline.	Extruded; measured perpendicular to axis of extrusion; tested with $< 2 \times 10^{-4}$ mm Hg and heating rate of 3 C min^{-1}.
△	51-39	373-1643		Same as above.	Same as above except measured parallel to axis of extrusion.
▽	51-39	293-1643		Grade C; multicrystalline.	Molded; measured parallel to direction of molding.
▷	51-39	293-1643		Same as above.	Molded; measured perpendicular to direction of molding.

TPRC



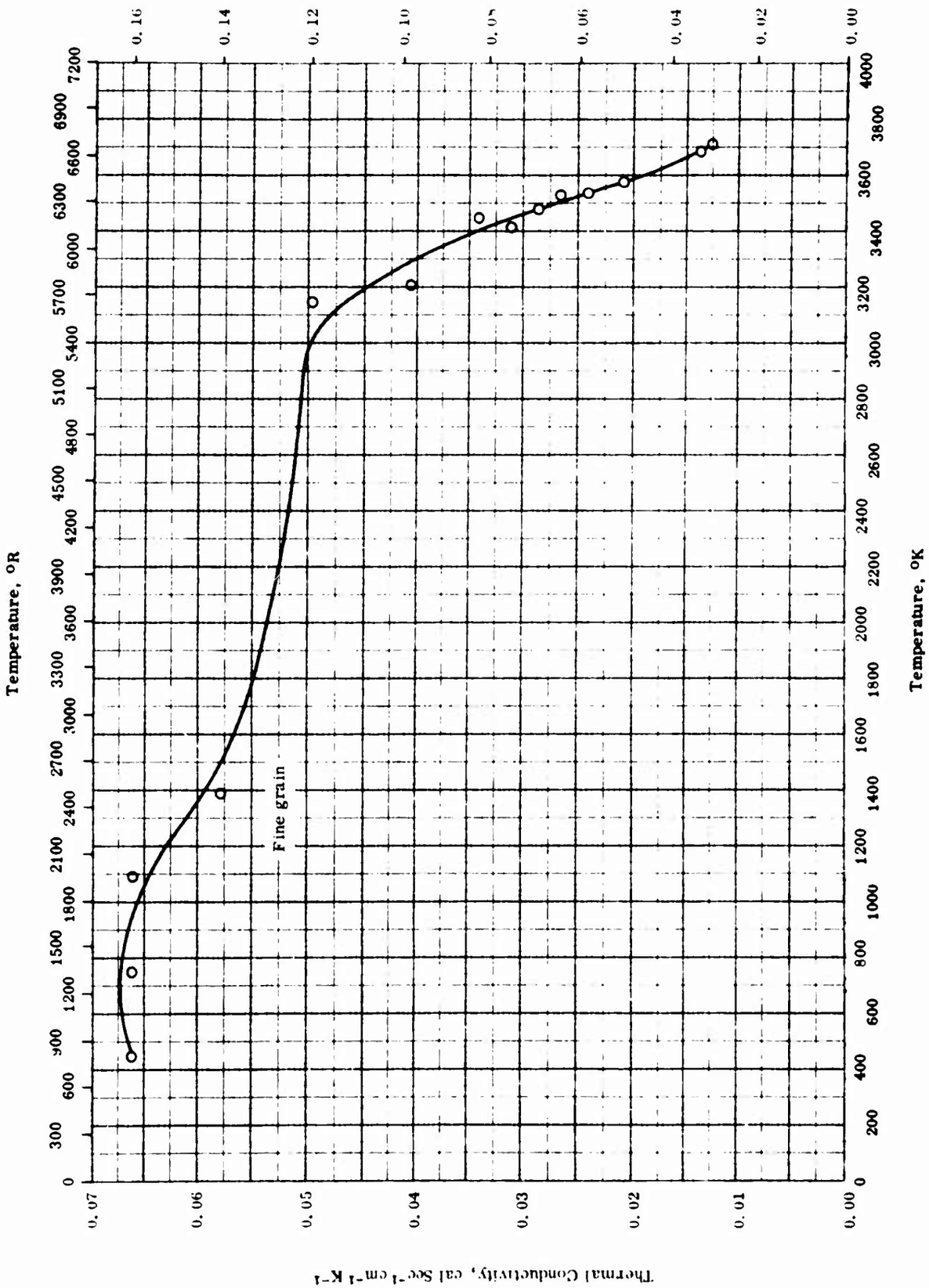
NORMAL TOTAL EMITTANCE -- ELECTRODE GRAPHITE

NORMAL TOTAL EMITTANCE -- ELECTRODE GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	60-41	644-1644	± 20		Preoxidized, environment purged with dry helium.
△	60-41	644-1644	± 20		Polished; same as above.

TPRC



THERMAL CONDUCTIVITY -- LAMPBLACK-BASE GRAPHITE

THERMAL CONDUCTIVITY -- LAMPBLACK-BASE GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Repr. Error %	Sample Specifications	Remarks
○	52-4	389-4000		Lampblack graphite; fine grain.	

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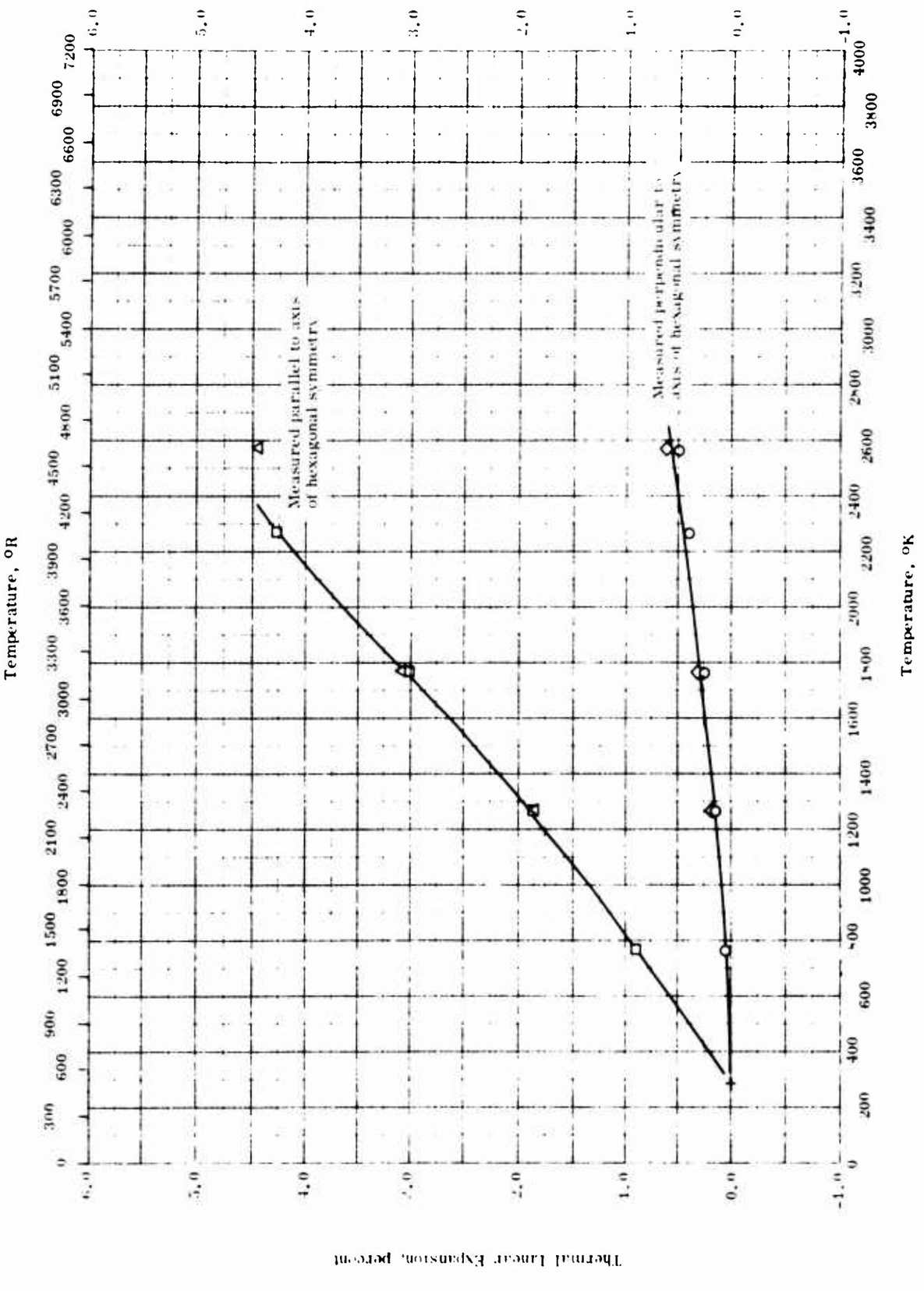
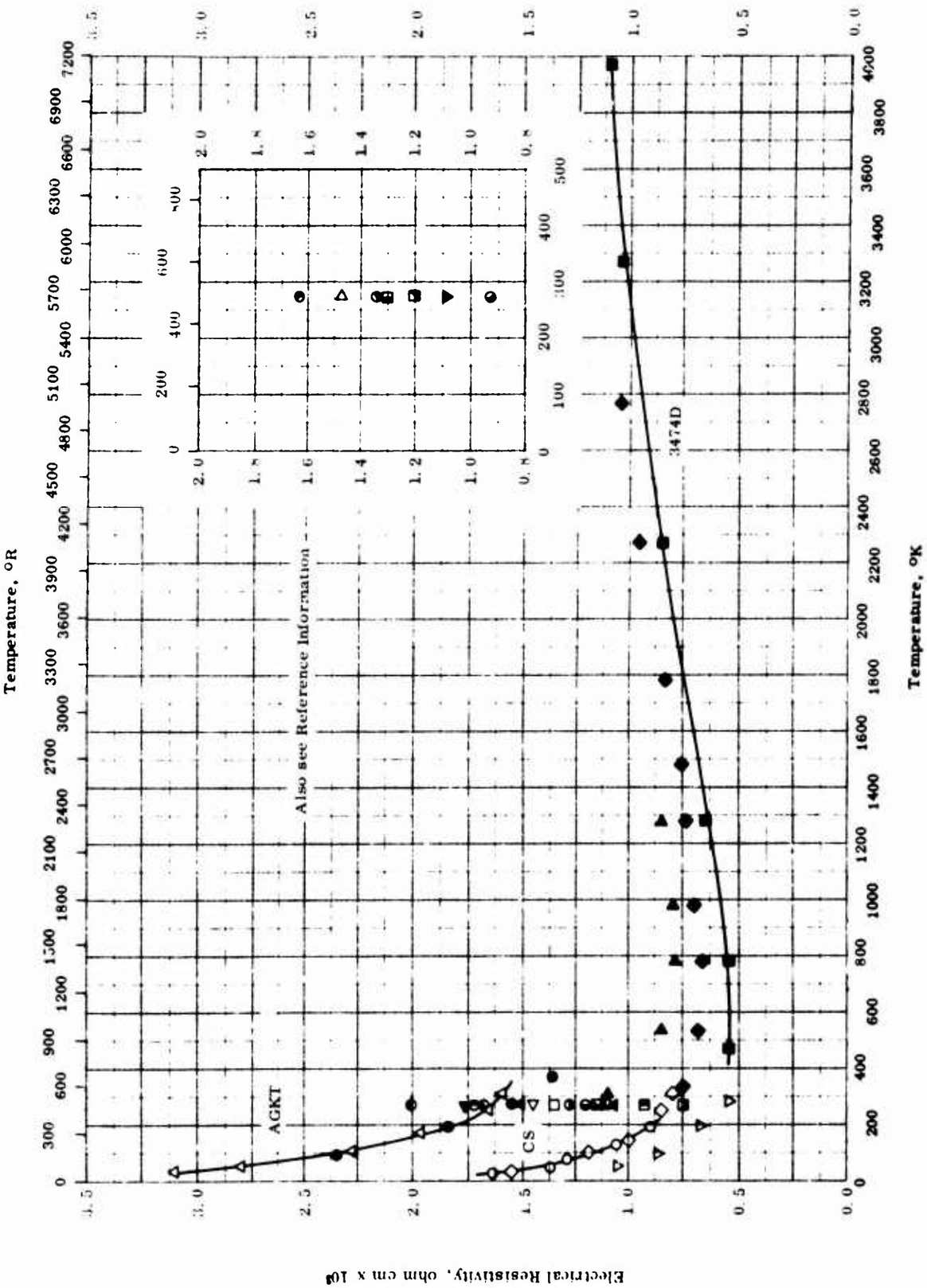


THERMAL LINEAR EXPANSION – FLAKE GRAPHITE

THERMAL LINEAR EXPANSION -- FLAKE GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	49-26	293-2573		99.94 C; 97% oriented.	Measured perpendicular to axis of hexagonal symmetry.
□	49-26	293-2273		99.94 C; 68% oriented.	Measured parallel to axis of hexagonal symmetry.
△	46-3	293-2573		99.9 C.	Same as above.
◇	46-3	293-2573		Same as above.	Measured perpendicular to axis of hexagonal symmetry.



ELECTRICAL RESISTIVITY -- MISCELLANEOUS GRAPHITES

ELECTRICAL RESISTIVITY -- MISCELLANEOUS GRAPHITES

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-27	31-300	± 2	National Carbon CS grade.	Extruded, sample axis perpendicular to preferred C_0-axis orientation.
△	42-3	10-300		Grade AGKT; artificial; pitch bonded petroleum coke.	Gas-baked, graphitized, lathe-cut, and extruded, measured perpendicular to extrusion.
◇	42-3	10-300		Same as above.	Same as above except measured parallel to extrusion.
▽	44-3	82-373		Acheson graphite electrodes.	Extruded; measured in longitudinal direction.
●	44-3	82-373		Same as above.	Extruded; measured in radial direction.
■	60-35	273-2958		Type 3474 D.	Extruded; measured parallel to extrusion.
◆	45-1	293-2773		Acheson graphite.	Extruded.
▶	45-1	293-2773		Acheson graphite.	Extruded.
□	59-23	273		Commercial grade 3499; density 1.54-1.61 g cm^{-3}.	Molded; graphitized at temperature ~4100 F, measured in molding direction; average of four runs on four different blocks numbered 0104, 0105, 0107, and 0501.
▲	59-23	273		Same as above.	Same as above except measured normal to molding direction.
▼	59-23	273		Same as above.	Same as above except measured perpendicular to molding direction.
◀	59-23	273		Commercial grade EH; density 1.64 g cm^{-3}.	Molded; graphitized at temperature ~4100 F, measured in molding direction.

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TPRC

REFERENCE INFORMATION

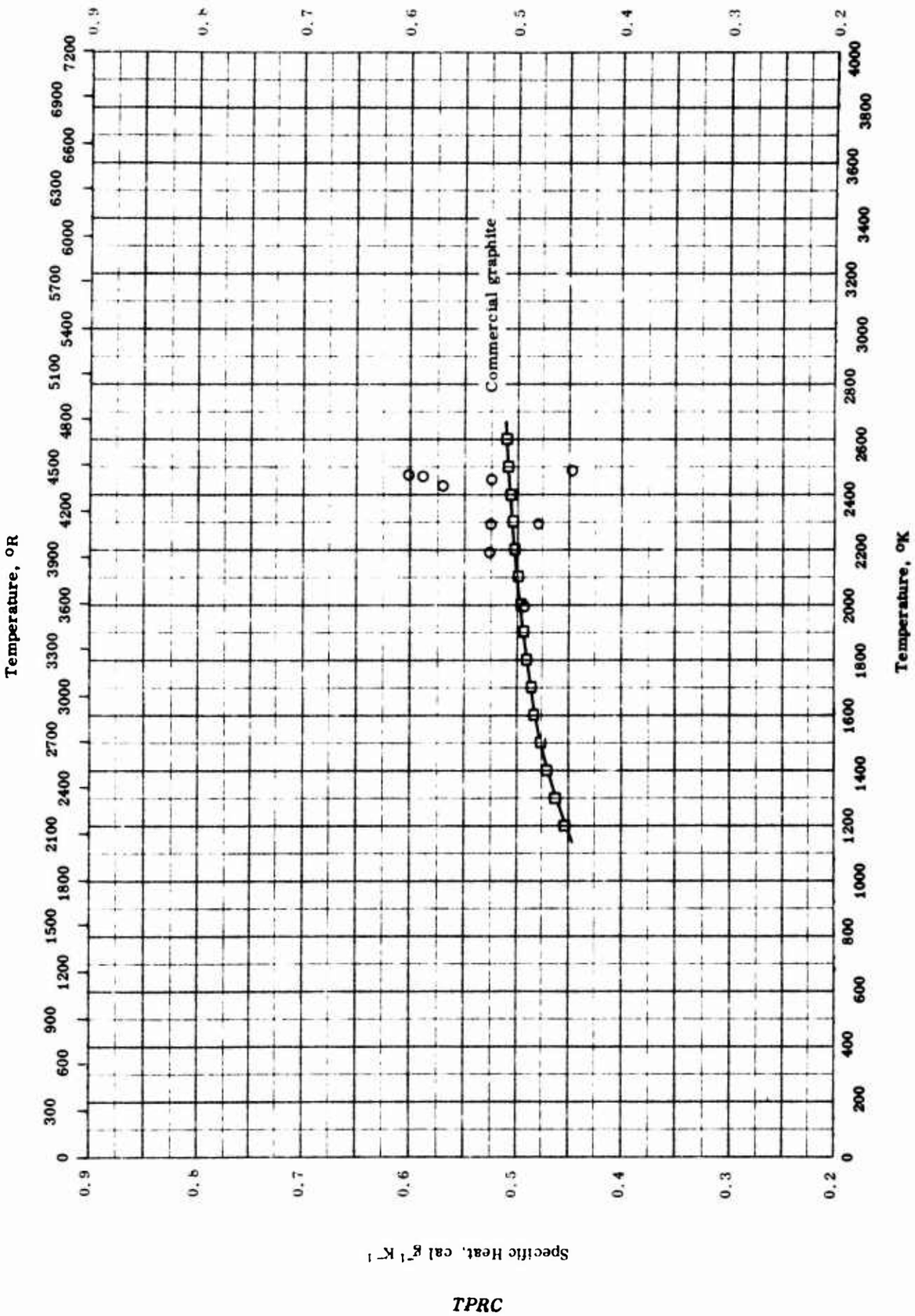
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specification	Remarks
◁	59-23	273		Same as above.	Same as above; measured normal to molding direction.
▷	59-23	273		Same as above.	Same as above; measured perpendicular to molding direction.
◑	59-23	273		Commercial grade ATJ; density 1.69-1.75 g cm^{-3}.	Molded; graphitized at 5000 F; measured in molding direction.
◐	59-23	273		Same as above.	Same as above; measured normal to molding direction.
◓	59-23	273		Commercial grade NT0005; density 1.72-1.78 g cm^{-3}.	Measured in molding direction; average of two runs on two different blocks numbered 1001 and 1002.
◒	59-23	273		Same as above.	Measured normal to molding direction.
◘	59-23	273		Same as above.	Measured perpendicular to molding direction.
◙	59-23	273		Commercial grade 942S; density 1.62-1.67 g cm^{-3}.	Extruded; graphitized at temperature >4100 F; measured in extrusion axis.
◧	59-23	273		Same as above.	Same as above; measured normal to extrusion axis.
◨	59-23	273		Commercial grade AGR; density 1.54-1.55 g cm^{-3}.	Extruded; graphitized at 5000 F; measured in extrusion axis.
◪	59-23	273		Same as above.	Same as above; measured normal to extrusion axis.
◩	59-23	273		Same as above.	Same as above; measured perpendicular to extrusion axis.

(Continued onto next page)

ELECTRICAL RESISTIVITY -- MISCELLANEOUS GRAPHITES (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◕	59-23	273		Commercial grade H3LM; density 1.74-1.75 g cm^{-3}.	Extruded; graphitized at 5075 F; measured in extrusion direction.
◐	59-23	273		Same as above.	Same as above; measured normal to extrusion axis.
◔	59-23	273		Same as above.	Same as above; measured perpendicular to extrusion axis.
◕	59-23	273		Commercial grade 896G; density 1.50-1.54 g cm	Extruded; graphitized at temperature >4100 F; measured in extrusion axis.
▲	59-23	273		Same as above.	Same as above; measured perpendicular to extrusion axis.



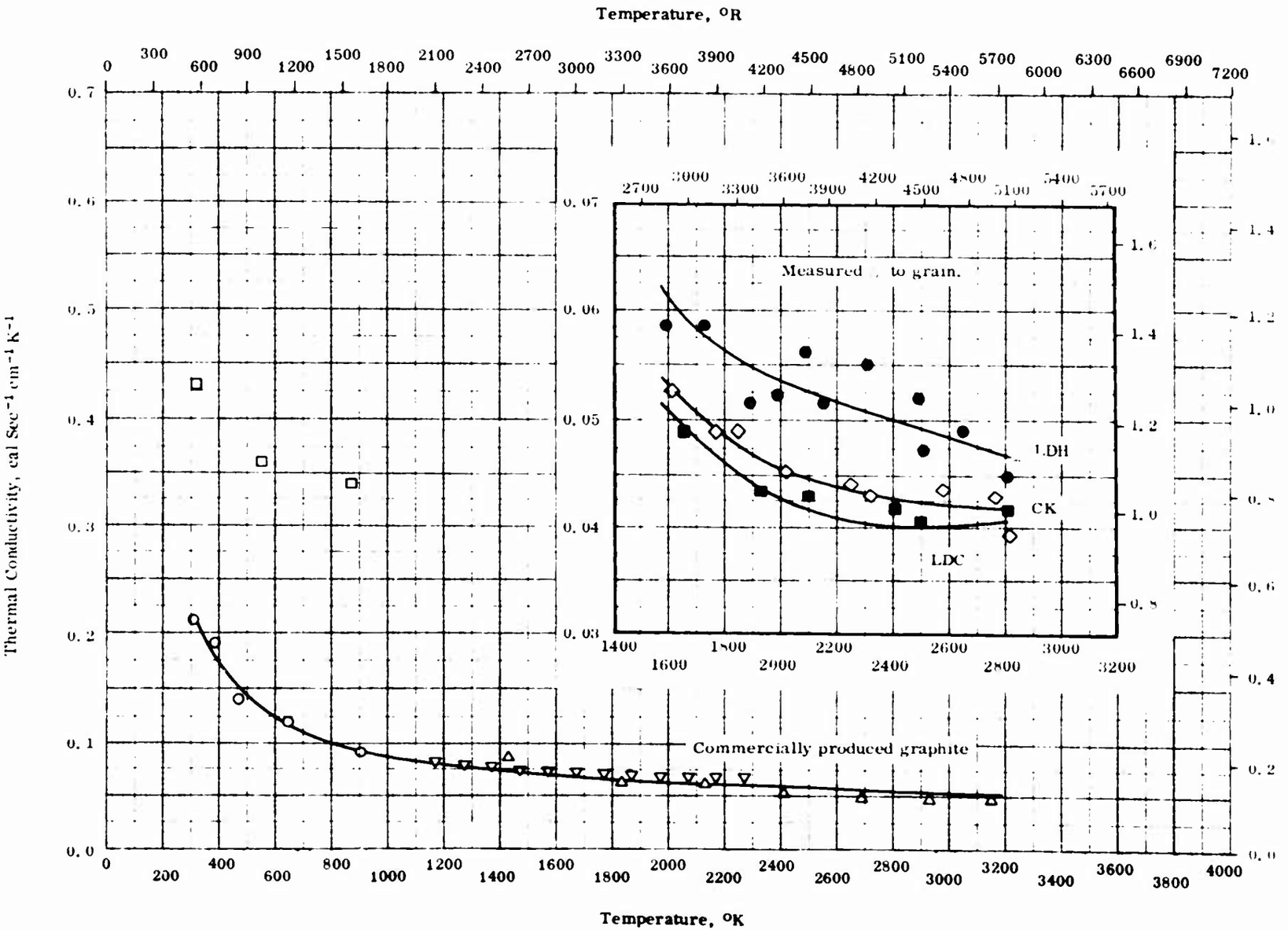
SPECIFIC HEAT -- MISCELLANEOUS GRAPHITE

SPECIFIC HEAT -- MISCELLANEOUS GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	62-32	1993-2483	±5.0	Not given.	
□	65-3	1200-2600	0.14	0.001 > Al, 0.001 > Si, 0.0001 B, Ca, and Mg.	

TPRC



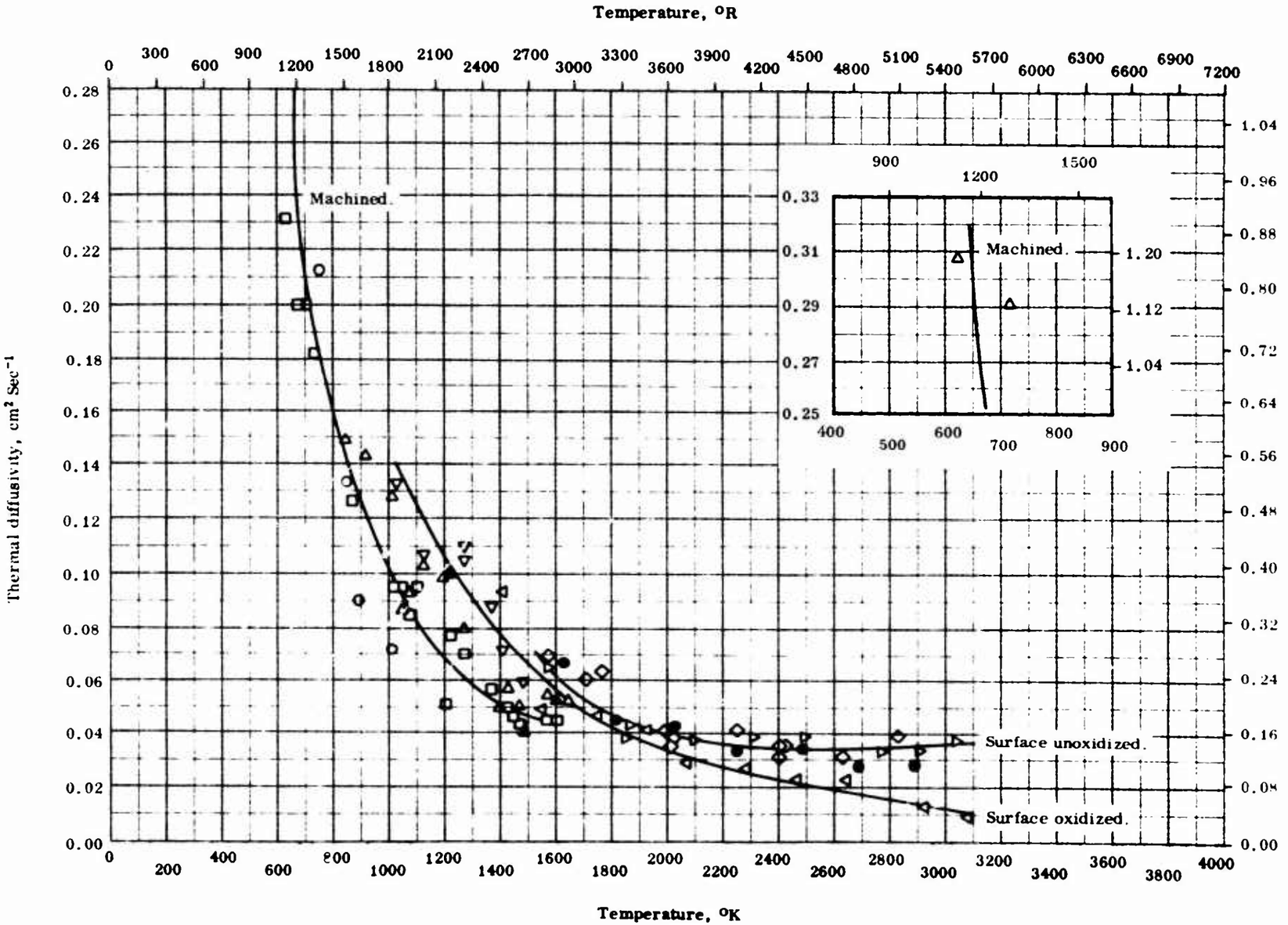
THERMAL CONDUCTIVITY -- MISCELLANEOUS GRAPHITE

THERMAL CONDUCTIVITY -- MISCELLANEOUS GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-9	308-903		Polycrystal.	Extruded.
□	55-9	313-873		Polycrystal.	Extruded.
△	60-22	1433-3153		Commercially produced by National Carbon Co.; density 1.54 g cm^{-3}.	Graphitized to a temperature above 3000 C in Argon at 1 atm.
▽	61-14	1173-2273	<6	Spectrally pure.	Preliminary annealed in a high vacuum at 1700 C for 1 hr; measured in vacuum.
◇	62-10	1613-2823		From Los Alamos Scientific Lab.; carbon density 1.71 g cm^{-3}; sample design. as CK by the Lab.	Measured parallel to the grain.
●	62-10	1593-2813		From Los Alamos Scientific Lab.; Uranium content 125 m g cm^{-3} of carbon; carbon density 1.73 g cm^{-3}; sample design. as LDH by the Lab.	Measured parallel to the grain.
■	62-10	1653-2813		From Los Alamos Scientific Lab.; uranium content 250 m g cm^{-3} of carbon; carbon density 1.66 g cm^{-3}; sample design. as LDC by the Lab.	Measured parallel to the grain.

TERC



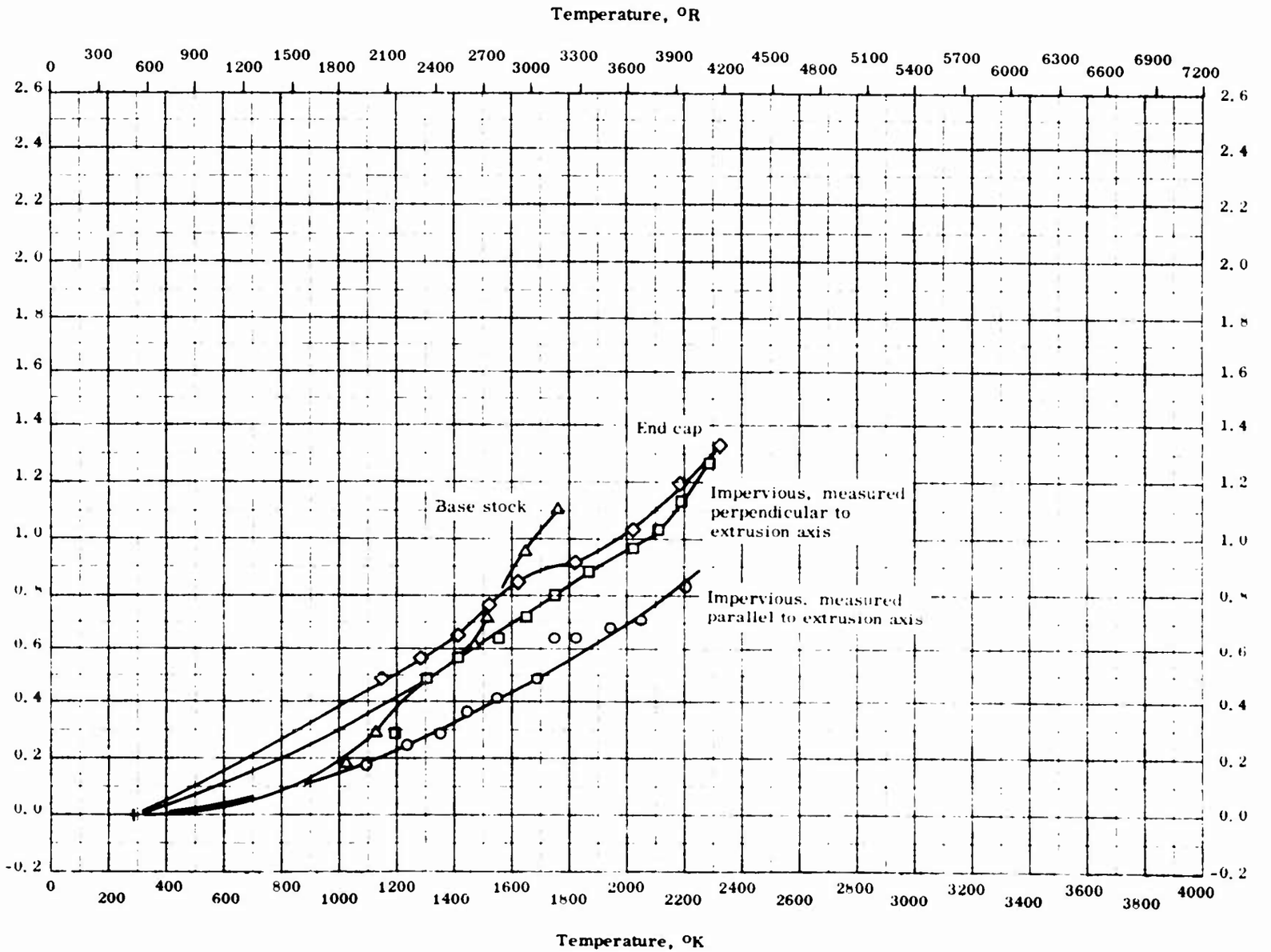
THERMAL DIFFUSIVITY -- MISCELLANEOUS GRAPHITE

THERMAL DIFFUSIVITY -- MISCELLANEOUS GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	57-4	748-1076	± 5-10	Not given.	Not given.
□	58-2	627-1605	± 10	Cylindrical specimen with 1.0 cm dia and 4.5 cm in length.	Machined; data taken at seventh run.
△	58-2	623-1646	± 10	Same as above.	Data taken at the tenth run of the above specimen.
▽	61-5	1023-1483		From National Carbon Co.; sample 6 in. long and 3/4 in. dia; density 1.63 g cm^{-3}.	Surface oxidized during testing.
◁	61-5	1408-3083		Same as above except 1/2 in. dia.	Same as above.
▷	61-5	1573-3043		Same as above.	Same as above except that surfaces are not oxidized.
◇	61-5	1578-2833		From Graphite Specialties Corp.; same dimension as the above sample; density 1.87 g cm^{-3}.	
●	61-5	1623-2893		Same dimension as the above sample; density 1.54 g cm^{-3}. [Author's design.: U. B. G-1 .	

TPRC



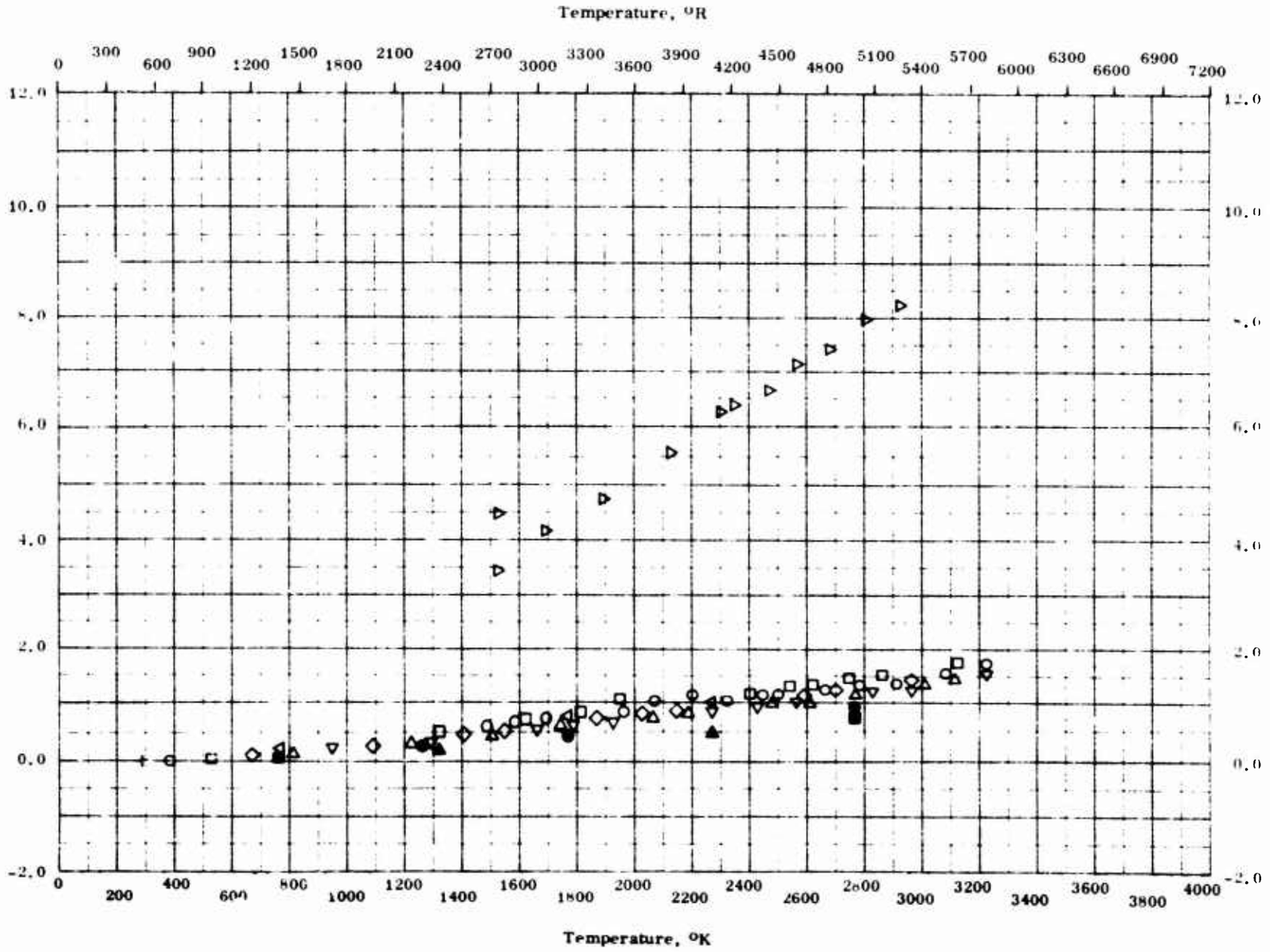
THERMAL LINEAR EXPANSION -- MISCELLANEOUS GREAT LAKES' GRAPHITE

THERMAL LINEAR EXPANSION -- MISCELLANEOUS GREAT LAKES' GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-42	293-2203		Great Lakes Impervious graphite, Great Lakes Carbon Co. [Author's design; specimen GLI-S4]	Baked; measured parallel to extrusion axis in helium atm.
□	63-42	293-2294		Same as above specimen.	Same as above except measured perpendicular to extrusion axis.
△	63-42	293-1761		Great Lakes Base Stock graphite, Great Lakes Carbon Co. [Author's design; specimen GV5G]	Impregnated at General Atomic and baked; measured transverse to direction of extrusion in helium atm.
◇	63-42	293-2325		Great Lakes End-Cap graphite, Great Lakes Carbon Co. [Author's design; specimen B-2]	Baked; measured transverse to direction of extrusion in helium atm.

TPRC



THERMAL LINEAR EXPANSION -- MISCELLANEOUS GRAPHITE

THERMAL LINEAR EXPANSION -- MISCELLANEOUS GRAPHITE

REFERENCE INFORMATION

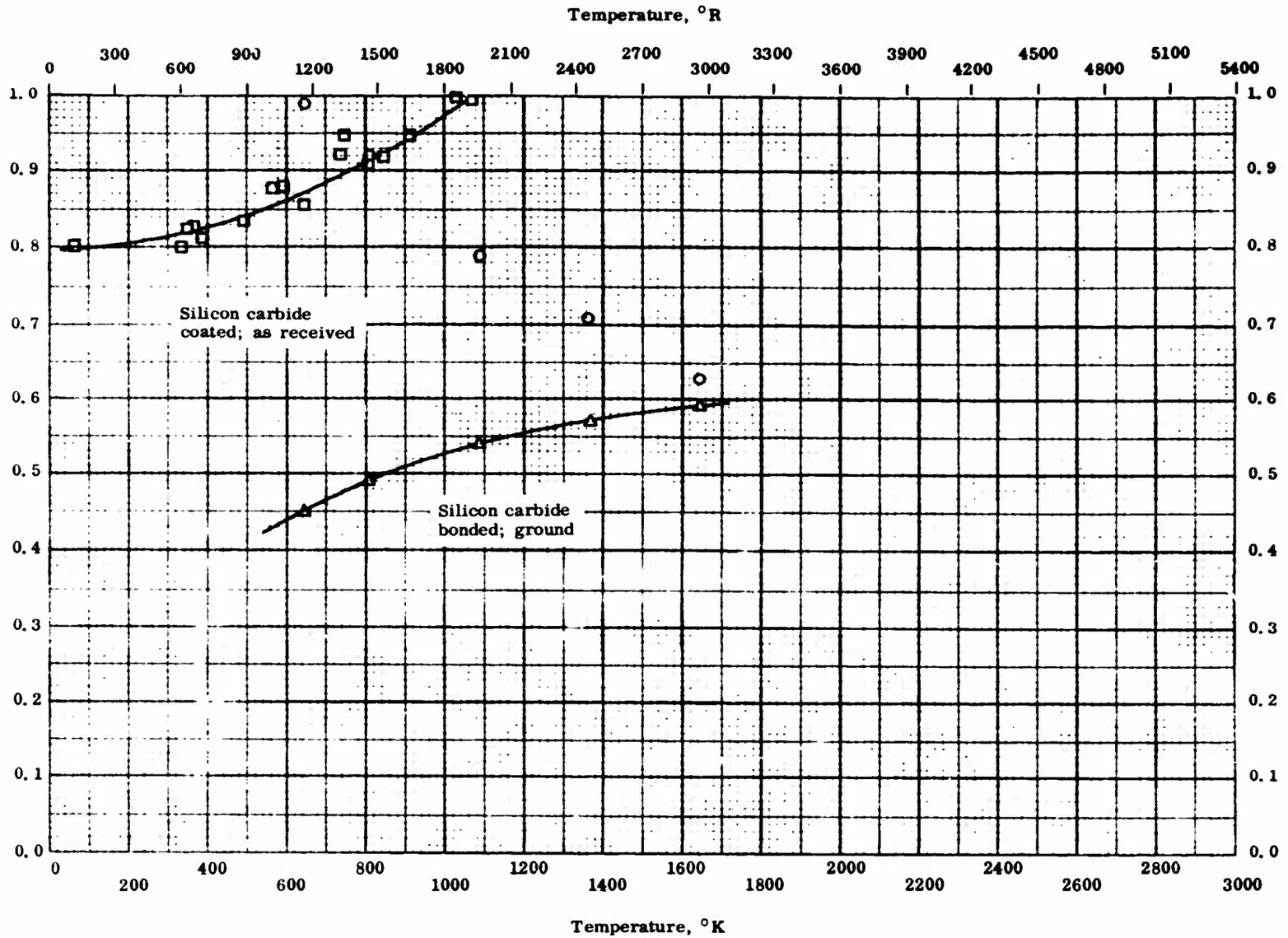
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-49	293-3225		83.0 graphite prepared from petroleum coke and coal tar pitch; fine flour, 63.5 -325 mesh, 26.2 -200 to +325 mesh, 9.2 -115 to +200 mesh, and 0.2 -65 to +115 mesh; bulk density 1.38 g cm^{-3}; total porosity 0.28 cm^3 g^{-1}. [Author's design: 7301 A]	Graphitized at 3000 C. [additional information received from author]
□	61-49	293-3121		72.0 graphite prepared from petroleum coke and coal tar pitch; fine particle, 97.4 -325 mesh, 1.7 -200 to 375 mesh, and 0.9 -115 to +200 mesh; bulk density 1.39 g cm^{-3}; total porosity 0.28 cm^3 g^{-1}. [Author's design: 6801 A]	Same as above specimen.
◇	61-49	293-3158		74.0 graphite prepared from petroleum coke and coal tar pitch; medium flour, 48.1 -325 mesh, 26 -200 to +325 mesh, 21.7 -115 to +200 mesh, and 3 -65 to +115 mesh; bulk density 1.37 g cm^{-3}; total porosity 0.29 cm^3 g^{-1}. [Author's design: 4701 A]	Same as above specimen.
△	61-49	293-3120		88.0 graphite prepared from 36 lb coal tar pitch added to 100 lb petroleum coke; low binder level; bulk density 1.41 g cm^{-3}; total porosity 0.26 cm^3 g^{-1}. [Author's design: 5201 A]	Same as above specimen.

(Continued onto next page)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▽	61-49	293-3225		76.0 graphite prepared from 41 lb coal tar pitch added to 100 lb petroleum coke mixture; no impregnation; standard flour, 39.8 -325 mesh, 20 -200 to +325 mesh, 27.9 -115 to +200 mesh, 10.8 -65 to +115 mesh, and 0.3 +65 mesh; bulk density 1.41 g cm^{-3}; total porosity 0.26 cm^3 g^{-1}. [Author's design: 4201 A]	Molded at 4 ton $in.^{-2}$ and graphitized at 3000 C. [Additional information received from author]
▷	60-60	293-2921		Proportion of disoriented layers 20%.	Measured perpendicular to basal plane; data calculated from interlayer spacings.
◁	56-50	293-2773		Made from 38 parts of Kendall coke with sufficient Portland Gas Co. pitch to give 100 parts after heat treatment to 1100 C; multicrystal line.	Coke heated to 500 C; calcined at 500 C, ground, mixed, extruded, heated to 1100 C in 3 days, and graphitized at 2800 C; data taken during cooling.
●	56-50	293-2773		Same as above specimen.	Same as above, except calcined at 800 C.
■	56-50	293-2773		Same as above specimen.	Same as above, except calcined at 1100 C.
▲	56-50	293-2773		Same as above specimen.	Same as above, except calcined at 1350 C.



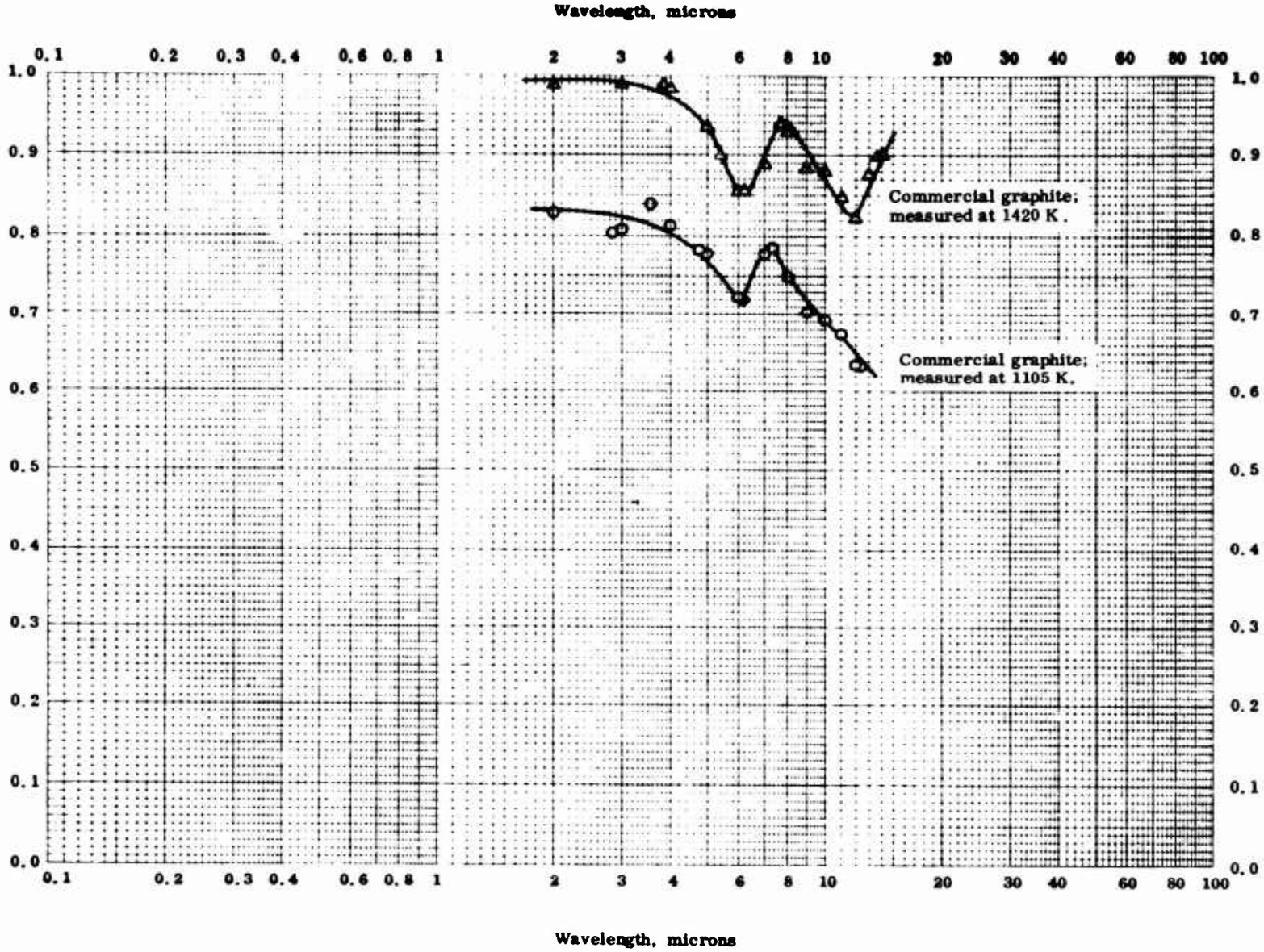
NORMAL TOTAL EMITTANCE -- MISCELLANEOUS GRAPHITE

TPRC

NORMAL TOTAL EMITTANCE -- MISCELLANEOUS GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-41	644-1644	± 20	Silicon carbide coated grade W graphite.	Purged with moisture removed He.
△	60-41	644-1644	± 20	Silicon carbide bonded.	Ground surface showing small pock marks; purged with moisture removed He.
□	58-21	72-1073		Silicon carbide coated.	As received; rapid oxidation causes unrealistic data above 866 K.



NORMAL SPECTRAL EMITTANCE -- MISCELLANEOUS GRAPHITES

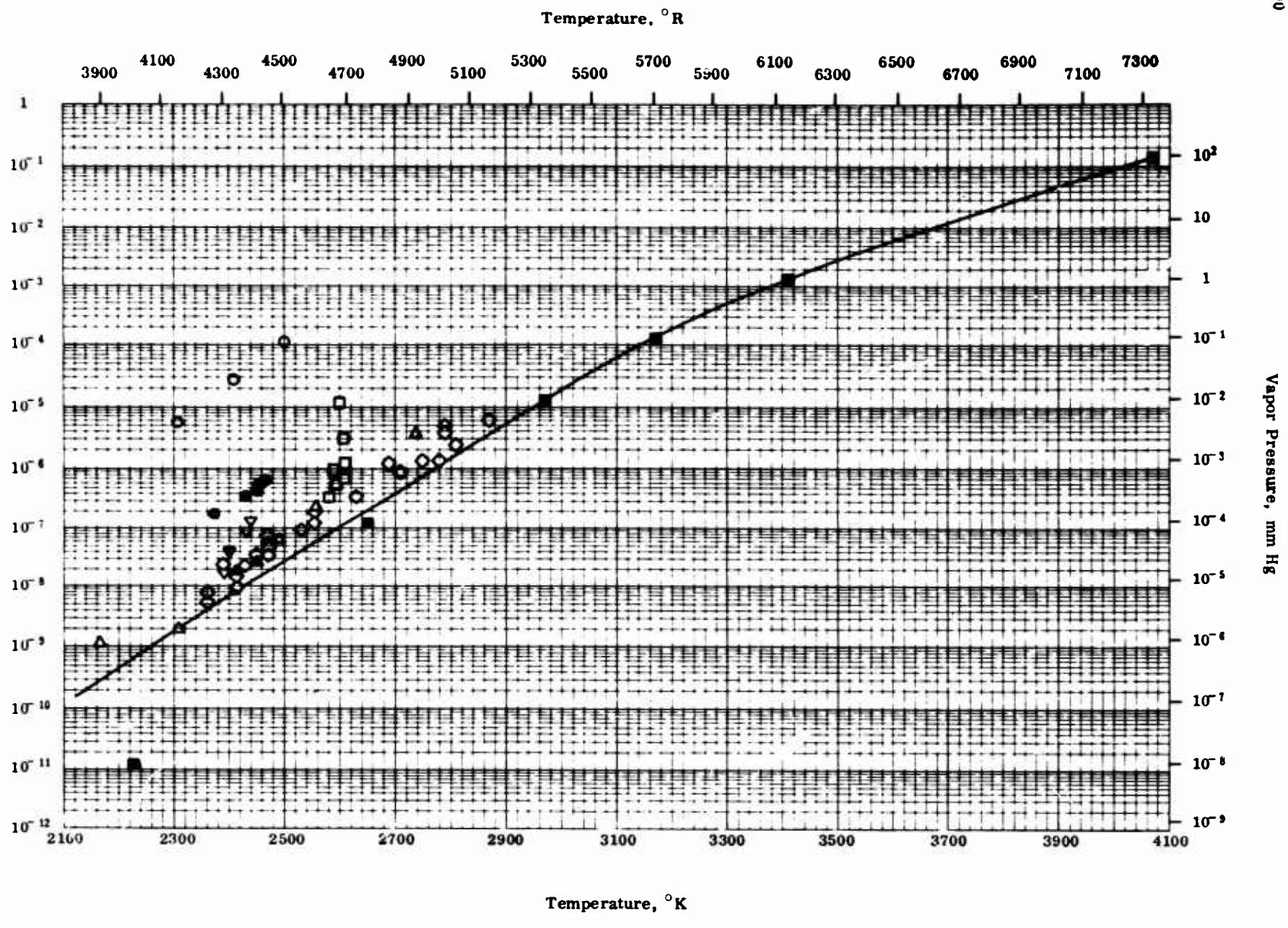
Normal Spectral Emittance

TPRC

NORMAL SPECTRAL EMITTANCE -- MISCELLANEOUS GRAPHITES

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	60-37	1105	2-12.3		Pure.	Smooth and flat (not optically polished); measured in 90 Ar + 10 H_2; data taken from a smooth curve.
△	60-37	1420	2-14.0		Same as above.	Same as above.



VAPOR PRESSURE -- GRAPHITE

VAPOR PRESSURE -- GRAPHITE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-4	2300-2500		Graphite Kendall type.	
□	48-2	2583-2613		Graphite.	
△	55-14	2171-2743		Graphite.	
◇	60-7	2357-2870		Acheson graphite.	Vacuum 10^{-8} mm Hg.
▽	55-13	2384-2437		"Very pure" Acheson graphite.	Authors reports pressure of C atoms only.
▲	47-3	2173-2473		Kendall graphite.	
●	57-18	2382-2466		Nuclear reactor grade graphite; only small amount of inorganic impurities.	
■	62-12	2223-4073		Graphite.	

PROPERTIES OF CARBON (DIAMOND)

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	3.51*	219*
Melting Point	3773*	6791*
Heat of Sublimation	15800	28500

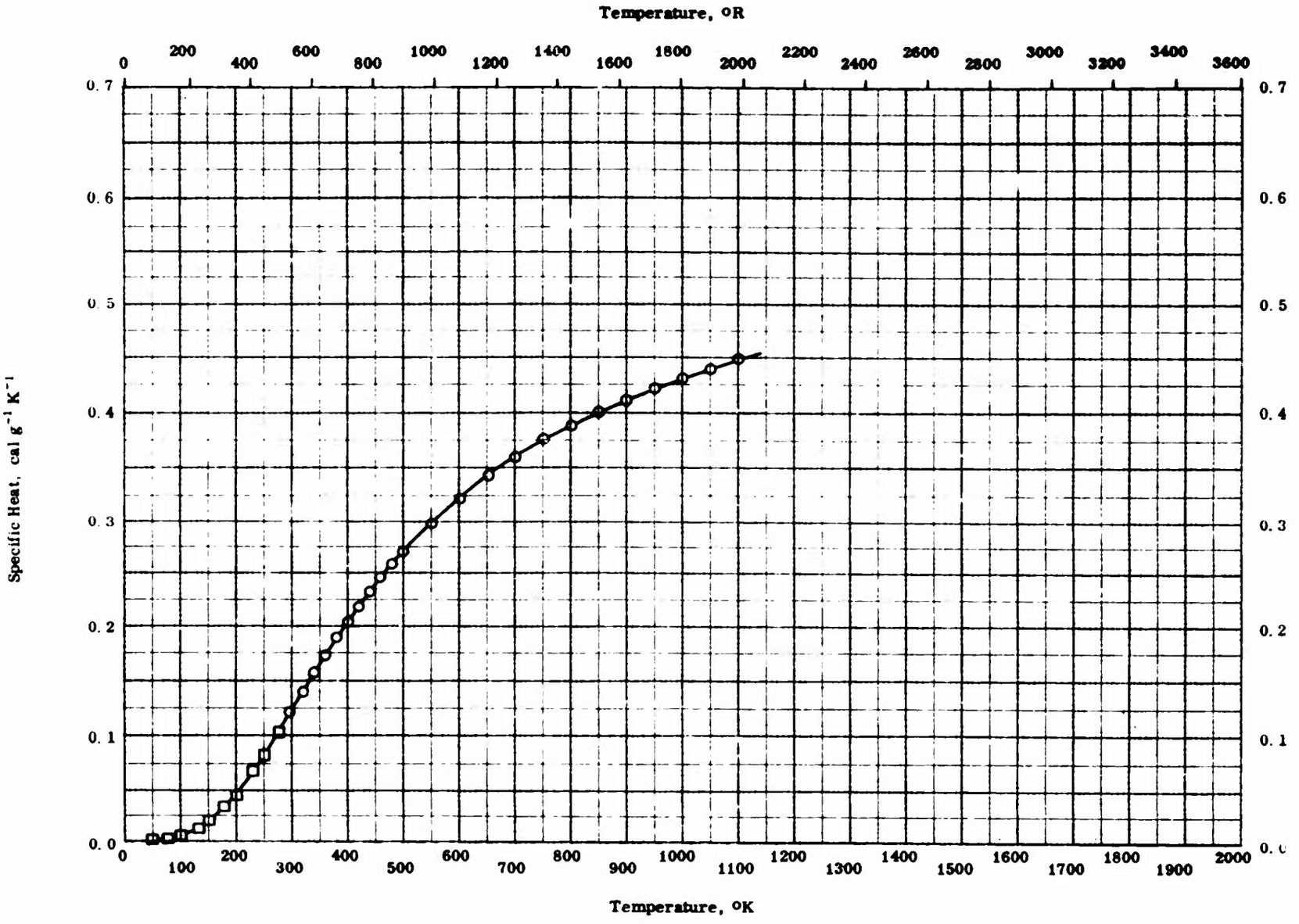
*Handbook of Chemistry and Physics (Ref. 64-28)

REPORTED VALUES

Heat of Sublimation	cal g^{-1}	Btu lb^{-1}
O	15800	28500

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	42-5			Diamond.	Δh_s computed from experimental data on heat of formation of acetylene.

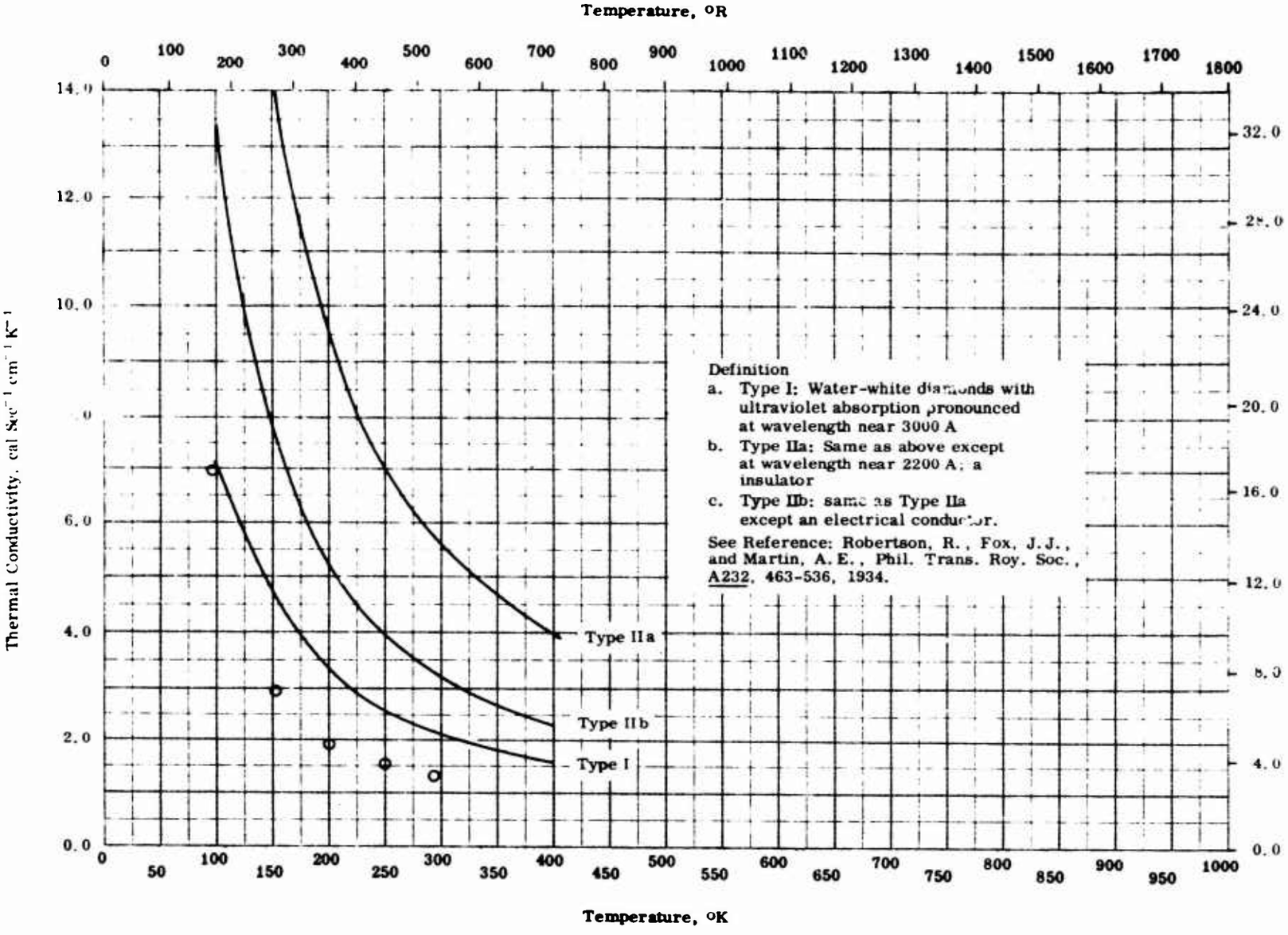


SPECIFIC HEAT -- DIAMOND

SPECIFIC HEAT -- DIAMOND

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-17	298-1100	0.4		
□	58-25	12-278	1.0	Commercial diamond.	

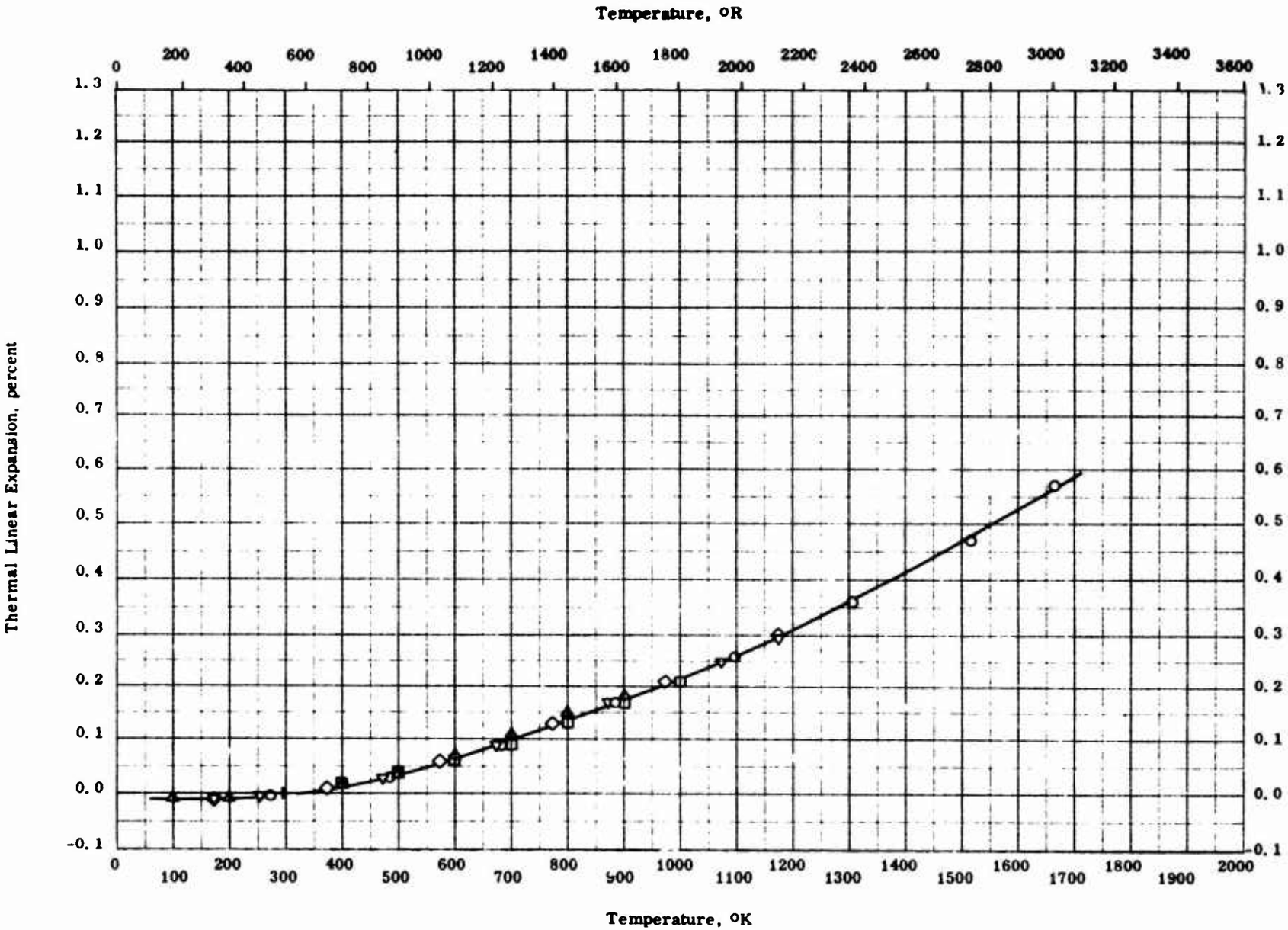


THERMAL CONDUCTIVITY -- DIAMOND

THERMAL CONDUCTIVITY -- DIAMOND

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-8	100-300		Gem quality (Auth. design. Type I)	

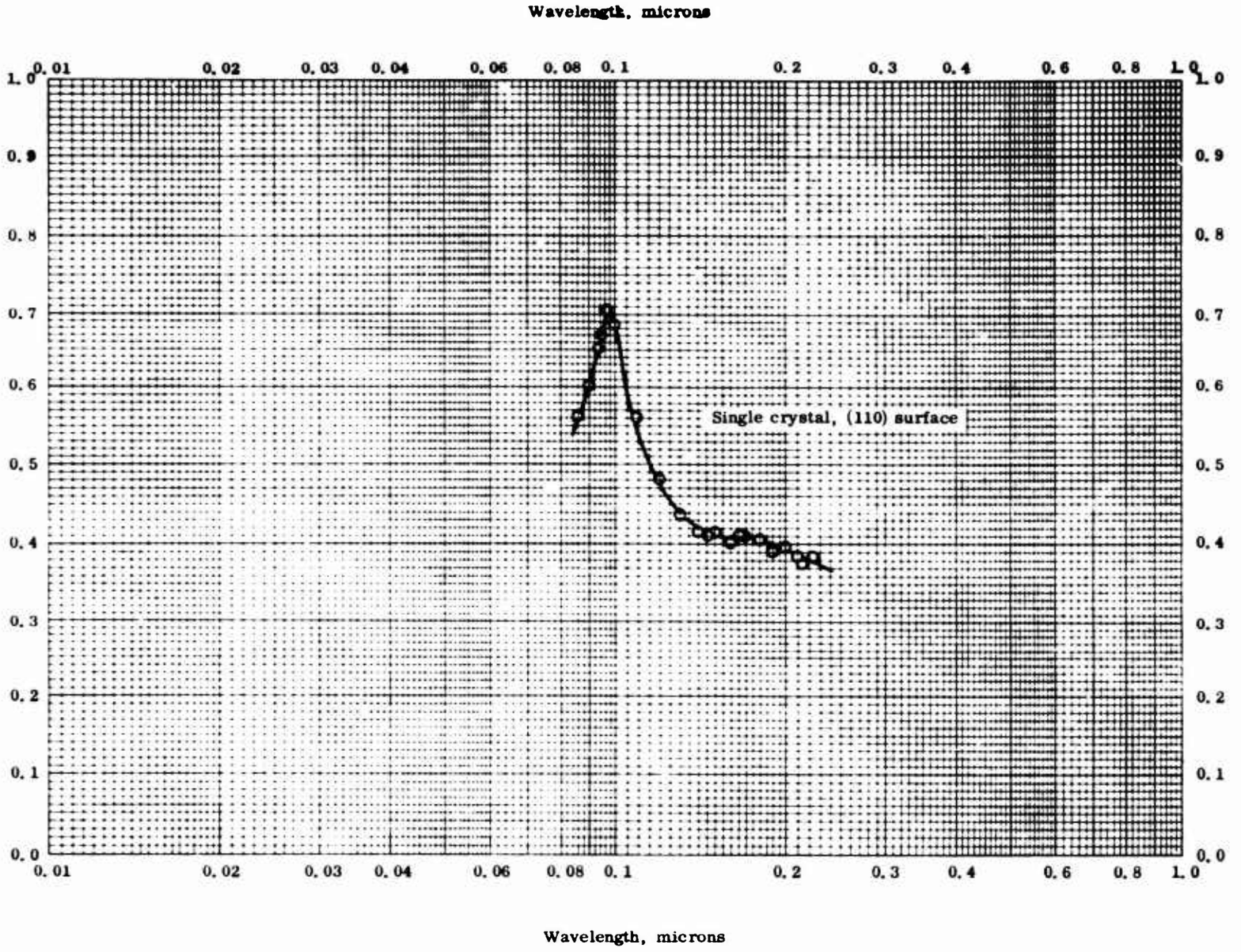


THERMAL LINEAR EXPANSION -- DIAMOND

THERMAL LINEAR EXPANSION -- DIAMOND

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-54 also 57-65	273-1663		Commercial diamond powder, Elgin No. 1 grade, 0 - 2μ.	
□	57-63	298-1000	±0.3	0.0020 Si, 0.0002 Mg, 0.0001 Fe, and 0.0001> Cu.	
△	46-4	100-900		Not given.	
◇	56-61	173-1173		Gem quality.	
▽	56-61	173-1173		Industrial quality.	



NORMAL SPECTRAL REFLECTANCE -- DIAMOND

NORMAL SPECTRAL REFLECTANCE - - DIAMOND

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
O	60-44	298	0. 086-0. 223	1	Single crystal with (110) surface.	Incidence 5 degrees from normal.

PROPERTIES OF CERIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	6.790	424
Melting Point	1077	1938
Heat of Fusion	20	30
Heat of Vaporization. . . .	768_{1590K}	1383_{2862R}
Heat of Sublimation	594	1070

REPORTED VALUES

Density	$g\ cm^{-3}$	$lb\ ft^{-3}$
▶	6.747	421.2
◁	6.65	415
▷	6.768	422.5
■	6.79	424

Melting Point	K	R
○	1066 ± 5	1919 ± 9
◇	1077	1938
▽	1077.2	1939.0
▼	1074	1933

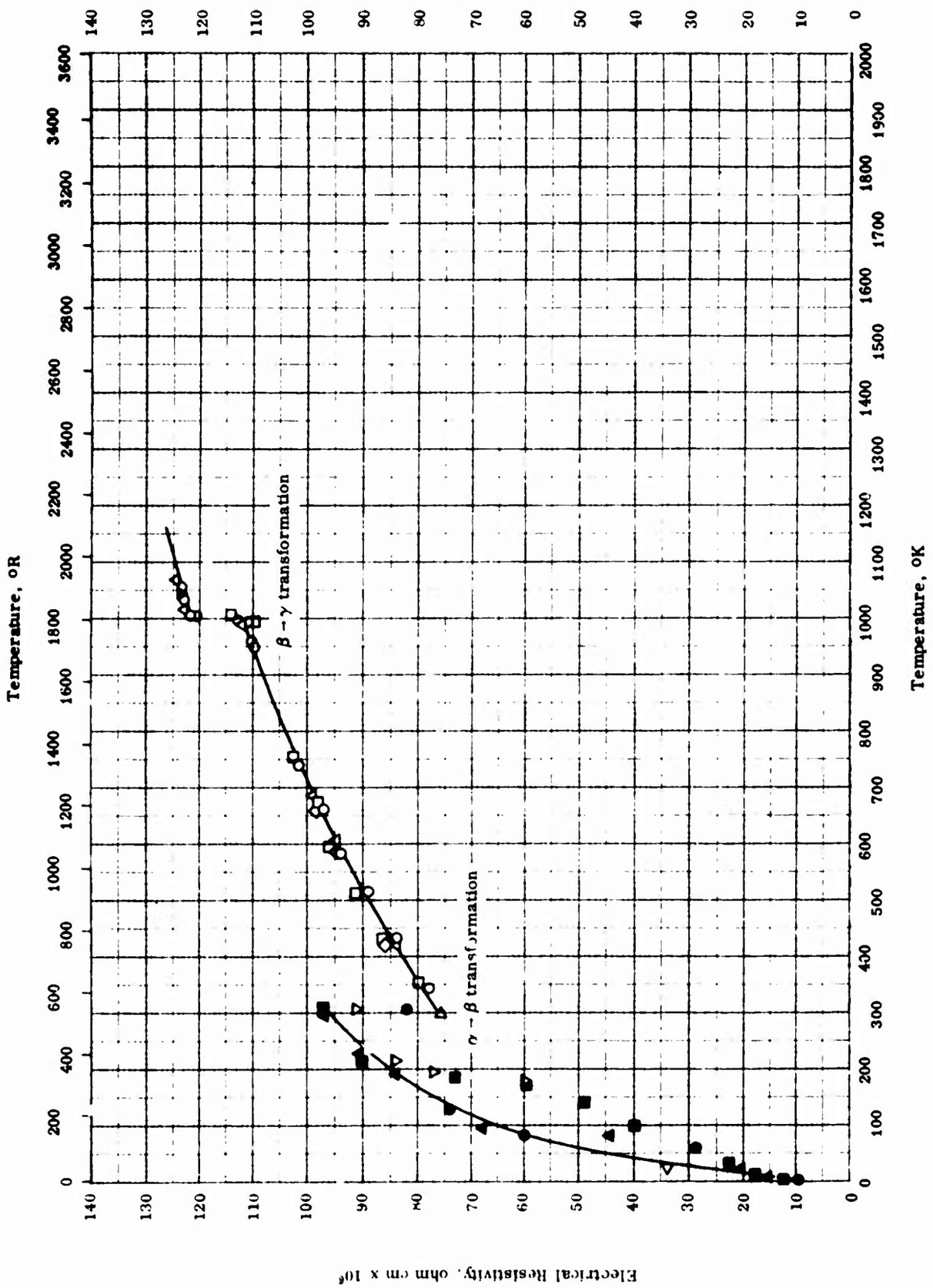
Heat of Fusion	$cal\ g^{-1}$	$Btu\ lb^{-1}$
△	22.1	39.8
◆	17	30
●	8.8	15.9

Heat of Vaporization	$cal\ g^{-1}$	$Btu\ lb^{-1}$
◀	768 ± 14	1383 ± 26
◁	678	1220

Heat of Sublimation	$cal\ g^{-1}$	$Btu\ lb^{-1}$
▷	594	1070

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-12	1460-1720		0.1 - 0.2 Ca and 0.05 - 0.20 Mg.	Δh_v from vapor pressure data.
△	53-34	1051			Δh_f of 4 average values ranging 30.1 - 57.7 Btu lb^{-1} depending on solute material.
◇	54-11	1077		Very pure.	Heating and cooling rate at 10 C min^{-1}.
▽	58-18	1077		0.05> Ca, 0.02> Si, and 0.01> La.	M. P. data from enthalpy data.
◁	55-42	298		Not given.	
▷	55-42	298		Not given.	Density from x-ray measurement.
▼	52-5	1074		Not given.	
◆	56-54	1077		Very high purity.	
▷	56-54			Same as above.	
●	62-13	138-148 358-368 1003		Not given.	$(\Delta h_f)\alpha \rightarrow \beta$ $(\Delta h_f)\beta \rightarrow \gamma$ $(\Delta h_f)\gamma \rightarrow \delta$
■	62-13	298		Not given.	
◁	62-13	298		Not given.	
◀	53-12	---		Not given.	
▶	53-12	298		Not given.	

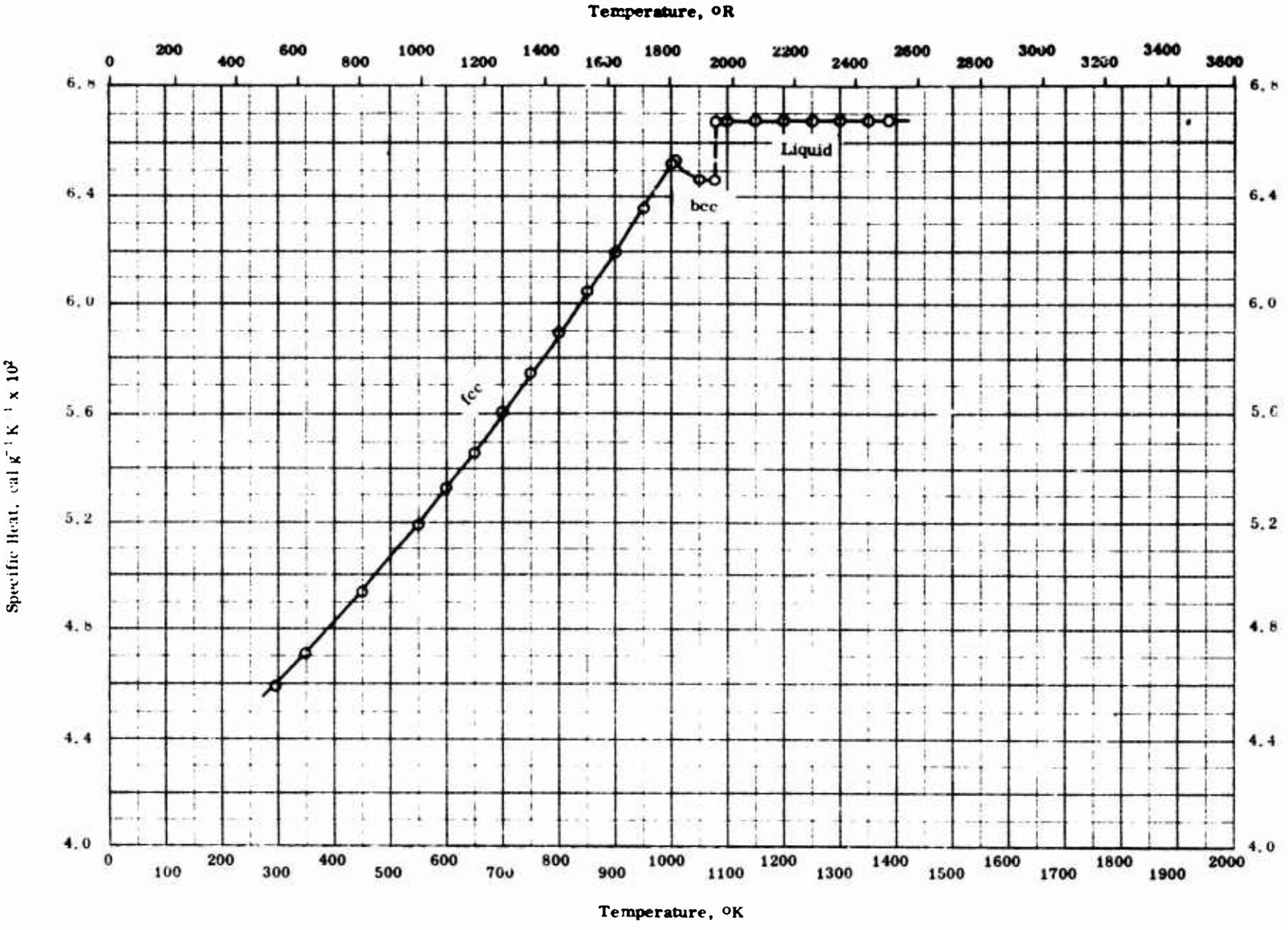


ELECTRICAL RESISTIVITY -- CERIUM

ELECTRICAL RESISTIVITY -- CERIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	353-1057		<0.05 Ca, <0.03 Pr, <0.02 ea. Mg, Nd, La, <0.01 Si, and <0.005 Fe.	Cast, rolled, swaged at room temp. vacuum annealed 1 hr. at 300 C, and heated to within 100 C of melting point, tested at 2 C min^{-1} rise.
□	55-28	353-1057		Same as above.	Same as above: cooling.
△	57-38	298-1063	± 1	99.9 pure.	
◇	57-38	298-1063	±1	Same as above.	Same as above.
▽	51-22	7-310		Not given.	At room temp. mixt. of fcc and hcp crystals to denser fcc at low temp: first run, heating.
●	51-22	7-310		Same as above.	First run, cooling.
■	51-22	7-310		Same as above.	Second run, heating.
▲	51-22	7-310		Same as above.	Second run, cooling.
◁	62-13	24		α - Ce.	
▷	62-13	298		β - Ce.	
▼	62-13	1043		γ - Ce.	

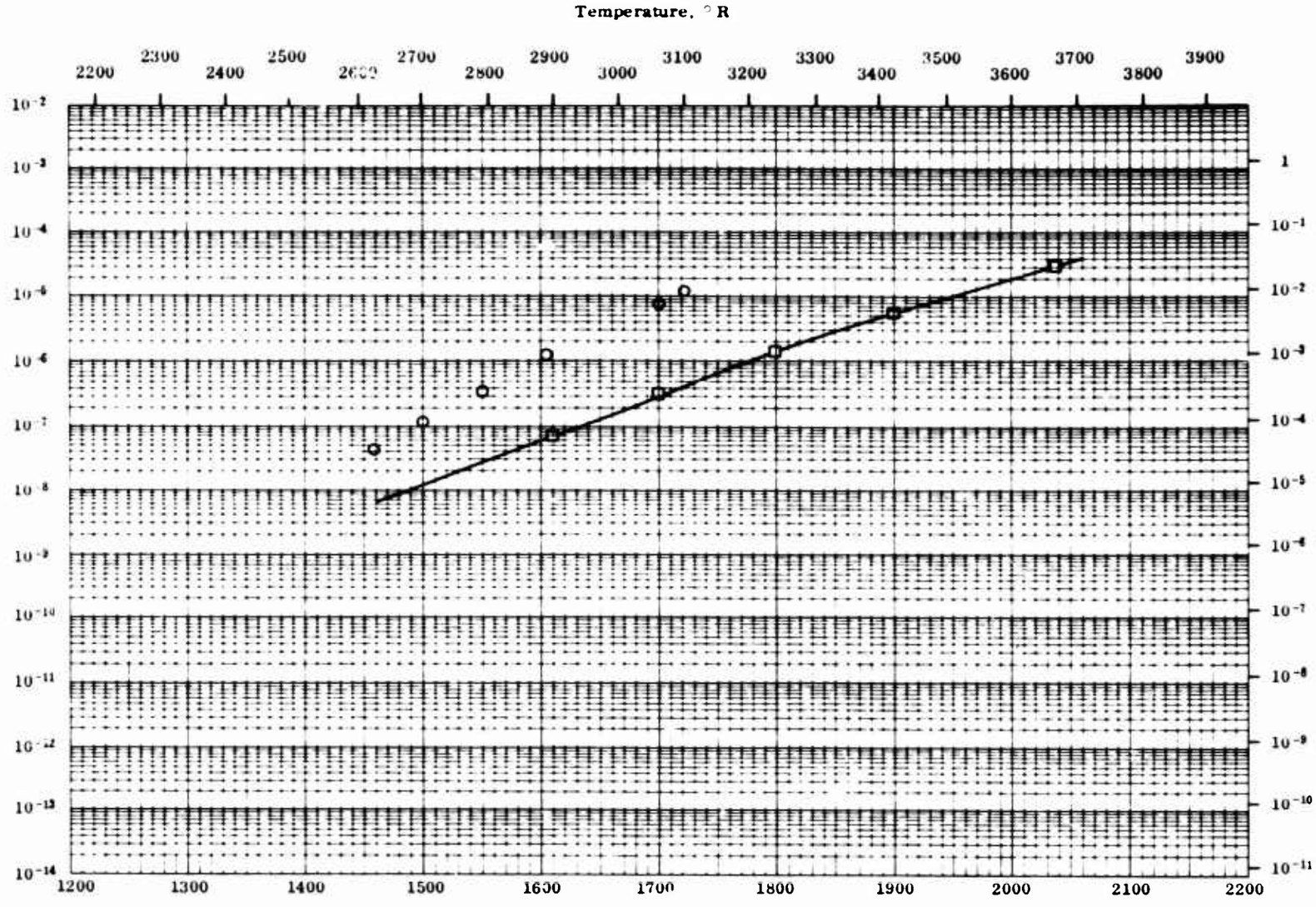


SPECIFIC HEAT -- CERIUM

SPECIFIC HEAT -- CERIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-25	298-1373	<0.14	>0.92 Ce, 0.05 ≥Cu, 0.02 Si, and 0.01 ≥Ca	



VAPOR PRESSURE -- CERIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-12	1460-1720		0.1 - 0.2 Ca and 0.05 - 0.2 Mg.	
□	62-13	1611-2038		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{20304}{(T)K} + (8.306 \pm 0.045)$.

TPRC

PROPERTIES OF CHROMIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7.16	447
Melting Point	2123	3821
Heat of Sublimation	1813_{0K}	3263_{0R}

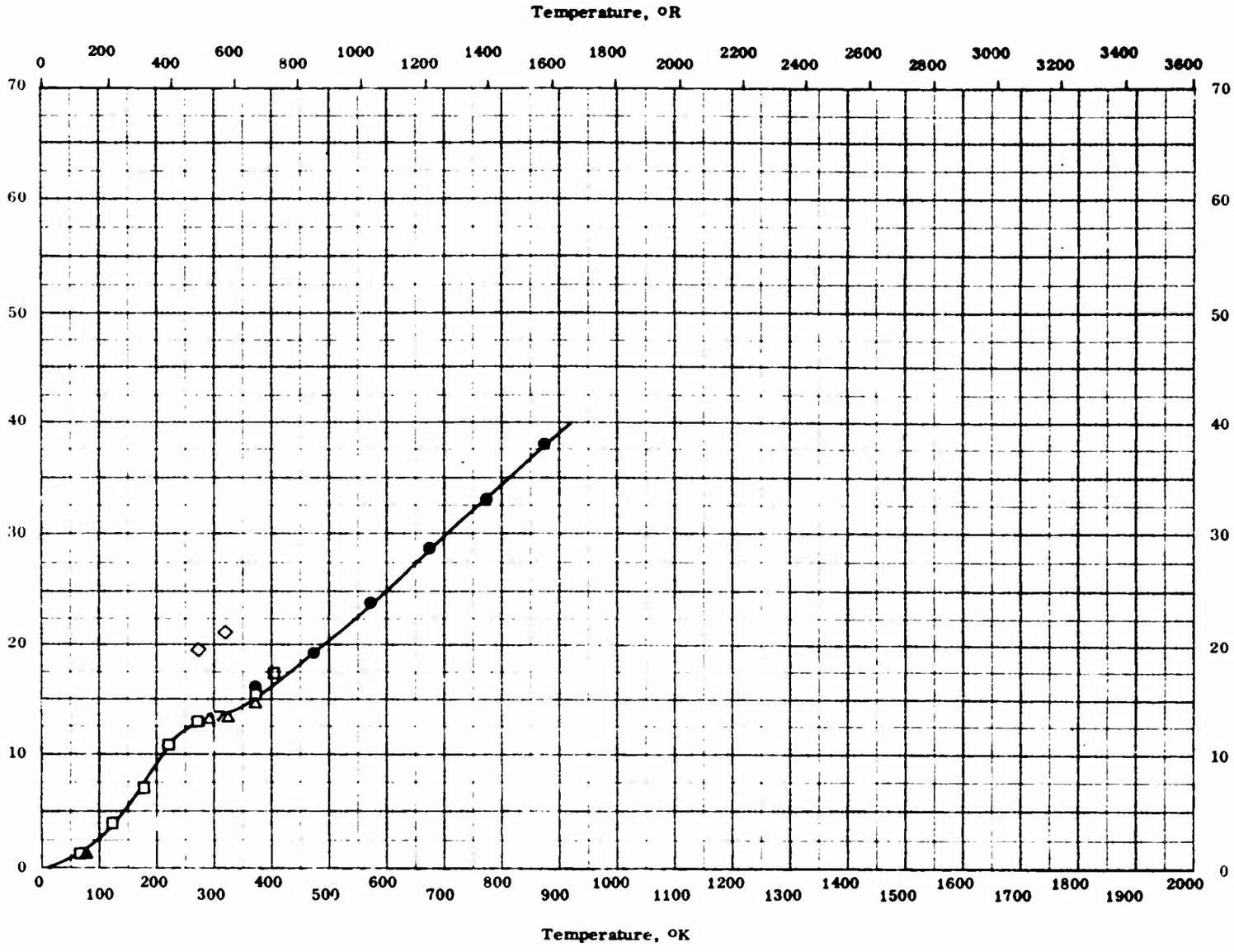
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	7.16	447
	●	7.100	443.23
Melting Point		K	R
	□	2118 ± 10	3810 ± 18
	▲	1858	3345
	△	1863	3354
	▲	2073	3732
	■	2118	3813
	▼	2118	3813
	◆	2109	3796
	◀	2133	3839
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	▽	1896	3412.8
	◇	1813	3263.3

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3 also 58-1	297		Chemically pure; ductile.	Density by weight and volume.
□	51-27 also 50-15	2105-2115		By spectroscopic analysis: 0.02-0.12 O_2, 0.014-0.076 N_2, and no metallic impurities.	
▲	53-32	1858		Not given.	M. P. data observing collapse of black body hole in the sample; on graphite slab at a pressure of 0.2 mm Hg; sample reacted with C.
△	53-32	1863		Not given.	Same as above except on SiC slab at a pressure of 0.054 mm Hg; sample reacted with C.
▽	57-17	0		99.997 Cr.	Cast; Δh_s from vapor pressure data.
◇	57-17	0		99.997 Cr.	Condensed from vapor; Δh_s from vapor pressure data.
●	41-5	298		99.93 Cr and 0.002 each Fe and Si; electrolytic metal.	Stabilized sample after several heating and cooling cycles and final heating at 2850 R.
■	56-56	2118		0.02 each O_2 and N_2.	M. P. from breaking time-temperature curves.
▲	56-55	2073		Not given.	
▼	49-21	2109-2133		0.14 O_2 and 0.011 N_2.	M. P. from thermal analysis.
◆	49-21	2109-2133		0.19 O_2.	Same as above.
◀	49-21	2109-2133		Pure.	Same as above; author's recommendation.

TPRC

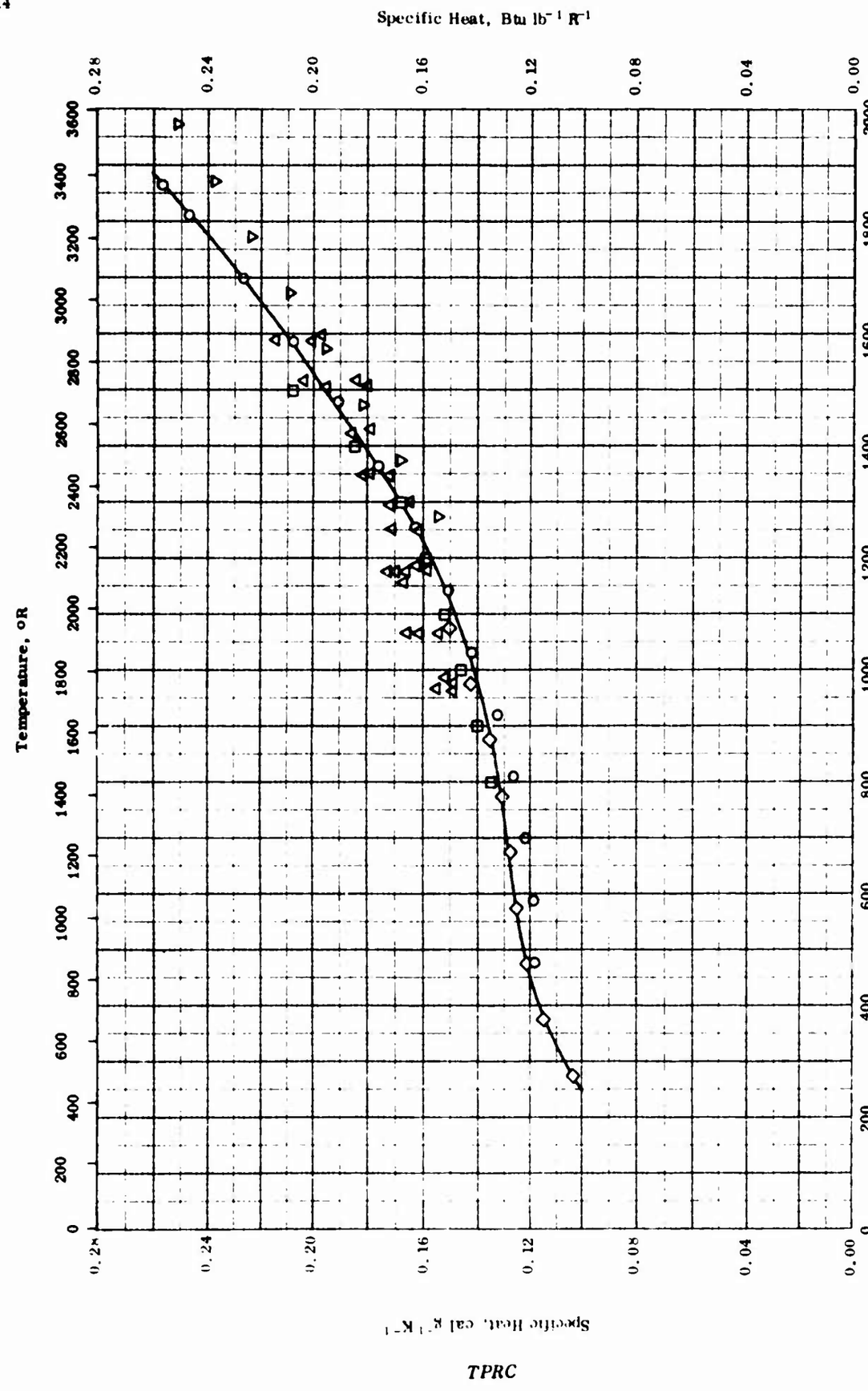


ELECTRICAL RESISTIVITY -- CHROMIUM

ELECTRICAL RESISTIVITY -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	51-21	73-398		99.89 pure; electrolytic powder.	Cold pressed and sintered.
△	51-21	273-373		99.89 pure; electroformed.	
◇	40-2	273-320		High purity.	Rolled into sheet and tempered twice (total 1/2 hr.) at 1000 C; internal hair cracks in sample.
●	53-26	293-873		0.06 Fe, 0.026 S, < 0.01 Si, and 0.007 N_2; electrolytic.	Annealed 26 hrs at 700 C; auth. report r/r_{20C}; r_{20C} not given.
▲	42-2	79-323		Very pure.	Supplements Ref. 40-2 above; same samples re-tempered 2 hrs at 1500 C; four hrs more at 1500 C produced no change.
▽	57-36	273-320		99.998 pure.	High purity sheath forged into bar, ground and polished; "Ductile", fully recrystallized.



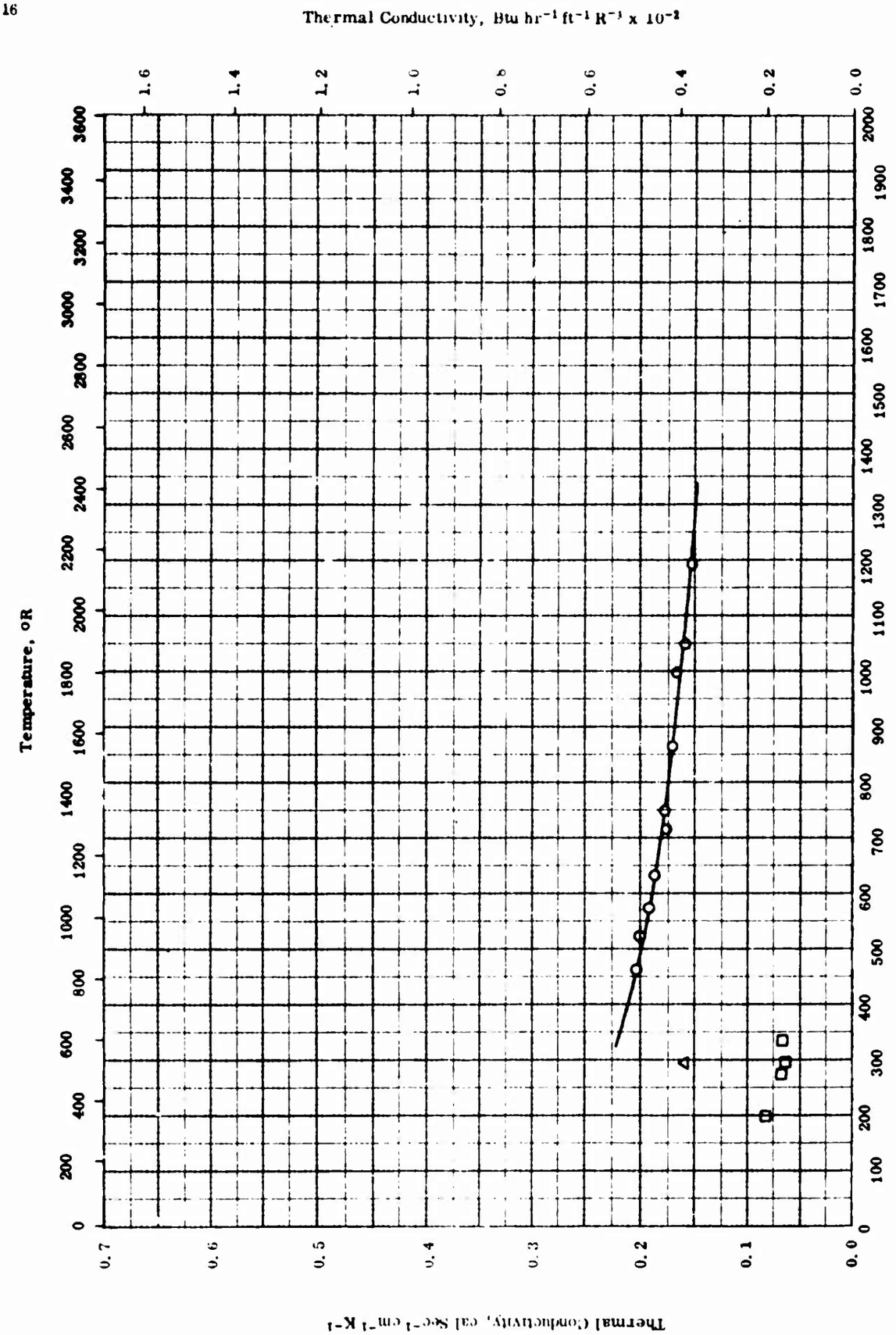
SPECIFIC HEAT -- CHROMIUM

TPRC

SPECIFIC HEAT -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-1	478-1866		Chemically pure; ductile; density 448 lb ft^{-3} at 75 F.	Specimen sealed in capsule.
□	59-18	800-1500	± 0.3	100 Cr.	Specimen under argon atmosphere.
△	58-13	964-1598	≤2.0	99.96 Cr and 0.04 O_2.	
◇	60-31	273-1073	1.0	0.1 impurities, mostly chromous oxide with absorbed H_2 and some Ca and Na; electrolytic flakes.	
▽	65-2	1273-2103		99.99 Cr; form of crystals made by vapor decomposition of the iodide.	

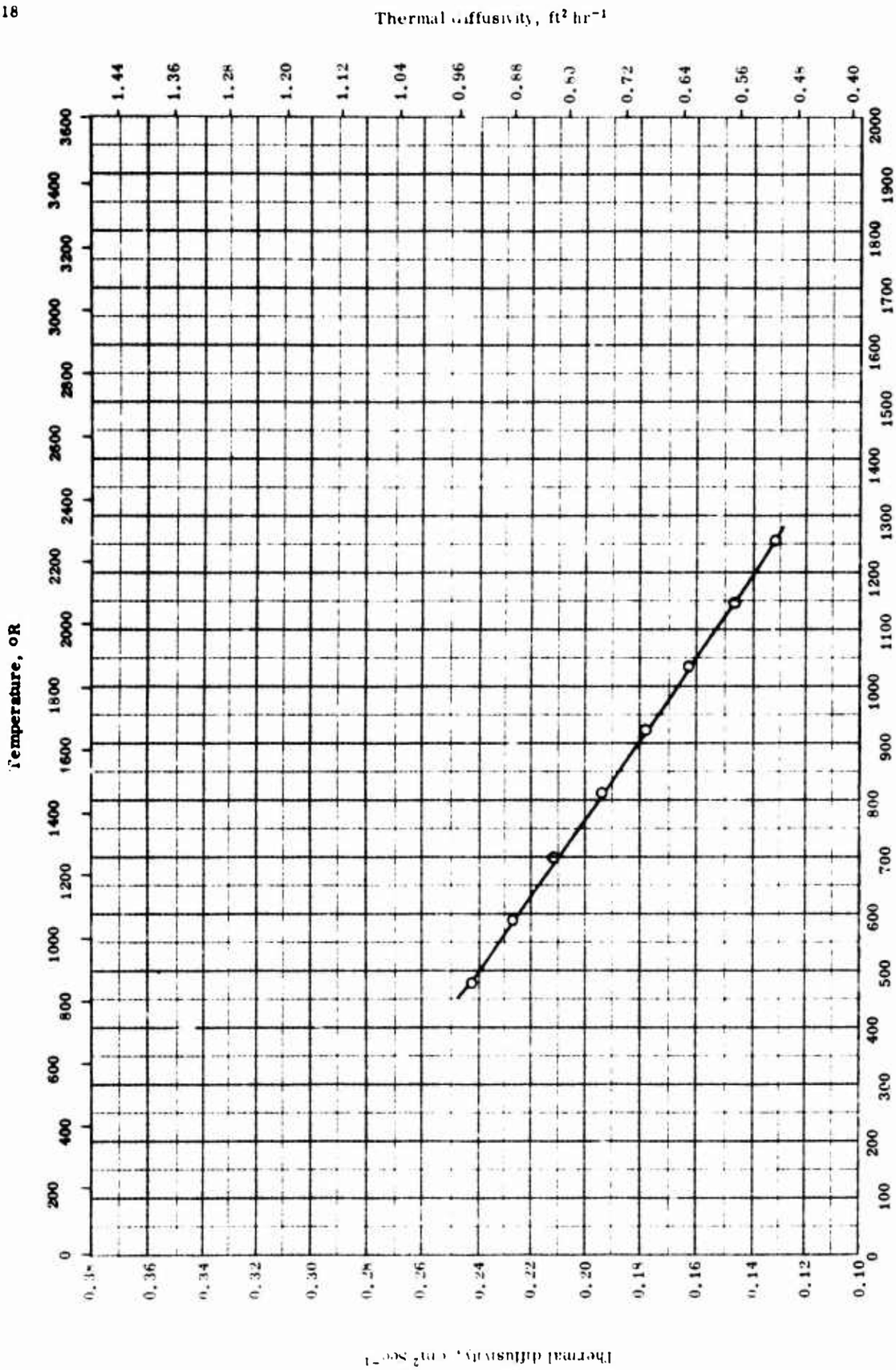


THERMAL CONDUCTIVITY -- CHROMIUM

THERMAL CONDUCTIVITY -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-3	471-1201		Chemically pure.	Ductile.
□	40-2	196-334	low	Electrolytic; high purity.	Test in vacuum; corrected for radiation loss.
△	59-2	293		Pure; density 7.20 $g\,cm^{-3}$.	

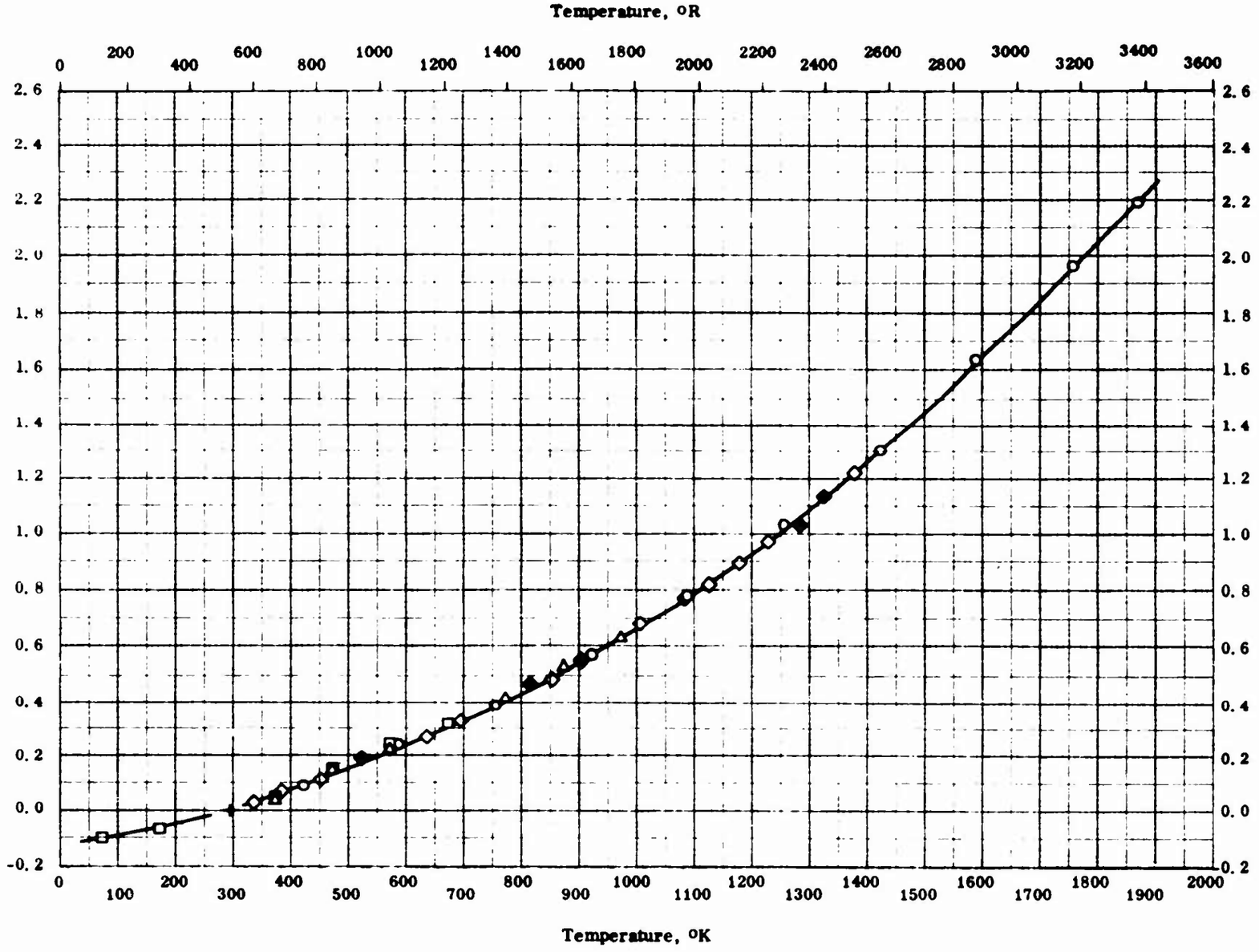


THERMAL DIFFUSIVITY -- CHROMIUM

THERMAL DIFFUSIVITY -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	58-1	478-1255		Commercially pure; ductile; density at 75 F 7.16 g cm^{-3}.	



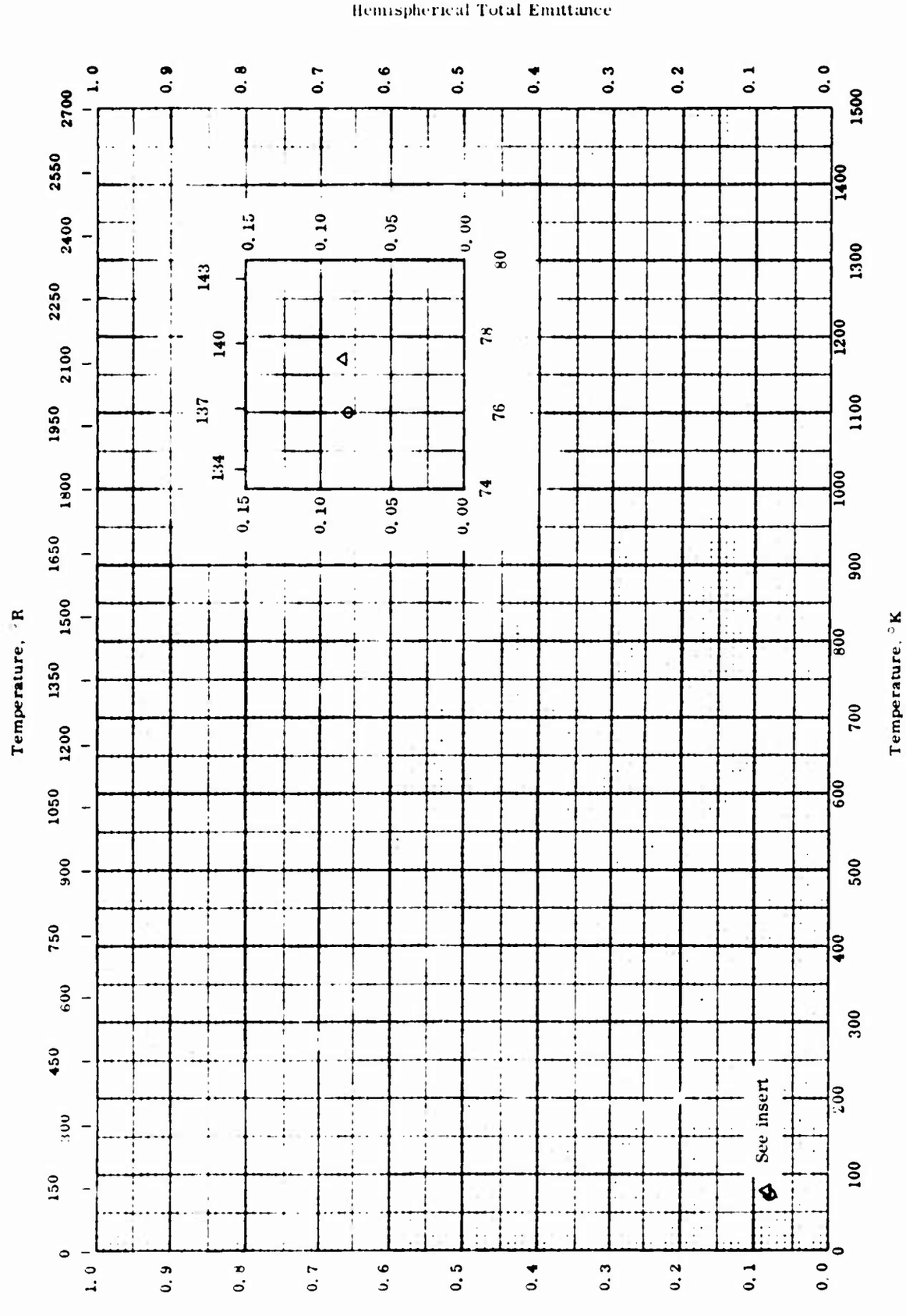
TPRC

THERMAL LINEAR EXPANSION -- CHROMIUM

THERMAL LINEAR EXPANSION -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3 also 58-1	293-1866		Chemically pure; ductile.	Max. heating rate 5 F min^{-1}.
□	51-21	78-673		99.89 pure.	Sample made by cold pressing sintered electrolytic powder.
△	41-5	293-972		Electrolytic; 99.3 Cr, 0.002 each Fe, Si; density 432.68 lb ft^{-3} before heating and 443.23 lb ft^{-3} after heating.	Stabilized sample after several heating and cooling cycles.
◇	54-45 also 55-49	293-1378		Electrolytic; 99' pure.	Heating.
◆	54-45 also 55-49	293-1378		Same as above.	The above specimen, cooling.

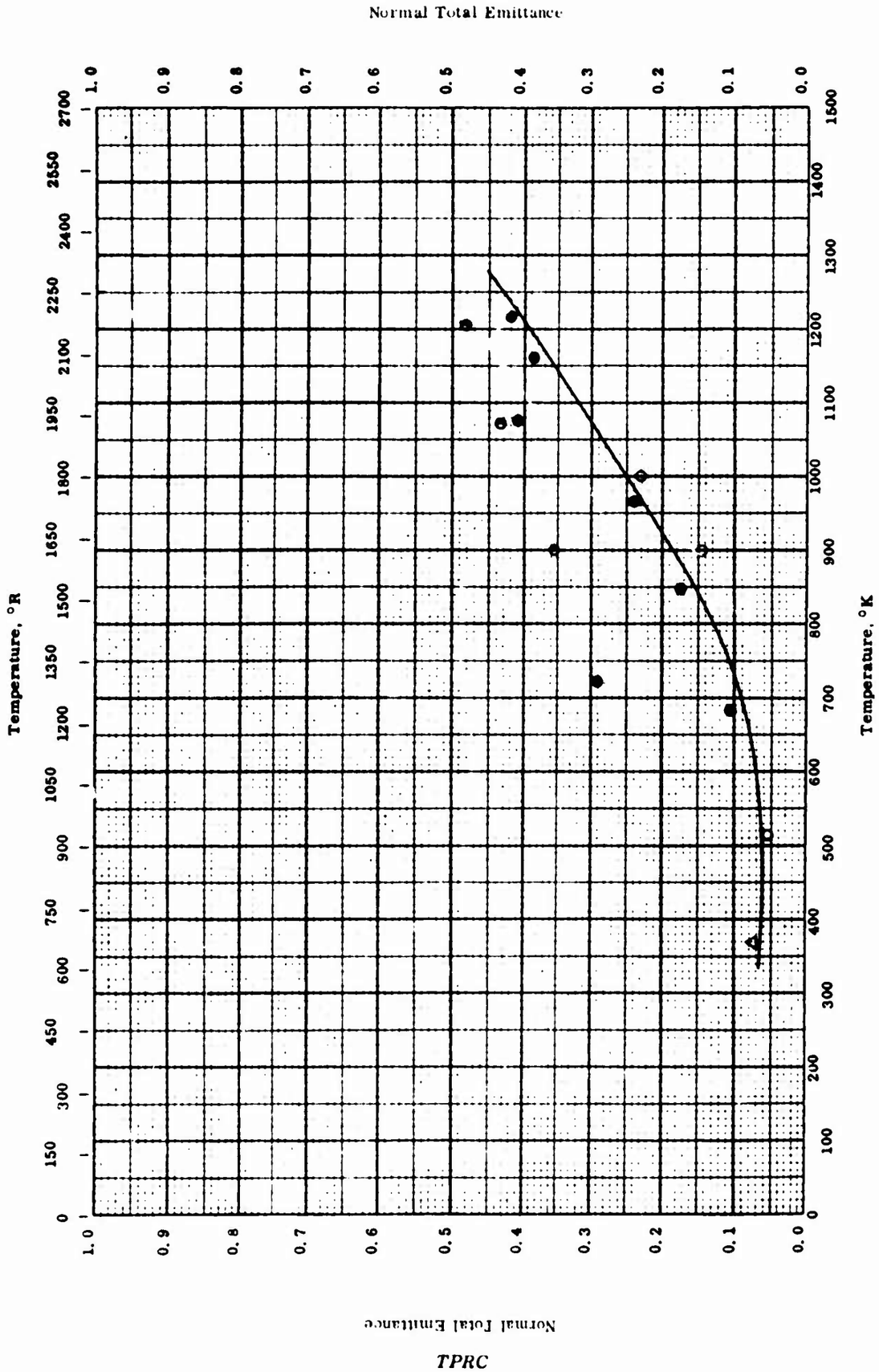


HEMISPHERICAL TOTAL EMITTANCE -- CHROMIUM

HEMISPHERICAL TOTAL EMITTANCE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	60-38	76	5	Chromium plate on copper.	Not given.
△	60-47	77		Plate on monel.	Measured in vacuum (10^{-5} mm Hg).

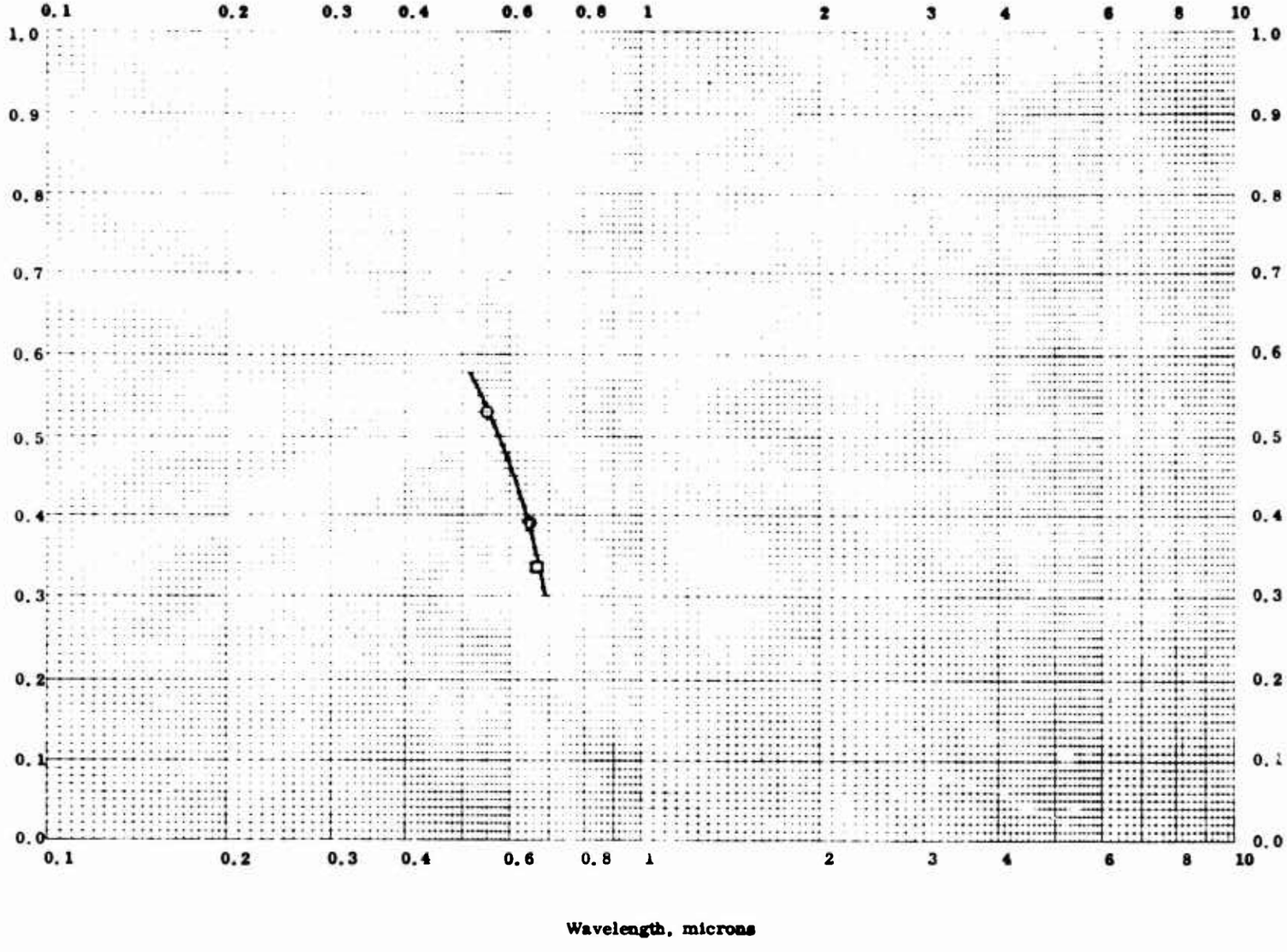


NORMAL TOTAL EMITTANCE -- CHROMIUM

NORMAL TOTAL EMITTANCE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	517-1000	± 10	Pure.	Same data for as received, cleaned, polished or oxidized samples; measured in vacuum (5×10^{-4} mm Hg); first cycle.
●	57-41	683-1217	± 10	Same as above.	Same as above; second cycle.
◑	57-41	722-1205	± 10	Same as above.	Same as above; third cycle.
△	47-9	373		Not given.	Polished.



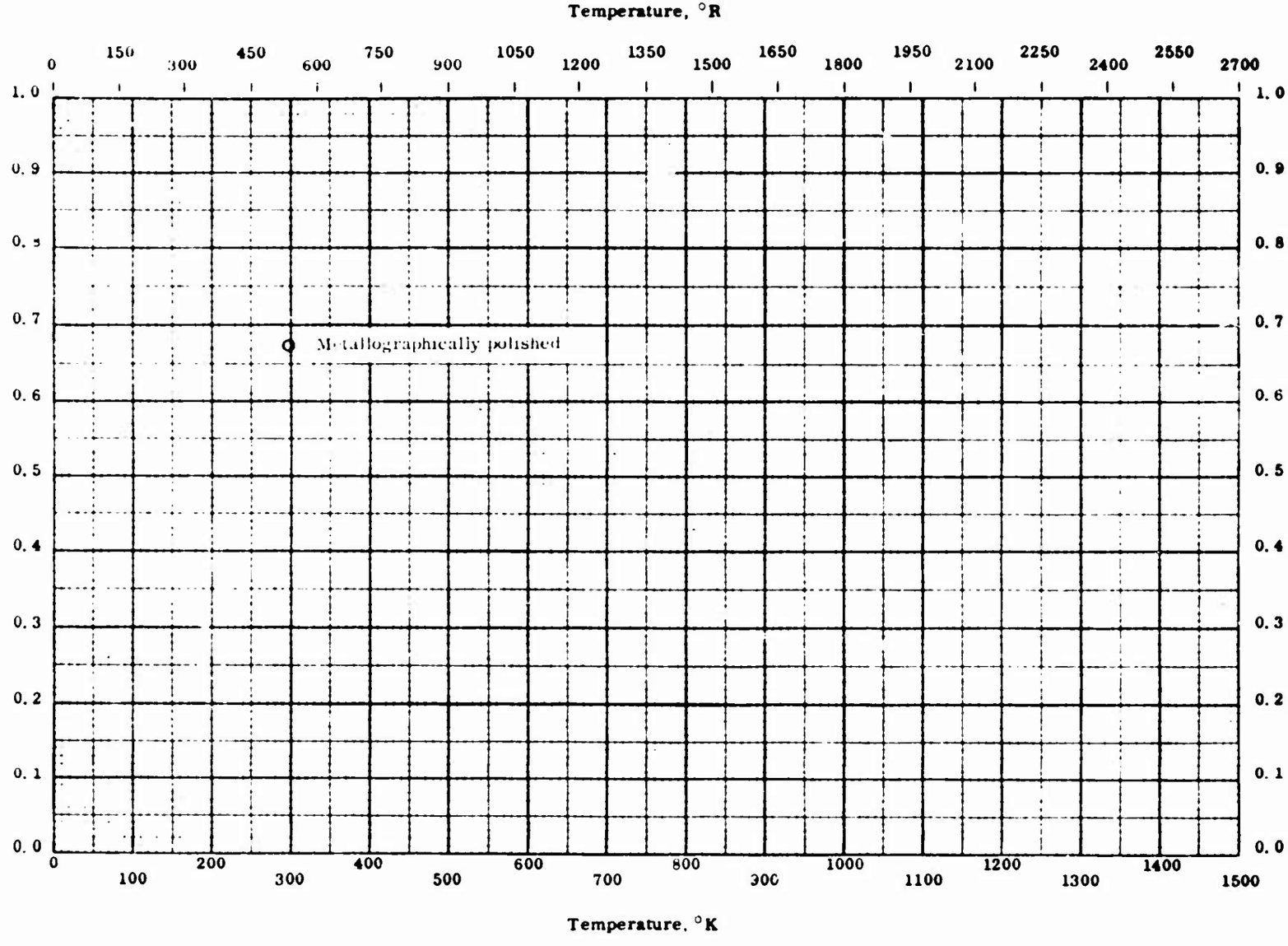
NORMAL SPECTRAL EMITTANCE -- CHROMIUM

TPRC

NORMAL SPECTRAL EMITTANCE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	15-1	1733	0.55-0.65	~1	Not given.	Measured in hydrogen atmosphere.
▽	15-1	1823	0.65	~1	Liquid state.	Same as above.
□	48-5	1550	0.669		Chromium electrodeposited.	Electrodeposit on brass tube, which was removed with nitric acid; heat to 1473 K in hydrogen for 1 week; measured in hydrogen; emittance value independent of temperature up to 1550 K.



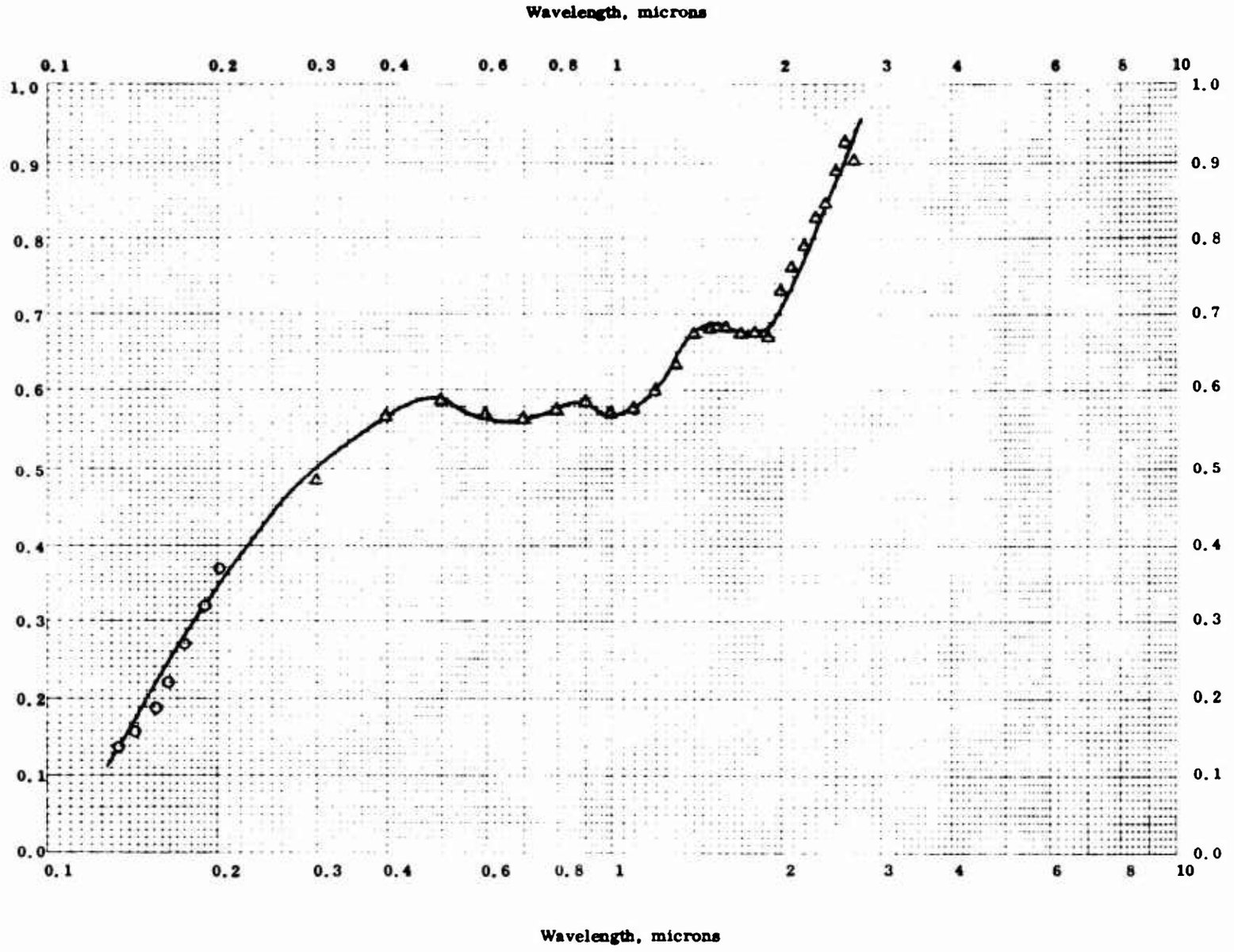
TPRC

NORMAL TOTAL REFLECTANCE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-29	298		Not given.	Metallographically polished; calculated from spectral data.

TPRC

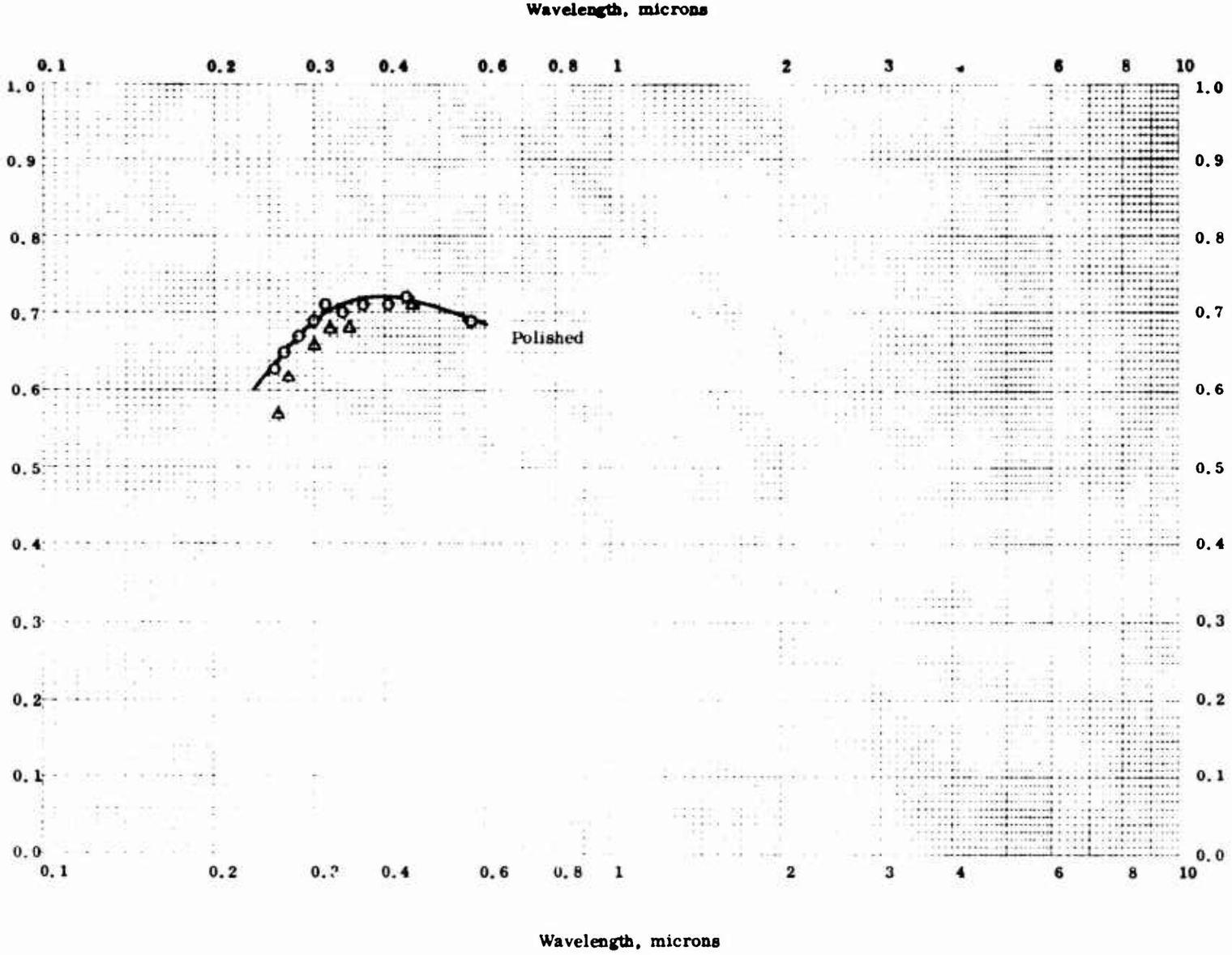


NORMAL SPECTRAL REFLECTANCE -- CHROMIUM

NORMAL SPECTRAL REFLECTANCE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	41-3	298	0.13-0.20		Not given.	Polished; measured in vacuum ($\sim 10^{-3}$ mm Hg).
△	58-21	298	0.3-2.7		Electroplated.	6 - 9 degree illumination and hemispherical viewing; $MgCO_3$ as reference standard; data taken from smooth curve.

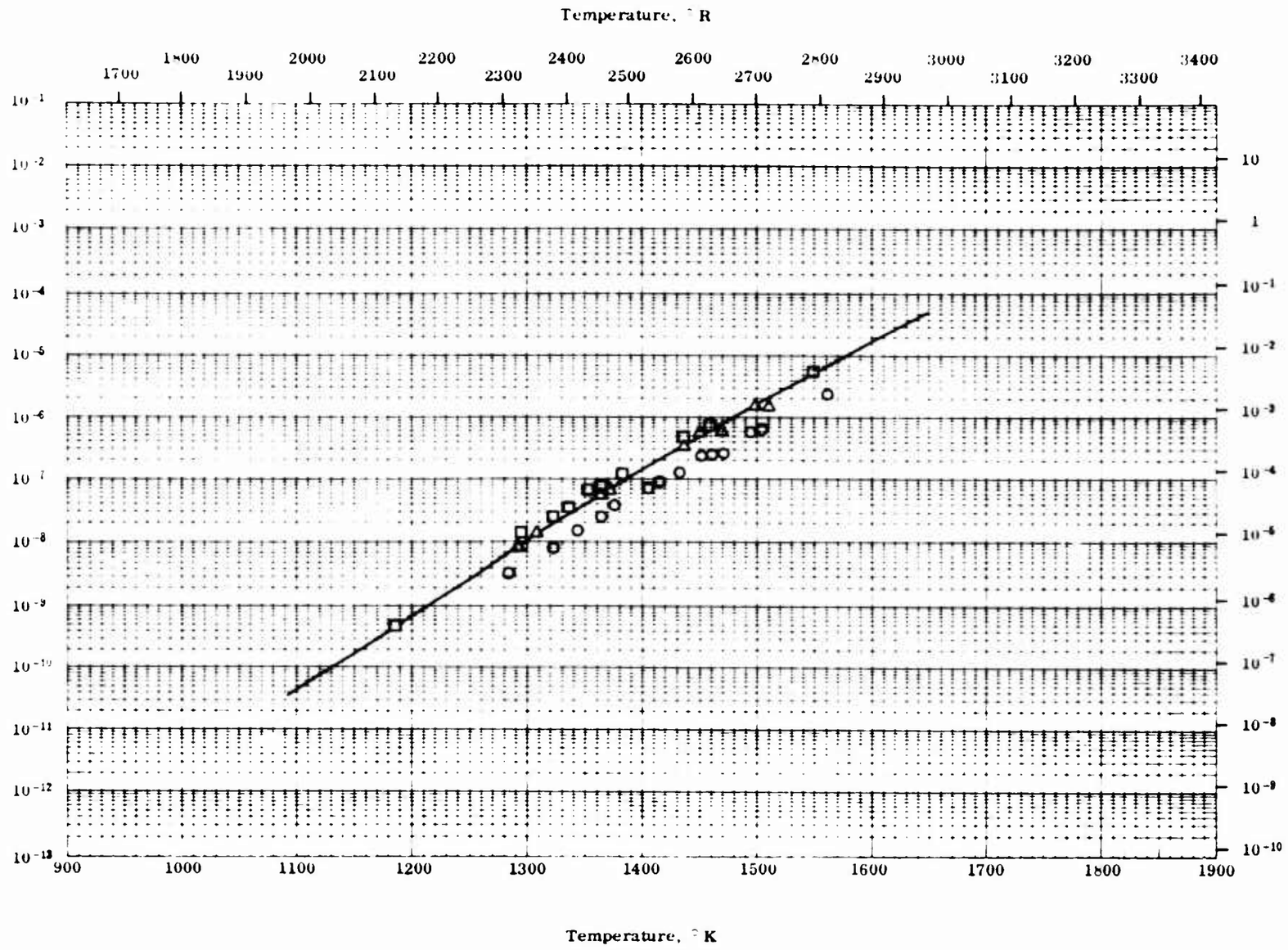


ANGULAR SPECTRAL REFLECTANCE -- CHROMIUM

ANGULAR SPECTRAL REFLECTANCE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	29-1	298	0.255-0.565		Electroplated on heavy blocks of hardened, highly polished steel, film thickness ~0.1 mm. [Author's design.: 1M].	Highly polished, quite free from scratches, optically flat; 45 degree illumination; right-angle prism of quartz as reference standard.
△	29-1	298	0.258-0.445		Same as above; film thickness ~0.005 mm. [Author's design.: 1C].	Same as above; exposed to Hg arc lamp for 30 hrs.



TPRC

VAPOR PRESSURE -- CHROMIUM

VAPOR PRESSURE -- CHROMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	50-3	1283-1561		99.7 pure with 0.2 O_2.	Vacuum at 10^{-6} mm Hg.
□	57-17	1187-1550	± 15	99.997 pure.	Cast; vacuum at 10^{-6} mm Hg.
△	57-17	1187-1550	± 15	Same as above.	Specimen made by condensation of vapor; vacuum at 10^{-6} mm Hg.

PROPERTIES OF COBALT

MOST PROBABLE VALUES

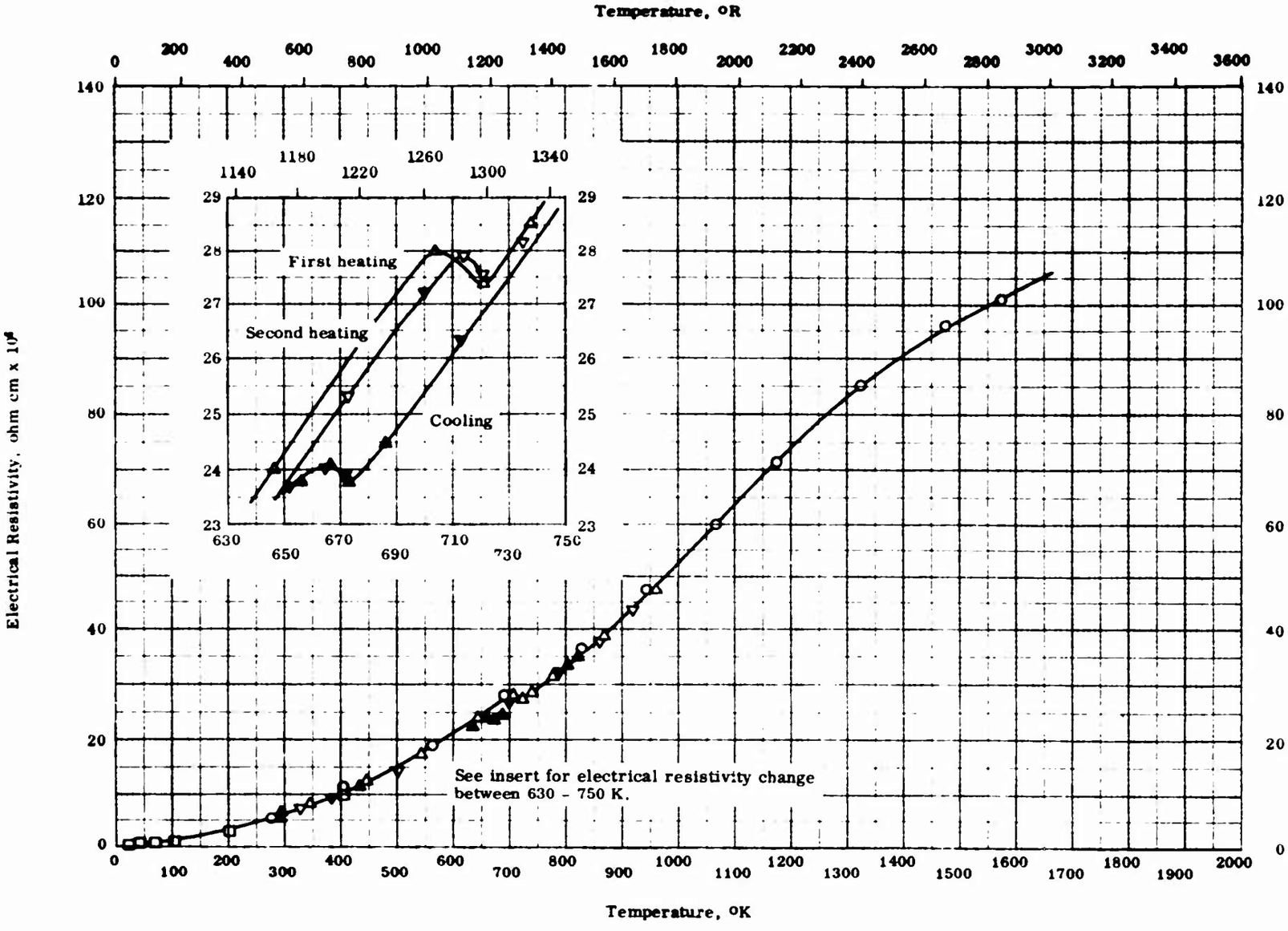
Property	C.G.S. Units	Brit. Eng. Units
Density.	8.862	552.6
Melting Point	1768	3183

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	◇	8.862 ± 0.033	552.6 ± 1.5
	▽	8.83	551
Melting Point		K	R
	○	1768 ± 1	3183 ± 2

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	47-11	1767-1769		Pure.	M. P.; temperature of black body enclosure immersed in liquid metal during freezing.
◇	50-15	298		99.86 Co, 0.117 Fe, 0.06 C, 0.020 As, 0.020 Cu, 0.013 P, 0.001 Mn and Si each, and no Ni and S.	Annealed electrolytic metal; density data from weight in air and in water.
▽	40-3	298		99.95 Co and 0.01 - 0.06 Fe.	Electrolytically deposited.



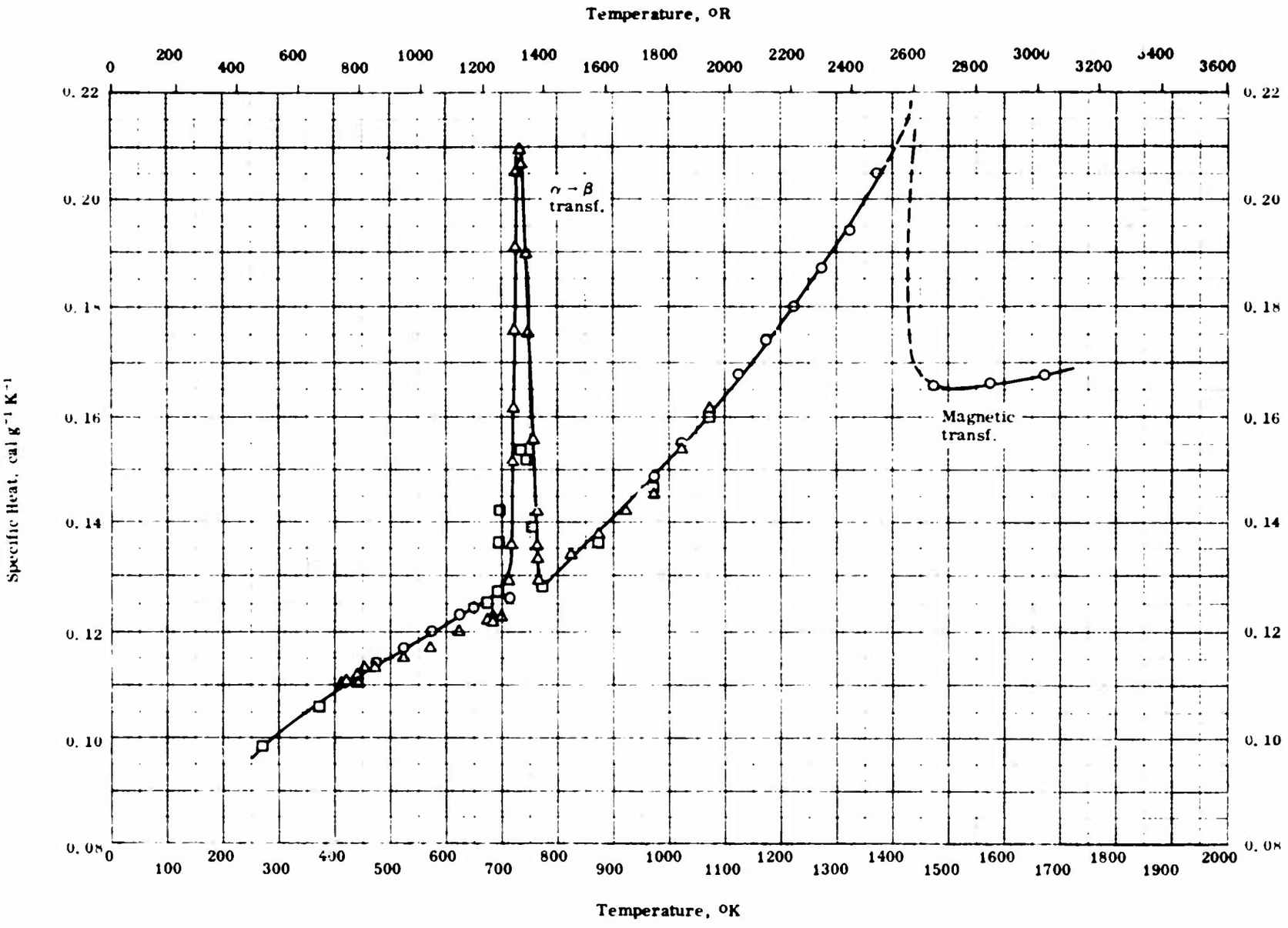
ELECTRICAL RESISTIVITY -- COBALT

TPRC

ELECTRICAL RESISTIVITY -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	40-3	273-1573		99.95 Co and 0.01 - 0.06 Fe; pure α-phase by spectroscopy.	
□	57-40	23-400		< 0.0005 Fe, 0.0002 Si and < 0.0001 ea. Al, Mg, Ca.	Authors' smoothed data ± 1% of experimental values.
△	64-2	293-963		99.97 Co rod of 0.951 cm dia. and 4.346 cm length.	Machined; first heating.
▲	64-2	293-823		Same as above.	Machined; first cooling.
▽	64-2	328-918		Same as above.	Machined; second heating.
▼	64-2	383-793		Same as above.	Machined; second cooling.

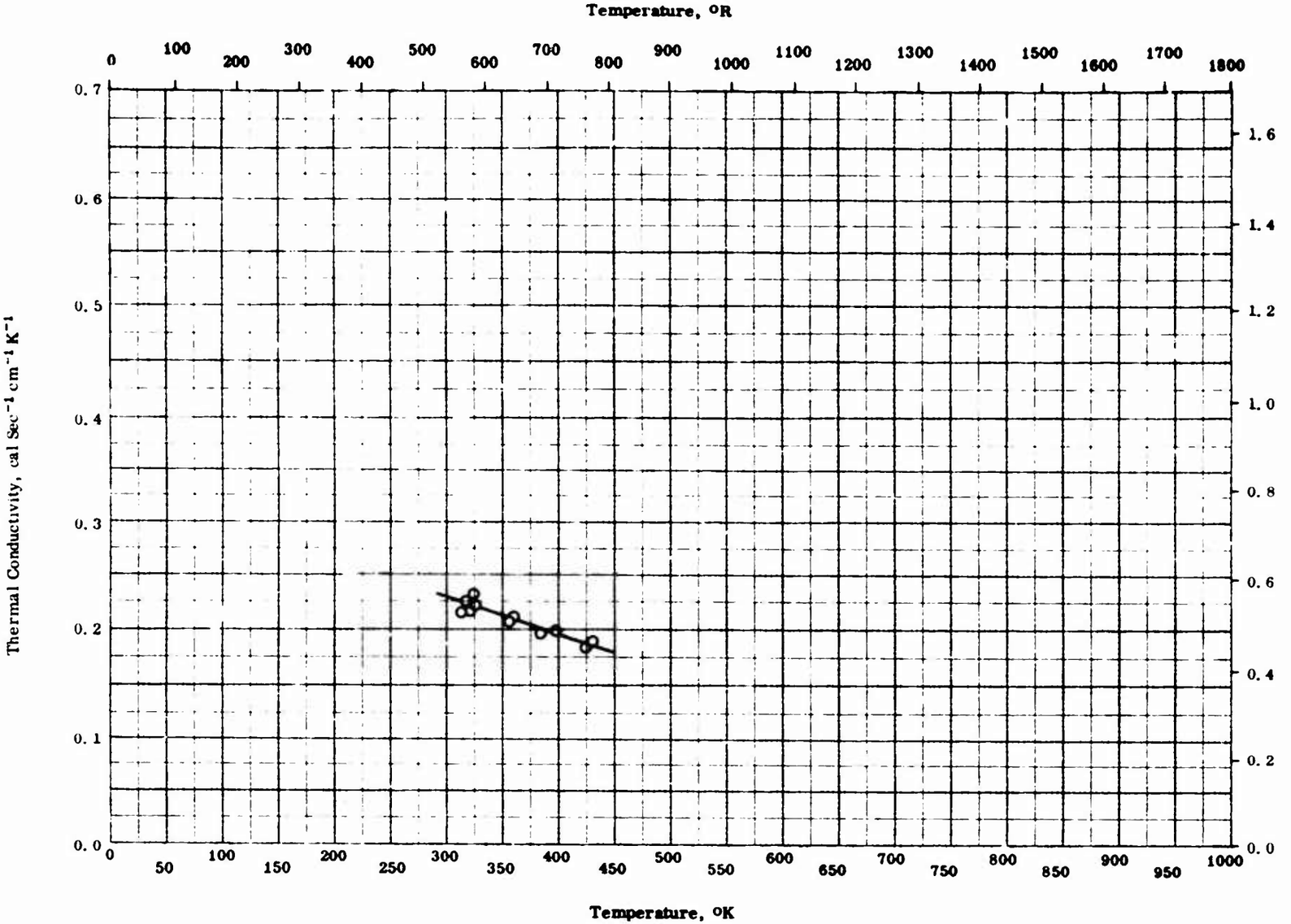


SPECIFIC HEAT -- COBALT

SPECIFIC HEAT -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	40-3	448-1673		99.95 Co, 0.01-0.06 Fe; density 551 lb ft^{-3}.	Deposited electrolytically.
□	50-6	273-753	1.0	0.01 % impurities.	Deposited electrolytically.
△	59-15	413-1073	1.0	Not given.	Sealed under argon atmosphere.

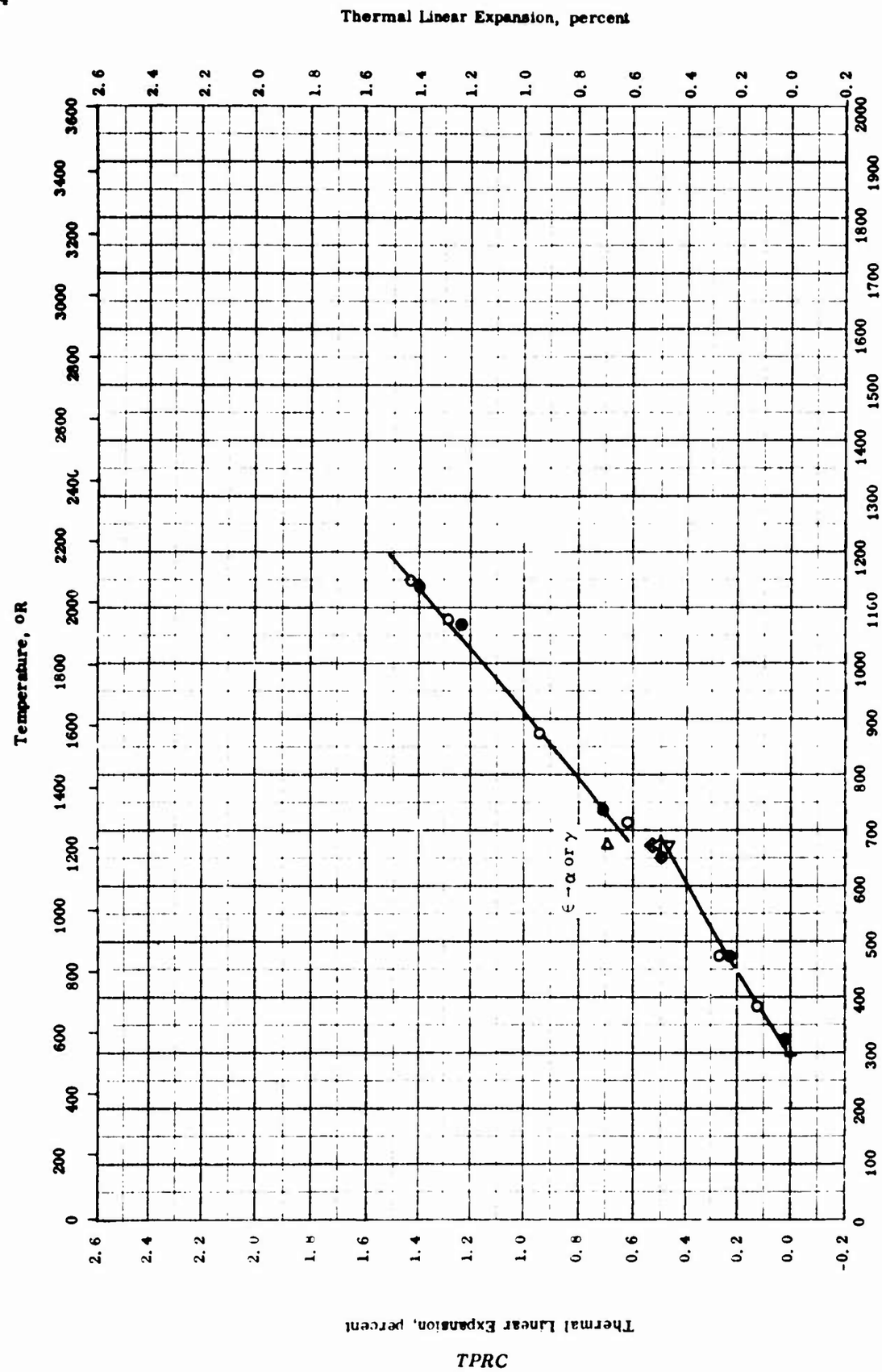


THERMAL CONDUCTIVITY -- COBALT

THERMAL CONDUCTIVITY -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	34-2	313-430		99.97 Co.	Machined.

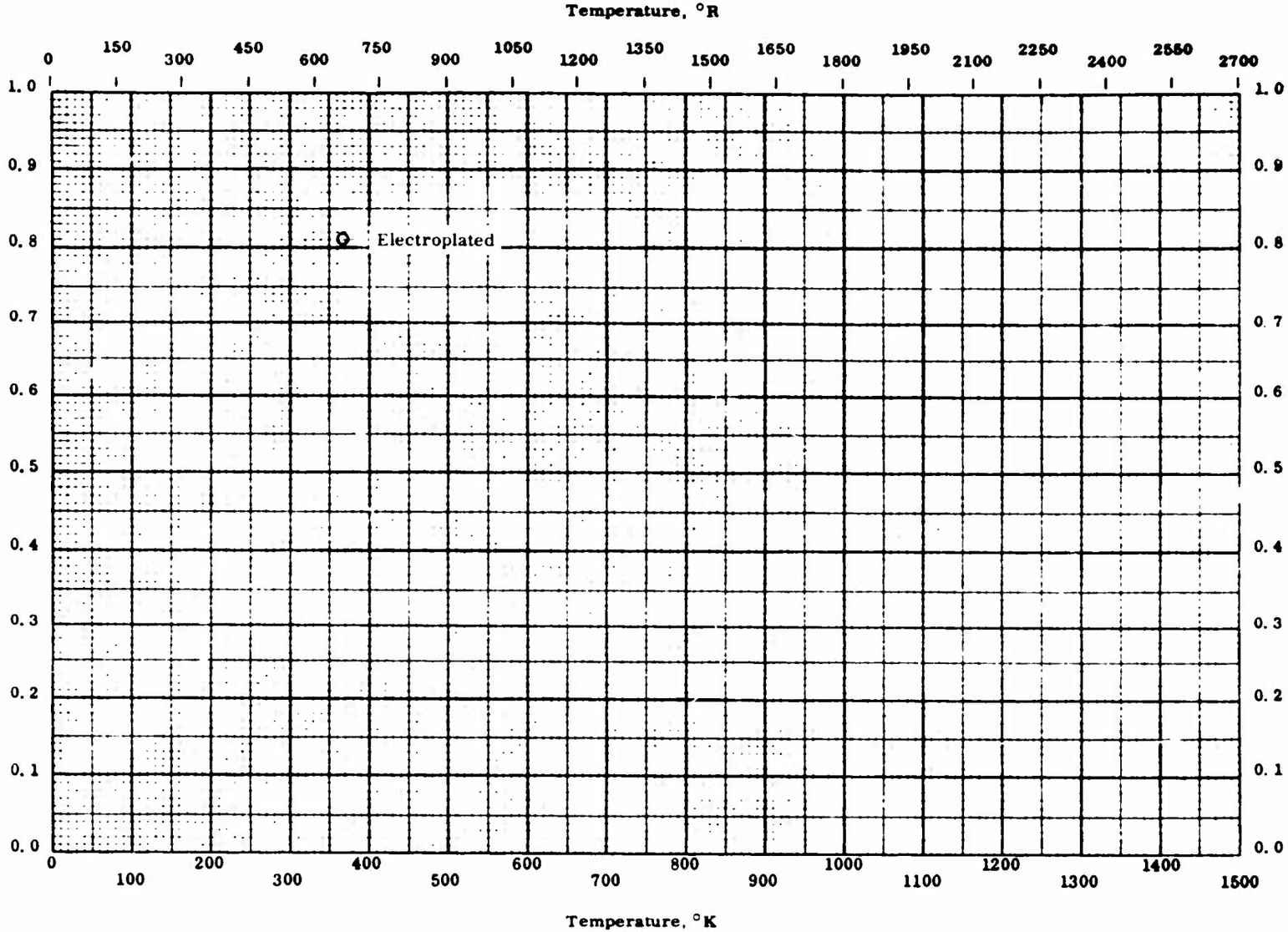


THERMAL LINEAR EXPANSION -- COBALT

THERMAL LINEAR EXPANSION -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	48-12	313-1148		99.9 Co (by diff.), 0.05 Fe, 0.04 Ni, 0.02 Si, trace of Mn, and nil C.	Induction melted in vacuum; swaged, annealed 1 hr at 900 C in H_2; cooled slowly; heating 200 C hr^{-1}.
●	48-12	323-1138		Same as above.	Cooling data of the above specimen; cooling ≤100 C hr^{-1}.
△	54-43	323-673		99.5 Co, 0.10 each Ni, Fe, and 0.02 Cu.	Degassed at 1200 C for 5 days; surface film removed electrolytically; average random direction.
◁	54-43	323-673		Same as above.	The above specimen; perpendicular to hexagonal axis.
▷	54-43	323-673		Same as above.	The above specimen; parallel to hexagonal axis.
◇	54-43	283-673		Same as above.	

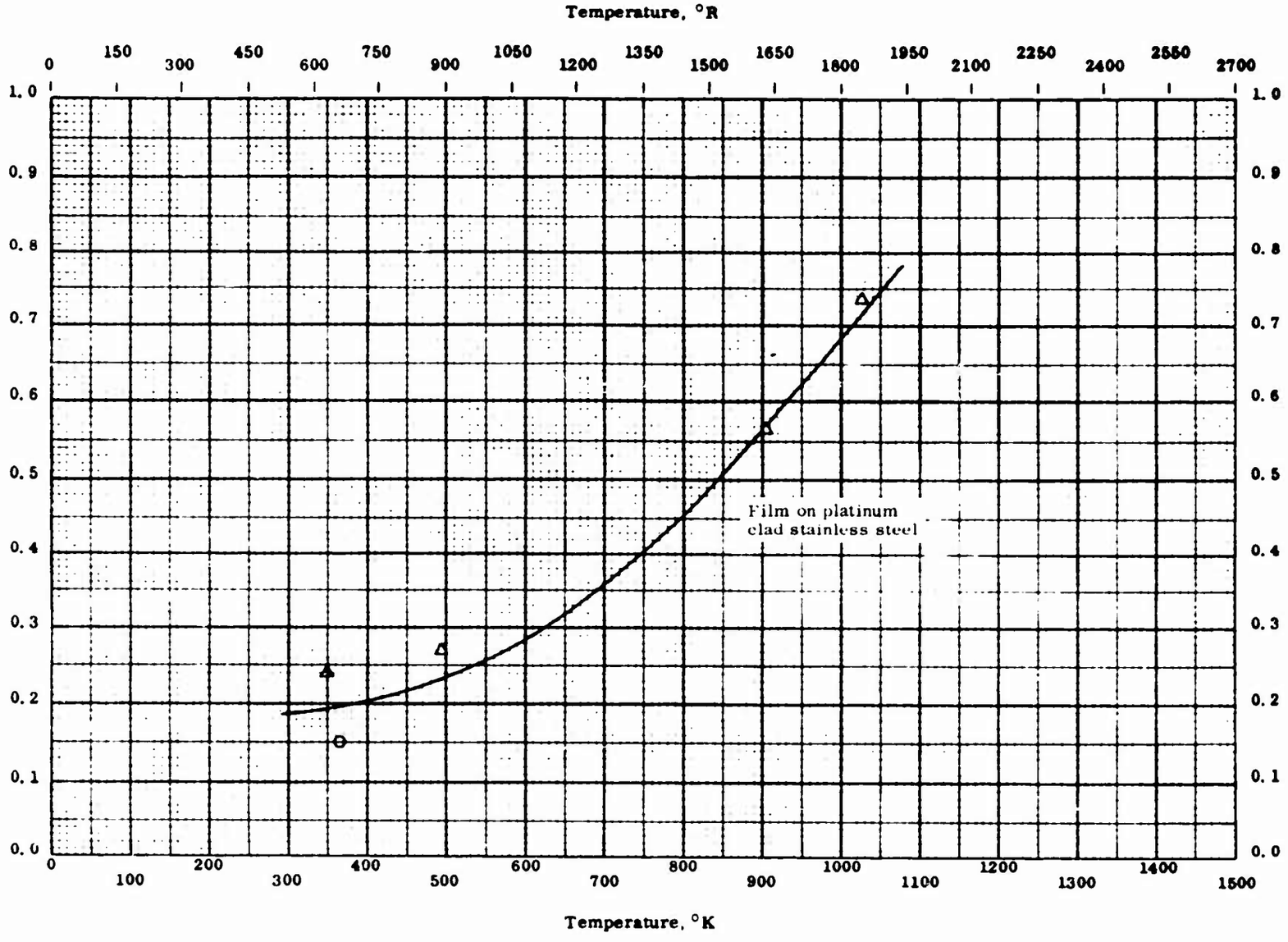


SOLAR ABSORPTANCE -- COBALT

SOLAR ABSORPTANCE -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-14	366	1.2	Thickness 0.0002 in.	Electroplated; measured in air.

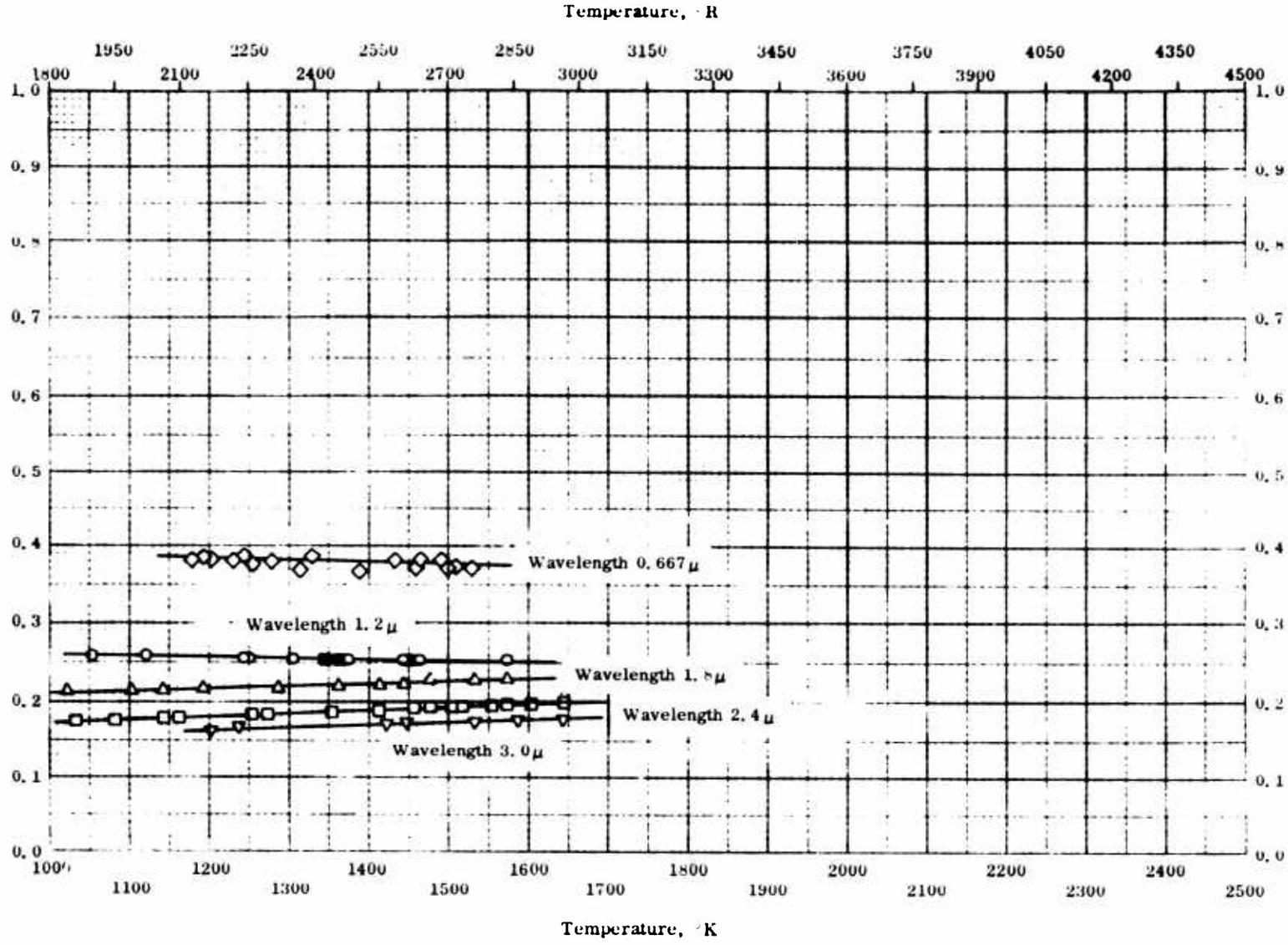


NORMAL TOTAL EMITTANCE -- COBALT

NORMAL TOTAL EMITTANCE -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-14	366		Thickness 0.0002 in.	Electroplated; measured in air.
△	62-14	350-1028		Cobalt film on platinum clad carpenter No. 20 stainless steel.	Measured in air.



TPRC

NORMAL SPECTRAL EMITTANCE -- COBALT

NORMAL SPECTRAL EMITTANCE -- COBALT

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-41	1.2	1053-1573	8	< 0.001 Fe, < 1.0 total impurities; [Author's design.: Specimen A]	Polished with emery paper down to grade 04, lapping with jeweler's rouge.
△	56-41	1.8	1023-1573	8	Same as above.	Same as above.
□	56-41	2.4	1033-1643	8	Same as above.	Same as above.
▽	56-41	3.0	1203-1643	8	Same as above.	Same as above.
◇	42-4	0.667	1180-1530		Prepared by electrolysis of chloride solution.	Baked at 623 K for 200 hrs.
■	52-13	1.2	1297-1451	5	Not given. [Author's design.: Sample 1].	Polished with 00 x 000 emery paper, washed with ether; measured in vacuum.

PROPERTIES OF COPPER

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	8.94	558
Melting Point	1356	2441
Heat of Fusion	32	57
Heat of Vaporization. . . .	1211_{1460K}	2179_{2628R}
Heat of Sublimation	1242_{1299K}	2236_{2339R}

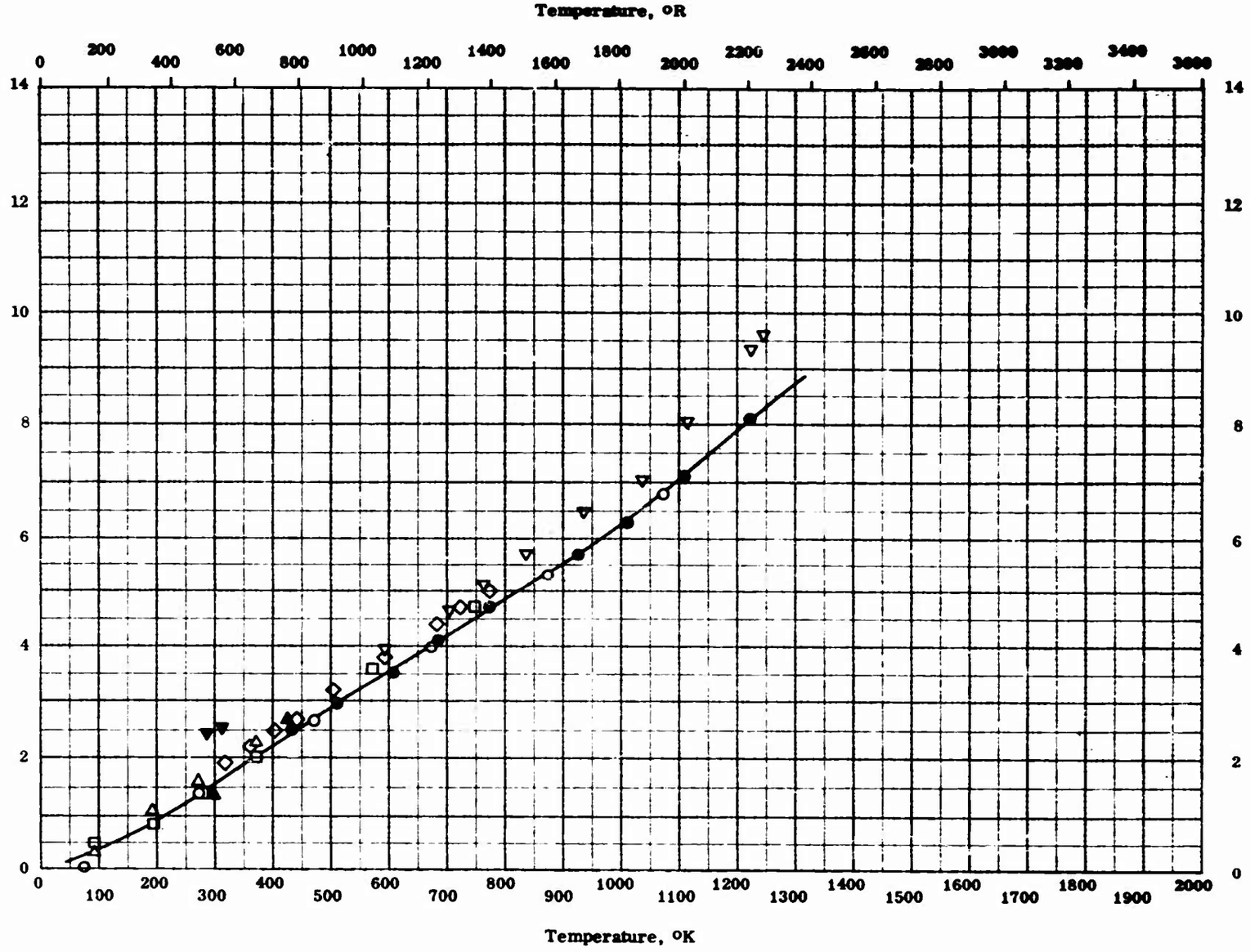
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	8.92	557
	◇	8.94	558
	▽	8.91	556
	●	8.929	557.4
	■	8.9528	558.91
	▲	8.90	555
	▼	8.93	557
Melting Point		K	R
	◆	1356	2441
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	▷	32	57
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	◀	1211_{1460K}	2179_{2628R}
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	△	1242_{1299K}	2236_{2339R}
	◁	1276_{0K}	2296_{0R}
	□	1263_{0K}	2273_{0R}

PROPERTIES OF COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3	297		Electrolytic tough pitch; Fed. Spec. QQC-502.	Density by weight and volume.
□	53-13	0		99.977 Cu. 0.01 > each Si and Al, 0.001 > each Ca, Mg, and Fe, 0.0005 > Ag.	Δh_s from vapor pressure data.
△	53-14	1299		99.99 Cu; oxygen free.	Δh_s from vapor pressure data.
◁	53-14	0		Same as above.	Same as above.
◀	53-14	1460		Same as above.	Δh_v from vapor pressure data.
▷	53-14	—		Same as above.	$\Delta h_f = \Delta h_s - \Delta h_v$.
◇	56-47	298		0.0005 Fe, 0.0001 Ni, 0.0001 Pb, 0.0001 > Ag, 0.00005 > each As, Mn, and Sb, and 0.00001 > each Bi and Sn.	
▽	58-1	297		Electrolytic tough pitch; Fed. spec. QQC-502.	Cold-drawn; density by water displacement.
●	57-55	293		Not given.	Density from weight in air and in water.
■	41-6	298		99.96 pure; single crystal.	Standard temperature sample of Bureau of Standards, melted and solidified 5 days in N_2.
▲	57-50	298		Commercial coalesced Cu; 0.0013 O_2, 0.0005> each Fe, As, Sb, and Sn; 0.0001 > each Te, Ag, Bi, 0.0008 Pb, and 0.0007 Ni.	
▼	57-59	298		Electrolytic Cu.	
◆	49-23	1356		Electrolytic Cu.	M. P.; break in time and temperature curve.



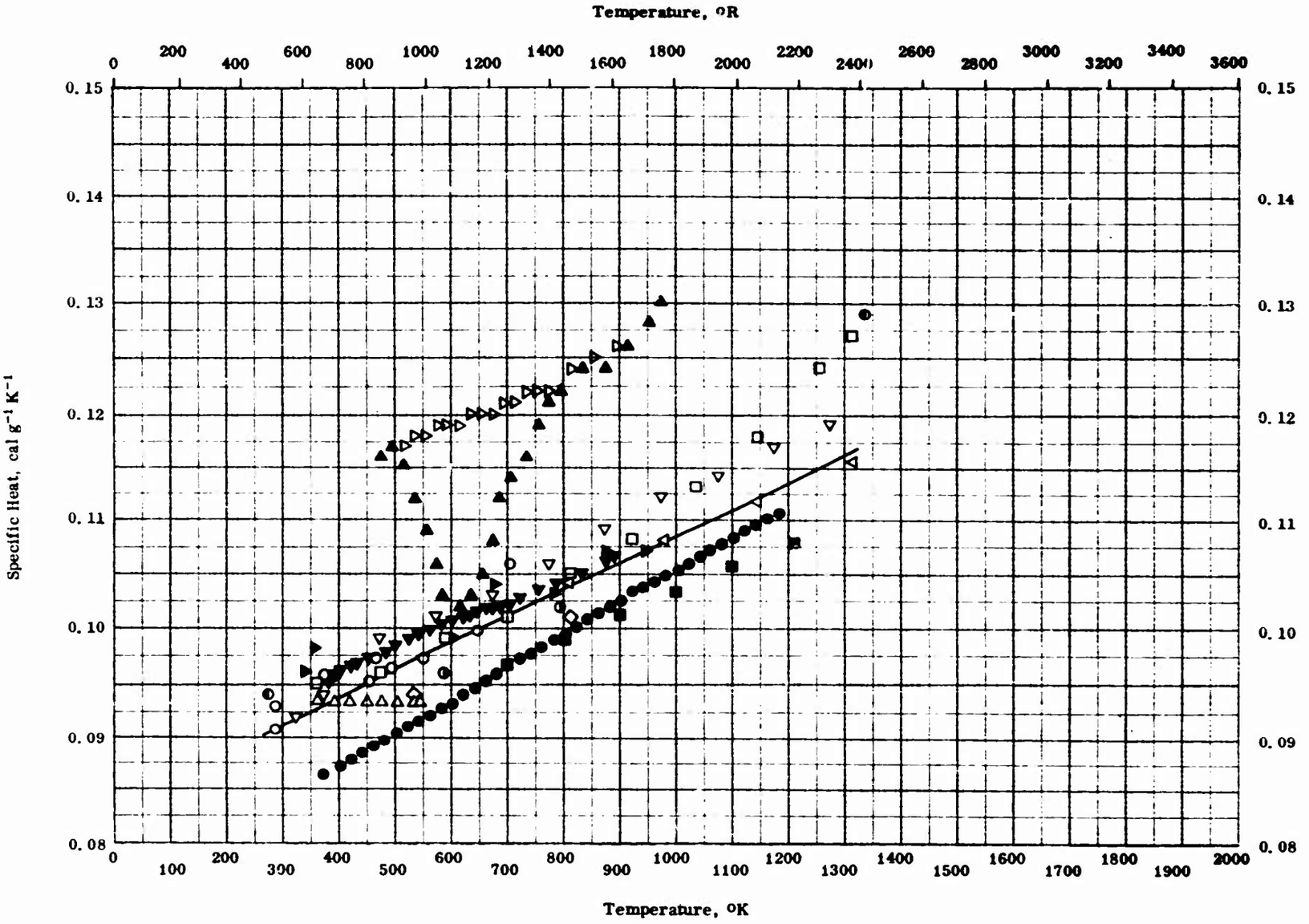
ELECTRICAL RESISTIVITY -- COPPER

TPRC

ELECTRICAL RESISTIVITY -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-19 also 55-23	73-1073		99.99 pure.	
△	52-8	91-373		Pure; < 0.01 Cd, Pb, Ag, Si and << 0.01 Mg, Fe.	Resistivity measured at drawing temp. of wire.
◇	56-5	320-773		99.99 pure.	Normalized.
▽	44-1	597-1245		Polycrystalline.	
□	56-33	73-773		99.99 pure.	Homogenized 24 hrs at 900 C, swaged to 0.030" dia. and annealed 1 hr at 500 C.
●	54-22 also 54-23	437-1222		99.999 pure.	Author reports relative values; set r = 2.72×10^{-6} ohm-cm at 787 R.
▲	57-30	298-423		Not given.	Resistivity measured on 100 micron diameter wires; author reported relative values; computed resistivity based on 1.6×10^{-6} ohm cm at 537 R.
▼	56-34	288-313		0.115 Fe, 0.008> Mg, 0.004> Si, 0.001> each of others.	

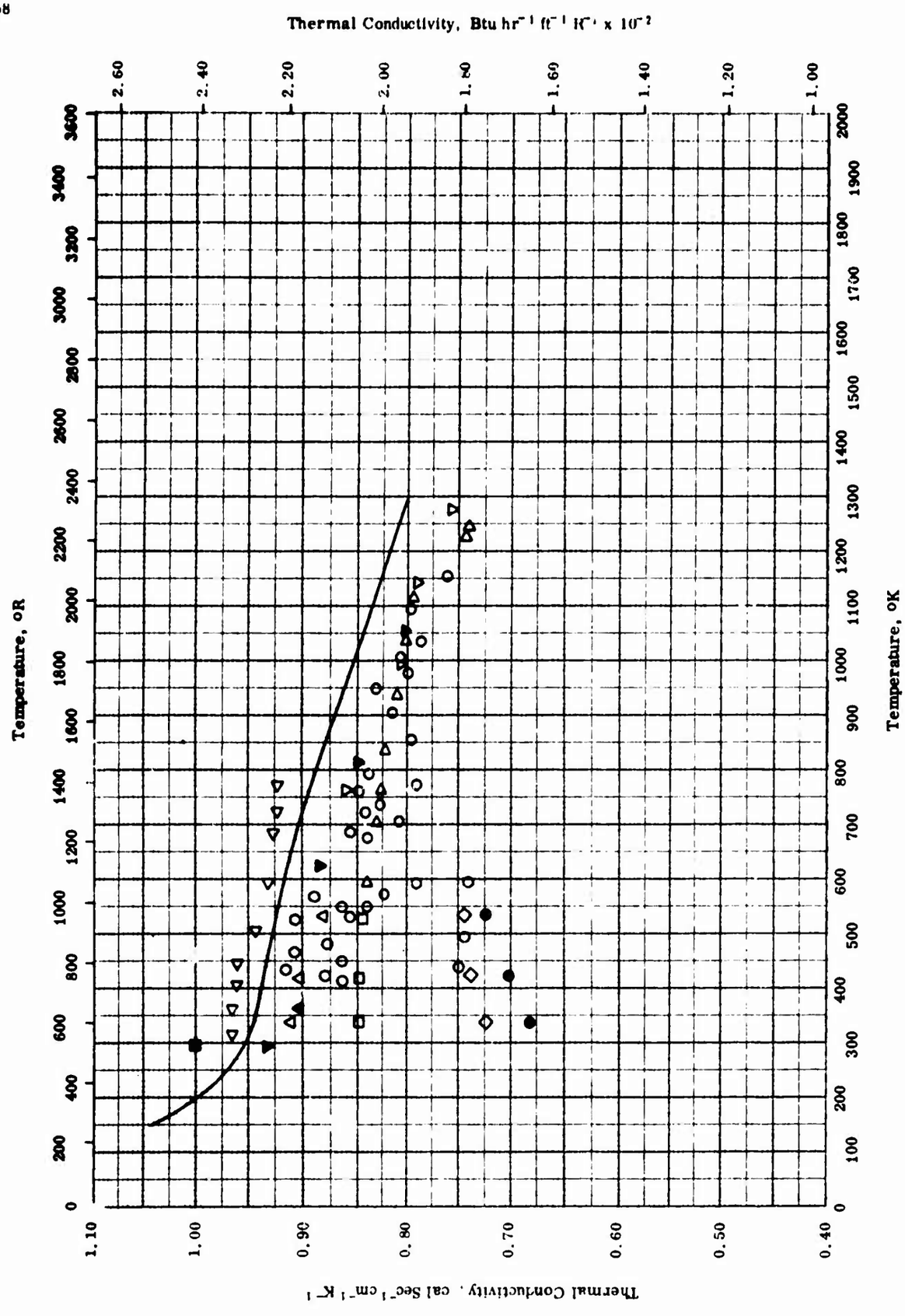


SPECIFIC HEAT -- COPPER

SPECIFIC HEAT -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-3	288-701		Not given.	
□	58-1	366-1310		Electrolytic tough-pitch; density 410 lb ft^{-3} at 75 F.	Cold drawn; under helium atmosphere.
△	61-28	367-545		Not given.	Calibration specimen.
◇	62-7	533-1088	<5.0	Electrolytic copper.	
▽	59-17	323-1273	1.0	99.9 Cu.	
▼	56-22	363-883	±0.5	99.99 Cu; major metallic impurities Ag, Fe.	
▲	62-20	473-973		99.8 Cu; powder compact.	Reduced for 3 hrs at 250 C in dry purified hydrogen steam; heated under 10^{-4} mm Hg vacuum at 400 C until degassing from powder is completed; first heating.
▷	62-20	513-973		99.8 Cu; powder compact.	Same as above; second heating.
◁	56-4	811-1311		QQC 576; electrolytic tough pitch; density 551.4 lb ft^{-3}.	
■	61-6	690-1210		Not given.	Specimen's surface plated with platinum black.
▶	58-16	337-946		Not given.	
◑	48-3	589-794		99.92 Cu.	
◐	56-3	273-1338		QQC 502; electrolytic tough pitch.	
●	54-12	373-1183		Not given.	

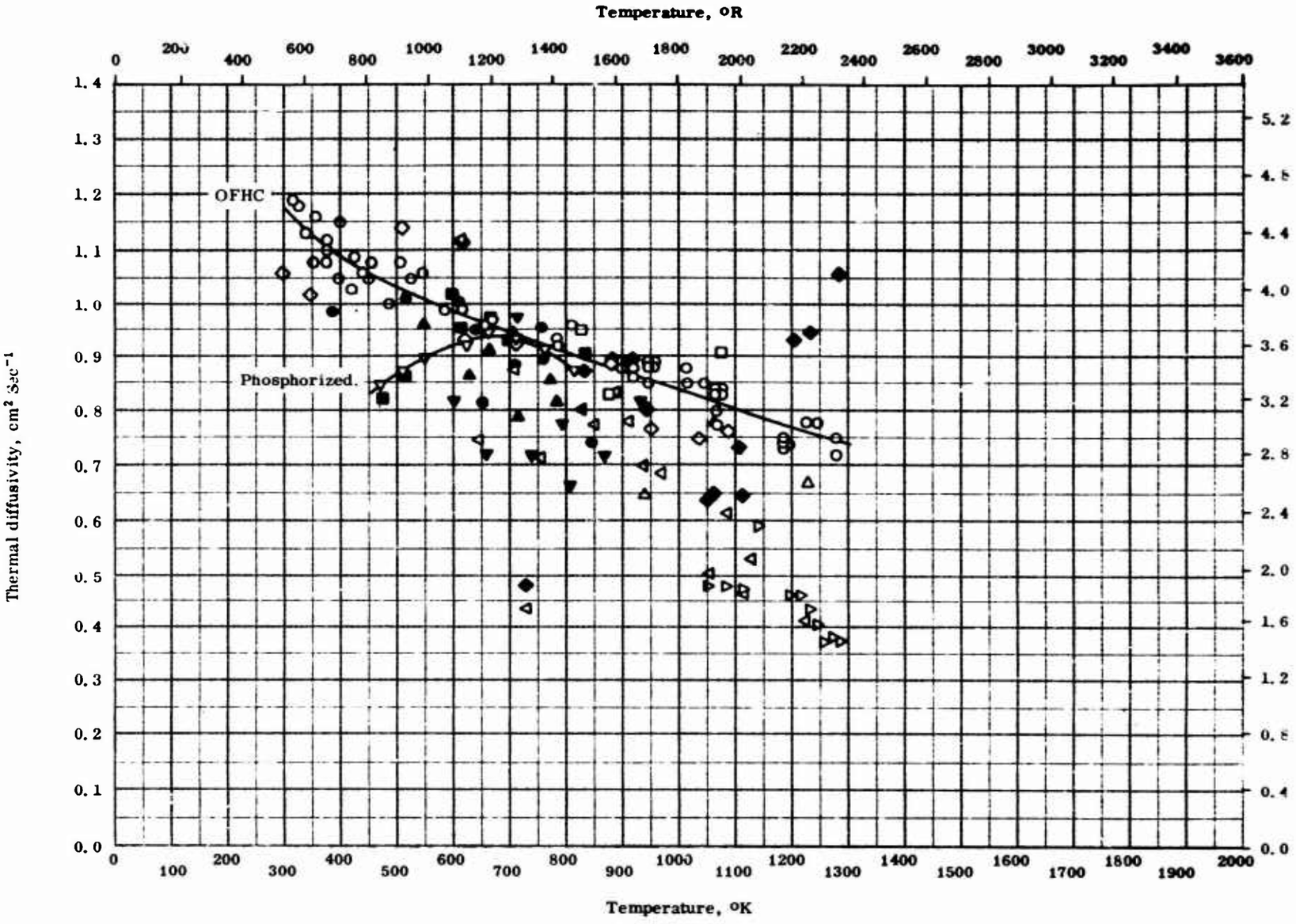


THERMAL CONDUCTIVITY -- COPPER

THERMAL CONDUCTIVITY -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3	413-1157	±10	Electrolytic tough pitch; Fed. Spec. QQC - 502.	Cold drawn.
□	52-1	339-533	±5	Electrolytic tough pitch; 0.0015 Fe, 0.011 ±0.001 P.	
△	56-4	339-533	±5	Oxygen free, high conductivity.	
▽	56-4	764-1278	±5	Electrolytic tough pitch; Fed. Spec. QQC - 576; density 551.4 lb ft^{-3}.	
◁	56-5	320-773		99.99 Cu.	Normalized.
▷	44-1	597-1245		Polycrystal.	Prepared from electrolytic tough pitch copper.
◇	52-1	339-533	±5	0.061 ±0.001 Fe and 0.016 ±0.002 P.	
●	52-1	339-533	±5	0.089 ±0.003 Fe and 0.015 ±0.002 P.	Same as above.
■	61-4	295	±5	OFHC; density (at 20 C) 8.96 g cm^{-3}.	
▲	60-4	363		Commercial grade.	Average of four runs.
▼	58-4	293-1053	3	99.9 Cu.	

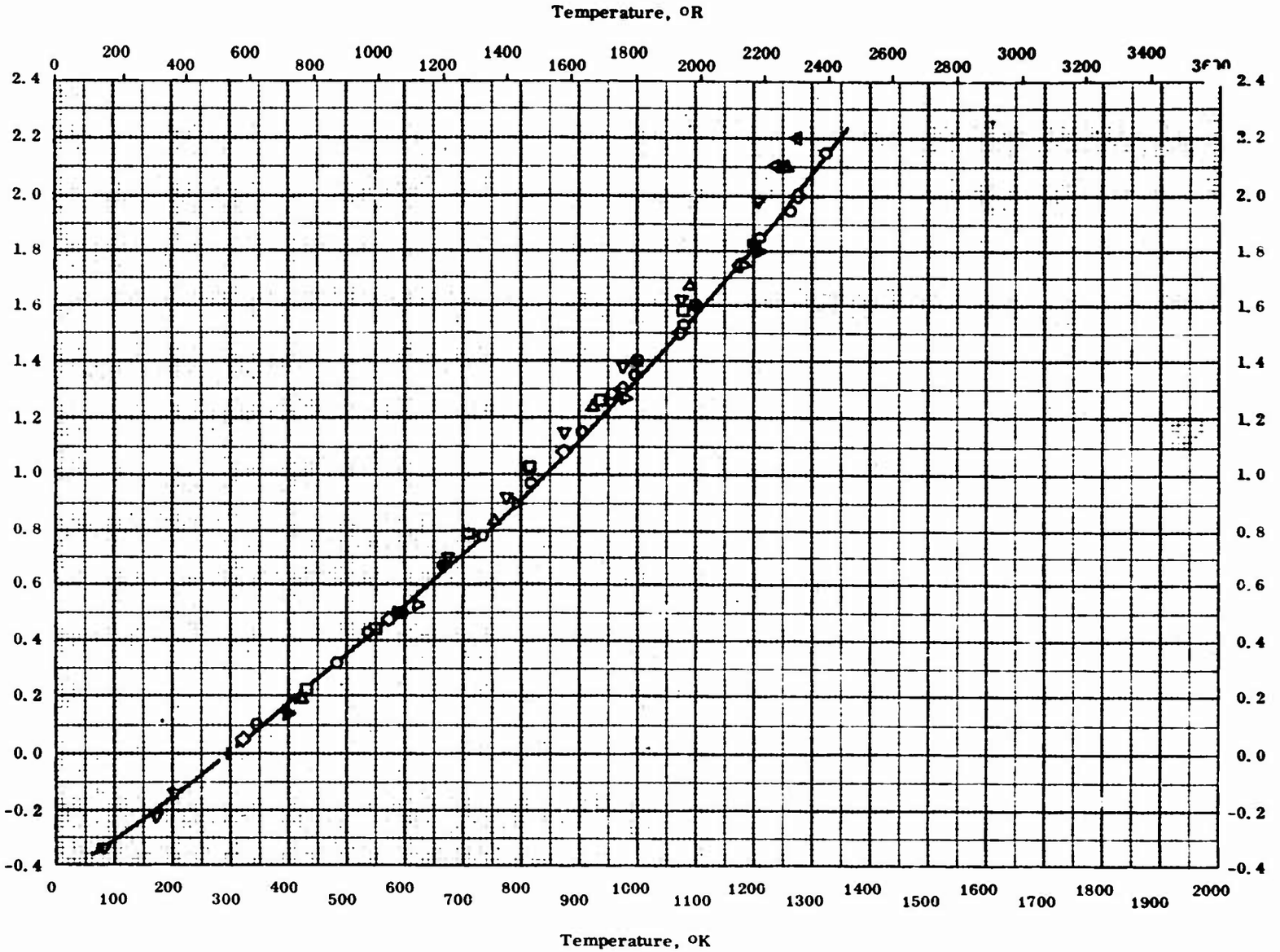


THERMAL DIFFUSIVITY -- COPPER

THERMAL DIFFUSIVITY -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-1	313-1278		OFHC, absolute oxygen content unknown.	
□	57-1	823-1073		OFHC (Author's design.: A)	Subjected to a large number of measurements prior to this test; exposed to radiation and followed by cooling.
△	57-1	938-1228		OFHC (Author's design.: B)	Subject to less extensive prior treatment and prepared from a different stock from the above sample; exposed to radiation and followed by cooling.
▽	56-1	469-813		99.9 Cu.	Phosphorized.
◇	60-1	295-1087	10	99.48 Cu, 0.1 Be, 0.1 Co, 0.1 Mg, 0.1 Si, 0.1 Sn, 0.01 Cr, traces As, B, Fe, P, and Sb.	Heated to 600 C for several times.
▷	58-2	1050-1284	±10	Cylindrical specimen with 1.0 cm in dia and 4.5 cm in length.	Machined; under the assumption of perfect insulation.
◁	58-2	611-1223	±10	Same as above	Second run of above sample under the same assumption.
◆	58-2	611-1283	±10	Same as above	Third run of above sample after corrections made for lateral heat loss.
●	60-2	383-845		Disc of 0.65 cm in dia and 0.202 cm in thickness.	
▲	60-2	547-782		Disc of 0.65 cm in dia and 0.254 cm in thickness.	
■	60-2	473-832		Disc of 0.65 cm in dia and 0.305 cm in thickness.	
▼	60-2	600-930		Disc of 0.65 cm in dia and 0.364 cm in thickness.	



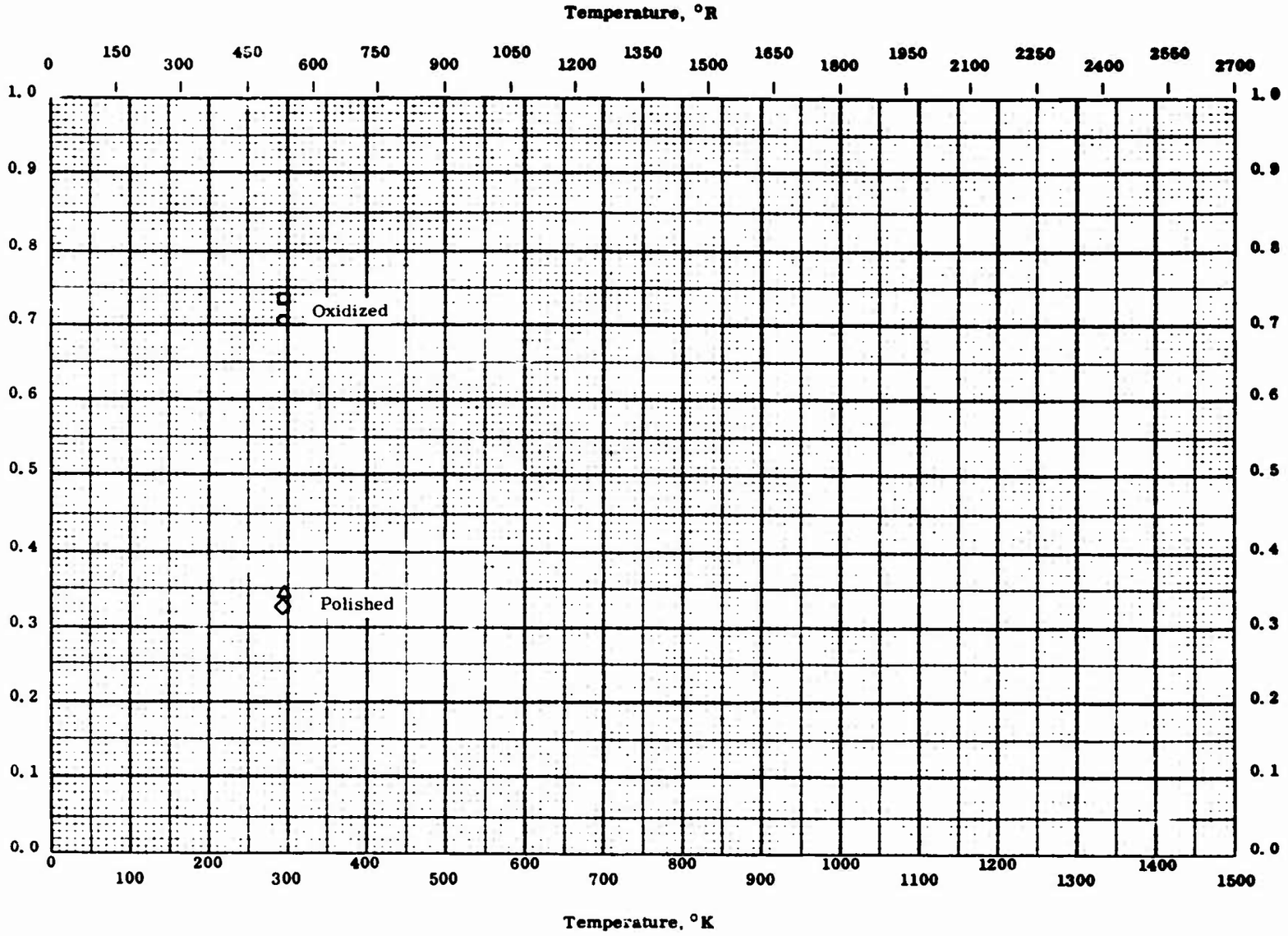
THERMAL LINEAR EXPANSION -- COPPER

TPRC

THERMAL LINEAR EXPANSION -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-4	352-1324		Electrolytic tough pitch; Fed. Spec. QQC-576; density 551.4 lb ft^{-3}.	
●	56-4	594-1324		Same as above.	Cooling data of above specimen.
△	56-3	293-1256		Electrolytic tough pitch; Fed. Spec. QQC-502.	Max. heating rate 5 F min^{-1}.
□	59-26	290-1256		Electrolytic tough pitch.	
▽	41-10	83-1207		High purity; bus bar type.	Measured in hydrogen atmosphere.
◇	41-8	273-1273		Electrolytic.	Annealed at 1020 C.
◁	57-55	293-1273		Not given.	
▷	56-62	293-1208	±1	99.999 pure.	Measured in helium atmosphere.

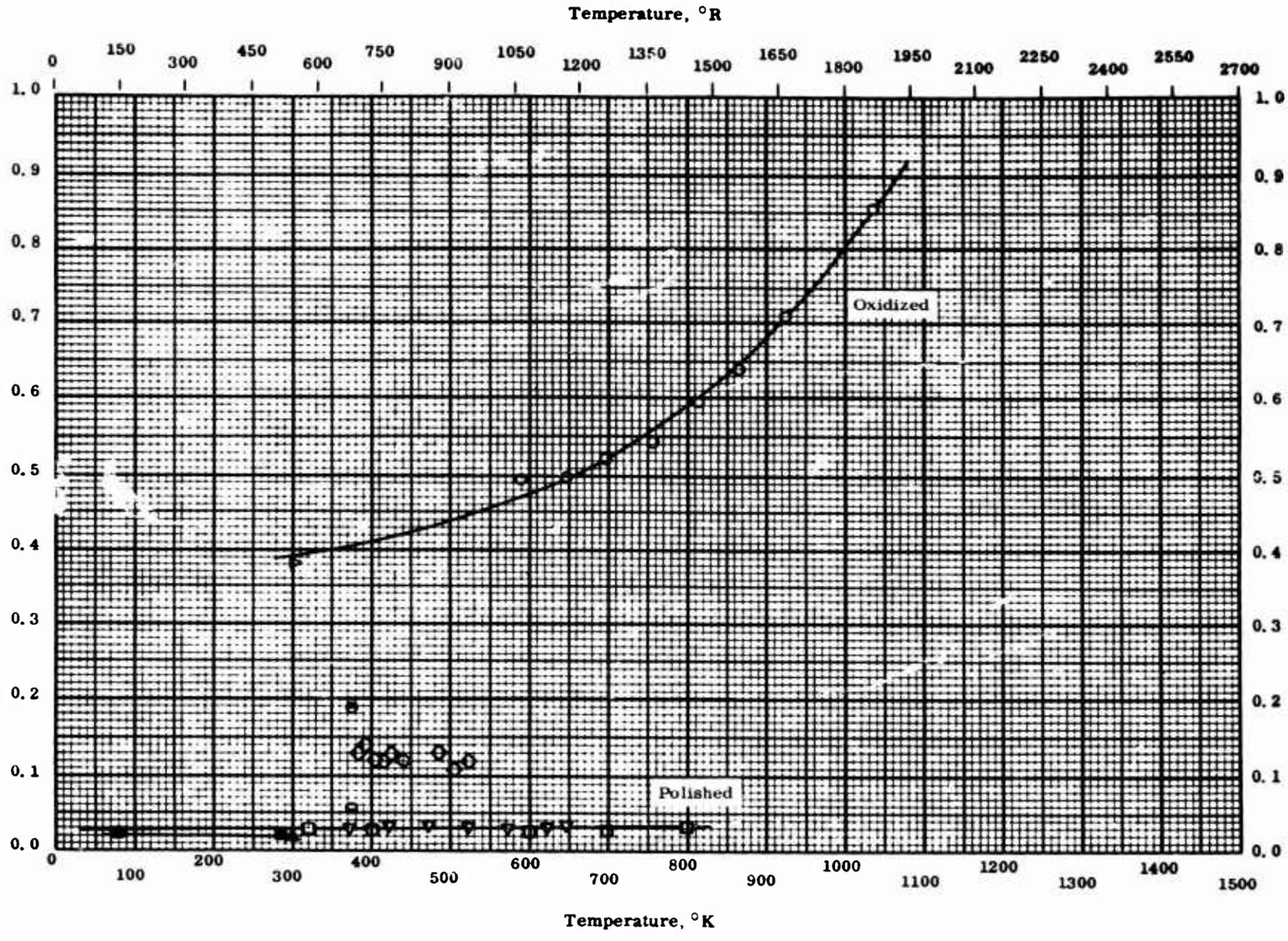


SOLAR ABSORPTANCE -- COPPER

SOLAR ABSORPTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	298		Electrolytic, tough pitch, Fed. Spec. QQ-C-576 or QQ-C-502.	Oxidized in air at red heat for 30 min.; above atmosphere.
□	57-41	298		Same as above.	Same as above; sea level.
△	57-41	298		Same as above.	Polished with fine polishing compounds on a buffing wheel; above atmosphere.
◇	57-41	298		Same as above.	Same as above; sea level.



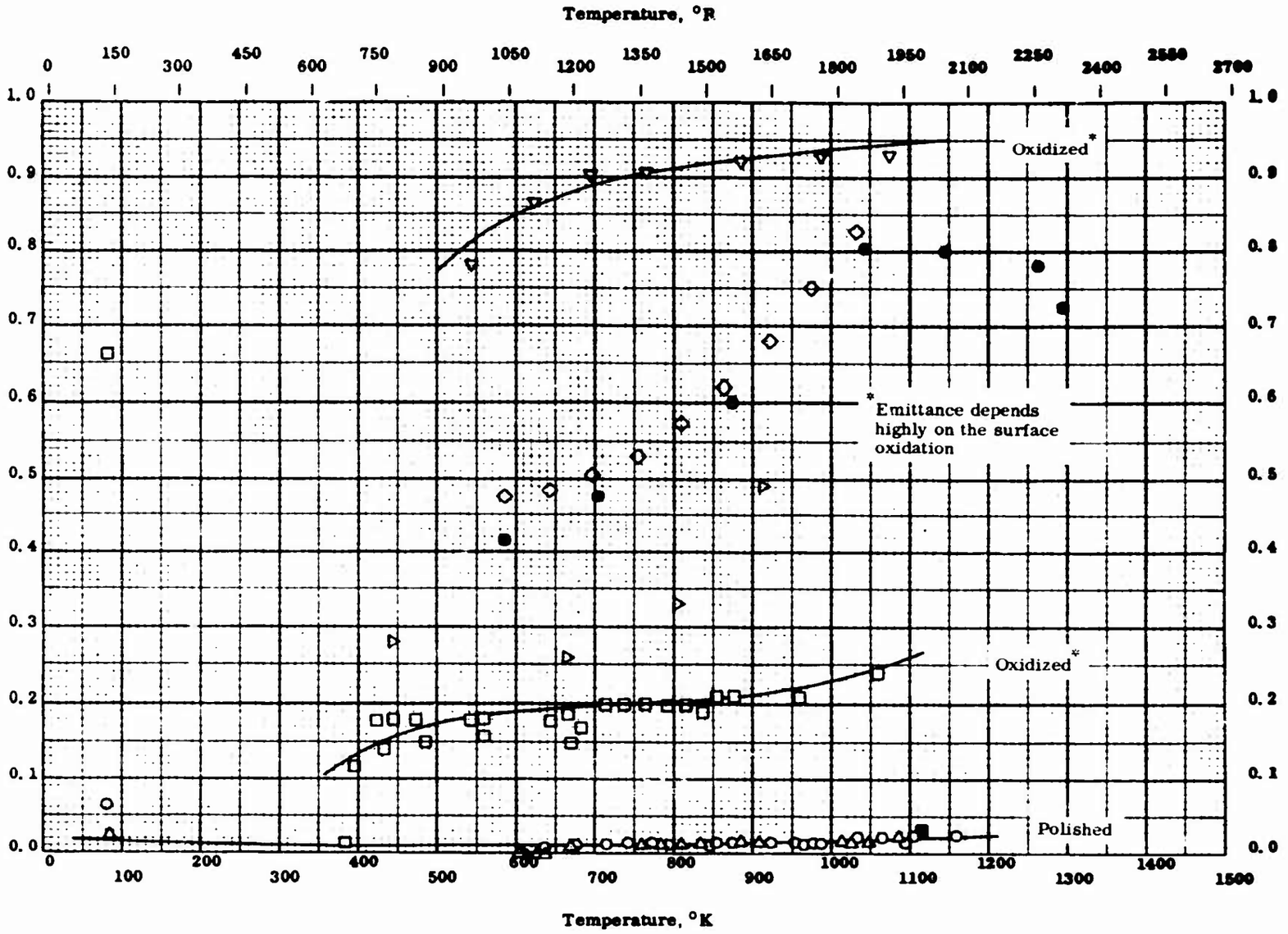
TPRC

HEMISPHERICAL TOTAL EMITTANCE -- COPPER

HEMISPHERICAL TOTAL EMITTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-19	589-1033	>2	Not given.	Stably oxidized in quiescent air at 1033 K; calculated by using integral method.
△	55-35	300	± 20	Not given.	Polished; measured in vacuum (3×10^{-6} mm Hg).
▷	48-7	300		Same as above.	Oxidized and corroded.
□	62-41	320-800		Pure.	Electropolished; measured in vacuum.
▽	49-12	373-648	< 5	Not given.	Polished to ~5 μ, rinsed with distilled water and alcohol, and dried in a stream of nitrogen; measured in vacuum; data taken from smooth curve.
◇	62-43	384-524	± 3	Not given.	Polished; measured in vacuum (10^{-3} mm Hg); data taken from smooth curve.
◓	63-23	373±10		Electrolytic copper.	Prefinished with 600 grit silicon carbide paper, sandblasted; measured in vacuum (10^{-5} mm Hg).
◒	63-23	373±10		Same as above.	Same as above; after 9.85×10^{20} ions cm^{-2} hydrogen ion bombardments.
■	63-26	80-295	± 2.5	Not given.	Mechanically polished; measured in vacuum ($\leq 2 \times 10^{-5}$ mm Hg).

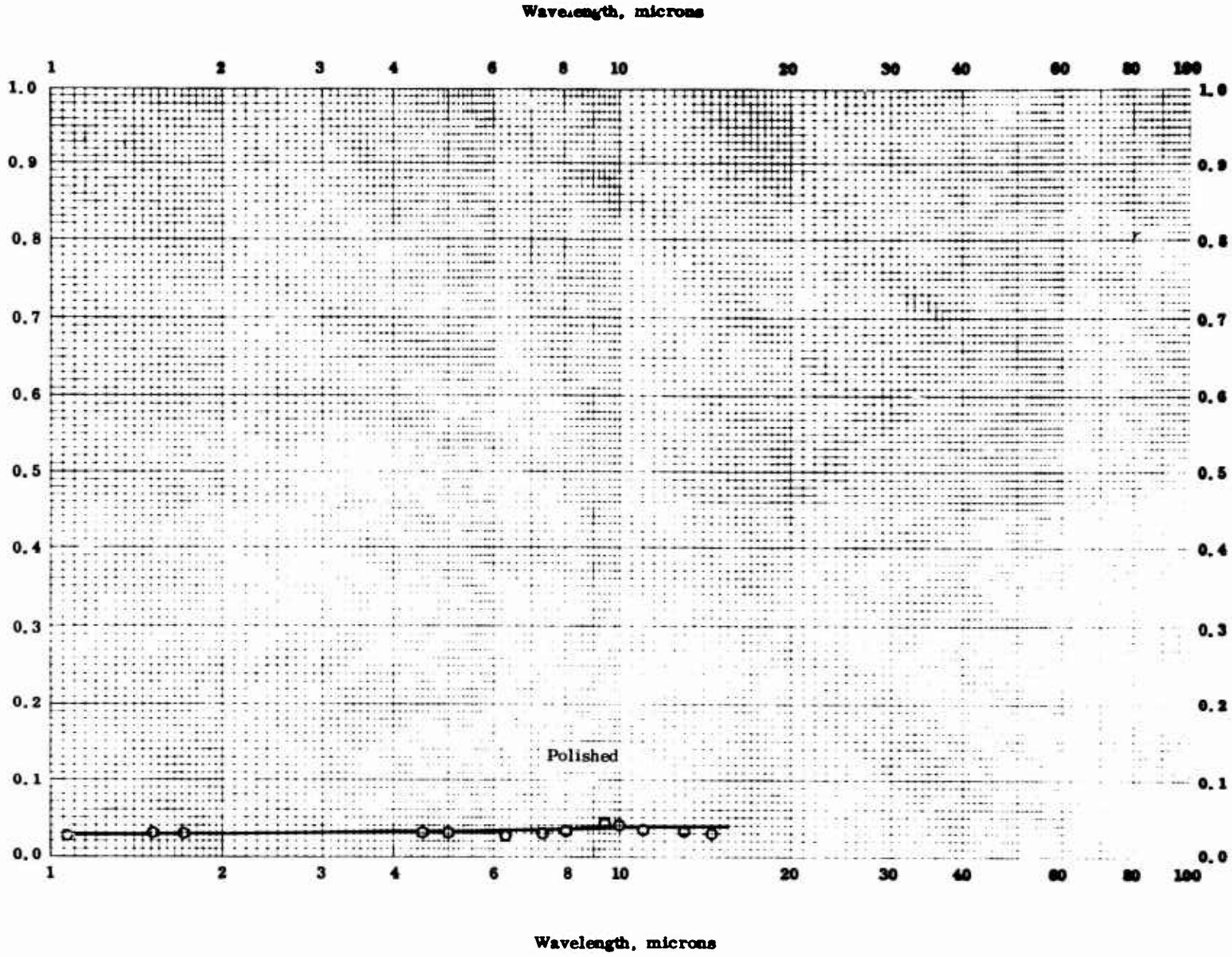


NORMAL TOTAL EMITTANCE -- COPPER

NORMAL TOTAL EMITTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	83-1161	± 10	Electrolytic, tough pitch; Fed. Spec. QQ-C-576 or QQ-C-502.	As received; measured in vacuum (5×10^{-4} mm Hg).
△	57-41	89-1089	± 10	Same as above.	Polished with fine polishing compounds on a buffing wheel, measured in vacuum (5×10^{-4} mm Hg).
□	57-41	83-1061	± 10	Same as above.	Oxidized in air at red heat for 30 min.; measured in vacuum (5×10^{-4} mm Hg)
▽	58-20	544-1072		Not given.	Oxidized.
▷	56-42	445-913	± 11	Electrolytic, tough pitch; Fed. Spec. QQ-C-576 or QQ-C-502.	Oxidized in air at 922 K for 30 min.; measured in air.
◇	58-19	589-1033	> 2	Not given.	Polished test strips oxidized at 1033 K for 40 min.
■	63-28	1111		Not given.	Mechanically polished, heated in air at 450 K for 3 hrs, 922 K for 3 hrs, kept at 1242 K in vacuum for 45 hrs; calculated from spectral data.
●	63-31	587-1297	± 10	[Author's design. · No. 1]	Smooth surface.

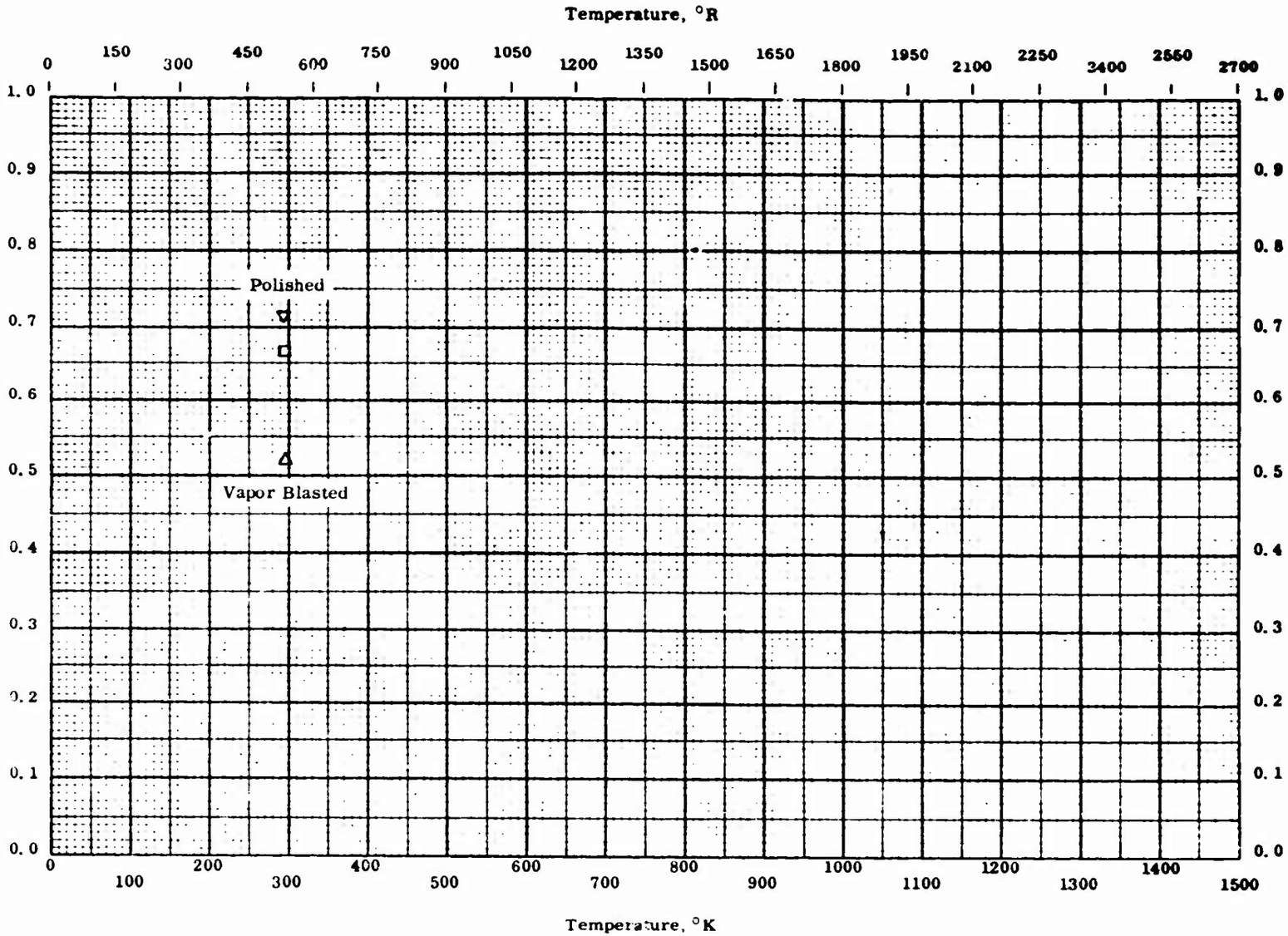


NORMAL SPECTRAL EMITTANCE -- COPPER

NORMAL SPECTRAL EMITTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	63-28	1242	1.06-14.50		Not given.	Mechanically polished, heated at 450 K in air for 3 hrs, 922 K for 3 hrs, and kept at 1242 K in vacuum for 45 hrs.

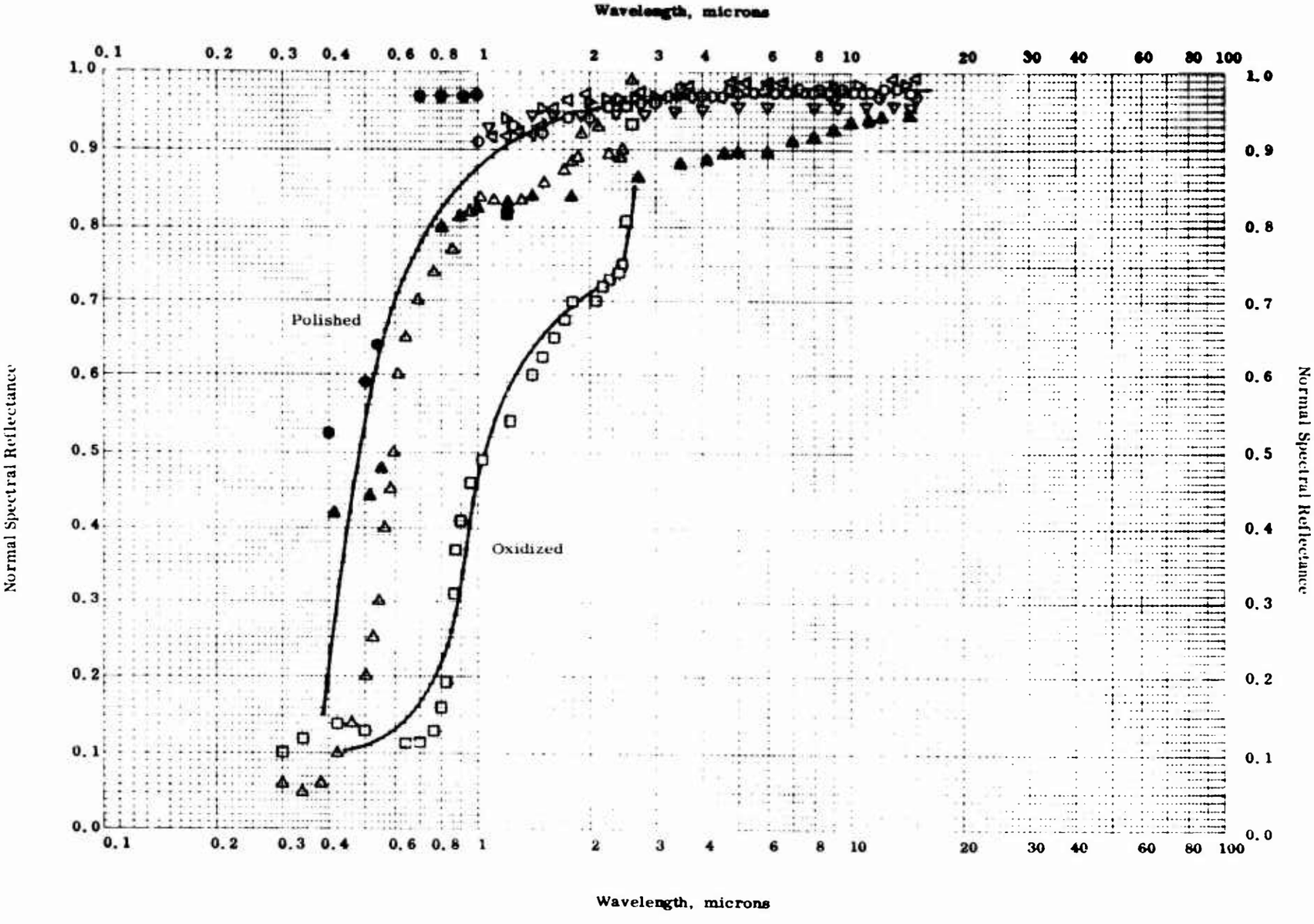


NORMAL TOTAL REFLECTANCE -- COPPER

NORMAL TOTAL REFLECTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-16	298		DS 1433 (British Aircraft material specification).	Turned, exposed to indoor atmosphere for one month; normal illumination, hemispherical viewing.
□	64-16	298		Same as above.	Same as above; turned, freshly prepared.
△	64-16	298		Same as above.	Same as above; vapor blasted, 400 mesh alumina nozzle pressure 70 psi, freshly prepared.
▽	53-29	298		Electrolytic.	Metallographically polished; calculated from spectral data.



NORMAL SPECTRAL REFLECTANCE -- COPPER

NORMAL SPECTRAL REFLECTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	54-24	298	1-15	±2.2	Commercial grade.	Polished with a soft rag, washed in acetone and ethyl alcohol; hemispherical illumination, 5 degree viewing.
△	57-41	298	0.30-2.60	±4	Electrolytic, tough pitch, Fed. spec. QQ-C-576 or QQ-C-502.	Polished with fine polishing compounds on a buffing wheel; data taken from smooth curve; $MgCO_3$ as reference standard; 6 - 9 degrees illumination, h viewing.
□	57-41	298	0.30-2.60	±4	Same as above.	Same as above; oxidized in air at red heat for 30 min.
▷	63-28	294	1.19-14.00		Not given; 0.02μ surface roughness.	Mechanically polished; measured in air; hemispherical illumination, 7 degree viewing.
◁	63-28	294	1.10-15.00		Same as above.	The above specimen heated in air at 450 K for 3 hrs.
▽	63-28	294	1.07-14.46		Same as above.	The above specimen heated in air at 1242 K for 3 hrs.
●	62-48	294	0.40-2.00		Not given.	Electropolished; normal illumination, hemispherical viewing.
▲	62-48	294	0.41-14.20		Same as above; surface roughness 1.25μ.	Roughened with sand paper; normal illumination, hemispherical viewing.

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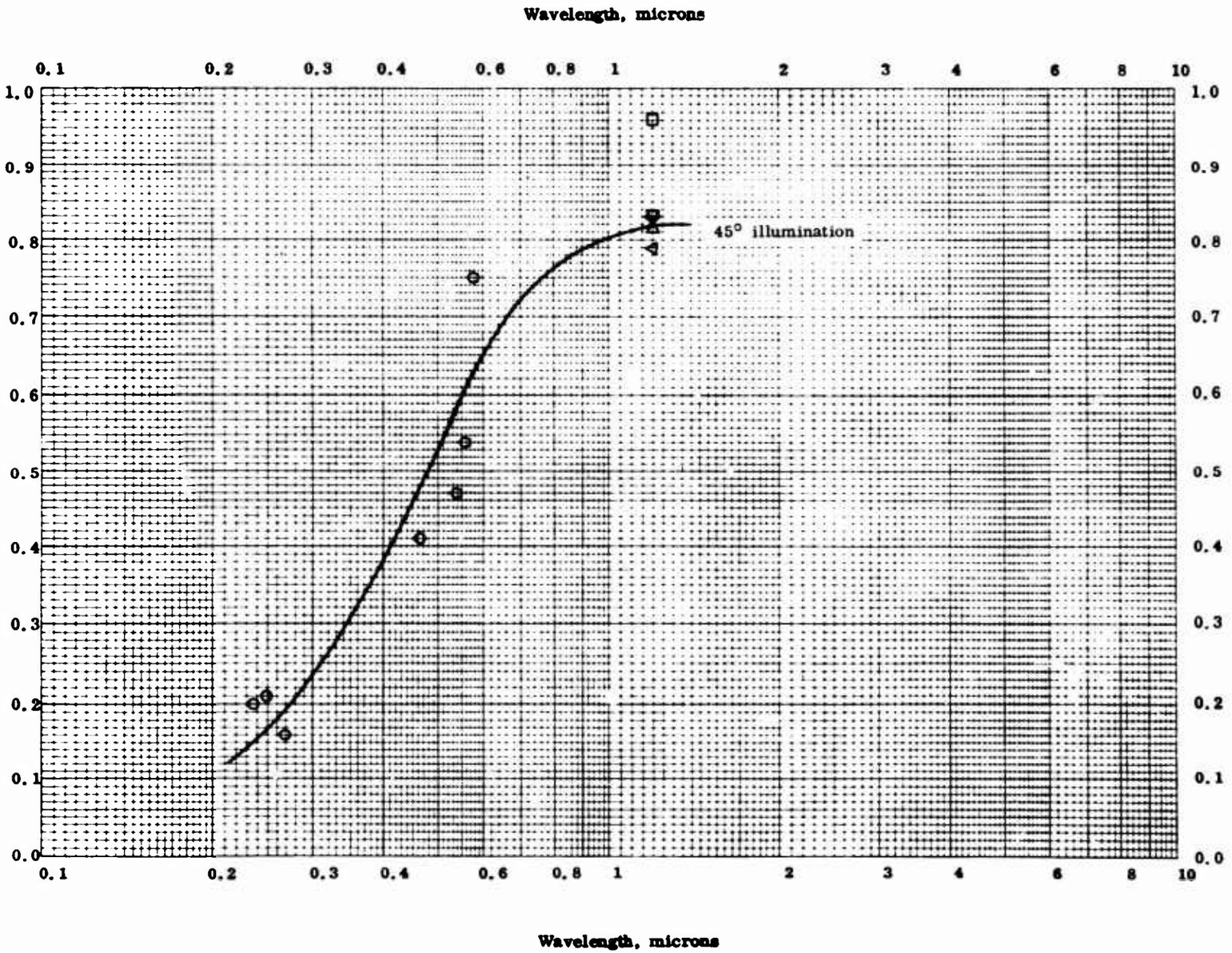
NORMAL SPECTRAL REFLECTANCE -- COPPER (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
■	60-43	298	1.2		Not given.	Roughened by a grid of grooves of 45 degree opening angle, 127μ deep, surface appeared as an array of pyramids; MgO as reference standard; normal illumination, hemispherical viewing.

TPRC

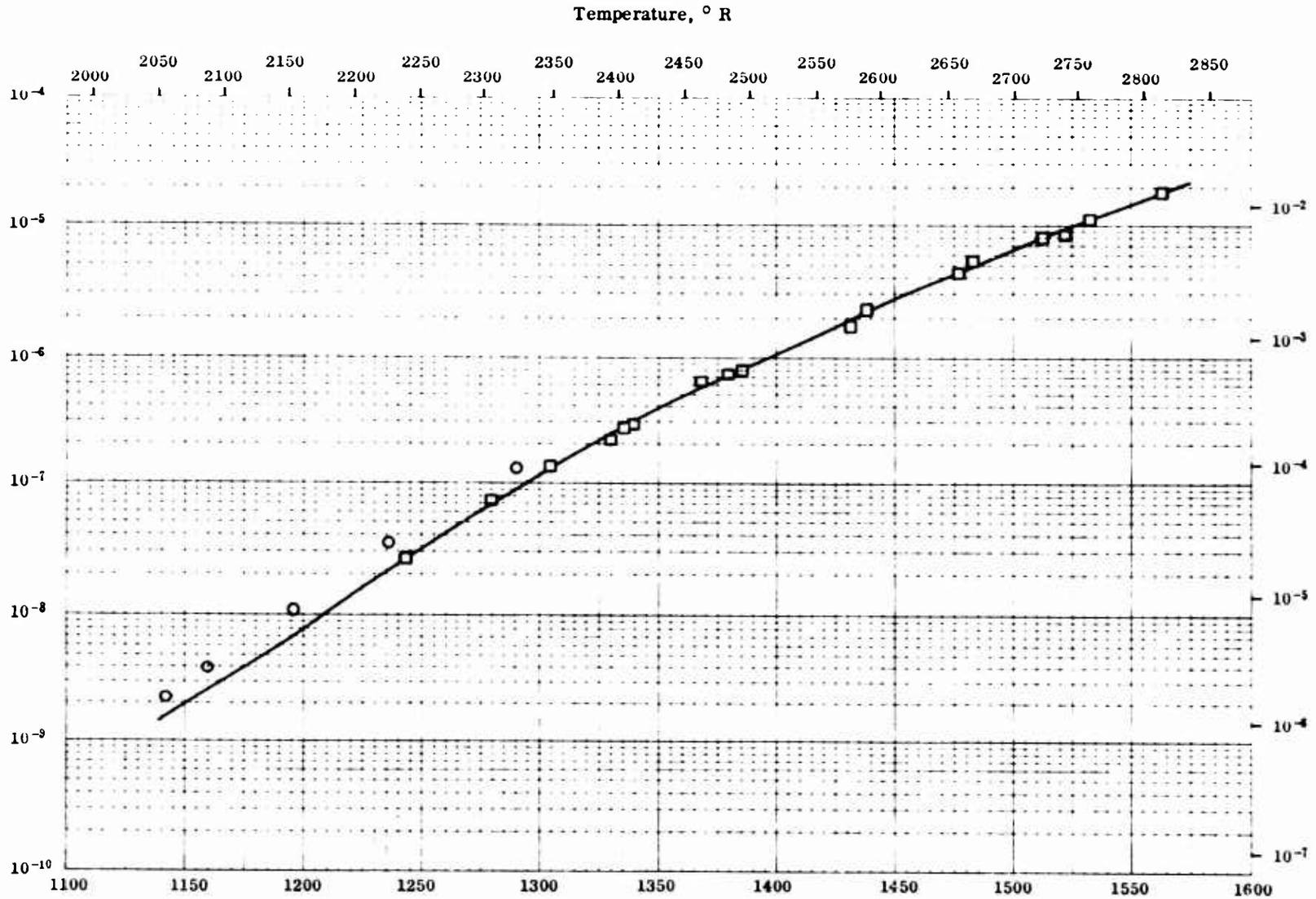


ANGULAR SPECTRAL REFLECTANCE -- COPPER

ANGULAR SPECTRAL REFLECTANCE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	61-37	298	0.238-0.58		Vacuum evaporated on glass, 0.2μ thickness.	Data taken from smooth curve; 45 degree illumination, 45 degree viewing.
□	60-43	298	1.2		Not given.	Polished; 10 degree illumination, hemisherical viewing; MgO as reference standard.
△	60-43	298	1.2		Not given.	Roughened by a grid of grooves of 45 degree opening angle, 127μ deep; surface appeared as an array of pyramids; 10 degree illumination, hemispherical viewing; MgO as reference standard.
◇	60-43	298	1.2		Not given.	Same as above except 30 degree illumination.
▽	60-43	298	1.2		Not given.	Same as above except 60 degree illumination.
◁	60-43	298	1.2		Not given.	Same as above except 80 degree illumination.



VAPOR PRESSURE -- COPPER

VAPOR PRESSURE -- COPPER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-13	1143-1292		99.977 Cu, 0.001 - 0.01 ea. Si, Al, 0.0001 - 0.001 ea. Fe, Ca, Mg, 0.00005 - 0.0005 Ag, and no measureable Mo, Sn, Mn, Ca.	
□	53-14	1242-1563		99.99 Cu; oxygen free.	

TPRC

PROPERTIES OF CURIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7	437

REPORTED VALUES

Density	$g\ cm^{-3}$	$lb\ ft^{-3}$
	○ 7	437

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	50-19 also 51-35	373		"Pure ± 5%"; possibility of void inside sample.	Purity by measurement of radioactivity; prepared by reduction of CmF_3 with Ba vapor 45 sec at 1275 C; heated 45 sec at 1100 C and 20 sec at 960 C.

PROPERTIES OF DYSPROSIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	8.556	534.1
Melting Point	1773	3192
Heat of Fusion	25	45
Heat of Vaporization. . . .	430_{298K}	774_{537R}
Heat of Sublimation	425_{1280K}	765_{2300R}

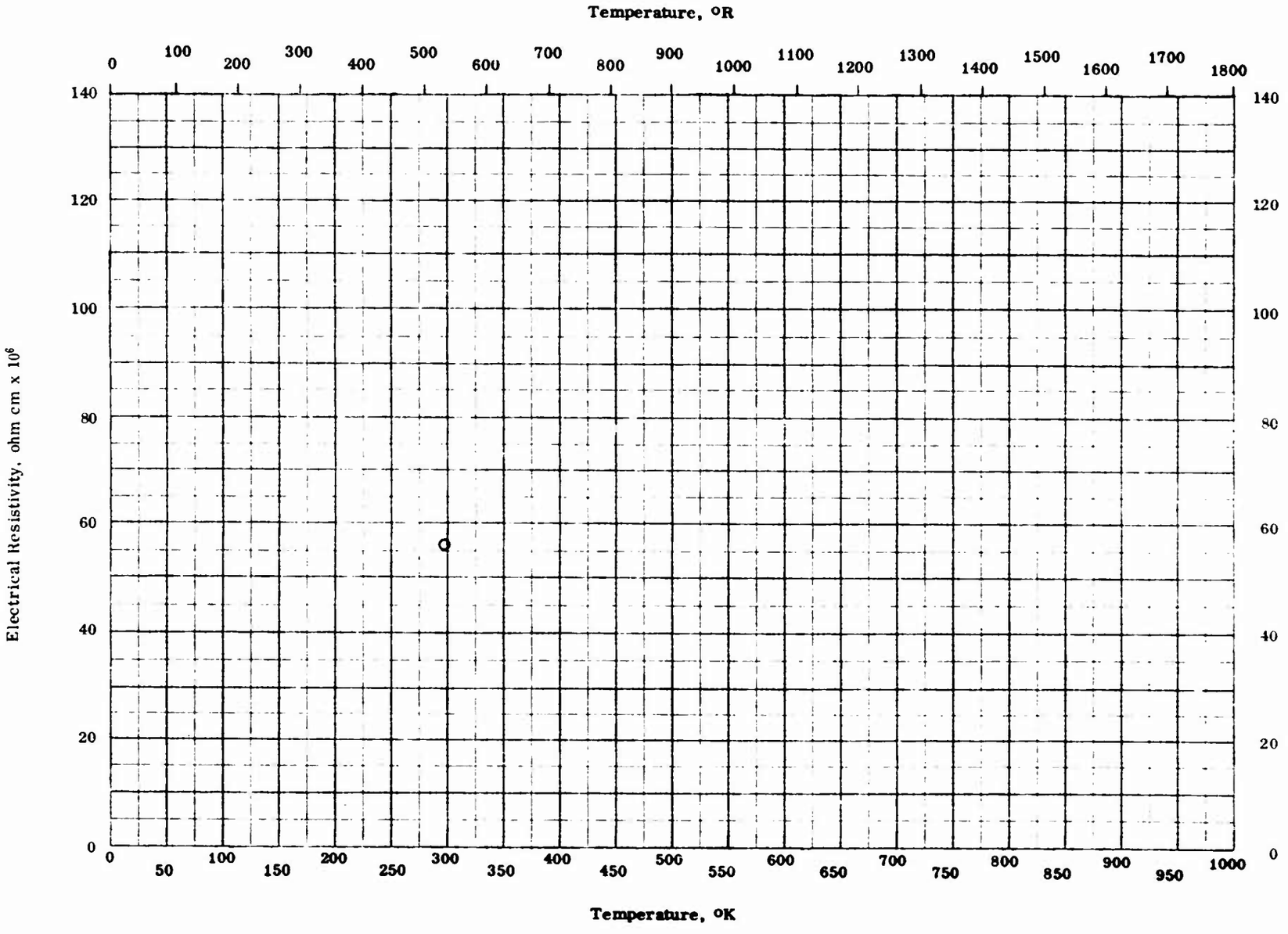
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	8.556	534.1
	■	8.35	521.0
Melting Point		K	R
	□	1773	3192
	△	1673	3012
	◇	1773	3191
	▽	1520^{+}	2736^{+}
	▲	1670	3010
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	▶	25	45
	●	23.4	42.1
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	◀	430_{298K}	774_{537R}
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	▷	425_{1280K}	760_{2300R}
	◁	431_{1215K}	776_{2187R}
	▼	$427_{1230K} \pm 4$	$769_{2214R} \pm 8$
	◆	$413_{1230K} \pm 4$	$743_{2214R} \pm 8$

PROPERTIES OF DYSPROSIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	54-11	1773		Very pure.	M. P. from observation of flow during preparation by optical pyrometer; Δh_s from vapor pressure data.
▷	54-11	1773		Very pure.	
△	53-37	1673		Not given.	
◇	52-5	1773		Not given.	
▽	56-48	1520		Not given.	
◁	56-48	1215		Not given.	Δh_s of the above sample from vapor pressure data.
▼	54-6	1230		High purity.	Vacuum cast; Δh_s from vapor pressure data.
◆	54-6	1230		Less pure.	Cast; same as above.
▲	56-54	1672		Very high purity.	
●	62-13	---		Not given.	
■	62-13	298		Not given.	
◀	62-13	298		Not given.	
▶	56-54	1672		Very high purity.	



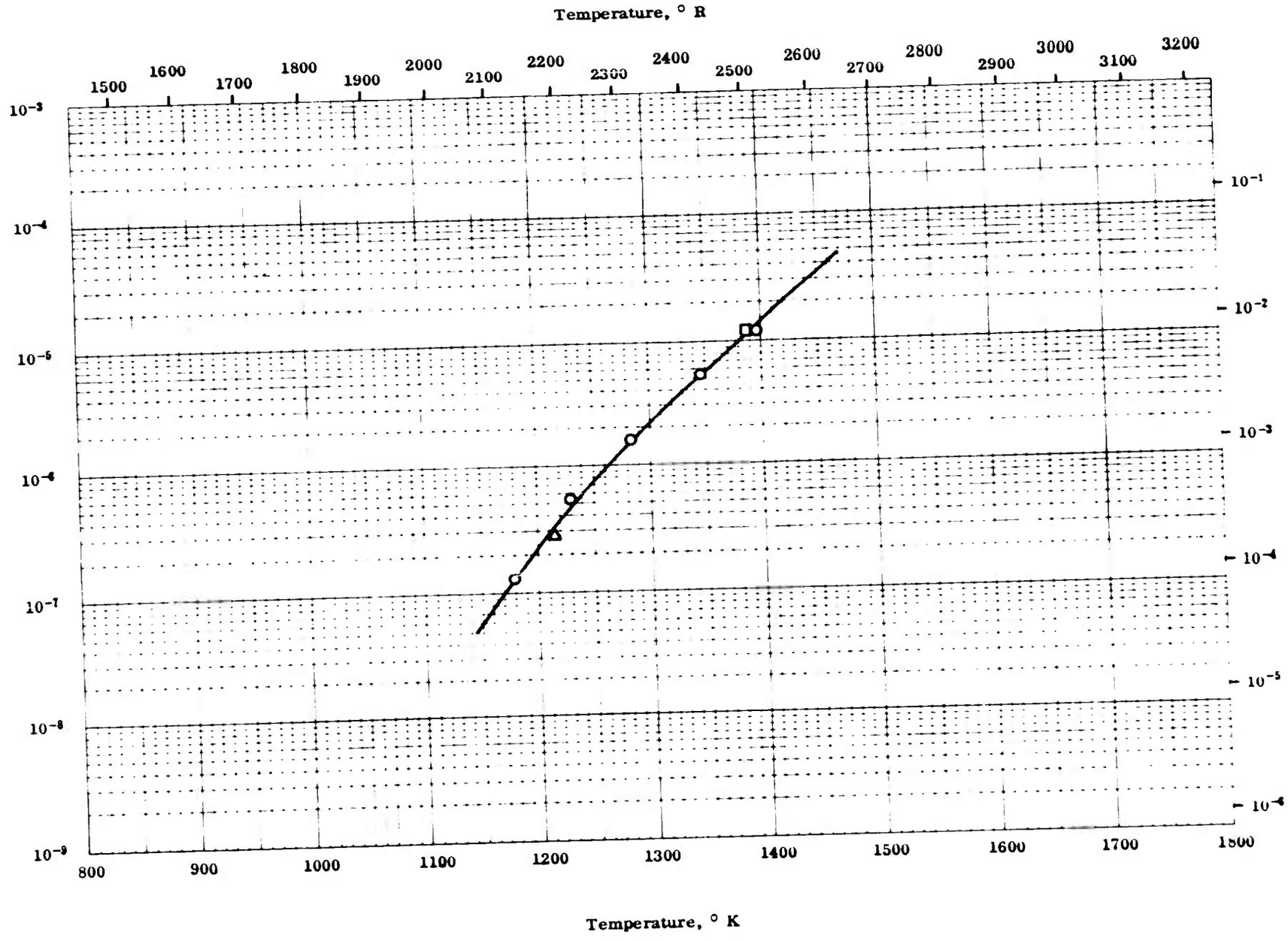
ELECTRICAL RESISTIVITY -- DYSPROSIUM

ELECTRICAL RESISTIVITY -- DYSPROSIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		Not given.	

TPRC



VAPOR PRESSURE -- DYSPROSIUM

VAPOR PRESSURE -- DYSPROSIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-11	1170-1397		"Very pure".	
□	52-5	1390		Not given.	
△	62-13	1215		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{14920}{T(K)} + 8.62.$

PROPERTIES OF ERBIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	9.06	566
Melting Point	1800	3240
Heat of Fusion	24	44
Heat of Vaporization . . .	440	792
Heat of Sublimation	416	750

REPORTED VALUES

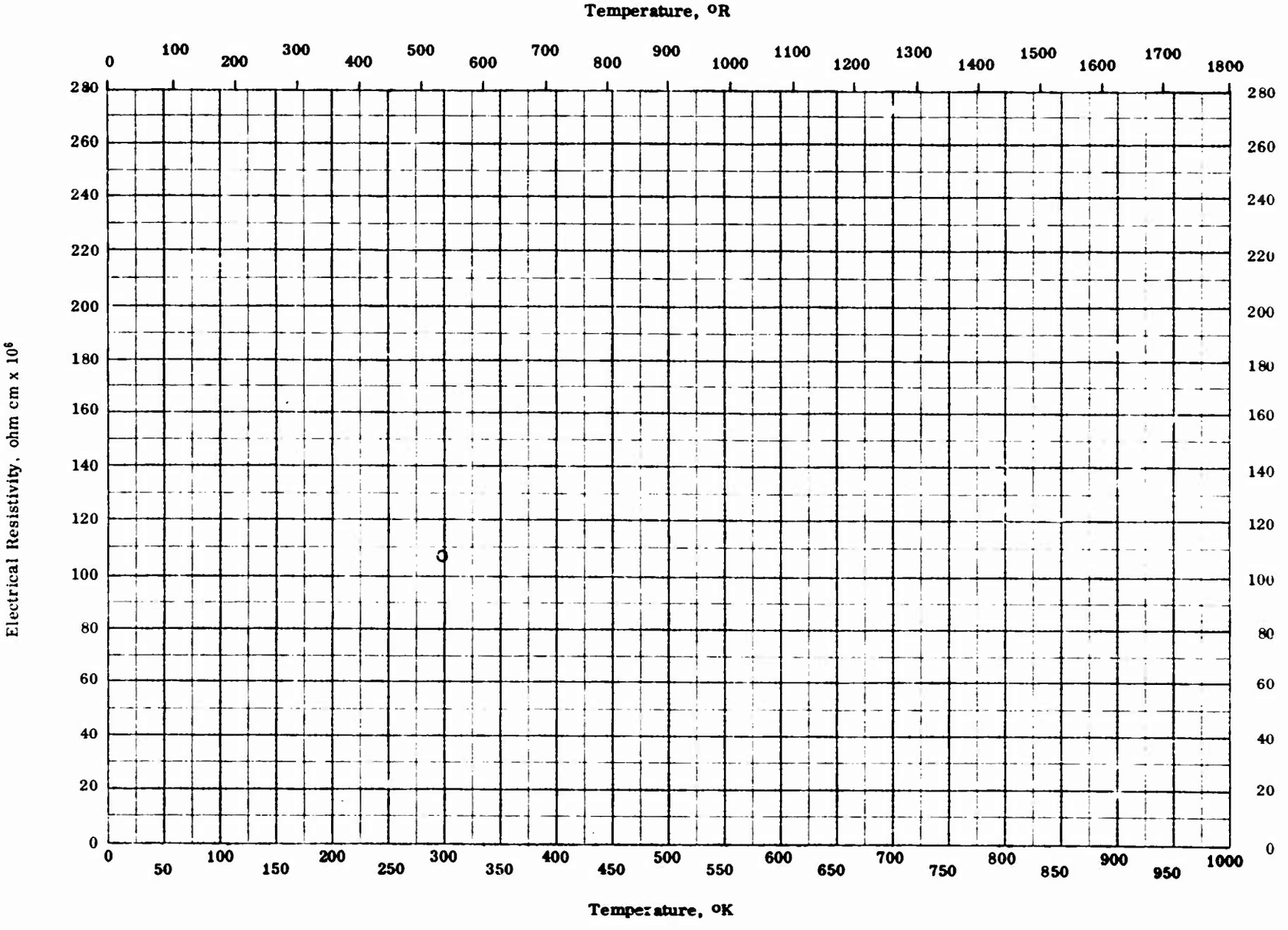
Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	9.058	565.5
Melting Point		K	R
	□	1800 ± 25	3240 ± 45
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◁	24	44
	◇	24.5	44.1
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▽	440_{298K}	792_{537R}
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	△	416	750

PROPERTIES OF ERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	54-11	1800		Not given.	M. P. from observations of flow during production by optical pyrometer.
△	56-54	—		Very high purity.	
◁	56-54	1800		Same as above.	Δh_f of above sample.
◇	62-13	—		Not given.	
▽	62-13	298		Not given.	

TPRC



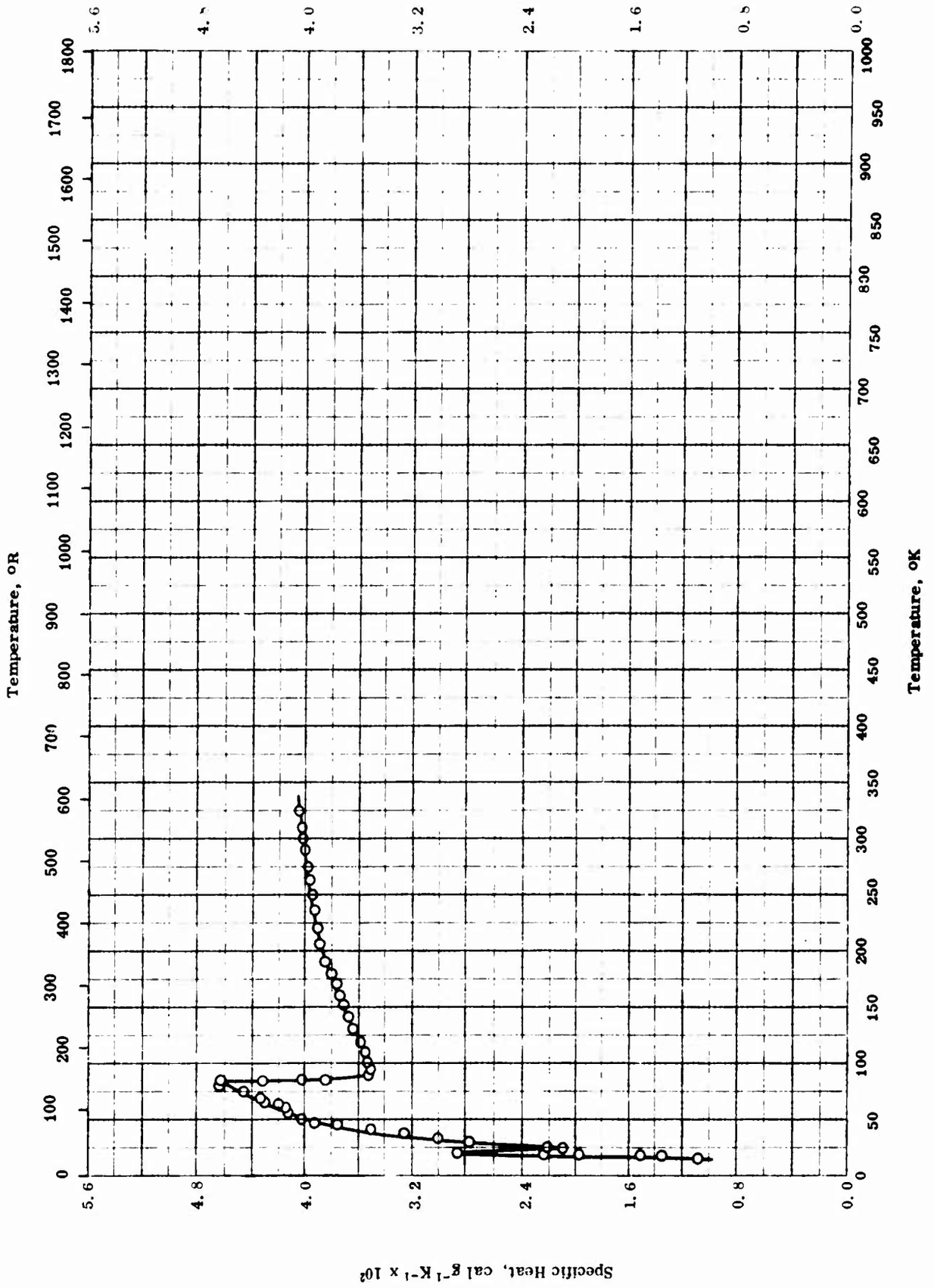
ELECTRICAL RESISTIVITY -- ERBIUM

ELECTRICAL RESISTIVITY -- ERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-13	298		Not given.	

TPRC



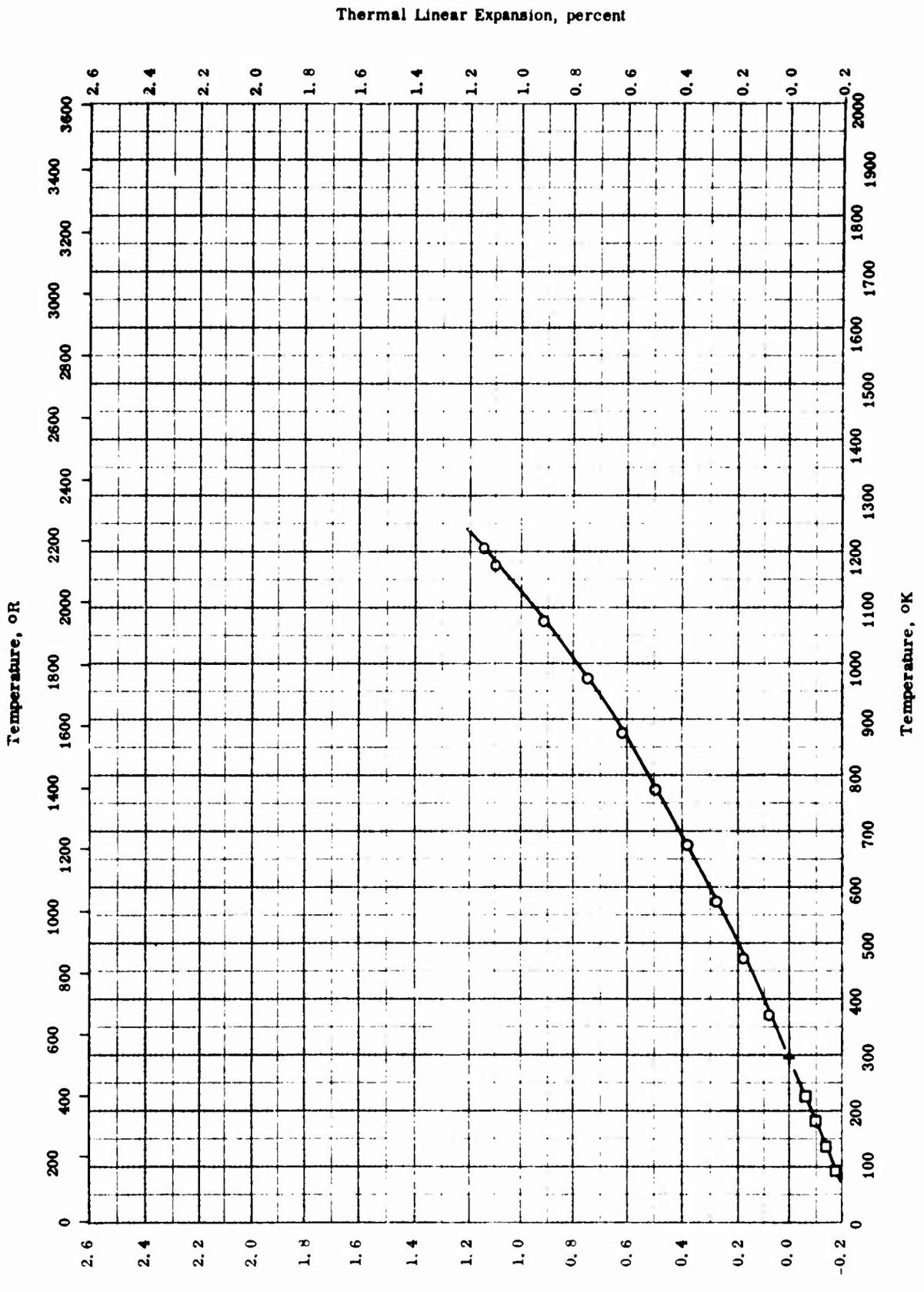
SPECIFIC HEAT -- ERBIUM

SPECIFIC HEAT -- ERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range ^{o}K	Rept. Error $\sigma_{\%}$	Sample Specifications	Remarks
O	55-16	15-325		0.10> Ca, Mg, Si, Y.	

TPRC



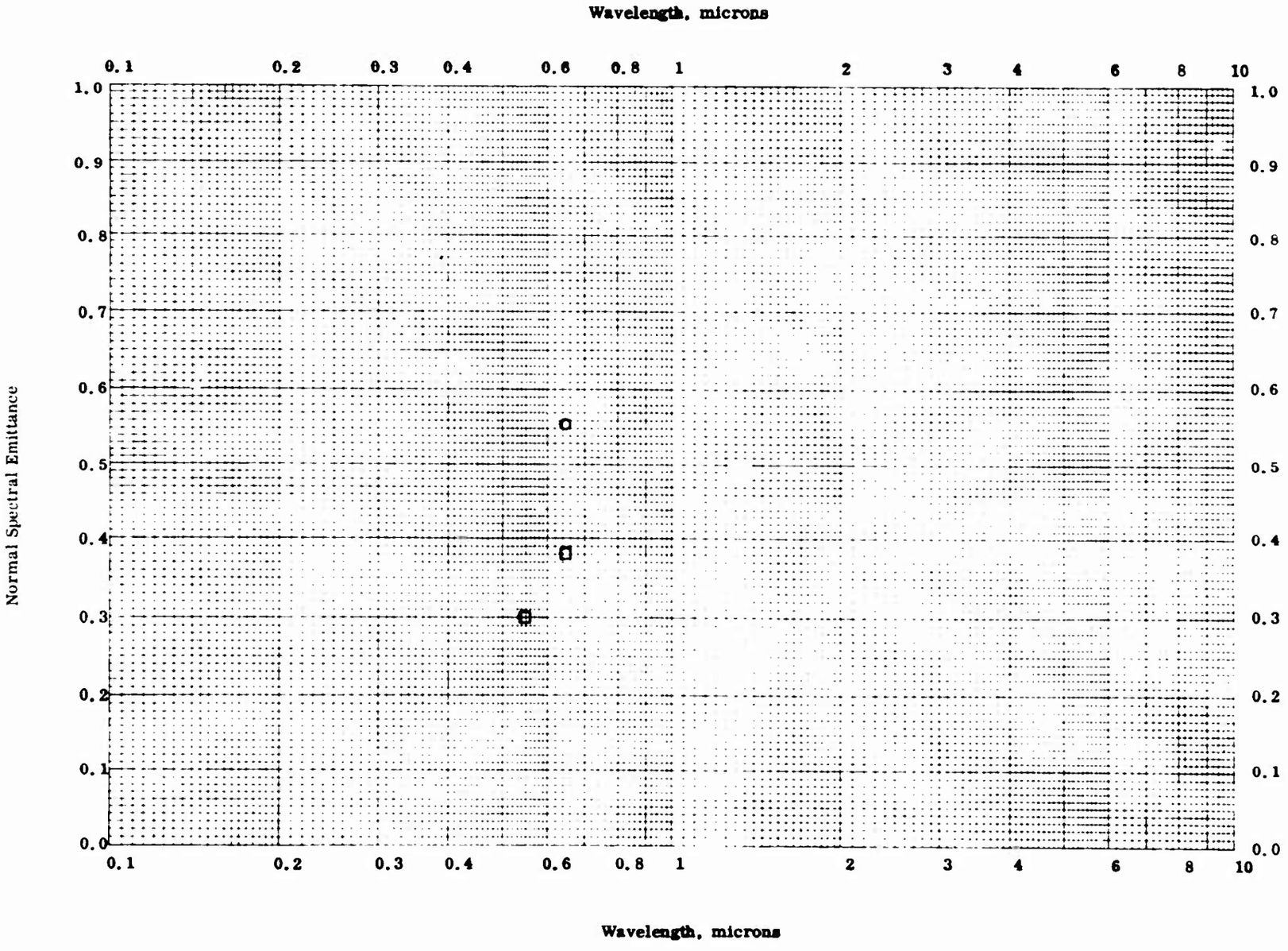
THERMAL LINEAR EXPANSION -- ERBIUM

THERMAL LINEAR EXPANSION -- ERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-62 also 57-62	293-1203	±1	99.8 pure, 0.07 Ca, 0.04 Si, 0.03 Fe, 0.01 each C, N_2, Ho, and Yb, 0.005 Dy, and 0.002 Tm.	Fluoride reduced with Ca and vacuum cast, recast into rod; mean of heating and cooling data; tested in He atmosphere.
□	53-49	92-317		0.01> Y; weak lines of Ca and Fe, and traces of Mg and Si.	Cast, machined, and annealed at 550 C; mean of heating and cooling data.

TPRC



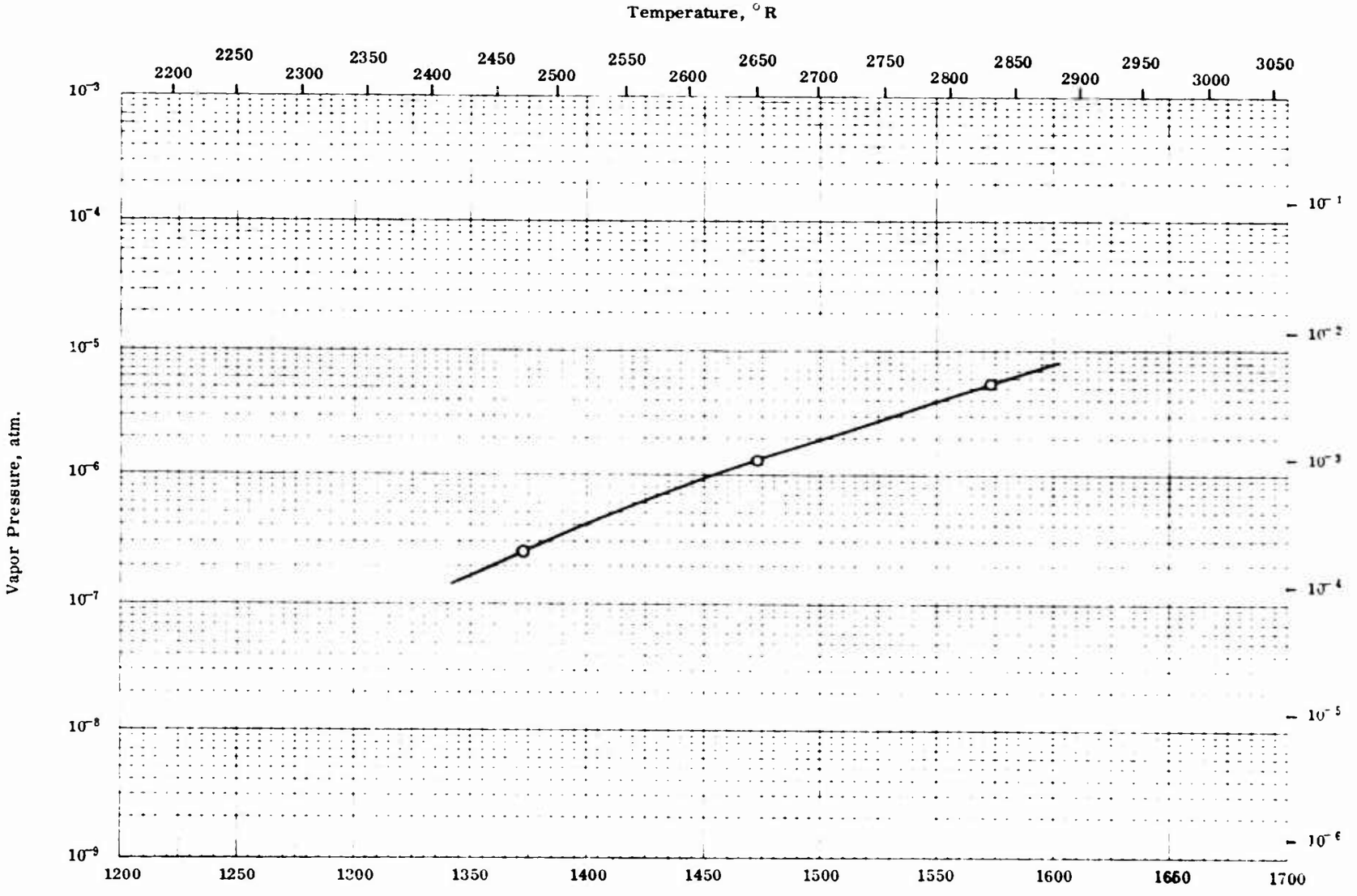
NORMAL SPECTRAL EMITTANCE -- ERBIUM

NORMAL SPECTRAL EMITTANCE -- ERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	15-1	<MP	0.65	1	Composition not given.	Measured in hydrogen atmosphere.
□	15-1	>MP	0.55-0.65	1	Same as above.	Liquid state; measured in hydrogen atmosphere.

TPRC



VAPOR PRESSURE -- ERBIUM

VAPOR PRESSURE -- ERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_o	Sample Specifications	Remarks
O	62-13	1373-1573		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{14146 \pm 469}{T(K)} - 6.625 \pm 0.315$.

TPRC

PROPERTIES OF EUROPIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	5.30	330.7
Melting Point	1473	2652
Heat of Fusion	17	30
Heat of Vaporization . . .	497_{298K}	276_{537R}
Heat of Sublimation	281_{298K}	506_{537R}

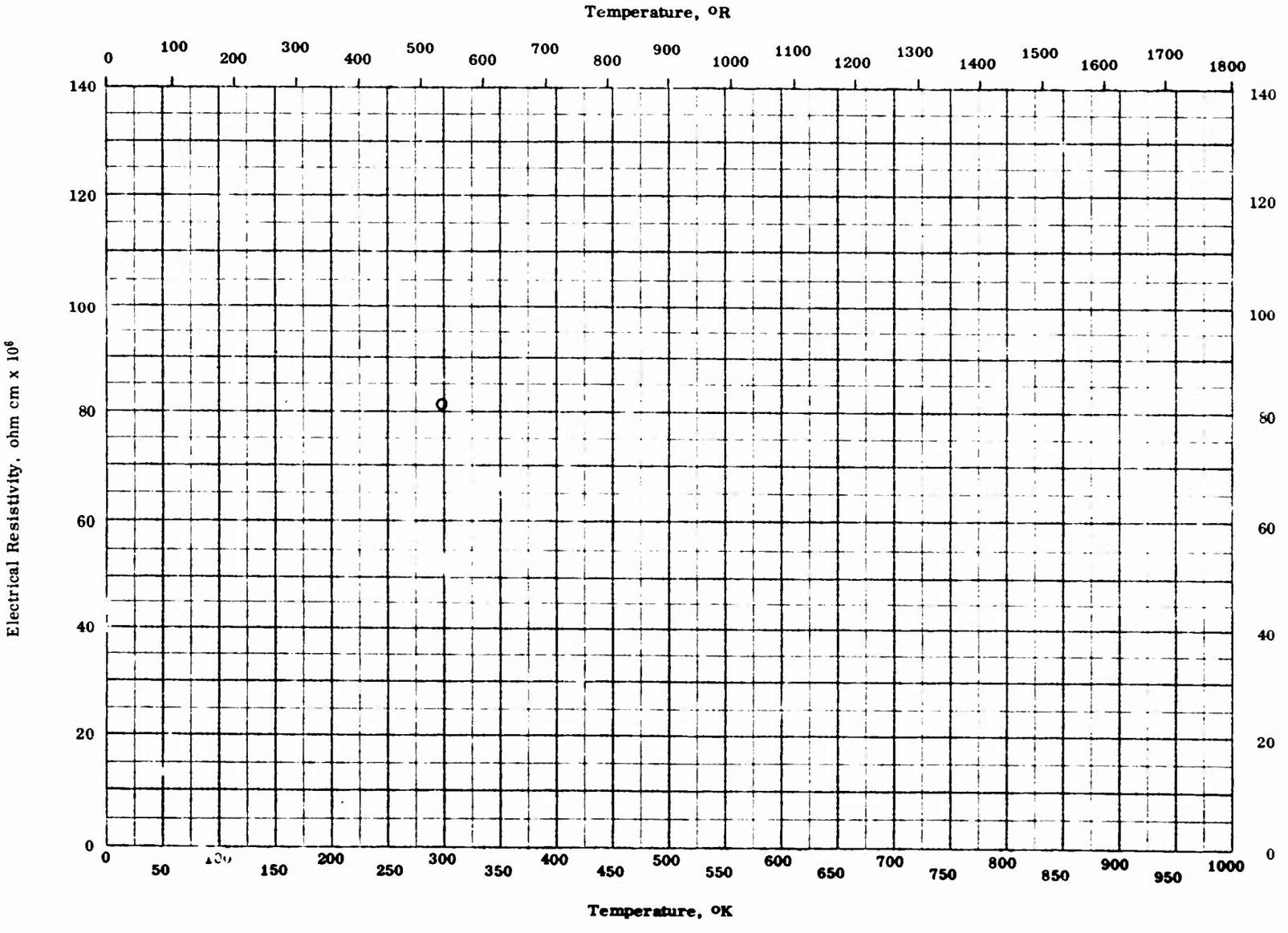
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	□	5.166	322.5
	■	5.30	330.7
Melting Point		K	R
	○	1473	2652
	◇	1170	2106
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	◇	17	30
	●	13.2	23.7
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	▲	497_{298K}	276_{537R}
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	△	$281_{298K} \pm 2$	$506_{537R} \pm 4$
	◇	261	470

PROPERTIES OF EUROPIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-37	1473		Not given.	
□	55-28	298		Not given; body centered cubic structure.	Density computed from x-ray measurement.
△	57-56	298		High purity.	Δh_s from vapor pressure data.
◇	56-54	1170		Very high purity.	
●	62-13	---		Not given.	
■	62-13	298		Not given.	
▲	62-13	298		Not given.	

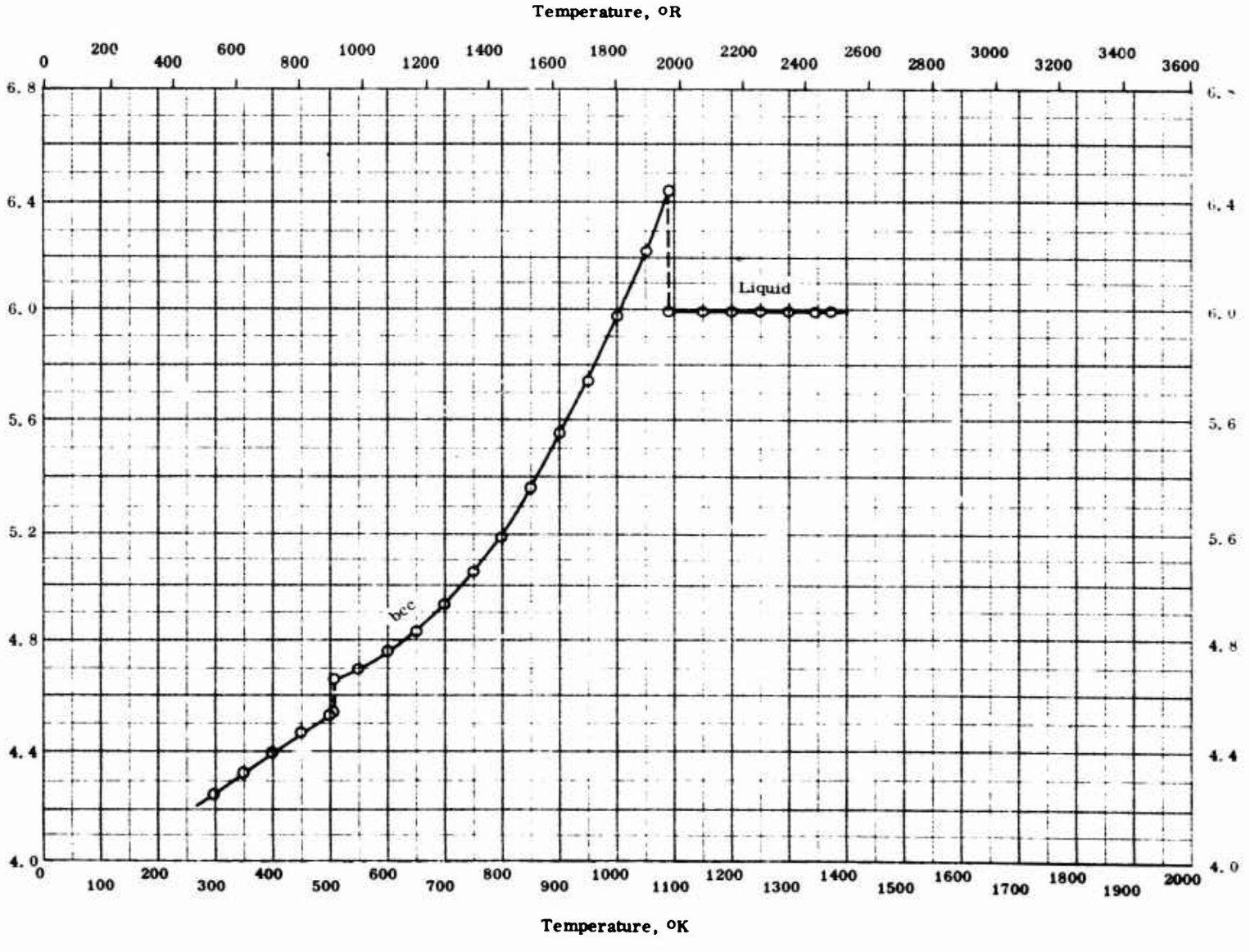


ELECTRICAL RESISTIVITY -- EUROPIUM

ELECTRICAL RESISTIVITY -- EUROPIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		Not given.	

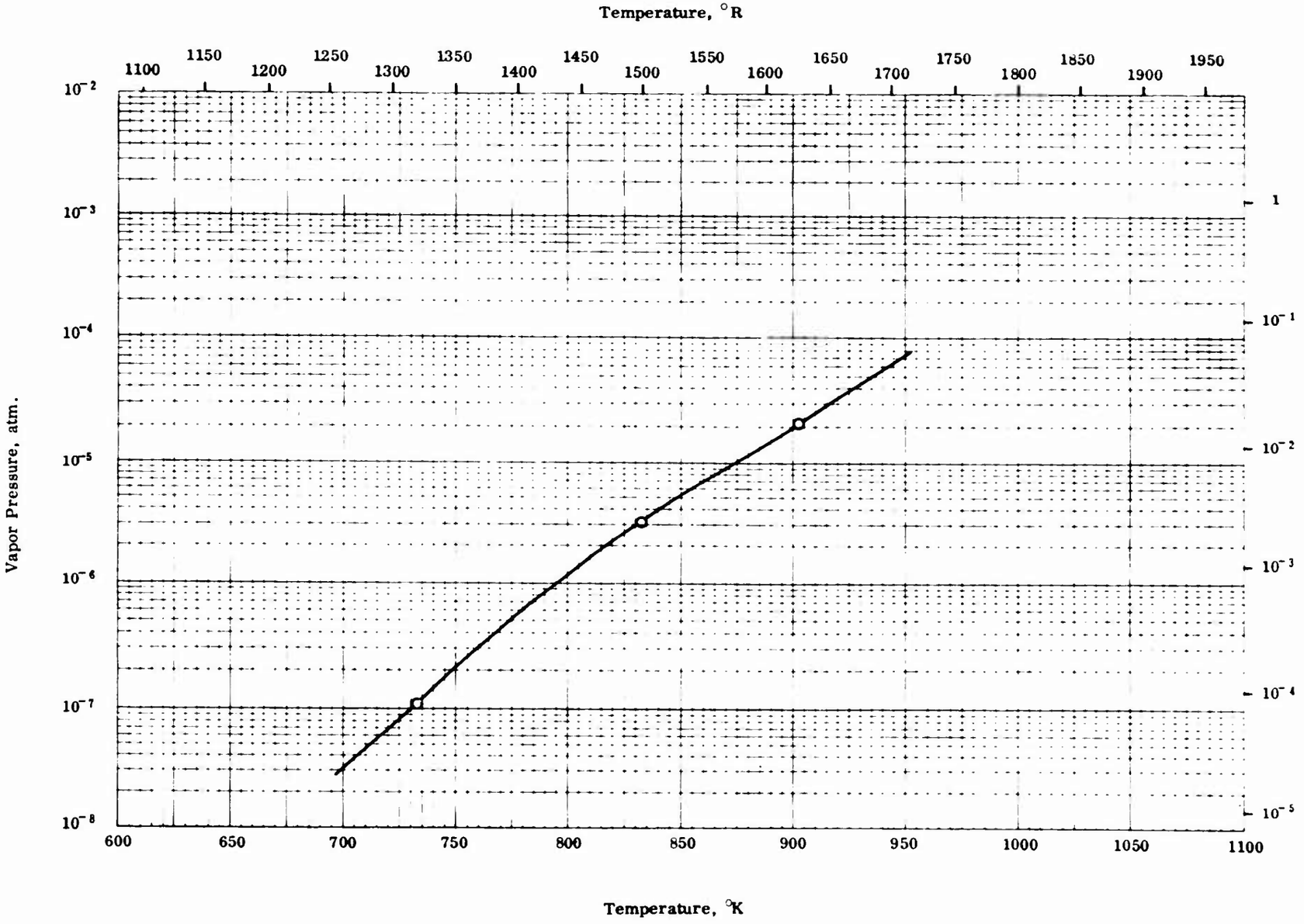


SPECIFIC HEAT -- EUROPIUM

SPECIFIC HEAT -- EUROPIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-31	298-1373		99.971< Eu, 0.02> Sm, 0.019 O_2, 0.009 Gd, 0.0045 C, 0.003 N_2, and 0.0012 H_2.	Sealed under helium.



VAPOR PRESSURE - EUROPIUM

VAPOR PRESSURE -- EUROPIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
○	62-13	733-903		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{5982 \pm 16}{T(K)} + 8.160 \pm 0.027$.

PROPERTIES OF GADOLINUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7.87	491
Melting Point	1579	2823
Heat of Fusion	23	42
Heat of Vaporization. . . .	458	824
Heat of Sublimation	460	830

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	7.868	491.2
	■	7.80	486.7

Melting Point		K	R
	□	1623	2922
	△	1579	2823
	◇	1520	2740

Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	◇	23	42
	●	13.4	24.1

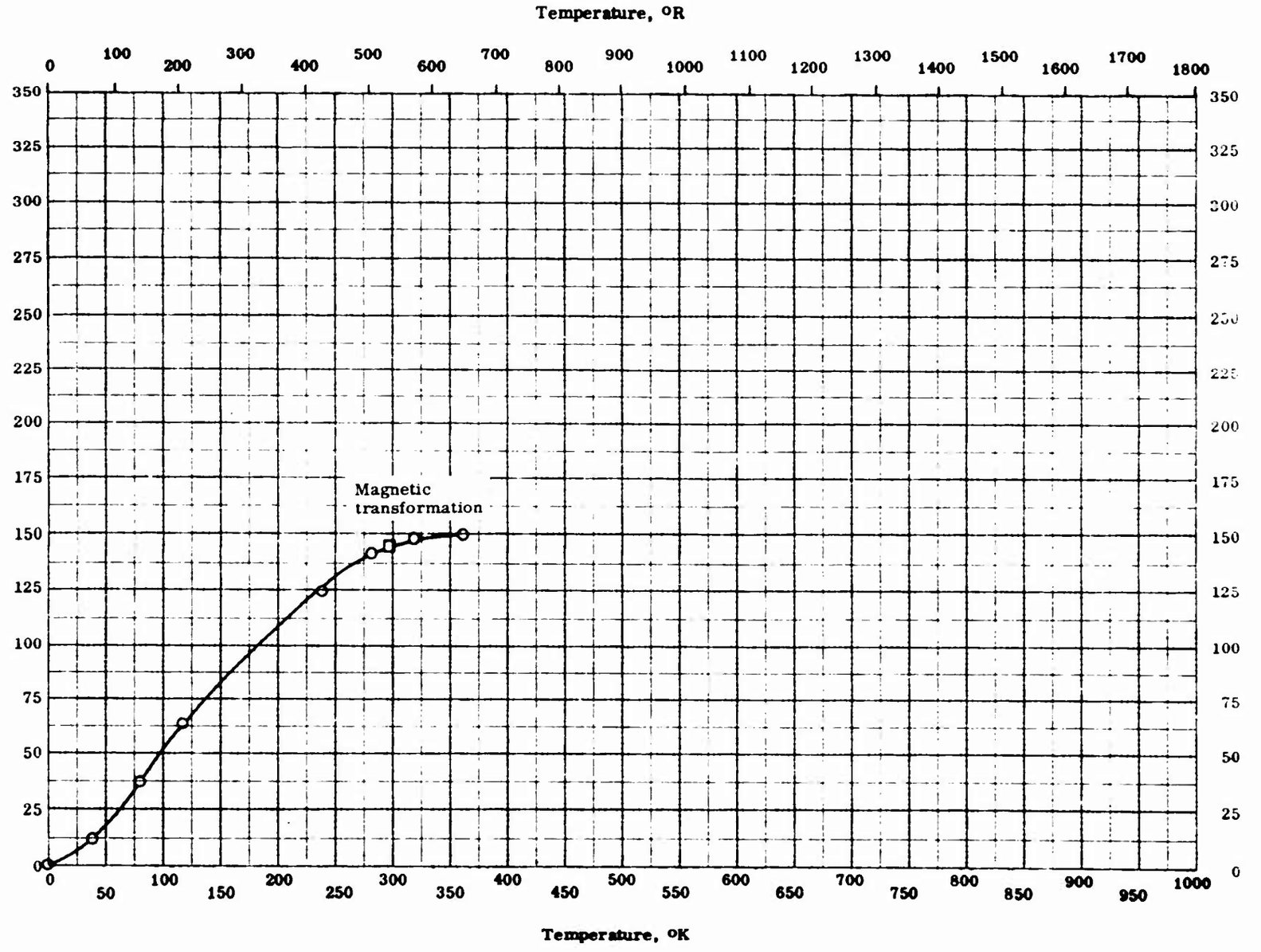
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	◆	458	824

Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	▲	460	830

PROPERTIES OF GADLINIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	54-11	1623		Very pure.	M. P. by observing metal flow during remelting by optical pyrometer.
△	53-37	1568		Not given.	
◇	56-54	1522		Very high purity.	M. P. and Δh_f.
▲	56-54	—		Very high purity.	Δh_s of the above sample.
●	62-13	1537		Not given.	Transition $\alpha \xrightarrow{1537\,K} \beta$.
■	62-15	298		Not given.	
◆	62-13	—		Not given.	

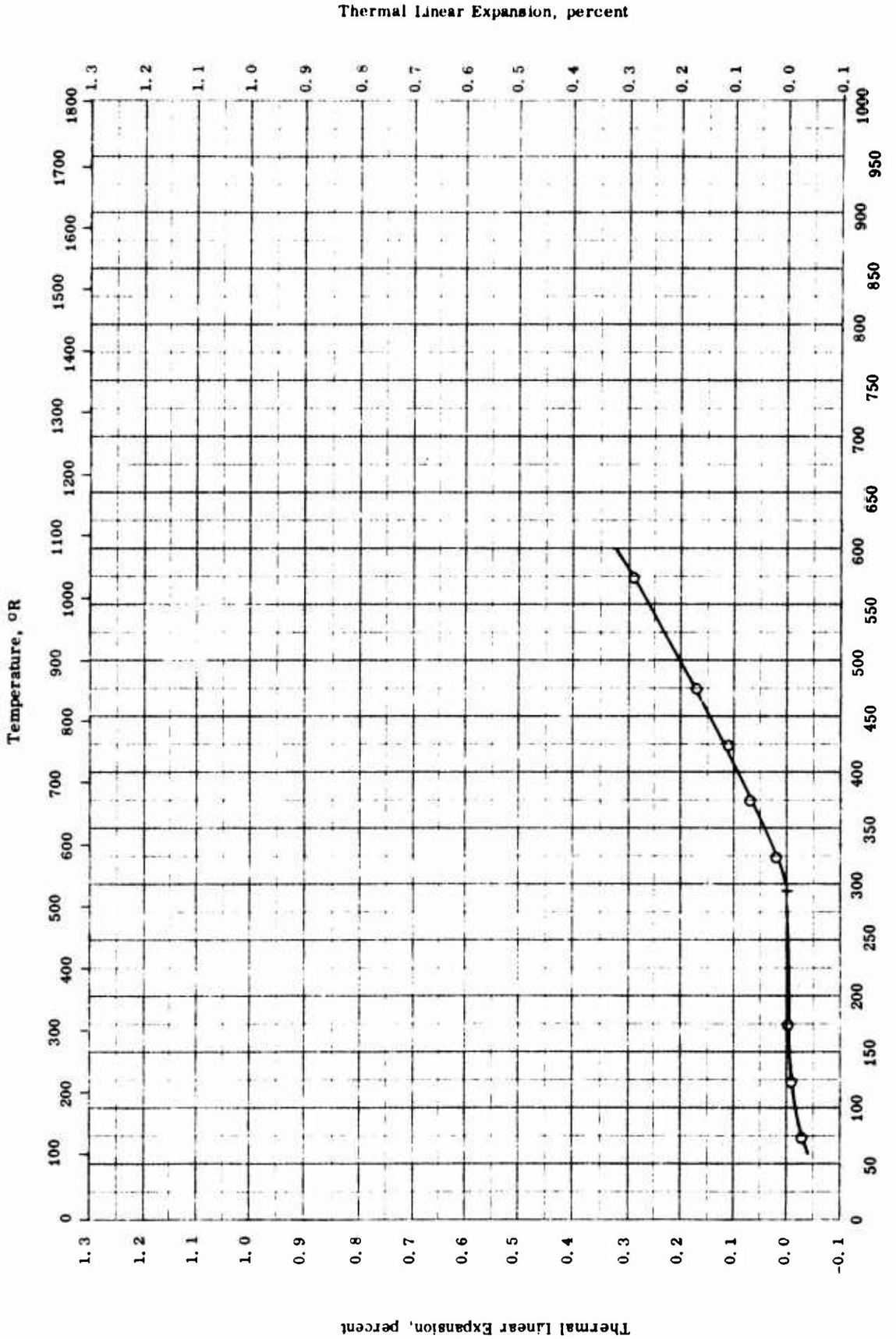


ELECTRICAL RESISTIVITY -- GADOLINIUM

ELECTRICAL RESISTIVITY -- GADOLINIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-23	0-360		< 0.15 Sm, 0.03 Ca, < 0.02 Mg, < 0.02 Fe.	Sample cast under vacuum, annealed for 7 hrs at 550 C.
□	62-13	298		α-Gd.	



THERMAL LINEAR EXPANSION -- GADOLINIUM

THERMAL LINEAR EXPANSION -- GADOLINIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	52-34	73-573		0.1 - 0.2 Mg and trace Fe.	Heating rate 100 C hr^{-1}.

TPRC

PROPERTIES OF GERMANIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	5.32	332
Melting Point	1210.7	2179
Heat of Fusion	103	185
Heat of Vaporization. . . .	1089_{1400K}	1960_{2520R}
Heat of Sublimation	1260_{298K}	2270_{537R}

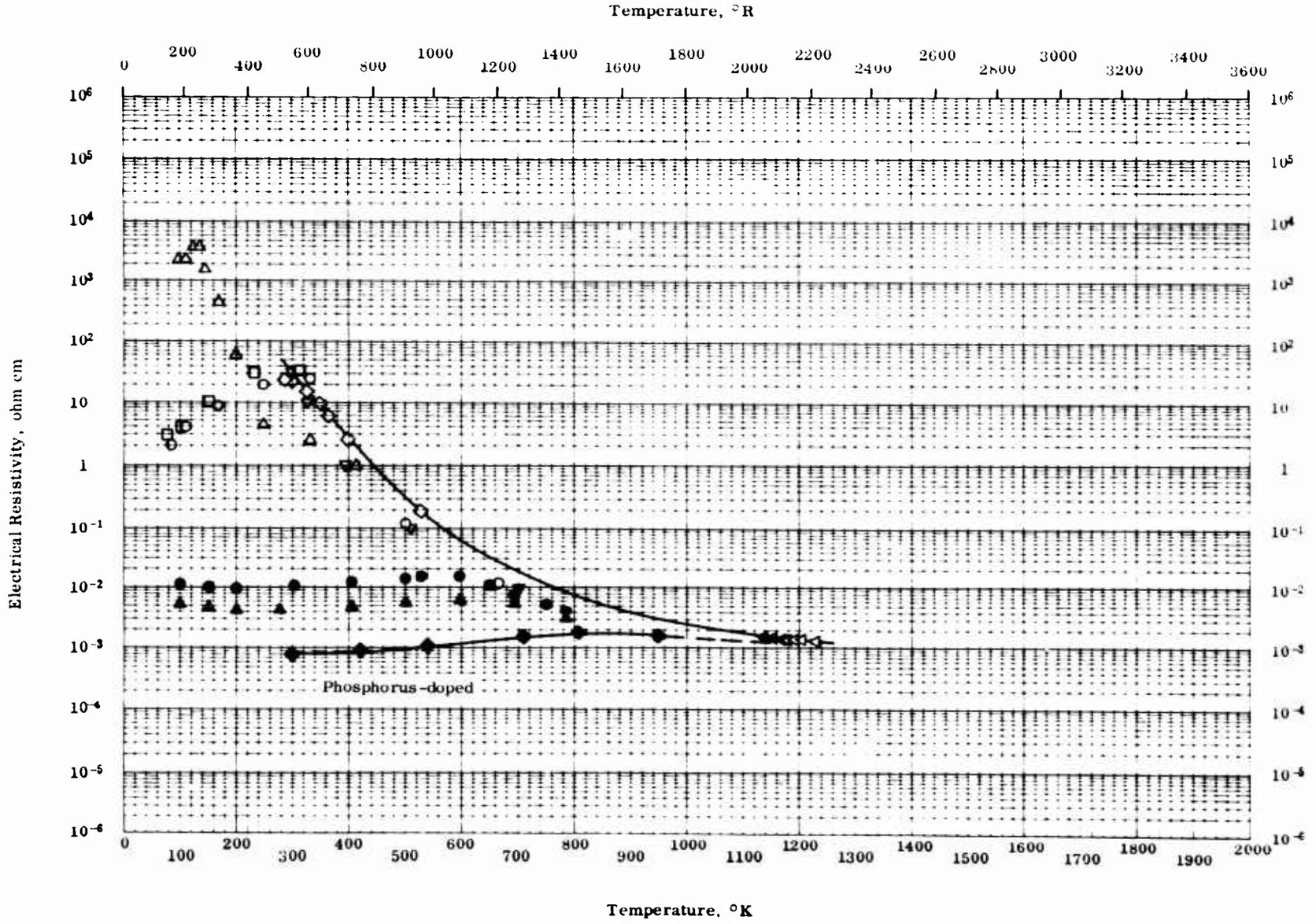
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	◇	5.32	332.33
Melting Point		**K**	**R**
	▽	1209	2177
	●	1210.7 ± 2	2179 ± 4
	■	1209	2177
Heat of Fusion		**cal g^{-1}**	**Btu lb^{-1}**
	△	98.3 ± 4.9	176 ± 9
	■	112 ± 11	201 ± 20
Heat of Vaporization		**cal g^{-1}**	**Btu lb^{-1}**
	□	Gas phase species Ge_1	1089_{1400K} ± 28	1960_{2520R} ± 50
		Gas phase species Ge_2	572_{1400K} ± 20	1030_{2520R} ± 37
		Gas phase species Ge_3	371_{1400K}	669_{2520R}
		Gas phase species Ge_4	241_{1400K}	434_{2520R}
Heat of Sublimation		**cal g^{-1}**	**Btu lb^{-1}**
	○	Gas phase species Ge_1	1260_{298K} ± 42	2270_{537R} ± 75
	□	Same as above	1228_{1150K} ± 28	2210_{2070R} ± 50
	▲	Same as above	1153_{298K} ± 20	2075_{537R} ± 37
	▼	Same as above	1174_{298K} ± 20	2113_{537R} ± 37

PROPERTIES OF GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-12	298		Not given.	Δh_s from vapor pressure data.
□	54-32	1100-1500		Not given.	Δh_s and Δh_v from vapor pressure data.
◇	52-17	298		99.999 Ge, 0.00024 Ca, 0.00005 Mg, 0.000047 Cu, and 0.00002 Si.	Density data from powder weighed in air and in benzene.
▽	55-40	1210		High purity single crystal.	M. P. by sudden change in electric resistivity of sample.
●	55-41	1211		99.99+ pure.	
△	52-20	At M. P.		99.6 Ge and 0.4 O_2.	Δh_f by measuring heat required to produce smooth thermal analysis curve.
▼	51-26	298		Not given.	Δh_s from vapor pressure data.
■	52-23	1210		Resistivity >20 ohm cm at 25 C.	M. P. from thermal analysis and Δh_f from duration of arrest during constant heat flow heating.
▲	52-22	298		Not given.	Δh_s from vapor pressure data of liquid.



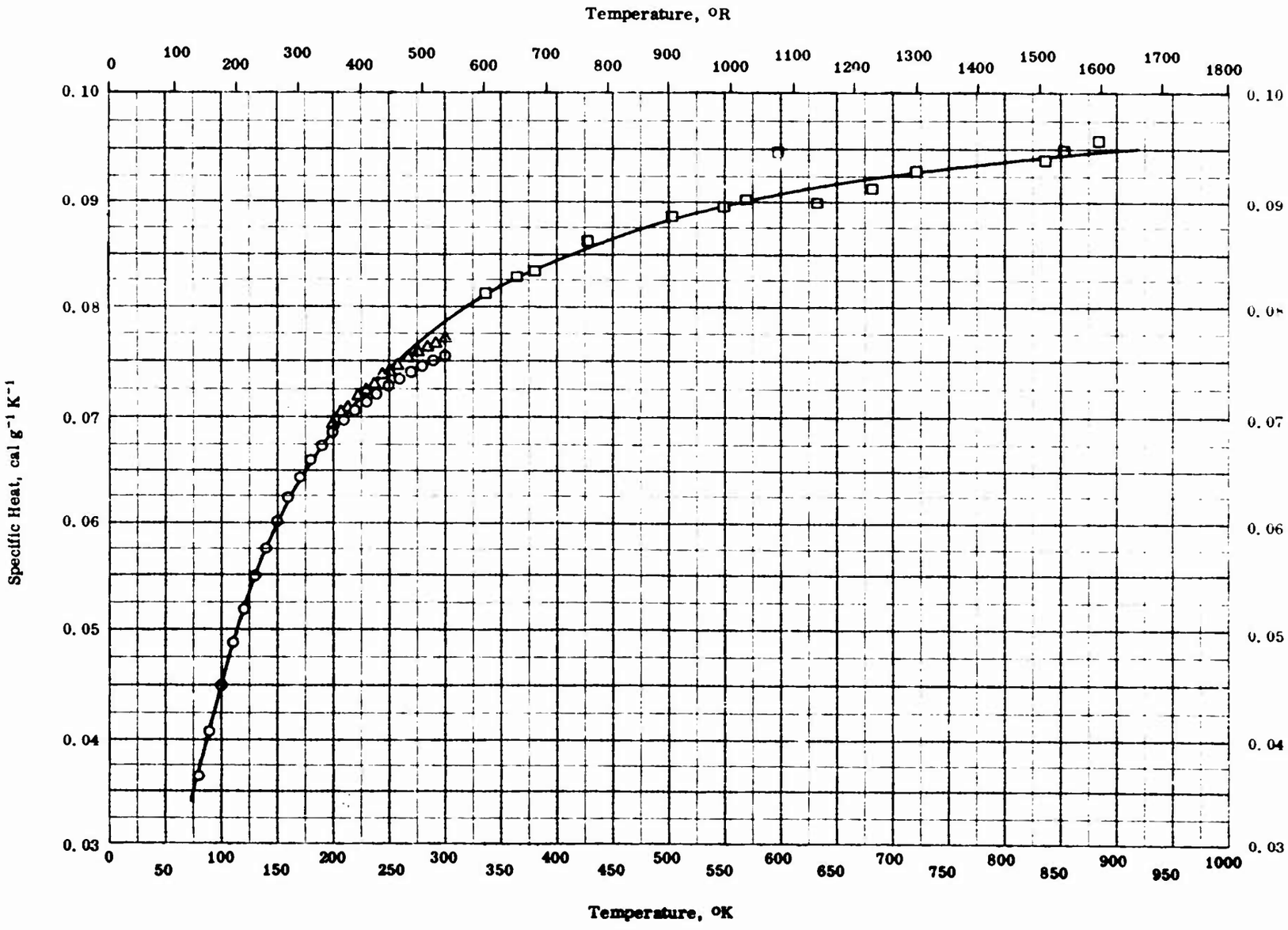
ELECTRICAL RESISTIVITY -- GERMANIUM

ELECTRICAL RESISTIVITY -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-25	83-667		Not given.	Author est. accuracy 0.001%.
□	55-30	79-313		High purity.	
◇	53-20	286-527		Pure n type single crystal with 1.88×10^{14} cm^{-3} conduction electron concentration.	Heat treated at many different temperatures.
▽	55-34	300-705		P type.	Zone purified.
△	56-30	100-417		Ni impurity added.	
◁	57-33	1178-1206		Pure, perhaps single crystal.	"Not allowed for contraction of 10% upon melting". heating.
◀	57-33	1135-1175		Same as above.	Cooling.
●	49-11	100-785		Impurity concentration n_p = 0.097 atomic percent.	
▲	49-11	100-785		Impurity concentration n_p = 0.196 atomic percent.	Data for impurity concentration = 0.141 atomic percent also given, which fall between the plotted values.
◆	60-36	300-950		Phosphorus-doped, 3×10^{19} cm^{-3}.	

TPRC

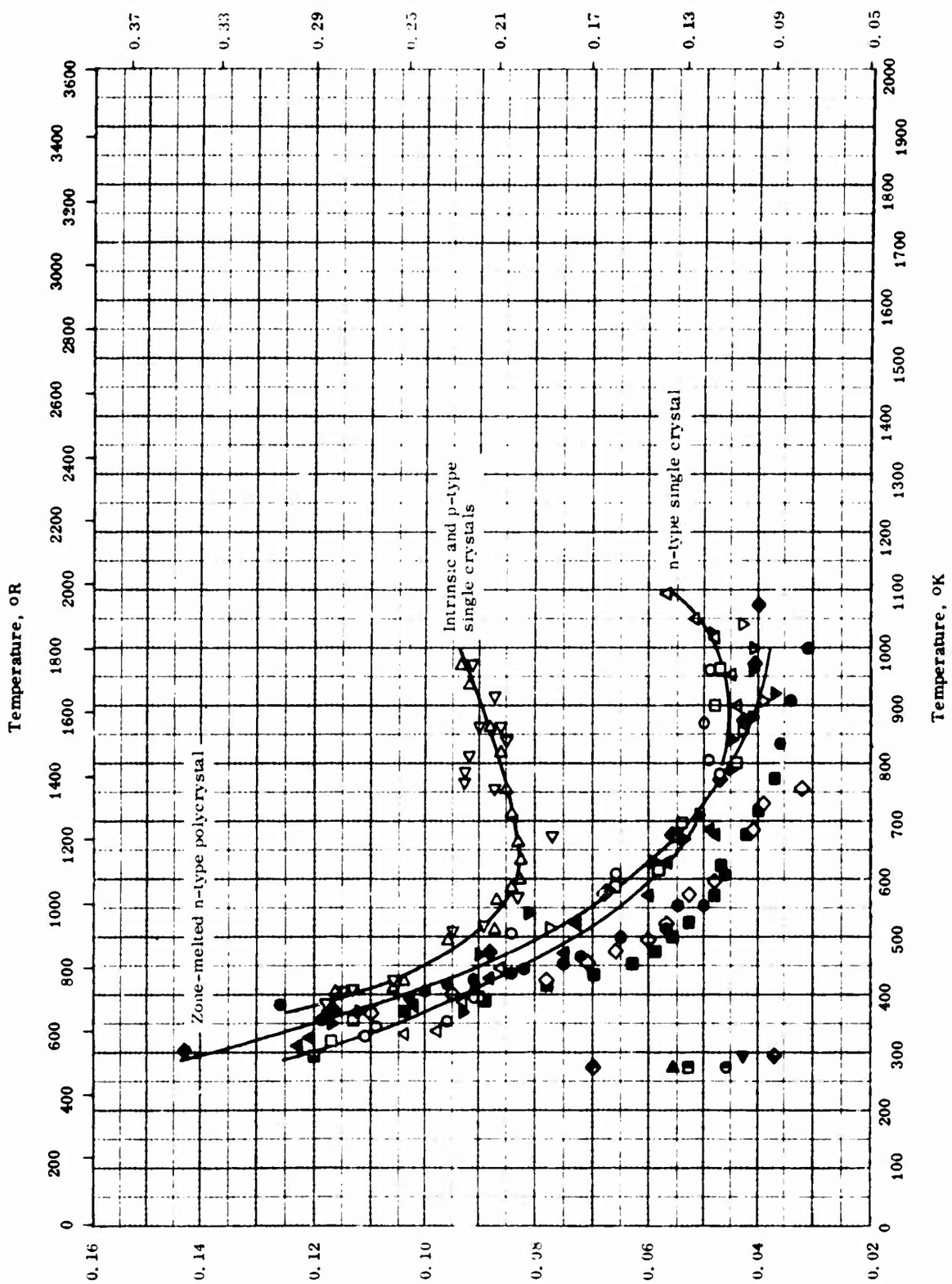


SPECIFIC HEAT -- GERMANIUM

SPECIFIC HEAT -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-19	80-300	≤7.0	p-germanium; single crystals.	
□	64-11	296-883	≤3.0	n-germanium; resistivity 0.01 ohm cm.	
△	59-22	2-300	≤± 2.0	Not given.	Under 10^{-6} mm H, helium atmosphere.



THERMAL CONDUCTIVITY -- GERMANIUM

THERMAL CONDUCTIVITY -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-6	329-962		n-type single crystal; electrical resistivity 3 ohm cm at room temperature.	
□	59-6	319-962		Same as above except electrical resistivity 0.05 ohm cm at room temperature.	
△	59-6	331-1094		Same as above except electrical resistivity 0.03 ohm cm at room temperature.	
▽	59-6	324-1040		Same as above except electrical resistivity 0.001 ohm cm at room temperature.	
◁	59-5	388-971		Intrinsic single crystal.	
▷	59-5	405-971		Single crystal; high hole conducting; impurity concentration 1.1×10^{18} cm^{-3}.	
◇	59-4	368-758		n-type.	Heat flow in [100] direction.
●	59-4	354-1000		n-type.	Heat flow in [110] direction.
■	59-4	370-775		n-type.	Same as above.
◧	58-5	293	4	Single crystal with impurity concentration 1.4×10^{15} cm^{-3}.	
◆	58-5	293	4	p-type Ga doped single crystal with impurity concentration 7.4×10^{17} cm^{-3}.	
◀	58-5	293	4	n-type Fe doped single crystal with impurity concentration 4.1×10^{17} cm^{-3}.	

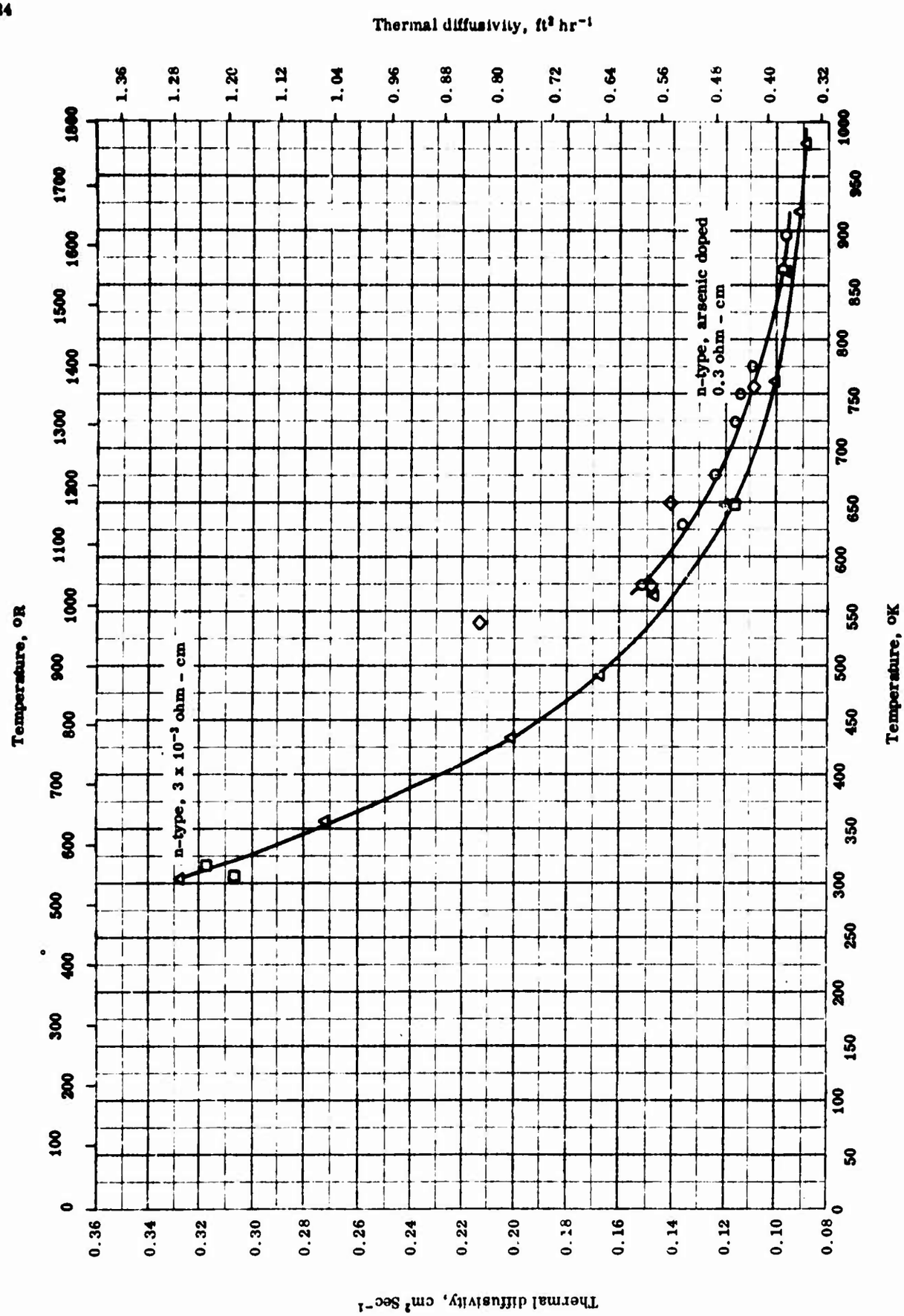
(Continued onto next page)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ	Sample Specifications	Remarks
▶	58-5	293	4	p-type Ga doped single crystal with impurity concentration 4.1×10^{16} cm^{-3}.	
◀	58-5	293	4	n-type Fe doped single crystal with impurity concentration 2.2×10^{16} cm^{-3}.	
●	58-5	293	4	p-type Ga doped single crystal with impurity concentration 8.8×10^{16} cm^{-3}.	
■	58-5	293	4	n-type Fe doped single crystal with impurity concentration 7.5×10^{16} cm^{-3}.	
▲	60-9	311-683	± 5	n-type; very inhomogeneous with barrier region in the center; a resistivity of about 5 ohm cm at 300 K.	
▼	60-8	300-1020		n-type; polycrystal with average crystallite size 0.2 cm; electrical resistivity 30 ohm cm at 300 K.	Zone melted; ground and cut.
◆	60-3	308-1073		n-type arsenic doped single crystal; electrical resistivity 0.3 ohm cm at room temperature.	Rod axis in 111 >.

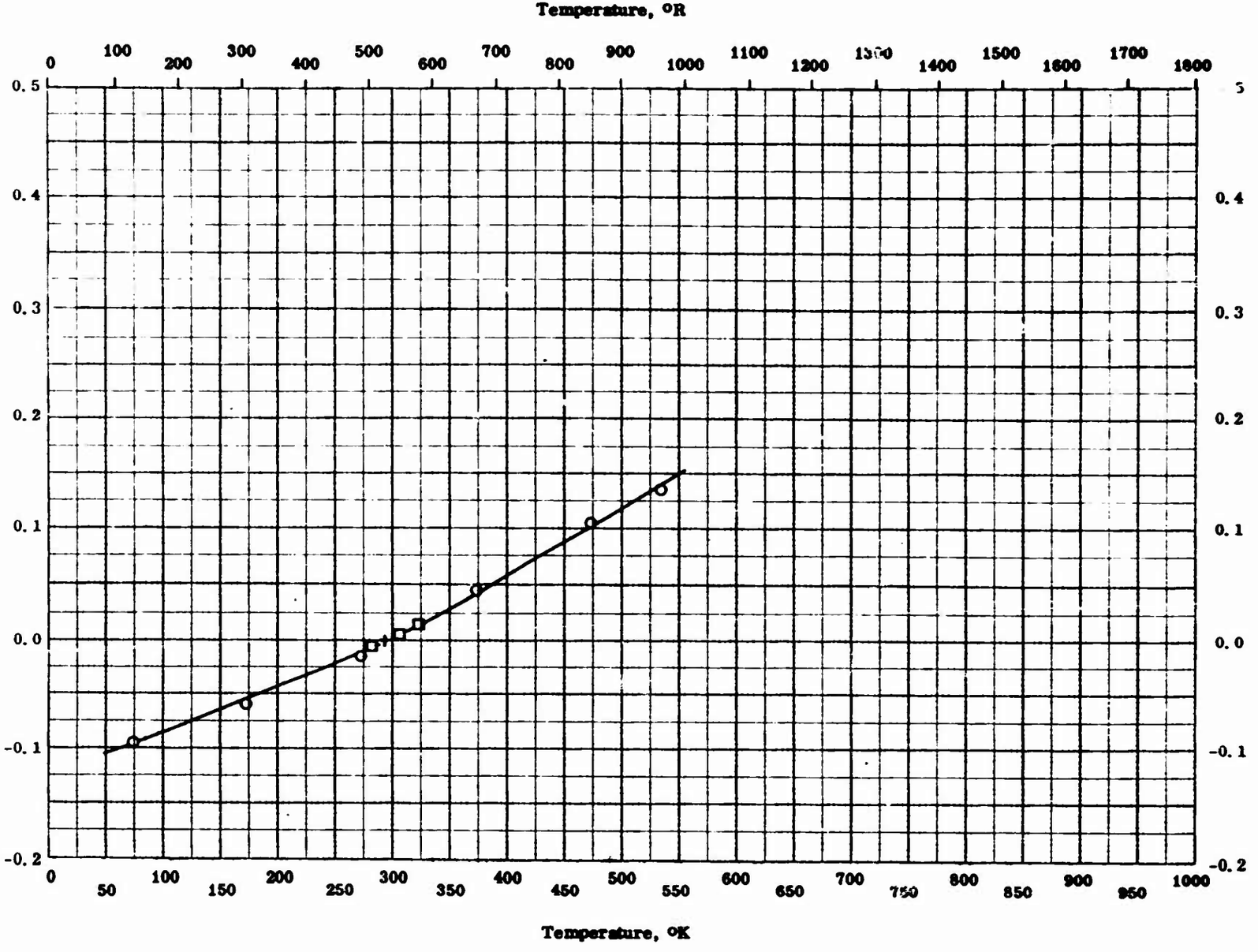
TPRC



THERMAL DIFFUSIVITY -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-3	575-896	±2	T 1810; n-type and arsenic doped 2 in. long square rod with sides 0.3 in.; electrical resistivity 0.3 ohm-cm at room temperature.	Cut from a single crystal with <111> along rod axis; measured with probes at a frequency 5 RPM.
□	59-1	306-648	3.0	1868-B; n-type crystal; electrical resistivity of 3×10^{-3} ohm-cm.	Measured frequency of 0.05 cps.
△	59-1	303-1021	3.0	Same as above	The above sample measured at a frequency of 0.2 cps.
◇	61-3	538-756	<5.0		

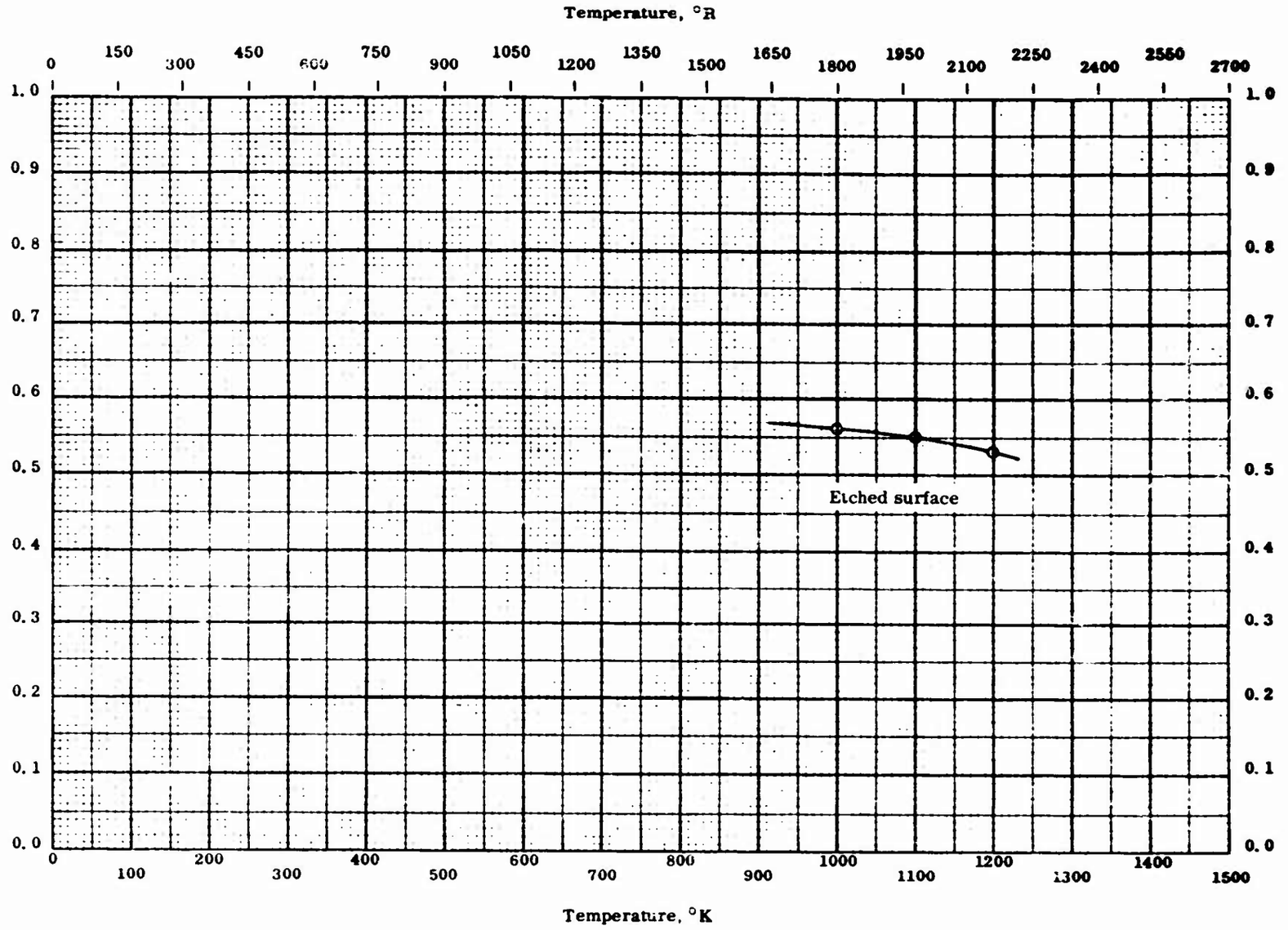


THERMAL LINEAR EXPANSION -- GERMANIUM

THERMAL LINEAR EXPANSION -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-48	77-548		99.99+ pure.	Length parallel to (100) and (111) directions.
□	52-17	283-322		99.999 Ge, 0.00024 Ca, 0.00005 Mg, 0.000047 Cu, and 0.00002 Si.	Measured by x-ray diffraction method.



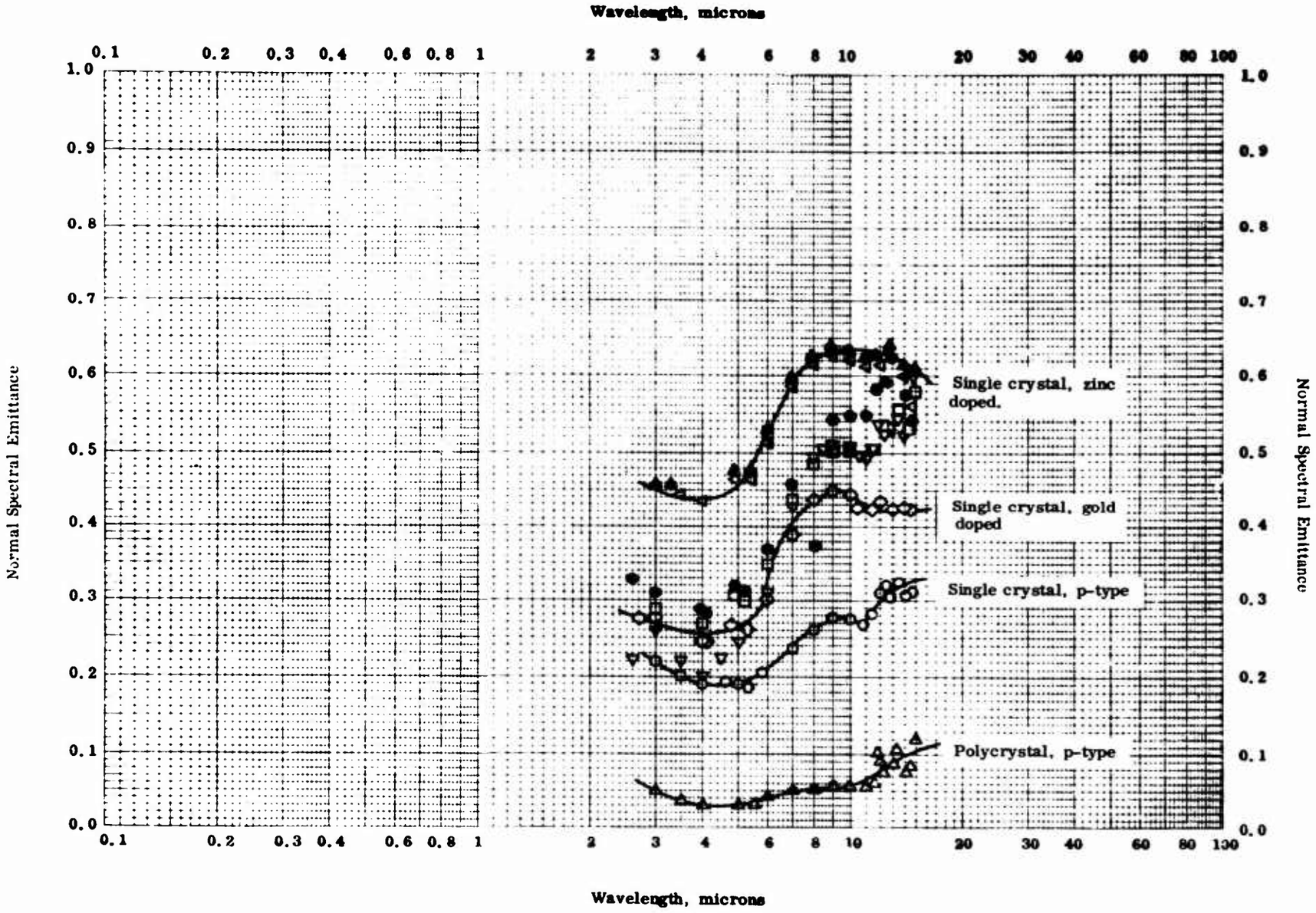
NORMAL SPECTRAL EMITTANCE -- GERMANIUM

TPRC

NORMAL SPECTRAL EMITTANCE -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range, °K	Rept. Error%	Sample Specifications	Remarks
O	57-43	0.65	1000-1200	< ± 10	Composition not given.	Surface etched; measured in vacuum.

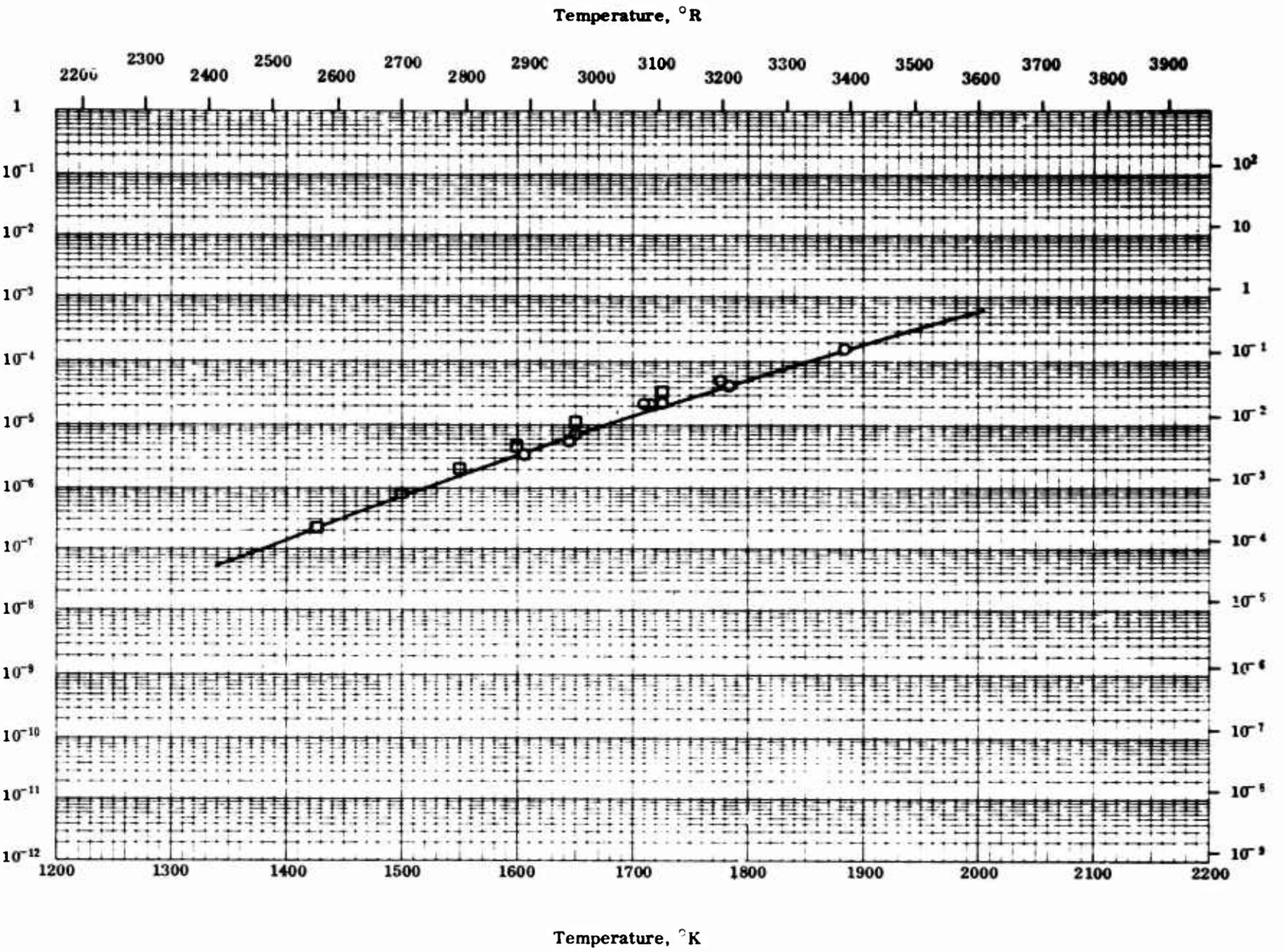


NORMAL SPECTRAL EMITTANCE — GERMANIUM

NORMAL SPECTRAL EMITTANCE -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	61-34	373	3-14.6	<1	Single crystal, p-type; resistivity 35 Ω cm.	Ground and polished; measured in vacuum; data taken from smooth curve.
□	61-34	433	3-15.0	<1	Same as above.	Same as above.
△	61-34	33[illegible]	3-15.0		Polycrystal, p-type; resistivity 40 Ω cm.	Same as above.
▽	61-34	433	2.6-14.9		Same as above.	Same as above.
◇	61-34	393	2.7-14.4		Single crystal, gold doped; resistivity 1.3 Ω cm.	Ground and polished; measured in vacuum; data taken from smooth curve.
●	61-34	433	2.6-14.8		Same as above.	Same as above.
◁	61-34	393	3.5-14.6		Single crystal, zinc doped, resistivity 0.2 Ω cm.	Ground and polished; measured in vacuum; data taken from smooth curve.
▲	61-34	433	3.0-15.0		Same as above.	Same as above.



VAPOR PRESSURE -- GERMANIUM

VAPOR PRESSURE -- GERMANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-12	1608-1885		Not given.	
□	53-10	1429-1724		"Pure".	

PROPERTIES OF GOLD

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	19.3	1205
Melting Point	1336.8	2406.3
Heat of Sublimation	429_{0K}	772_{0R}

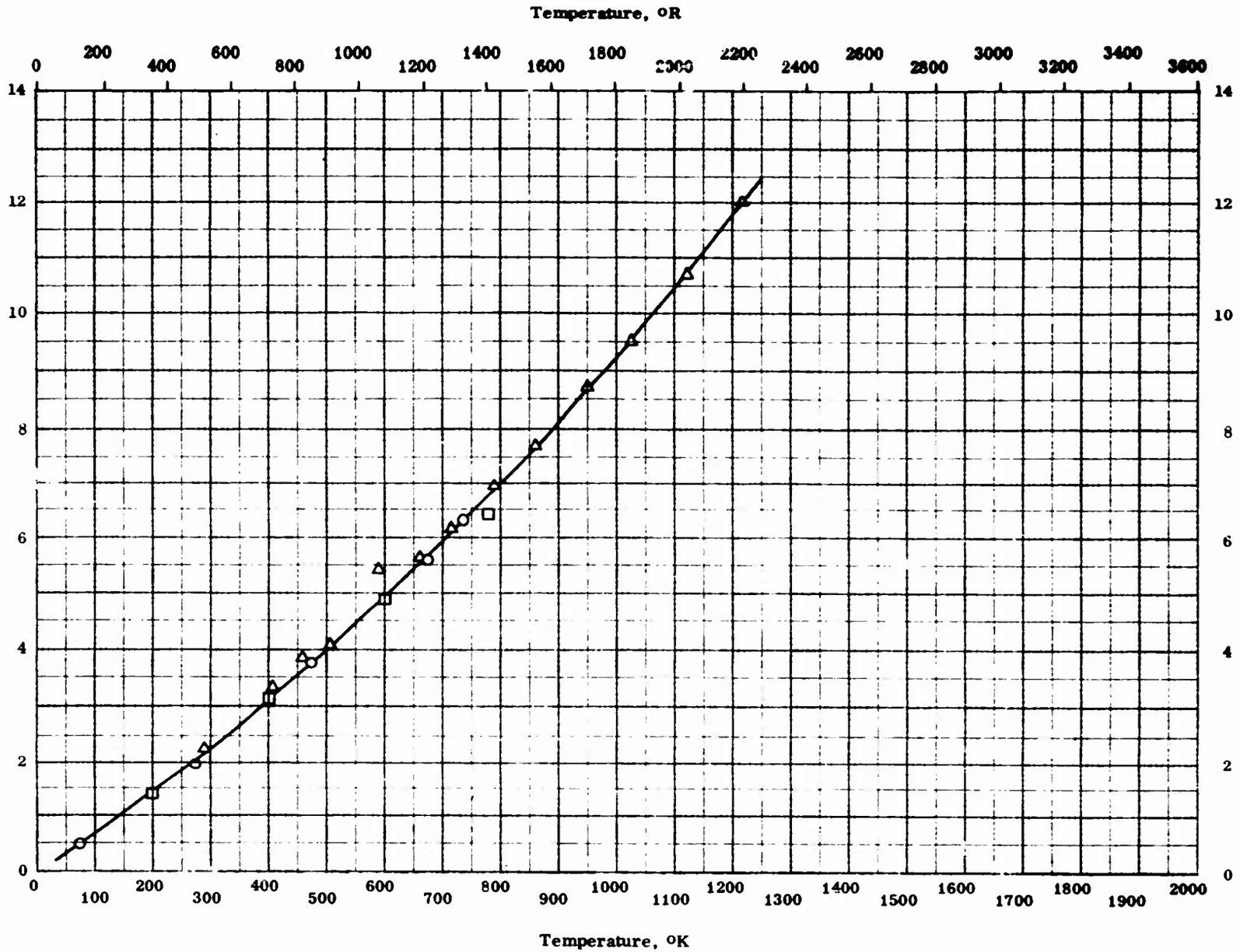
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	◇	19.30	1205
Melting Point		K	R
	○	1336.84 ± 0.05	2406.31 ± 0.09
	□	1334 ± 4	2402 ± 7
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	△	429_{0K} ± 4	772_{0R} ± 7

PROPERTIES OF GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-49	1337		Not given but material apparently very pure.	M. P. by thermal analysis with constant volume N_2 thermometer.
□	54-29	1335		99.999 pure.	M. P. from the loss of electric continuity in wire suspended in heated cylinder by optical pyrometer.
△	51-9	0		Not given.	Δh_s from vapor pressure.
◇	43-3	298		Not given.	Quenched from 850 C.



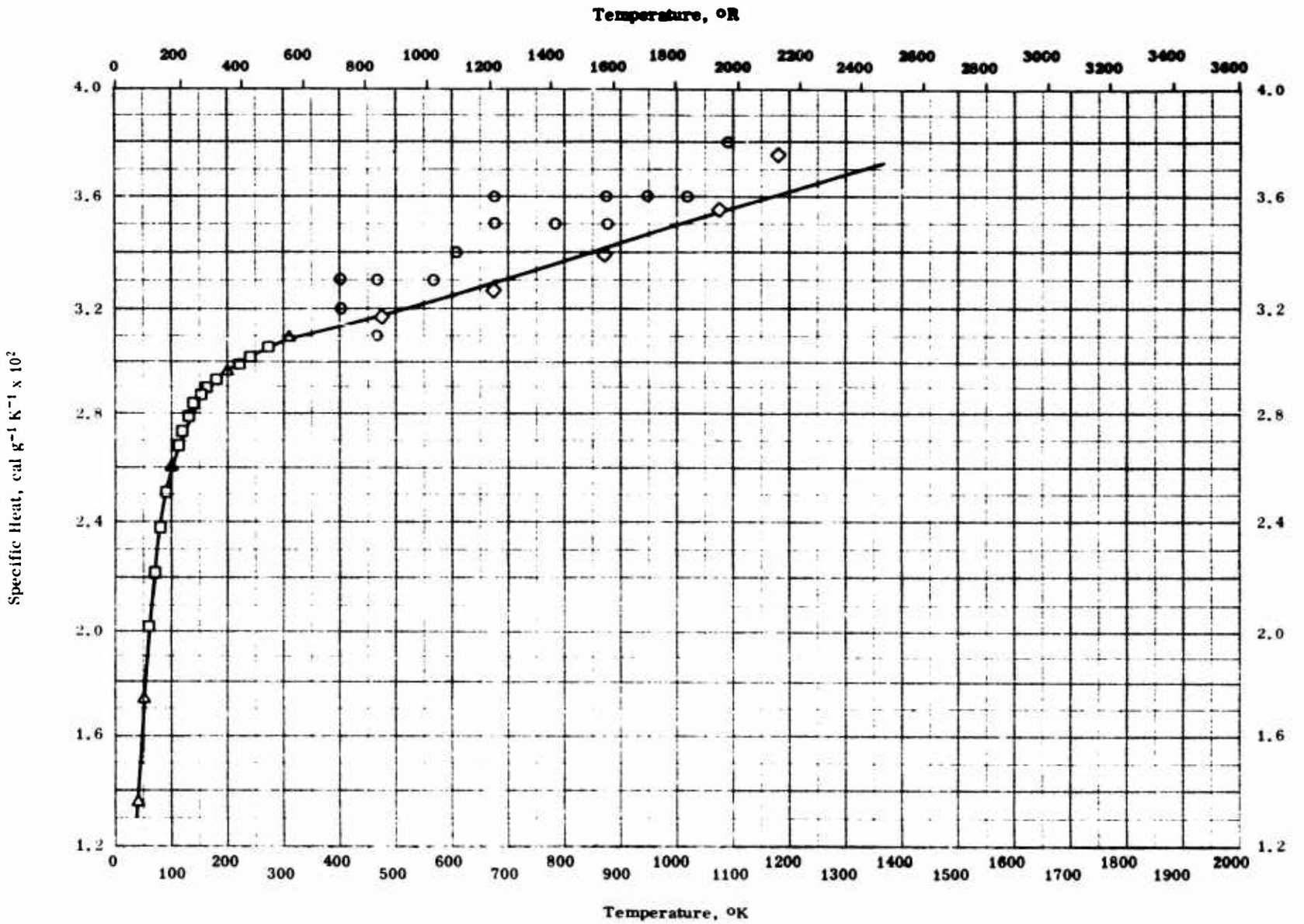
ELECTRICAL RESISTIVITY -- GOLD

TPRC

ELECTRICAL RESISTIVITY -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	56-33	73-773		99.99 pure.	Heated 24 hrs at 900 C, swaged, and annealed 1 hr at 500 C.
Δ	54-22 also 54-23	291-1217		99.999 pure.	Drawn into 0.012 in. dia. wire.
□	62-39	200-780		Pure.	

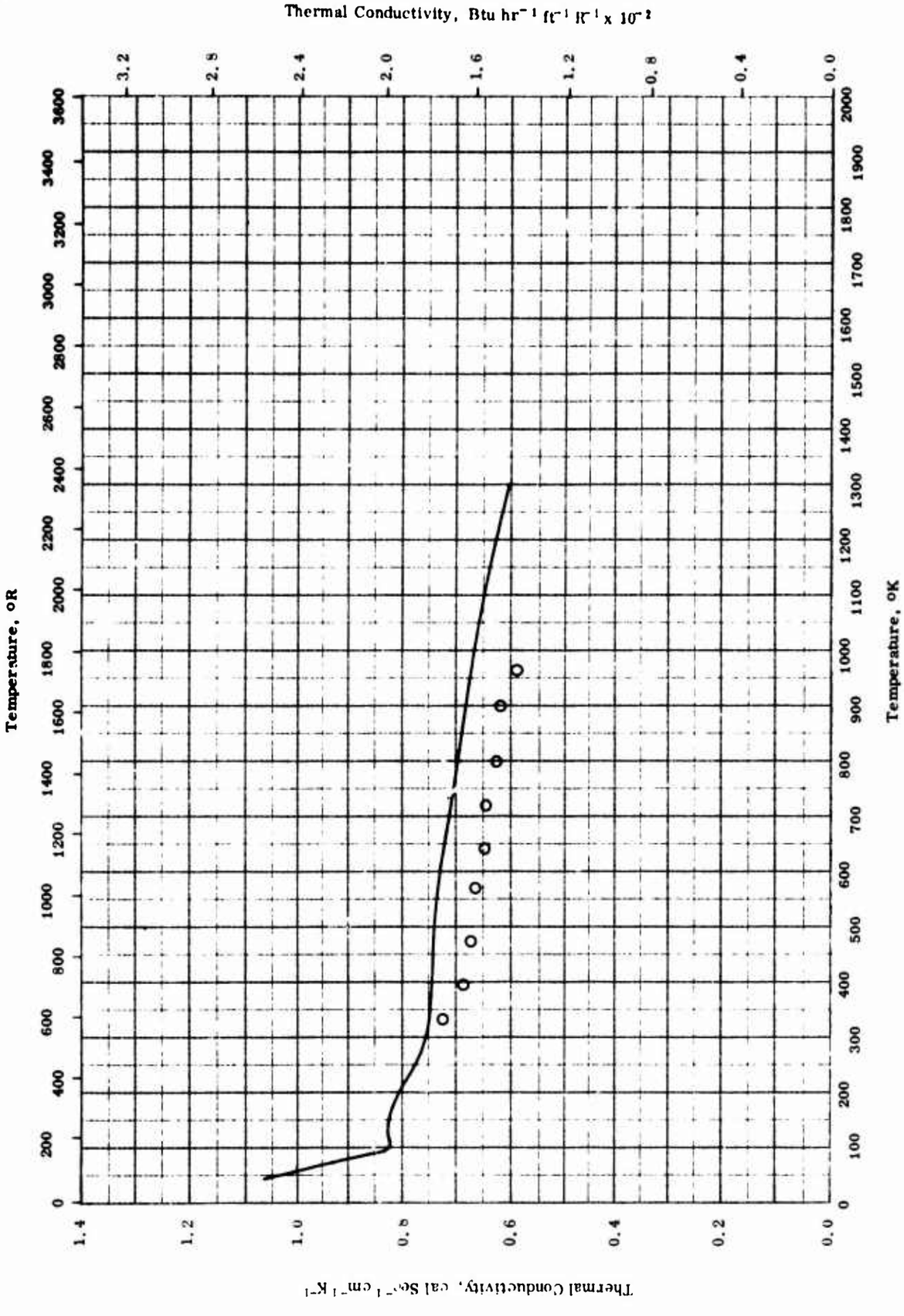


SPECIFIC HEAT -- GOLD

SPECIFIC HEAT -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-16	400-1164		"Pure".	Specimen's surface plated with platinum black.
□	63-44	12-273		99.99 Au.	
△	52-33	16-310		99.99 Au, single crystal.	
◇	32-1	473-1336		Perfectly pure state.	

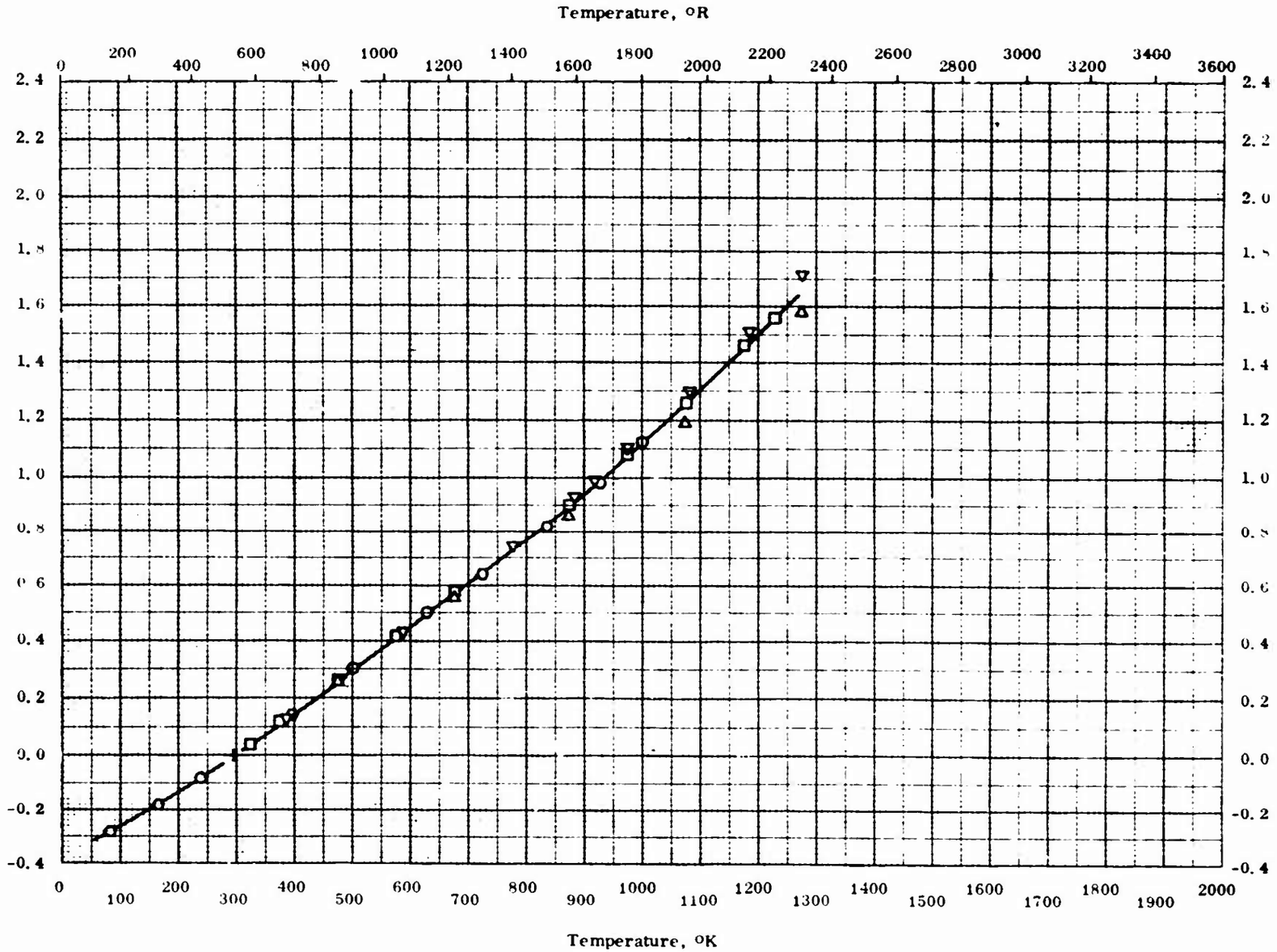


THERMAL CONDUCTIVITY -- GOLD

THERMAL CONDUCTIVITY -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-14	331-964		99.99 pure; polycrystal.	



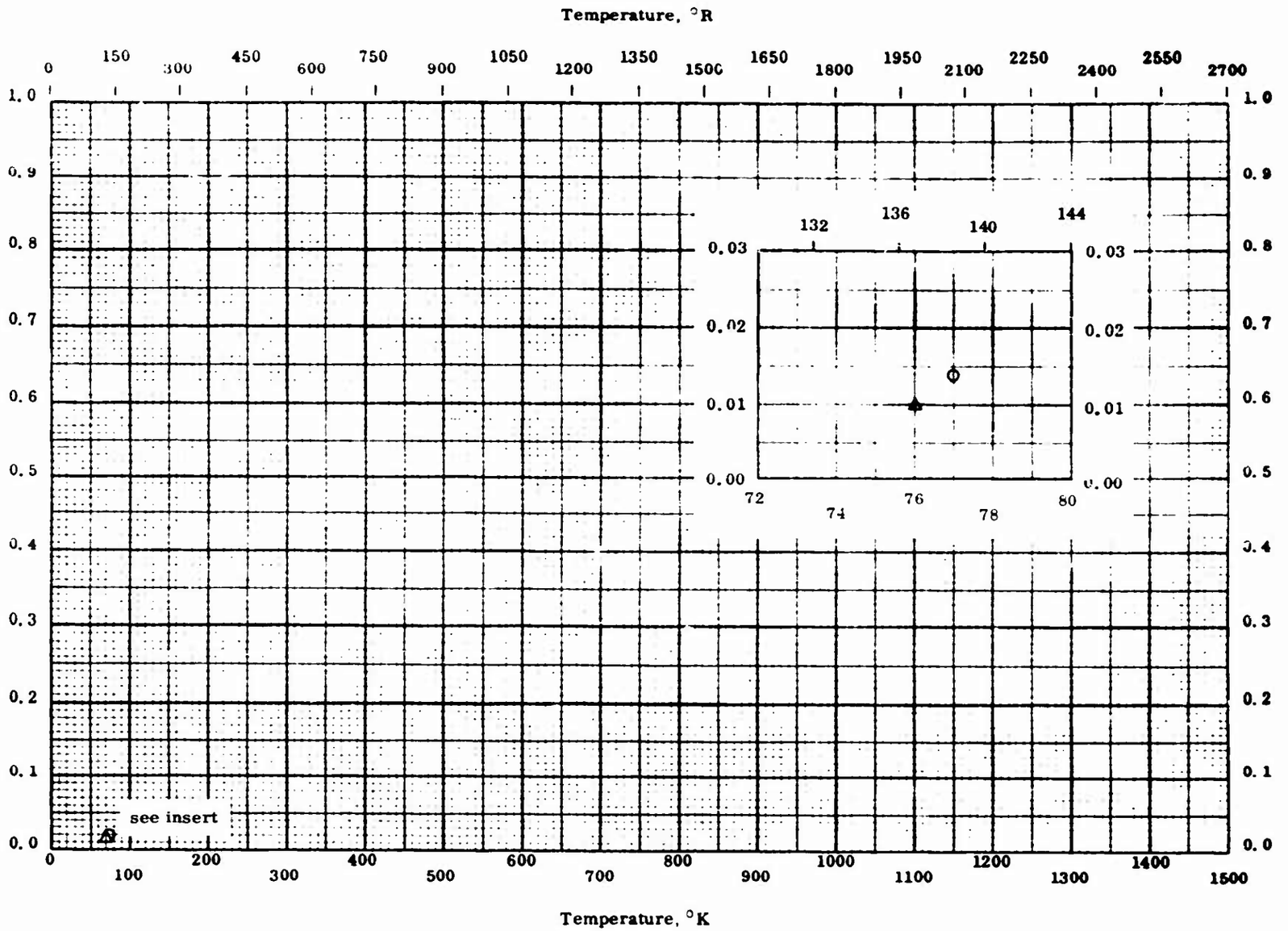
THERMAL LINEAR EXPANSION -- GOLD

TPRC

THERMAL LINEAR EXPANSION -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ	Sample Specifications	Remarks
○	41-9	86-1003		99.99 Au and traces of Ag, Cu, Pd.	
□	41-8	273-1223		Spectroscopically pure.	Annealed 1 hr at 950 C and cooled very slowly.
△	51-29	293-1273		Not given.	Machined from casting; annealed.
▽	64-29	298-1275		0.1> Zn, Rh, Ir each, 0.05> K, V, Co, Sr, Cd each, 0.01> Na, Al, Ca, Cr, Fe, Ni, Ru, Pd, Ag, Ba, Pt each, 0.004> B, Mn, Cu, Pb each, 0.002> Li, and 0.001> Be, Mg each.	Measured in vacuum in the range 1×10^{-3} to 5×10^{-3} mm Hg; x-ray method; standard deviation in the lattice parameters 15.5×10^{-5} Å; parameters not corrected for refraction.



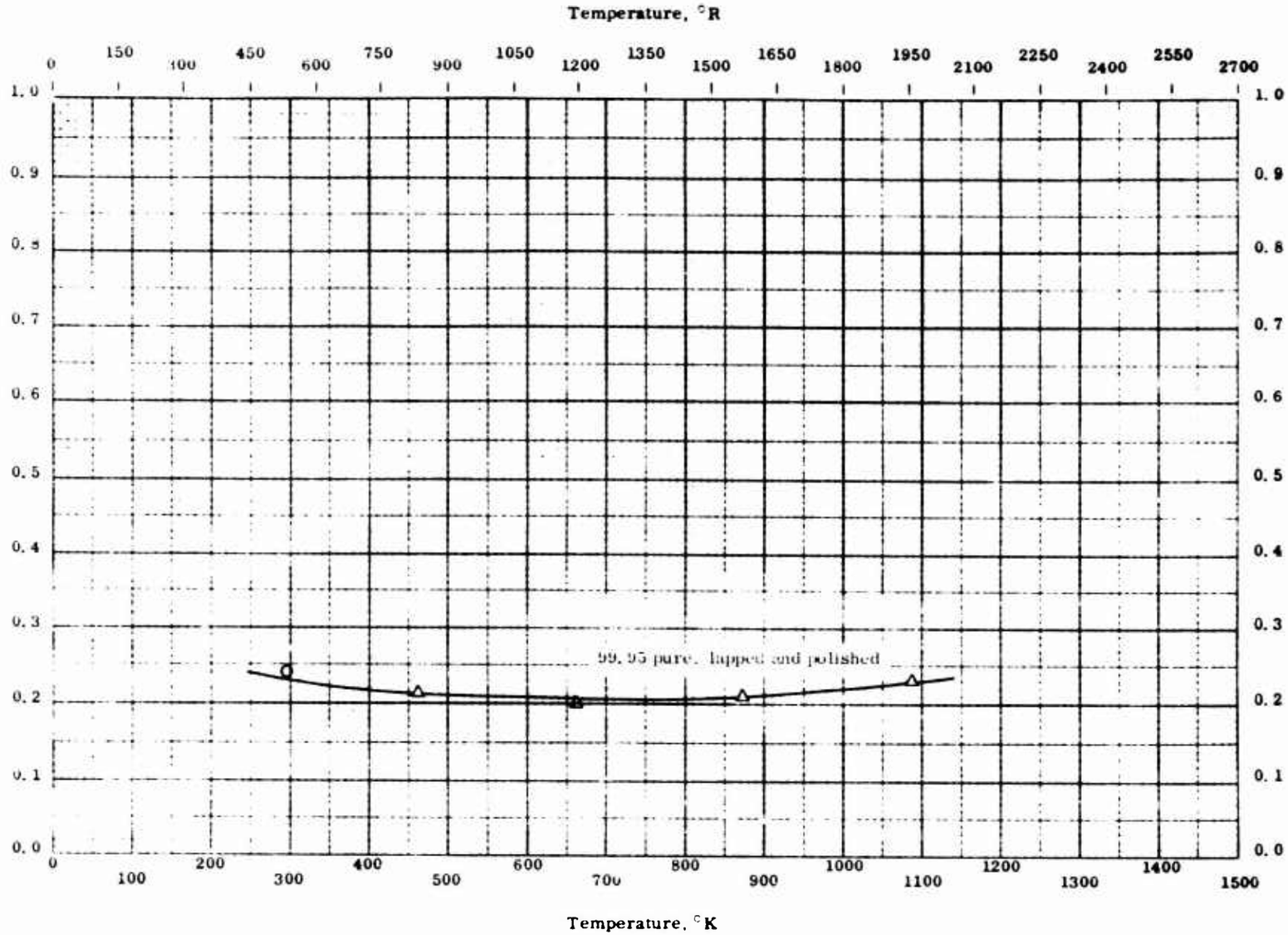
HEMISPHERICAL TOTAL ABSORPTANCE -- GOLD

TPRC

HEMISPHERICAL TOTAL ABSORPTANCE — GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	55-35	77	± 10	Electroplate ~ 0.0003 in thickness.	Matte surface, unbuffed, dull or milky in appearance; measured in vacuum (3×10^{-6} mm Hg)
Δ	57-42	76	5	Foil, 0.0015 in thickness.	Not given.



Solar Absorptance

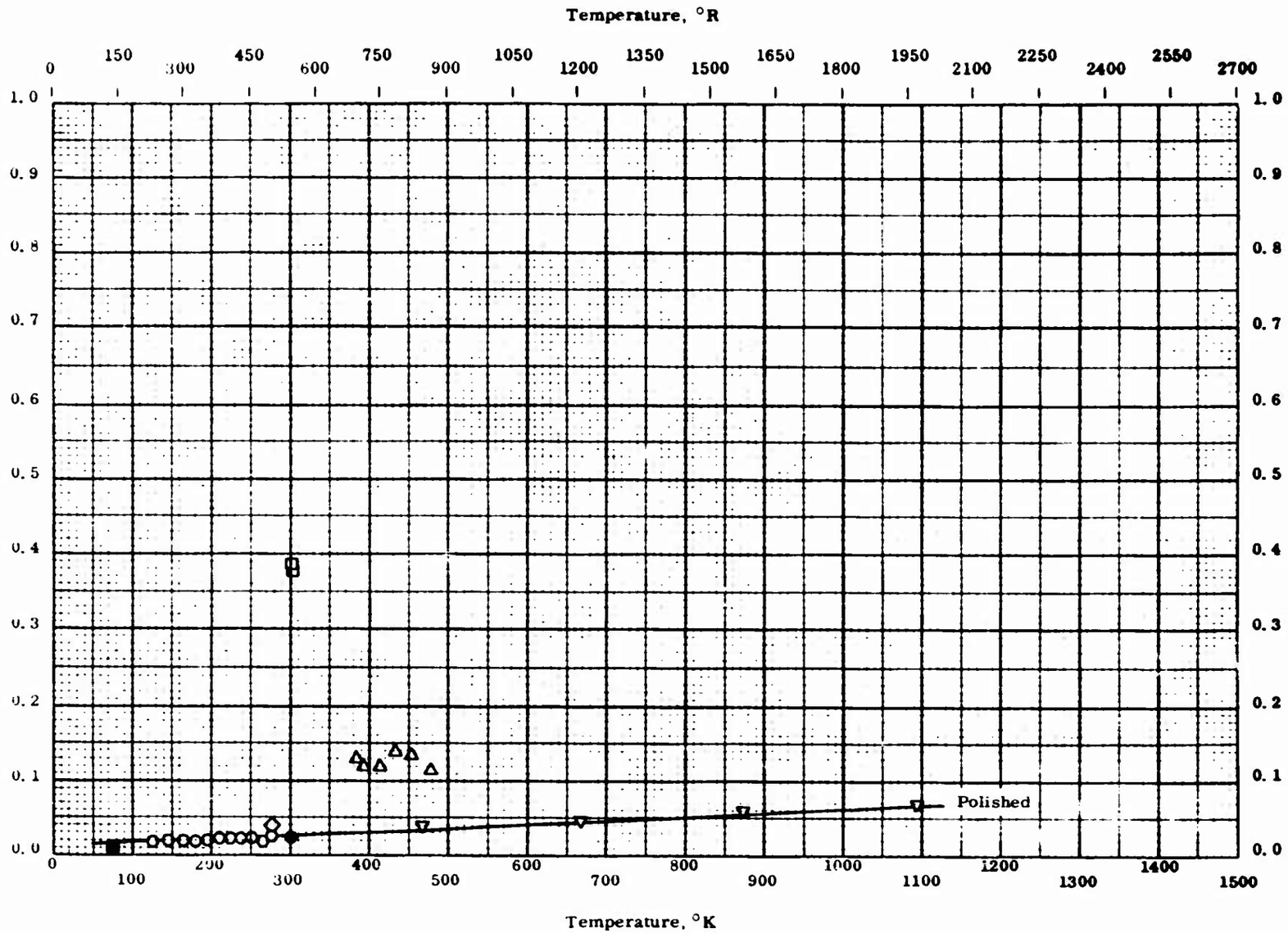
Solar Absorptance

SOLAR ABSORPTANCE -- GOLD

SOLAR ABSORPTANCE -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-38	298	10	Vacuum deposited gold on aluminum.	Average value.
△	60-42	463-1088		99.95 pure, commercial grade.	Lapped and polished; measured in vacuum at ≈5μ Hg.



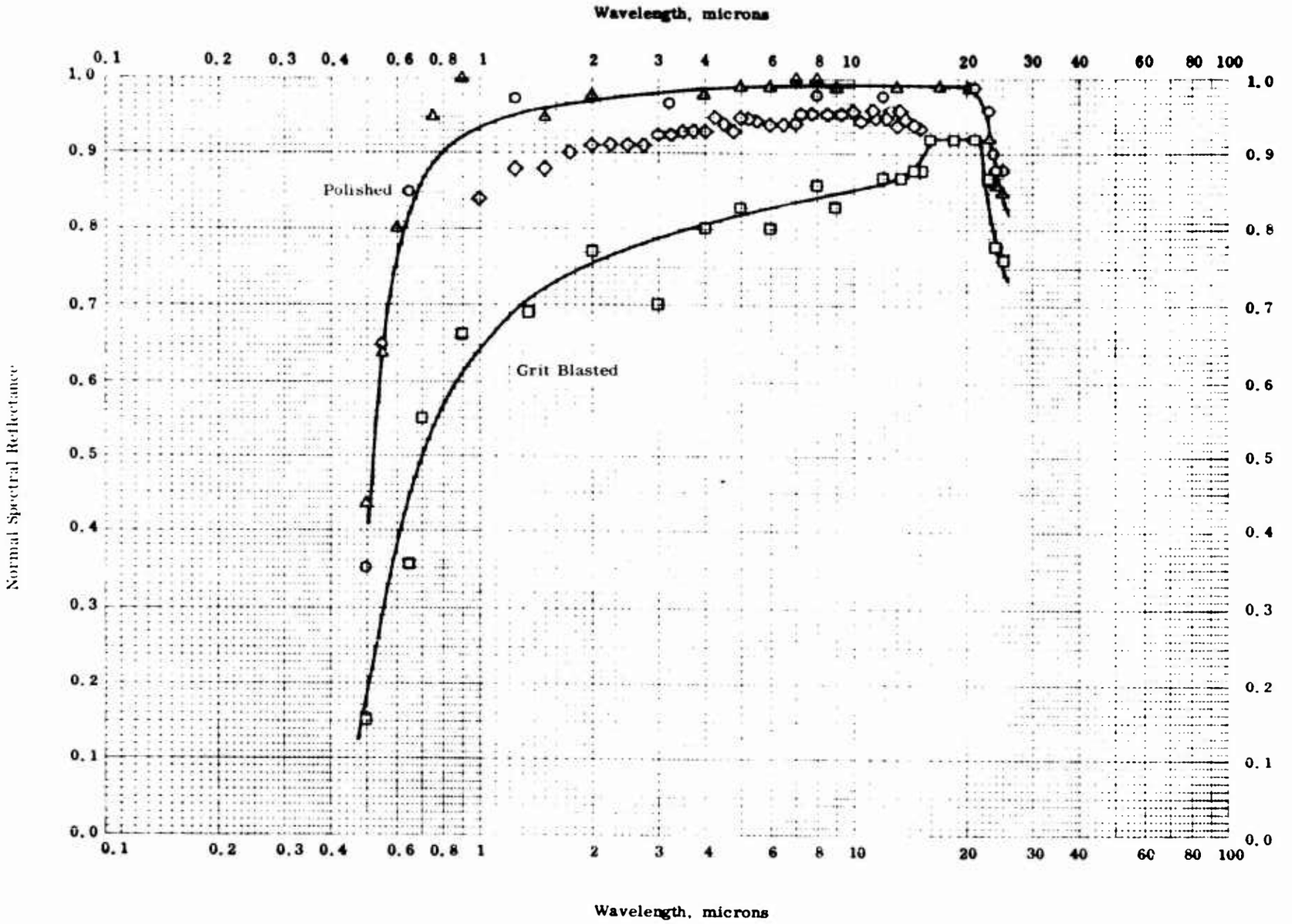
HEMISPHERICAL TOTAL EMITTANCE -- GOLD

HEMISPHERICAL TOTAL EMITTANCE -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-25	126-275	± 10	Not given.	Polished; measured in vacuum (5×10^{-10} mm Hg).
△	62-43	384-477	± 3	Leaf, ~ 6 μ thickness.	Measured in vacuum (10^{-3} mm Hg); data taken from smooth curve.
□	64-17	301		Plate on aluminum.	Buffed surface; measured in vacuum (2×10^{-7} mm Hg).
▽	61-39	468-1093	≤ 10	99. 95 pure, commercial grade.	Ground with 600 grit carborundom, polished on a wet cloth, lap with either Linde Alumina type B-5125 or unlevigated jewelers rouge; measured in vacuum (10^{-5} mm Hg).
◇	61-38	278	10	Vacuum deposite on aluminum.	Vacuum deposite; average value.
■	60-38	76	5	Foil, 0. 0015 in thickness.	Solvent cleaned; measured in vacuum (10^{-6} - 10^{-7} mm Hg).
●	55-35	300	± 20	Electroplating ~ 0. 0003 in. thickness.	Polished, kerosene buff; measured in vacuum (3×10^{-6} mm Hg).

TPRC



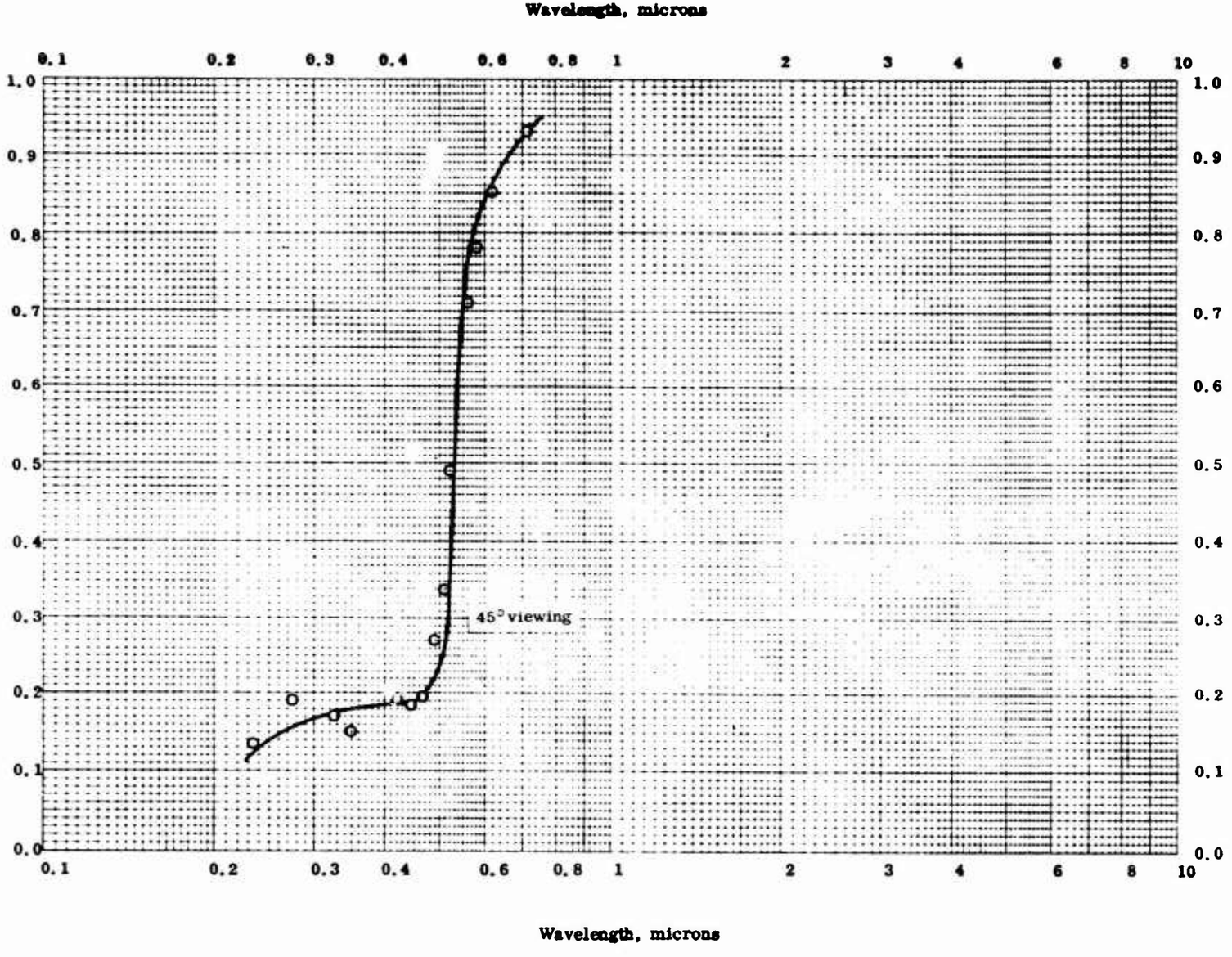
NORMAL SPECTRAL REFLECTANCE -- GOLD

NORMAL SPECTRAL REFLECTANCE — GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	62-46	298	0.50-25.0		Substrate 6061-T6 Al plated over a copper strike using Selrex 24 K gold plating solution to 0.0002 in. thickness.	As received.
△	62-46	298	0.50-25.0		Substrate 6061-T6 Al, 1 min. in double zincate bath, 1 min copper strike, 3 min in Selrex 24 K gold plating solution.	Chemically polished.
□	62-46	298	0.50-25.0		Same as above.	Grit blasted.
◇	54-24	298	1-15	±2.4	Electrolytically pure.	Polished with soft rag, washed in acetone and ethyl alcohol.

TPRC

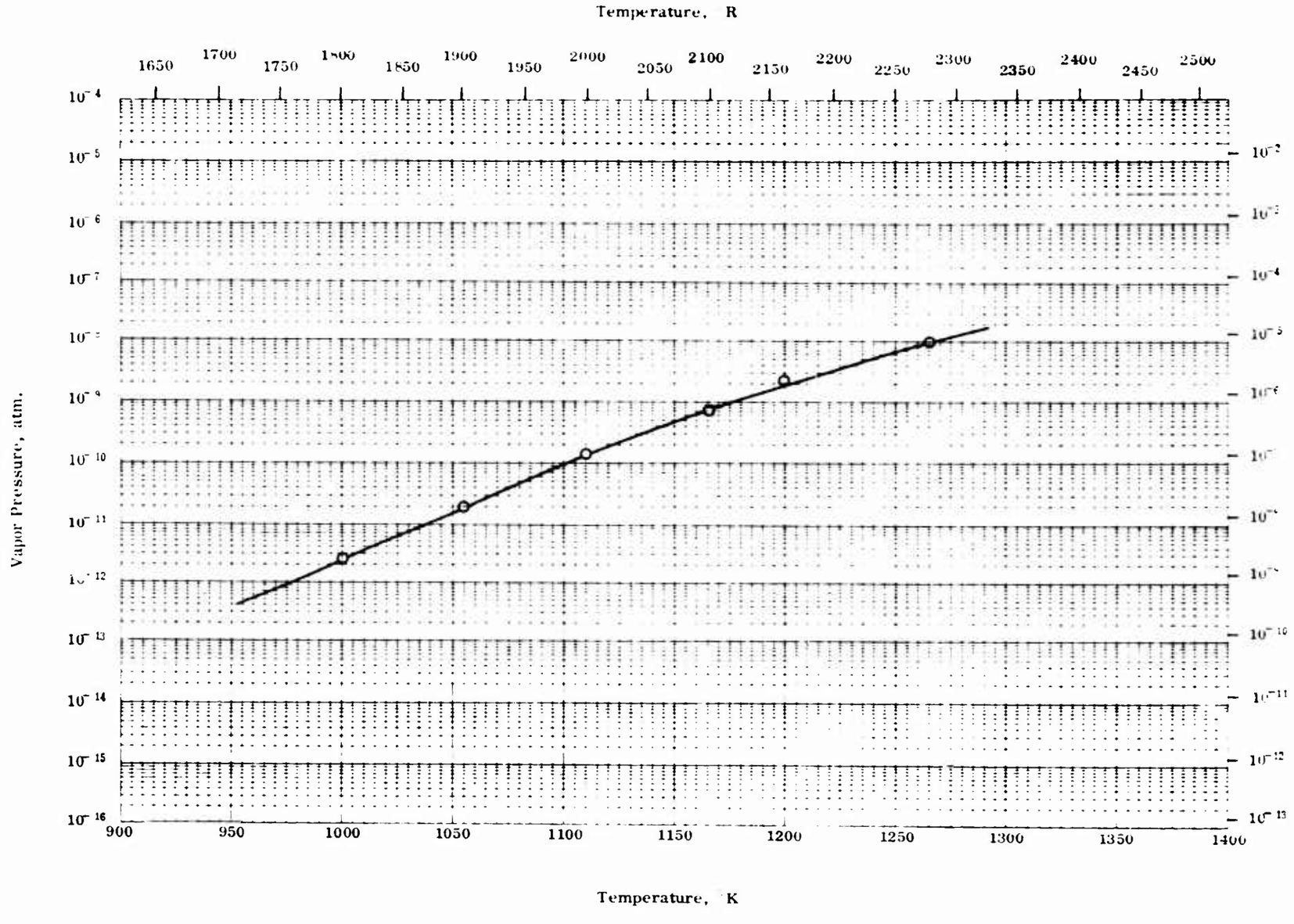


ANGULAR SPECTRAL REFLECTANCE -- GOLD

ANGULAR SPECTRAL REFLECTANCE -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	61-37	298	0.255-0.710		Film, 2×10^{-1} μ thickness.	Vacuum evaporated on glass; 45 degree illumination, 45 degree viewing; data taken from smooth curve.



TPRC

VAPOR PRESSURE -- GOLD

VAPOR PRESSURE -- GOLD

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	51-9	1000-1267		Not given.	Mo cell.

PROPERTIES OF HAFNIUM

MOST PROBABLE VALUES

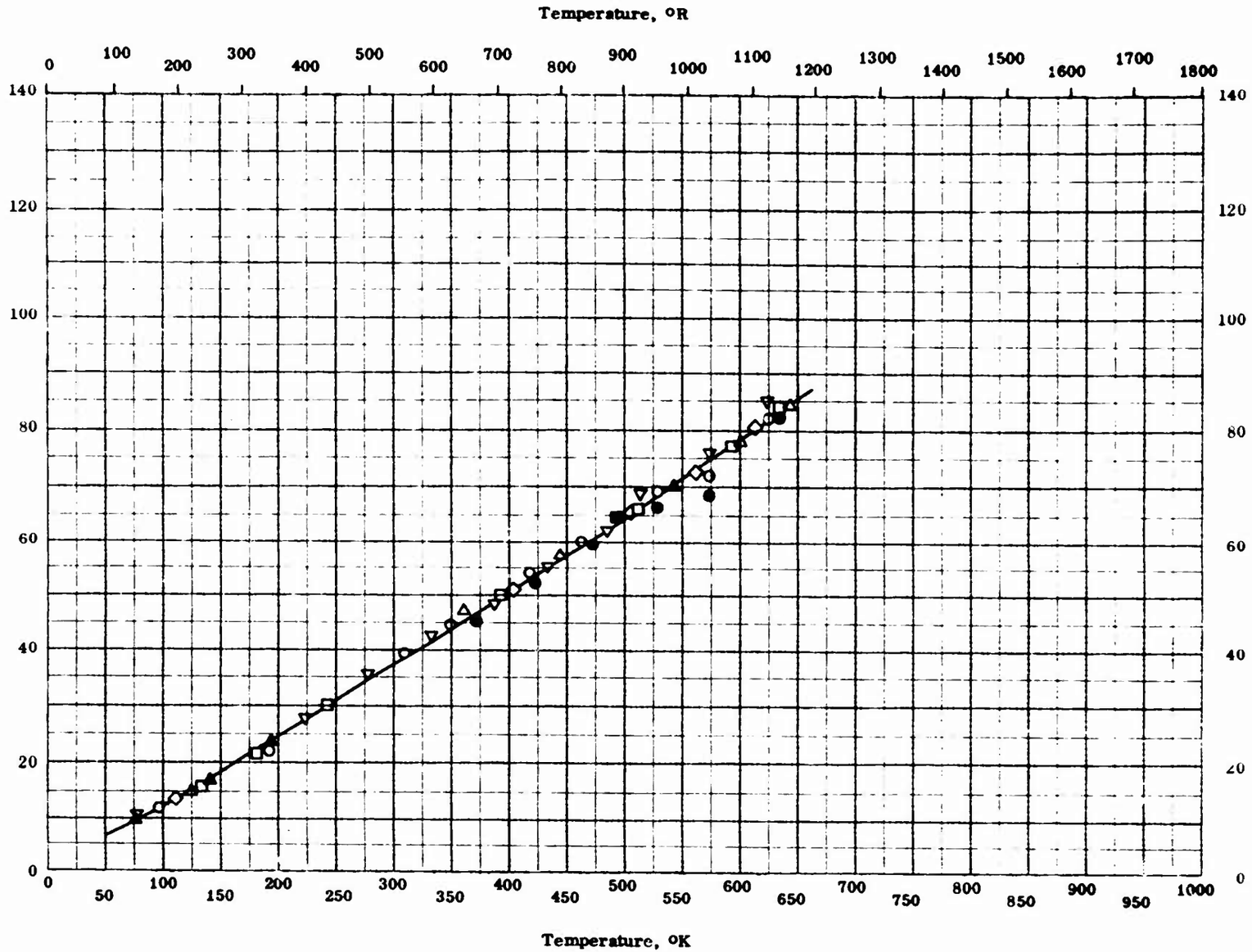
Property	C.G.S. Units	Brit. Eng. Units
Density.	13.28	829
Melting Point	2495	4490

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	▽	13.28	829
Melting Point		K	R
	◇	2495 ± 30	4490 ± 54
	○	2503	4506
	□	2455 ± 30	4419 ± 50
	△	2400	4330

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◇	56-46	2466-2526		0.08 Fe, 0.015 Si, 0.012 O_2, 0.01 Ti, 0.008 Zr, 0.006 Mo, 0.004 each Cu, Mg, Ni, and V, 0.003 > C, 0.002 Al.	M. P.; black body cavity, optical pyrometer.
▽	51-33	298		Not given.	
○	56-55	2503		Not given.	M. P.; by breaking in time-temperature curve.
□	54-40	2427-2483		Not given.	M. P. from visual observation rounding of corners of hole, optical pyrometer sighting on black body cavity.
△	52-29	2406		0.03 C, 0.01 each Fe and Zr, 0.009 Ni, and traces of Al, Si, and Be crystal bar.	M. P. from breaking in time-temperature curve.



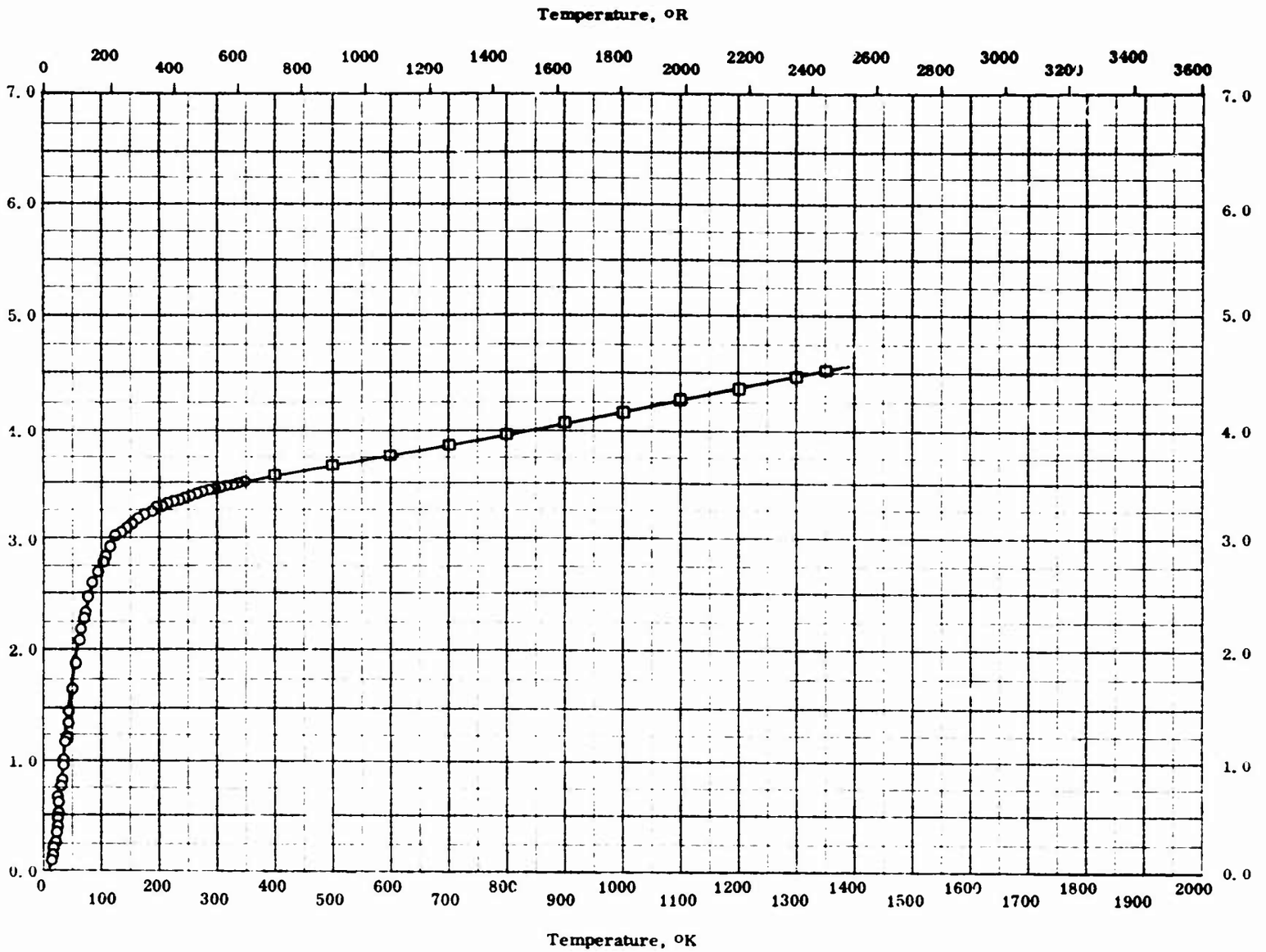
TPRC

ELECTRICAL RESISTIVITY -- HAFNIUM

ELECTRICAL RESISTIVITY -- HAFNIUM

REFERENCE INFORMATION

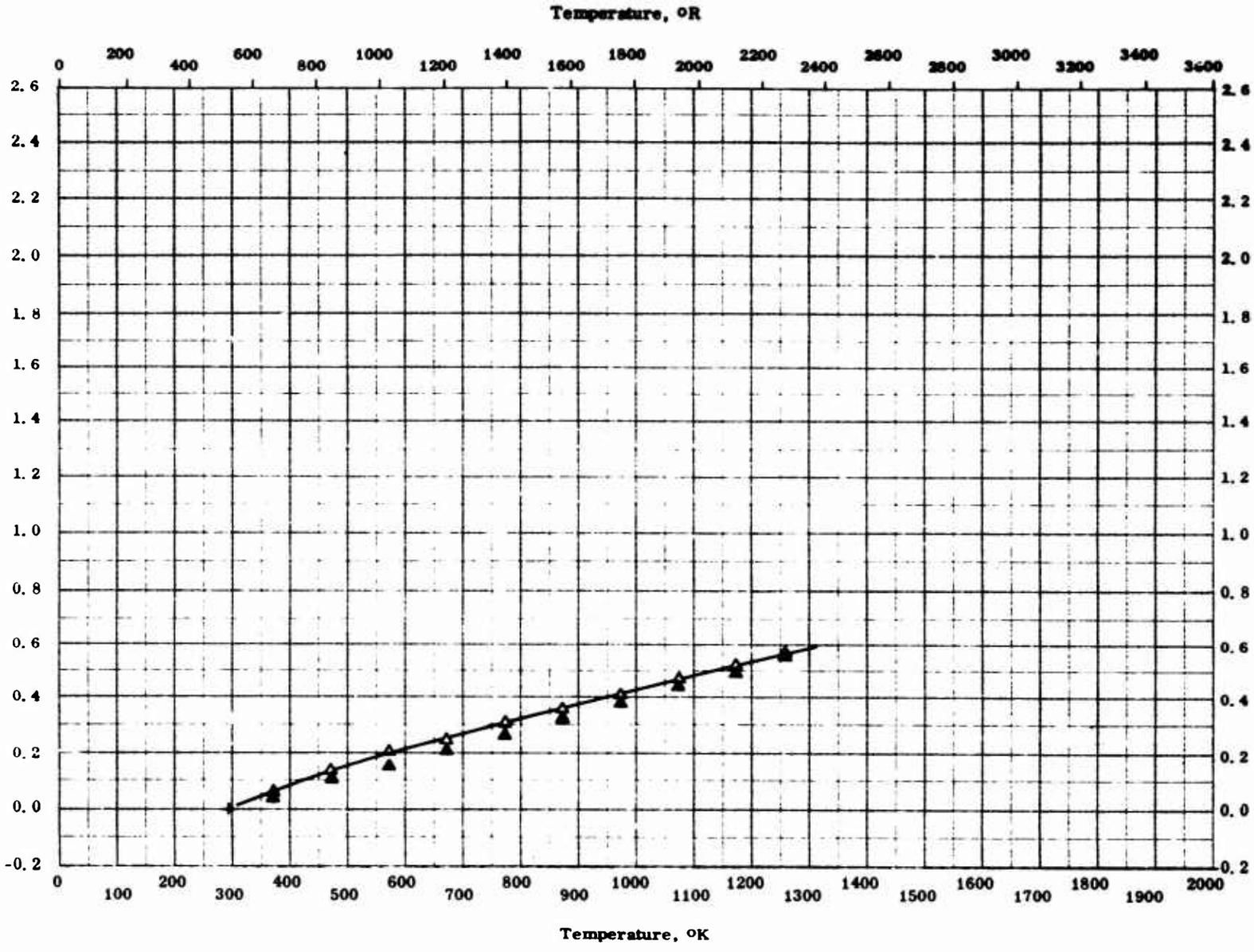
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▽	56-39	77-622		70 Grade No. 1 and 30 Grade No. 2 Hf crystal bar.	Consumable electrode arc melted.
○	56-39	77-626		Same as above.	Same as above; another sample.
□	56-39	77-626		30 Grade No. 1 and 70 Grade No. 2 Hf crystal bar.	Same as above.
△	56-39	77-628		Same as above.	Same as above.
◇	56-39	77-626		100 Grade No. 2 Hf crystal bar.	Same as above.
●	56-39	77-625		Same as above.	Same as above.
▲	56-39	77-622		100 Grade No. 1 Hf crystal bar.	Same as above.
■	56-39	77-622		100 Grade No. 2 Hf crystal bar.	Arc melted, nonconsumable tungsten electrode then arc remelted consumable electrodes.



SPECIFIC HEAT -- HAFNIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-9	5-348		99.95 Hf, 0.05 Zr, 0.02 Fe, 0.015 C, 0.0065 Si, 0.0043 Mg, 0.0018 O_2, 0.0007 Ni, 0.0005 > N_2, 0.0003 Cu, 0.0001 W, and 0.0001 > H_2.	
□	63-21	298-1346		2.8 Zr, 0.020 Fe, 0.010 Ni, and 0.008 O_2.	Corrected for impurities.



THERMAL LINEAR EXPANSION -- HAFNIUM

THERMAL LINEAR EXPANSION -- HAFNIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	54-47	293-1258		Not given.	Prepared from a billet, arc melted by WAPD, extruded at 1100 C at KAPL, swaged cold to the final size in several passes, and annealed at 750 C after each swaging pass.
▲	54-47	373-1258			Cooling data of above specimen.

PROPERTIES OF HOLMIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	8.799	549.3
Melting Point	1773	3192
Heat of Fusion	25	45
Heat of Vaporization. . . .	418	752
Heat of Sublimation	405	730

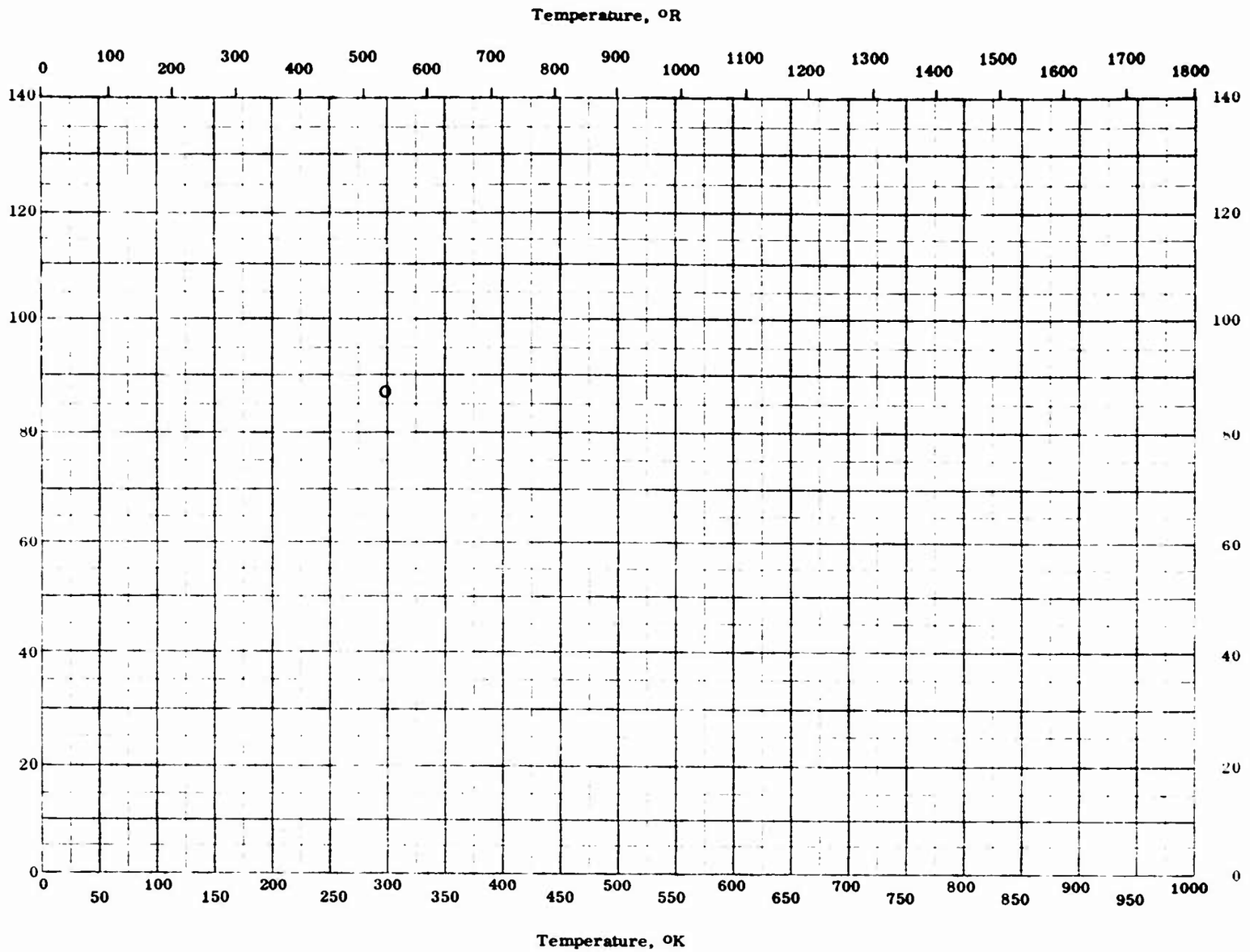
REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	□	8.799	549.3
	▽	8.65	539.8
Melting Point		K	R
	○	1773	3192
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	△	25	45
	◇	24.9	44.8
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▽	418	752
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◁	405	730

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-11	1773		Very pure.	M. P. by observation during preparation by optical pyrometer.
□	55-28	298		Not given.	Density computed from x-ray measurements.
△	56-54	1773		Very high purity.	
◁	56-5₁	---		Very high purity.	Δhs of the above sample.
◇	62-13	---		Not given.	
▽	62-13	298		Not given.	Δh_f and density.

TPRC



TPRC

ELECTRICAL RESISTIVITY -- HOLMIUM

ELECTRICAL RESISTIVITY -- HOLMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		Not given.	

PROPERTIES OF IRIDIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	22.5	1400
Melting Point	2727*	4909*
Heat of Sublimation	838	1508

*Handbook of Chemistry and Physics (Ref. 64-28)

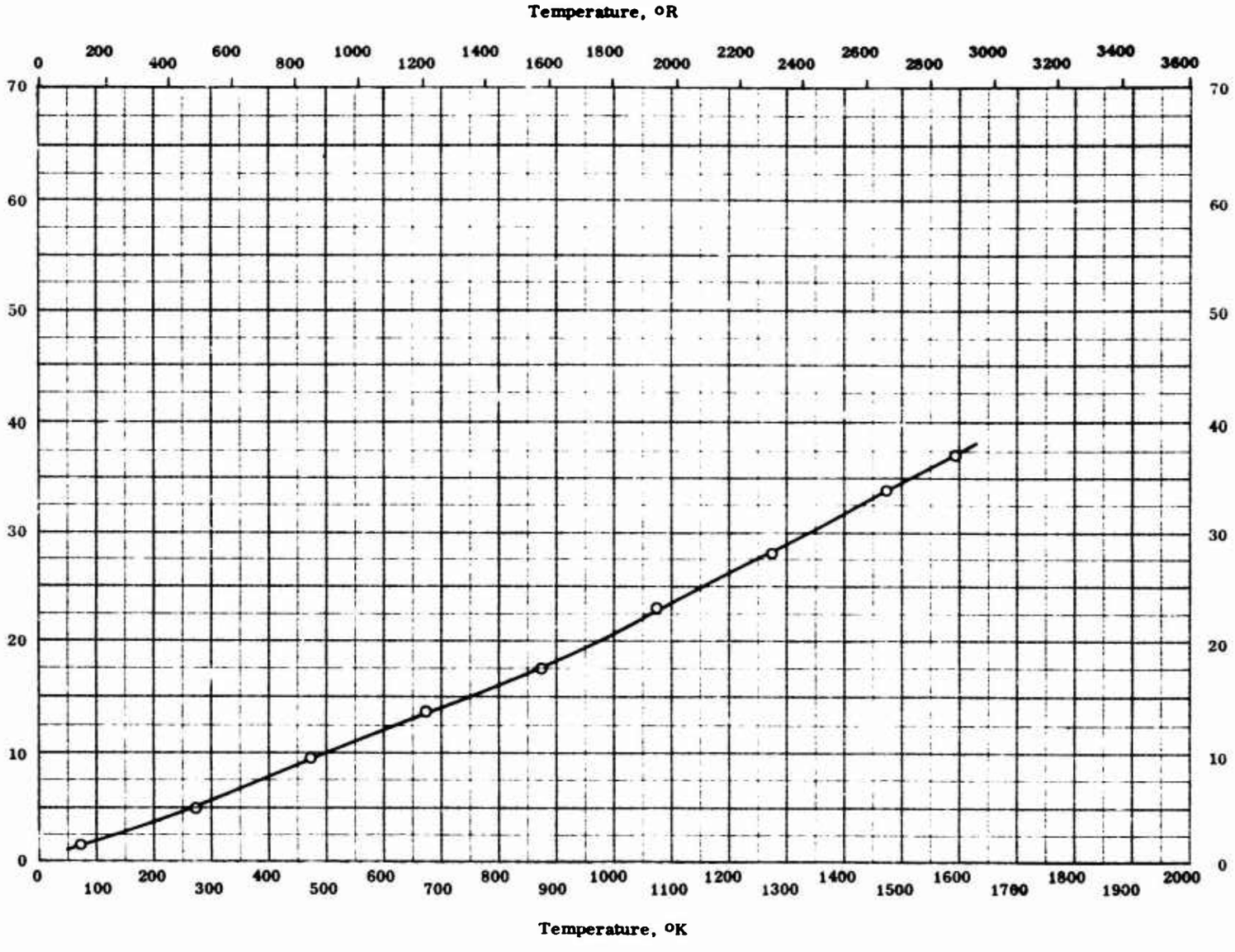
REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	22.49	1404
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	□	838 ± 15	1508 ± 27

PROPERTIES OF IRIDIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-1	298		0.02 - 0.05 Rh, 0.002 - 0.005 Ru, and 0.001 Pd.	Annealed at 1313 C.
□	61-20	298		Not given.	

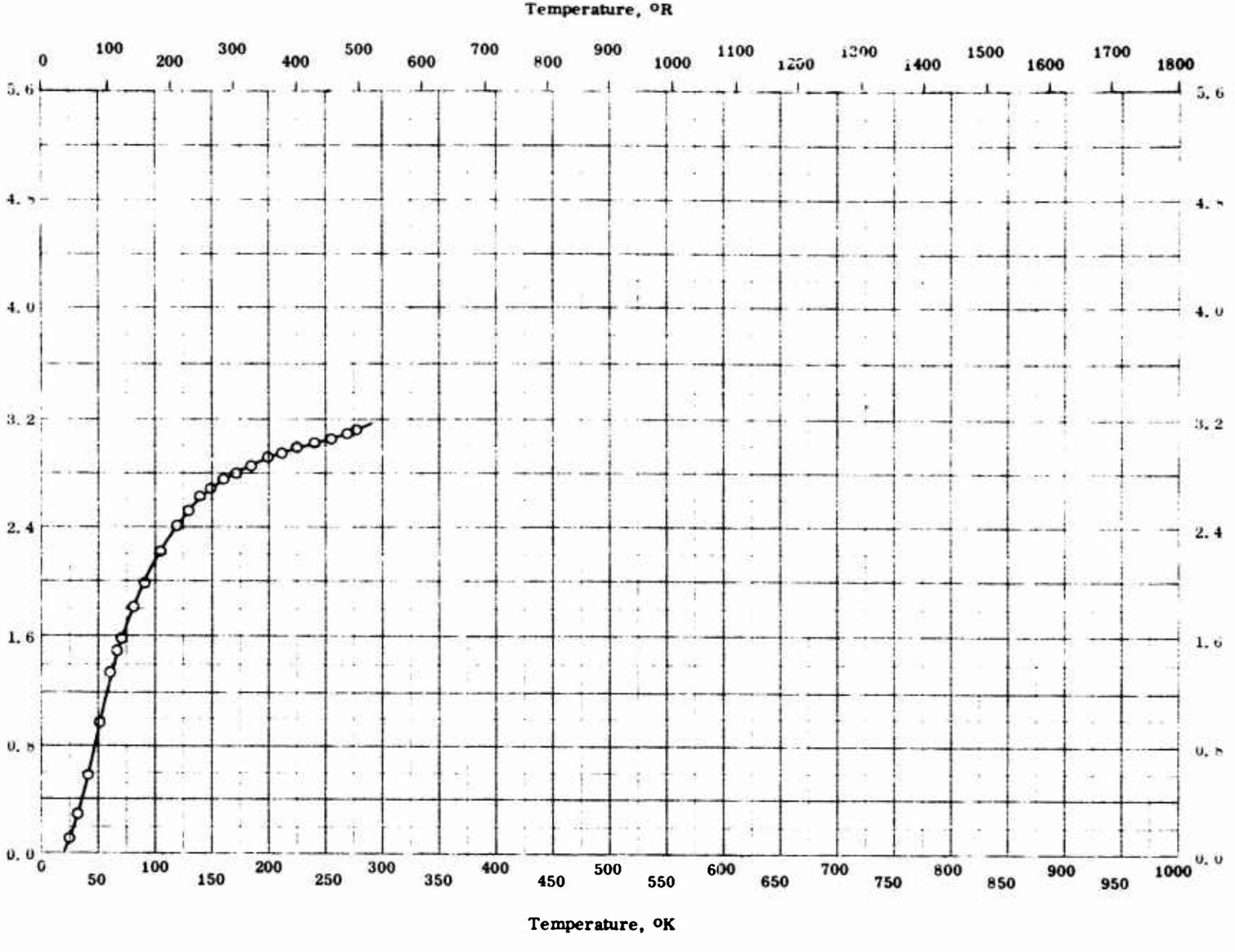


ELECTRICAL RESISTIVITY -- IRIDIUM

ELECTRICAL RESISTIVITY -- IRIDIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-34	73-1593		0.02 - 0.05 Rh, 0.002 - 0.005 Ru, and 0.001 Pd; density 22.42 g ml^{-1}; 5.0 cm in length and 0.318 cm dia.	

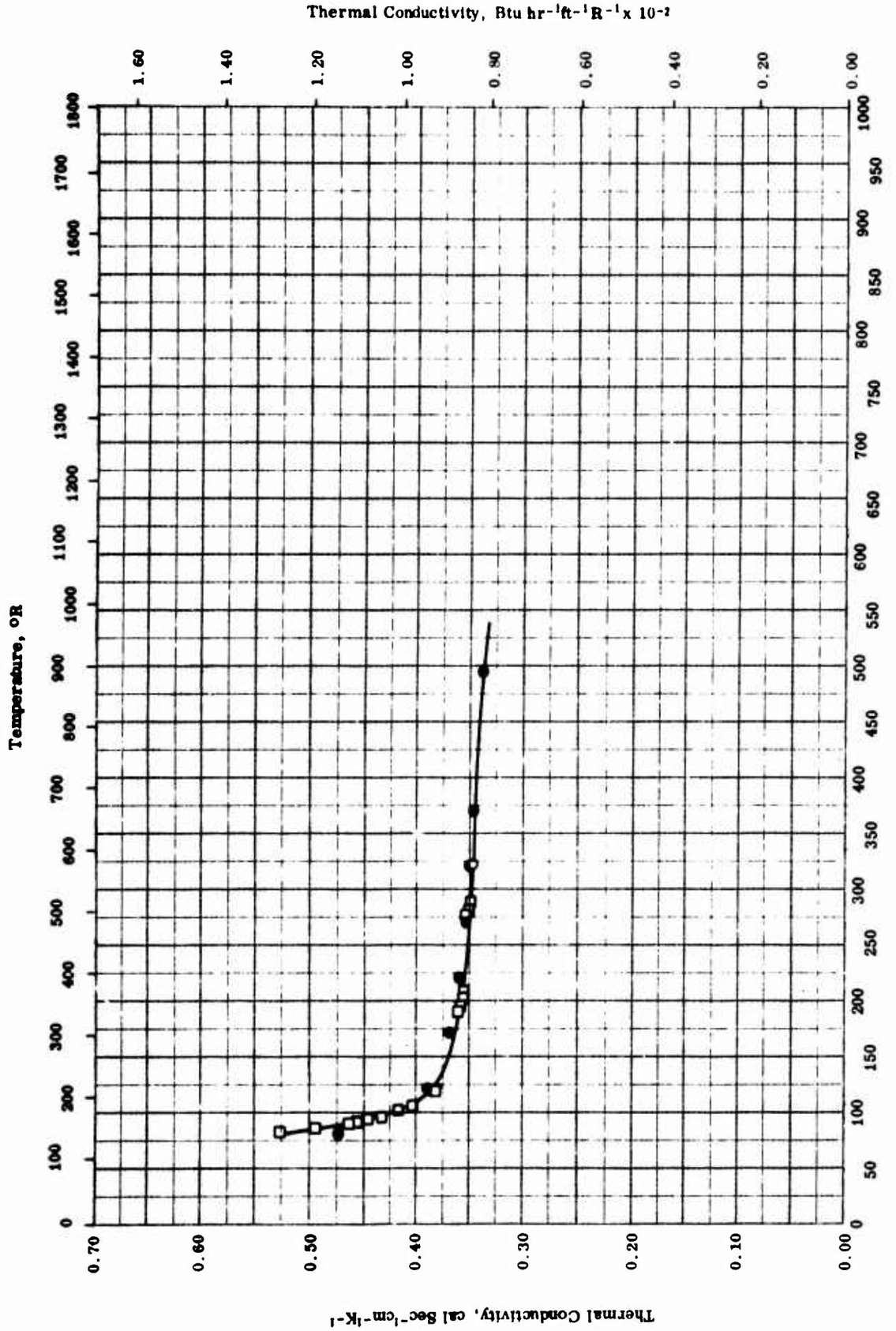


SPECIFIC HEAT -- IRIDIUM

SPECIFIC HEAT -- IRIDIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	55-22	11-276		99.96 Ir, 0.0X Pt type metals, and traces Ag, Cu, Fe.	Cast.

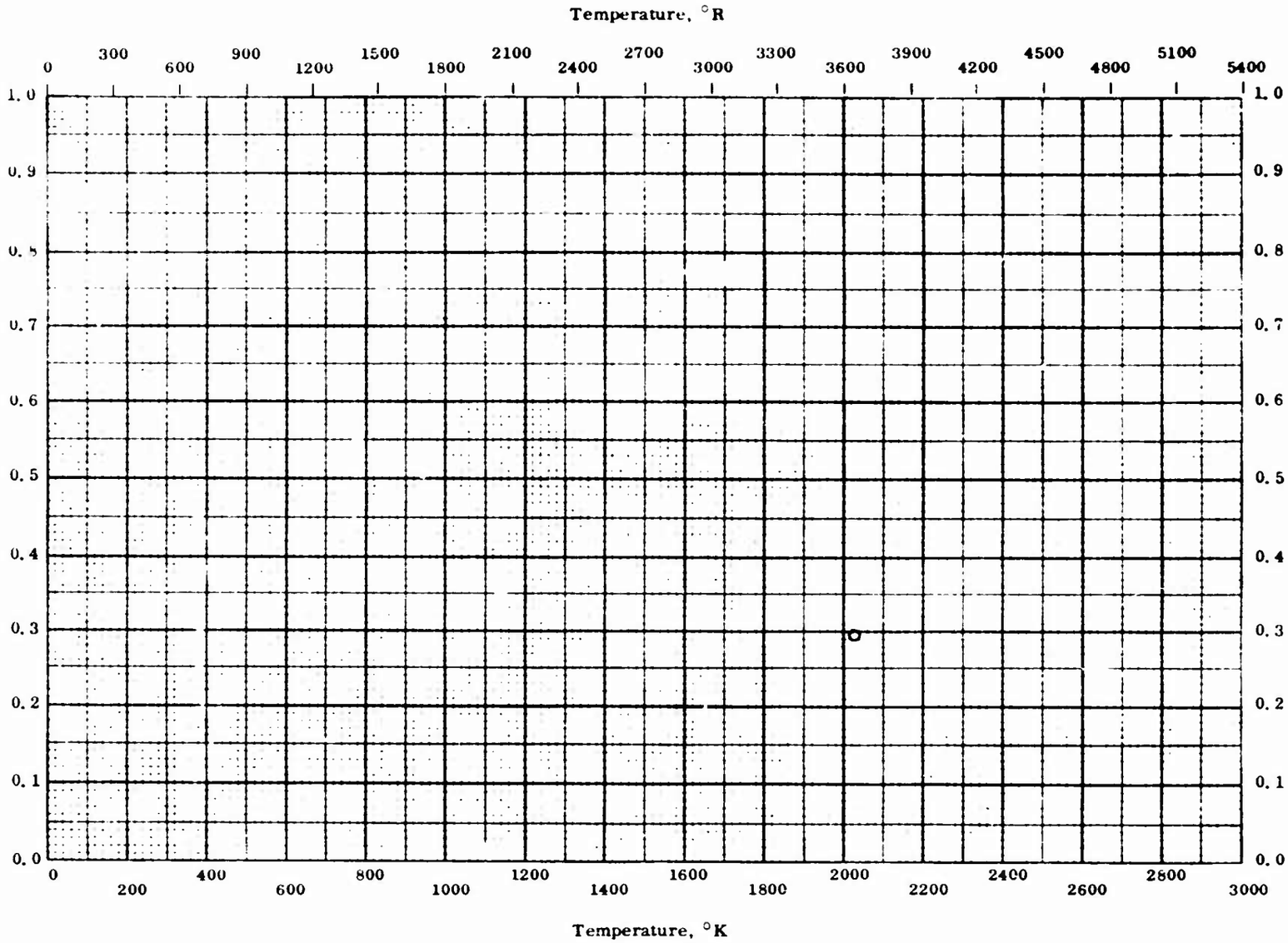


THERMAL CONDUCTIVITY -- IRIDIUM

THERMAL CONDUCTIVITY -- IRIDIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-1	323		99.944 < Ir, 0.02 - 0.05 Rh, 0.001 Pd, 0.002 - 0.005 Ru; density 22.49 g cm^{-3} at 25 C.	Annealed to 1313 C.
□	55-1	83-289	< 3.1	Same as above.	Same as above.
●	62-34	83-493		0.02 - 0.05 Rh, 0.002 - 0.005 Ru, and 0.001 Pd; 5.0 cm long and 0.318 cm dia rod with density 22.43 g ml^{-1}.	



NORMAL SPECTRAL EMITTANCE -- IRIDIUM

NORMAL SPECTRAL EMITTANCE --IRIDIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	15-1	0.65	2023	~1	Not given.	Measured in hydrogen atmosphere.

PROPERTIES OF IRON

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7.874	491.6
Melting Point	1810	3258
Heat of Fusion	65	117
Heat of Sublimation	1862_{0K}	3351_{0R}

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	7.874 ± 0.001	491.56 ± 0.06
	◁	7.875	491.59 ± 0.11
	▷	7.8	487
	●	7.87	490.5
	■	7.53	470

Melting Point		K	R
	△	1808	3255
	□	1812 ± 2	3262 ± 4
	▲	1653	2976
	▼	1812	3262
	◀	1799 ± 13	3238 ± 23
	▶	1858 ± 8	3330 ± 29

Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	▼	65.0 ± 2	117 ± 3

Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	◆	1776.3_{0K}	3197.4_{0R}
	◇	1694	3050
	▽	1853 ± 10	3336 ± 19
	◑	1736	3126
	◐	1868.9_{0K}	3364.1_{0R}
	◨	1861.6_{0K}	3350.9_{0R}
	◧	1719_{0K}	3094_{0R}

PROPERTIES OF IRON

REFERENCE INFORMATION

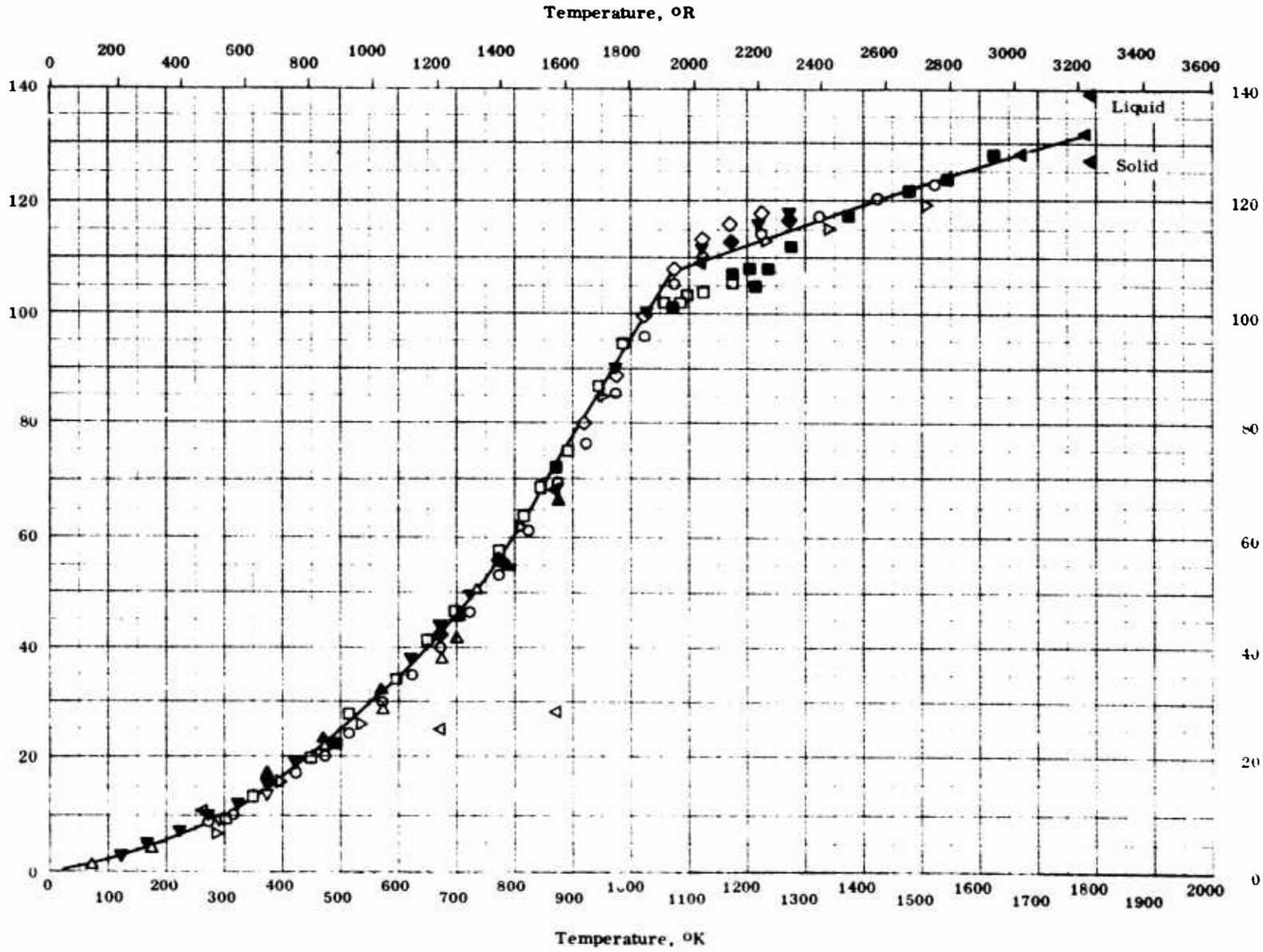
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	42-1	293		0.005> P, 0.004> S and O_2, 0.003> Si or Be, 0.002> Cu, 0.001> Al, C, and N_2, 0.0002> H_2.	
□	54-29	1812		Electrolytic.	Vacuum of 1-2 microns of Hg; M. P. from loss of electric continuity in resistance heated wire suspended in heated cylinder.
△	53-31	1806		0.016 O_2, 0.009 Si, 0.007 each Cu and Ni, 0.0055 S, 0.004 Mn, 0.003 N_2, 0.0025 C, 0.002 Cr, and 0.001> each Al and P.	Measured in argon at absolute pressure of 4 mm Hg; M. P. from liquid forming in black body cavity in sample; data of 4 tests.
◇	57-21	---		Pure electrolytic.	Δh_s from vapor pressure data.
▽	53-36	---		Pure γ-iron.	Δh_s from vapor pressure data with radioactive counting.
▼	50-11	1812		Pure.	M. P. and Δh_f.
◆	51-16	0		99.97 Fe, 0.01> each Al, Cu, and Si, 0.001> Ni, Ca, Mo each.	Vacuum cast; Δh_s from vapor pressure data.
▲	53-32	1653		Not given.	M. P. from collapse of black body hole in sample.
◑	57-20	---		Technical iron.	Repeated annealed; Δh_s from vapor pressure data.
◐	57-17	0		99.89 pure.	Cast; Δh_s from vapor pressure.
◨	57-17	0		99.89 pure.	Condensed from vapor; Δh_s from vapor pressure.
◀	52-28	1756-1818		Electrolytic iron.	M. P. from measuring temperatur liquid-solid interface of drip melting sample in vacuum.

(Continued onto next page)

PROPERTIES OF IRON (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▶	50-16 also 51-31	1834-1866		Not given.	M. P. by visual observation.
◁	49-5	298		99.99+ pure.	Annealed.
▷	53-5	298		Armco iron.	
◧	49-21 also 51-37	0		99.99 pure electrolytic iron.	Δh_s from vapor pressure data.
●	62-12	293		Not given.	
■	62-7	298		Armco iron.	



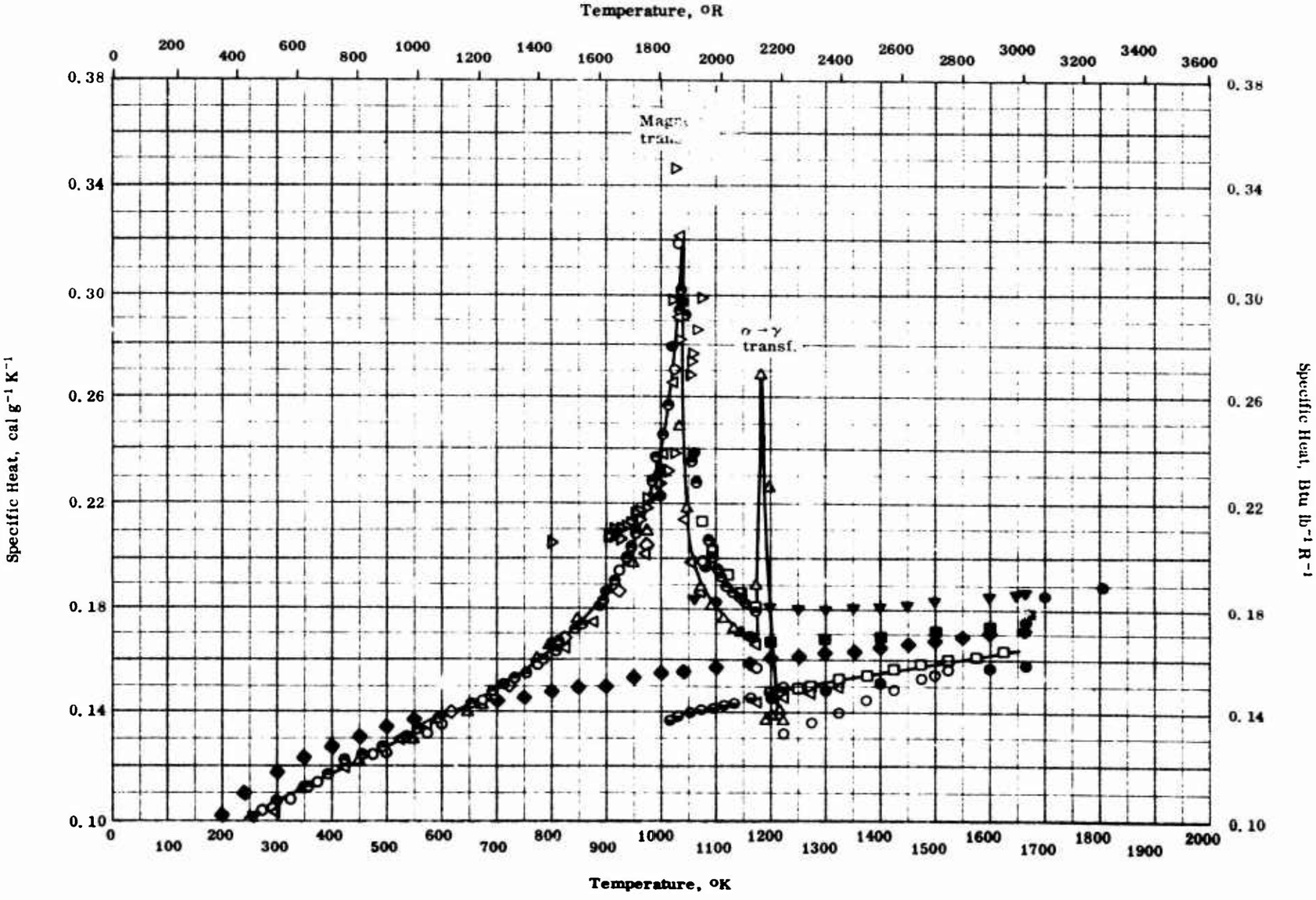
ELECTRICAL RESISTIVITY -- IRON

ELECTRICAL RESISTIVITY -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_0	Sample Specifications	Remarks
○	49-5	273-1523	± 1	Impurities < 0.01; density 491.59 ± 0.31 lb ft^{-3}	Annealed; in thermal equilibrium; tested in vacuum.
△	55-26	73-703		99.95 pure.	Melted in vacuum; homogenized 6-10 hrs below M.P.; cold rolled and swaged to wire: annealed in vacuum 1 hr. at 600 C.
□	52-11	303-1167	±0.4	Electrolytic; 99.8 pure.	Annealed 4 hrs at 600 - 700 C; both heating and cooling.
◇	56-26	923-1223		Armco Iron: 0.027 Mn, 0.02 C, 0.018 P, 0.017 S, 0.007 Si, 0.005 N_2.	
▽	42-1	292-373		< 0.0043 O_2, < 0.0023 S, < 0.002 ea. Cu, Si, < 0.001 ea. C, Be, < 0.0002 ea. N_2, H_2.	Six samples; same data.
▲	57-5	385-872	±1	0.045 S, 0.04 C, 0.005 P. Armco Iron.	
■	51-24	273-1617		Armco Ingot Iron.	Grain size increased by factor of 9 during test with no measurable effect on resistivity.
▼	64-1	77-1273	2	Armco Iron.	
◆	60-11	273-1273		Armco Iron.	
◁	62-40	273-873		Pure.	
▷	62-35	283-1505		Armco Iron.	
◀	62-37	293-1793		0.064 O, 0.002 S, 0.0027 C, and 0.001 each Si, Mn, and N.	

TPRC



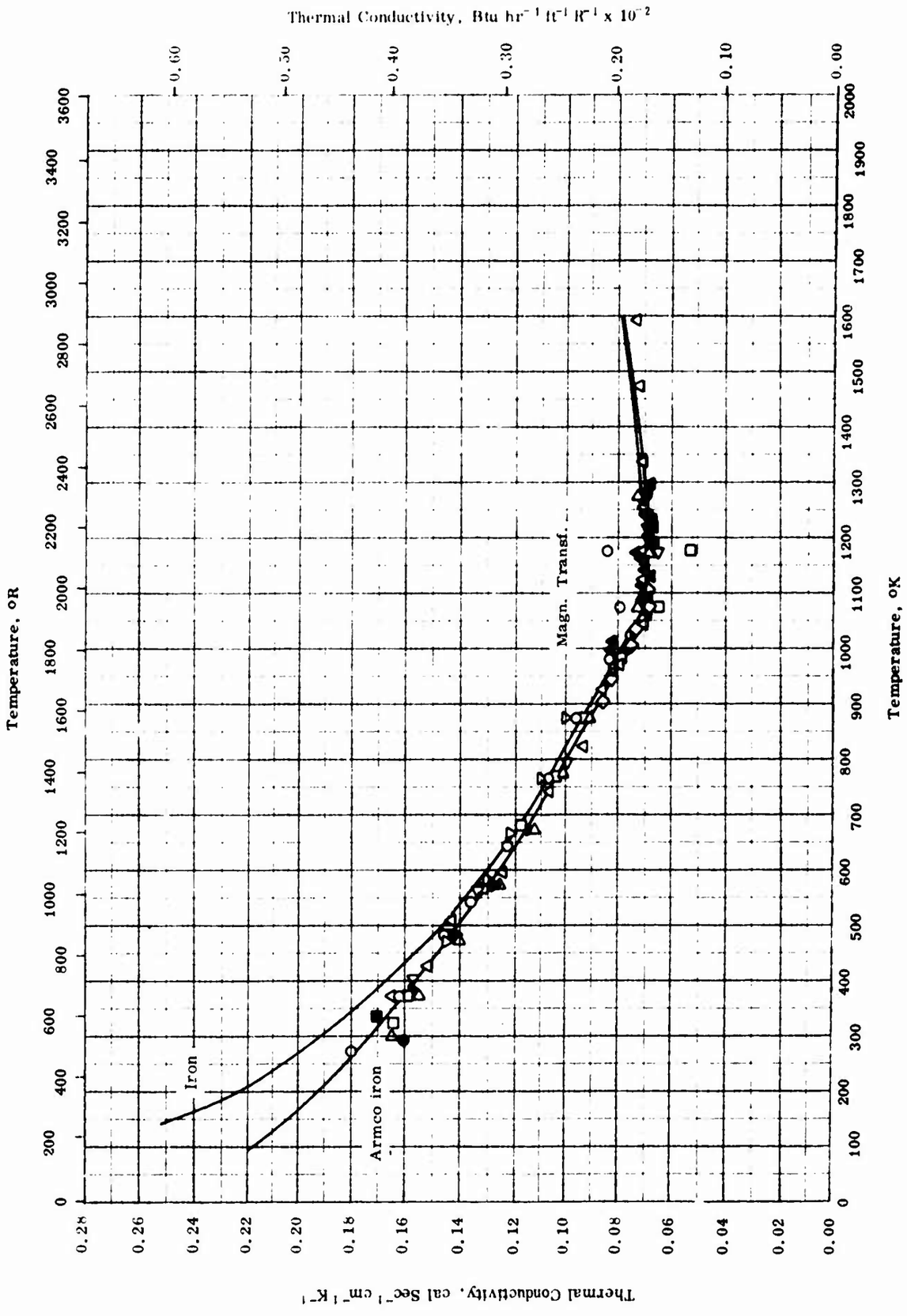
SPECIFIC HEAT -- IRON

SPECIFIC HEAT -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-5	273-1523	± 2.0	99.99 Fe; density 491.59 lb ft^{-3}.	Annealed.
□	63-19	1073-1673		0.004 P, 0.004 Si (insol.), 0.003 Al (sol.), 0.0026 S, 0.002 Si (sol.), 0.001 C, 0.001 N_2, 0.001> Al (insol.), 0.0006 O_2, 0.0001 H_2; α and γ iron.	
△	40-4	373-1223		99.99 Fe.	
◇	55-19	618-973	3-5	Armco; 99.75 Fe nominal composition.	
▷	59-15	800-1071		Armco; 99.75 Fe nominal composition.	
◁	60-24	298-1323	< 2.0	0.10 N_2, 0.03 C, 0.01 O_2, 0.0005 > Ni, 0.0001 Cu, 0.0001> Ag, 0.0001> Mg, 0.0001> Na, and 0.0001> Si.	
⊖	57-24	353-1173	≤0.9	Electrolytic iron; 0.016 C, 0.009 S, 0.005> Mn 0.005> Si, 0.002> P, and traces, Al, Cu, Ni.	
⊖	57-24	1013-1218	≤0.9	γ-iron; 0.016 C, 0.009 S, 0.005> Mn, 0.005> Si, 0.002> P, and traces, Al, Cu, Ni.	
●	62-33	298-1809		99.945 Fe, 0.031 Ni, 0.008 Si, 0.005 C, 0.004 S, 0.004 other metals, 0.002 P, and 0.001 other nonmetals.	
■	62-33	1184-1665		99.945 Fe, 0.031 Ni, 0.008 Si, 0.005 C, 0.004 S, 0.004 other metals, 0.002 P, and 0.001 other nonmetals.	
▲	46-2	348-1198	2.0	99.9< Fe.	
◆	63-15	20-1663		Pure iron; γ-iron.	
▼	63-15	20-1663		Pure iron; α-iron.	

TPRC

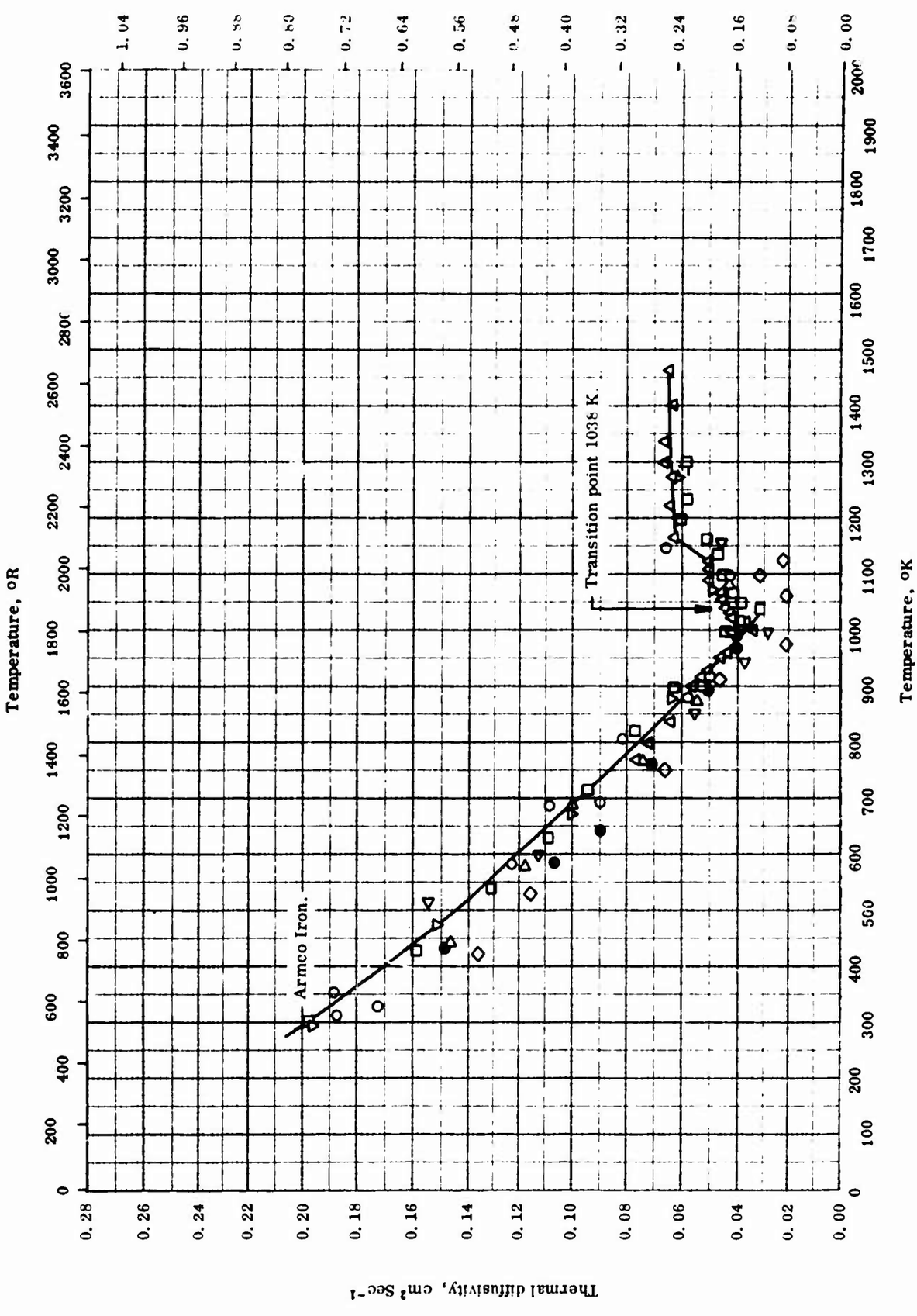


THERMAL CONDUCTIVITY -- IRON

THERMAL CONDUCTIVITY -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-3	273-1173		Armco iron; 99.906 Fe, 0.035 Cu, 0.026 S, 0.015 Mn, 0.014 C. 0.004 P.	In rod form.
□	53-4	323-1173		Svea Iron; 99.894 Fe, 0.028 Si, 0.026 C, 0.021 P, 0.02 Mn, 0.011 S.	Pb as primary standard; "Advance" as working standard.
△	58-6	367-1594		Armco iron.	Test in He atm. of cylinderical stacked disks.
▽	57-5	385-872	±4	Armco iron; 0.045 S, 0.04 C, 0.005 P.	Test in vacuum of 10^{-3} mm Hg.
◁	56-6	373-1173	±7	99.9 pure.	In a thick-walled cylinder form.
▷	60-11	303-1273	±2.5	Armco iron; 0.083 Cu, 0.03 Mn, 0.023 S, 0.02 C, 0.006 P, and 0.004 Si.	Annealed 1/2 hr at 850 C.
◇	60-10	904-1108	<±14	Armco iron.	
●	61-4	295	±5	Armco iron; density 7.87 g cm^{-3} at 20 C.	
■	63-7	338	±1.8	99.82 Fe.	Hot rolled.
▲	60-3	995-1298	±2	Armco iron.	
▼	64-1	385-1092	±4.9	Armco iron; 0.1 Cu, 0.1 Ni, 0.086 O_2, 0.05 Mn, < 0.05 Al, Cr, and Mo each, 0.023 S, < 0.02 Si and V each, 0.013 C, 0.01 Ti, 0.006 P, 0.005 N_2, and < 0.0001 H_2.	
◀	64-1	484-1198	±4.9	Same as above.	Second run.
▶	64-1	973-1206	±4.9	Same as above.	Third run.
◆	64-1	1206-1273	±4.9	Same as above.	Fourth run.
⊖	64-1	1025-1198	±4.9	Same as above.	Fifth run.

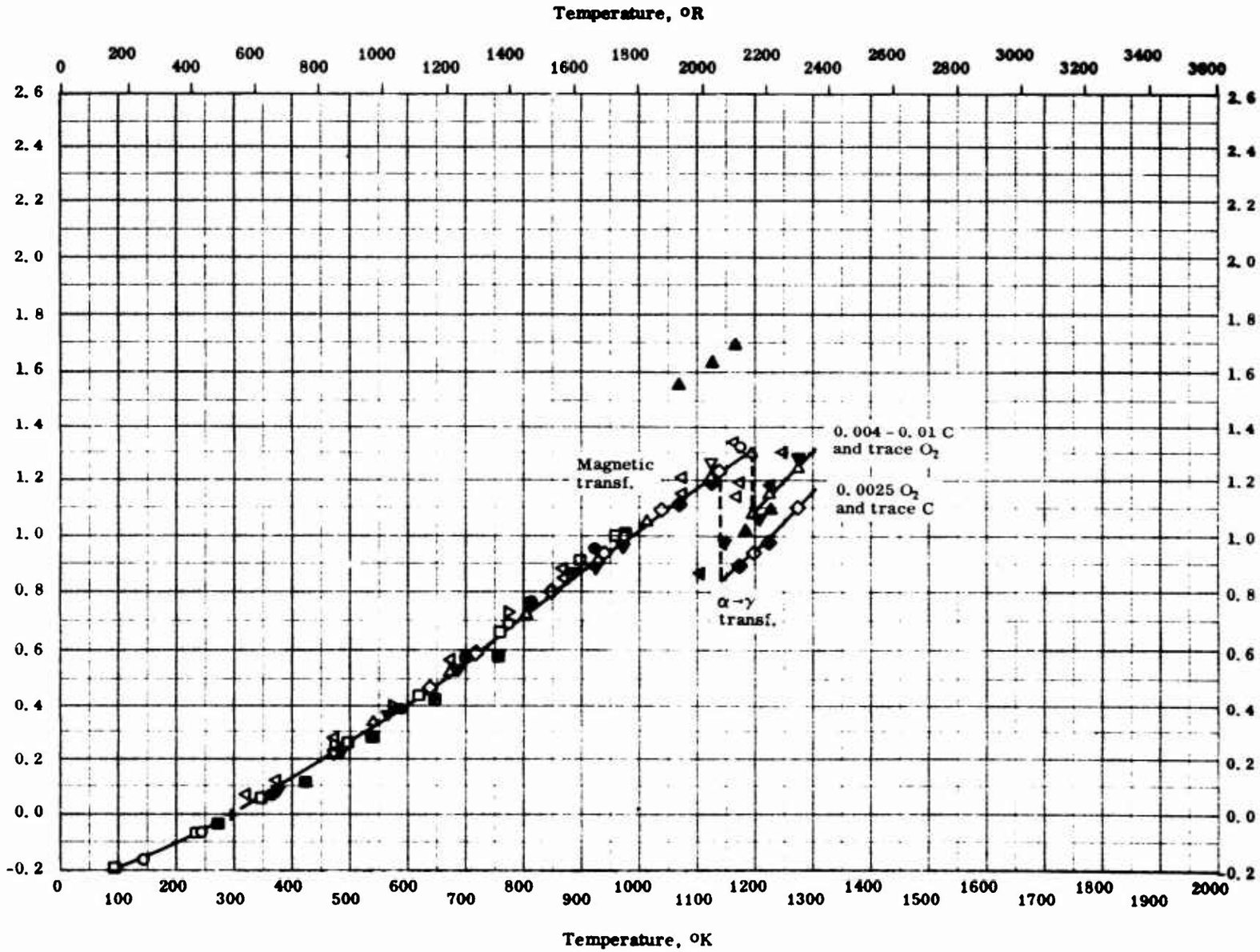


THERMAL DIFFUSIVITY -- IRON

THERMAL DIFFUSIVITY -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-1	310-1146	9	Armco Iron; 99.94 Fe, 0.01 Cr, 0.01 Cu, 0.01 Mg, 0.01 Mn, 0.005 Ni, 0.001 Mo, and 0.001 Sn.	From NBS
□	59-3	300-1297	2-10	Armco Iron V	Machined
△	63-1	766-1460	±5	Armco Iron	
▽	63-1	290-1270	±5	Armco Iron	The above sample measured in 1 atm helium.
◇	60-2	418-1123		Armco Iron; disc of 0.64 cm in dia and 0.077 cm in thickness.	
◁	60-2	511-1153		Armco Iron; disc of 0.64 cm in dia and 0.103 cm in thickness.	
▷	60-2	440-1083		Armco Iron; disc of 0.64 cm in dia and 0.133 cm in thickness.	
●	60-2	430-990		Armco Iron; disc of 0.64 cm in dia and 0.148 cm in thickness.	



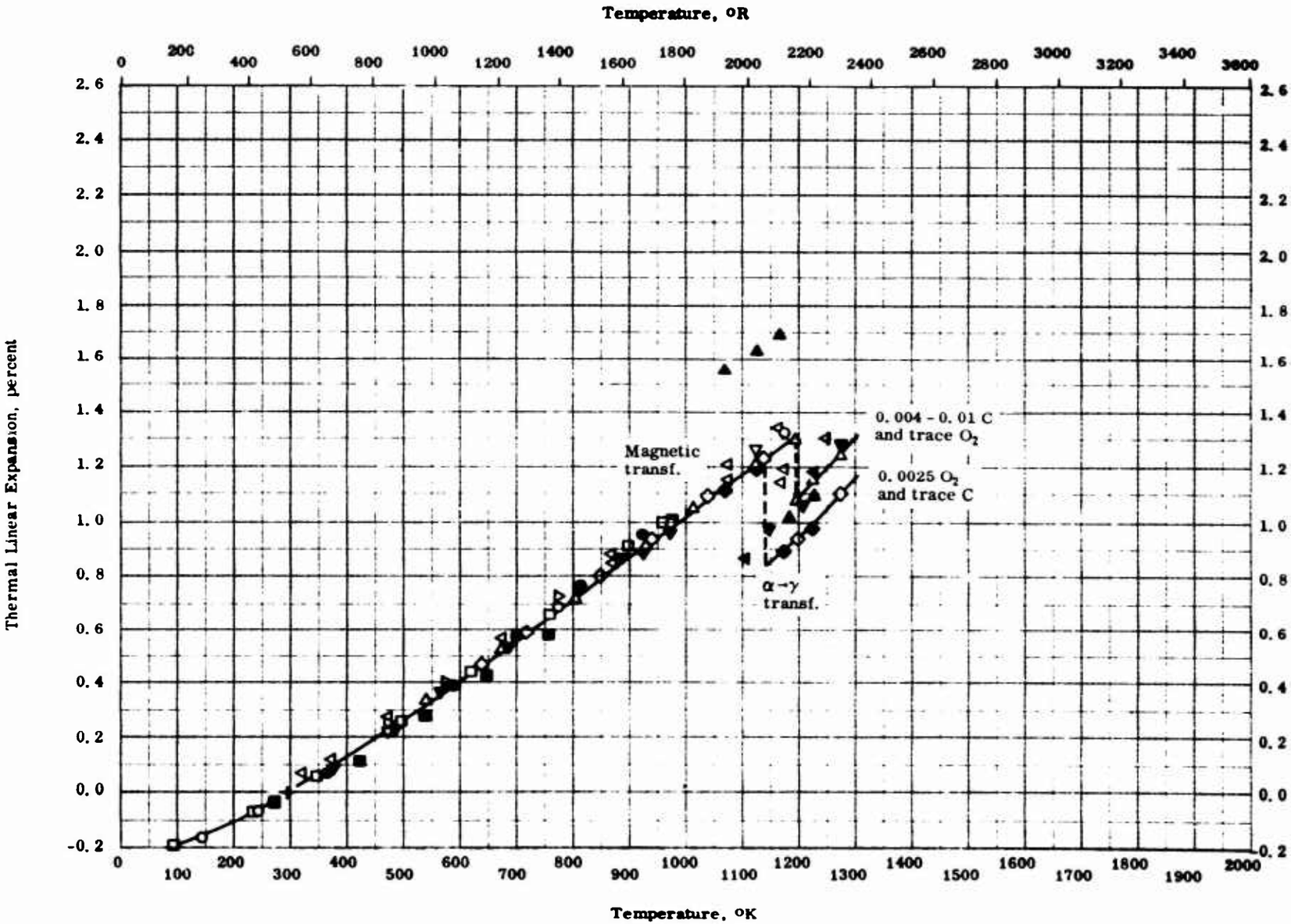
THERMAL LINEAR EXPANSION -- IRON

THERMAL DIFFUSIVITY -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-1	310-1146	9	Armco Iron; 99.94 Fe, 0.01 Cr, 0.01 Cu, 0.01 Mg, 0.01 Mn, 0.005 Ni, 0.001 Mo, and 0.001 Sn.	From NBS
□	59-3	300-1297	2-10	Armco Iron V	Machined
△	63-1	766-1460	±5	Armco Iron	
▽	63-1	290-1270	±5	Armco Iron	The above sample measured in 1 atm helium.
◇	60-2	418-1123		Armco Iron; disc of 0.64 cm in dia and 0.077 cm in thickness.	
◁	60-2	511-1153		Armco Iron; disc of 0.64 cm in dia and 0.103 cm in thickness.	
▷	60-2	440-1083		Armco Iron; disc of 0.64 cm in dia and 0.133 cm in thickness.	
●	60-2	430-990		Armco Iron; disc of 0.64 cm in dia and 0.148 cm in thickness.	

TPRC



THERMAL LINEAR EXPANSION -- IRON

THERMAL LINEAR EXPANSION -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	42-1	143-1173		Natl. Bur. of Stds. high purity iron; 0.01 total impurities.	Data for several samples, both heating and cooling; differences due to minor composition changes were within experimental error.
□	41-9	92-958		0.005 P, 0.0023 S, 0.002> Cu, 0.001 each Si, C, 0.001> Be, 0.0003 O_2, and 0.0002 each N_2, H_2.	
▽	56-60	373-1123		Armco Iron.	Purified by heating 200 hrs at 950 C in H_2.
△	41-8	293-1273		Two samples; Sample 1: 0.004 C and traces of O_2; Sample 2: 0.01 C.	Electrolytic; vacuum melted, heating.
▲	41-8	1070-1273		Same as above.	The above specimen, cooling.
◇	41-8	293-1273		0.0025 O_2, traces of C, and total impurities < 0.03.	Made from dissociated and pressed Fe carbonyl by sintering at 1300 C; annealed 100 hrs at 1000 C and forged; heating.
◆	41-8	1068-1273		Same as above.	The above specimen; cooling.
◁	48-12	293-1248		Electrolytic Fe; 0.02 C.	Induction melted in vacuum, swaged, annealed 1 hr at 900 C in H_2, cooled slowly.
▷	56-63	303-772		Enameling iron (nominal < 0.1 C).	
●	59-23	300-922		Armco Iron.	
■	50-23	273-977		0.05 Mn, 0.04 C, 0.015 S, 0.01 Si, and 0.005 P.	Normalized; initial structure ferrite and lamellar pearlite.

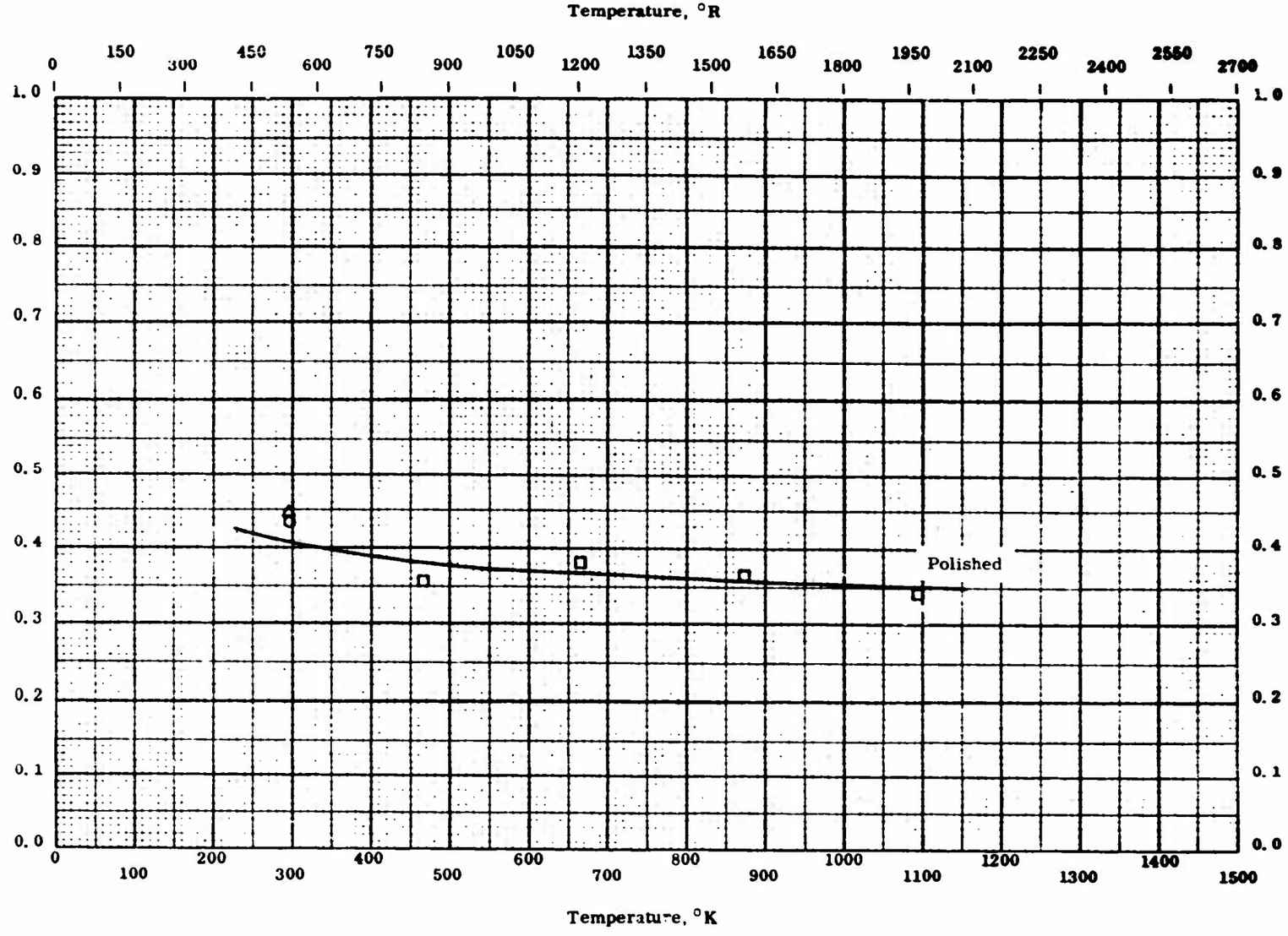
(Continued onto next page)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
▼	41-8	293-1273		0.13 C, 0.03> O, 0.02> Mn, 0.004> Si, and 0.0024> S.	Annealed 1 hr at 700 C in vacuum; cooled slowly; heating.
◀	41-8	1101-1273		Same as above.	The above specimen; cooling.

TPRC

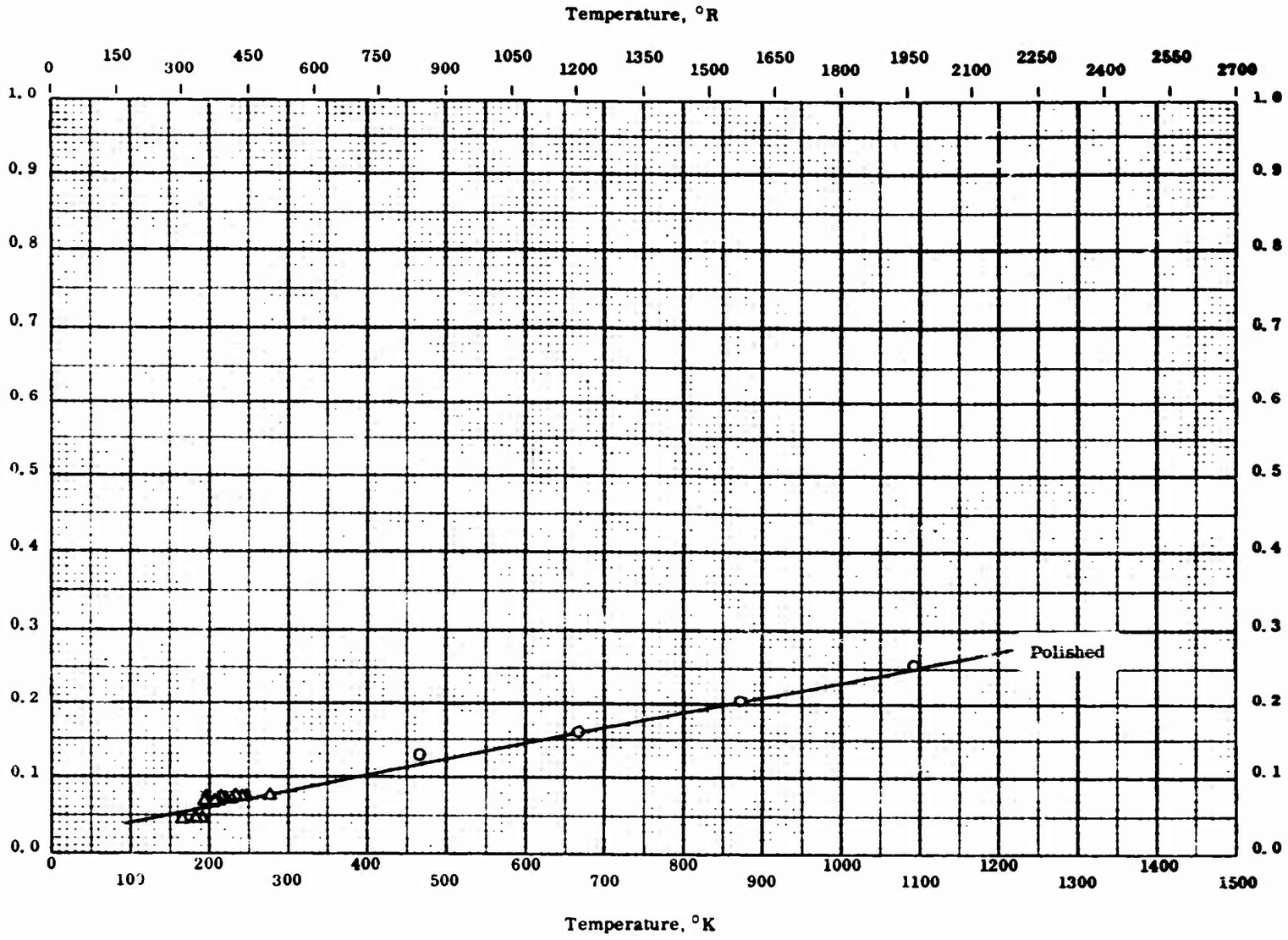


SOLAR ABSORPTANCE -- IRON

SOLAR ABSORPTANCE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	298		Armco; surface roughness 2 μ in.	Above atmosphere.
△	57-41	298		Same as above.	Sea level.
□	61-39	468-1093	≤ 10	99.821 Fe, 0.11 Cu, 0.032 Mn, 0.014 C, 0.017 S, and 0.003 Si.	Ground with 600 grit carborumdum, polished on a wet cloth and lapped with either Lindle Alumina type B-5125 on unlevigated jewelers rouge; measured in vacuum (10^{-5} mm Hg).



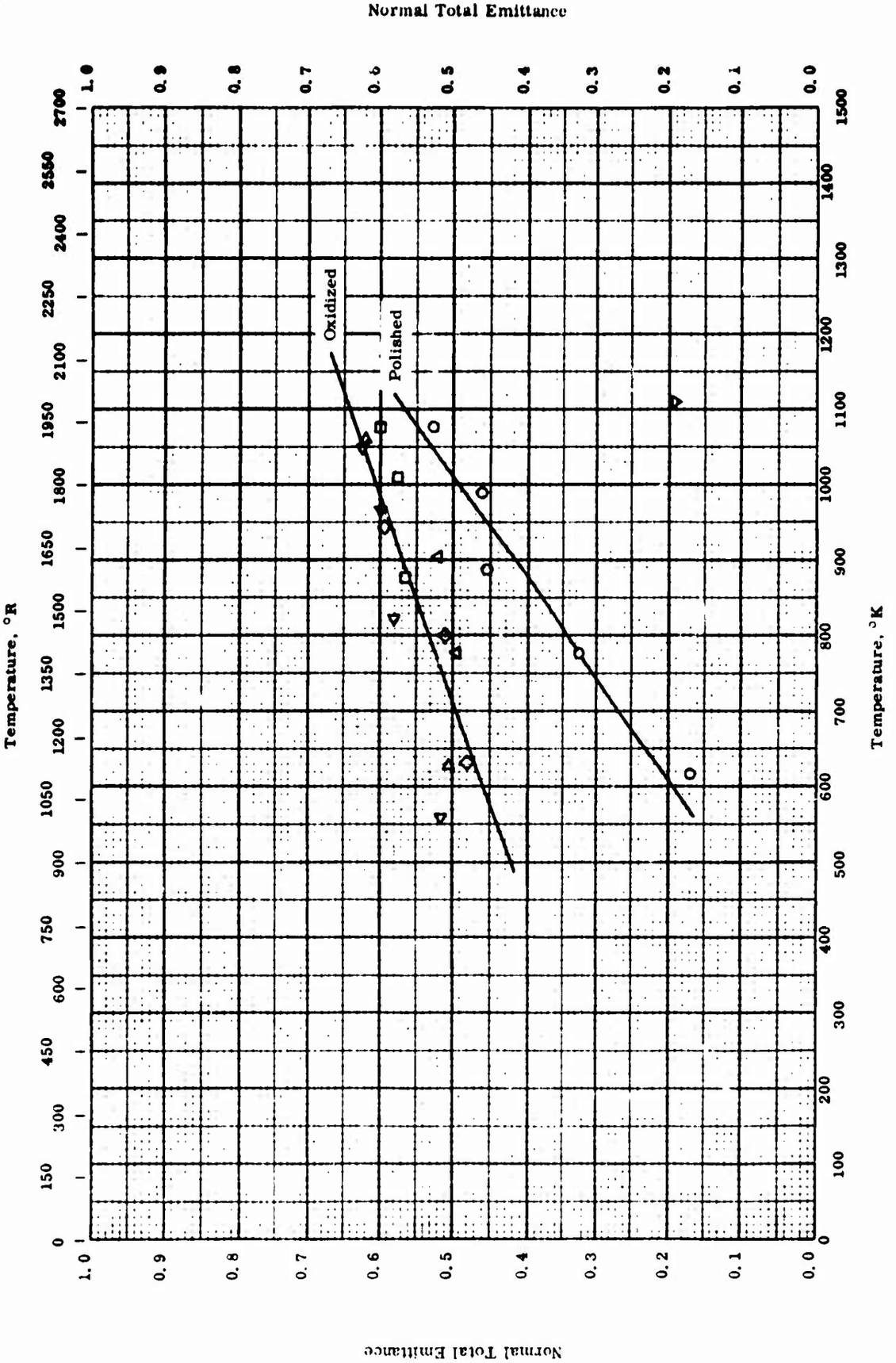
HEMISPHERICAL TOTAL EMITTANCE -- IRON

TPRC

HEMISPHERICAL TOTAL EMITTANCE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-39	468-1093	≥ 10	Armco iron, 99.821 pure.	Ground with 600 grit carborundum and polished on a wet cloth lap with either Linde Alumina type B-5125 or unlevigated jewelers rouge ; measured in vacuum (10^{-5} mm Hg).
Δ	62-14	168-278		Pure.	Polished; measured in air.

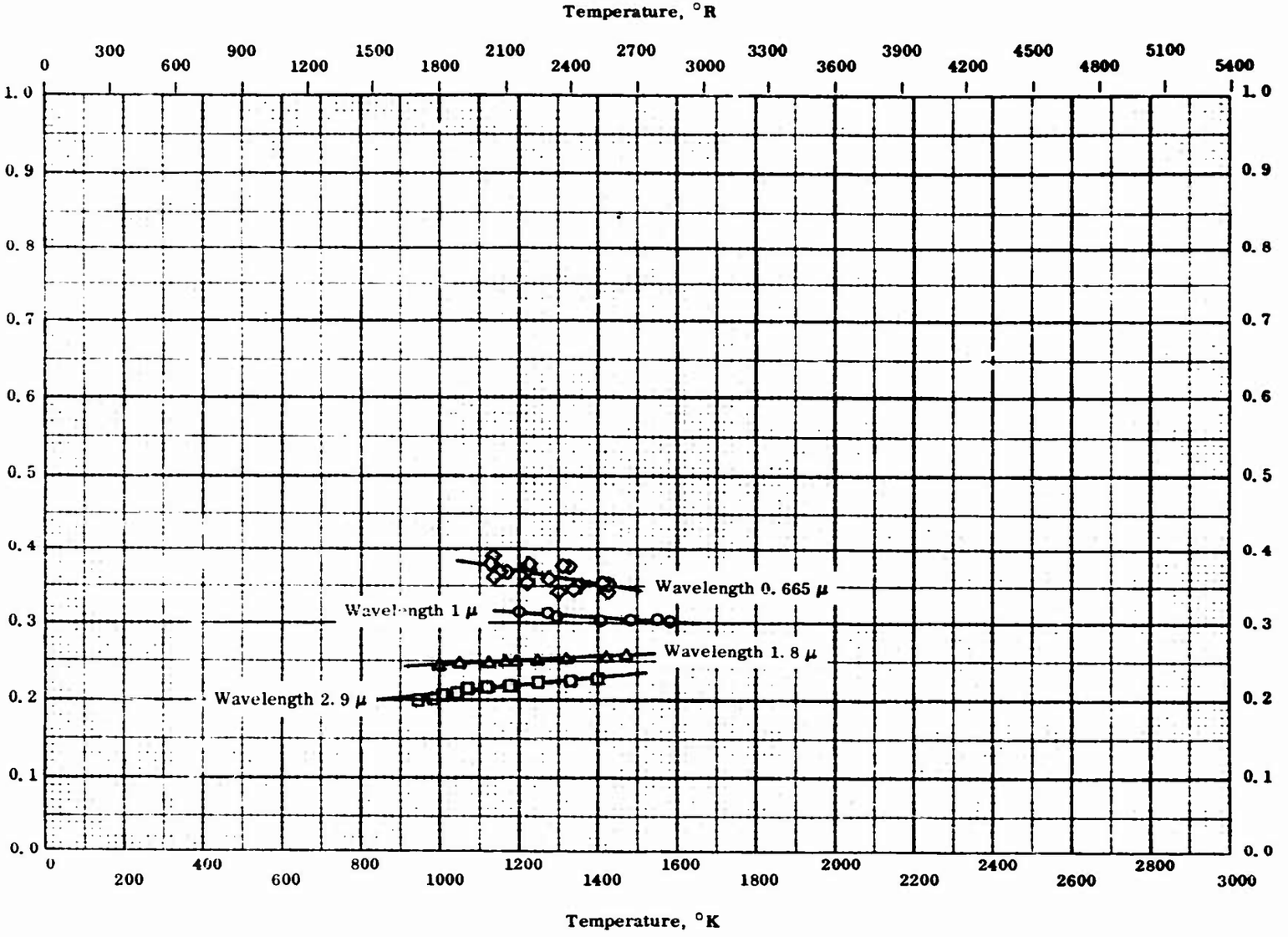


NORMAL TOTAL EMITTANCE -- IRON

NORMAL TOTAL EMITTANCE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	617-1078	±10	Surface roughness 2 μ in. RMS.	Measured in vacuum (5 x 10^{-4} mm Hg) first cycle.
△	57-41	778-905	±10	Same as above.	Same as above; second cycle.
□	57-41	878-1078	±10	Same as above.	Same as above; third cycle.
▽	63-28	1111		Not given.	Polished with aluminum oxide and cleaned with water and heated in argon at 1078 K for 2.5 hrs, calculated from spectral data and connected to 1111 K.
◇	57-41	633-944	±10	Surface roughness 2 μ in. RMS.	Oxidized in air at red heat for 30 min.; measured in vacuum 5 x 10^{-4} mm Hg; first cycle.
◁	57-41	561-1050	±10	Same as above.	Same as above; second cycle.
▷	57-41	628-1061	±10	Same as above.	Same as above; third cycle.

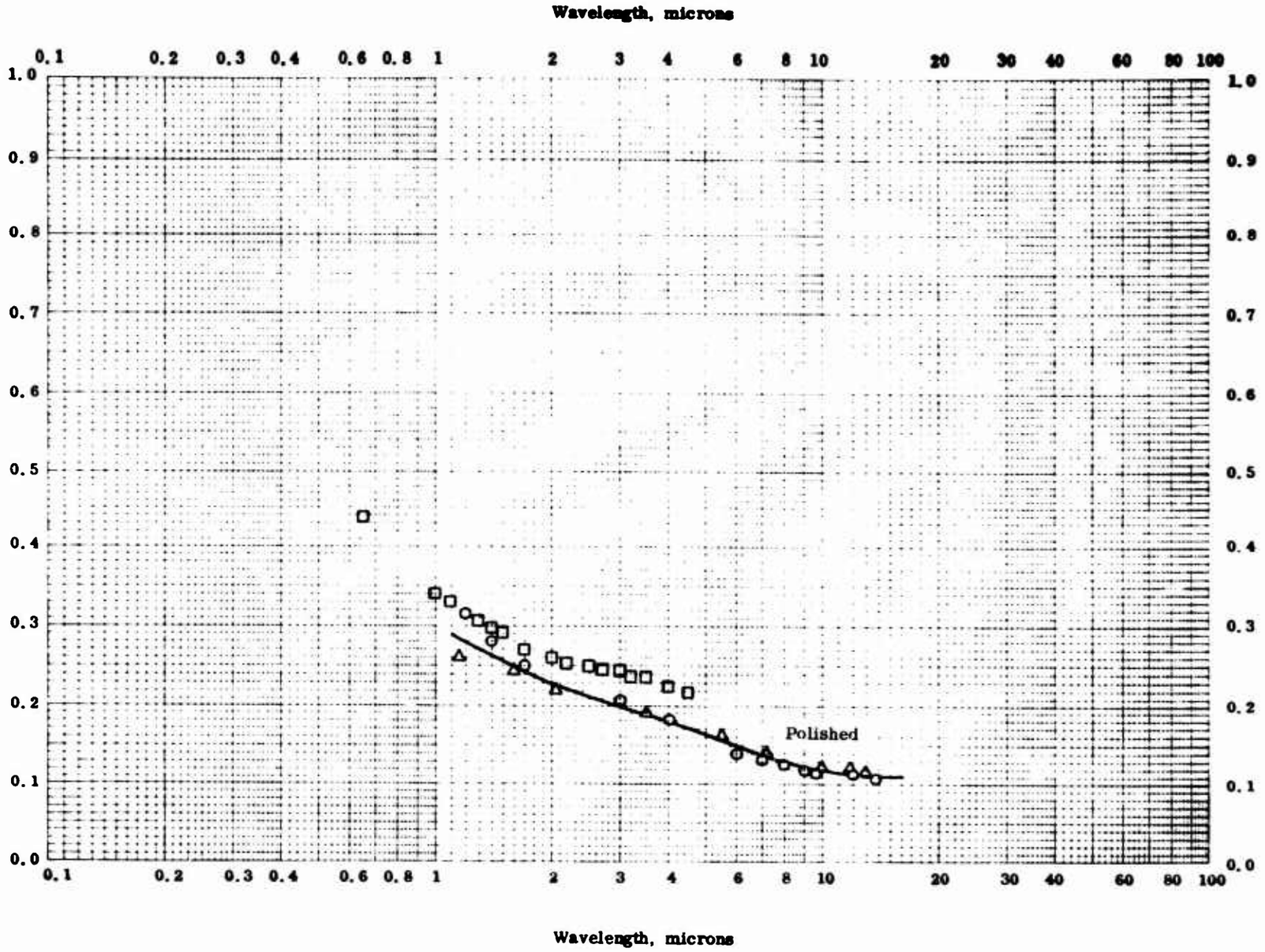


NORMAL SPECTRAL EMITTANCE -- IRON

NORMAL SPECTRAL EMITTANCE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	56-41	1	1203-1593	8	Pure.	Polished with emery paper down to grade 04, lapped with jeweller's rouge.
△	56-41	1.8	1003-1473	8	Same as above.	Same as above.
□	56-41	2.9	943-1403	8	Same as above.	Same as above.
◇	57-41	0.665	1130-1428		Armco; surface roughness 2 μ in. RMS.	Measured in vacuum.

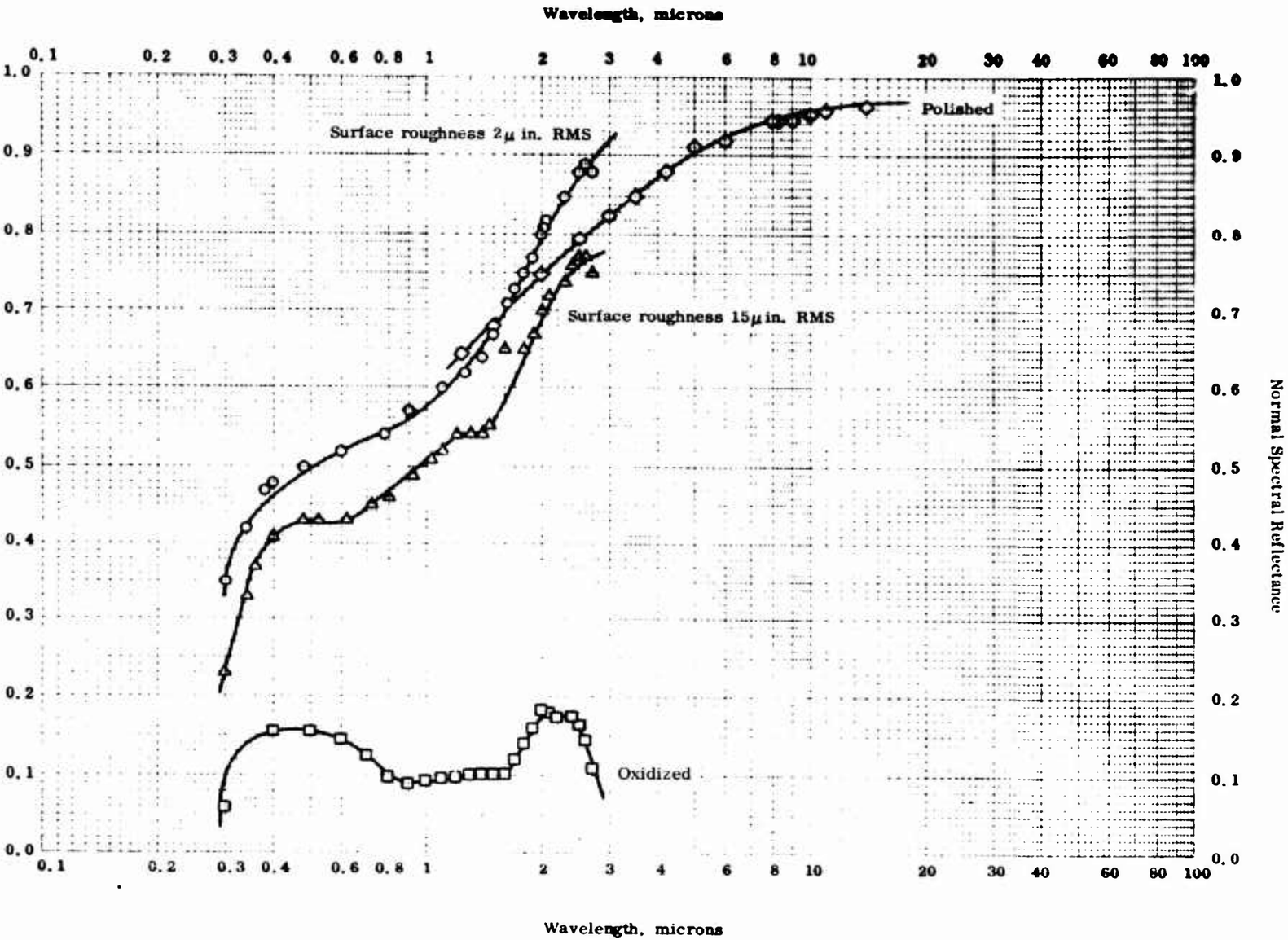


NORMAL SPECTRAL EMITTANCE -- IRON

NORMAL SPECTRAL EMITTANCE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	63-28	1078	1.20-13.80		Not given.	Polished with aluminum oxide, cleaned with water and heated in argon at 1078 K for 2-1/2 hrs.
△	63-28	1317	1.15-13.00		Same as above.	The above specimen heated in argon at T >667 K for 24 hrs and kept at 1317 K for 5 hrs.
□	47-10	1418	0.65-4.5	4	99.96 pure.	Heated in hydrogen at 1473 K for over 12 hrs; measured in vacuum.



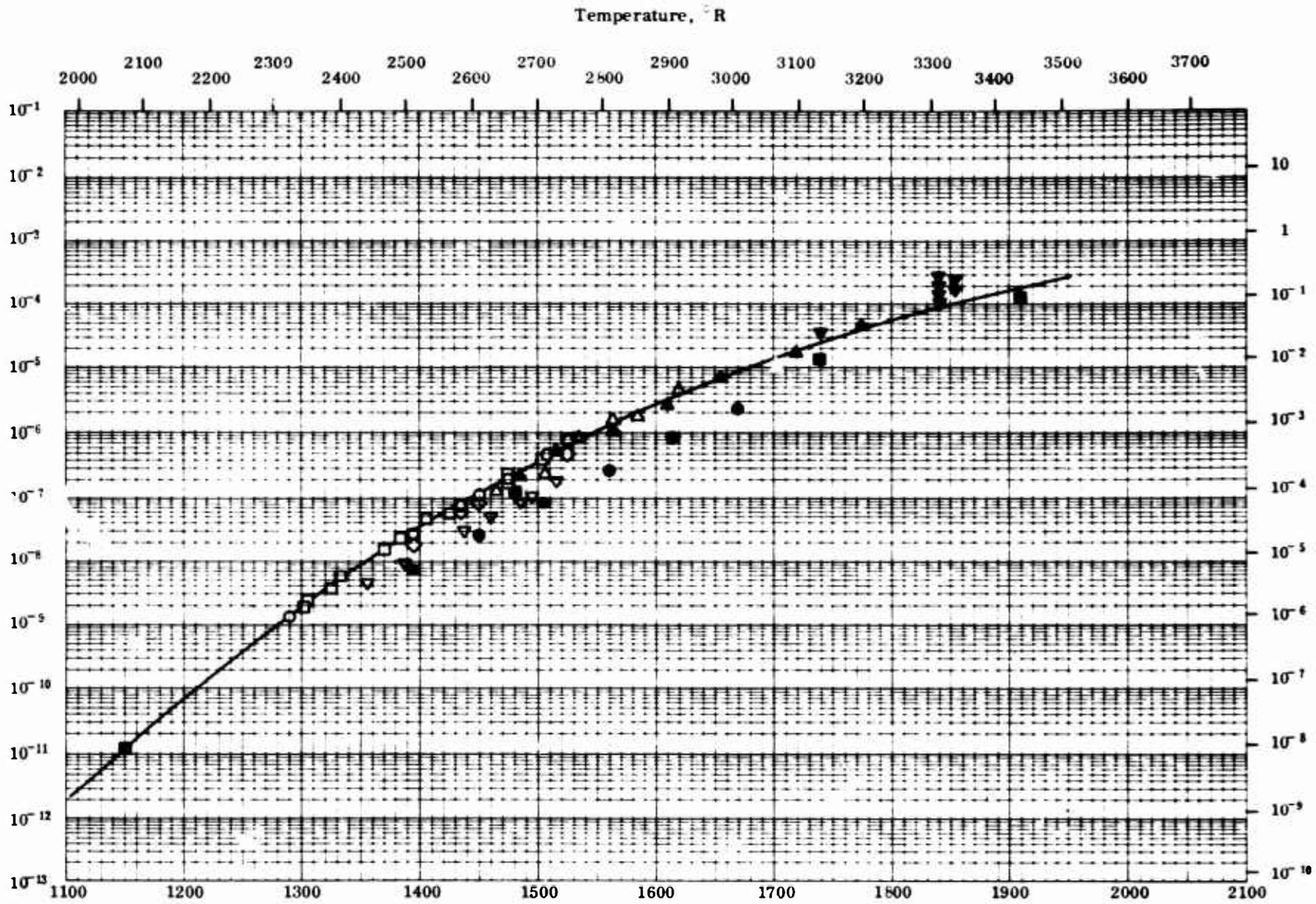
NORMAL SPECTRAL REFLECTANCE -- IRON

NORMAL SPECTRAL REFLECTANCE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	57-41	298	0.3-2.7	±4	Armco; surface roughness 2μ in. RMS.	Data taken from smooth curve; 6 - 9 degrees illumination, hemispherical viewing; $MgCO_3$ as reference standard.
△	57-41	298	0.3-2.7	±4	Same as above.	Same as above.
□	58-12	298	0.3-2.7		Same as above.	Oxidized; same as above.
◇	63-28	295	1.23-14.00		Not given; roughness (after measurement) 0.05μ (peak to peak) and 10μ (lateral).	Polished with aluminum oxide and cleaned with water; hemispherical illumination; 7 degree viewing.

TPRC



VAPOR PRESSURE -- IRON

TPRC

VAPOR PRESSURE -- IRON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-17	1302-1529	± 15	99.89 pure.	Cast; vacuum 10^{-6} mm Hg.
□	57-17	1302-1529	± 15	Same as above.	Made by condensation of vapor; vacuum 10^{-6} mm Hg.
△	55-15	1464-1623	± 10	99.85 pure; γ-iron.	Vacuum 10^{-6} mm Hg.
◇	57-20	1393-1528		"Technical iron".	Annealed.
▽	51-16	1356-1519		99.97 Fe, 0.001-0.01 ea. Si, Cu, Al, < 0.001 ea. Ni, Ca, and Co, Mo, Mn, not detected.	Vacuum cast.
●	57-21	1393-1677		"Pure" electrolytic.	
▲	51-12	1483-1778		Chemically pure.	
▼	49-3	1745-1856		99.99 pure.	Electrolytic Fe.
■	62-12	1150-1910		Not given.	

PROPERTIES OF LANTHANUM

MOST PROBABLE VALUES

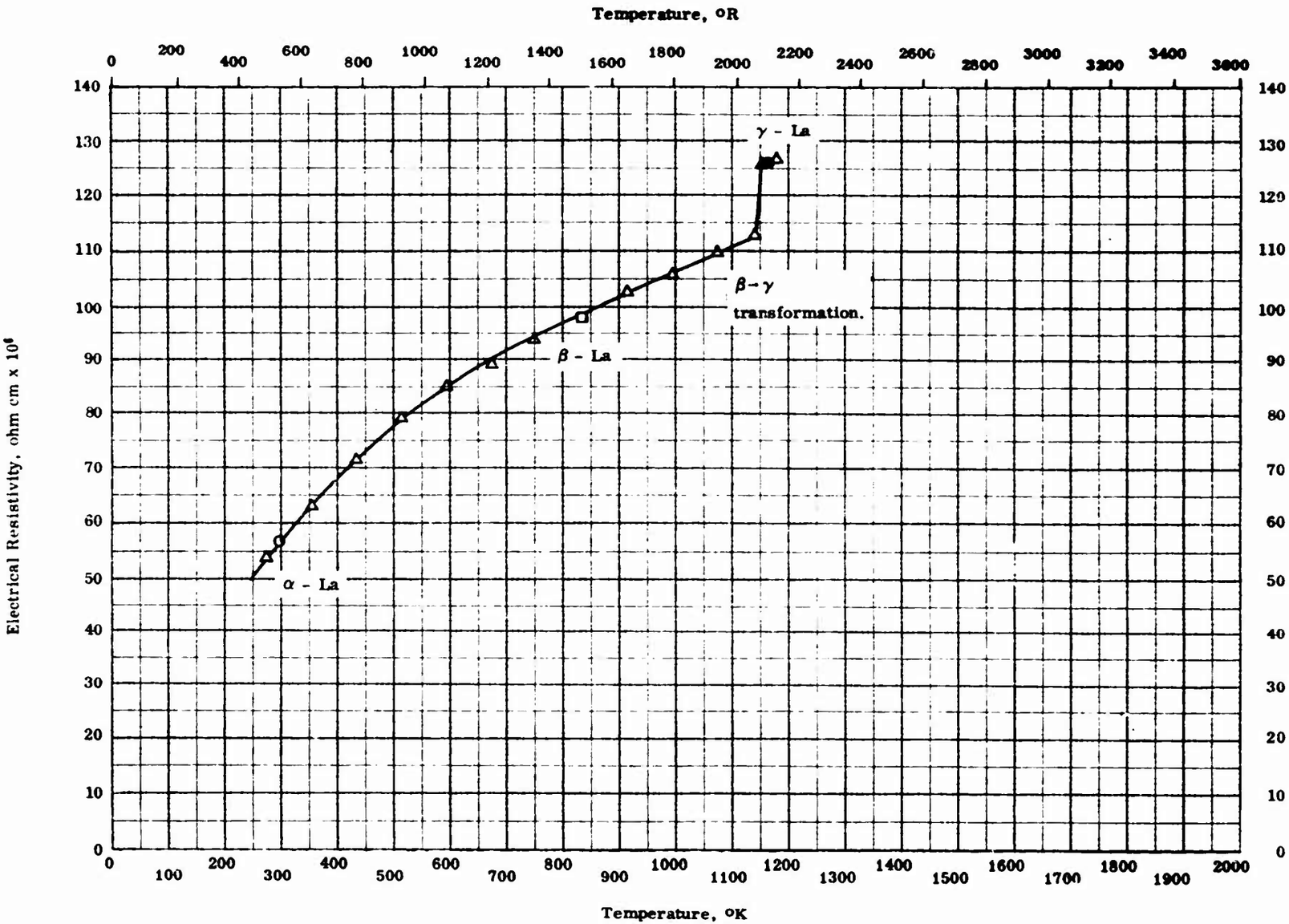
Property	C.G.S. Units	Brit. Eng. Units
Density.	6.18	386
Melting Point	1193	2148
Heat of Fusion	17	31
Heat of Vaporization. . . .	691	1244
Heat of Sublimation	583_{1906K}	1050_{3430R}

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	◇	6.162	384.7
	●	6.18	386
Melting Point		K	R
	□	1193	2148
	▽	1139 ± 4	2051 ± 7
	▲	1133	2039
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	▼	17	31
	■	11.5	20.7
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	●	691	1244
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	△	583_{1906K}	1050_{3430R}

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	54-11	1193		Very pure.	M. P. from thermal analysis; heating and cooling rates at 10 C min^{-1}.
△	54-11	1906		Very pure.	Δh_S from vapor pressure data.
◇	55-28	298		Not given.	Density computed from x-ray measurement.
▽	48-10	1136-1143		0.014 Ca.	M. P. from breaking in time - temperature curve.
▲	52-5	1133		Not given.	
▼	56-54	1193		Very high purity.	
●	62-13	298		Not given.	
■	62-13	578-588 1137		Not given.	Δh_f for transition: $\alpha \xrightarrow{583 \pm 5 K} \beta$ $\rho \xrightarrow{1137 K} \gamma$



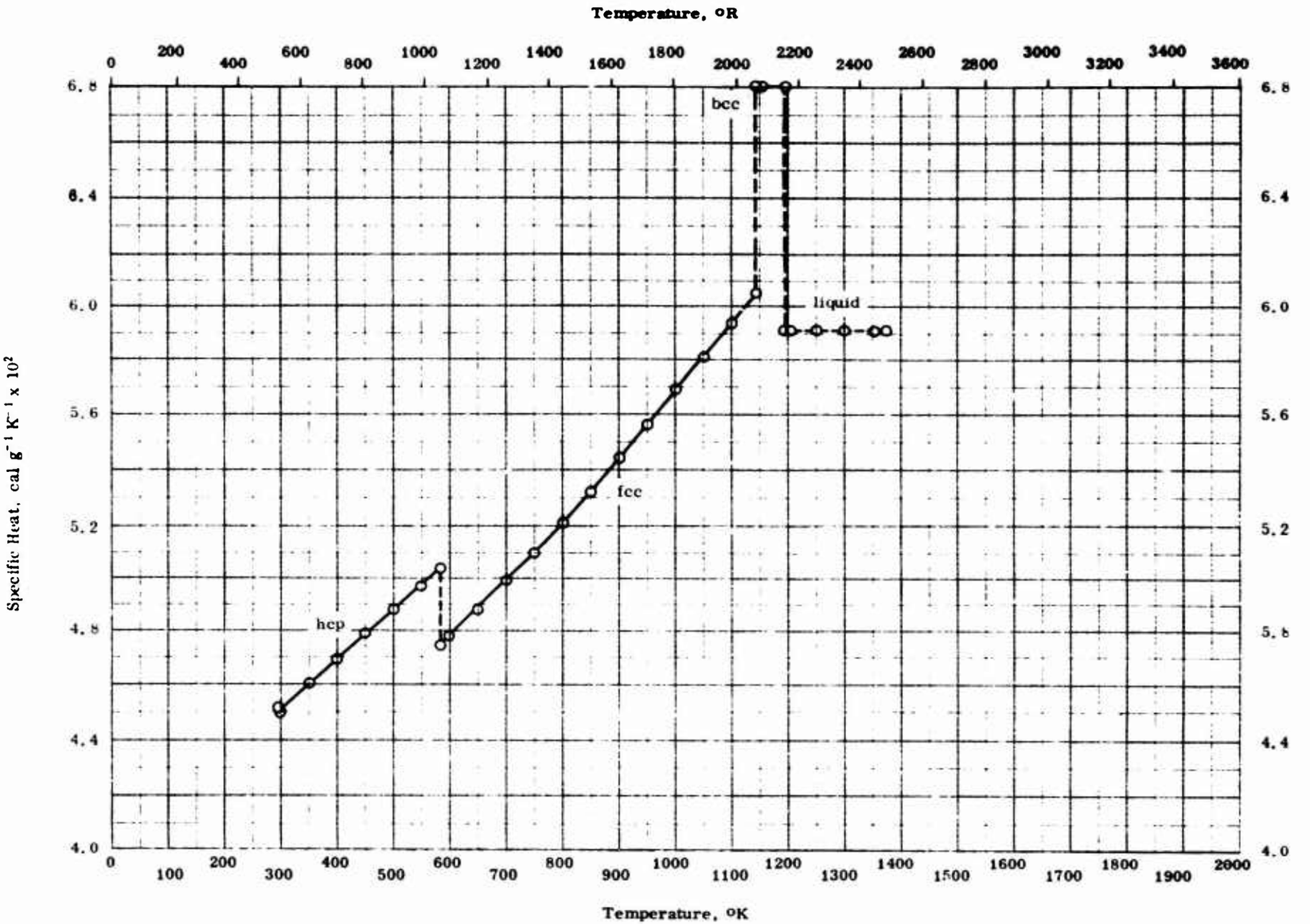
ELECTRICAL RESISTIVITY -- LANTHANUM

TPRC

ELECTRICAL RESISTIVITY -- LANTHANUM

REFERENCE INFORMATION

Symbol	Ref	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	55-28 also 57-38	298-1178		0.07 Fe, 0.05 > Ta, 0.04 > Ca, 0.03 Pr, 0.02 Si, and 0.02 > ea. Mg. Nd, Ce.	Cast, rolled and swaged at room temp., annealed 1 hr. at 300 C in vacuum, heated to within 100 C of melting point; tested at 2 C min^{-1} rise.
○	62-13	:)8		α - La	
□	62-13	833		β - La	
●	62-13	1163		γ - La	



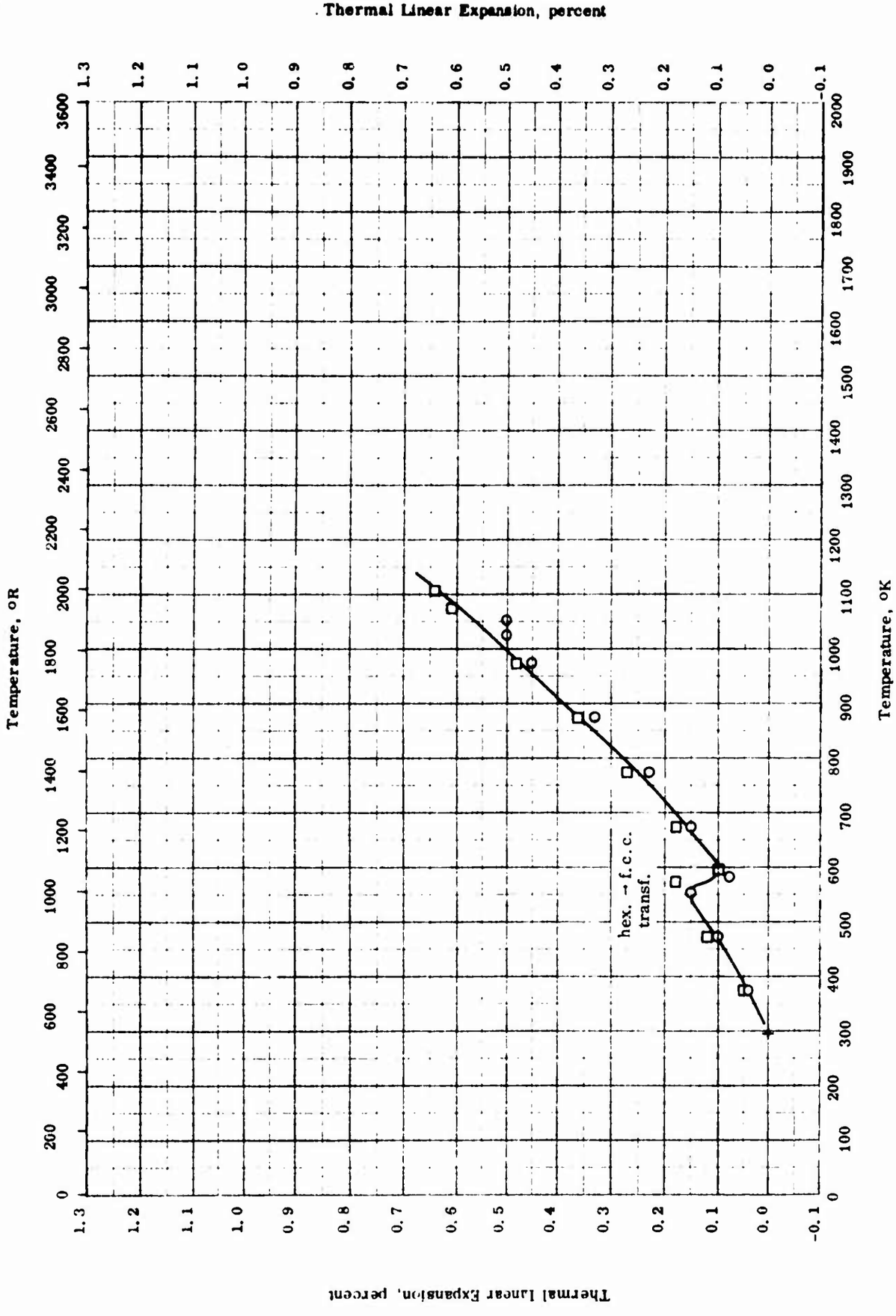
SPECIFIC HEAT -- LANTHANUM

TPRC

SPECIFIC HEAT -- LANTHANUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-31	298-1373		99.76 < La, 0.2 Nd, 0.1 >Ta, 0.05 >Ca, 0.0455 O_2, 0.03 >Ce, 0.03 >Pr, 0.02 >Mg, 0.0152 C, 0.01 >Cr, 0.0033 H_2, and 0.0013 N_2.	Prepared by metallothermic reduction of unhydrous lanthanum fluoride and calcium metal; cast into 1/2 in. rods; sealed under helium atmosphere in tantalum crucibles.

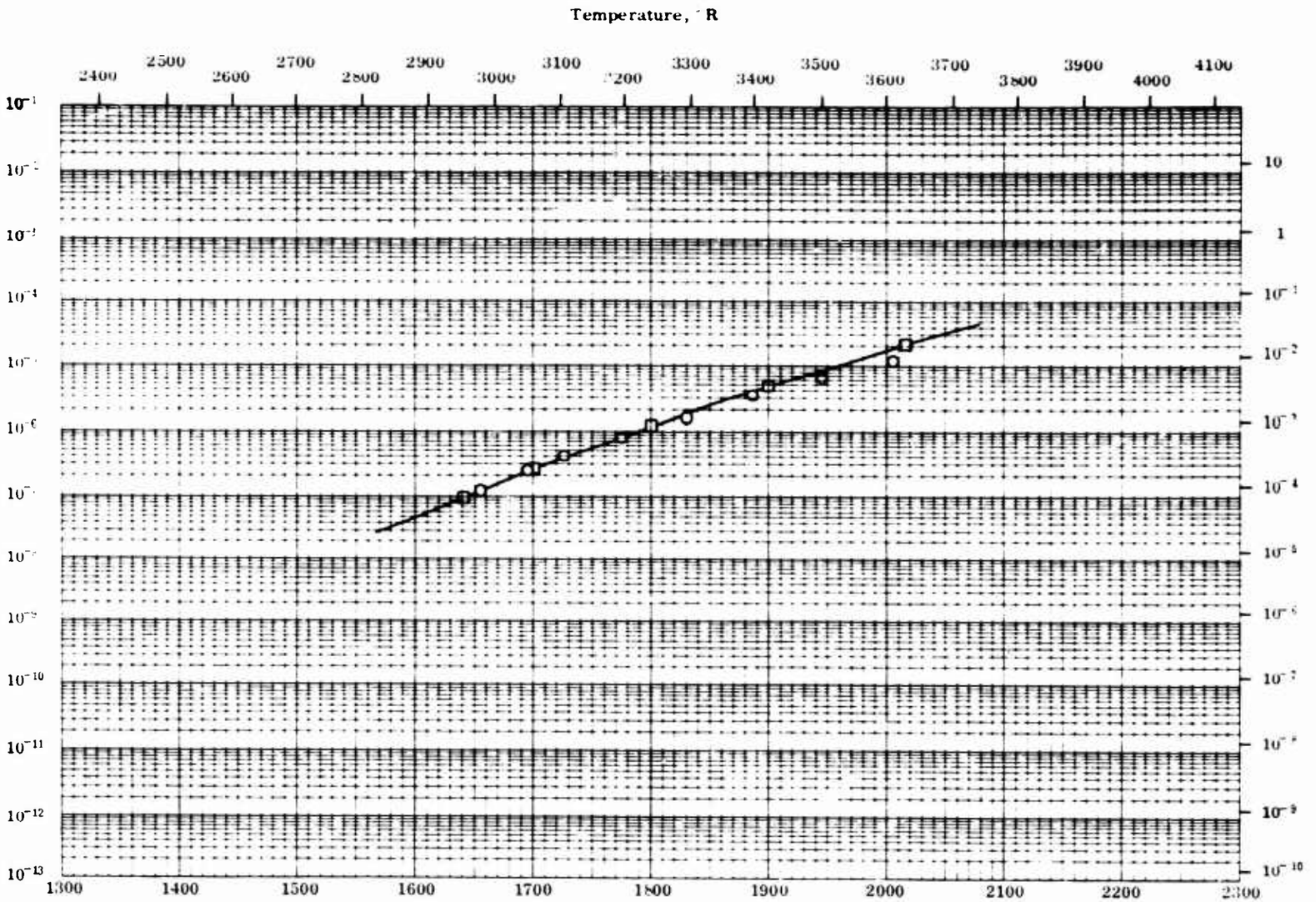


THERMAL LINEAR EXPANSION -- LANTHANUM

THERMAL LINEAR EXPANSION -- LANTHANUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	56-62 also 57-62	293-1050		99.9 pure, 0.04 each Ca, N_2, 0.02 C, and no trace of Al, Be, Se, Ta, Yb, other rare earths; Sample No. 1.	Fluoride reduced with Ca, vacuum cast, recast into rod; data obtained during heating; cooling data not shown because sample softened.
□	56-62 also 57-62	293-1106		Same as above; Sample No. 2.	Same as above.



TPRC

VAPOR PRESSURE -- LANTHANUM

VAPOR PRESSURE -- LANTHANUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-11	1653-2008		Very pure.	
□	62-13	1640-2017		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{20511 \pm 203}{T(K)} + 8.3640 \pm 0.113.$

PROPERTIES OF LUTETIUM

MOST PROBABLE VALUES

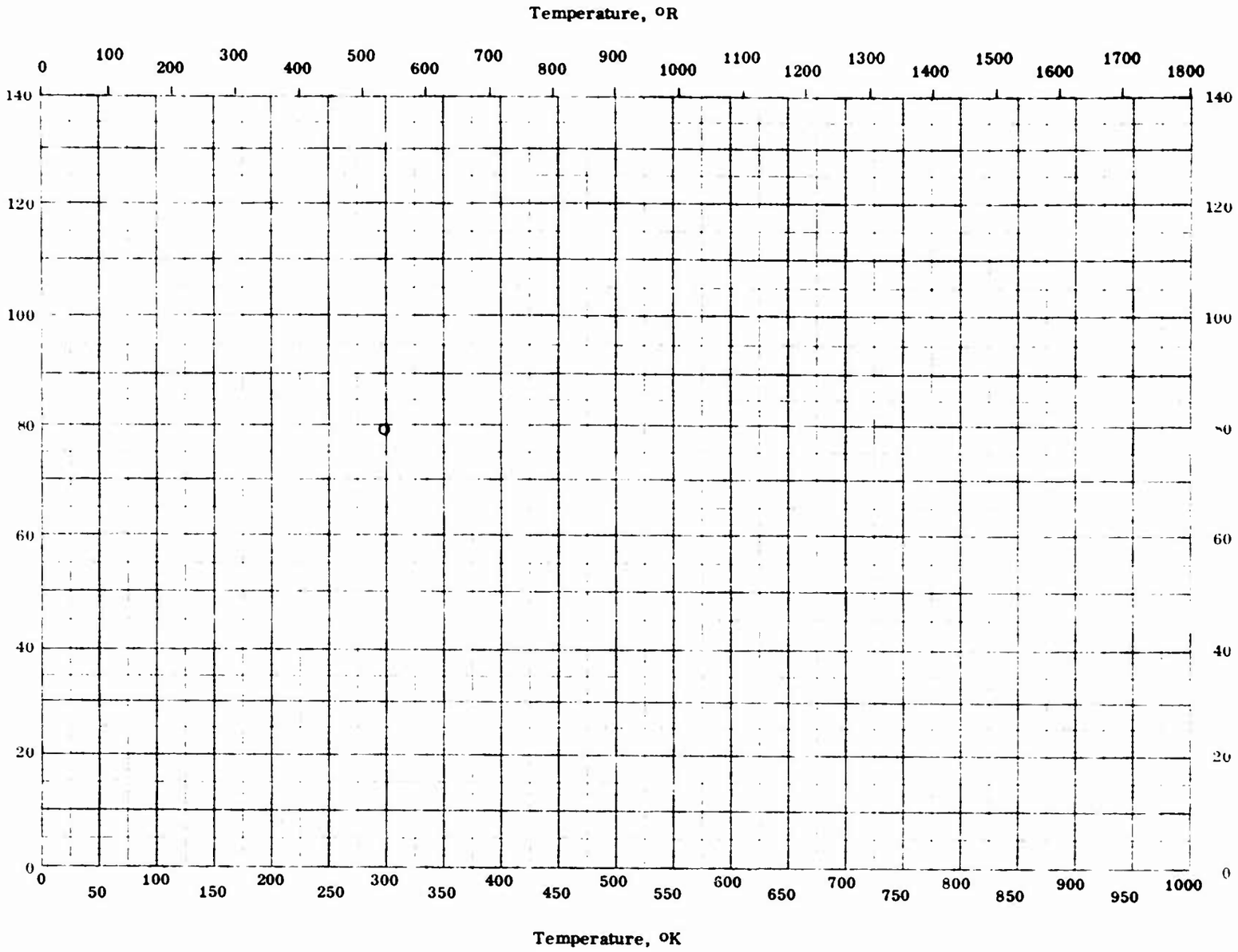
Property	C.G.S. Units	Brit. Eng. Units
Density.	9.85	615
Melting Point	1973	3552
Heat of Fusion	26	47
Heat of Vaporization. . . .	792	440
Heat of Sublimation	340	610

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	9.849	614.9
	◇	9.79	610.9
Melting Point		K	R
	□	1973 ± 50	3552 ± 90
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	△	26	47
	●	25.7	46.3
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	■	440	793
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	△	340	610

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurements.
□	54-11	1923-2023		Very pure.	M. P. by observing of flow during preparation by optical pyrometer.
△	56-54	1973		Very high purity.	
▽	56-54	—		Very high purity.	
◇	62-13	298		Not given.	
●	62-13	—		Not given.	
■	62-13	298		Not given.	



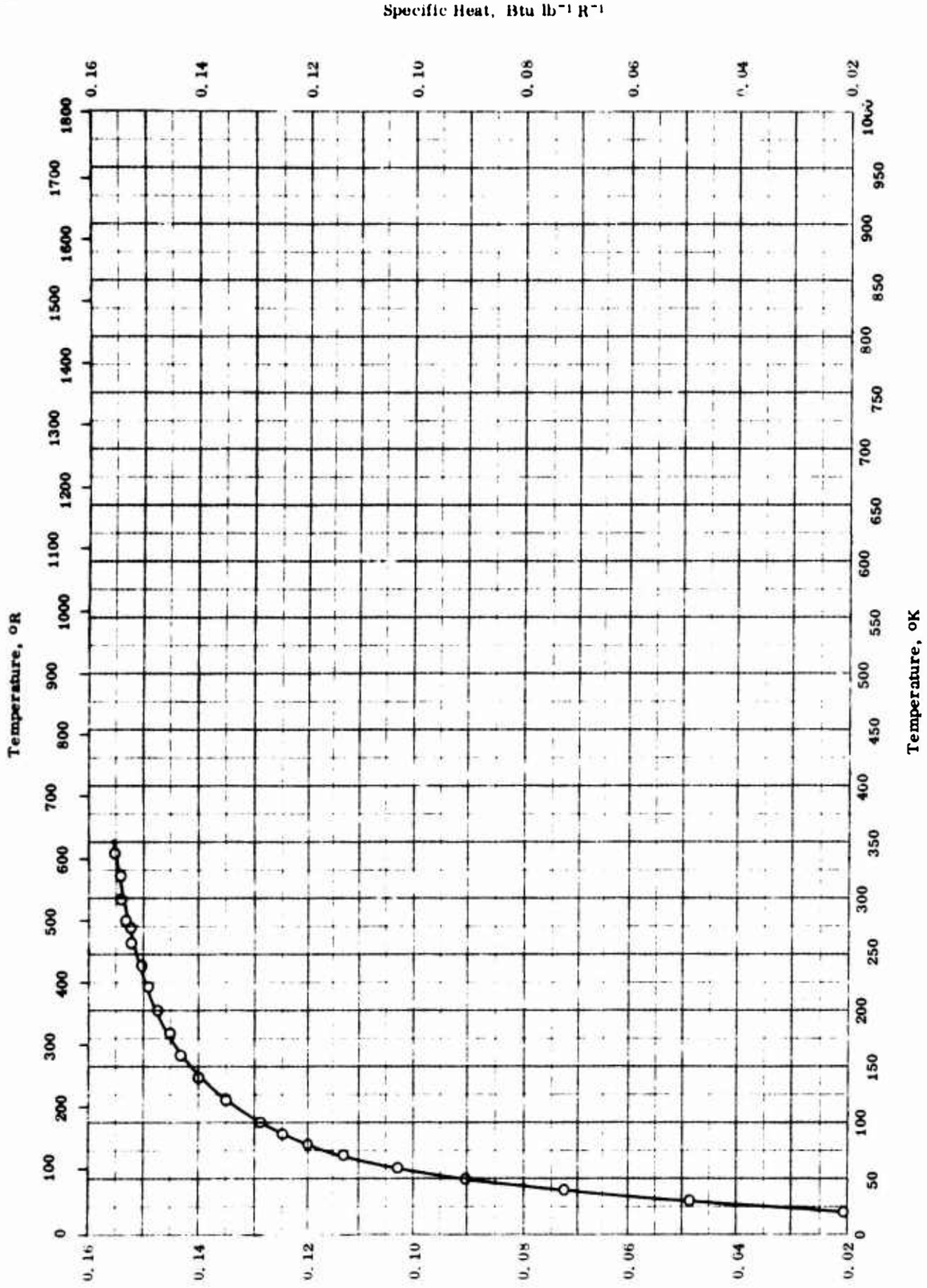
ELECTRICAL RESISTIVITY -- LUTETIUM

TPRC

ELECTRICAL RESISTIVITY -- LUTETIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		Not given.	



SPECIFIC HEAT -- LUTETIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-29	12-348	0.3	0.20> total of Ca, Cr, Cu, Fe, Mg, Sc, Si, Tm, Y, Yb, 0.08 N_2, 0.01 C; after heat capacity measurements, chemical analysis showed 1.62 Ta, 1.97 LuOF.	Corrected for impurities.

PROPERTIES OF MAGNESIUM

MOST PROBABLE VALUES

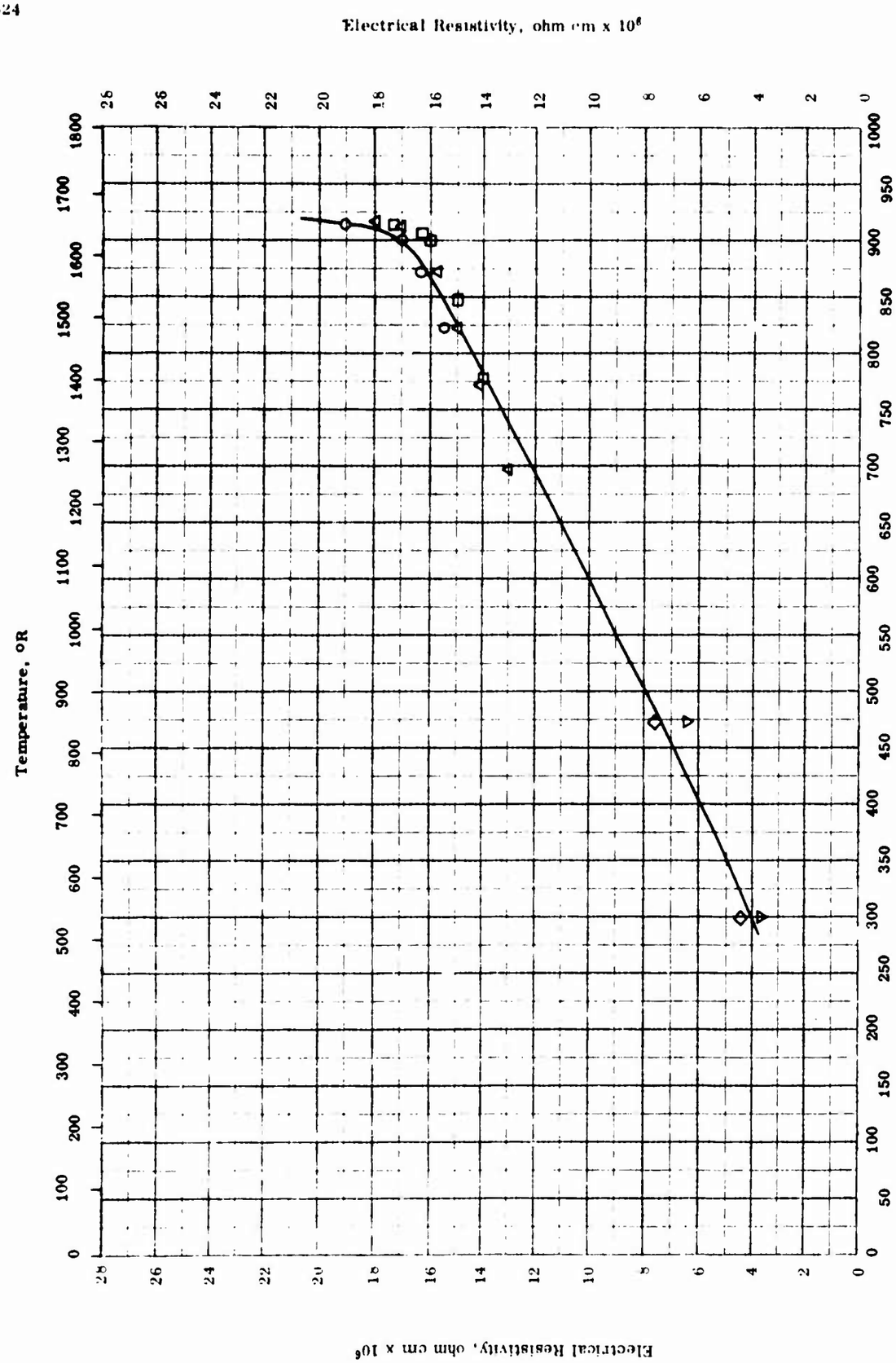
Property	C.G.S. Units	Brit. Eng. Units
Density	1.74	109
Melting Point	923	1661
Heat of Fusion	88	158
Heat of Sublimation	1400_{870K}	2530_{1570R}

REPORTED VALUES

		Density	Melting Point	Heat of Fusion	Heat of Sublimation
		g cm^{-3}	K	cal g^{-1}	cal g^{-1}
		lb ft^{-3}	R	Btu lb^{-1}	Btu lb^{-1}
○		1.74			
		109			
□			922.6	83.5 ± 0.3	
			1660.9	150.3 ± 0.6	
△			913	87.2	
			1644	157	
◇			923	88 ± 2	
			1661	158 ± 4	
▽			923	88 ± 2	
			1661	158 ± 4	
◁					1407_{868K}
					2532_{1563R}
▷					1384_{993K}
					2491_{1788R}

REFERENCE INFORMATION

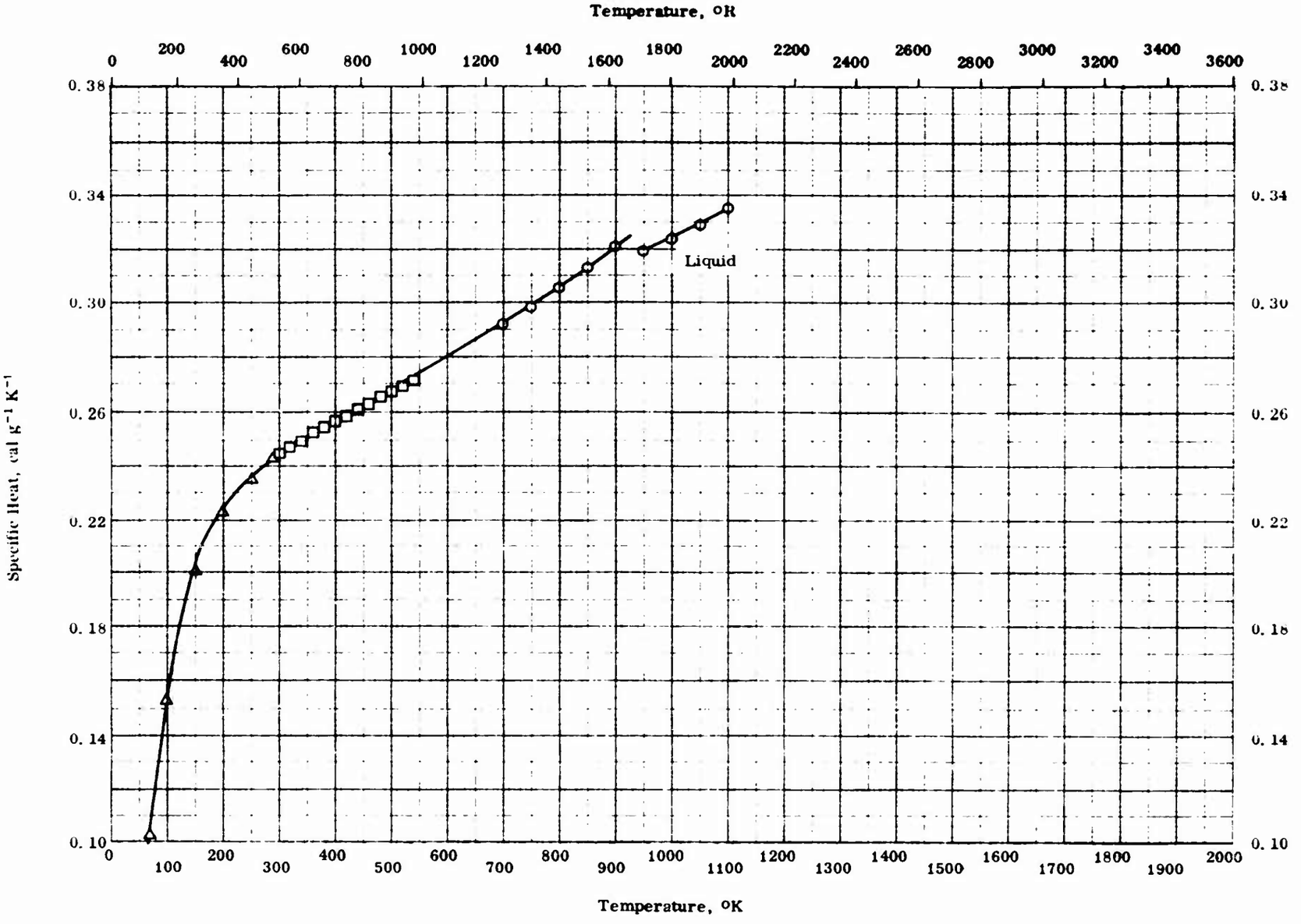
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-26	298		Not given.	
□	50-12	923		99.6 pure.	M. P. and Δh_f; Δh_f from enthalpy difference at M. P. with ice calorimeter.
△	52-27	913		Not given.	M. P. and Δh_f; Δh_f from high temperature calorimeter of Nagasaki-Takagi type; heat rate 2 C min^{-1}.
◇	55-18	923		99.95 ~ 99.98 pure.	Δh_f by drop-method.
▽	57-51 also 55-39	923		Pure.	
◁	41-2	818-918		Not given.	Δh_s from vapor pressure data.
▷	41-2	918-1068		Not given.	Same as above.



ELECTRICAL RESISTIVITY -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_0	Sample Specifications	Remarks
○	51-23	823-913		99.05 Mg.	
□	51-23	780-913		99.67 Mg.	
△	51-23	698-915		99.52 Mg.	
◇	54-20	297-473		99.98 pure; single crystal.	Measured perpendicular to hexagonal axis.
▽	54-20	297-473		Same as above.	Measured parallel to hexagonal axis.

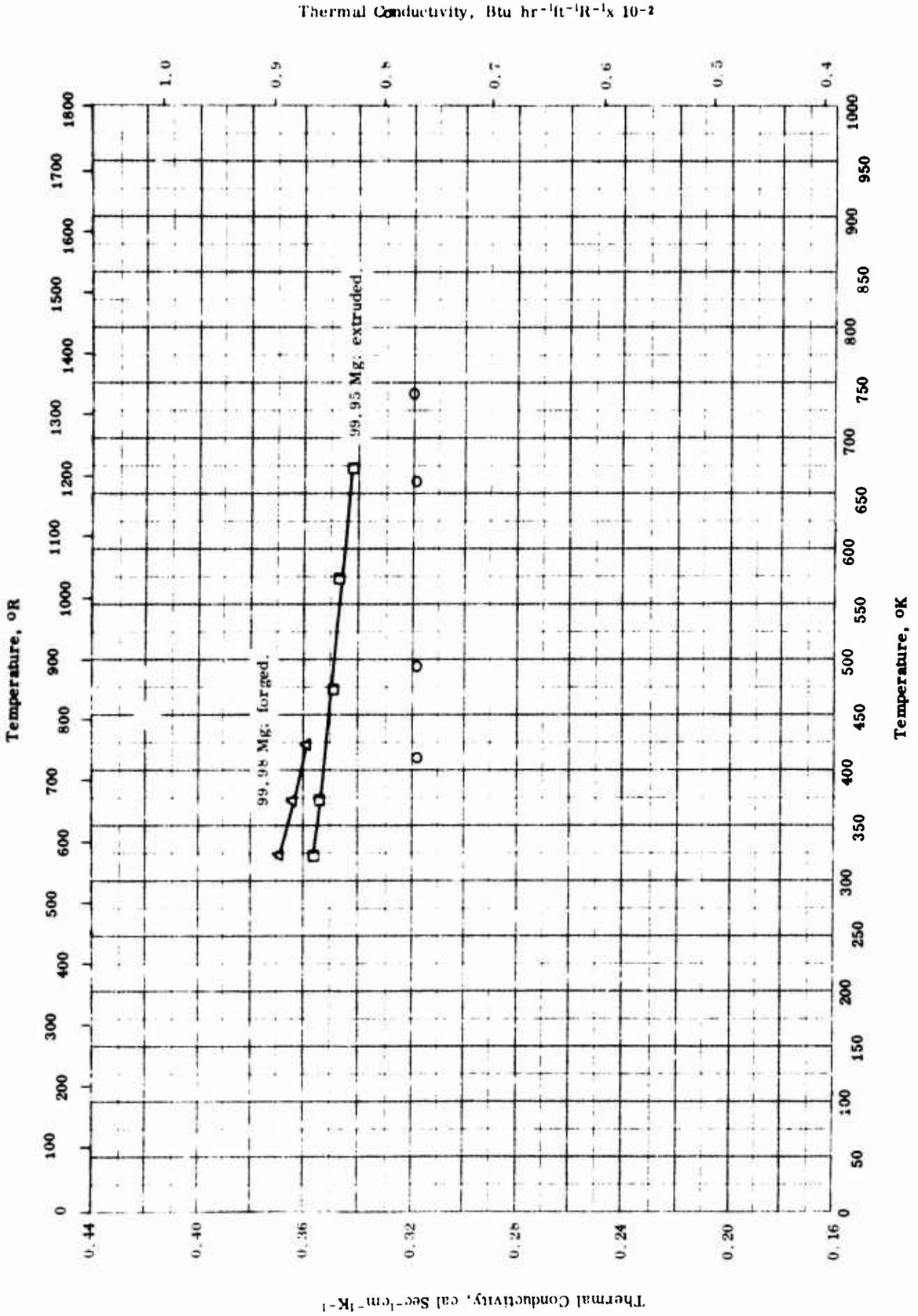


SPECIFIC HEAT -- MAGNESIUM

SPECIFIC HEAT -- MAGNESIUM

REFERENCE INFORMATION

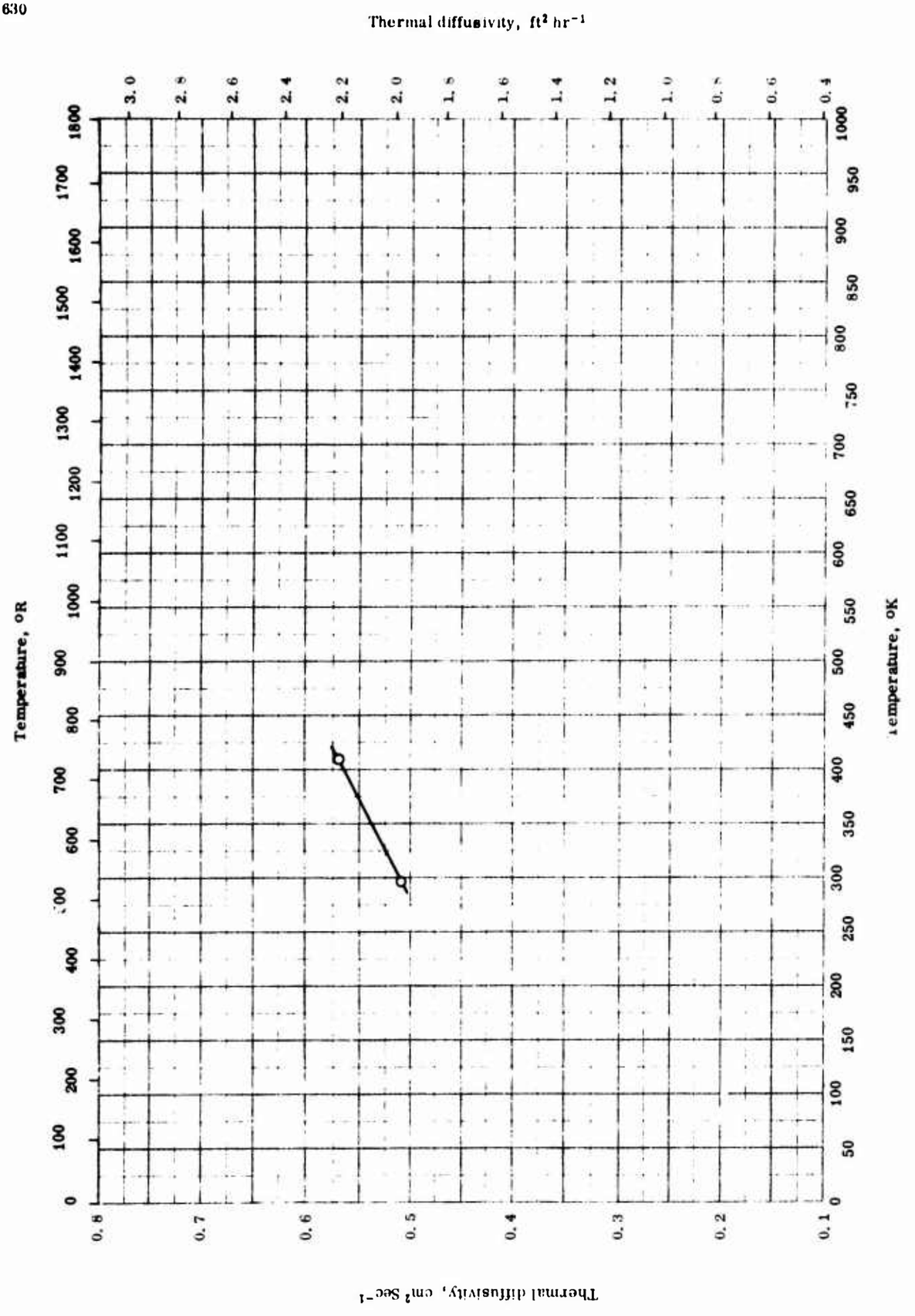
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-18	700-1100		99.95 - 99.98 Mg.	
□	57-12	298-543		99.99 Mg.	
△	54-14	13-321	0.1	99.99 Mg.	



THERMAL CONDUCTIVITY -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-6	411-741		98% theoretical density.	Extruded.
□	64-4	323-673		99.95 Mg, ≈0.033 Al, and ≈0.012 Zn. (Author's design: Mg I).	Forged rod.
△	64-4	323-423		99.98 Mg, ≈0.017 Al and ≈0.004 Zn. (Author's design: Mg II).	

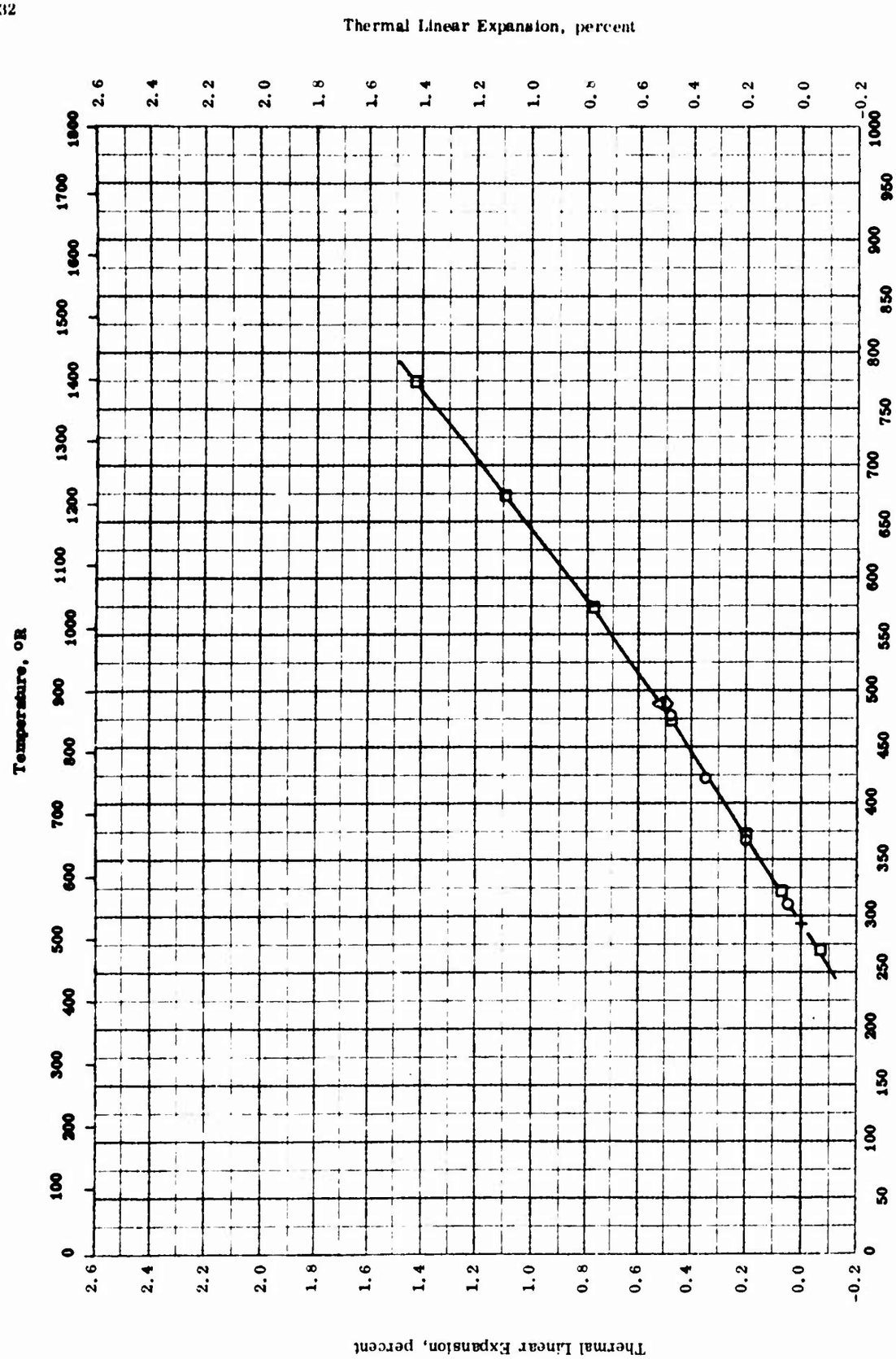


THERMAL DIFFUSIVITY -- MAGNESIUM

THERMAL DIFFUSIVITY -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-1	295-408	±5	HK-31; 1.9 cm^2 in cross-section and 0.352 cm in length.	

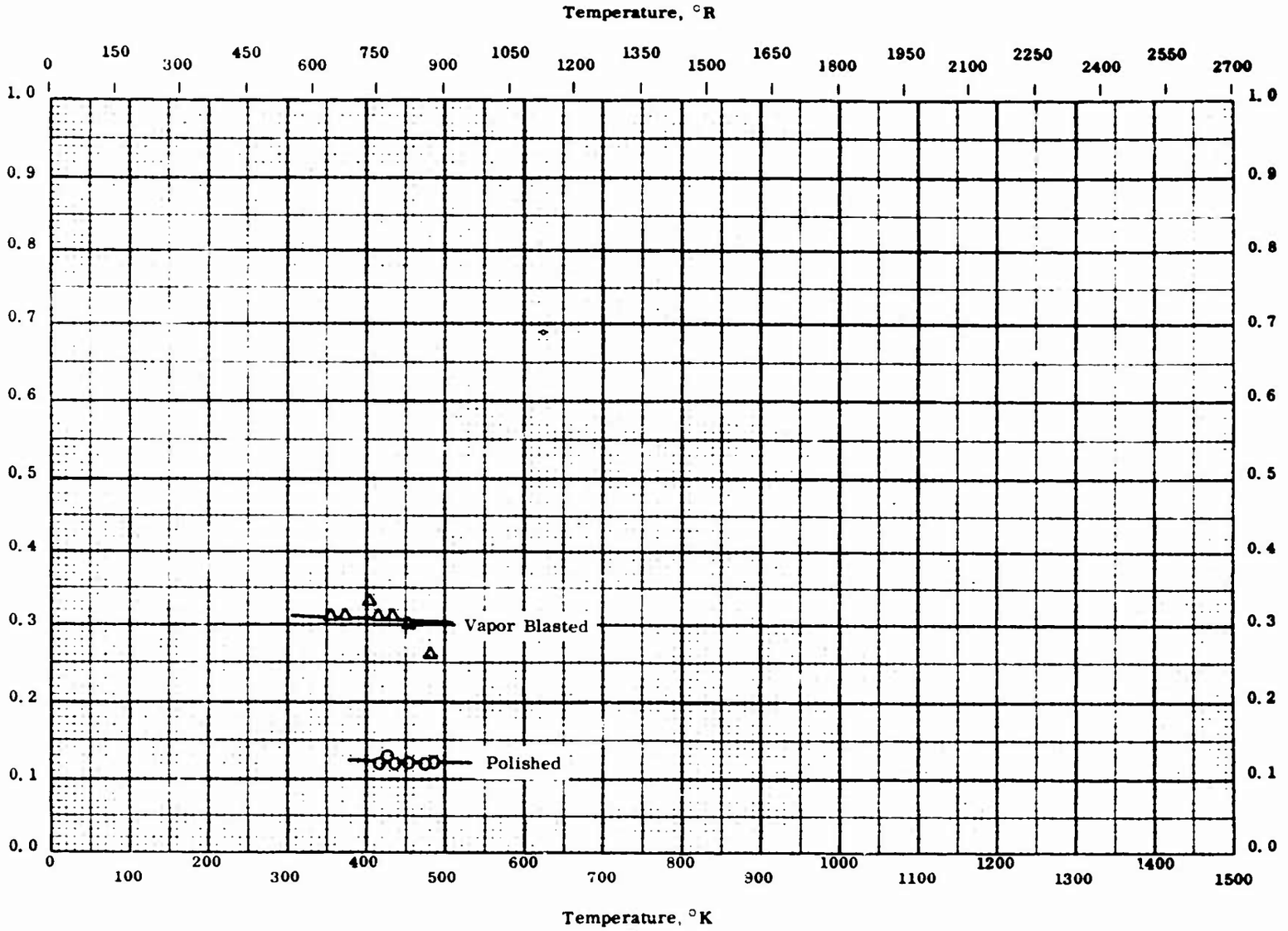


THERMAL LINEAR EXPANSION -- MAGNESIUM

THERMAL LINEAR EXPANSION -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-41	293-478		Pure.	Cast or extruded; auth. report coeff. of exp. as: (14.96 ± 0.03) x 10^{-6} F^{-1} cast and (14.71 ± 0.09) x 10^{-6} F^{-1} extruded based on: 13.9 x 10^{-6} C^{-1} for chronin.
□	41-8	273-773		99.99 pure.	Annealed 30 min. at 520 C in vacuum.
△	55-39	298-488		Pure.	Cast.
▽	55-39	298-488		Same as above.	Extruded.



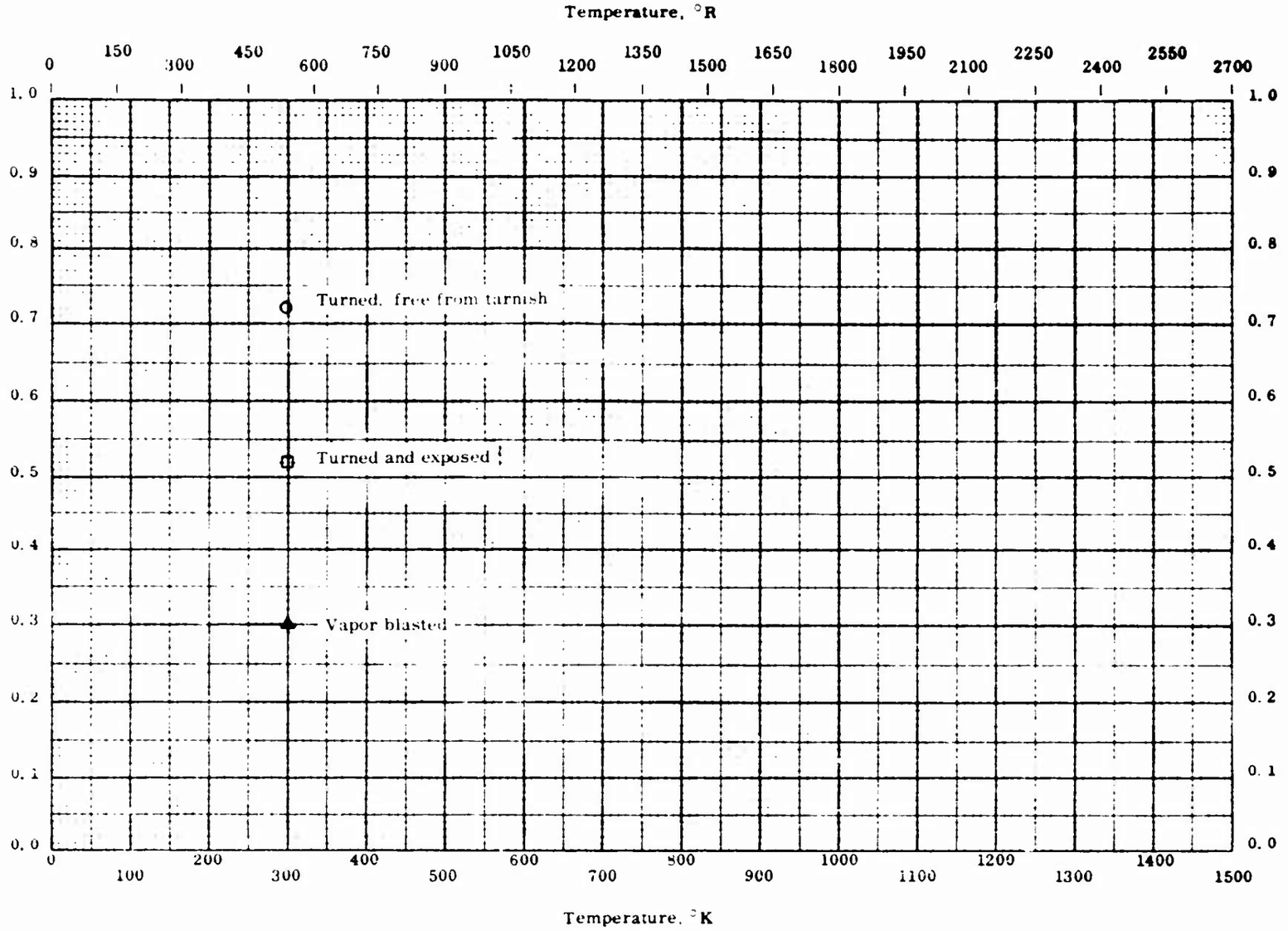
HEMISPHERICAL TOTAL EMITTANCE -- MAGNESIUM

HEMISPHERICAL TOTAL EMITTANCE -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-43	416-485	±3	Not given.	Hand-polished; measured in vacuum (10^{-3} mm Hg): data taken from smooth curve.
Δ	62-43	355-479	± 3	Same as above.	Vapor-blasted; same as above.

TPRC



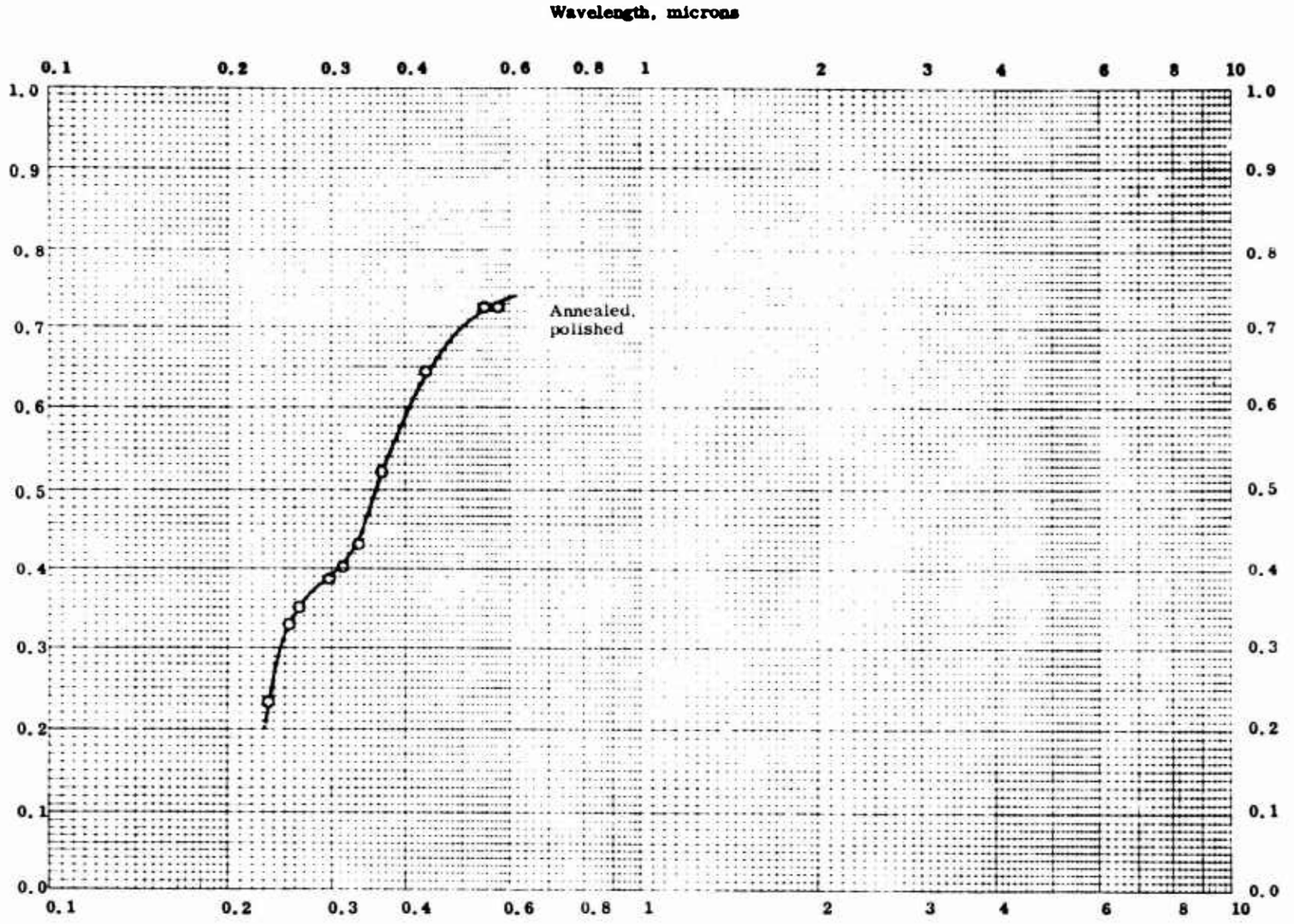
NORMAL TOTAL REFLECTANCE — MAGNESIUM

NORMAL TOTAL REFLECTANCE -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-16	298		L 120 (British aircraft material spec.)	Turned; freshly prepared.
□	64-16	298		Same as above.	Turned; exposed to indoor atmosphere for 1 month.
△	64-16	298		Same as above.	Vapor blasted; exposed to indoor atmosphere for 1 month.

TPRC



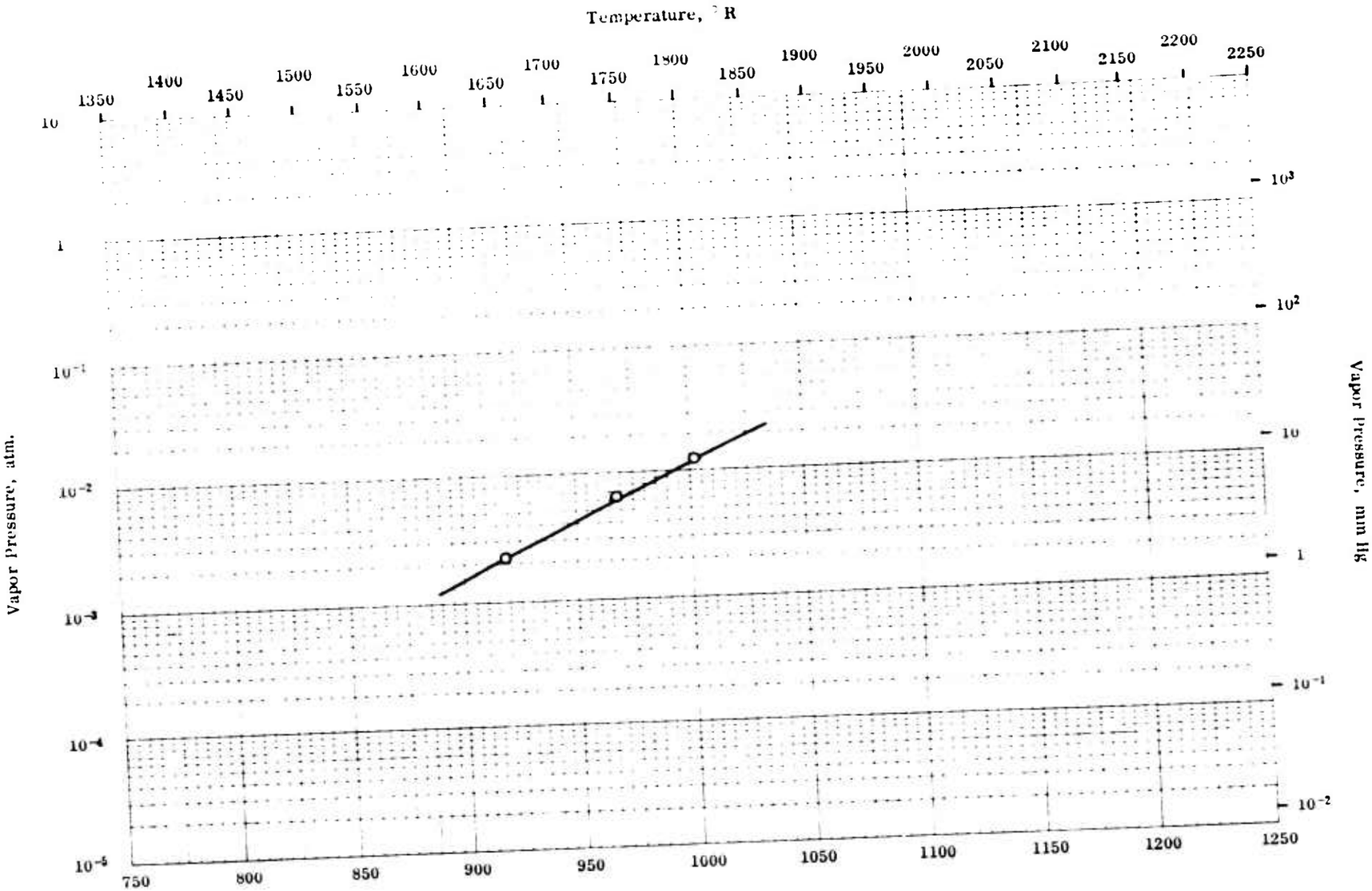
NORMAL SPECTRAL REFLECTANCE -- MAGNESIUM

NORMAL SPECTRAL REFLECTANCE -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	34-2	298	0.235-0.578	< 2		Annealed in inert gas for 6 - 24 hrs; etch tested, polished, and stored in (NaOH - NaF) solution; normal illumination.

TPRC



VAPOR PRESSURE -- MAGNESIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	41-2	918-1002		Not given.	Purified in H_2 atmos; each point represents the average of a min. of six determinations.

TPRC

PROPERTIES OF MANGANESE

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7.4*	462*
Melting Point	1525	2746
Heat of Sublimation	2177_{0K}	3919_{0R}

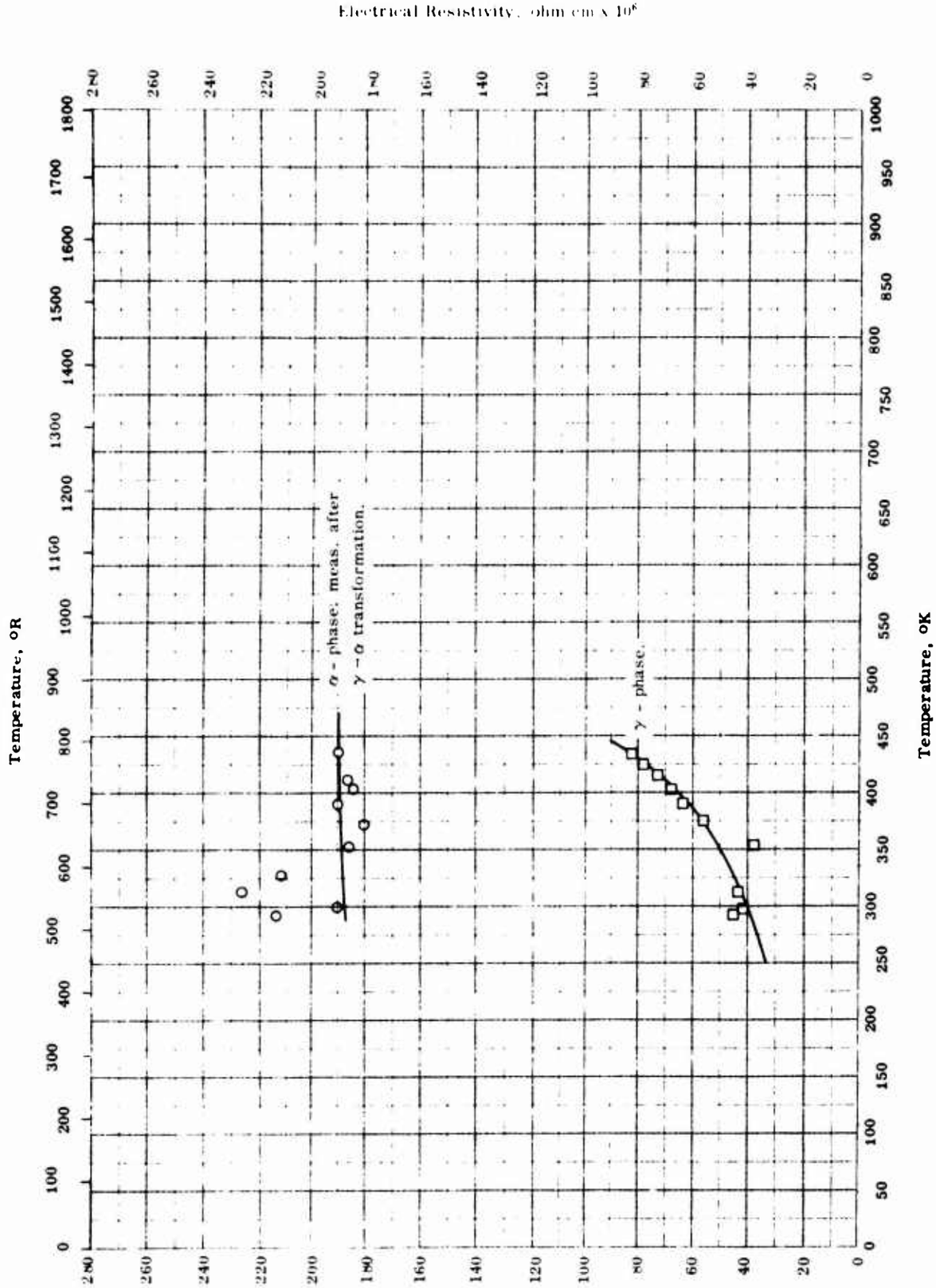
*α-hase Mn

REPORTED VALUES

		Density		Melting Point		Heat of Sublimation	
		g cm^{-3}	lb ft^{-3}	K	R	cal g^{-1}	Btu lb^{-1}
◇		7.19	449				
▽		7.4	462				
○				1517 ± 5	2713 ± 9		
□				1525 ± 8	2746 ± 14		
◁				1518	2733		
△						2177_{0K} ± 9	3919_{0R} ± 15

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	46-1	1517		99.9+ Mn, 0.07 S, and 0.03 Si.	M. P. by visual observation; measured in He atm.
□	51-34	1526		99.9 Mn, 0.045 Fe, 0.029 Al, 0.01 C, and traces of Si.	Distilled; heated to 1200 C and cooled, reheated to 800 C and cooled, and then reheated above M. P. to 1300 C and cooled; M. P. data by breaking in magnetization curve.
△	57-16	0		0.05 Fe and 0.002 each Cu, Pb, and Ni; prepared from carbon free CP grade powder.	Δh_s from vapor pressure data.
◇	40-5	298		γ-phase.	Deposited as γ-phase and converted to α-phase in 6 days.
▽	40-5	298		α-phase.	
◁	49-23	1518		99.95 pure.	M. P. from break in time - temperature curve.



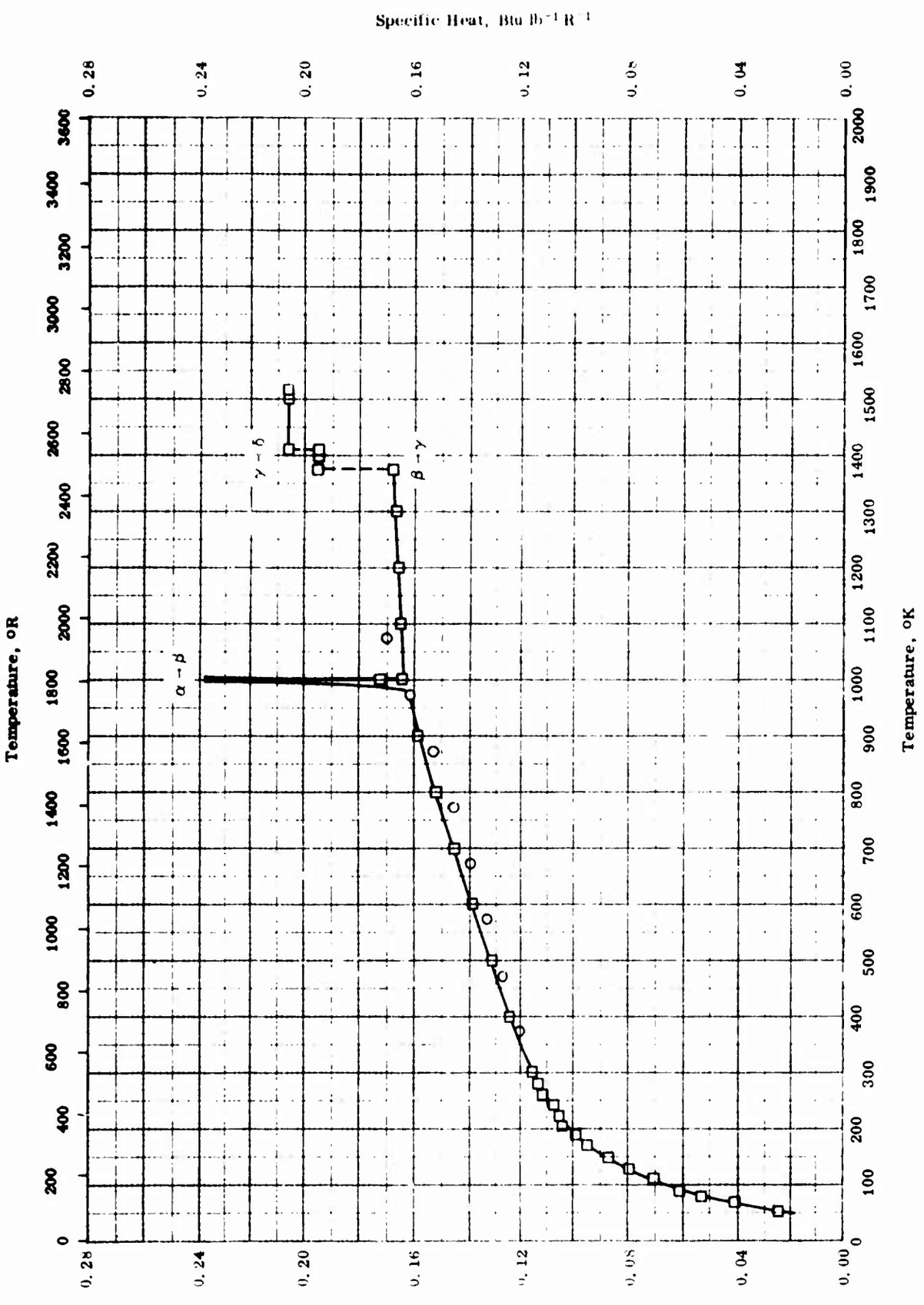
ELECTRICAL RESISTIVITY -- MANGANESE

Electrical Resistivity, ohm cm x 10^6

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	49-10	293-433		α - phase; electrodeposited.	Various aging periods ranging from 980 hr at 20 C to 13 sec at 160 C; measurements made after γ to α transformation was completed.
D	49-10	293-433		γ - phase; electrodeposited.	γ - phase unstable below 1100 C; measurements made immediately following electrodeposition

TPRC

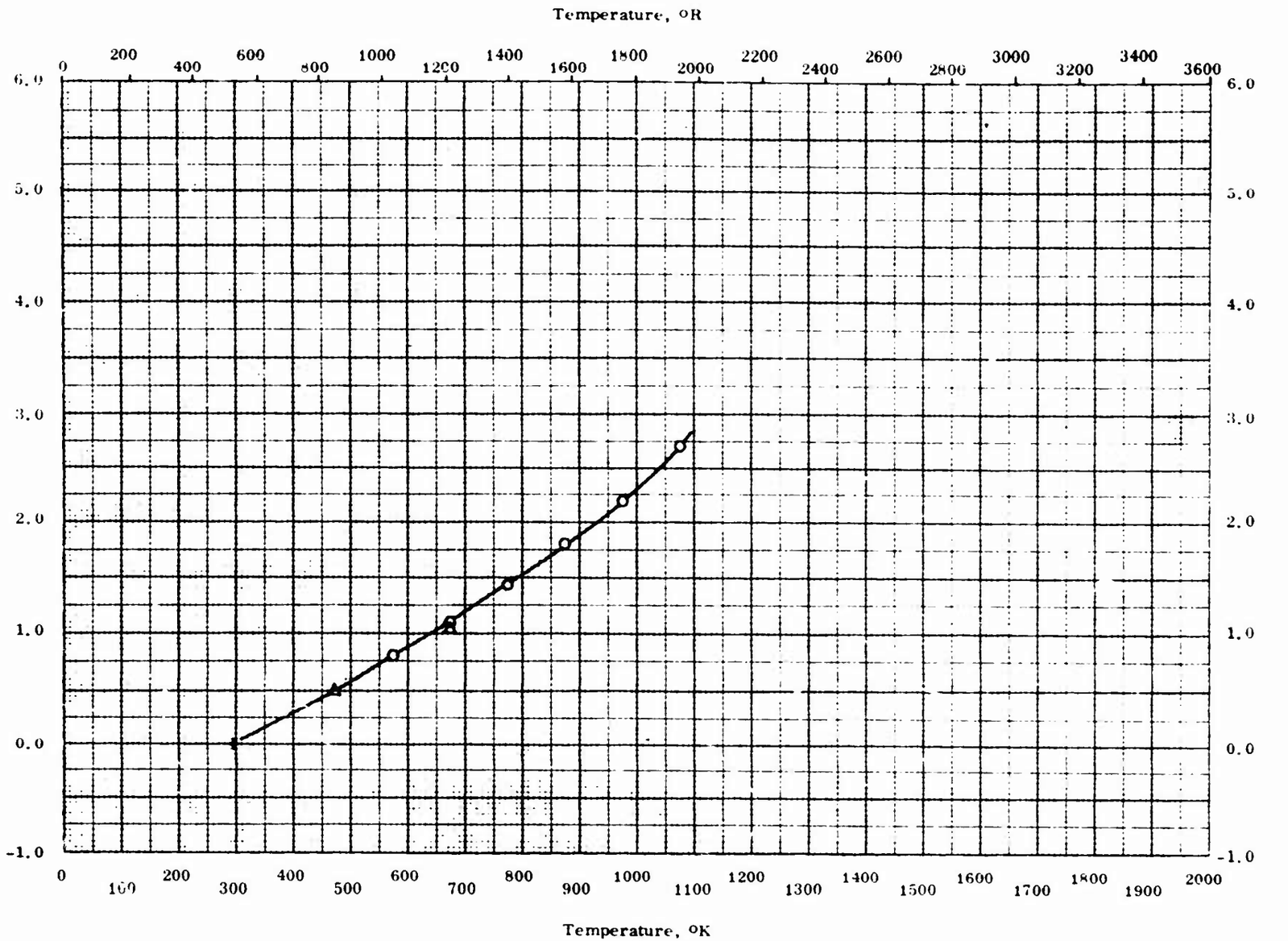


SPECIFIC HEAT -- MANGANESE

SPECIFIC HEAT -- MANGANESE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	50-6	273-1073	1.0	Electrolytic; 0.01> impurities, mainly Mg.	
□	46-1	53-1517		99.9 Mn; α, β, γ, δ manganese.	



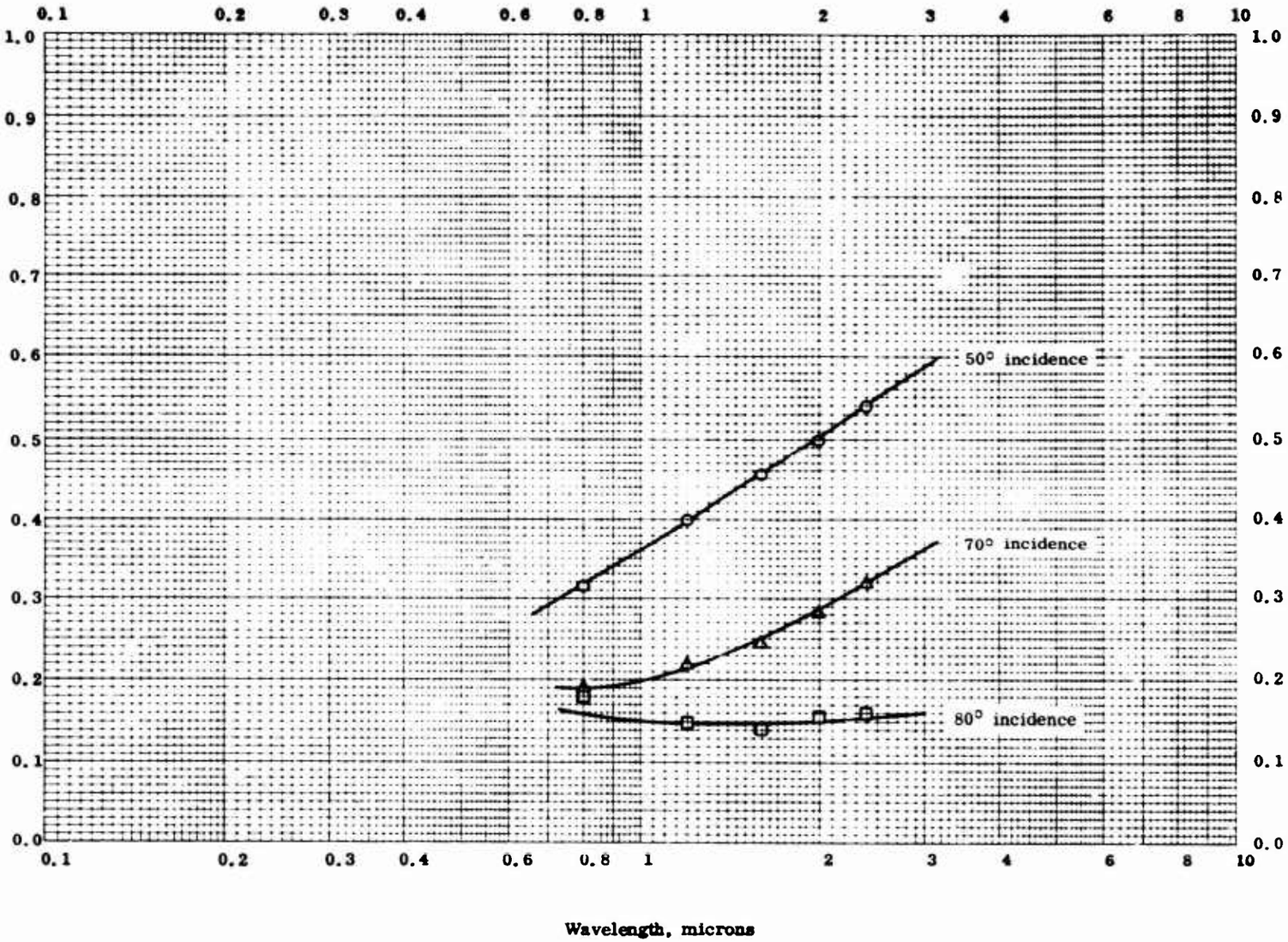
THERMAL LINEAR EXPANSION -- MANGANESE

TPRC

THERMAL LINEAR EXPANSION -- MANGANESE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error	Sample Specifications	Remarks
O	55-53	289-1073		Electrolytically pure.	Annealed.
Δ	49-27	473-673		Electrolytically pure.	Author gives coeff. of exp. 200 - 400 C; plotted pt. at 1212 R (400 C) based on datum of Ref. 55 - 53 (above) at 552 R (200 C).



ANGULAR SPECTRAL REFLECTANCE -- MANGANESE

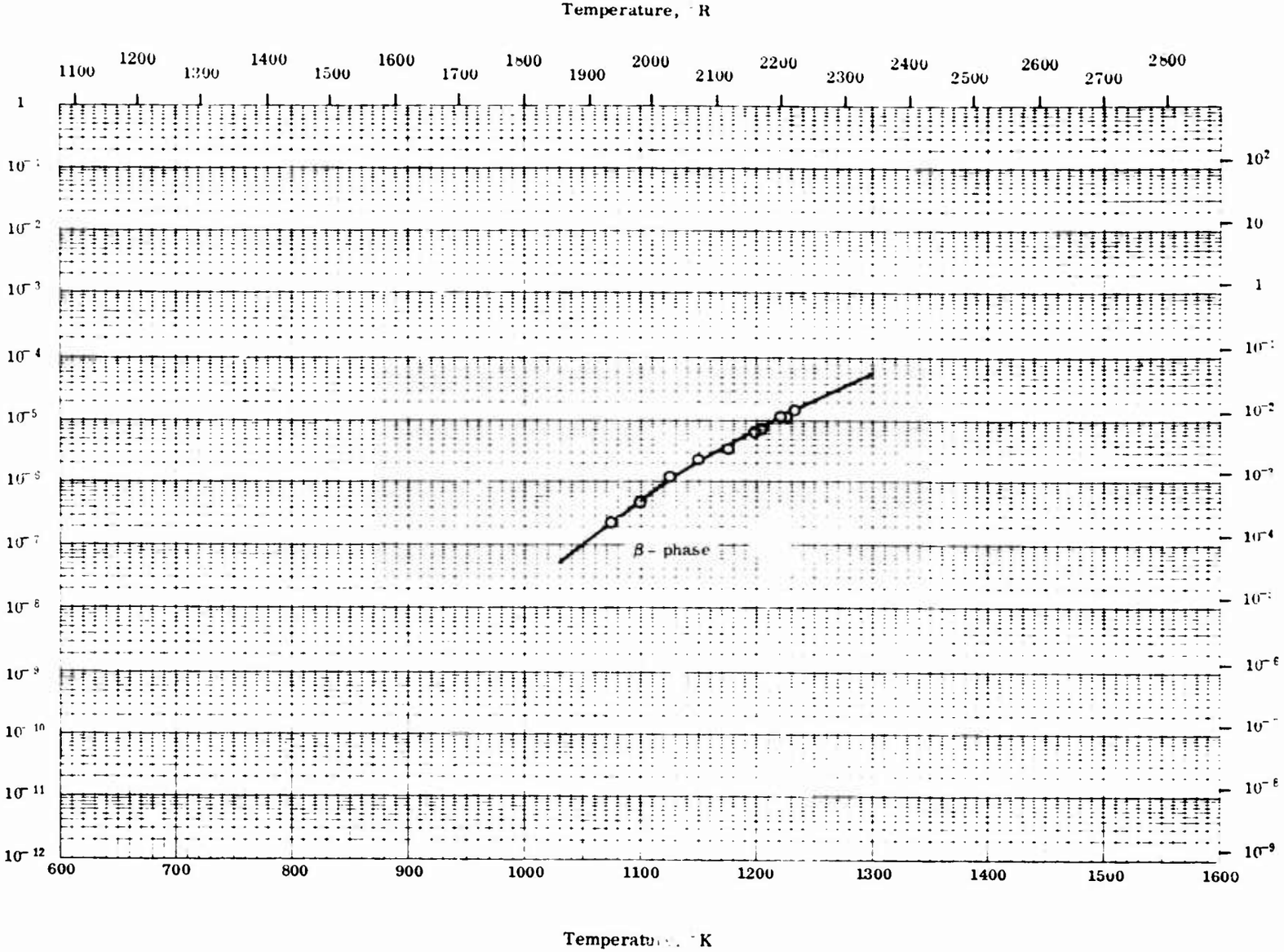
Angular Spectral Reflectance

TPRC

ANGULAR SPECTRAL REFLECTANCE -- MANGANESE

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	48-8	298	0.8-2.4		Evaporated metal film.	Data taken from smooth curve; 50 degree incidence; for polarization parallel to plane of incidence.
△	48-8	298	0.8-2.4		Same as above.	Same as above; 70 degree incidence.
□	48-8	298	0.8-2.4		Same as above.	Same as above; 80 degree incidence.



TPRC

VAPOR PRESSURE -- MANGANESE

VAPOR PRESSURE -- MANGANESE

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-16	1075-1235		0.05 Fe and 0.002 ea. Cu, Pb, Ni; in β phase.	Cp grade powder, carbon free.

TPRC

PROPERTIES OF MOLYBDENUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density	10.24	639.3
Melting Point	2895	5211
Heat of Sublimation . . .	156_{0K}	2918_{0R}

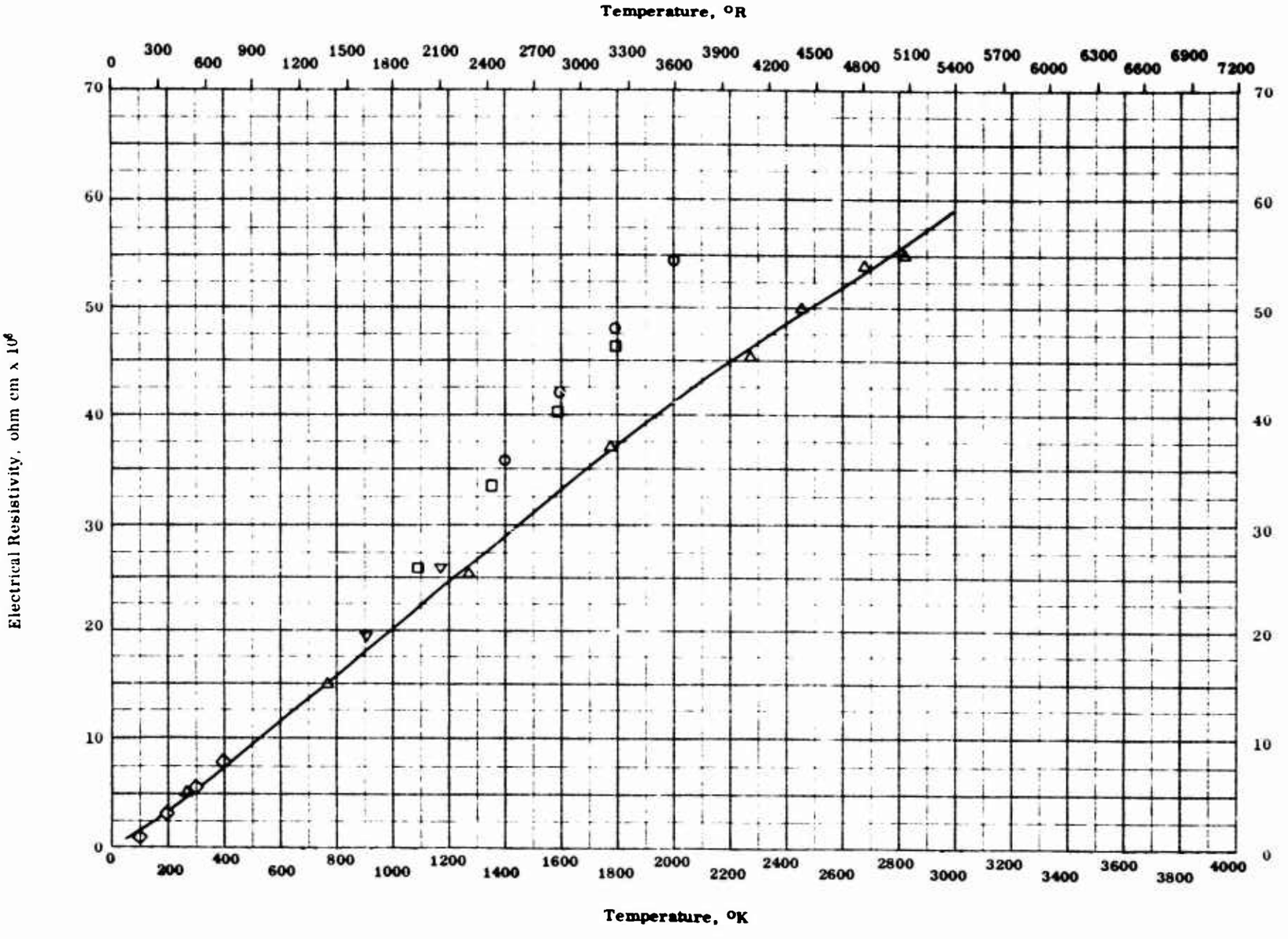
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	10.24	639.3
	△	10.24	639.3
	●	10.22	638
Melting Point		**K**	**R**
	▲	2870	5166
	▼	2853	5135
	■	2891	5204
	◆	2901	5222
	◀	2895	5211
Heat of Sublimation		**cal g^{-1}**	**Btu lb^{-1}**
	□	155.55_{0K}	2918.1_{0R}

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_0	Sample Specifications	Remarks
○	56-3 also 58-1	297		Not given	Arc-melted and unalloyed; density measured by weight and volume.
□	52-7	0		0.023 C and 0.01 > Fe and Si.	Δh_s from vapor pressure data.
△	56-4	298		Not given.	Arc-melted.
▲	50-20	2870		Not given.	M. P. from observation of first liquid drop; optical pyrometer sighting on black body cavity.
▼	50-20	2853		Not given.	Same as above.
■	50-7	2891		Not given.	M. P. calibrated disappearing filament optical pyrometer.
◆	50-7	2901		Not given.	Same as above.
◀	56-55	2895		Not given.	
●	62-12	293		Not given.	

TPRC



ELECTRICAL RESISTIVITY -- MOLYBDENUM

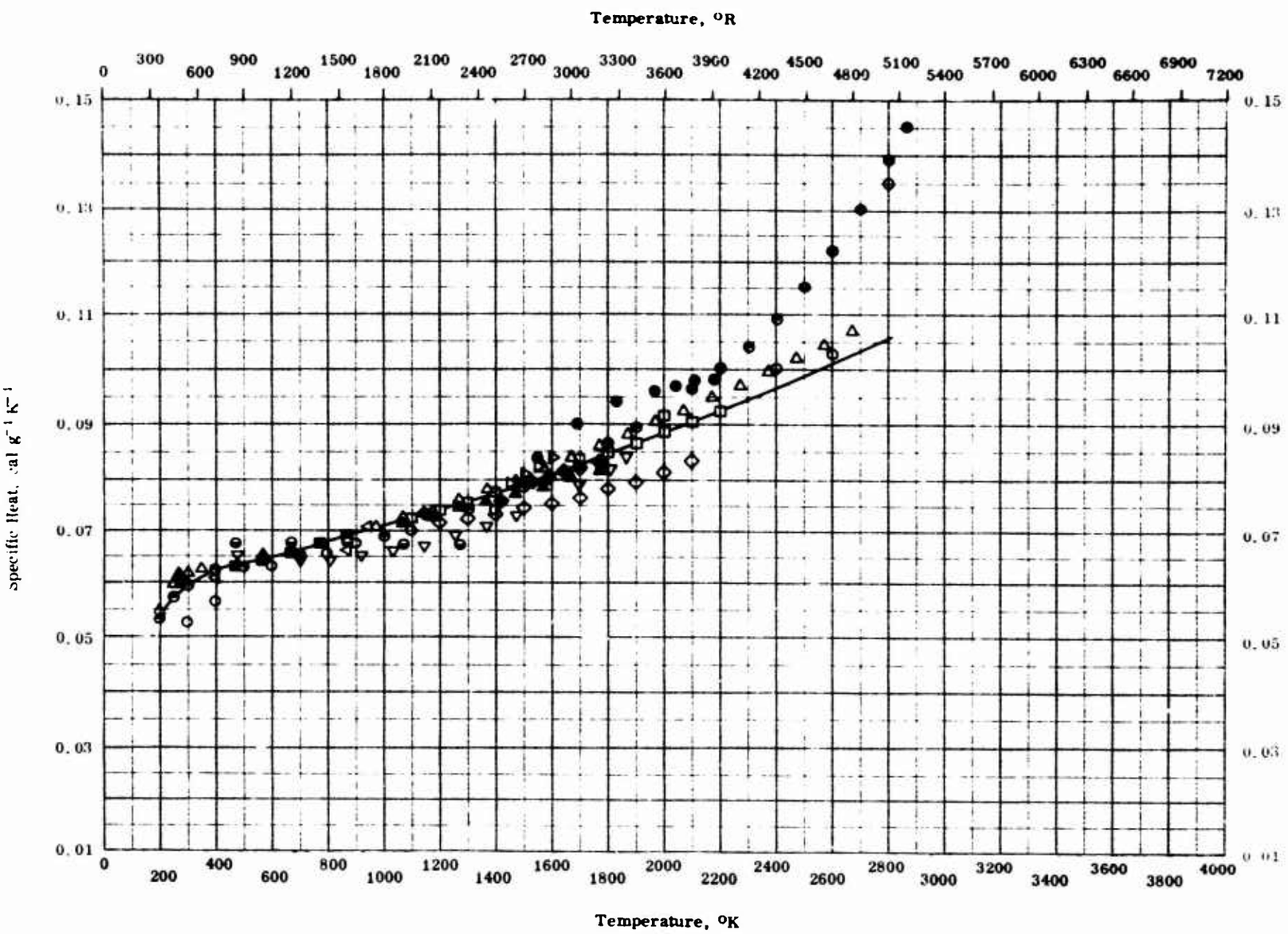
Electrical Resistivity, ohm cm x 10⁶

ELECTRICAL RESISTIVITY -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-23	1400-2000		Impurities undetermined; considered small.	Wire heated to 2000 F for 20 hrs before test.
□	41-1	1100-1800		Traces of metallic impurities.	Aged at 2200 K for 2 hrs.
△	52-9	273-2823		Not given.	
▽	56-35	903-1173		99.5 pure.	Melted Mo sponge in A arc furnace, rolled, annealed 30 min at 950 C, placed in A atmos. and quenched; author gives relative data, computed resistivity based on 26 μ ohm cm at 2112 R.
◇	64-12	100-400	± 2	Spectral pure bar from Johnson, Matthey and Co., London.	

TPRC

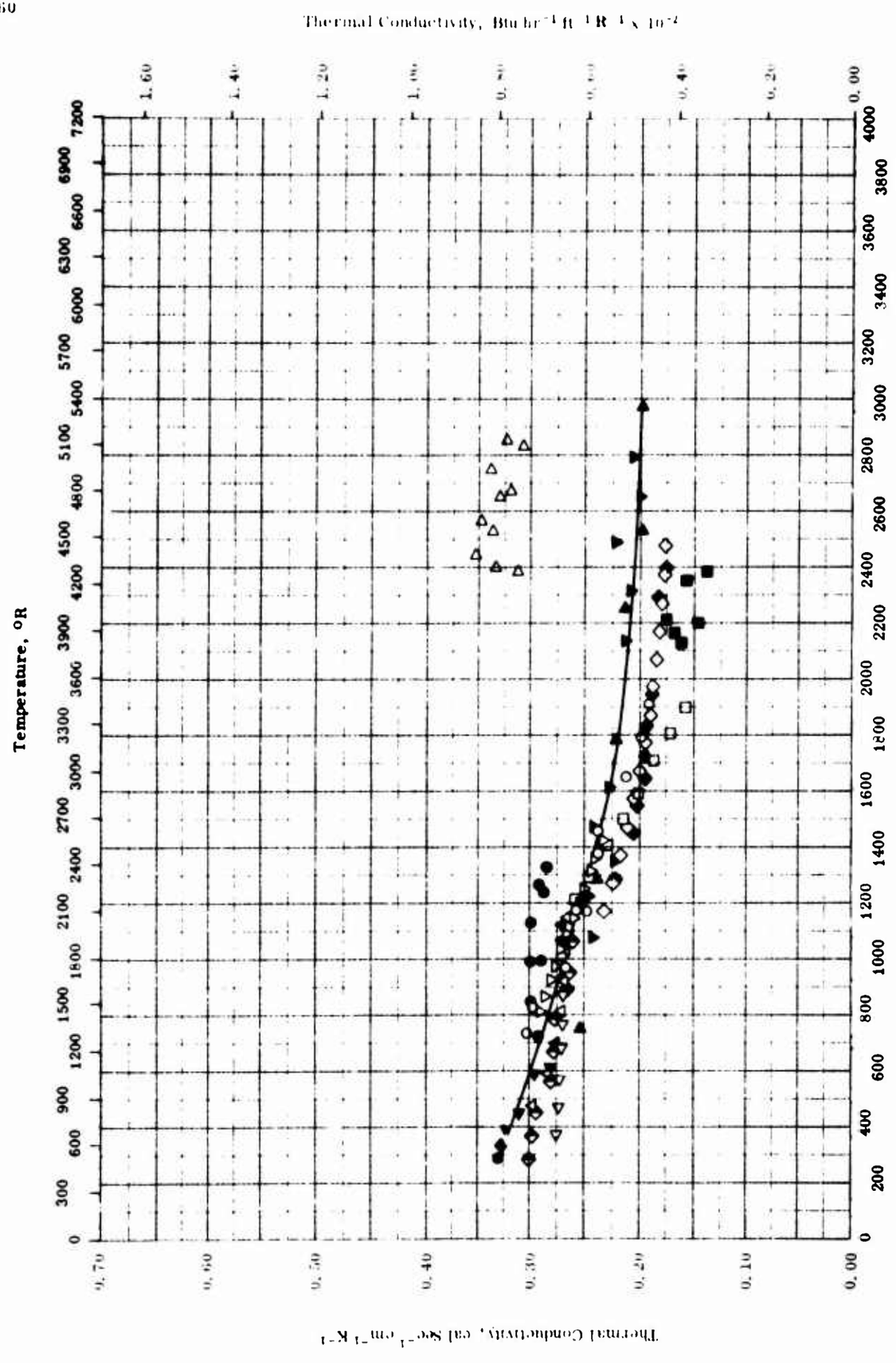


SPECIFIC HEAT -- MOLYBDENUM

SPECIFIC HEAT -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-26	300-2800		Not given.	
□	61-24	1100-2200	5.0	99.98 Mo and 0.02 MoO.	
△	62-24	973-2673	± 1.2	Not given.	Polished surface.
◇	63-14	1200-2100	≤3.0	99.93 Mo, 0.01 C, 0.01 Fe, 0.005 O_2, 0.001 H_2, 0.001 N_2, and 0.02 residue.	Out gassed and evacuated at 1×10^{-6} mm Hg.
▽	58-1	477-1866		Density 640 lb ft^{-3} at 75 F.	Under 95% argon - 5% hydrogen.
◓	61-22	200-2860	4.0	Not given.	
◒	51-17	473-1273		Not given.	
●	62-19	1550-2180	± 10	Not given.	
■	62-30	273-2673		Not given.	
▲	34-1	273-1873		Pure.	Heated at 1400 C for 4, 8, and 12 hrs respectively.
◆	60-32	1088-1700		Mo-9-8; 99.90 Mo, 0.005> Fe, and 0.003> C.	
▷	65-4	1250-1600	0.09	99.9 Mo.	Annealed at 1425 K.
◁	58-16	400-946		Not given.	Specimen's surface plated with platinum black.



THERMAL CONDUCTIVITY -- MOLYBDENUM

THERMAL CONDUCTIVITY -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-4	757-1959		Density 639 lb ft^{-3}.	Arc-melted; unalloyed.
□	41-1	1200-1900		Traces of metallic impurities.	Aged 2 hr at 2200 K.
△	56-3	476-1182			Arc-melted; unalloyed.
▽	52-2	811-1422		99.9 Mo, 0.005 max. Fe, and 0.003 max. C.	
◁	54-7	373-973	± 2	Murex; large and coarse grained structure on outside, and fine structure inside; many inclusions.	Forged and machined to 1 in. bar; low experimental value due to inclusions.
▷	60-12	2384-2849		0.18 Fe, 0.073 Si, 0.04 C, 0.036 Mn, 0.005 O_2, and 0.01 others.	Cut under inert gas, hot worked, and hot rolled.
◇	60-17	1173-2473		Pure.	Measured in vacuum.
●	61-8	290-1325		From Fansteel Metallurgical Corp.; 99.9 pure; electrical resistivity 5.98 x 10^{-6} ohm cm at 23 C.	Third run.
■	62-6	2129-2382	15	Pure.	Localized heating within 0.003 in. of the surface to 1000-3000 C in high vacuum of 10^{-5} mm Hg by high frequency induction at current frequencies of 5000000 cps; measured with the cylindrical axis in parallel to the magnetic field.
▲	61-7	1073-1148		99.98 pure; 1 mm dia wire sample.	Polished and annealed for 12 hrs at about 1000 C.
▼	56-9	1080-2795	5	0.0025 Fe, 0.00073 Si, 0.00021 Ti, 0.00013 Cu, and 0.00007 C.	
◀	61-9	394-616		Commercially pure.	
▶	60-13	755-2978		0.0025 Fe, 0.00073 Si, 0.00021 Ti, 0.00013 Cu, 0.00007 C, and 0.000003 Cr.	

(Continued onto next page)

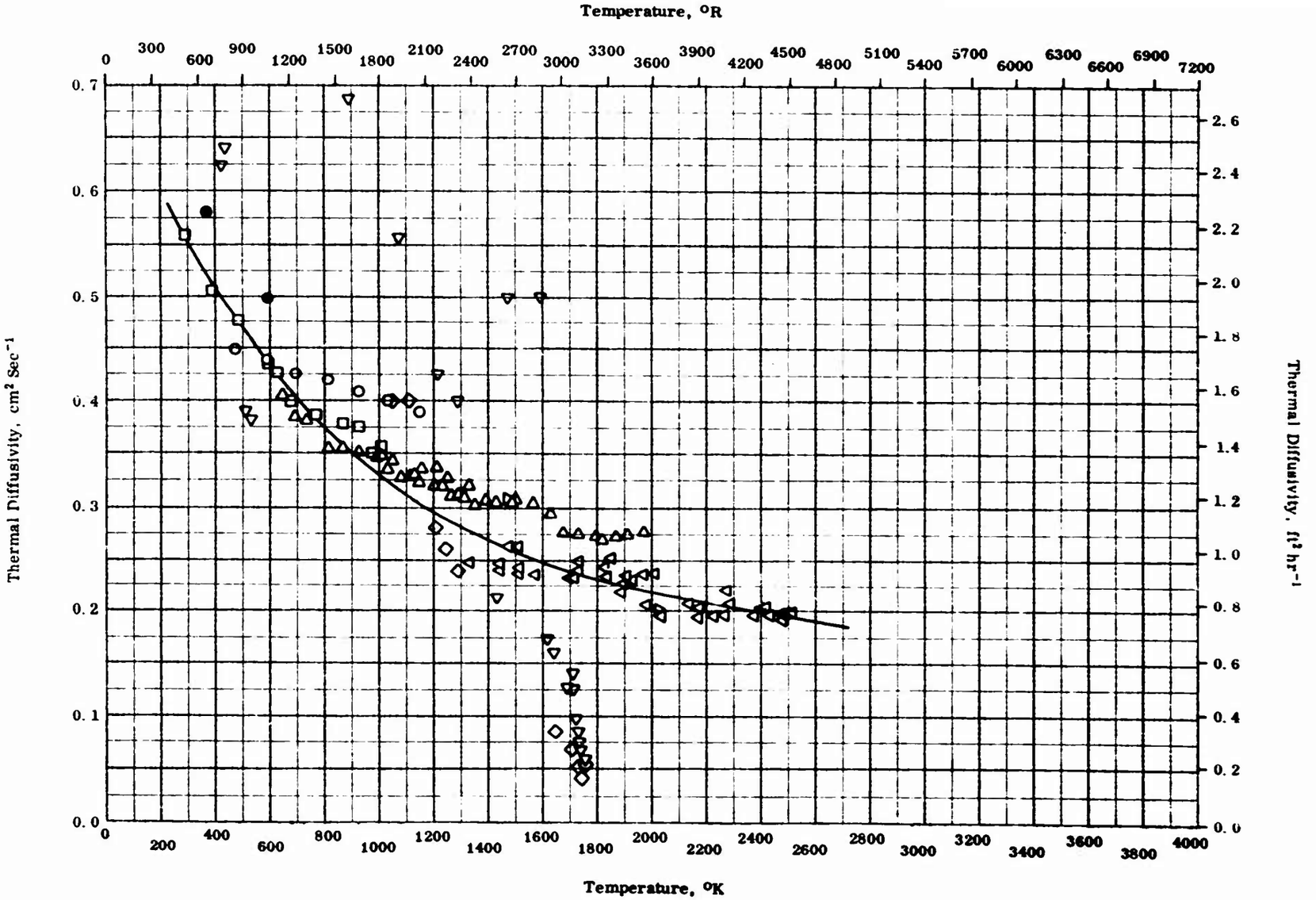
THERMAL CONDUCTIVITY -- MOLYBDENUM (Continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◆	60-15	339-2477		Not given.	
◈	55-6	283-1228		Not given.	Unalloyed.

TPRC

Temperature, °R



THERMAL DIFFUSIVITY -- MOLYBDENUM

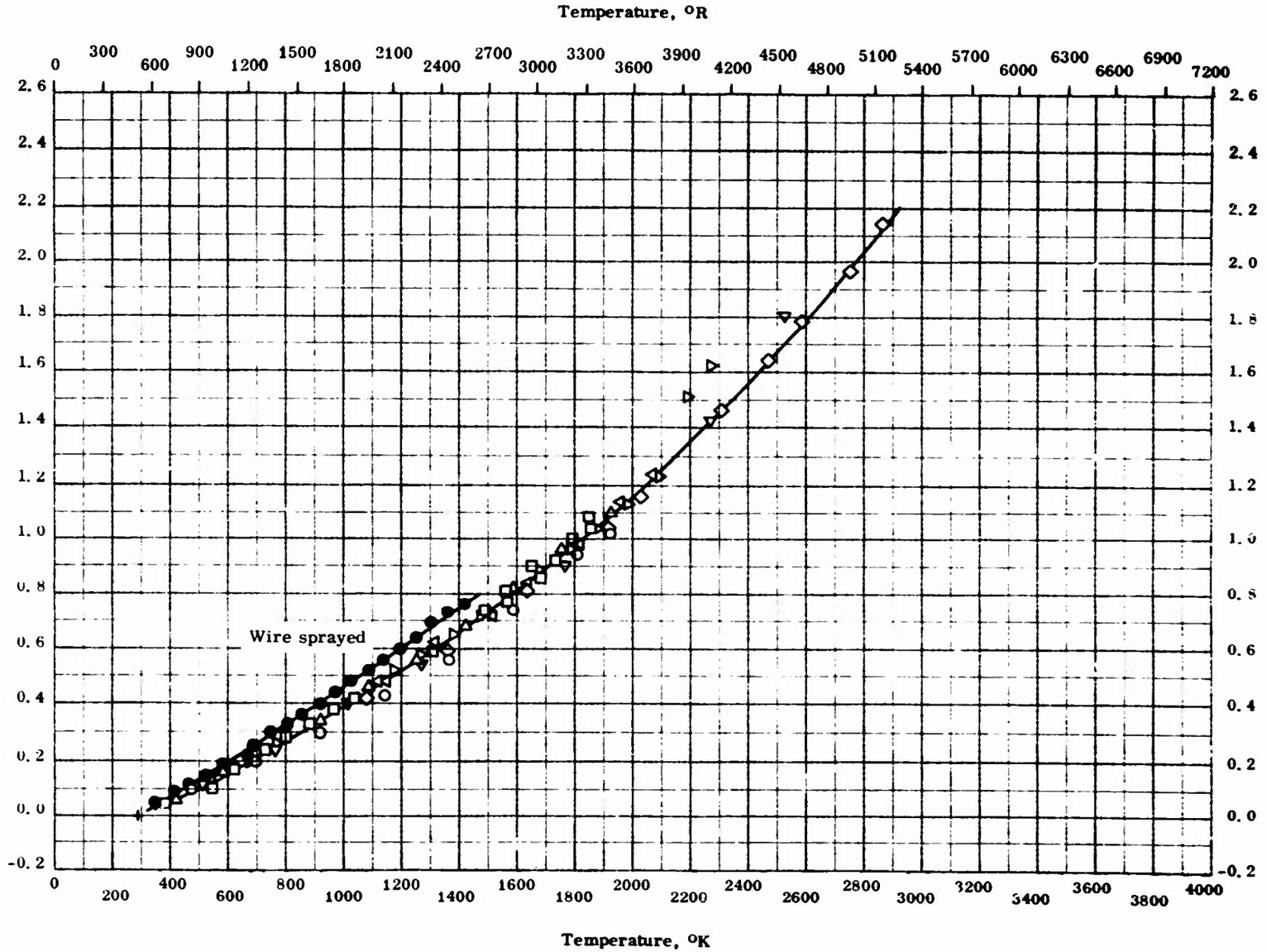
TPRC

6603

THERMAL DIFFUSIVITY -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-1	478-1144		Pure; density 10.24 g cm^{-3} at 75 F.	Arc-melted.
□	63-1	393-1008	±5	Pure	Measured in resistance furnace with 1 atm helium pressure.
△	63-1	650-1968	±5	Same as above	Same as above
▽	58-2	423-1751		Pure; cylindrical sample with 1.0 cm in dia and 4.5 cm in length.	Machined; data taken at fourth run.
◇	58-2	1048-1760		The above sample	Same as above except data taken at ninth run.
●	61-2	367-589		Pure	
▷	63-4	1473-2023		Not given.	
◁	65-1	1335-2510		From Murex; 0.01>Fe and traces of other elements; average grain size 111 mμ; 0.040 in. thick sheet.	



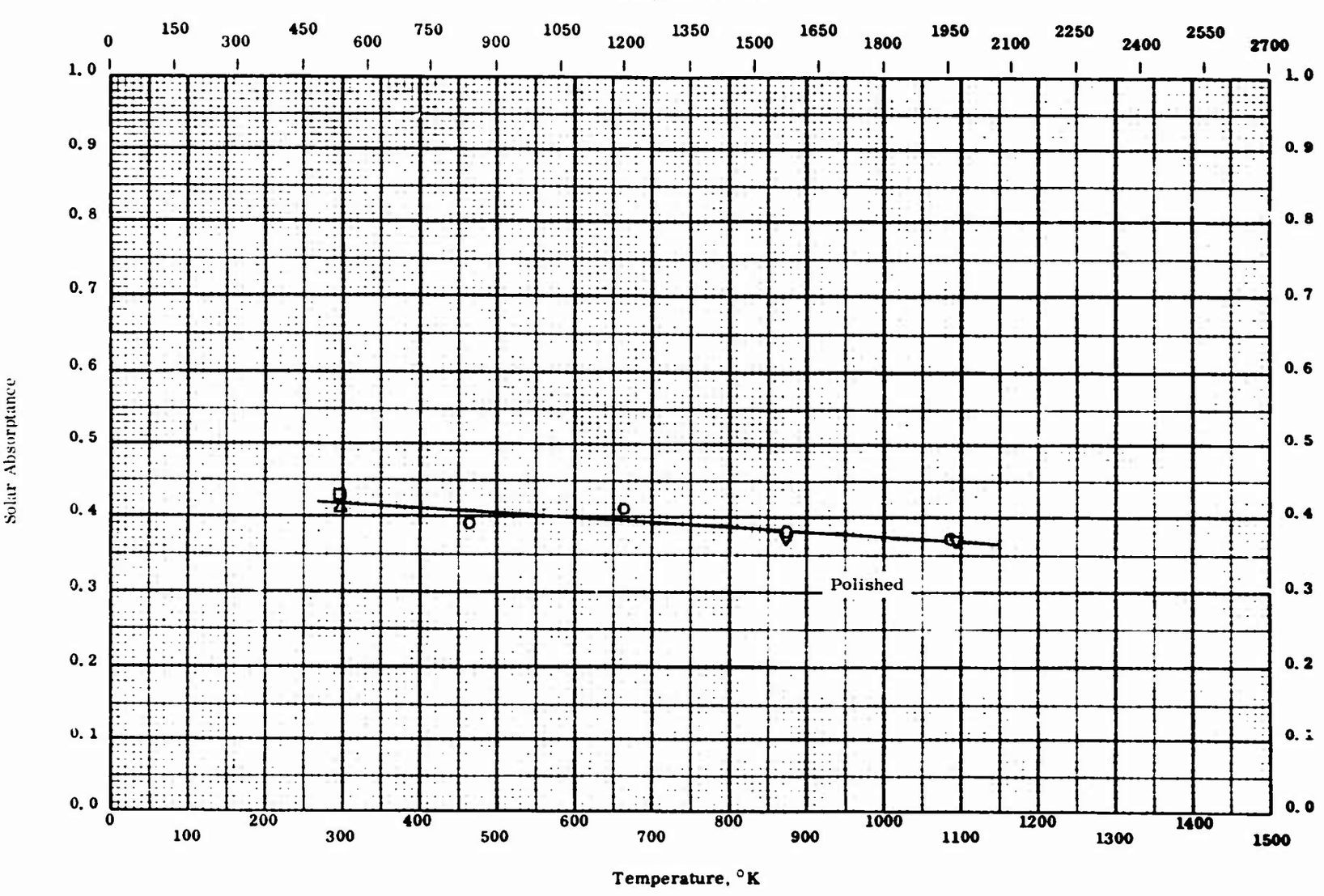
THERMAL LINEAR EXPANSION -- MOLYBDENUM

THERMAL LINEAR EXPANSION -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-40	295-1922		99.9 pure.	Heating rate: 200 F sec^{-1}.
□	56-4	320-1850		Density 631.9 lb ft^{-3}.	Arc melted and unalloyed.
△	56-3 also 58-1	293-1922			Arc melted and unalloyed; max. heating rate: 5 F $min.^{-1}$.
◇	56-9	1083-2867		Before test: 0.25 Fe, 0.073 Si, 0.021 Ti, 0.013 Cu, 0.007 C, 0.0003 Cr; after test: 0.063 Si, 0.008 C, others unchanged; density 638 lb ft^{-3}.	Arc melted, unalloyed.
▽	45-9	273-2523		Not given.	
◁	51-41	291-2073	±2	99.9 Mo, 0.10 O_2, 0.02 Ni, and 0.015 C.	
▷	64-30	293-2272	<3	Commercial rod material.	Annealed at above 2000 C for 1 1/2 to 2 hrs; measured at pressure not exceeding 1 to 2 x 10^{-5} mm Hg.
●	61-53	294-1422		High purity; 0.003 O and 0.0005 N.	Wire sprayed, mandrel removed by leaching, induction heat-treated in wet hydrogen for 1 hr at 3600 F, then machined into 0.19 in. dia by 2.5 in. long specimen.

TPRC

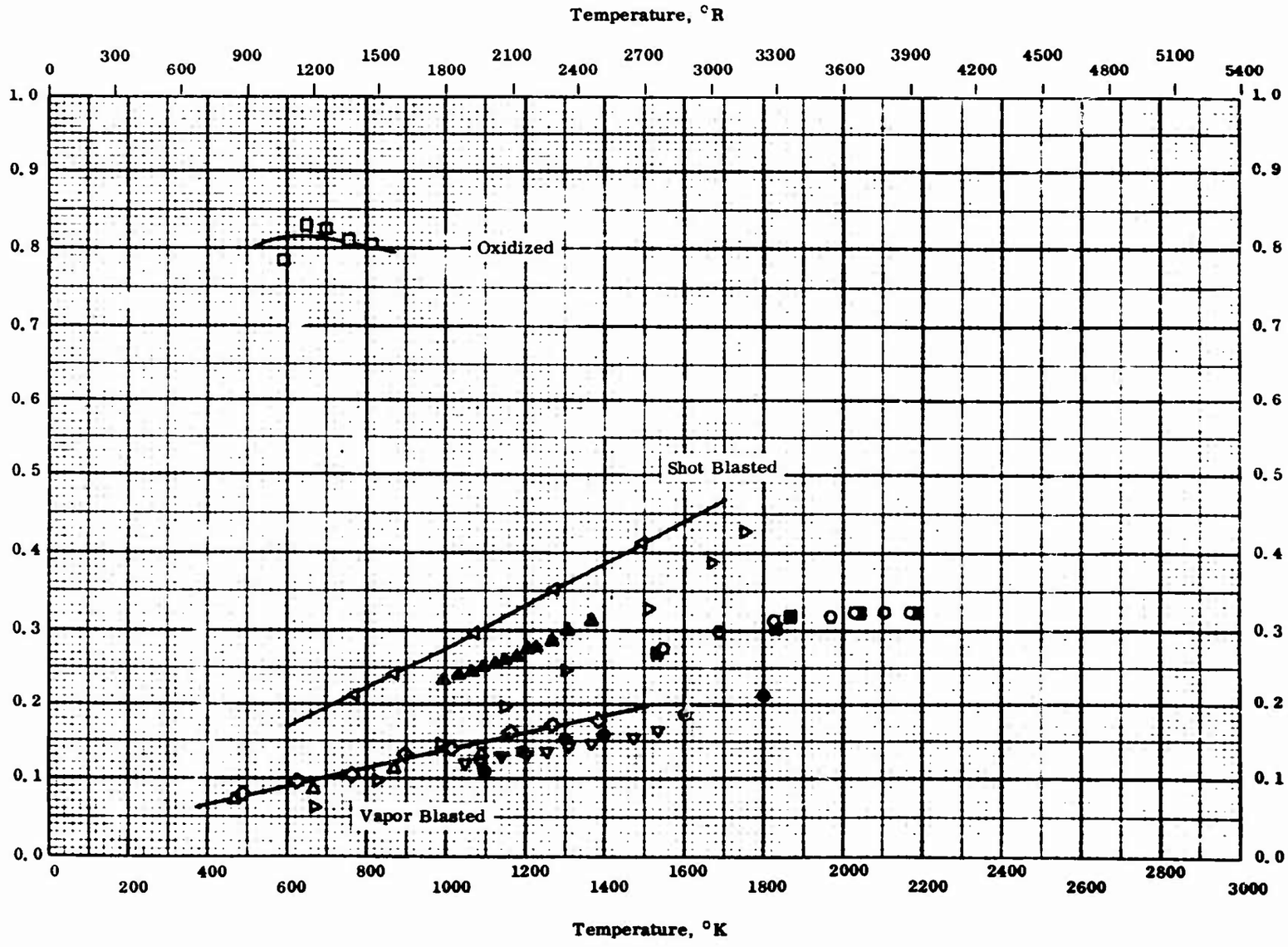


SOLAR ABSORPTANCE -- MOLYBDENUM

SOLAR ABSORPTANCE -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-42	463-1088		Not given.	Lapped and polished; measured in vacuum (~5μ).
△	57-41	298			Arc melted and unalloyed; above atmosphere.
□	57-41	298			Same as above; sea level.
▽	61-39	468-1093	≤10		Vacuum arc cast, machined, extruded, recrystallized, and rolled; ground with 600 grit carborundum and polished on a wet cloth lap with either Linde Alumina type B-5125 or unlevigated jeweler's rouge; measured in vacuum (10^{-6} mm Hg).

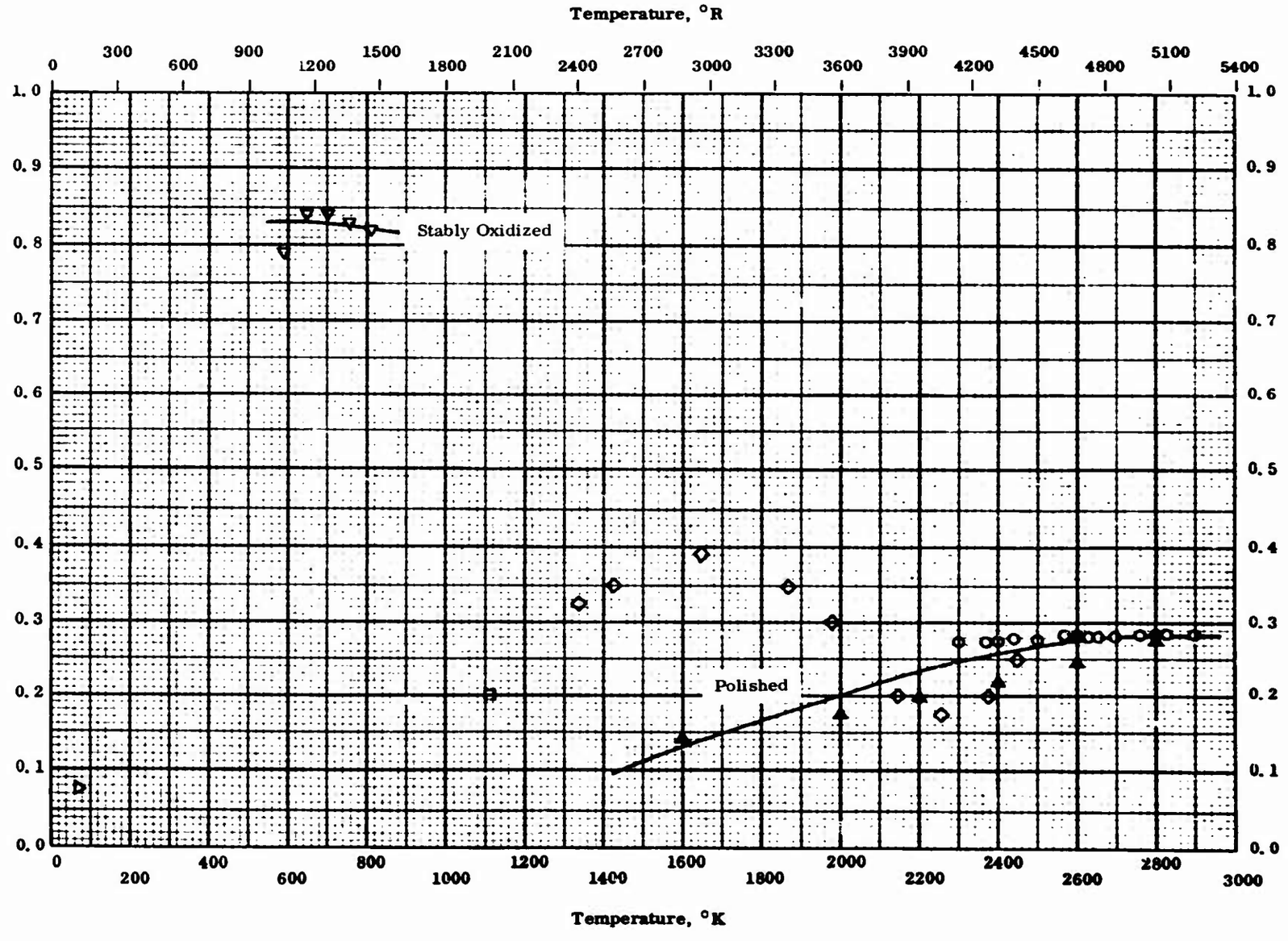


HEMISPHERICAL TOTAL EMITTANCE -- MOLYBDENUM

HEMISPHERICAL TOTAL EMITTANCE -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	58-19	589-811	≥ 2	Not given.	Stably oxidized in quiescent air at 811 K.
○	60-51	1544-2172	± 10	Not given.	Not given.
△	61-39	468-1093	≤ 10	Not given.	Vacuum arc-cast, machined, extruded, recrystallized, and rolled; ground with 600 grit carborundum, polished on a wet cloth, lapped with either Linde Alumina type B-5125 or unlevigated jewelers rouge; measured in vacuum (10^{-5} mm Hg).
▽	64-23	1045-1539		Commercially pure.	As received; measured in vacuum ($\geq 10^{-6}$ mm Hg).
◇	64-23	491-1385		Same as above.	Vapor blasted; measured in vacuum ($\geq 10^{-6}$ mm Hg).
▷	61-44	673-1758		Commercially pure.	Lightly etched and flashed in vacuum at 2073 K for 10 min., measured in vacuum ($< 5 \times 10^{-6}$ mm Hg).
◁	61-44	773-1493		Commercially pure.	Shot-blasted and pickled in hydrochloric acid; measured in vacuum ($< 5 \times 10^{-6}$ mm Hg).
●	62-54	1000-2000		Ribbon.	Not given.
■	62-19	1540-2180		Wire.	Measured in vacuum (10^{-5} mm Hg).
▲	60-48	998-1368		Not given.	Blasted with aluminum oxide No. 90 (PMC 3043A); measured in vacuum ($6.0 \times 10^{-7} - 2.0 \times 10^{-6}$ mm Hg).



NORMAL TOTAL EMITTANCE -- MOLYBDENUM

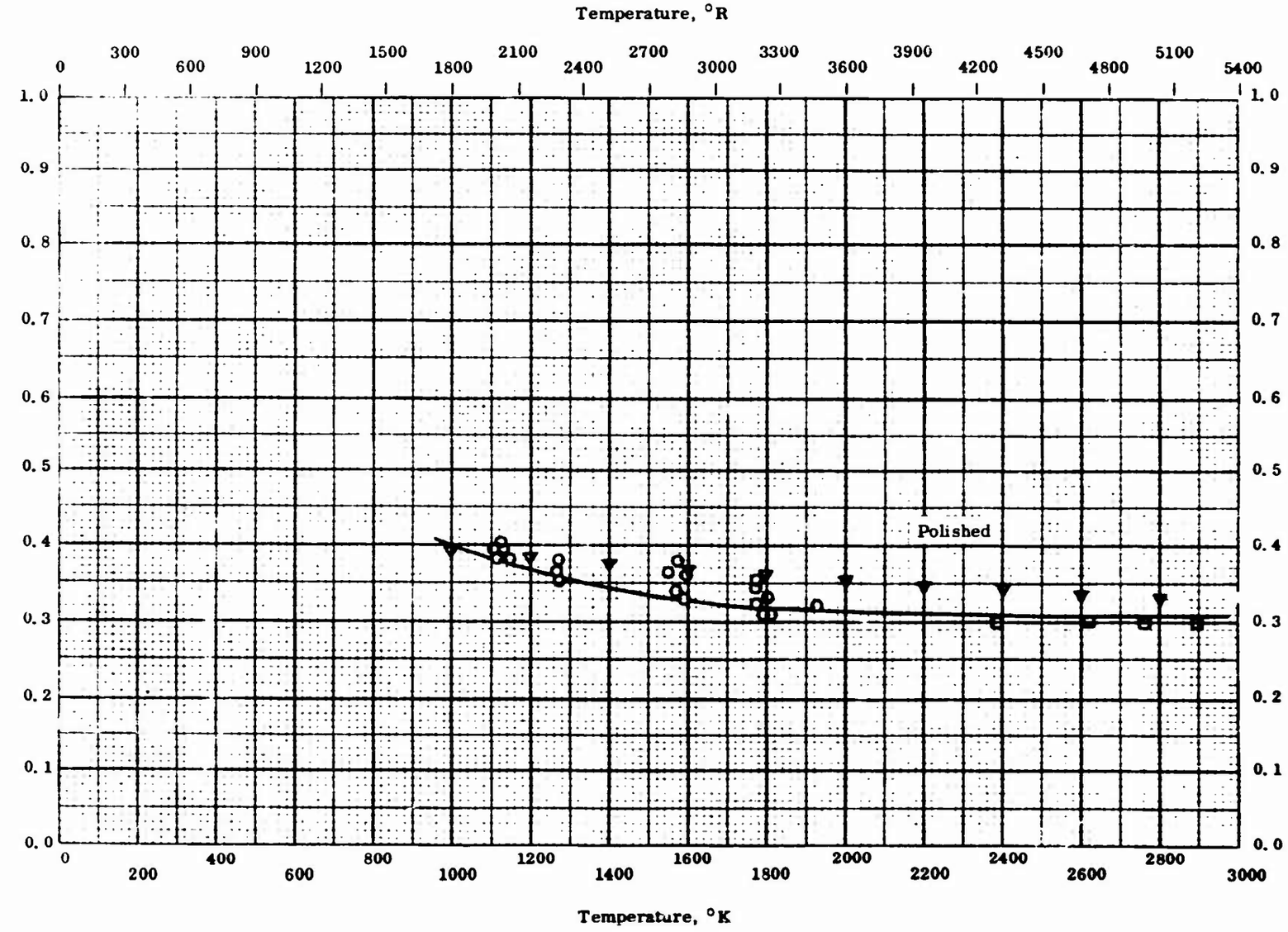
TPRC

NORMAL TOTAL EMITTANCE — MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-12	2300-2900		0.18 Fe, 0.073 Si, 0.036 Mn, 0.04 C, 0.005 O_2 and 0.01 others.	Hot-worked and hot-rolled; polished with 1, 0, 00, 000 and 0000 abrasive papers; measured in argon atmosphere.
□	63-28	1111		Not given.	Cleaned with acetone, heated in argon at T > 1144 K for 1 hr; calculated from spectral data.
△	63-24	1600-2800		99.9 pure.	Polished to an optically smooth surface, washed and dried; data taken from smooth curve.
◇	62-42	1339-2450		Not given.	Uncoated material ground to a smooth finish; measured in dried argon or helium atmosphere after evacuation; data taken from smooth curve.
▽	58-19	589-811	>2	Same as above.	Stably oxidized in quiescent air at 811 K.
▷	56-43	77		Same as above.	Oxidized in air at 1273 K for 30 min.

TPRC



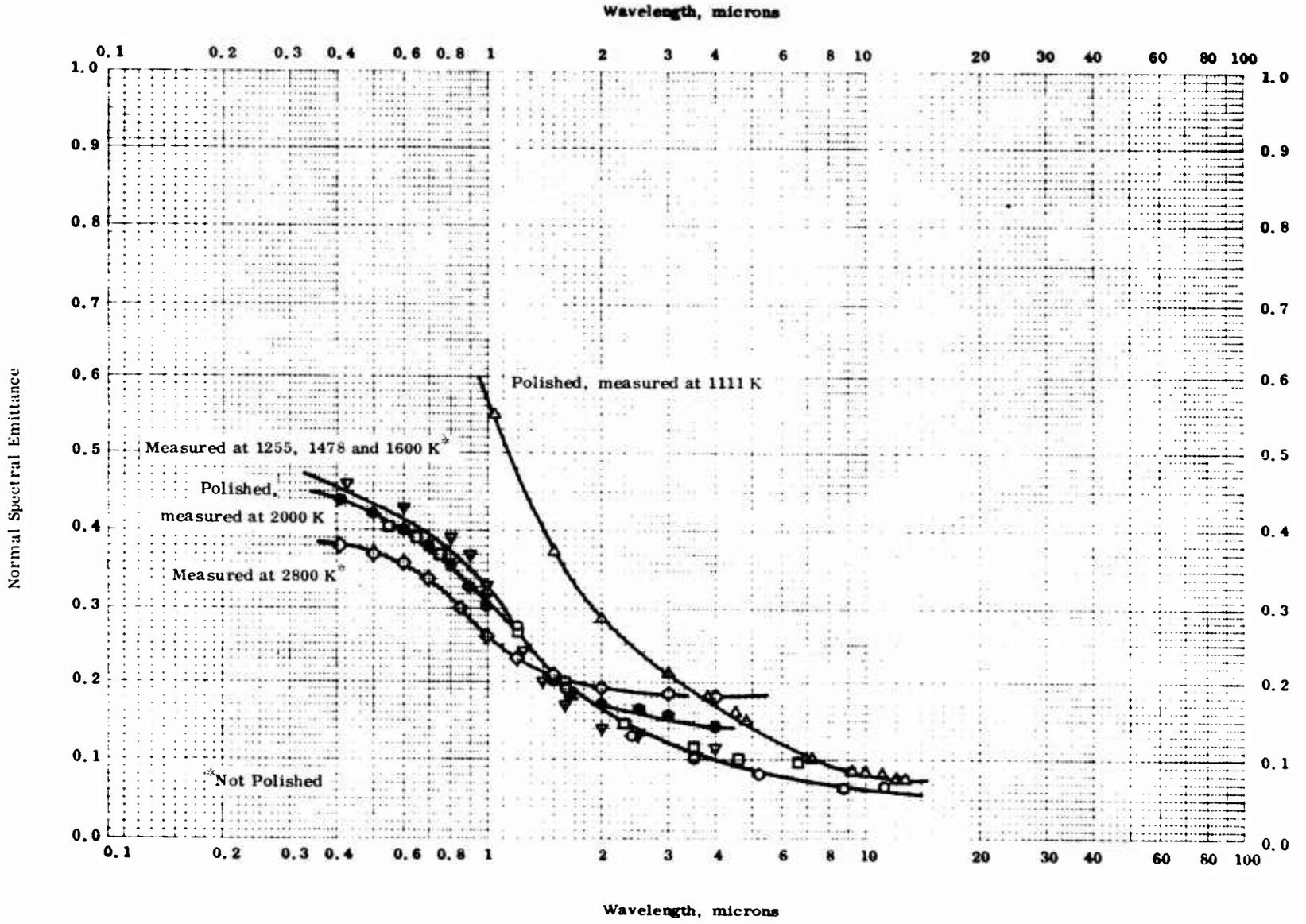
NORMAL SPECTRAL EMITTANCE -- MOLYBDENUM

NORMAL SPECTRAL EMITTANCE -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
□	60-12	0.65	2385-2895		0.18 Fe, 0.073 Si, 0.04 C, 0.036 Mn, 0.005 O_2, 0.01 other impurities.	Hot-worked and hot-rolled; polished with 1, 0, 00, 000, and 0000 abrasive papers; measured in argon atmosphere.
·	55-23	0.665	1000-2800	<5	Not given.	Heated electrically above 2100 K for 10 hrs; measured in vacuum (10^{-7} mm Hg)
○	57-41	0.665	1103-1922		Not given.	Measured in vacuum; same data for as received, cleaned and polished surfaces.

TPRC



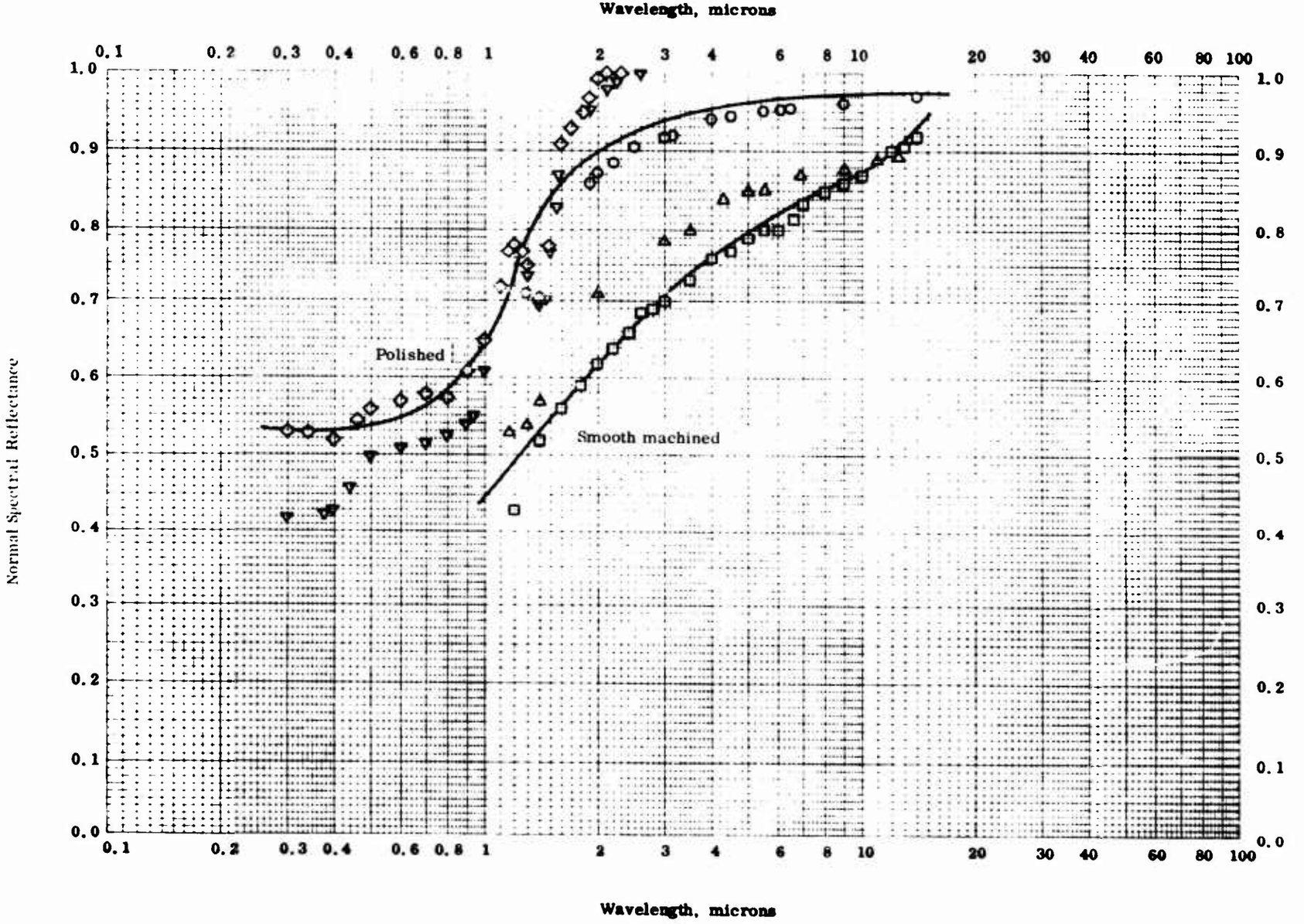
NORMAL SPECTRAL EMITTANCE - MOLYBDENUM

NORMAL SPECTRAL EMITTANCE -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	64-23	1255	1.0-11.1		Not given.	As received; measured in vacuum ($\leq 10^{-6}$ mm Hg)
□	64-23	1478	0.55-6.6		Same as above.	Same as above.
△	63-28	1111	1.03-12.80		Same as above.	Cleaned with . cetone and surface roughness 0.25μ; heated in argon at T > 1144 K for 1 hr.
▽	62-51	1600	0.425-4.00		Not given.	Polished and etched; data taken from smooth curve.
◇	62-51	2800	0.403-4.00		Same as above.	Same as above.
●	63-24	2000	0.41-4.00		99.9 pure.	Polished to an optically smooth surface, and washed and dried; data taken from smooth curve.

TPRC



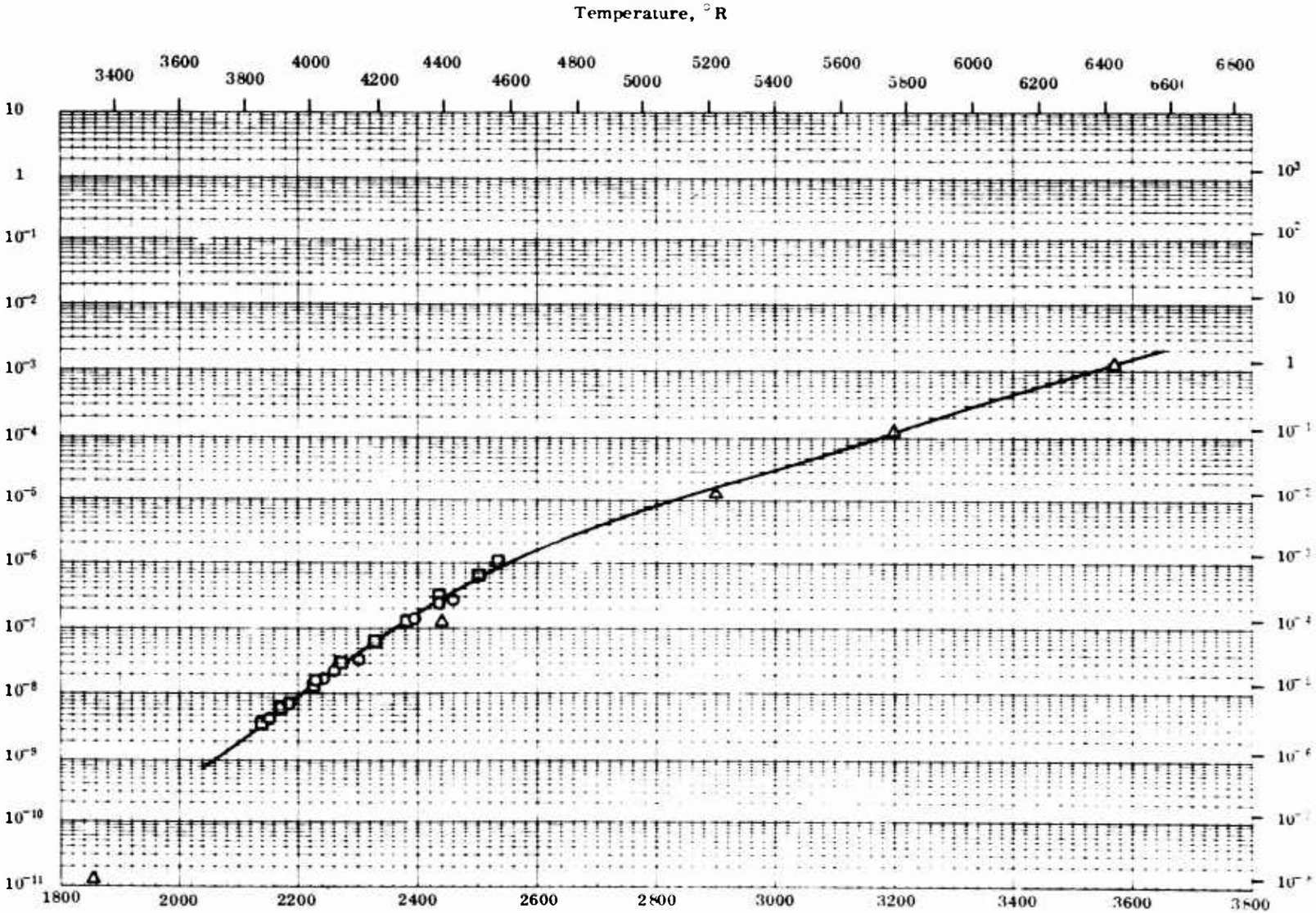
NORMAL SPECTRAL REFLECTANCE -- MOLYBDENUM

NORMAL SPECTRAL REFLECTANCE -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	63-28	295	1.28-14.0		Not given; surface roughness 0.25 μ.	Cleaned with acetone; measured in air.
△	63-28	295	1.16-12.5		Same as above.	The above specimen heated in argon at T ≃ 1144 K for 9 hr; measured in air; hemispherical illumination, 7 degree viewing.
□	62-48	295	1.20-14.0		Same as above.	Smoothly machined.
◇	57-41	298	0.3-2.3	±4		Arc melted and unalloyed; polished with fine polishing compounds on a buffing wheel; data taken from smooth curve; 6-9 degree illumination, hemispherical viewing; $MgCO_3$ as reference standard.
▽	57-41	298	0.3-2.6	±4	Same as above.	As received; 6-9 degree illumination, hemispherical viewing; $MgCO_3$ as reference standard.

TPRC



TPRC

VAPOR PRESSURE -- MOLYBDENUM

VAPOR PRESSURE -- MOLYBDENUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-7	2151-2462		0.023 C, 0.001-0.01 Fe and Si.	
□	64-5	2140-2535		0.1 >Fe, Ni, Cr, and Si, 0.0070 C, and 0.0030 O_2.	From equation: $\log P_{m_o}$ (atm) = 7.064 - $3.317 \times 10^{-4} T^{-1}$.
△	62-12	1855-3570		Not given.	

TPRC

PROPERTIES OF NEODYMIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density	7.01	437
Melting Point	1292	2326
Heat of Fusion	25	44
Heat of Vaporization . . .	$^{497}_{1348K}$	$^{895}_{2426R}$
Heat of Sublimation	$^{522}_{1236K}$	$^{939}_{2225R}$

REPORTED VALUES

Density	$g\ cm^{-3}$	$lb\ ft^{-3}$
△	7.007	437.4
■	6.96	434.5

Melting Point	K	R
◇	1297	2334
▽	1292	2326
○	1118	2013
◁	1293	2327
▷	1292	2326
▲	1292	2326

Heat of Fusion	$cal\ g^{-1}$	$Btu\ lb^{-1}$
◀	$^{25}_{1292K} \pm 7$	$^{44}_{2326K} \pm 12$
▽	$^{25}_{1292K} \pm 7$	$^{44}_{2326K} \pm 12$
●	$^{11.9}_{1135\ K}$	$^{21.4}_{2043K}$

Heat of Vaporization	$cal\ g^{-1}$	$Btu\ lb^{-1}$
▶	$^{480}_{1348K} \pm 3$	$^{864}_{2426R} \pm 5$
◀	$^{497}_{1348K} \pm 14$	$^{895}_{2426R} \pm 25$
▽	$^{497}_{1348K} \pm 14$	$^{895}_{2426R} \pm 25$
■	$^{479}_{298K}$	$^{862}_{537R}$

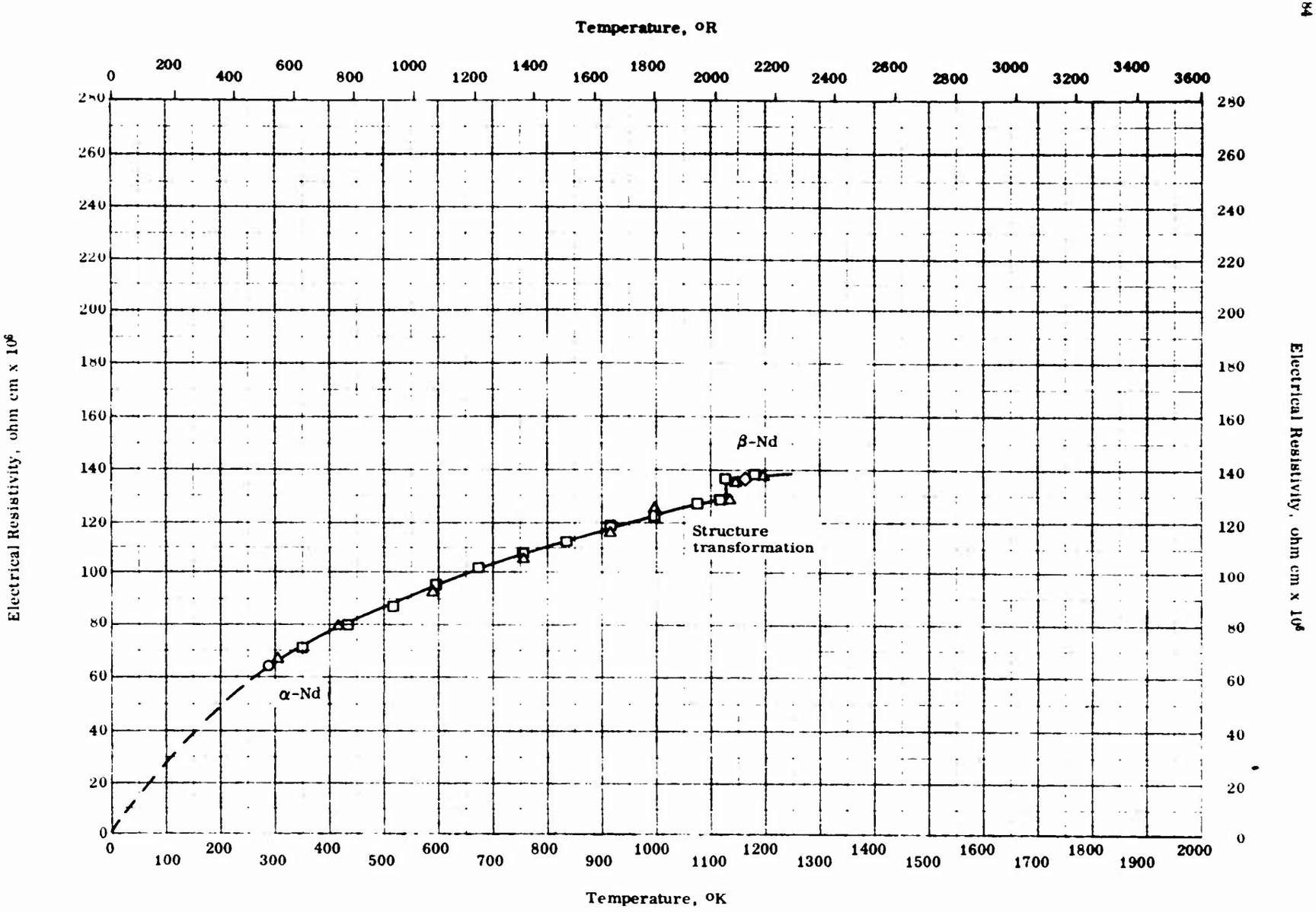
PROPERTIES OF NEODYMIUM (continued)

REPORTED VALUES

Heat of Sublimation	cal g^{-1}	Btu lb^{-1}
▼	480_{1472K}	860_{2650R}
▽	$480_{1348K} \pm 14$	$860_{2427R} \pm 25$
◀	$522_{1236K} \pm 14$	$939_{2225R} \pm 25$

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	55-28	298		Not given.	Density computed from X-ray measurement.
◇	54-11	1297		Very pure.	M. P. by thermal analysis.
▼	54-11			Very Pure.	Δh_s from vapor pressure.
▽	53-33 also 52-21	1292		99.9+ pure.	M. P. by thermal analysis and Δh_s by vapor pressure data.
○	48-10	1118		Not given.	M. P. by visual observation; rough measurement.
◁	52-5	1293		Not given.	
▷	52-5	1292		Not given.	
▶	52-5	1348		Not given.	Δh_v from vapor pressure.
▲	56-52 also 53-33	1292		0.1 > metallic impurities.	Vacuum cast metal reduced from fluoride by Ca in Ta crucible in A atm; M. P. from discontinuity of slope of vapor pressure.
◀	52-21	1167-1400		Isotope of 142 molecular weight.	Δh_s and Δh_v from vapor pressure data and Δh_f by difference.
●	62-13	1135		Not given.	Δh_f for transition of $\alpha \rightarrow \beta$.
◧	62-13	298		Not given.	

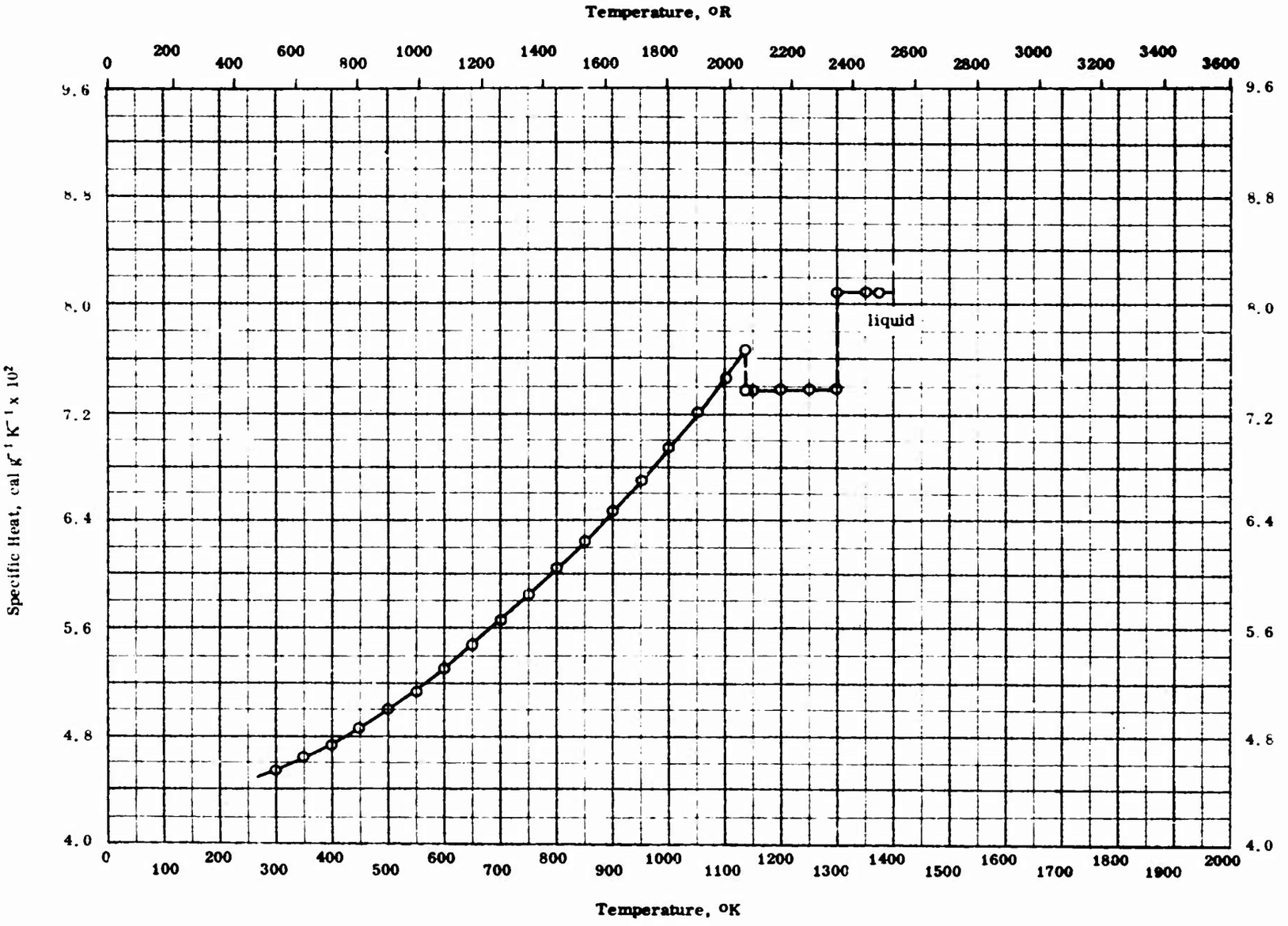


ELECTRICAL RESISTIVITY -- NEODYMIUM

ELECTRICAL RESISTIVITY -- NEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	55-28	298-1178		0.08> Pr, 0.06> Sm, 0.05> Ca, 0.03> Si, 0.02> Mg, and 0.005> Fe.	Cast, rolled and swaged at room temp., annealed 1 hr at 300 C in vacuum, heated to within 100 C of melting point; tested at 2 C min^{-1} rise.
△	57-38	298-1193	±1	99.8 pure.	Cast, rolled, annealed at 300 C in vacuum, and pickled.
○	62-13	298		α-Nd.	
◇	62-13	1163		β-Nd.	



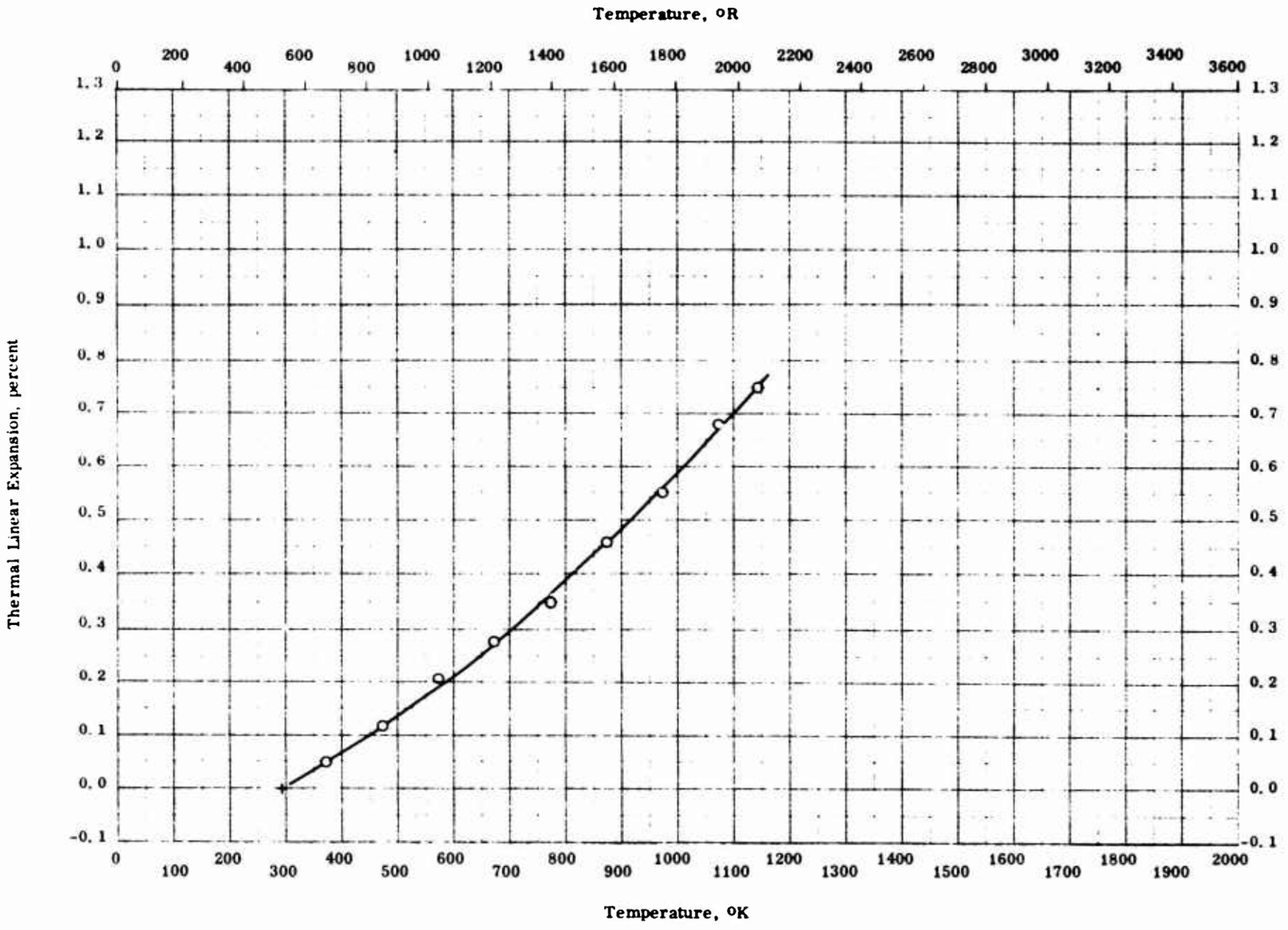
SPECIFIC HEAT -- NEODYMIUM

TPRC

SPECIFIC HEAT -- NEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-25	29[illegible]-137[illegible]	0.14	99.78< Nd, 0.10 Ca, 0.04 ≥ Pr, 0.03 ≥ Sm, 0.02 ≥ Si, 0.02 ≥ Ta, and 0.01 ≥ Fe.	

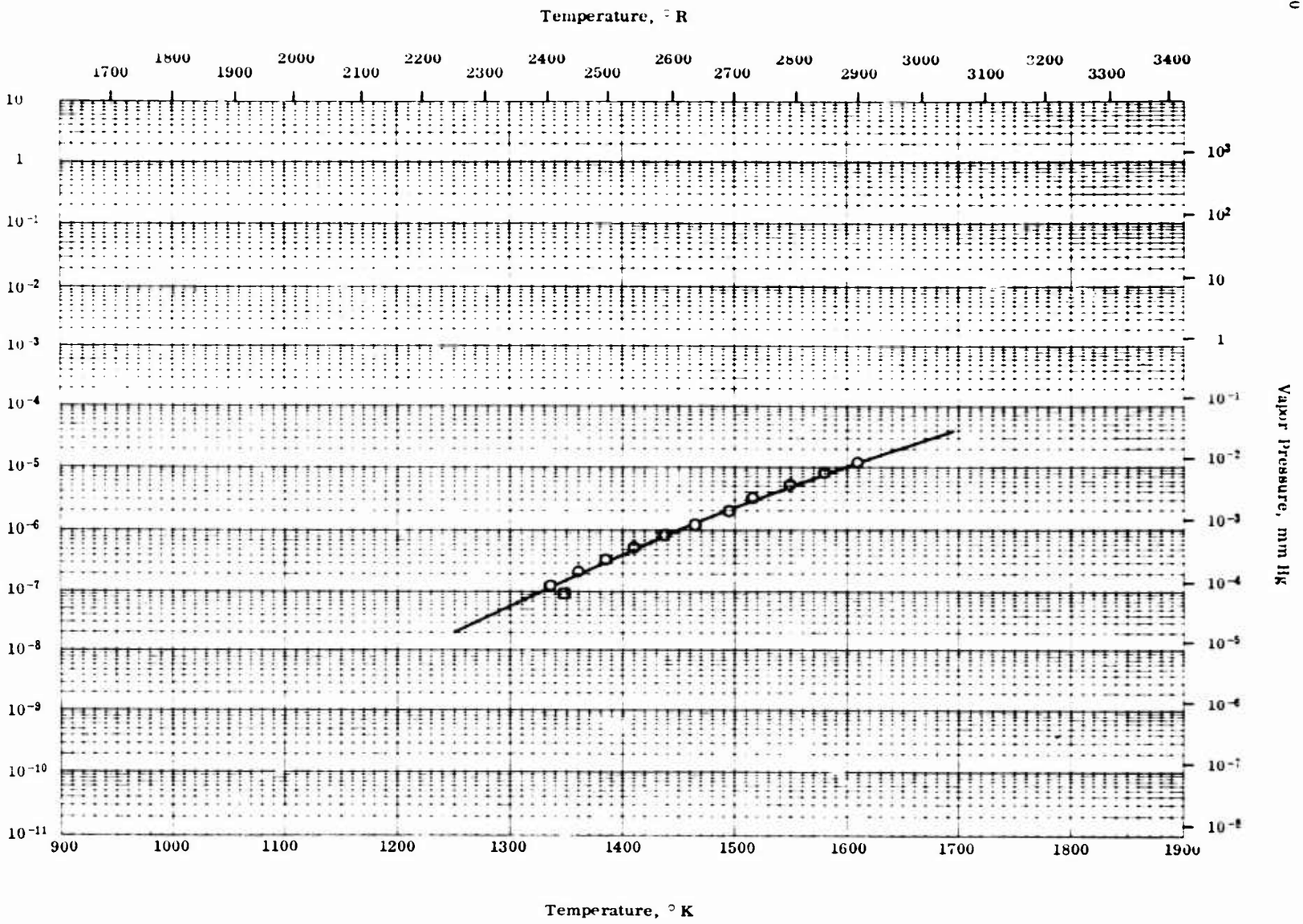


THERMAL LINEAR EXPANSION -- NEODYMIUM

THERMAL LINEAR EXPANSION -- NEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ	Sample Specifications	Remarks
O	56-62 also 57-62	293-1144	± 1	99.7 Nd, 0.08 Pr, 0.06 each N_2, Sm, 0.05 Ta, 0.025 Si, 0.02 C, 0.01 Ca, 0.006 Fe, and no trace La or Ce.	Ca reduced the fluoride, vacuum cast, recast into rod; data obtained during heating; cooling data not shown because sample softened, measured in helium atmosphere.



TPRC

VAPOR PRESSURE -- NEODYMIUM

VAPOR PRESSURE -- NEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-11	1341-1613		"Very pure".	
□	62-13	1348		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{15450}{T(K)} + 7.32.$

PROPERTIES OF NEPTUNIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density	20.46	1277
Melting Point	903*	1626*

*Handbook of Chemistry and Physics (Ref. 64-28)

REPORTED VALUES

Density	g cm^{-3}	lb ft^{-3}
□	20.46 ± 0.15	1277 ± 10
○	17.7	1105

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	52-30	298		Not given; α - phase.	
○	45-7 also 49-22	298		Not given.	

TPRC

PROPERTIES OF NICKEL

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	8.90	555
Melting Point	1728	3111

REPORTED VALUES

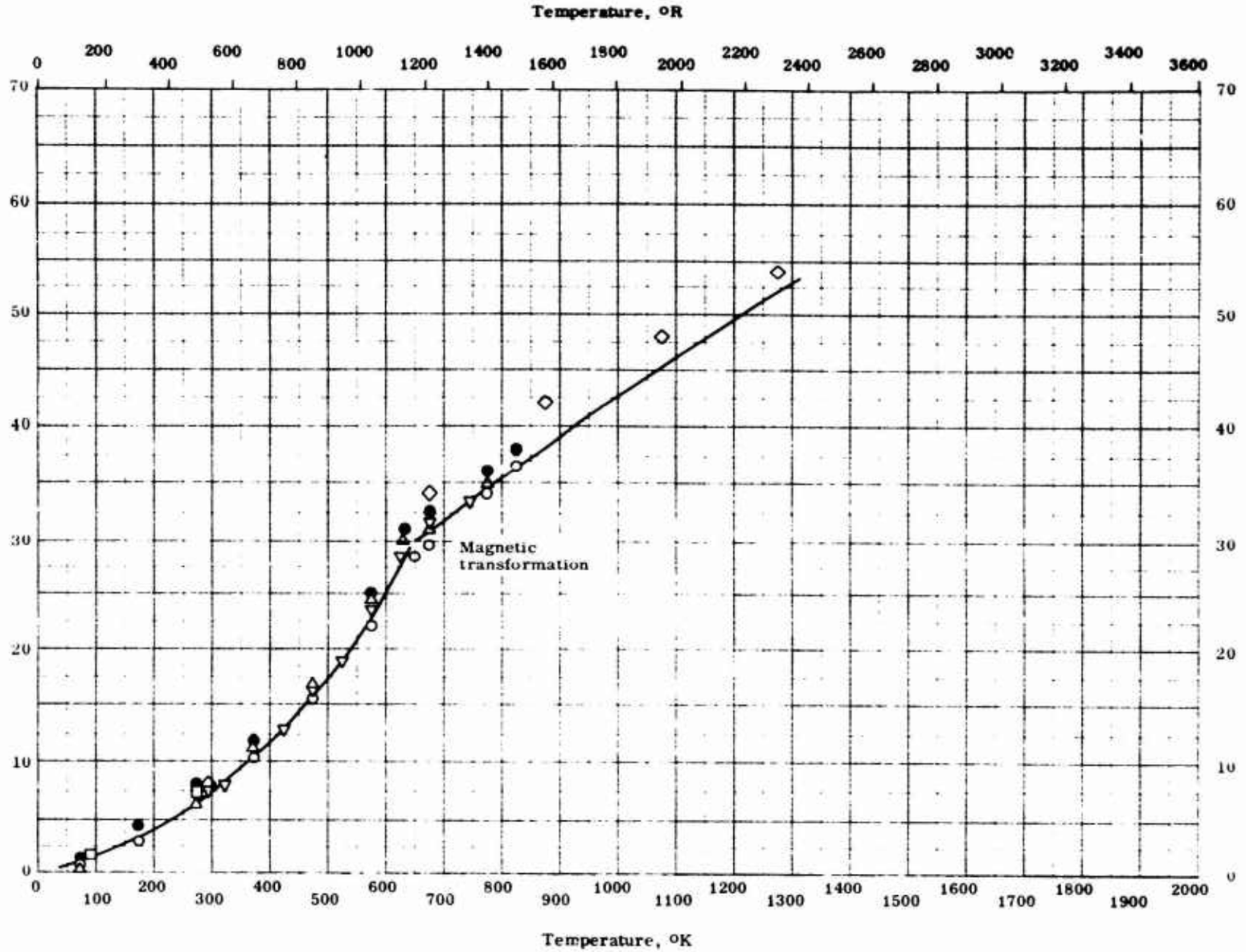
		$g\ cm^{-3}$	$lb\ ft^{-3}$
Density	▽	8.963 ± 0.027	559.5 ± 1.7
	▲	8.844	552.1
	▼	8.79	549
	●	8.90	555
	■	8.75	546

		K	R
Melting Point	○	1724 ± 4	3104 ± 7
	□	1728 ± 1	3111 ± 2
	◇	1728 ± 10	3111 ± 18
	△	1726 ± 4	3106 ± 7
	◆	1726 ± 7	3107 ± 13
	◁	1744	3140
	▷	1721	3098

PROPERTIES OF NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ	Sample Specifications	Remarks
○	53-31	1724		0.01 O_2, 0.096 C, 0.04 Cu, 0.004 Si, 0.001 Mo, 0.001 Fe, and 0.01> Al.	M. P.; liquid forming in black body cavity of sample; measured in vacuum.
□	47-11	1728		Pure.	M. P.; black body enclosure immersed in liquid metal observed with optical pyrometer during freezing.
◇	53-32	1728		Not given.	M. P.; collapse of black body hole in disk; measured in vacuum.
△	54-29	1726		Carbonyl nickel.	M. P. from loss of electrical continuity.
◆	52-14	1726		Electroytic powder.	Powder pressed at 50,000 psi and sintered approx. 15 min at 1150 - 1215 C; M. P. by liquid forming in black body cavity.
◁	50-16 also 51-31	1745		Not given.	M. P. by visual observation.
▽	50-15	298		Electrolytic nickel; 99.92 Ni, 0.037 Fe, 0.003 Co, 0.023 As, 0.020 Cu, 0.01 C, 0.009 P, 0.001 Si and 0.001 Mn.	Annealed; density from weight in air and in water.
▲	56-4	298		Grade A.	
▼	53-5	298		Grade A.	
▷	50-7	1721		Not given.	M. P. by visual observation.
●	62-12	293		Not given.	
■	62-7	---		Not given.	



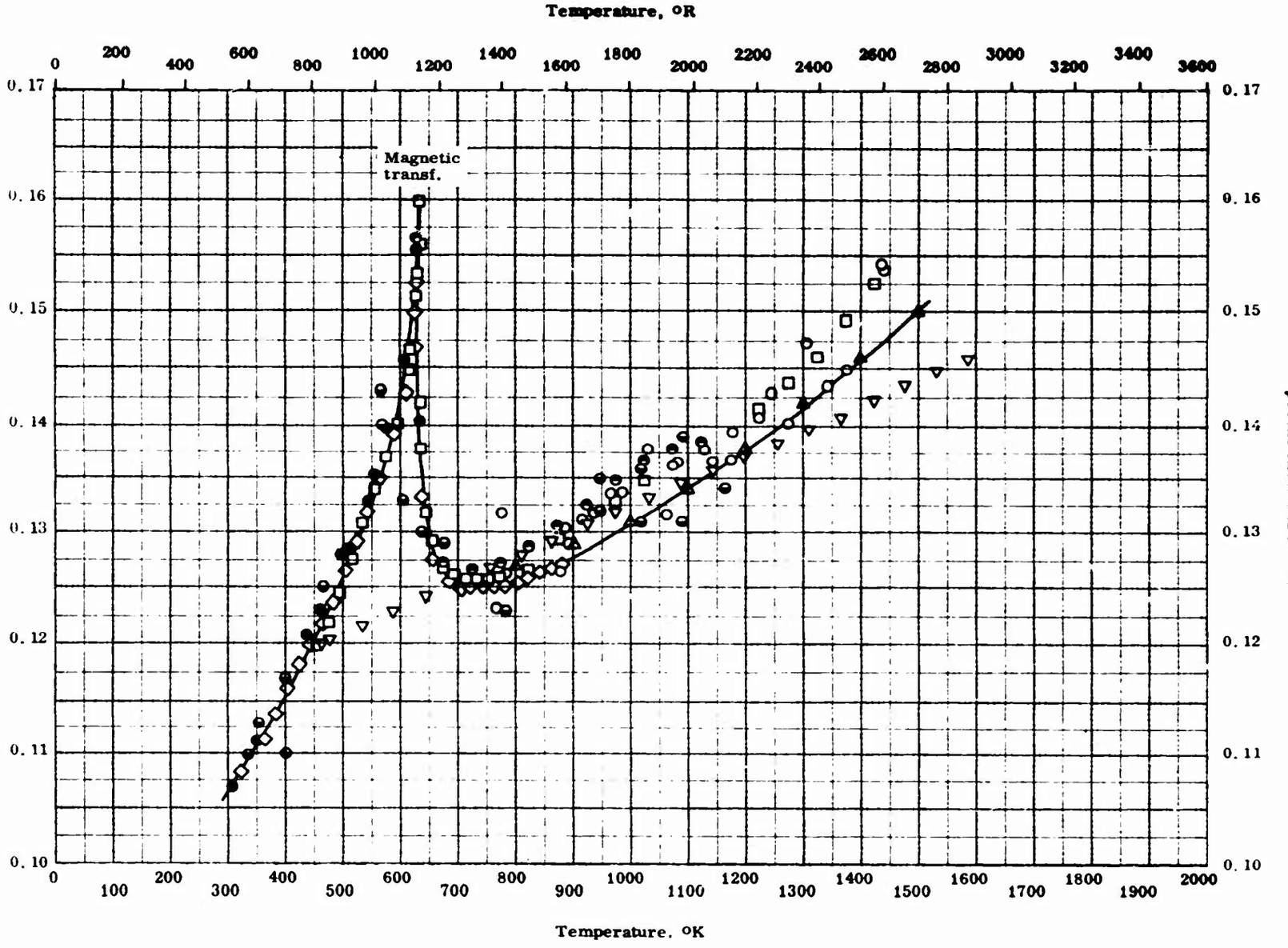
ELECTRICAL RESISTIVITY -- NICKEL

Electrical Resistivity, ohm cm x 10⁶

ELECTRICAL RESISTIVITY-- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-26	73-823		99.98 pure.	Homogenized 6 hrs just below M. P., cold rolled and swaged; annealed 1 hr at 600 C in vacuum.
□	52-8	91-373		0.12 Mg, 0.05 > ea. Mn, Cr, Cu, 0.03 C, and 0.01 Co.	Measured at same temp. as drawing temp. of wire.
▽	57-31	293-743		Not given.	Vacuum annealed 2 hrs at 800 C and gradually cooled in 24 hrs.
◇	51-25	293-1273		Pure.	Vacuum melted, forged, hot or cold rolled, cold drawn from 1 cm to 0.4 mm; heated slowly to 800 C, and then cooled slowly.
△	55-26	73-823		0.04 Si; prepared from 99.9 Ni and 99.95 Si.	Homogenized 6-10 hrs just below the M. P.
●	55-26	73-823		0.199 Si; same as above.	Same as above.

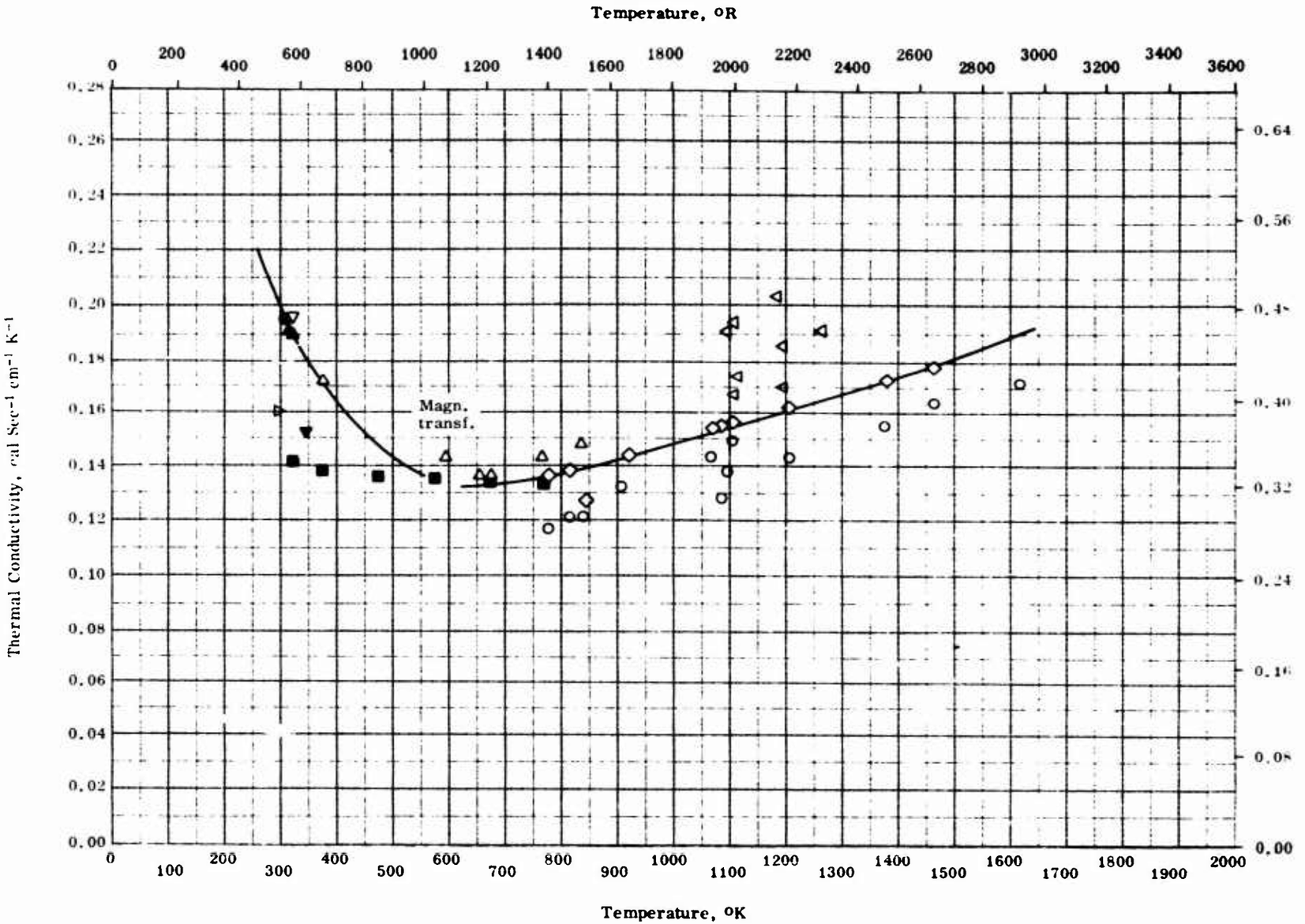


SPECIFIC HEAT -- NICKEL

SPECIFIC HEAT -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-20	769-1436	1.0	99.97 Ni, 0.0008 As, 0.0006 Fe, 0.0004 > Si, 0.0003 > Cr, 0.0003 > Cu, and 0.0001 Mn.	Remelted several times; heated several times to 1100 C and cooled slowly.
□	55-20	453-1423	1.0	Same as above.	Same as above.
△	59-18	800-1500		Not given.	Sealed in argon.
◇	56-22	323-883	± 0.5	Electrolytic nickel; 99.95 Ni, 0.05 > Co, rest Al, Cu, Fe, Si.	
▽	61-6	466-1584		Not given.	
◓	54-13	673-1123		99.9 Ni.	
◒	58-16	337-1164		Not given.	Specimen's surface plated with platinum black.
●	62-18	308-670	0.6	99.85 Ni, 0.14 Fe, trace Co.	

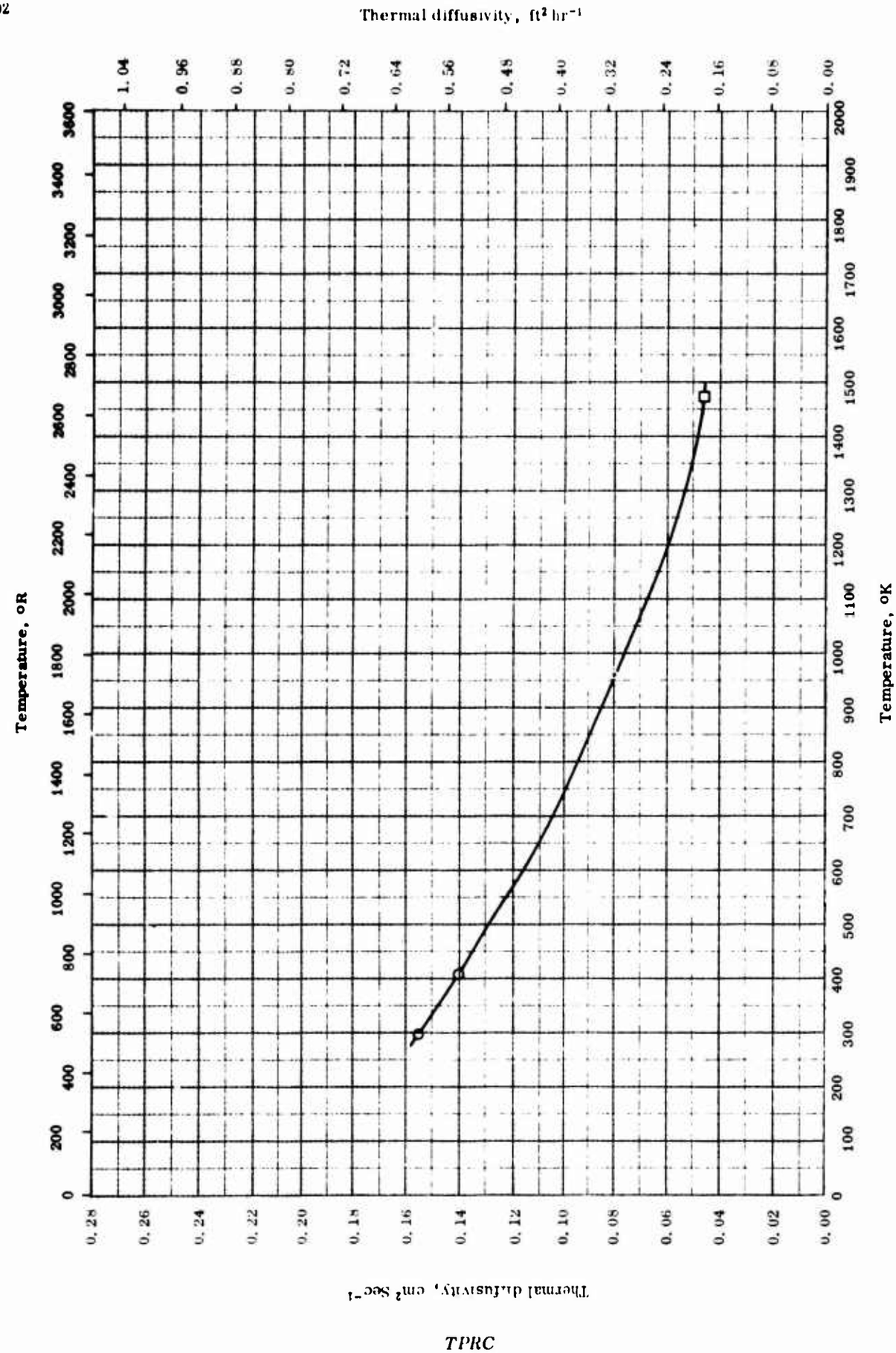


THERMAL CONDUCTIVITY -- NICKEL

THERMAL CONDUCTIVITY -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-4	778-1616		Grade A; density 552 lb ft^{-3}.	Flat plate; measured in He atm.
■	54-3	323-773		"Nivac"; high purity.	Vacuum cast rods.
△	55-2	373-833		0.094 Si. 0.082 Cu, 0.056 Fe, 0.027 C, 0.025 Co, 0.008 S, and 0.007 Al.	Rod.
▼	53-5	343		"A" Nickel; density 549 lb ft^{-3}.	Rod; measured in vacuum.
◁	61-7	1093-1263		99.95 pure; 1 mm dia wire.	Vacuum melted; polished and annealed for 12 hrs at about 1000 C.
▷	61-4	295	±5	Pure; density 8.90 g cm^{-3} at 20 C.	
◇	61-6	778-1462		L nickel.	
●	60-5	305-323	±3	Pure.	Steel used as standard.
□	60-5	303-317	±3	Pure.	Nickel used as standard.
▲	60-5	302-320	±3	Pure.	Yellow brass used as standard.
▽	60-5	305-321	±3	Pure.	Aluminum used as standard.

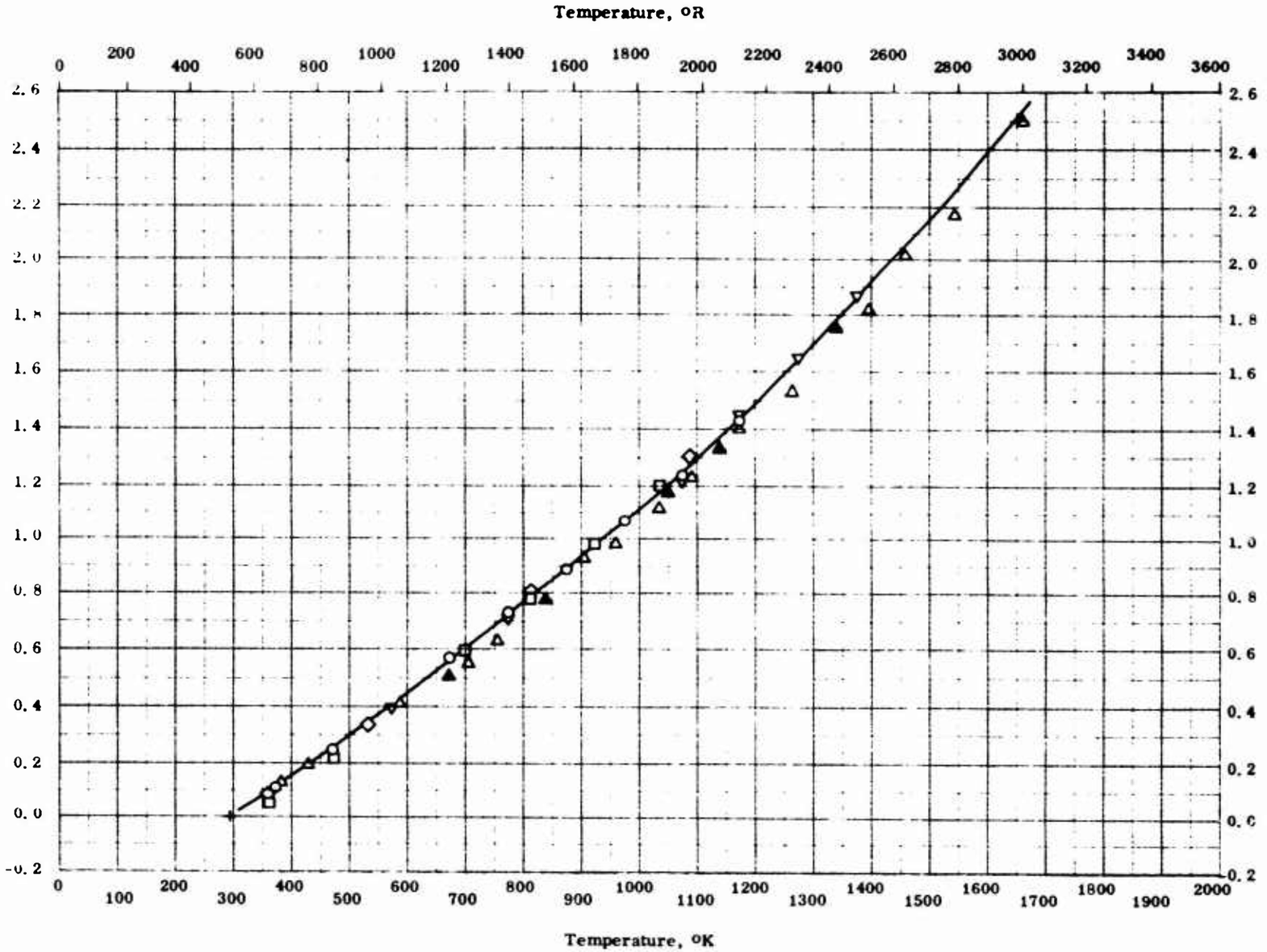


THERMAL DIFFUSIVITY -- NICKEL

THERMAL DIFFUSIVITY -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-1	295-405	±5	Rod with 1.26 cm dia and 0.1 cm long.	
□	63-4	1473		Not given.	



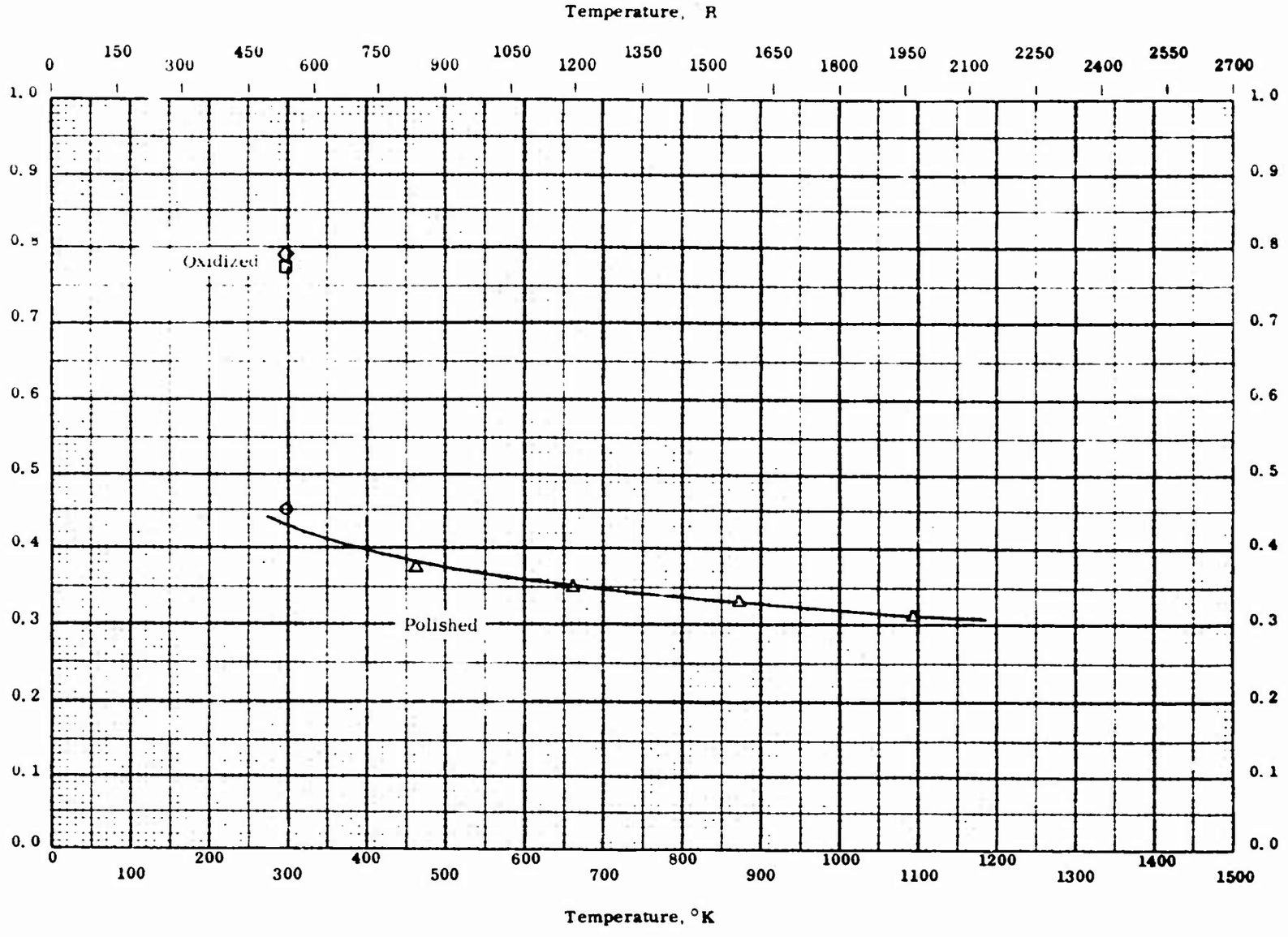
THERMAL LINEAR EXPANSION -- NICKEL

Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	56-4	386-1658		Grade "A"; density 522 lb ft^{-3}.	Heating.
▲	56-4	1658-672		Same as above.	Cooling data of above specimen.
○	57-68	293-1173		99.94 Ni, 0.03 Fe, 0.006 Ca, Cu, Si each, 0.005 C, and 0.004 S.	Cold-swaged and annealed at 950 C.
□	59-23	293-1033		Grade "A".	Average of 10 runs; standard deviation 0.17 x 10^{-6} per degree F.
▽	64-31	273-1373		Electrolytic Ni.	
◇	65-6	294-1089		Nickel 270 from International Nickel Co.; nominal composition 99.98 Ni, 0.01 C, and 0.001 > Mn, Fe, S, Si, Cu, Cr, Ti Co. Mg each; density 0.321 lb $in.^{-3}$; melting temperature 2650 F.	



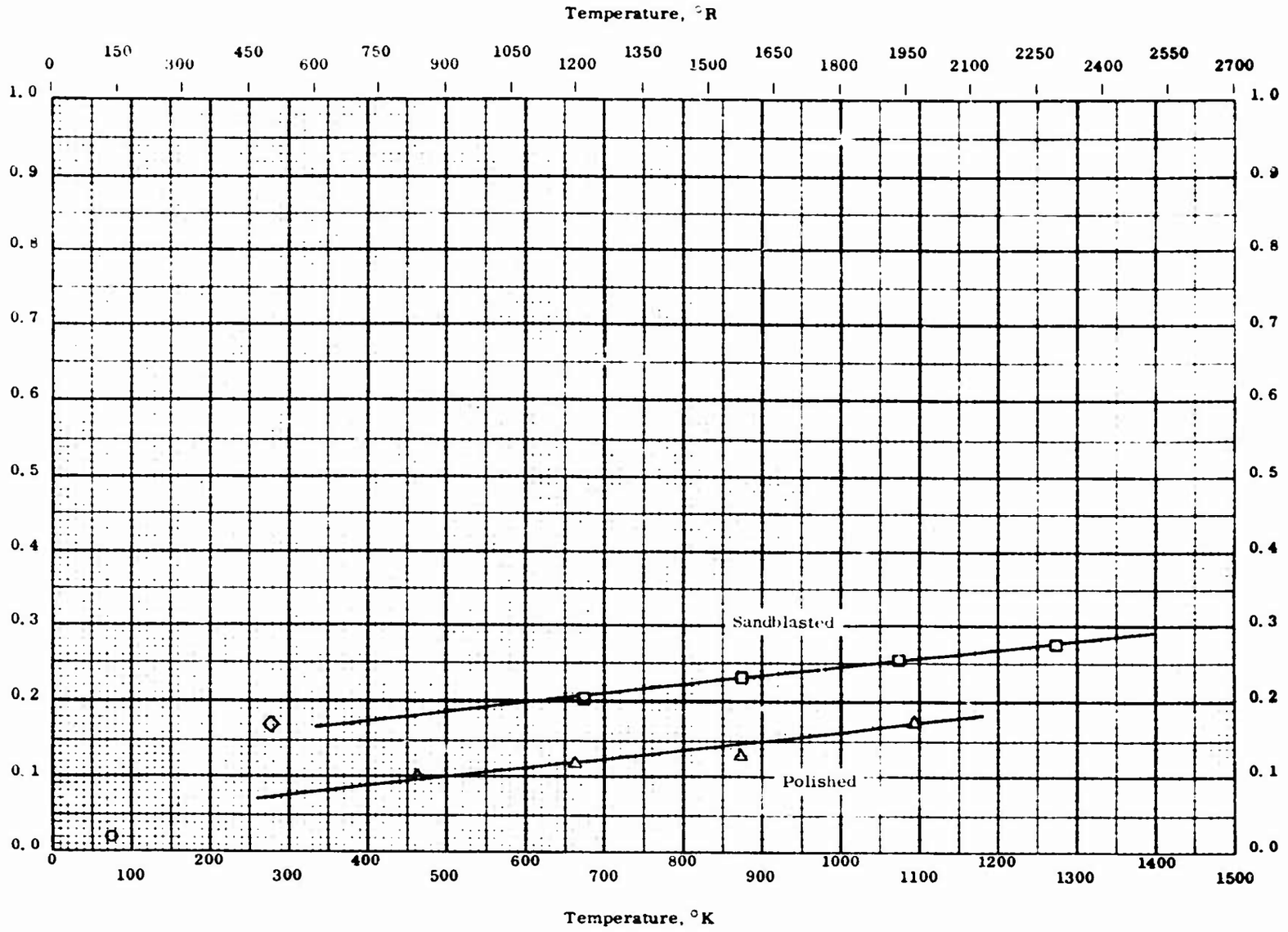
SOLAR ABSORPTANCE -- NICKEL

TPRC

SOLAR ABSORPTANCE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-38	298	10	Electroless plated (Ni coated on Ni).	Data reported in average value.
△	61-39	463-1093	≈10	Commercially pure.	Ground with 600 grit carborundum, polished on a wet cloth, and lapped with either Linde Alumina type B-5125 or unlevigated jewelers rouge; measured in vacuum (10^{-5} mm Hg).
□	57-41	298		Commercial grade A.	Oxidized in air at red heat for 30 min.; above atmosphere.
◇	57-41	298		Same as above.	Same as above; sea level.

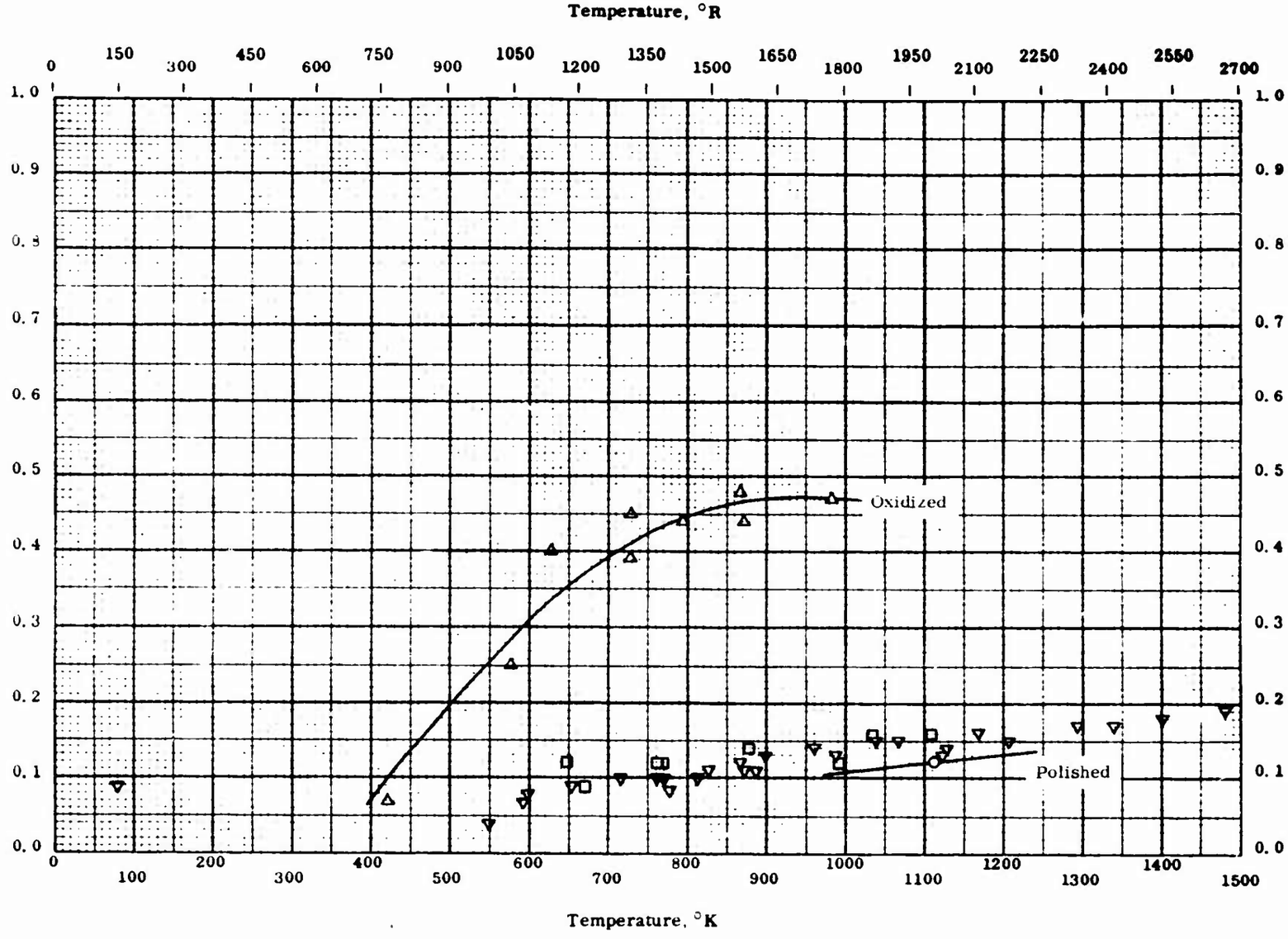


HEMISPHERICAL TOTAL EMITTANCE -- NICKEL

HEMISPHERICAL TOTAL EMITTANCE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept Error %	Sample Specifications	Remarks
○	60-38	76	5	Foil, 0.004 in. thickness.	Cleaned with solvent; measured in vacuum.
△	61-39	463-1093	≤10	Commercially pure.	Ground with 600 grit carborundum, polished on a wet cloth, lap with Linde Alumina type B-5125 or unlevigated jeweler's rouge; measured in vacuum. (10^{-5} mm Hg).
□	61-44	673-1273	±2.5	Not given.	Sandblasted; measured in vacuum (< 5×10^{-6} mm Hg).
◇	61-38	278	10	Electroless plated (Ni coated with Ni).	Data reported is average value.



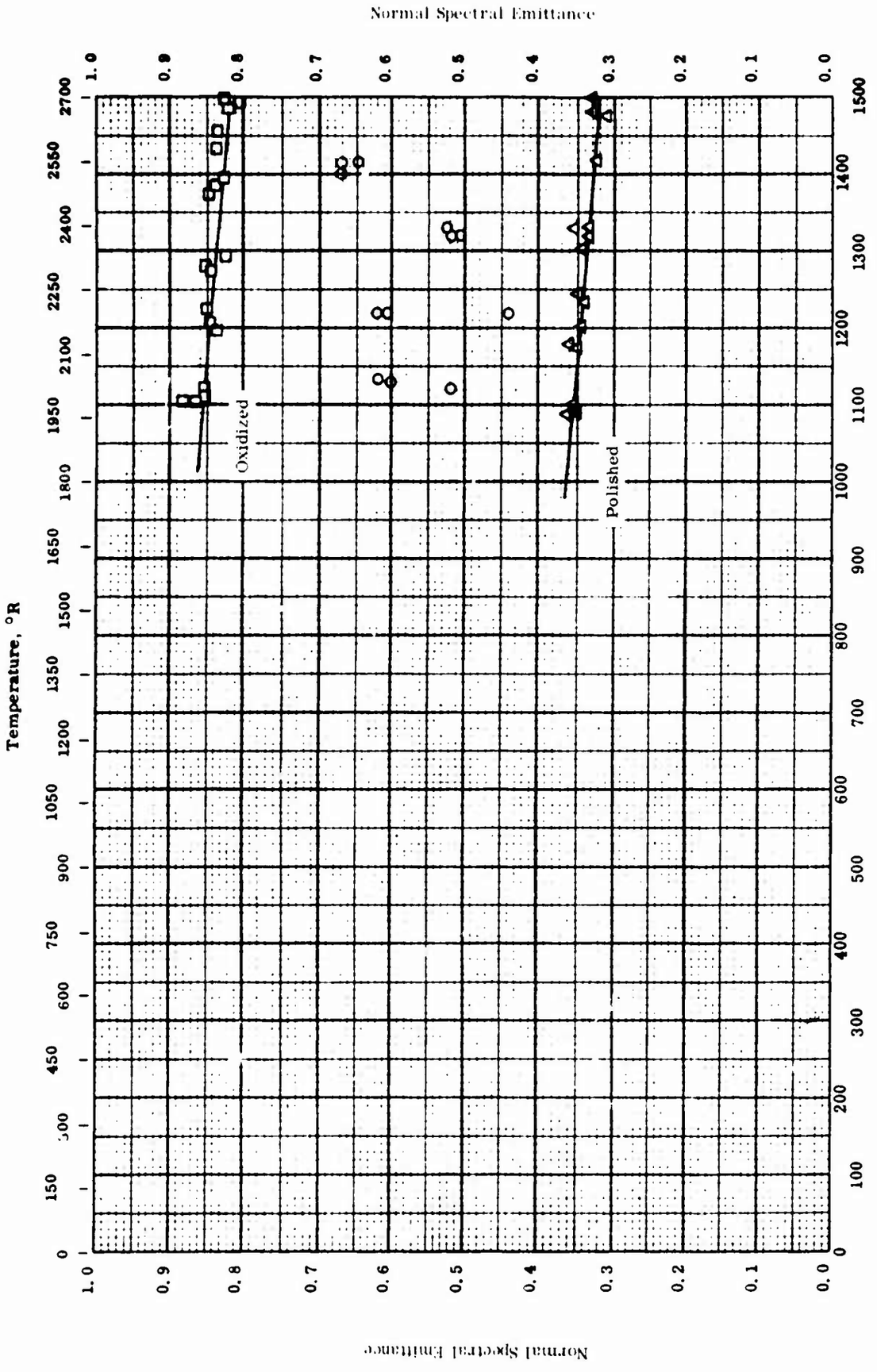
NORMAL TOTAL EMITTANCE -- NICKEL

NORMAL TOTAL EMITTANCE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-28	1111		Not given.	Polished with aluminum oxide, cleaned with water, and heated in vacuum at 1256 K for 1 hr; calculated from spectral data and corrected to 1111 K.
△	56-42	422-983	± 11	Grade A, pure, Steel Sales Co., Chicago.	Oxidized in air at 1089 K for 30 min.; measured in vacuum ($< 10^{-3}$ mm Hg).
□	56-42	649-1108	± 11	Same as above.	As received; measured in vacuum ($< 10^{-3}$ mm Hg).
▽	57-41	83-1478	± 10	Commercial grade A.	Cleaned with a liquid detergent; measured in vacuum (5×10^{-4} mm Hg).

TPRC

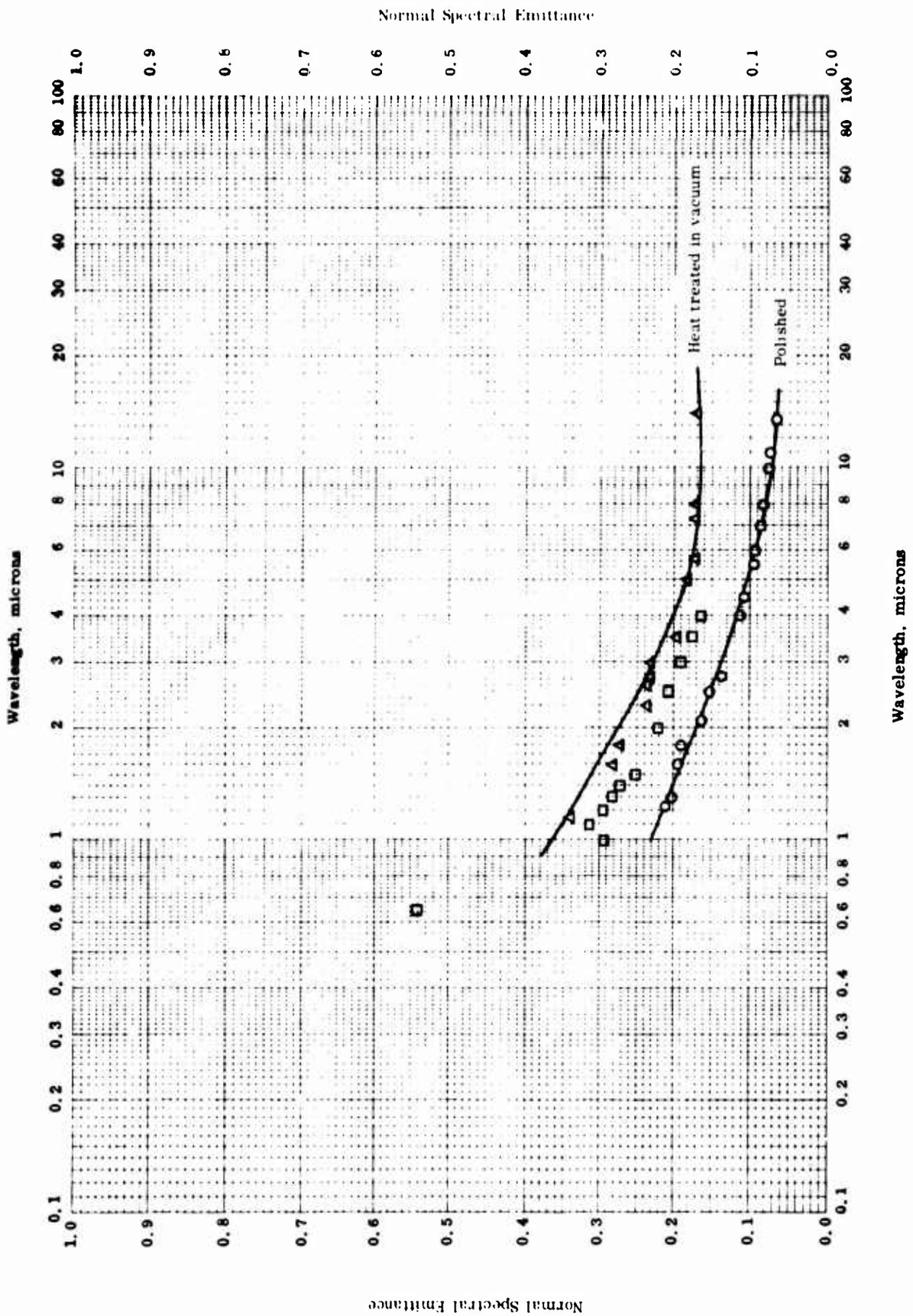


NORMAL SPECTRAL EMITTANCE – NICKEL

NORMAL SPECTRAL EMITTANCE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	57-41	0.665	1122-1414		Commercial grade A.	As received; measured in vacuum.
△	57-41	0.665	1089-1497		Same as above.	Polished with fine polishing compounds on a buffing wheel; measured in vacuum.
□	57-41	0.665	1105-1497		Same as above.	Oxidized in air at red heat for 30 min.; measured in vacuum.

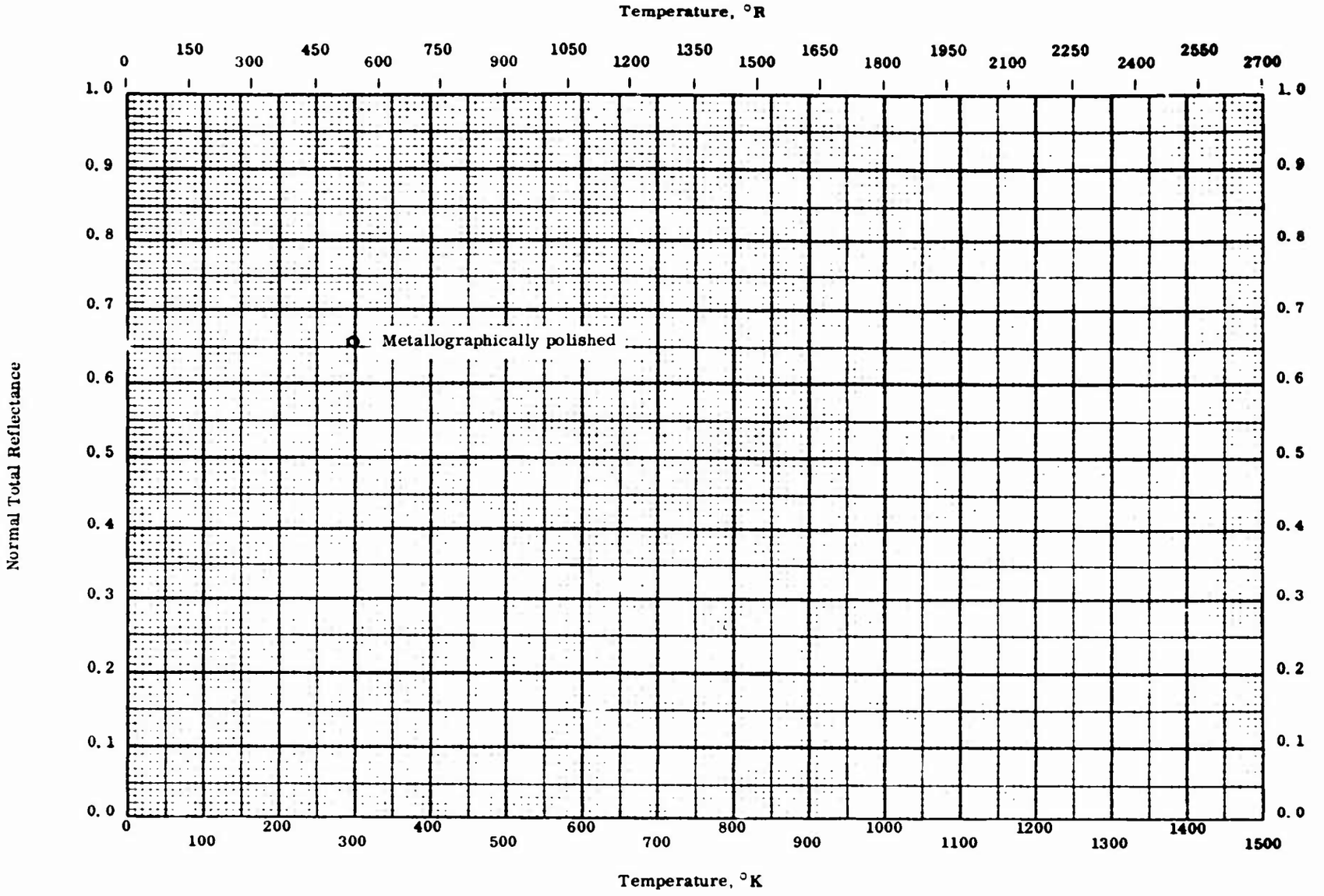


NORMAL SPECTRAL EMITTANCE — NICKEL

NORMAL SPECTRAL EMITTANCE -- NICKEL

REFFRENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	63-28	1200	1.23-13.50		Not given.	Polished with aluminum oxide cleaned with water and heated in vacuum at 1256 K for 1 hr.
△	63-28	1428	1.15-14.00		Same as above.	Above specimen heated in vacuum at T > 1256 K for 48 hrs.
□	47-10	1383	0.65-4.0		99.97 pure.	Measured in vacuum.



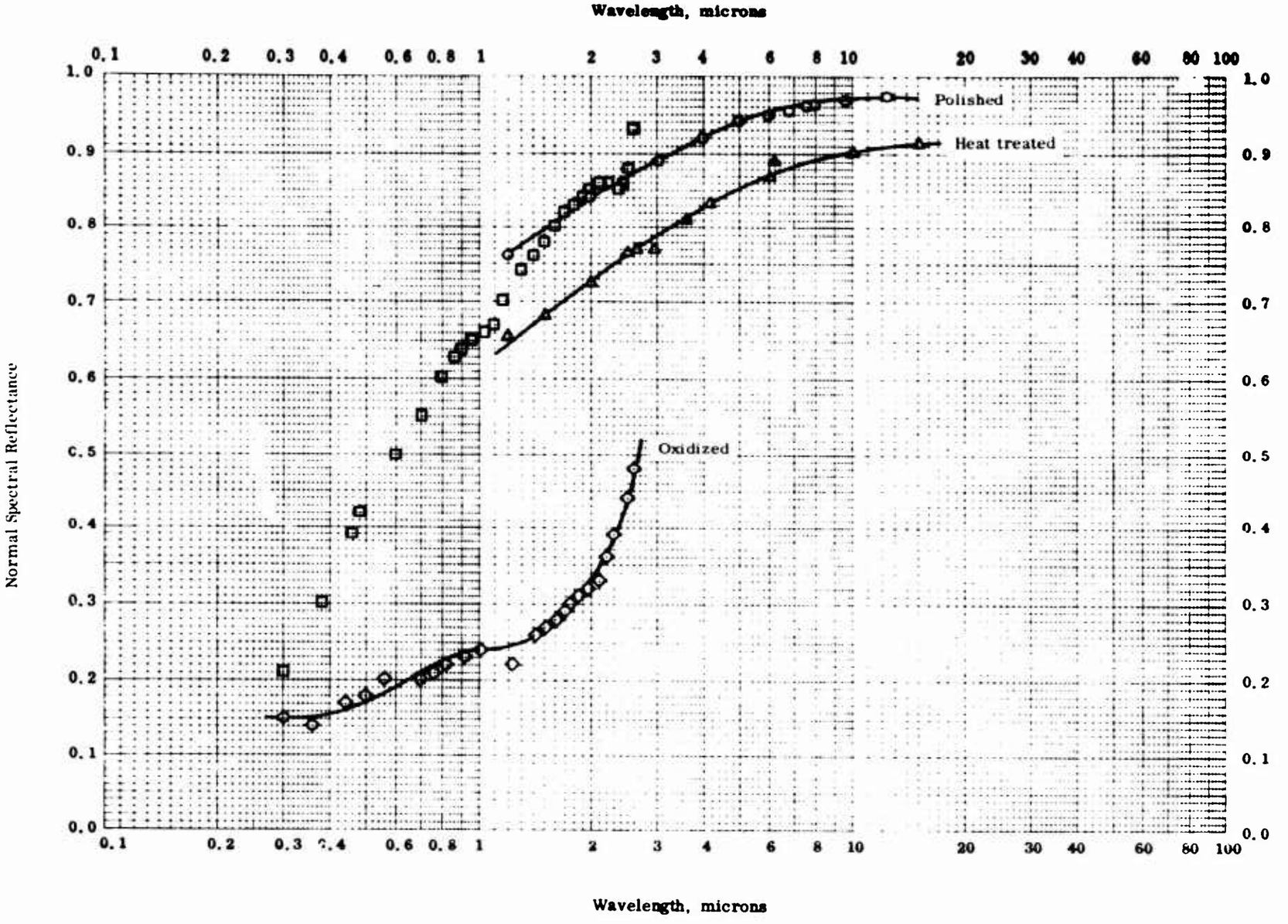
TPRC

NORMAL TOTAL REFLECTANCE -- NICKEL

NORMAL TOTAL REFLECTANCE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-29	298		Electrolytic.	Metallographically polished; calculated from spectral data.



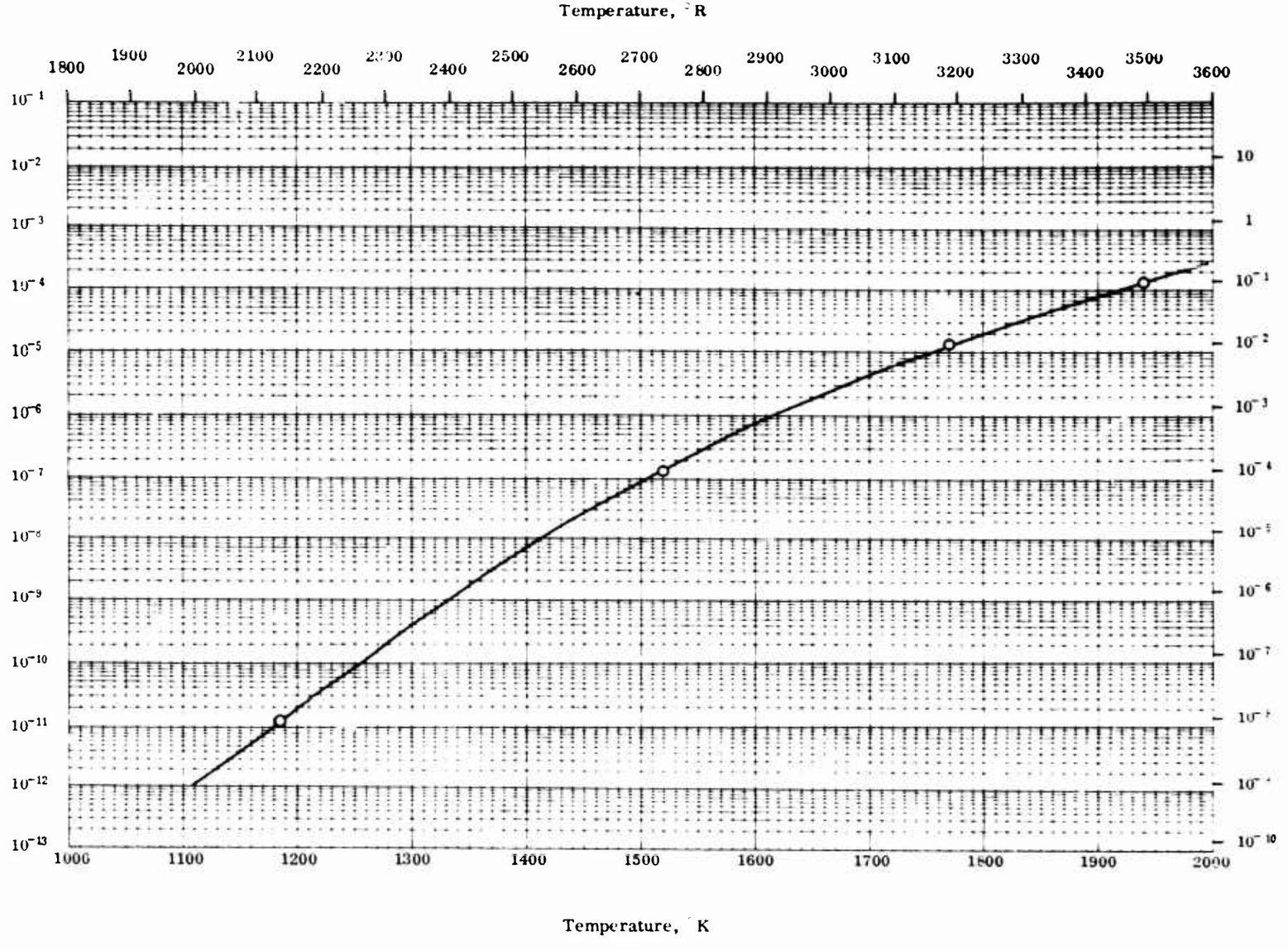
NORMAL SPECTRAL REFLECTANCE -- NICKEL

NORMAL SPECTRAL REFLECTANCE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	63-28	295	1.2-12.4		Not given; surface roughness 0.025 μ and lateral 25 μ.	Polished with aluminum oxide, cleaned with water; measured in air; hemispherical illumination, 7 degree viewing.
△	63-28	295	1.2-15.0		Not given; surface roughness 7.5 μ and lateral 25 μ.	Above specimen heated in vacuum at 1255 K for 48 hrs; measured in air; hemispherical illumination, 7 degree viewing.
□	57-41	298	0.3-2.6	±4	Commercial grade A.	As received; data taken from smooth curve; 6-9 degree illumination, hemispherical viewing; $MgCO_3$ as reference standard.
◇	57-41	298	0.3-2.6	±4	Same as above.	Same as above; oxidized in air at red heat for 30 min.

TPRC



VAPOR PRESSURE -- NICKEL

VAPOR PRESSURE -- NICKEL

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-12	1185-1940		Not given.	

PROPERTIES OF NIOBIUM

MOST PROBABLE VALUES

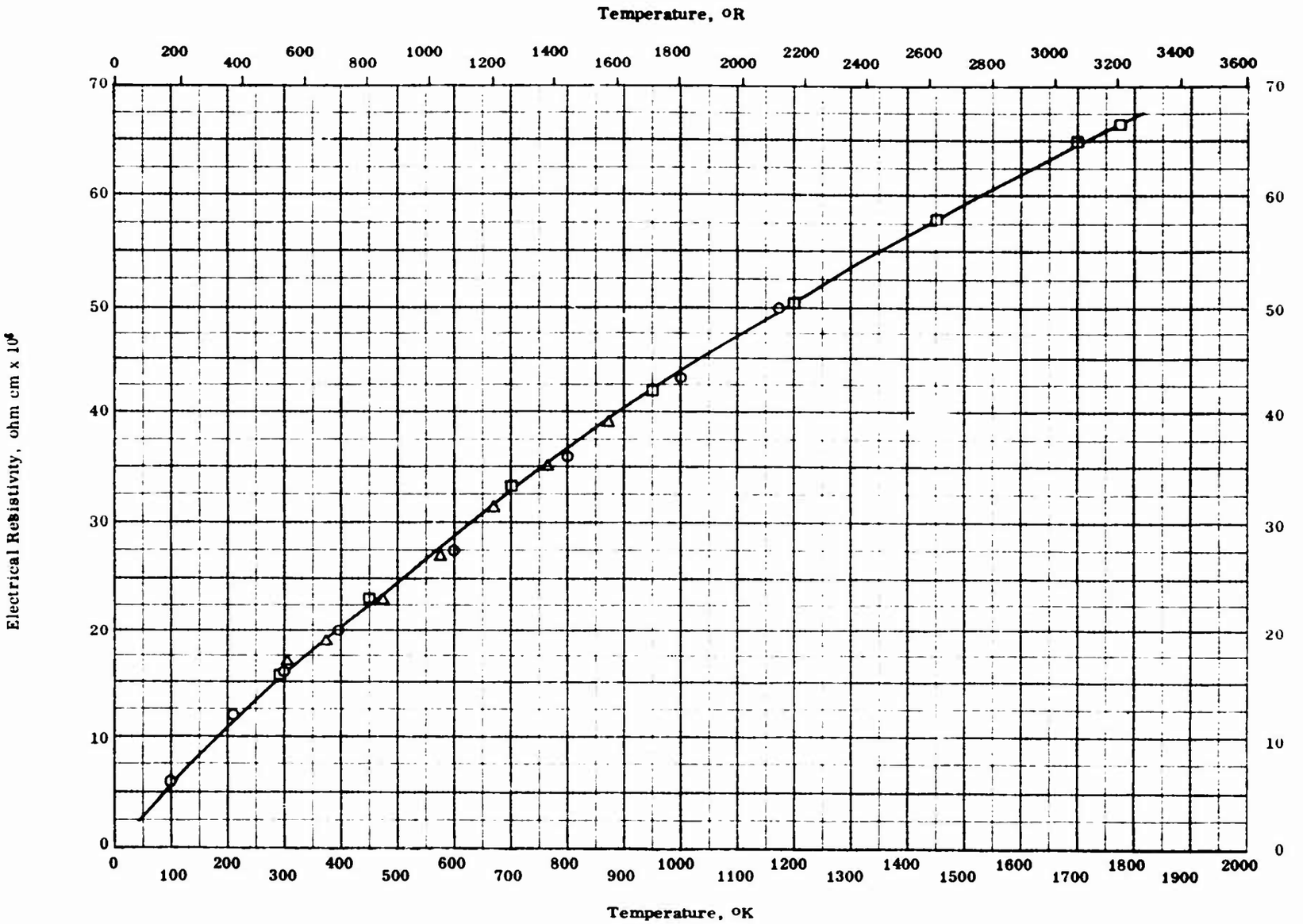
Property	C.G.S. Units	Brit. Eng. Units
Density.	8.57	535
Melting Point	2740	4932

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
		8.57	535
Melting Point		K	R
	□	2693	4848
	△	2773	4992
	▽	2688	4838
	◁	2573 ± 15	4632 ± 27
	▷	2523 ± 5	4542 ± 9

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	62-12	293		Not given.	
□	54-30	2693		0.05 - 0.18 C and minor amounts of Ca, Cr, Fe, Mn, Sc, Ti, V, and Zr.	Liquid forming in black body cavity of sample.
△	56-55	2773		Not given.	
▽	63-38	2688			
◁	61-48	2558-2588		Flat plate.	
▷	61-48	2518-2528		V- shape.	

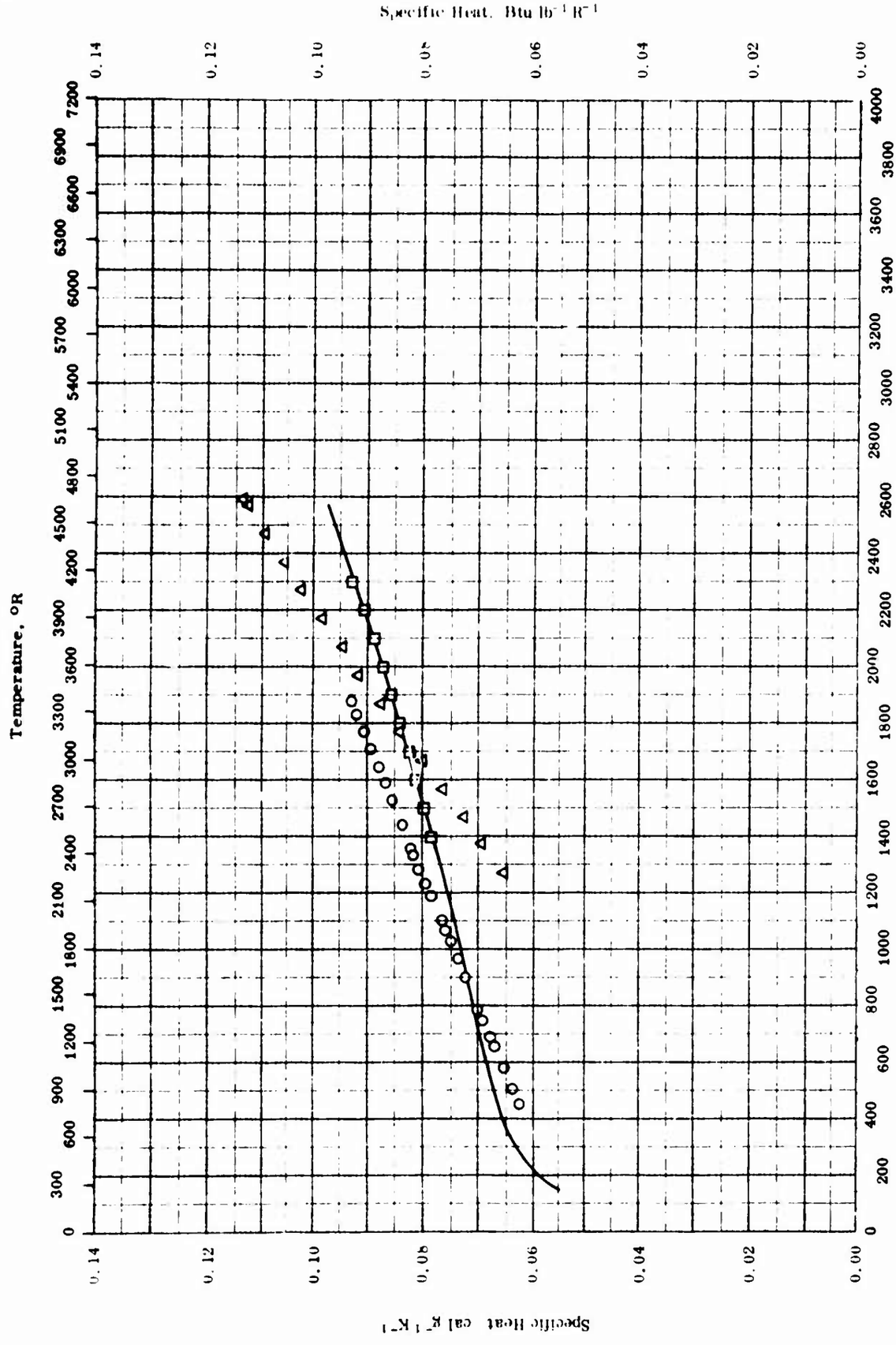


ELECTRICAL RESISTIVITY -- NIOBIUM

ELECTRICAL RESISTIVITY -- NIOBIUM

REFERENCE INFORMATION

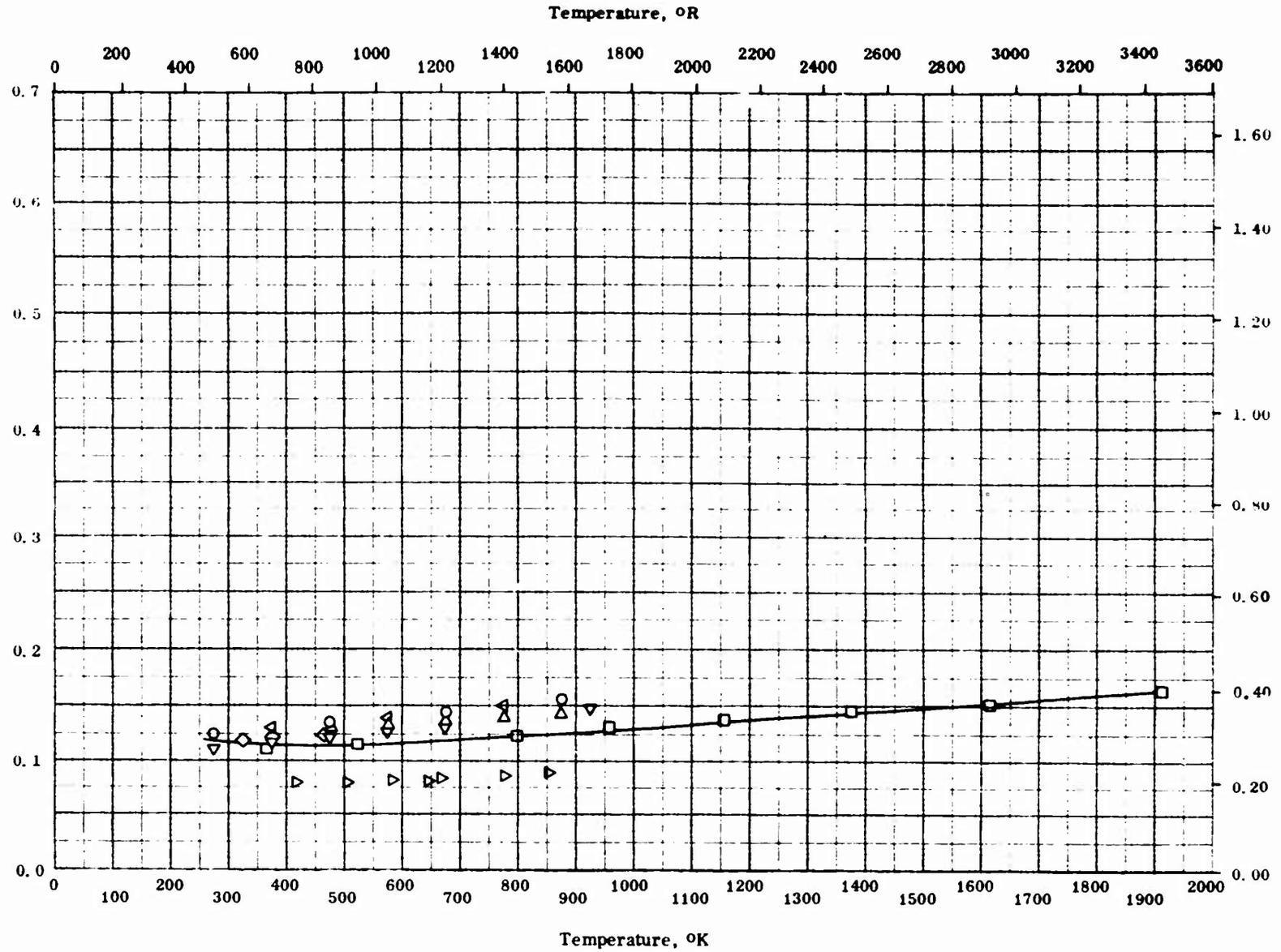
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-15	100-1173		Spectroscopically pure; β phase.	Cast, rolled, remelted, hot forged, surface layers removed, cold swaged, homogenized 70 hrs at 1000 C in vacuum, and quenched.
△	57-7	273-873		99.95 pure.	High density.
□	61-32	293-2775		0.1 Ta, 0.015 Ti, 0.01 C, 0.01 Fe, 0.01 N, 0.01 O, and 0.01 Si; in wire form.	Sintered above 200 C and cold swaged.



SPECIFIC HEAT -- NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-6	454-1882	≤2.9	Not given.	Sealed under helium atmosphere.
□	63-14	1400-2300	<4.0	99.7 Nb, 0.08 Ta, 0.05 N_2, 0.05 O_2, 0.02 C, 0.02 Fe, 0.02 Ta, 0.02 Zr, 0.01 Ni and 0.01 W.	Outgassed and sealed under $< 1 \times 10^{-6}$ mm Hg.
△	65-2	1273-2593		99.83 Nb; powder metallurgy product or 20-mil sheet.	



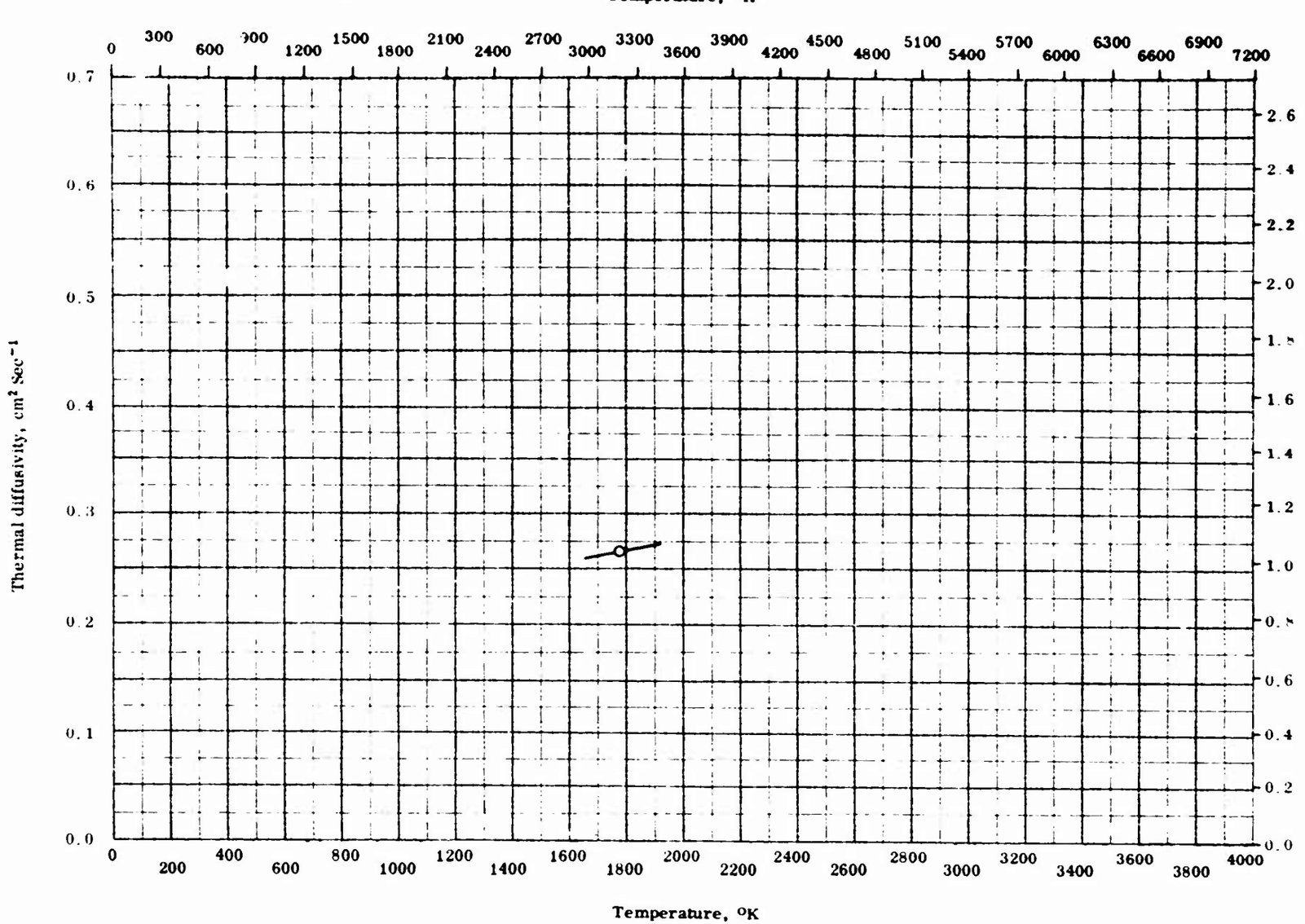
THERMAL CONDUCTIVITY -- NIOBIUM

TPRC

THERMAL CONDUCTIVITY -- NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-7	273-873		99.95 Nb; "High density".	Measured in vacuum.
□	58-6	365-1911			
△	58-8	473-873		99.92 Nb.	
▽	55-3	273-923		Density 8.38 g cm^{-3}.	
◁	55-3	273-873		Density 8.65 g cm^{-3}.	
▷	54-5	417-853		Density 7.73 g cm^{-3}.	
◇	61-9	322-574		High purity.	

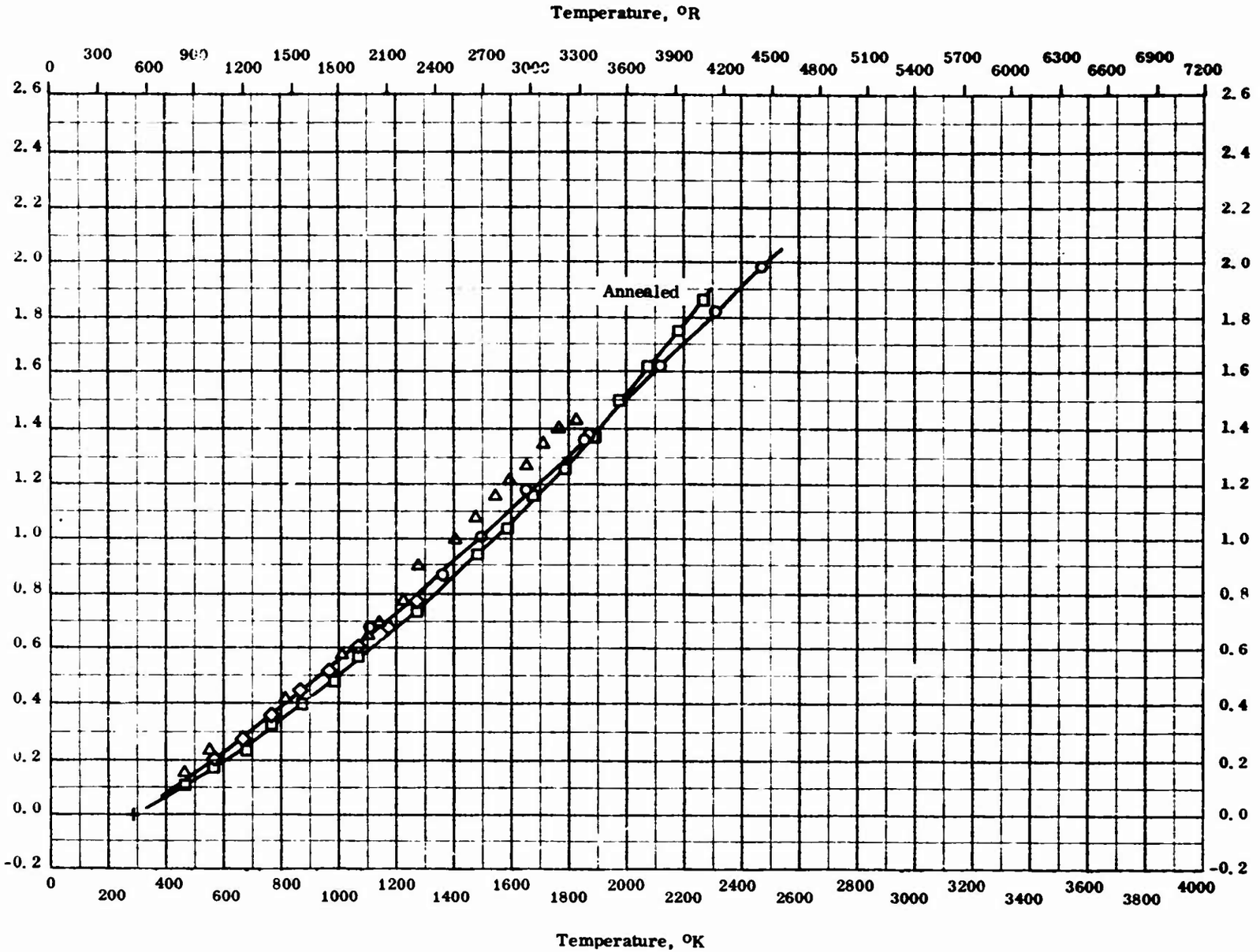


THERMAL DIFFUSIVITY -- NIOBIUM

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	63-4	1773		Not given	

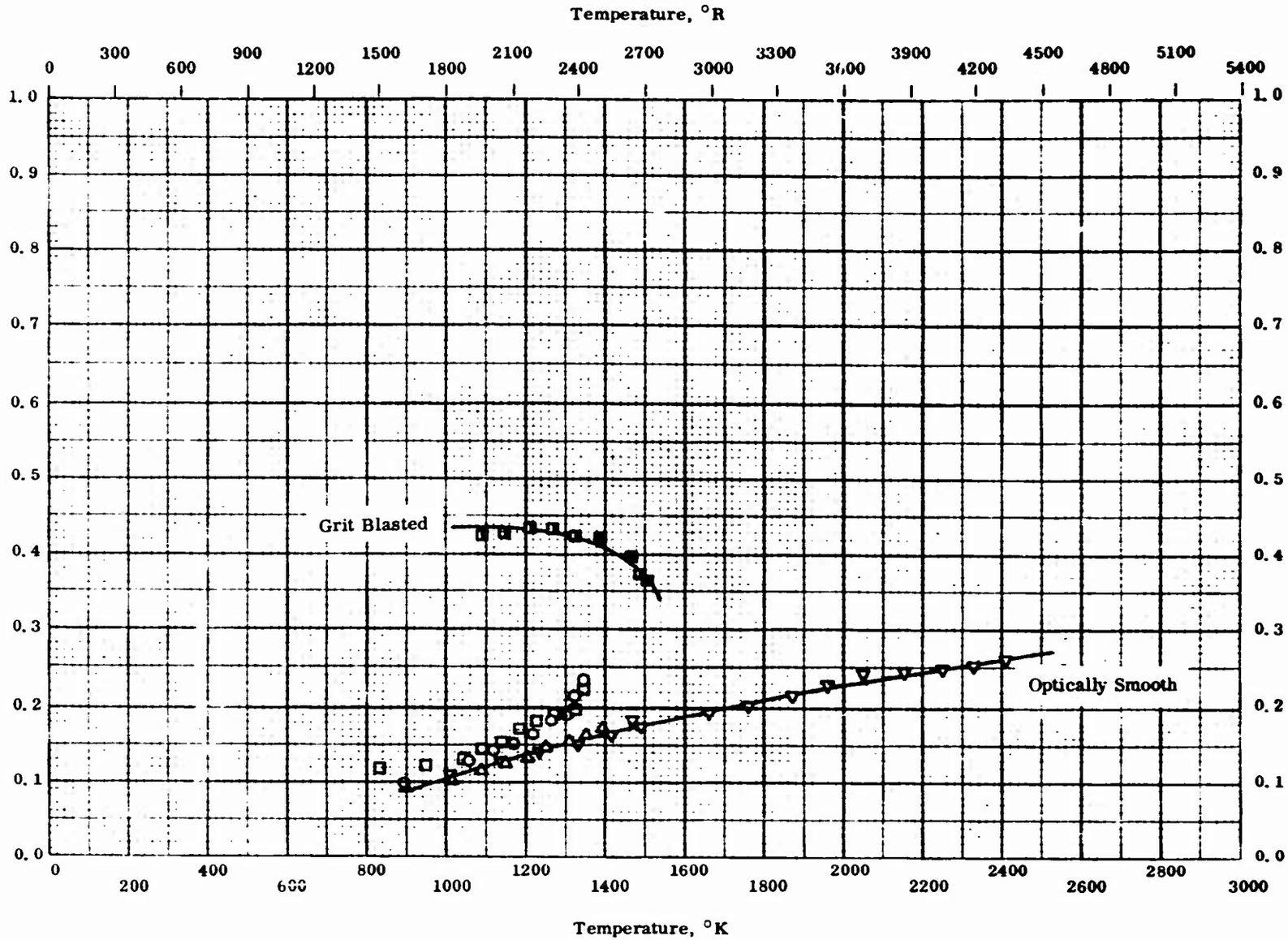


THERMAL LINEAR EXPANSION -- NIOBIUM

THERMAL LINEAR EXPANSION--NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-41	291-2470	± 2	99.8 Nb with principal impurity 0.06 tantalum.	X-ray diffraction method.
△	58-6	300-1825		Not given.	
◇	57-7	293-1273		Approx. 99.95 pure.	Tested in 10^{-4} mm Hg vacuum.
□	64-30	293-2263	<3	Pure.	Melted in an arc furnace and subsequently subjected to pressure working; annealed at above 2000 C for 1-1/2 to 2 hrs; measured at pressure not exceeding 1 to 2 x 10^{-6} mm Hg.

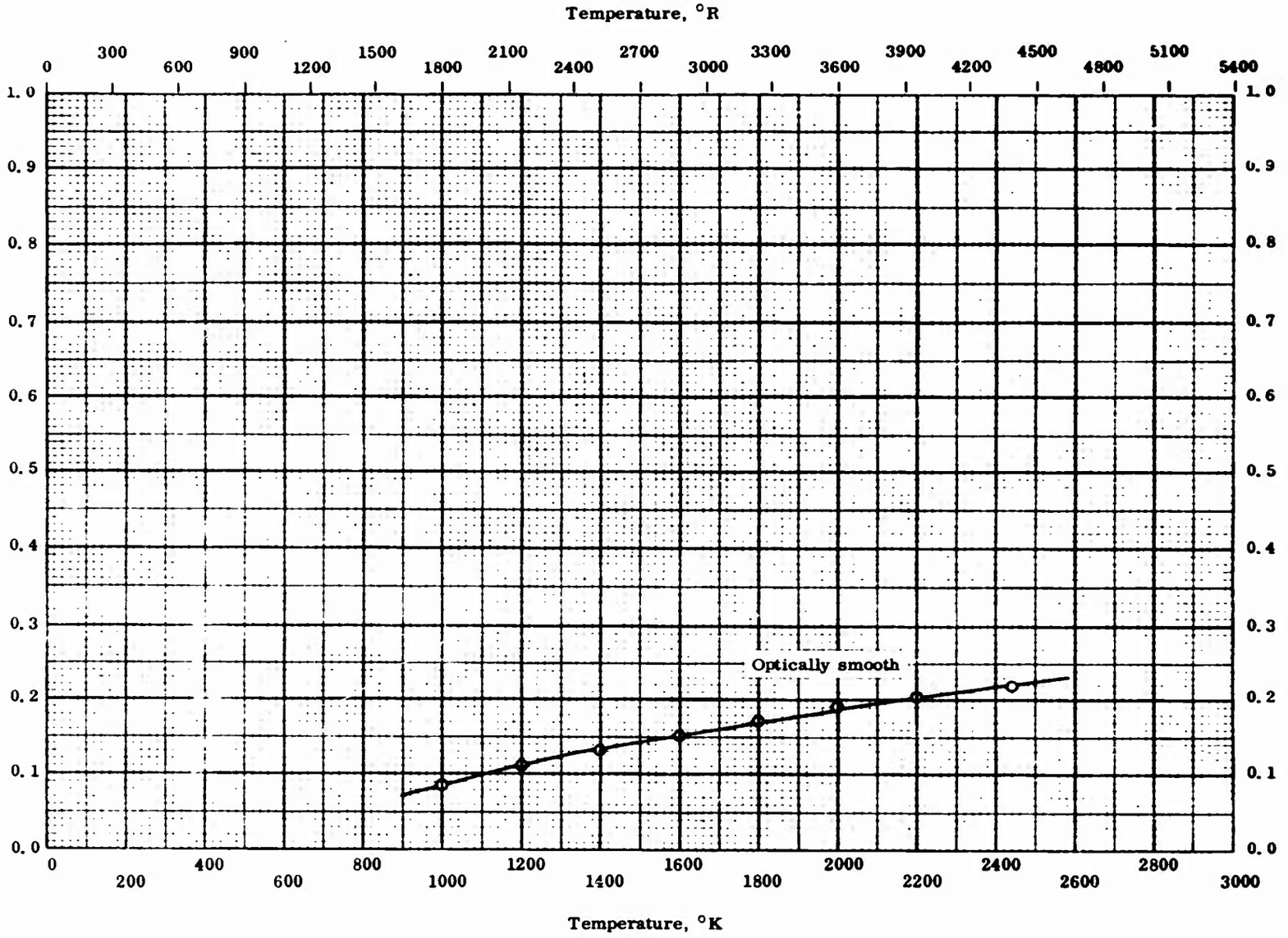


HEMISPHERICAL TOTAL EMITTANCE -- NIOBIUM

HEMISPHERICAL TOTAL EMITTANCE -- NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-49	896-1348	≤5	Not given.	As received.
△	62-49	903-1396	≤5	Same as above.	Deoxidized by pickling in an acid mixture.
□	62-49	835-1343	≤5	Same as above.	Nitrided from 473 K to 973 K linearly in 1 hr.
◨	64-23	1089-1504		Commercial.	Grit blasted; measured in vacuum ($>10^{-4}$ mm Hg).
▽	63-35	1010-2410	± 5	Ribbon.	Optically smooth, contamination free; measured in vacuum ($\leq 1 \times 10^{-5}$ mm Hg).

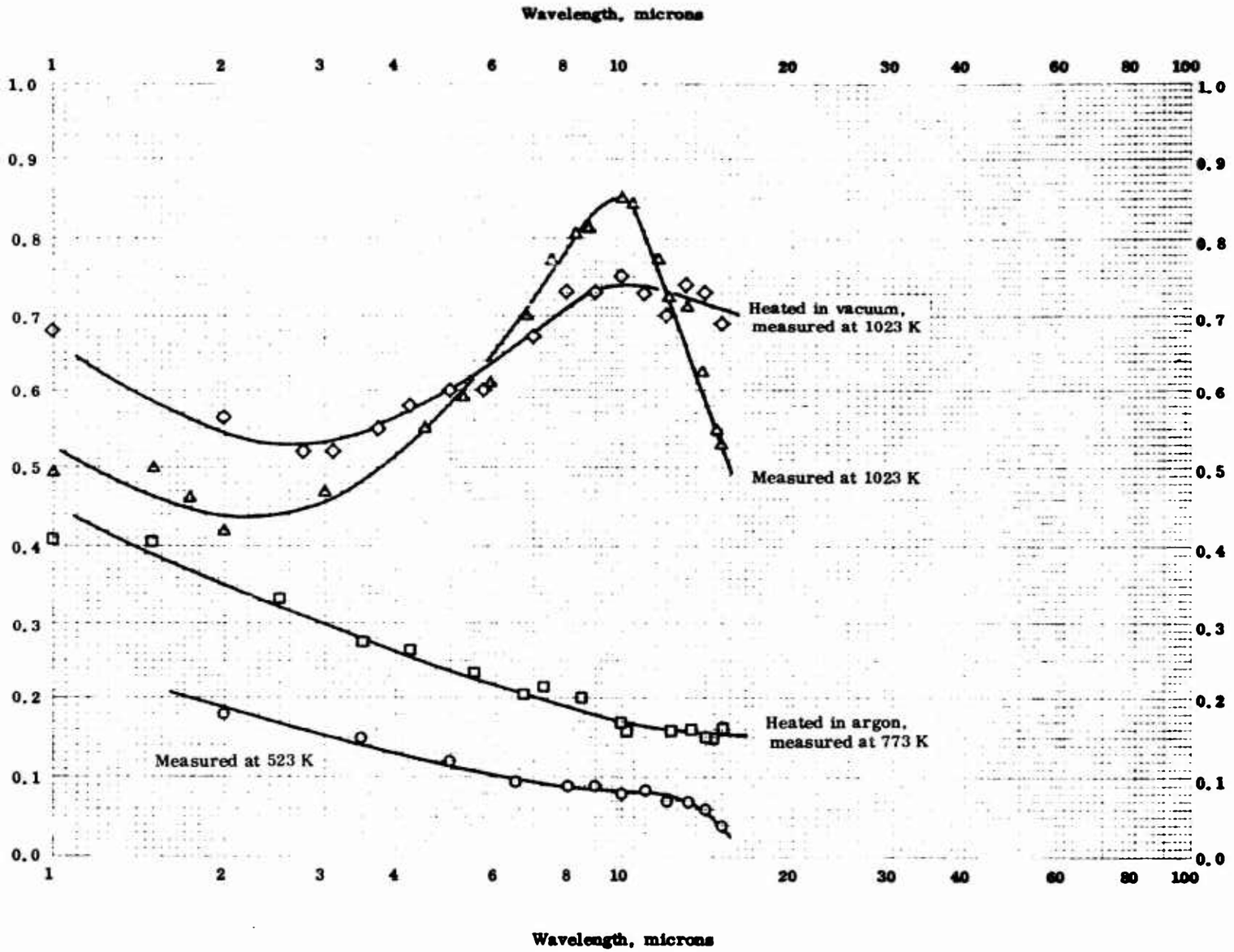


NORMAL TOTAL EMITTANCE -- NIOBIUM

NORMAL TOTAL EMITTANCE -- NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	63-35	1000-2440	± 5	Ribbon.	Optically smooth and contamination free; data taken from smooth curve.

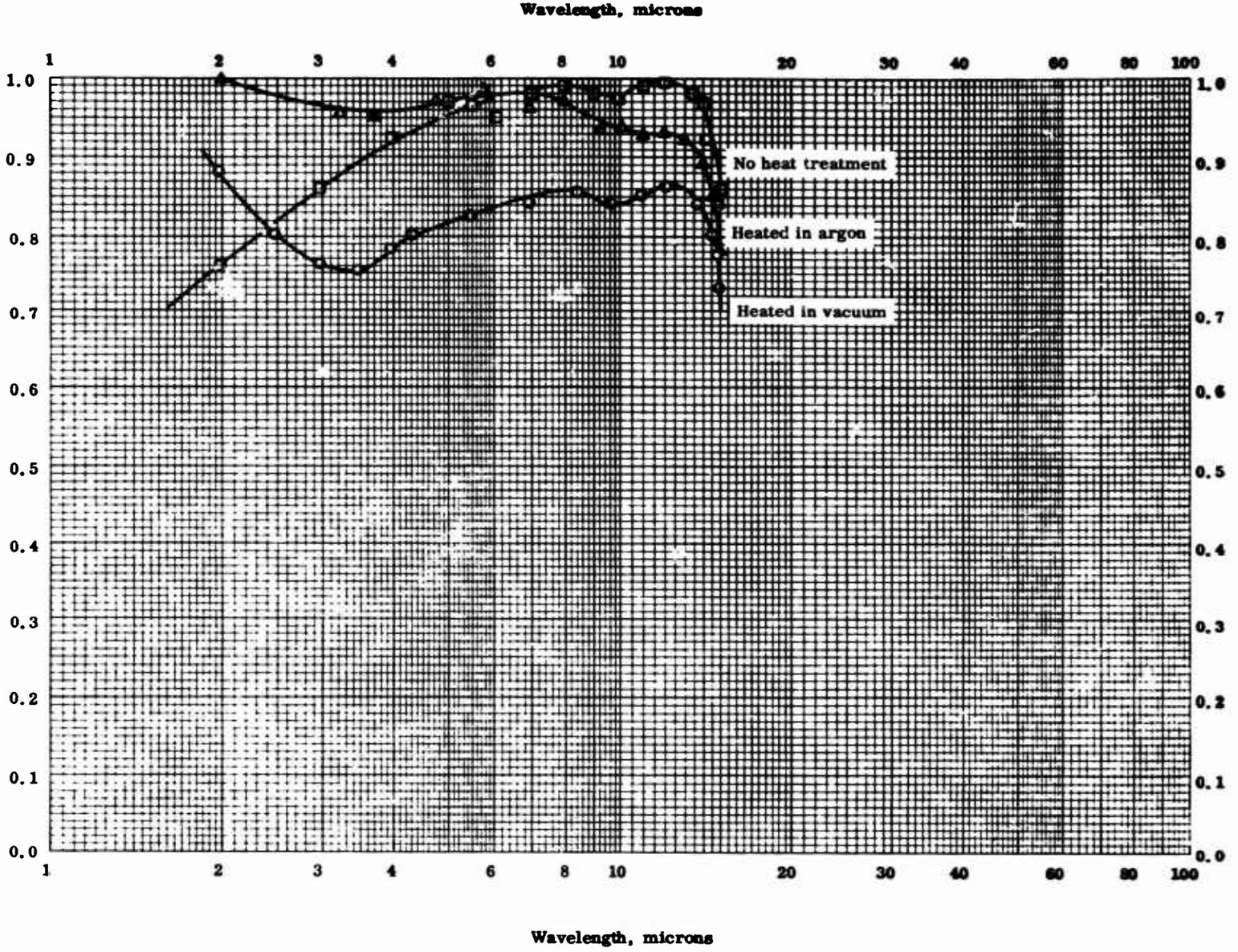


NORMAL SPECTRAL EMITTANCE -- NIOBIUM

NORMAL SPECTRAL EMITTANCE -- NIOBIUM

REFERENCE INFORMATION

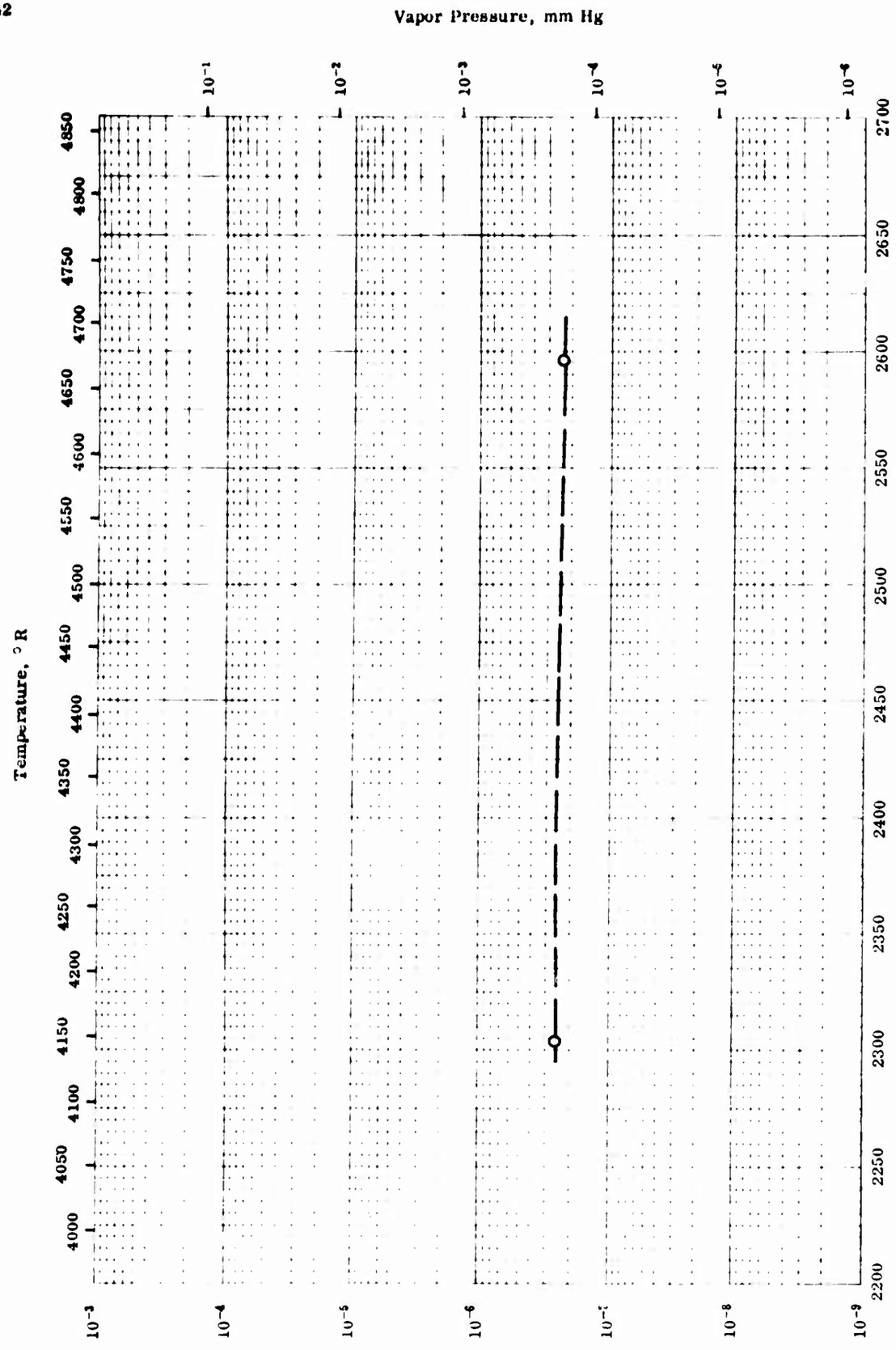
Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	62-45	523	2.0-15.0		Chemically pure.	As received.
△	62-45	1023	1.0-15.0		Same as above.	Same as above; different specimen.
□	62-45	773	1.0-15.0		Same as above.	Heated in argon at 1366 K for 30 min.
◇	62-45	1023	1.0-15.0		Same as above.	Heated in a vacuum (22×10^{-5} mm Hg) for 30 min.



NORMAL SPECTRAL REFLECTANCE — NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. ° K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	62–45	< 322	2.0–15.0		Chemically pure.	Heated in vacuum (22×10^{-5} mm Hg) at 1366 K for 30 min; hemispherical illumination.
△	62–45	< 322	2.0–15.0		Same as above.	Heated in argon at 1366 K for 30 min; hemispherical illumination.
□	62–45	< 322	2.0–15.0		Same as above.	As received; hemispherical illumination.



VAPOR PRESSURE -- NIOBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-12	2304-2596		Not given.	

PROPERTIES OF OSMIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	22.48*	1404*
Melting Point	2967	5341

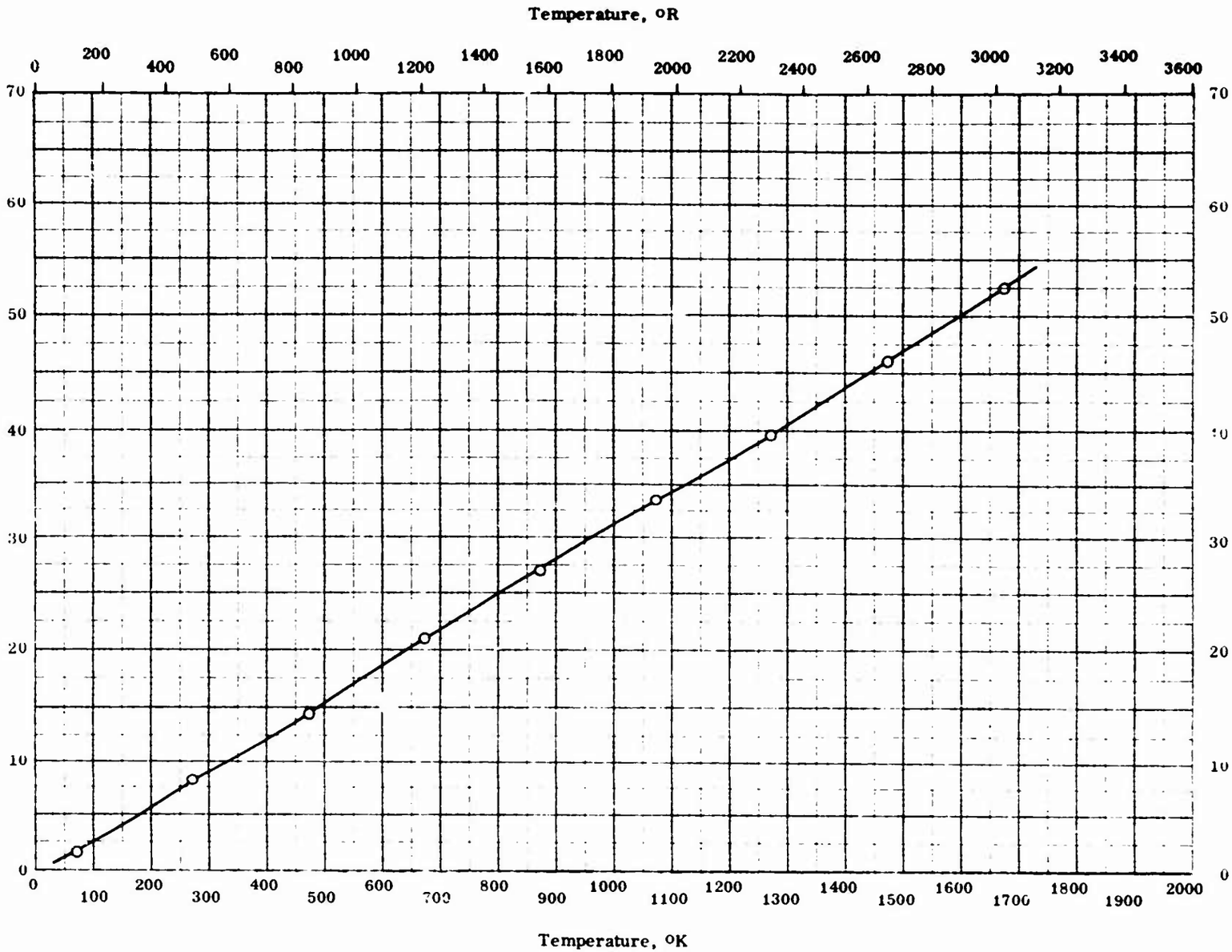
*Handbook of Chemistry and Physics. (Ref. 64-28)

REPORTED VALUES

Melting Point	K	R
	O 2967	5341

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-56	2967		Not given.	

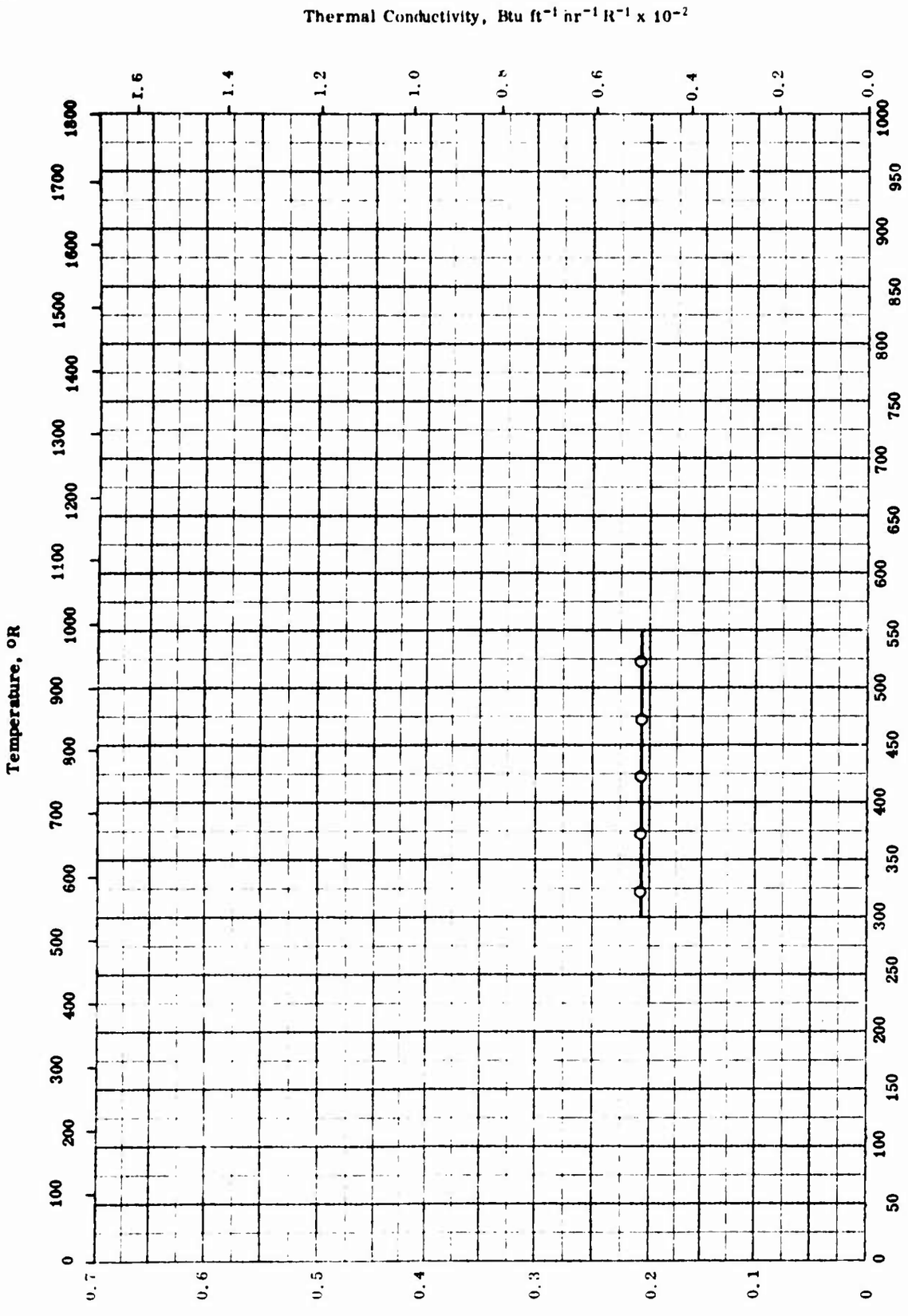


ELECTRICAL RESISTIVITY -- OSMIUM

ELECTRICAL RESISTIVITY -- OSMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-34	73-1673		0.03 Ru, 0.002 Rh, 0.0005 Fe, 0.0002 Cu, and 0.0001 Ag; density 22.45 g ml^{-1}; 2.7 cm in length and 0.489 cm in dia.	Argon-arc melted and ground.

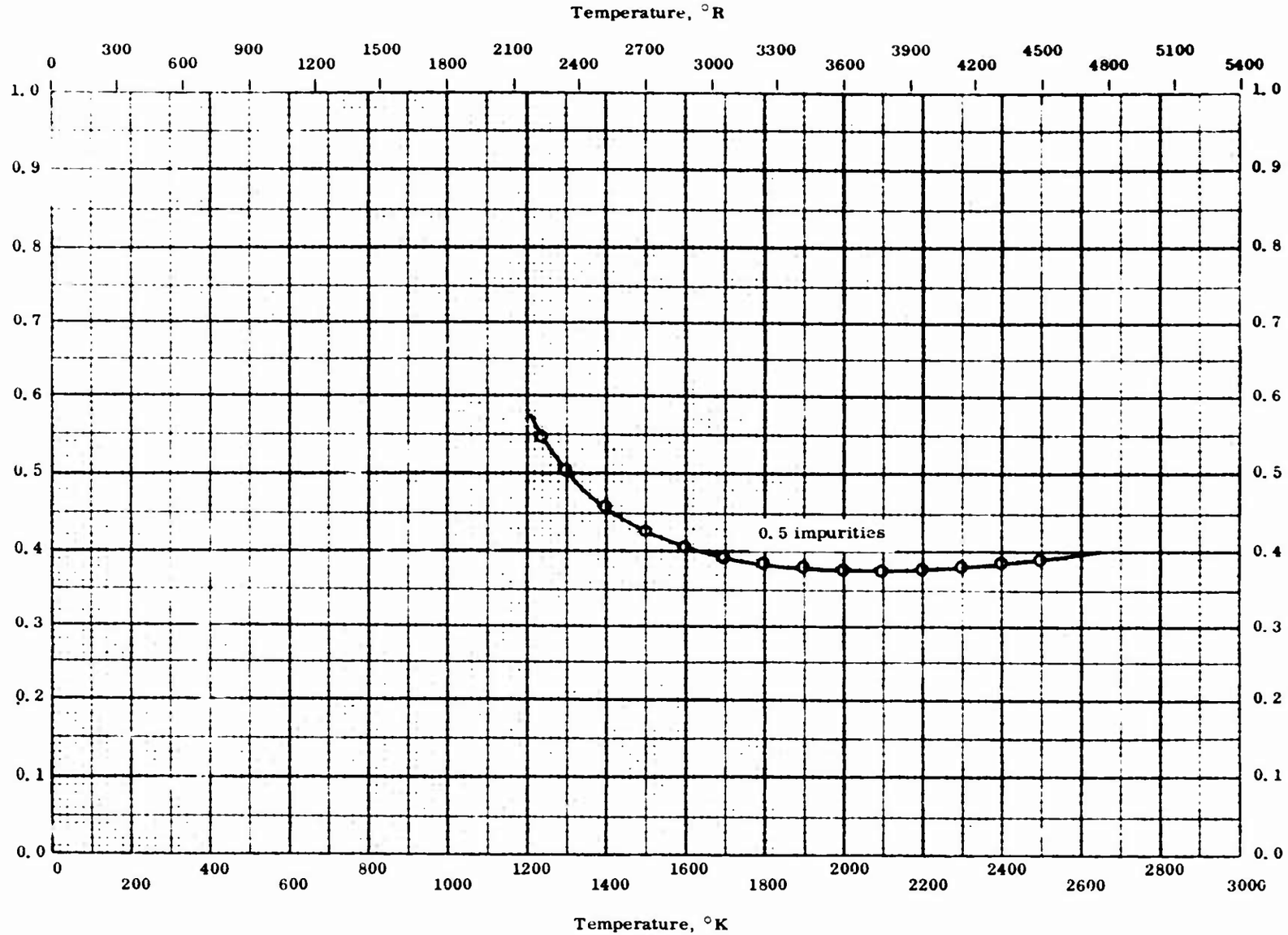


THERMAL CONDUCTIVITY -- OSMIUM

THERMAL CONDUCTIVITY -- OSMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-34	323-523		0.03 Ru, 0.002 Rh, 0.0005 Fe, 0.0002 Cu, and 0.0001 Ag; 2.7 cm long and 0.489 cm dia rod with density 22.45 g ml^{-1}.	Argon-arc melted and ground.



NORMAL SPECTRAL EMITTANCE -- OSMIUM

NORMAL SPECTRAL EMITTANCE -- OSMIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	61–45	0.665	1240–2500		0.5 impurities.	Measured in vacuum; data taken from smooth curve.

TPRC

PROPERTIES OF PALLADIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	11.4*	712*
Melting Point	1825	3286

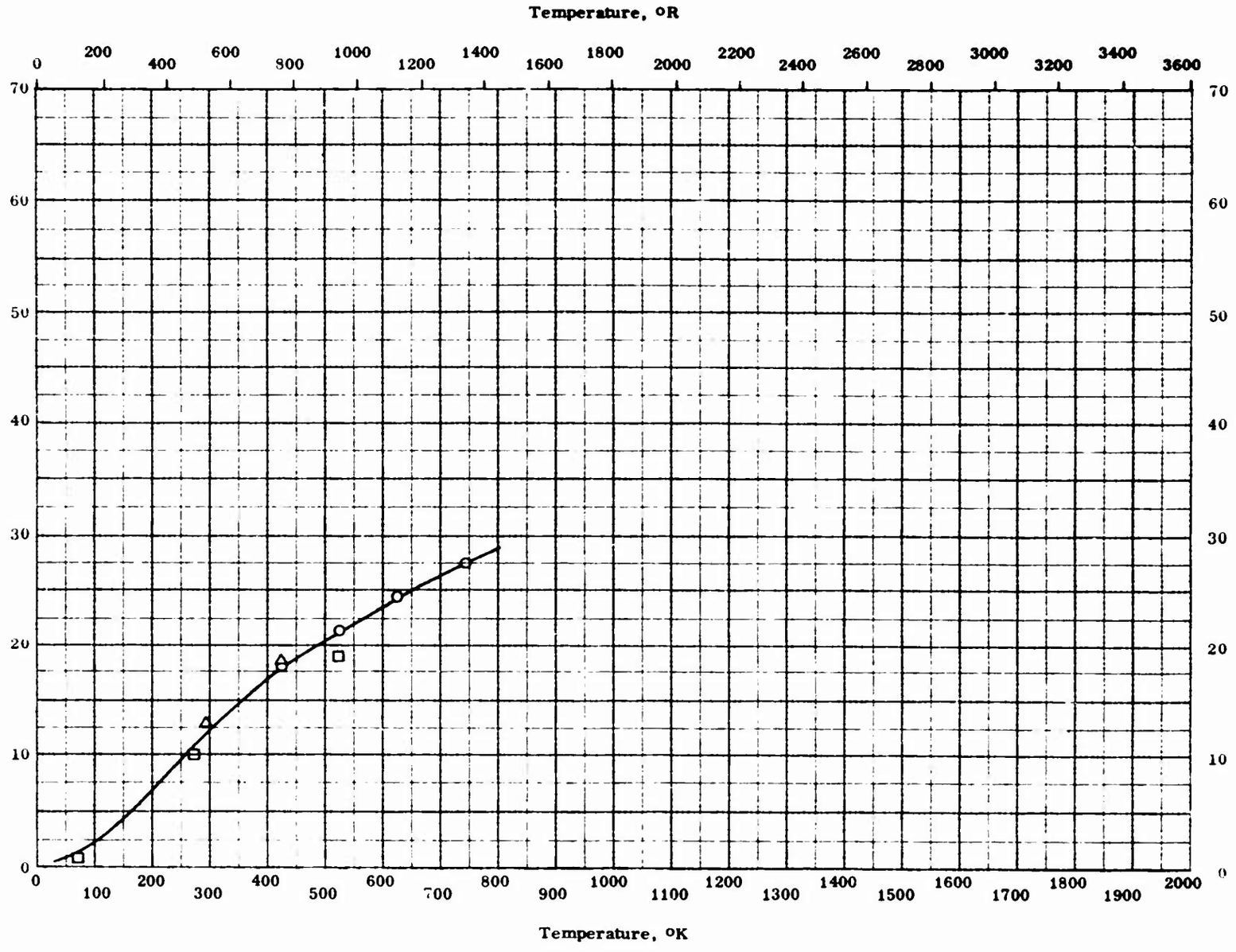
*Handbook of Chemistry and Physics, (Ref. 64-28)

REPORTED VALUES

Melting Point	K	R
	○ 1825	3286

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	56-53	1826		99.95 Pd and 0.05 Pt.	M. P. by breaking time-temperature curve.

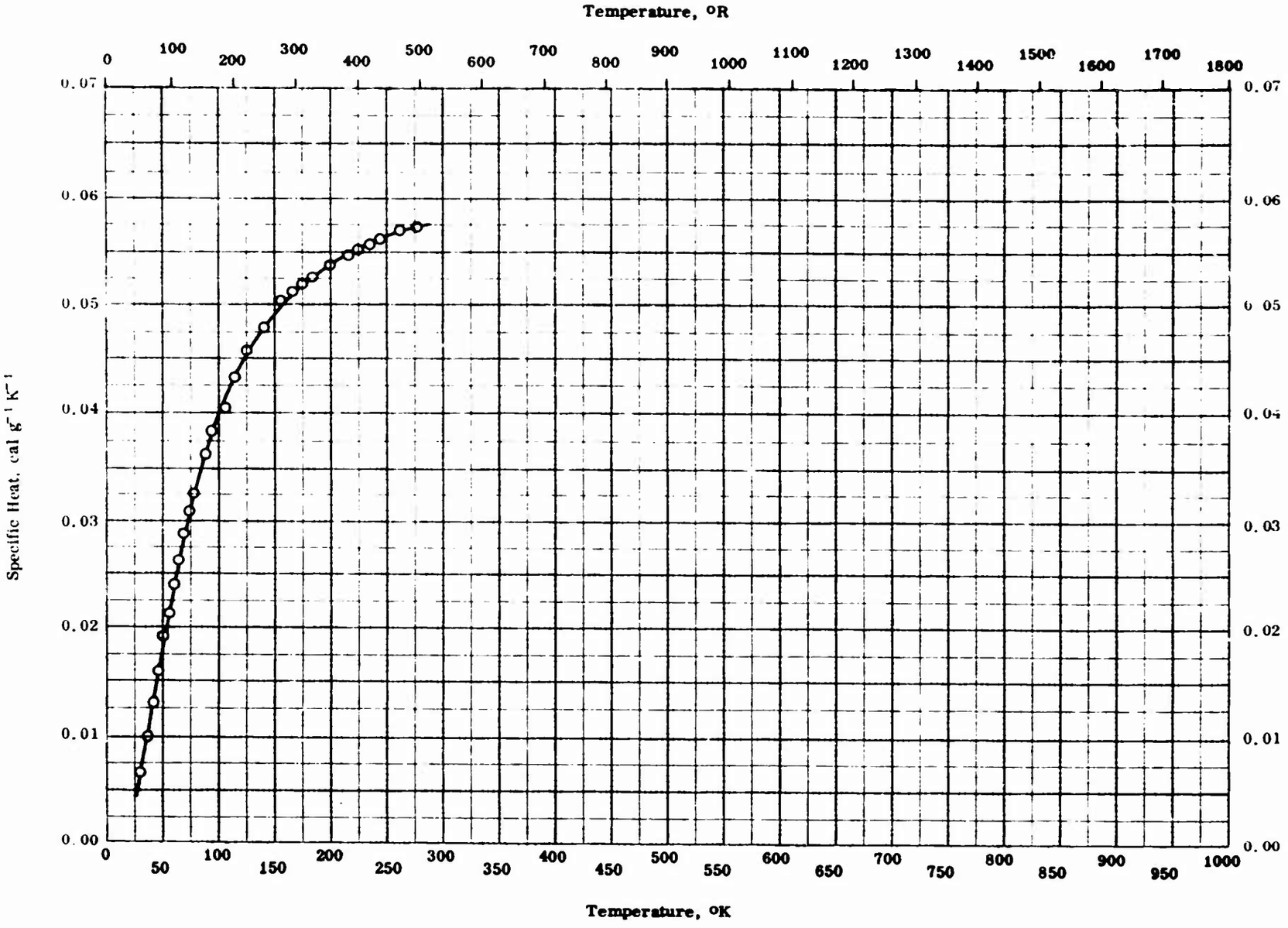


ELECTRICAL RESISTIVITY -- PALLADIUM

ELECTRICAL RESISTIVITY -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-31	293-743		Not given.	Vacuum annealed 2 hrs at 800 C and furnace cooled for 24 hrs; tests run in vacuum.
△	57-30	298-423		Purity not given; 0.1 mm dia. wire.	Relative values; computed resistivity based on 13 μ ohm cm at 25 C.
□	62-34	73-523		0.005 Rh, 0.0005 Fe, 0.0005 Au, 0.0002 Pt, 0.0001 Cu, and 0.0001 > Ag; density 12.02 g ml^{-1}; 6.1 cm in length and 0.636 cm dia.	



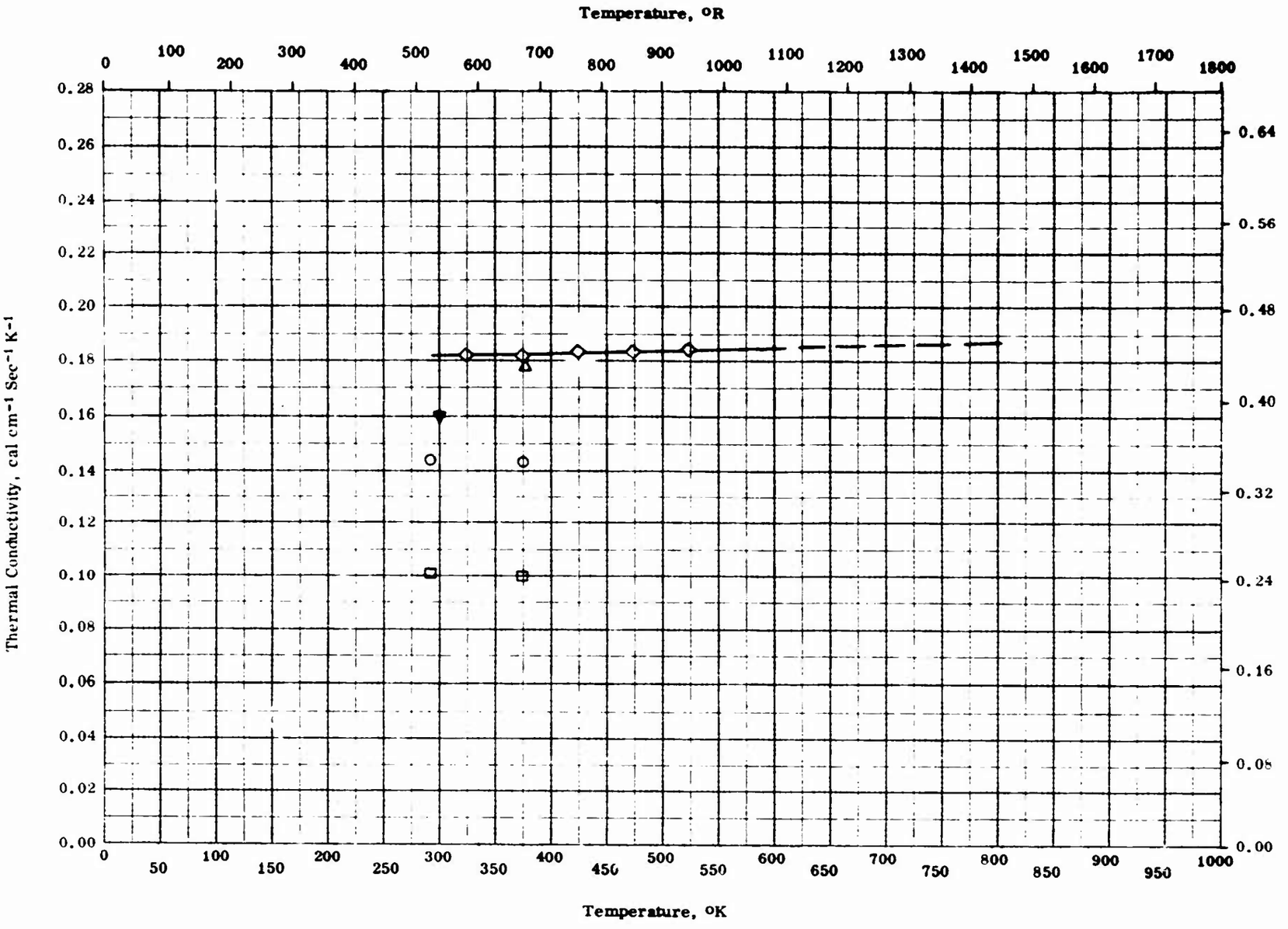
SPECIFIC HEAT -- PALLADIUM

SPECIFIC HEAT -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	63-20	30-277	0.05	High purity.	

TPRC

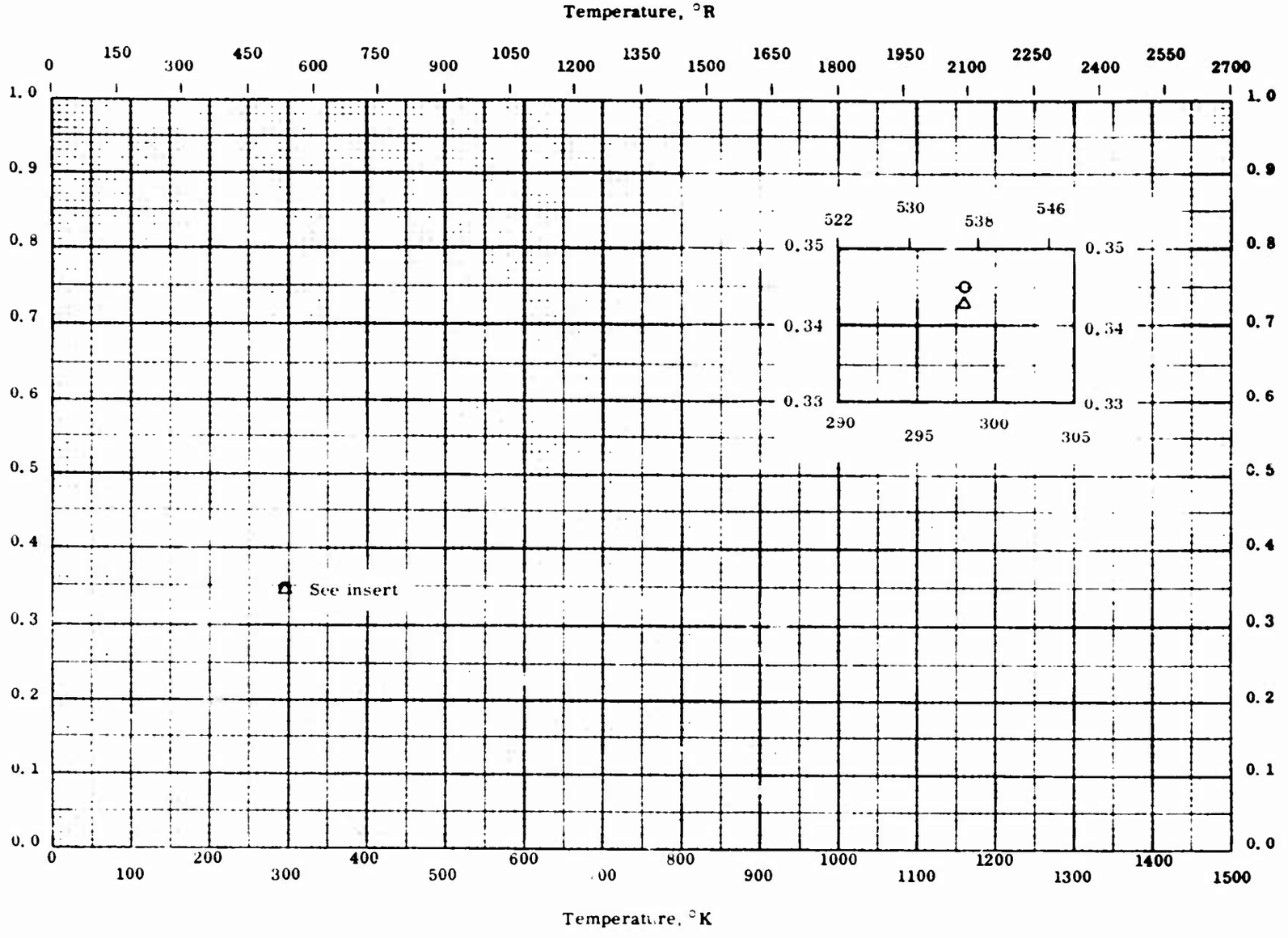


THERMAL CONDUCTIVITY -- PALLADIUM

THERMAL CONDUCTIVITY -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	25-2	290-373		Pure.	
□	25-2	290-373		Commercially pure.	
△	56-7	375		Pure.	
▽	25-1	298		Impurity < 0.03.	
◇	62-34	323-523		0.005 Rh, 0.0005 Fe, 0.0005 Au, 0.0002 Pt, 0.0001 Cu, and 0.0001 > Ag; 6.1 cm long and 0.636 cm dia rod with density 12.02 g ml^{-1}.	As received.



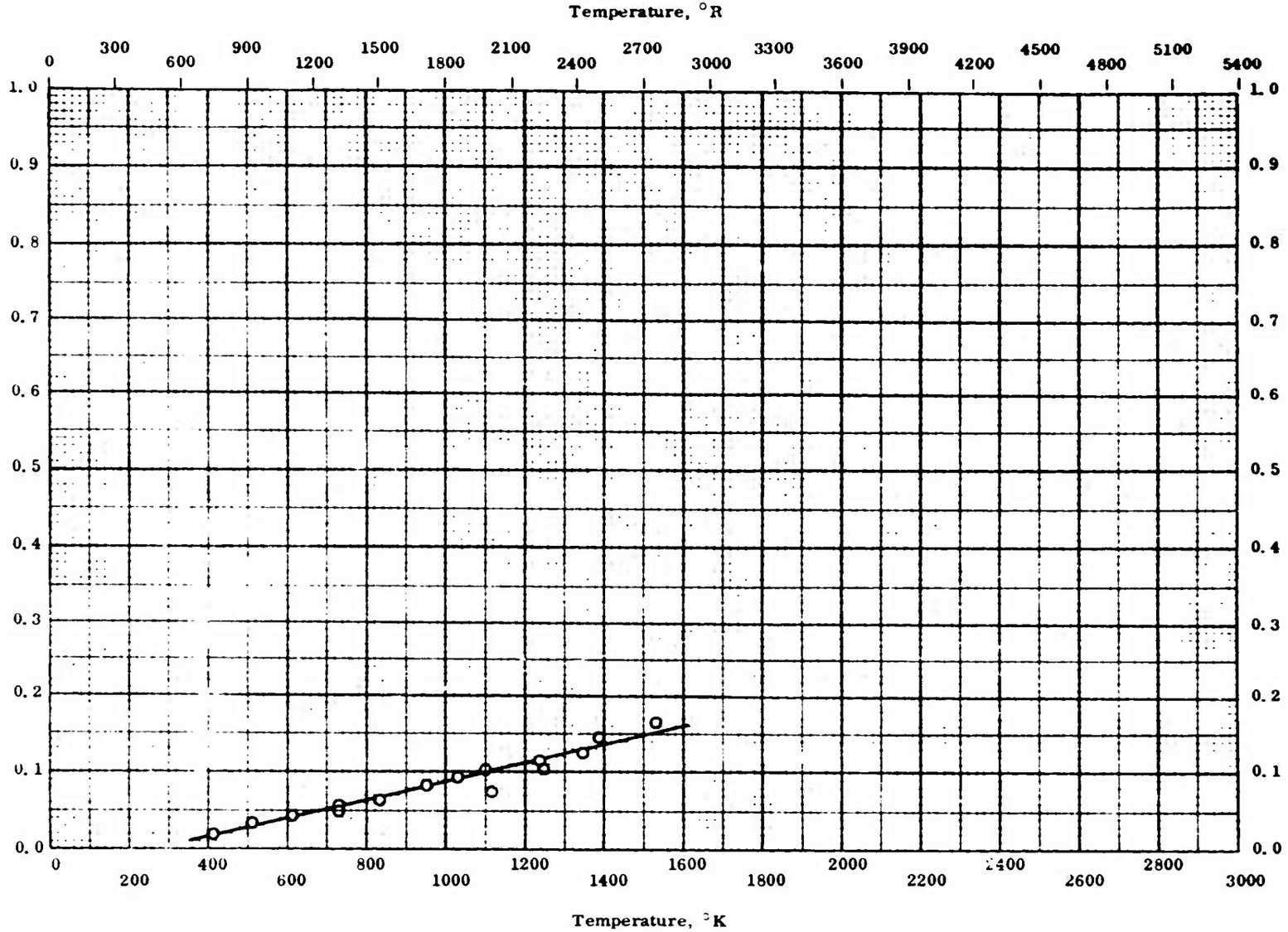
SOLAR ABSORPTANCE -- PALLADIUM

SOLAR ABSORPTANCE -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	57-41	298		Pure.	As received; above atmosphere.
○	57-41	298		Same as above.	Same as above; sea level.

TPRC

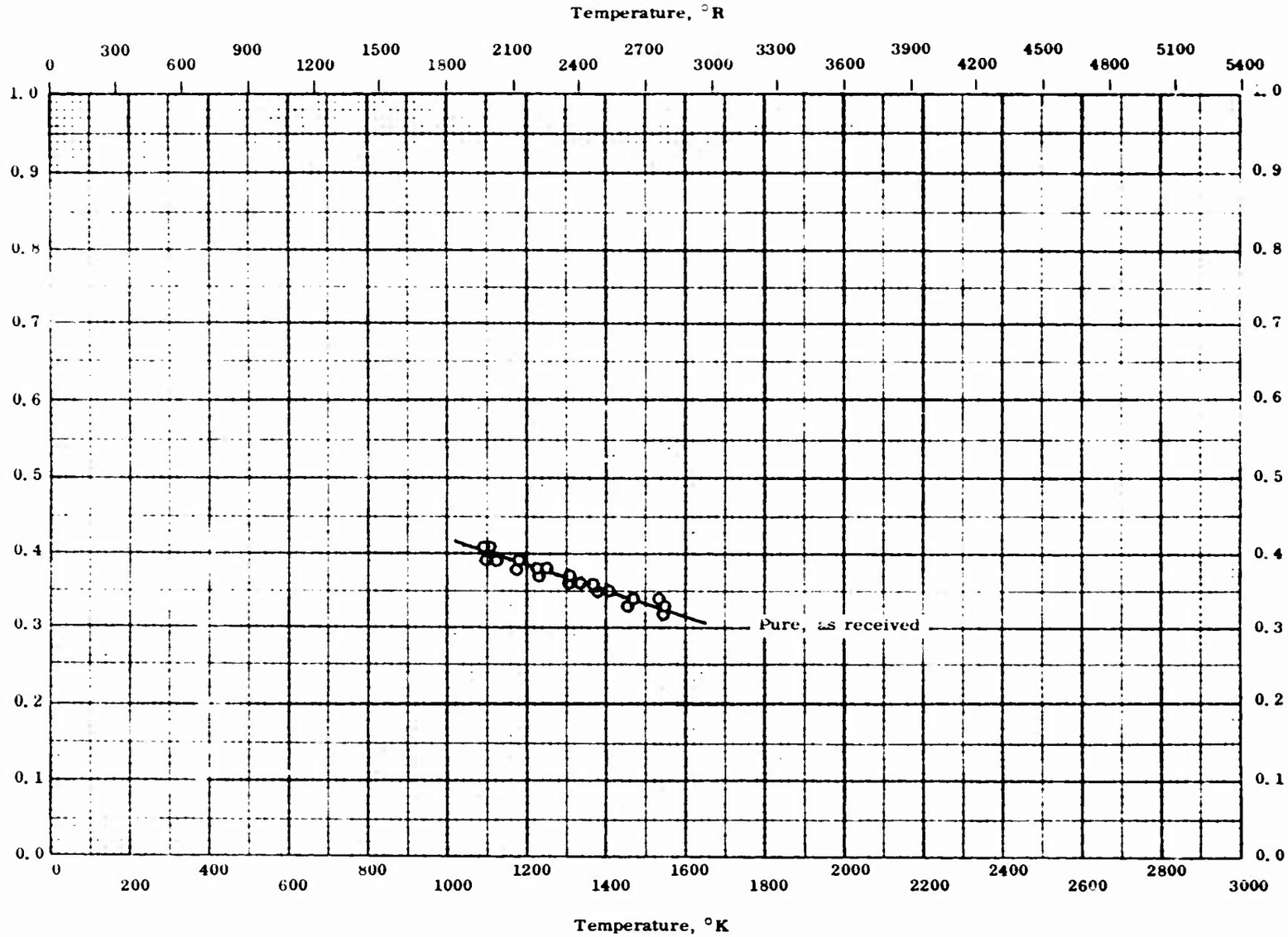


NORMAL TOTAL EMITTANCE -- PALLADIUM

NORMAL TOTAL EMITTANCE -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-41	416-1533	± 10	Pure.	Measured in vacuum (5×10^{-4} mm Hg); same data for as received, cleaned, polished, and oxidized.

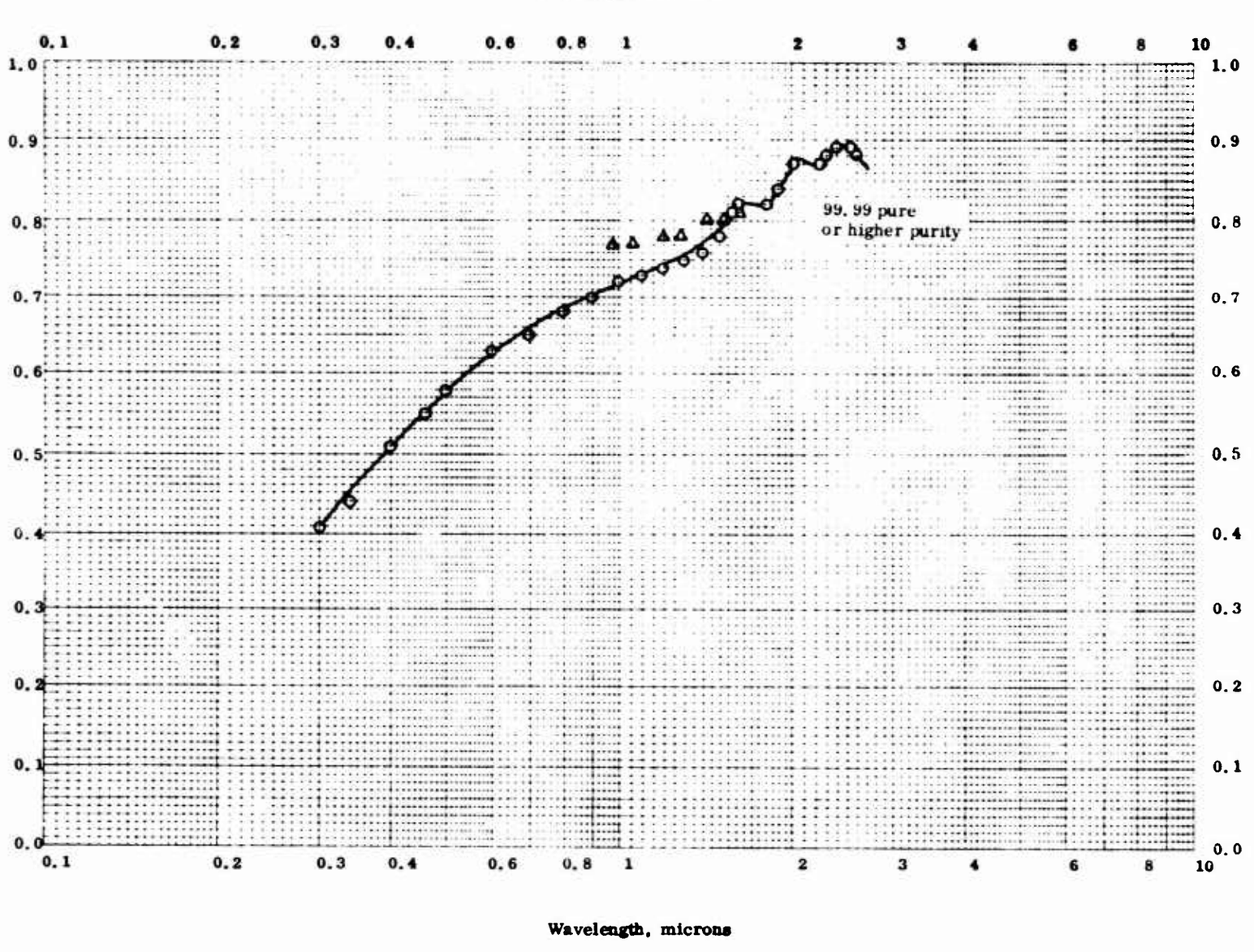


NORMAL SPECTRAL EMITTANCE -- PALLADIUM

NORMAL SPECTRAL EMITTANCE -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept Error%	Sample Specifications	Remarks
O	57-41	0.665	1094-1547		Pure.	As received; measured in vacuum.



NORMAL SPECTRAL REFLECTANCE -- PALLADIUM

NORMAL SPECTRAL REFLECTANCE -- PALLADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	57-41	298	0.3-2.6	±4	Pure.	As received; data taken from smooth curve; 6 - 9 degrees illumination, hemispherical viewing; $MgCo_3$ as reference standard.
△	62-53	298	0.98-1.64		99.99 pure.	Vacuum evaporated on cleaved silicon, 0.041 μ thickness; silver mirror as reference standard.

PROPERTIES OF PLATINUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	21.5	1340
Melting Point	2047	3684

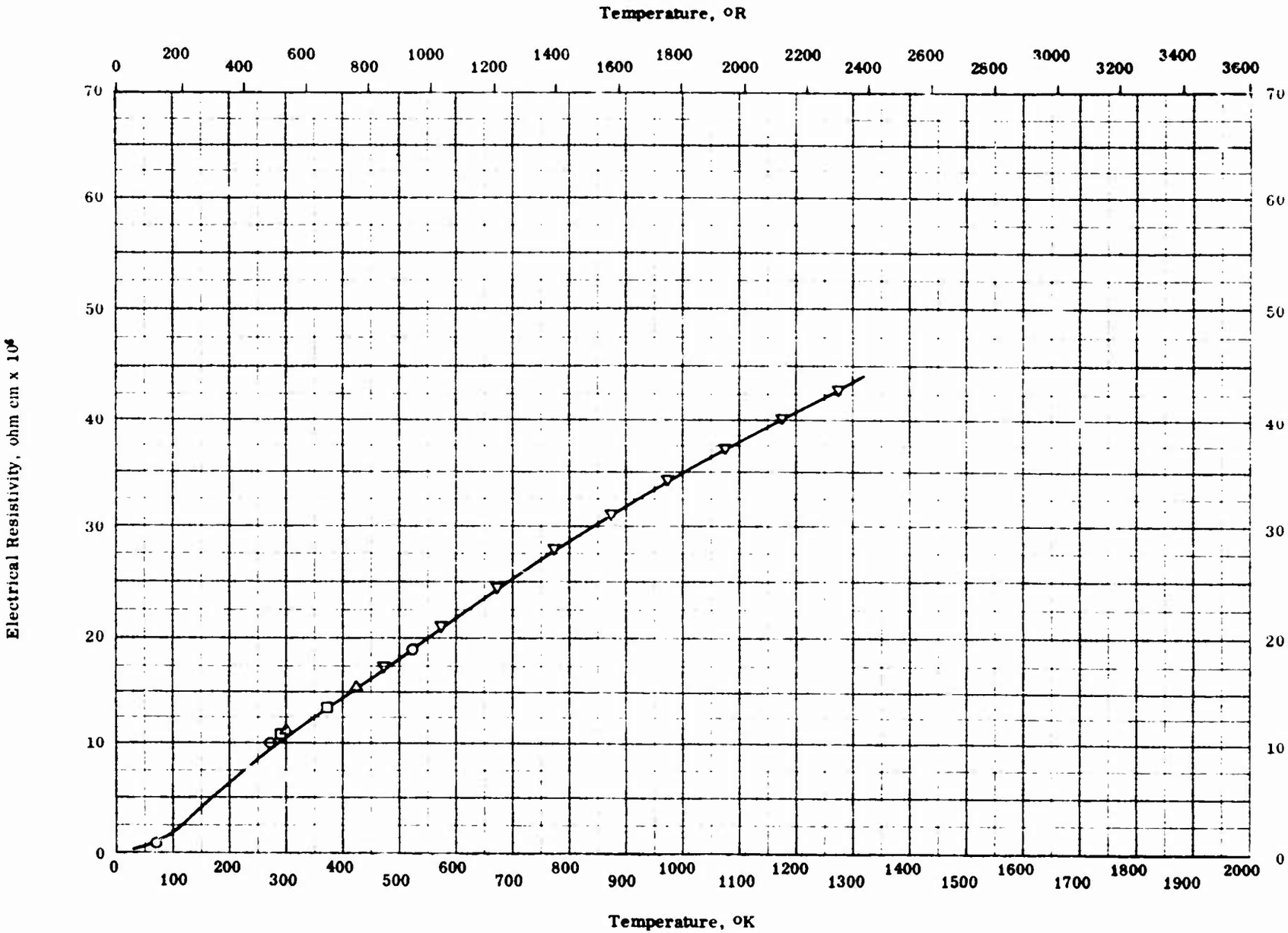
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	◁	21.5 ± 0.3	1340 ± 20
Melting Point		K	R
	○	2033 ± 2	3660 ± 4
	□	2039 ± 10	3670 ± 18
	△	2045 ± 1	3681 ± 2
	◇	2049	3689
	▽	2017 ± 14	3630 ± 25
	●	2046.7	3684
	■	2042	3676
	▲	2042	3676

PROPERTIES OF PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-29	2033		Thermocouple grade.	M. P. by loss of electric continuity in resistance heated wire under vacuum of 1-2 microns of Hg
□	53-31	2030-2050		99.995 pure.	M. P. by liquid forming in black body cavity of sample; mean value of 2 tests.
△	56-45	2043-2046		Not given.	
◇	45-3	2050	± 10	Not given; sample picked up about 0.5 SiO_2 and 0.3% MgO in furnace.	M. P.; corners of pyramid rounding.
▽	50-16 also 51-31	2003-2031		Not given.	M. P. by visual observation.
◁	58-23	298		Not given; microgram size sample.	Density; weight in air on microbalance, and volume in dibutylpthalate in 200 μ ID micropycnometer.
●	62-56	2047		Not given.	
■	62-57	2042		Not given.	
▲	61-47	2042		Not given.	



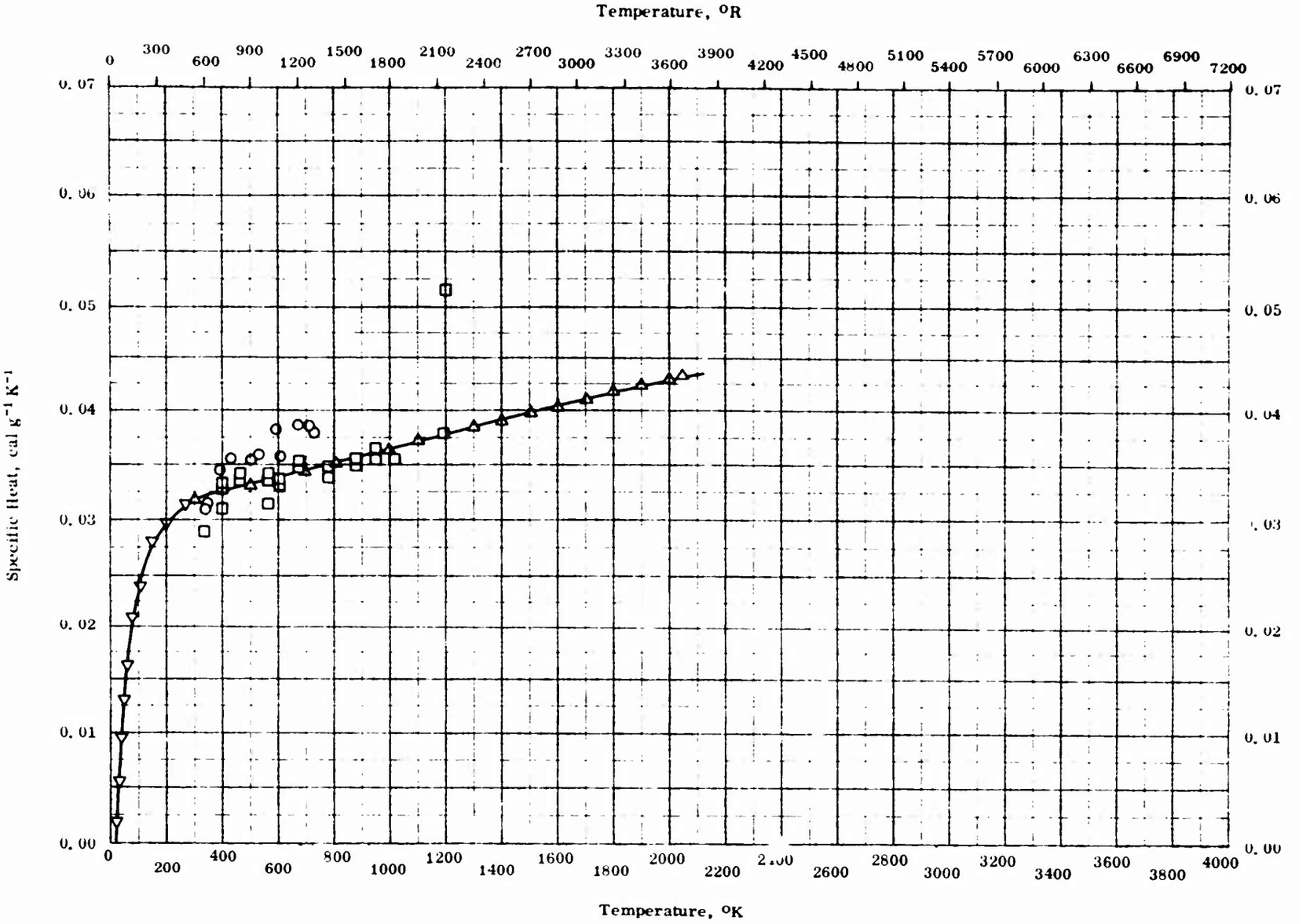
TPRC

ELECTRICAL RESISTIVITY -- PLATINUM

ELECTRICAL RESISTIVITY -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_r	Sample Specifications	Remarks
□	48-4	293-373		99.99+ pure.	Annealed 7 days at 1250 C.
△	57-30	298-423		Purity not given; 0.1 mm dia. wire.	Relative values; computed resistivity based on 11 μ ohm cm at 537 R.
○	62-34	73-523		0.0001 Cu, 0.0001 Fe, and 0.0001> Pd; density 21.51 g ml^{-1}; 6.1 cm in length and 0.635 cm dia.	Annealed at approx. 1000 C.
▽	63-12	273-1273		0.0001 ea. Fe and Si, and 0.0001> ea. Ca, Cu, Mg, Pd, and Ag; density 21.5 g ml^{-1}; 10.16 cm length and 1.269 cm dia.	Machined.



TPRC

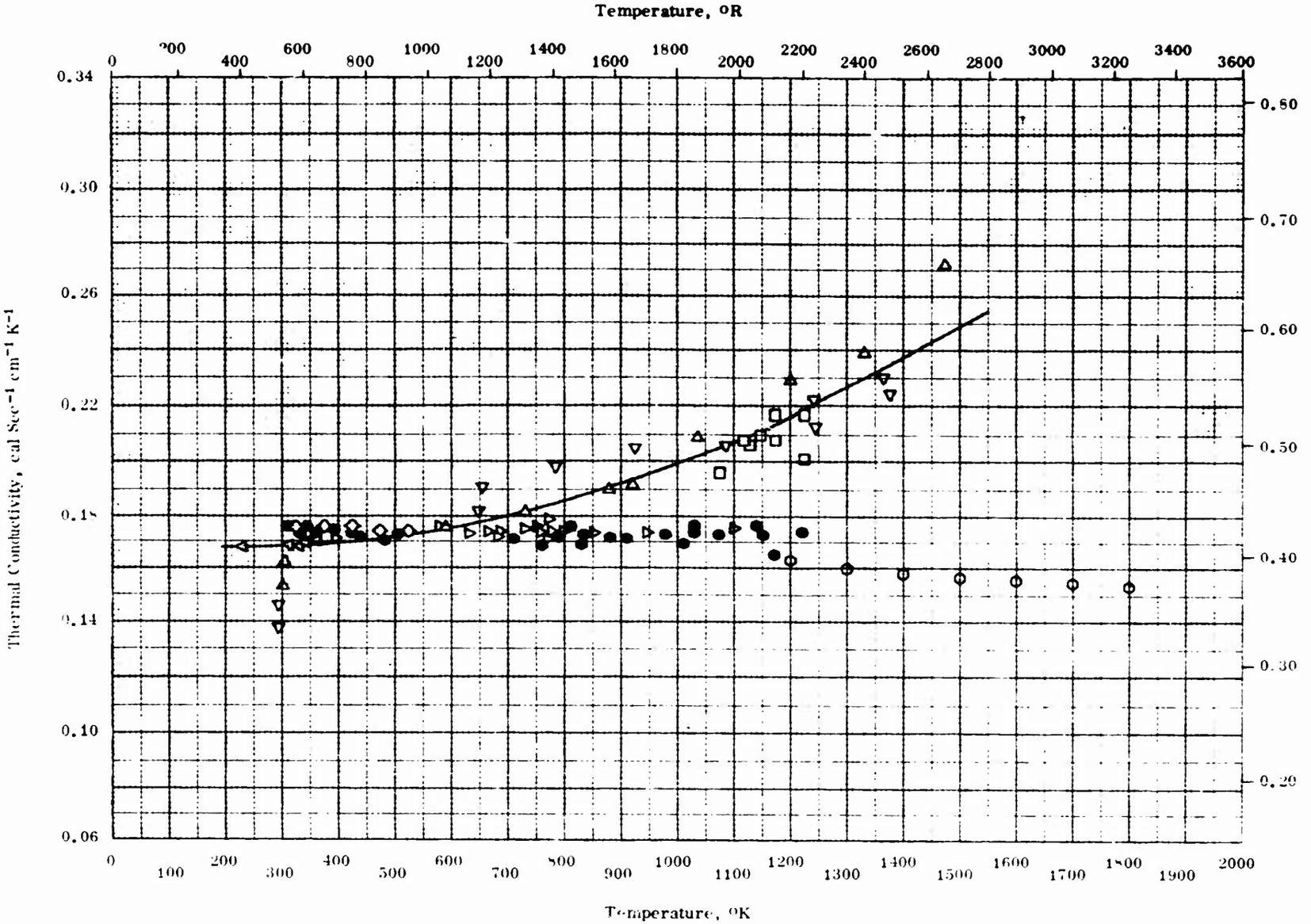
SPECIFIC HEAT -- PLATINUM

SPECIFIC HEAT -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-17	338-727		Thermocouple grade.	
□	58-16	337-1194		Not given.	Specimen's surface plated with platinum black.
△	62-16	298-2043		99.99 Pt.	Argon atmosphere.
▽	57-61	10-273		99.94 Pt, 0.03 Rh, 0.01 Pd, traces of Ag, Ca, Cu, Fe and Mg.	

TPRC



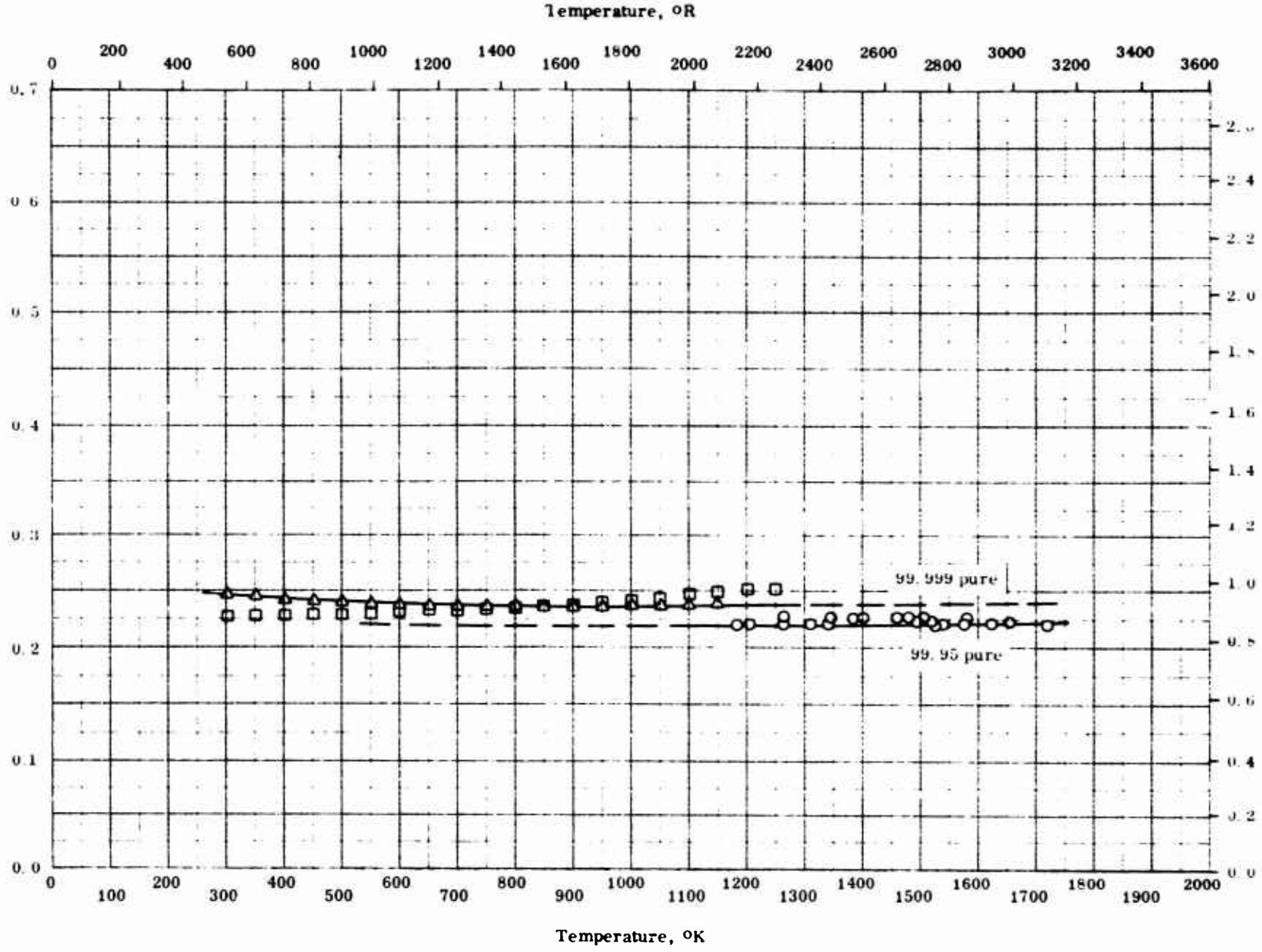
THERMAL CONDUCTIVITY -- PLATINUM

TPRC

THERMAL CONDUCTIVITY -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-4	1200-1800		Spectroscopic pure wire.	
□	61-7	1073-1223		99.9 chemically pure 1 mm dia wire	Polished and annealed for 12 hrs at 1000 C.
△	61-8	301-1473		99.9 pure; electrical resistivity 10.6×10^{-6} ohm cm at 23 C.	
▽	61-8	292-1376		Same as above.	
◇	62-14	323-523		0.0001 Cu, 0.0001 Fe, and 0.0001 > Pd; density 21.51 g cm^{-3}.	Annealed at approx 1000 C.
●	63-12	315-1220		0.0001 Cu, 0.0001 Fe, and 0.0001 > Pd; density 21.5 g cm^{-3}. [Author's design.: 1]	Machined.
▷	63-12	357-1140		0.0001 Si, 0.0001 > Ag, 0.0001 > Ca, 0.0001 > Cu, 0.0001 Fe, 0.0001 > Mg, and 0.0001 > Pd; density 21.5 g cm^{-3}. [Author's design.: 2]	
◁	64-8	298-358		≈ 0.0030 Ir, 0.0021 - 0.0023 Cu, 0.0021 - 0.0023 Rh, 0.0015 - 0.0017 Al, 0.0015 - 0.0017 Pd, 0.0011 Au, 0.007 - 0.0009 Mg, 0.0007 - 0.0009 Ag, and 0.0004 - 0.0005 Fe; density 21.32 g cm^{-3} at 20 C.	Cast, cold-pressed to 20% volume reduction, and then machined; total of four runs.



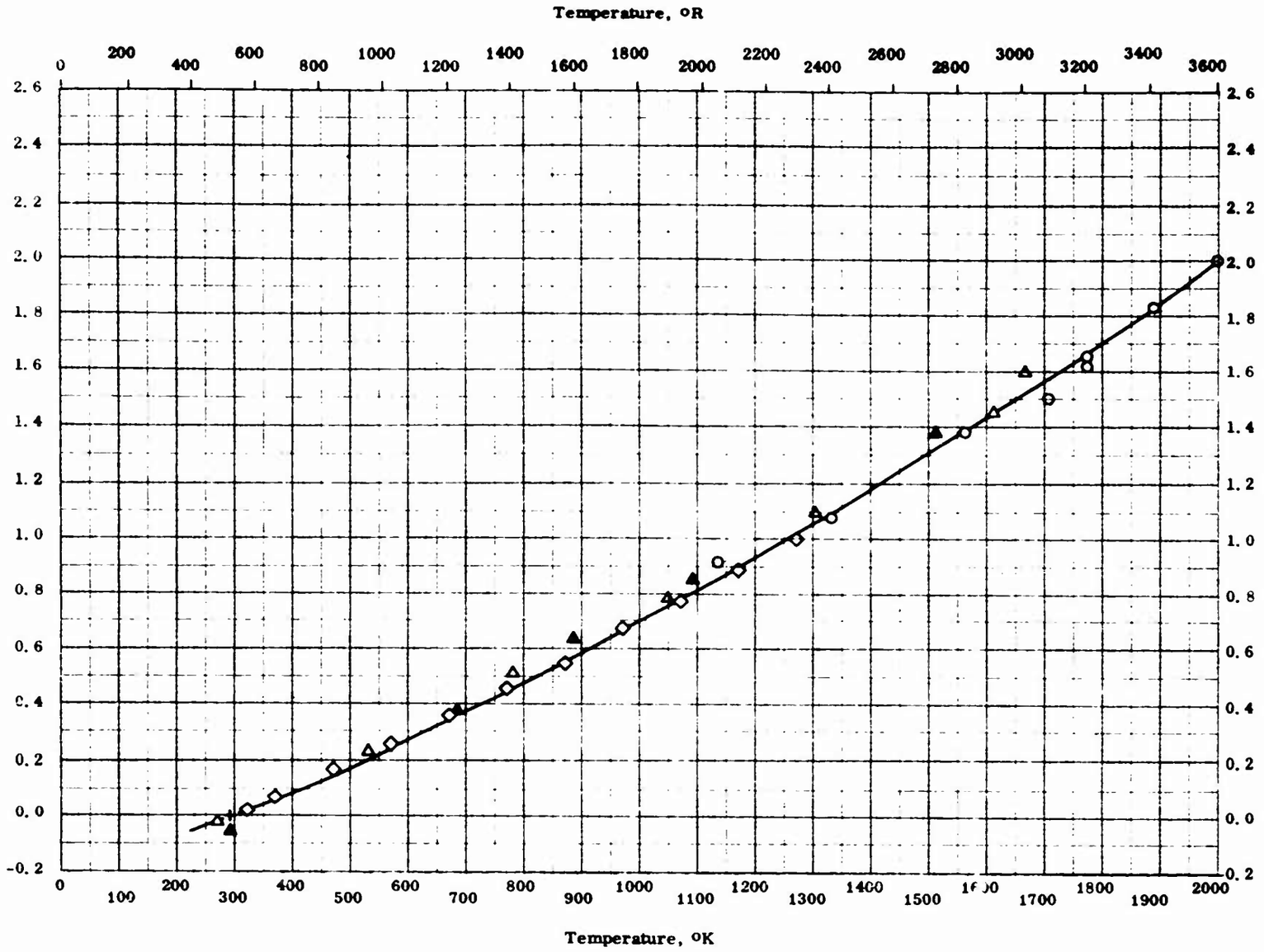
THERMAL DIFFUSIVITY -- PLATINUM

THERMAL DIFFUSIVITY -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	65-1	1183-1720		99.95 pure; from Johnson-Matthey Co.; average grain size 1000 μm after testing; sample 1 mm thick sheet.	
Δ	64-6	300-1150		99.999 pure from J. Bishop and Co.; electrical resistivity ratio $R_{273k} / R_{4k} = 900$.	
□	64-6	300-1250		99.9 pure from J. Bishop and Co.; electrical resistivity ratio $R_{273k} / R_{4k} = 12$.	

TPRC

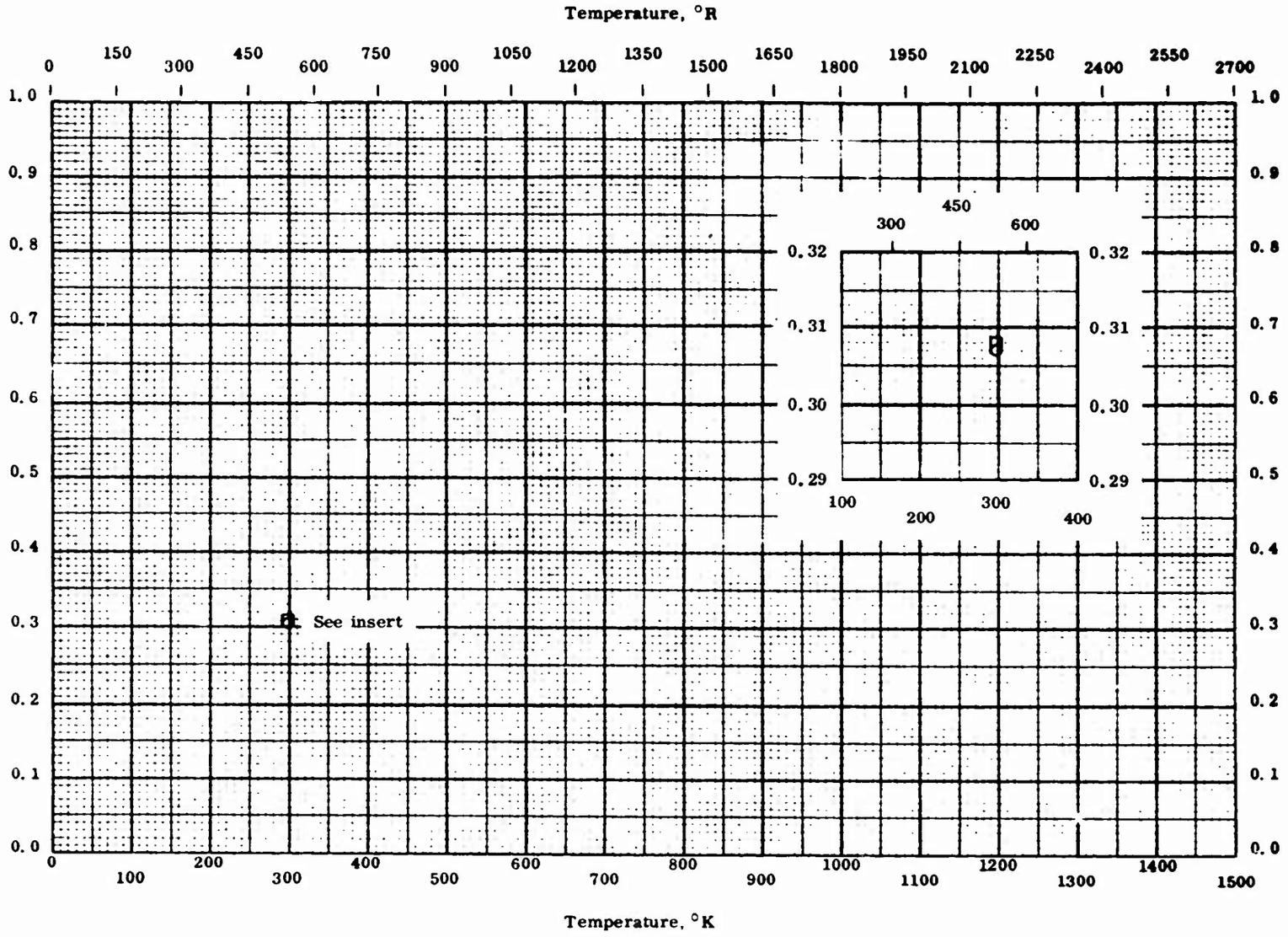


THERMAL LINEAR EXPANSION -- PLATINUM

THERMAL LINEAR EXPANSION -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-41	291-2005	±2	99.95 pure.	
△	57-65	273-1663		< 0.01 impurities.	X-ray diffraction method; heating.
▲	57-65	294-1663		Same as above.	The above specimen, cooling.
◇	41-8	273-1273		Spectroscopically pure.	Annealed at 1000 C.



TPRC

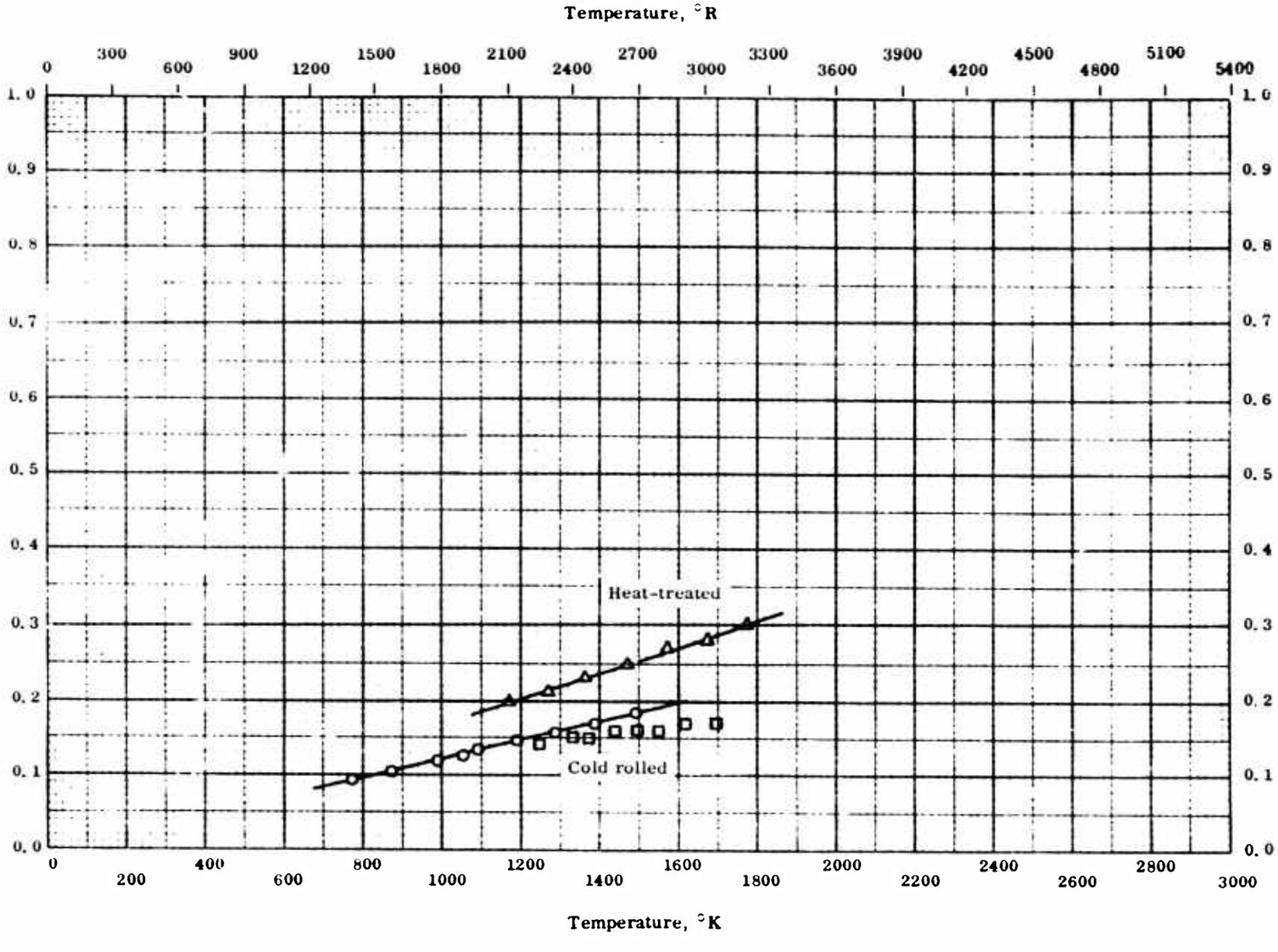
SOLAR ABSORPTANCE -- PLATINUM

SOLAR ABSORPTANCE -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-41	298		Pure.	As received; above atmosphere.
□	57-41	298		Same as above.	Same as above; sea level.

TPRC



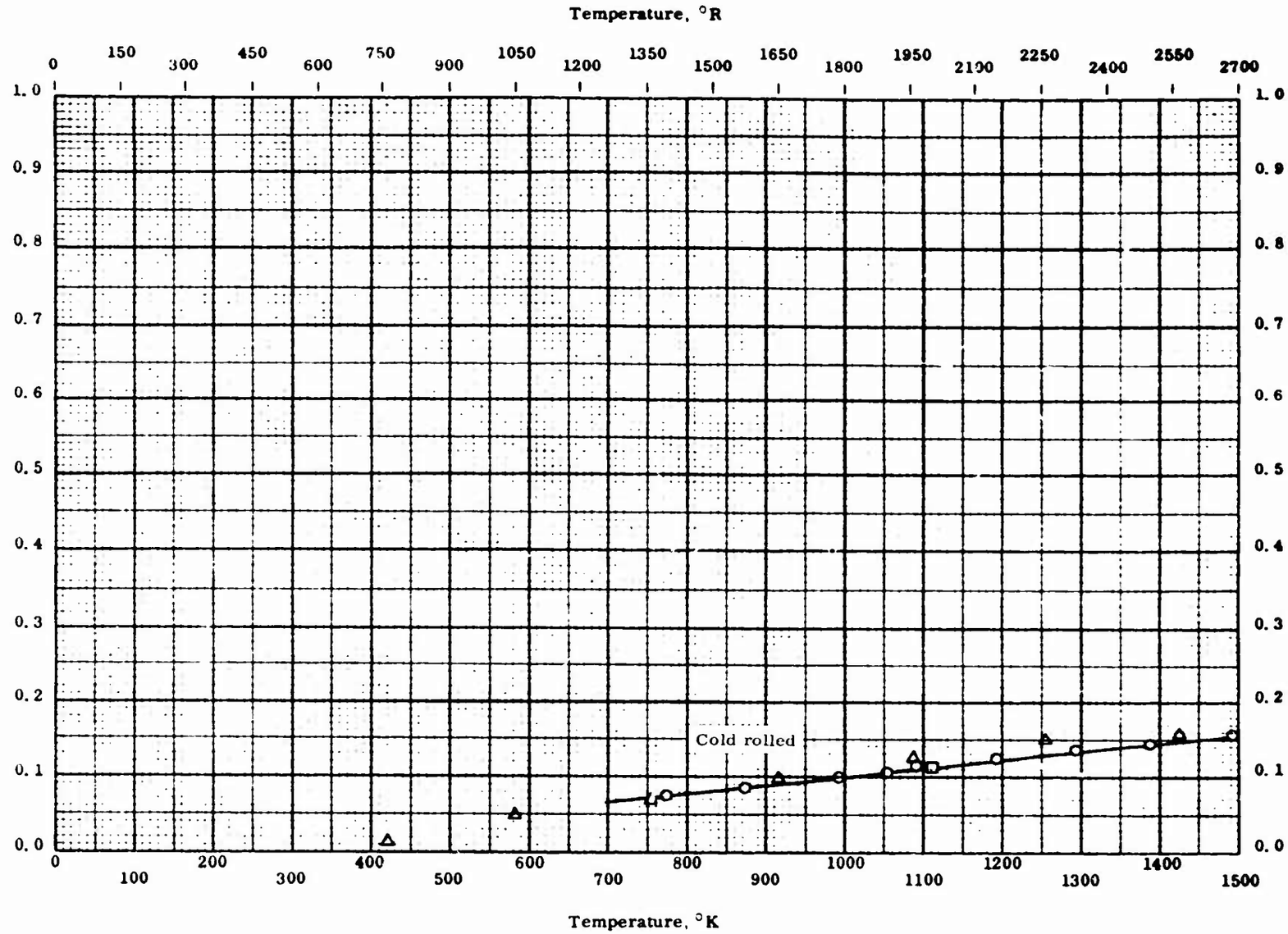
TPRC

HEMISPHERICAL TOTAL EMITTANCE -- PLATINUM

HEMISPHERICAL TOTAL EMITTANCE -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-42	774-1493	± 5	99.95 pure, and traces of Au, Pd, Rh, Ag.	Cold-rolled; measured in vacuum (10^{-4} mm Hg).
△	61-44	1173-1773	± 2.5	Not given.	Flashed in vacuum at 2023 K; measured in vacuum (~ 5×10^{-6} mm Hg).
□	54-4	1100-1700		Spectroscopically pure.	Not given.

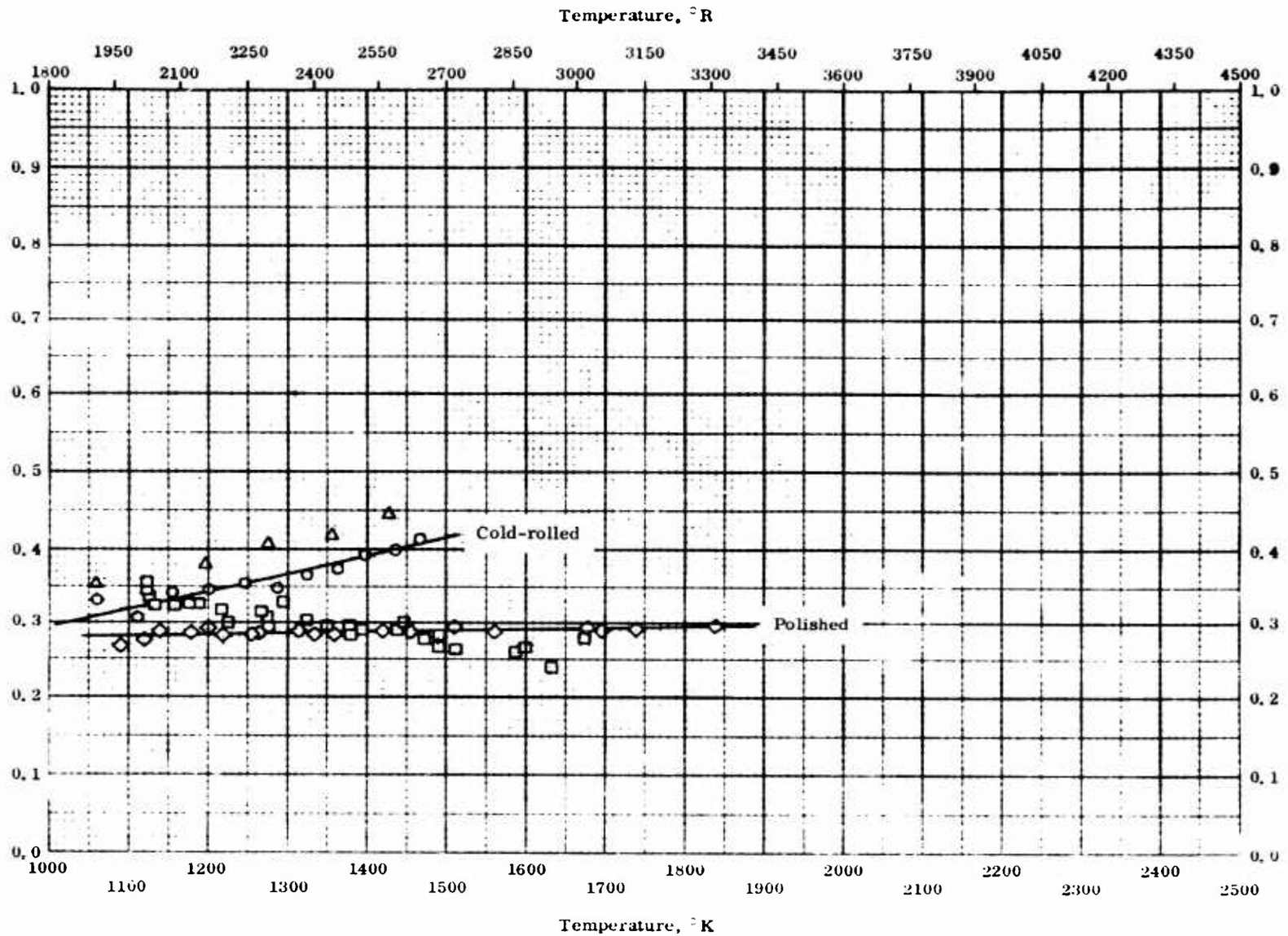


NORMAL TOTAL EMITTANCE -- PLATINUM

NORMAL TOTAL EMITTANCE -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-42	774-1493	± 5	99.5 pure and traces of Au, Pd, Rh, Ag.	Cold-rolled; measured in vacuum (10^{-4} mm Hg).
□	63-28	1111		Not given.	Polished with aluminum oxide, cleaned with water, and heated in air at 672 K for 3 hrs, in vacuum at 1089 K for 3 hrs, and T > 1217 K for 1 hr; data calculated from spectral data and corrected to 1111 K.
Δ	57-11	422-1422	± 10	Pure.	Measured in vacuum (5×10^{-4} mm Hg); same data for as received, cleaned or polished specimen.



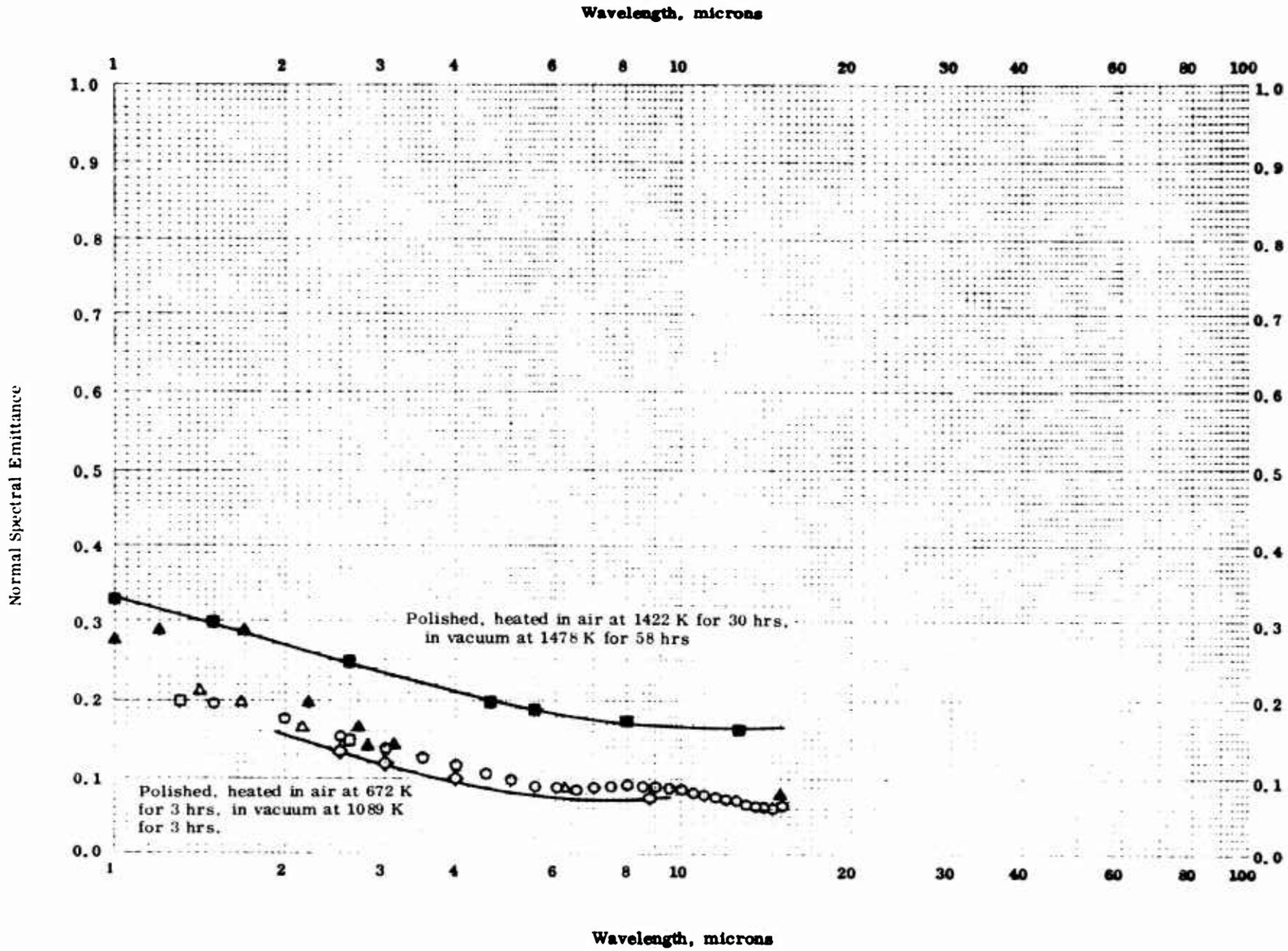
TPRC

NORMAL SPECTRAL EMITTANCE -- PLATINUM

NORMAL SPECTRAL EMITTANCE -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	61-42	0.65	1061-1467	± 5	99.95 pure and traces of Pd, Rh, Ag and Au.	Cold-rolled; measured in vacuum (10^{-4} mm Hg); increasing temperature.
△	61-42	0.65	1429-1058	± 5	Same as above.	Same as above; decreasing temperature.
□	57-41	0.665	1122-1672		Pure.	As received; measured in vacuum.
◇	39-2	0.66	1190-1840		Not given.	Polished with rouge.



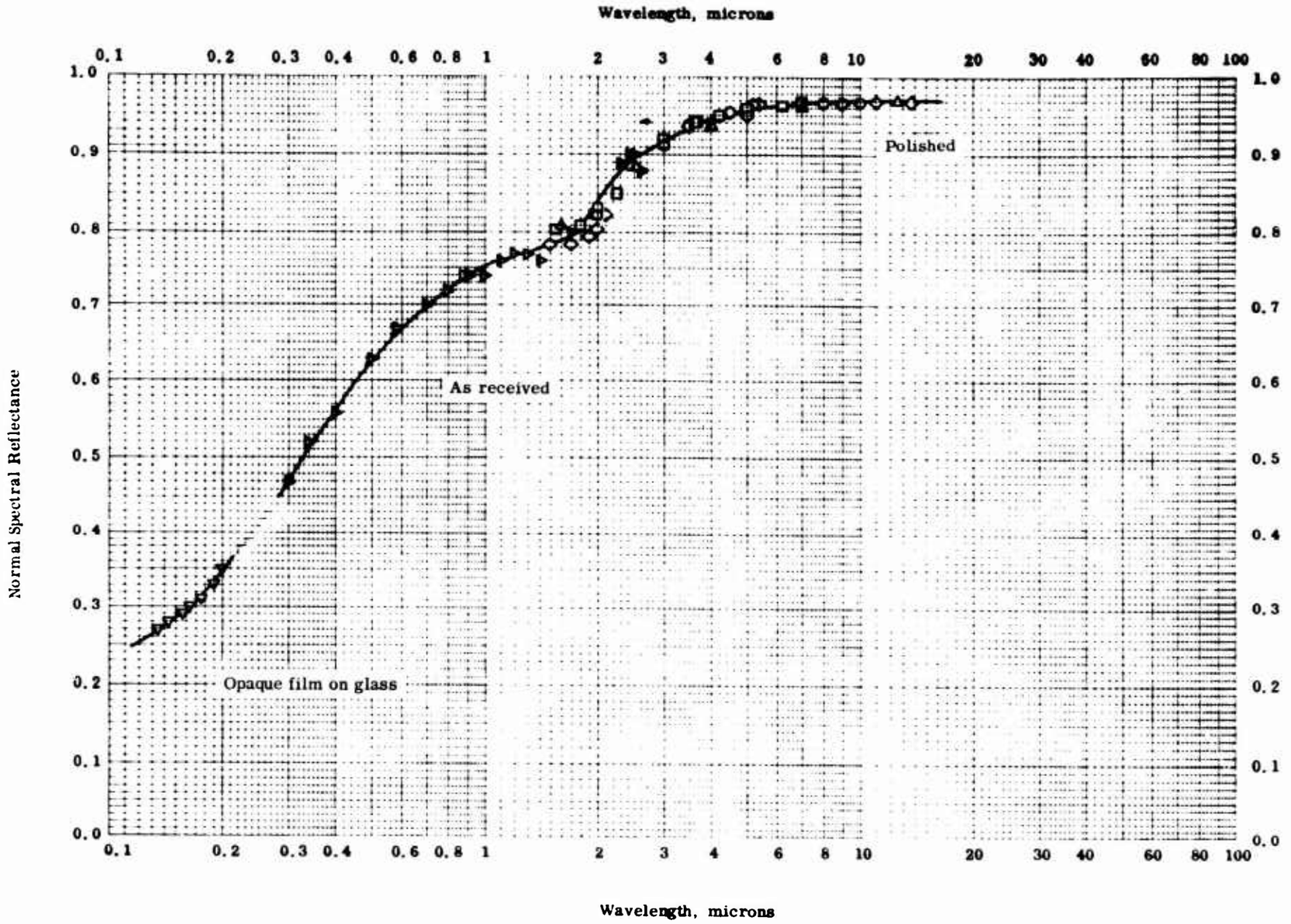
NORMAL SPECTRAL EMITTANCE -- PLATINUM

NORMAL SPECTRAL EMITTANCE -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	60-49	1400	1.5-15	5	Not given.	Annealed at 1525 K; surface become crystalline after annealing.
△	63-28	1089	1.42-6.20		Same as above.	Heated in air at 1523 K for 1 hr followed by a cooling period (12 hrs) and then heated in argon at T > 1089 K for 1 hr.
□	63-28	1328	1.30-12.50		Same as above.	Same as above; heated at T > 1278 K for 1 hr; surface roughness (after measurement) 0.15μ and lateral 20μ.
◇	63-28	1217	2.5-8.8		Same as above.	Polished with aluminum oxide, cleaned with water and heated in air at 672 K for 3 hrs in vacuum at 1089 K for 3 hrs, and at T > 1217 K for 1 hr.
■	63-28	1444	1.0-12.6		Same as above.	Same as above; heated in air at 1422 K for 30 hrs and in vacuum at 1478 K for 58 hrs.
▲	62-52	1273	1-15	< 8.9	Foil.	As received.

TPRC



NORMAL SPECTRAL REFLECTANCE -- PLATINUM

NORMAL SPECTRAL REFLECTANCE -- PLATINUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	63-28	294	1.6-12.5		Not given; surface roughness [illegible] μ and lateral 10 μ.	Polished with aluminum oxide and cleaned with water; hemispherical illumination, 7 degree viewing.
△	63-28	294	1.6-12.5		Same as above.	Same as above, heated in air at 672 K for 3 hrs.
□	63-28	294	1.5-12.6		Same as above.	Same as above; heated in vacuum at T > 1217 K for 1 hr, in argon at T > 1111 K for 48 hrs, in argon at T > 1222 K for 4 hrs, and in air at 1422 K for 30 hrs.
◇	63-28	294	1.5-13.6		Same as above.	Heated in air at 1523 K for 1 h, followed by a cooling period of 12 hrs; roughness 0.12 μ, lateral 10 μ; measured in vacuum; hemispherical illumination, 7 degree viewing.
▽	41-3	298	0.13-0.20		Opaque film on glass.	Deposited by cathodic sputtering; measured in vacuum (0.001 mm Hg).
▷	57-41	298	0.3-2.6	± 4	Pure.	As received; data taken from smooth curve; 6 - 9 degree illumination, hemispherical viewing; $MgCO_3$ as reference standard.

TPRC

PROPERTIES OF PLUTONIUM

MOST PROBABLE VALUES

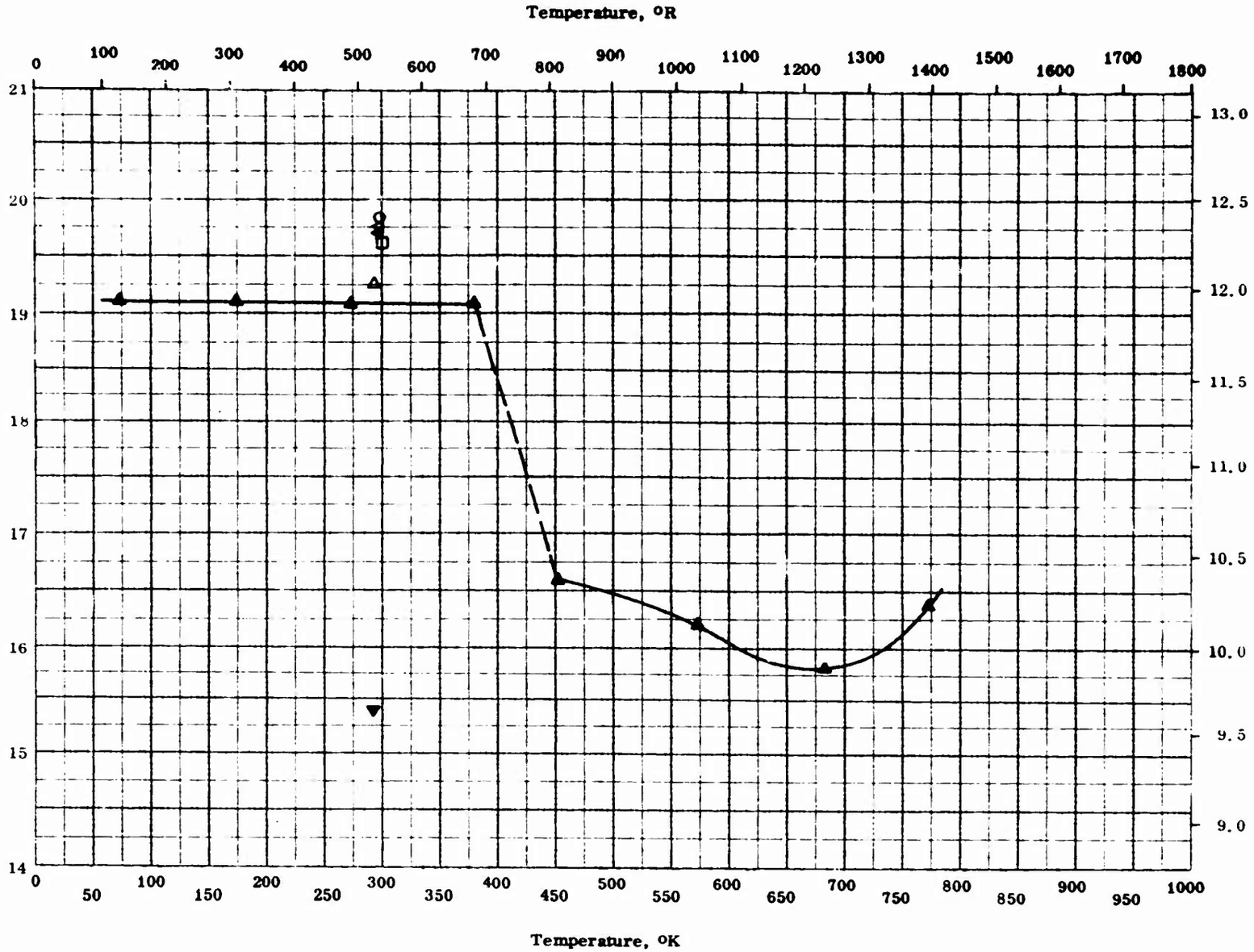
Property	C.G.S. Units	Brit. Eng. Units
Melting Point.	910	1640
Heat of Vaporization . . .	332	598

REPORTED VALUES

	Figure		
Density			
Melting Point		K	F
	▽	913	1644
	▷	903	1626
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	●	342 ± 12	616 ± 20
	■	332	598

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▽	55-47	913		Pure.	M. P. from breaking in time-temperature curve.
▷	55-29	903		99.95 - 99.97 pure; α - phase	
●	49-7	1300-1650		Not given.	
■	49-7	298		Not given.	

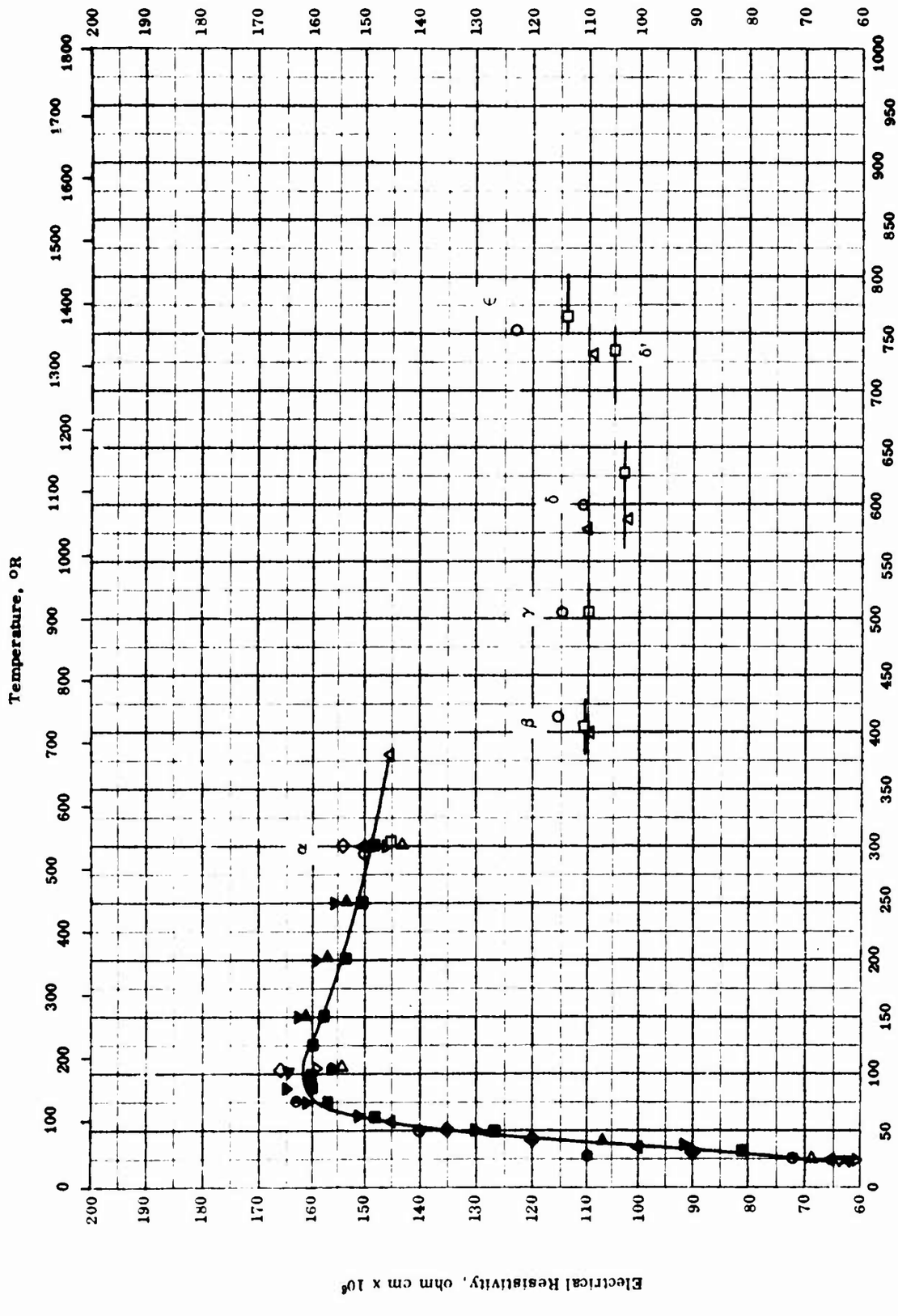


DENSITY -- PLUTONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-52	298		α- Pu.	Computed from X-ray.
□	52-18	300		0.068 Fe, 0.027 C, 0.005 Ni, 0.003 Al 0.003 Cr, 0.002 > V, 0.002 > Bi, and 0.0064 > all others ; α-phase.	Cast; heated to 325 C and cooled to room temperature under 50,000 psi.
◀	57-45	298		Not given.	
△	54-17	293		α- Pu.	Found by measuring water displacement.
◁	55-29	298		99.95-99.97 pure; α- phase.	Weight on fiber torsion microbalance and volume in dibutyl phthalate in micropycnometer with ID about 200 μ.
▼	58-23	298			
▲	49-7	73-773		Not given.	

THRC



ELECTRICAL RESISTIVITY -- PLUTONIUM

REFERENCE INFORMATION

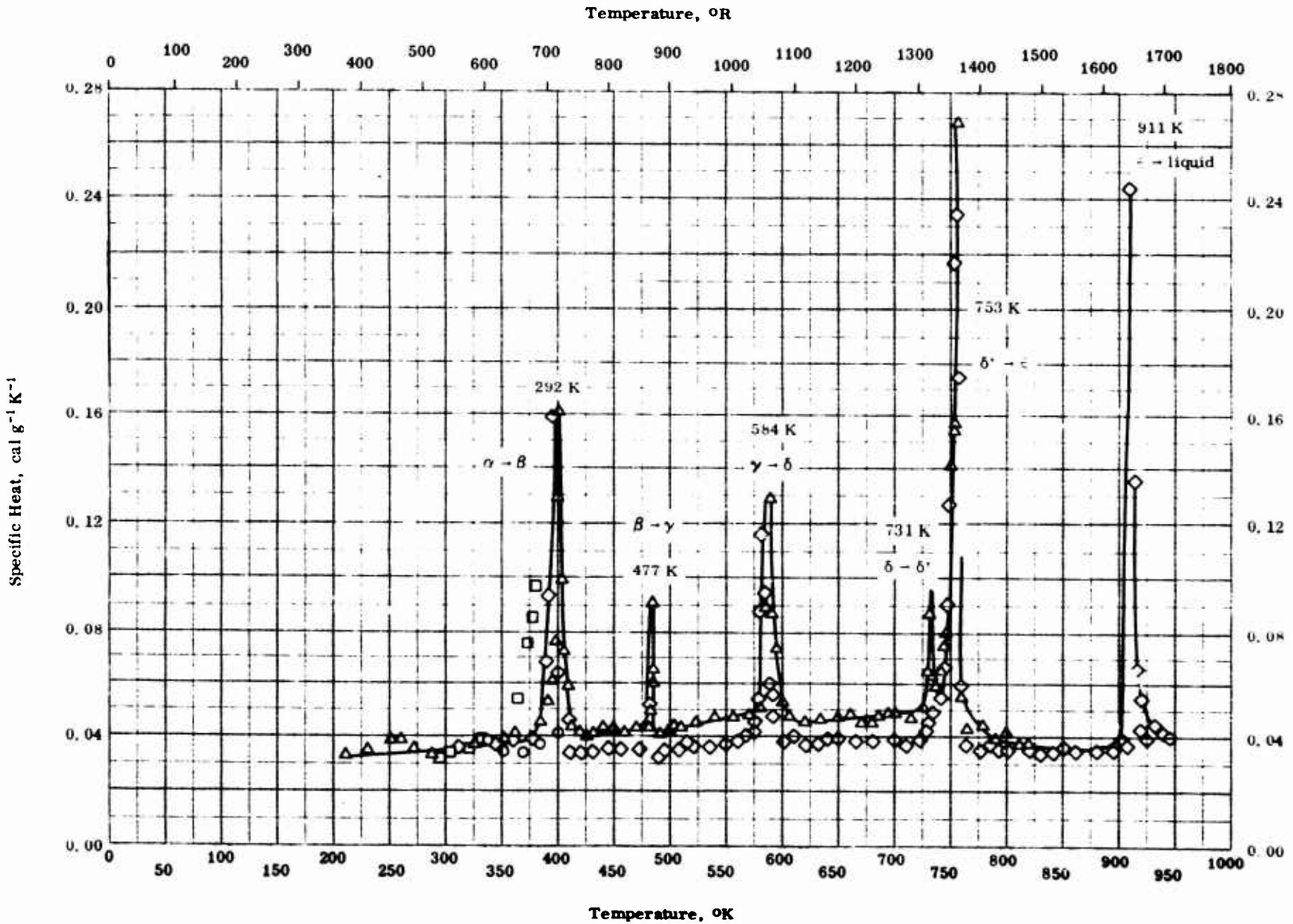
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-17	293-353		α-phase; purity not given.	Mean values for several specimens; variation between specimen ± 3 μ ohm-cm; values for β-, γ-, δ-, and ∈- corrected for volume changes on the basis of isotropic expansions from the α-phase.
		413-418		β-phase.	
		503		γ-phase.	
		598-748		δ-phase.	
		753		∈-phase.	
□	55-29	301-763		99.97 pure and 99.95 pure samples from an earlier material of 99.87 pure.	Average of 2 samples.
△	49-7	298-733		Pure.	
▽	62-38	25-300		Los Alamos high-purity Pu; 0.0070 O_2, 0.0040 C, 0.0025 Si, 0.0010 Al, 0.0010 Fe, and 0.0010> Na, Mg, Ca, La, Pb, Cu, Ni, Cr, Mn, Sn, Bi, Co, and Zn; α-phase with density 19.55 g cm^{-3} before test and 19.52 g cm^{-3} after test.	As cast.
◇	62-38	25-300		0.0210 C, 0.0175 O_2, 0.0300 ± 0.0020 Th, 0.0040 Fe, 0.0020 Si, 0.0020 Al, 0.0020 Mg, 0.0020> Ni, 0.0020> Co, and 0.0010> other impurities; α-phase with density 19.47 g cm^{-3} before measurement and 19.48 g cm^{-3} after measurement.	As cast.
◀	62-38	25-300		0.0050 O_2, 0.0030 C, 0.0040 Al, 0.0030 U, 0.0026 W, 0.0035> Ta, 0.0020 Fe, and 0.0010> all other impurities; α-phase with density 19.50 g cm^{-3} before test.	As cast and electro-refined.
▷	62-38	25-300		0.0105 C, 0.0070 O_2, 0.0060 Ni, 0.0050 Fe, 0.0065 Si, 0.0020 Cr, 0.0020 Mg, 0.0020 Al, and 0.0010> Cu and Na; α-phase with density 19.55 g cm^{-3}.	As cast.

(Continued onto next page)

ELECTRICAL RESISTIVITY -- PLUTONIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
●	62-38	25-300		0.05 > O_2, 0.0035 C, 0.0035 Al, 0.0050 Si, 0.0030 Cr, 0.0025 Fe, 0.0020 > Ni, and 0.0010 others; α-phase with density 19.61 g cm^{-3} before test and 19.60 g cm^{-3} after test.	As cast.
△	62-38	25-300		0.0280 ± 0.0005 Th, 0.0185 ± 0.0010 O_2, 0.0050 Fe, 0.0050 Ni, 0.0075 C, 0.0040 Ca, 0.0025 Al, 0.0020 Si, 0.0020 Mg, 0.0020 > Cr, and 0.0010 > others; α-phase with density 19.56 g cm^{-3} before test.	As cast.
■	62-38	25-300		Los Alamos high-purity Pu.	Hydrostatic compressed (15 x 10^4 psi); data taken immediately after quenching from 300 K to 20 K.
▲	62-38	25-300		Same as above.	Hydrostatic compressed (15 x 10^4 psi); data taken after quenching from 300 K to 20 K and holding at 20 K for 1 week.
▼	62-38	25-300		Same as above.	Hydrostatic compressed (15 x 10^4 psi); data taken immediately after quenching from 300 K to 20 K.
◆	62-38	25-300		Same as above.	Hydrostatic compressed (15 x 10^4 psi); data taken after quenching from 300 K to 20 K and holding at 20 K for 1 week.
▶	62-38	25-300		Same as above.	As cast and electro-refined; data taken immediately after quenching from 300 K to 20 K.
◑	62-38	25-300		Same as above.	As cast and electro-refined; data taken after quenching from 300 K to 20 K and holding at 20 K for 1 week.



SPECIFIC HEAT -- PLUTONIUM

TPRC

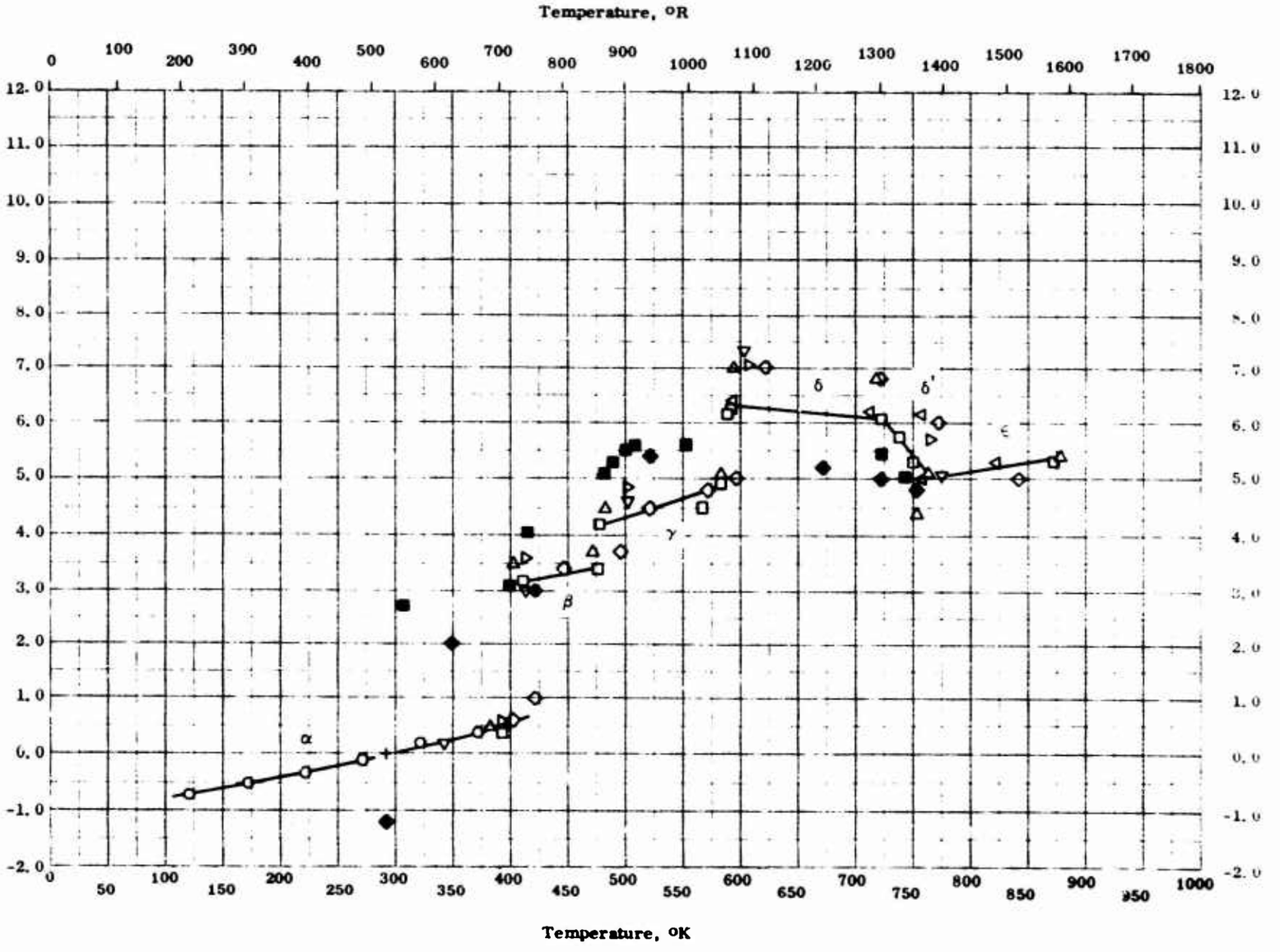
Specific Heat, Btu lb⁻¹ R⁻¹

SPECIFIC HEAT -- PLUTONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-29	338-400		Not given.	
□	58-15	295-385	± 5.0	Not given.	
△	58-14	211-819	± 5.0	Not given.	
◇	64-10	303-944	± 5.0	99.95 Pu.	

TPRC



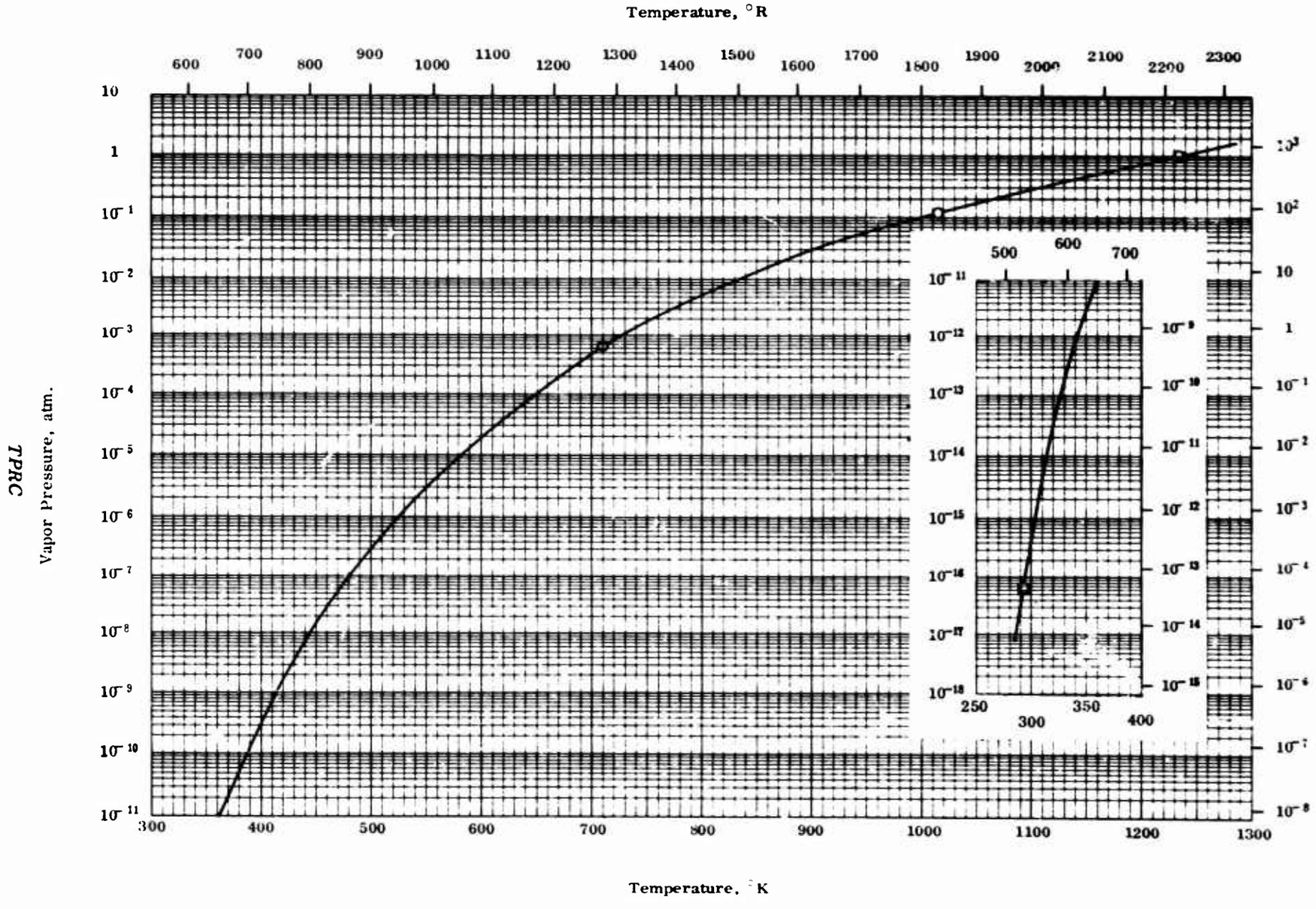
THERMAL LINEAR EXPANSION -- PLUTONIUM

TPRC

THERMAL LINEAR EXPANSION -- PLUTONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-18	93-373		α-plutonium; 0.068 Fe, 0.027 C, 0.005 Ni, 0.003 each Al and Cr, 0.002> each V and Bi, and 0.0064> all others.	Cast; heated to 325 C and cooled to room temperature at 50,000 psi.
□	57-67	293-873		Not given.	Heating data.
■	57-67	308-742		Not given.	Cooling data of above sample.
△	55-29	293-843		Two samples of 99.97 and 99.95 Pu.	
◇	55-29	293-873		99.87 Pu.	Heating curve.
◆	55-29	293-753		Same as above.	Cooling curve of above sample.
▽	54-46	293-763		Not given.	
▷	54-17	293-763		Not given.	
◁	56-59	593-823		Not given.	X-ray method; temperature by measuring lattice constant of silver powder.



VAPOR PRESSURE -- POLONIUM

TPRC

803

VAPOR PRESSURE -- POLONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-11	711-1018		Not given.	Boiling point extrapolated by author.
□	56-19	293		Not given.	

PROPERTIES OF PRASEODYMIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	6.77	423
Melting Point	1203	2174
Heat of Fusion	20	30
Heat of Vaporization. . . .	501_{1248K}	902_{2426R}

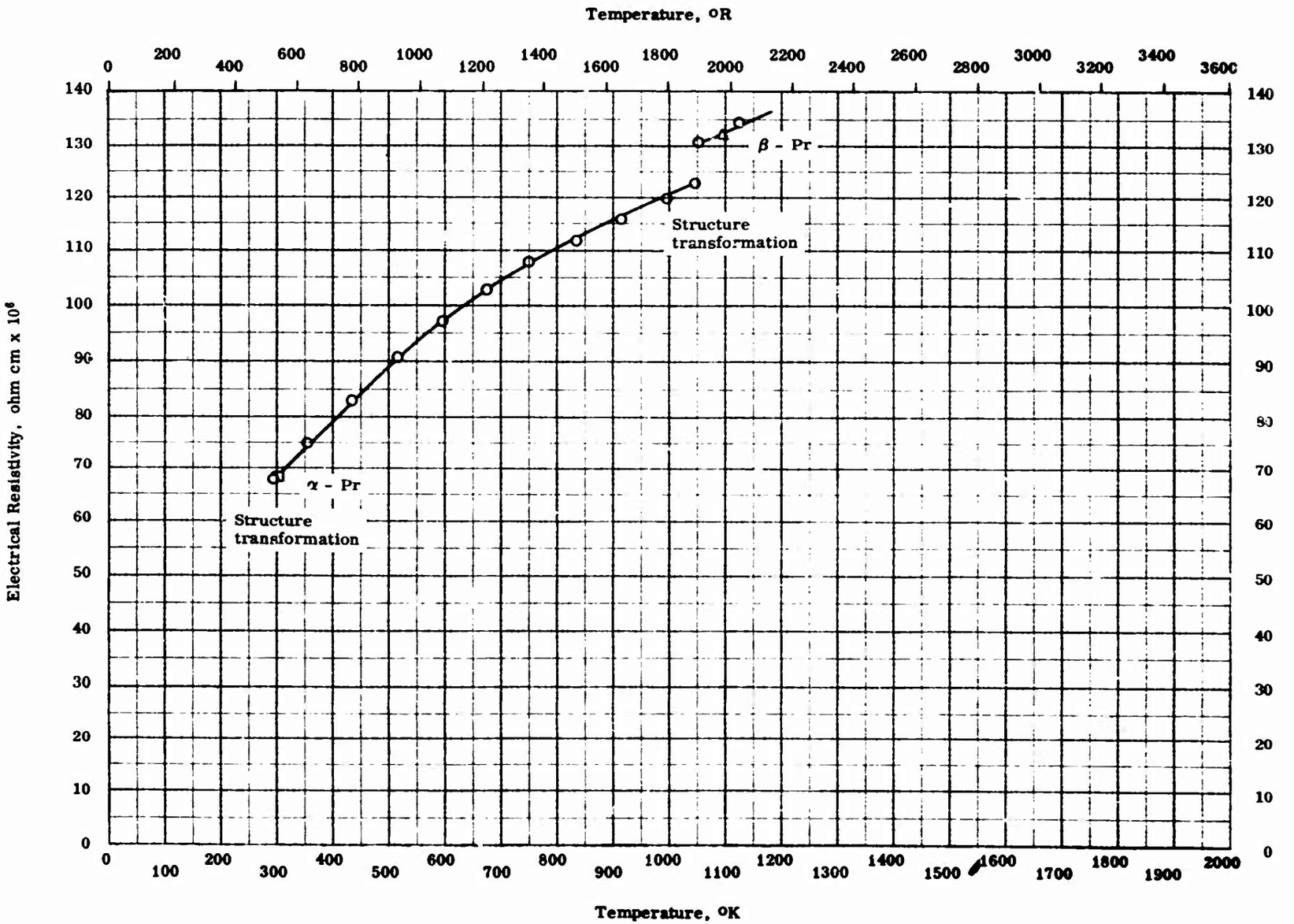
REPORTED VALUES

		Density	Melting Point	Heat of Fusion	Heat of Vaporization
		g cm^{-3}	K	cal g^{-1}	cal g^{-1}
○		6.769			
■		6.71			
		lb ft^{-3}	R	Btu lb^{-1}	Btu lb^{-1}
△			1208		
◇			1192 ± 2.5		
▽			1203		
▲			1192 ± 2		
▼			1192 ± 2		
◆				16	
●				11.7	
				Btu lb^{-1}	
▷					561_{1630K}
◀					563_{1300K}
◁					563_{1320K}
▶					561
					1010_{2930K}
					1015_{2340K}
					1015_{2380K}
					1010

PROPERTIES OF PRASEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_r	Sample Specifications	Remarks
○	55-28	298		Hexagonal close-packed structure.	Density from x-ray measurements.
△	54-11	1208		Very pure.	M. P. from thermal analysis.
▷	54-11	---		Very pure.	Δh_v from vapor pressure data.
◇	52-21 also 53-33	1192		99.9+ pure.	M. P. from thermal analysis; heating and cooling rate at 10 C min^{-1}.
◀	52-21 also 53-33	1300		99.9+ pure.	Δh_v from vapor pressure data.
▽	52-5	1203		Not given.	
▲	56-52	1192		0.1> other rare earth and 0.1> Ta.	Vacuum cast metal reduced from fluoride by Ca in Ta crucible in A atm.; M. P. from thermal analysis.
◁	56-52	1192		Same as above.	Same as above except Δh_v from vapor pressure data.
▼	56-48	1192		Not given.	
◆	56-54	1208		Very high purity.	
●	62-13	1065		Not given.	Δh_f for $\alpha \rightarrow \beta$ transition.
■	62-13	298		Not given.	
▶	62-13	---		Not given.	Δh_v.



ELECTRICAL RESISTIVITY -- PRASEODYMIUM

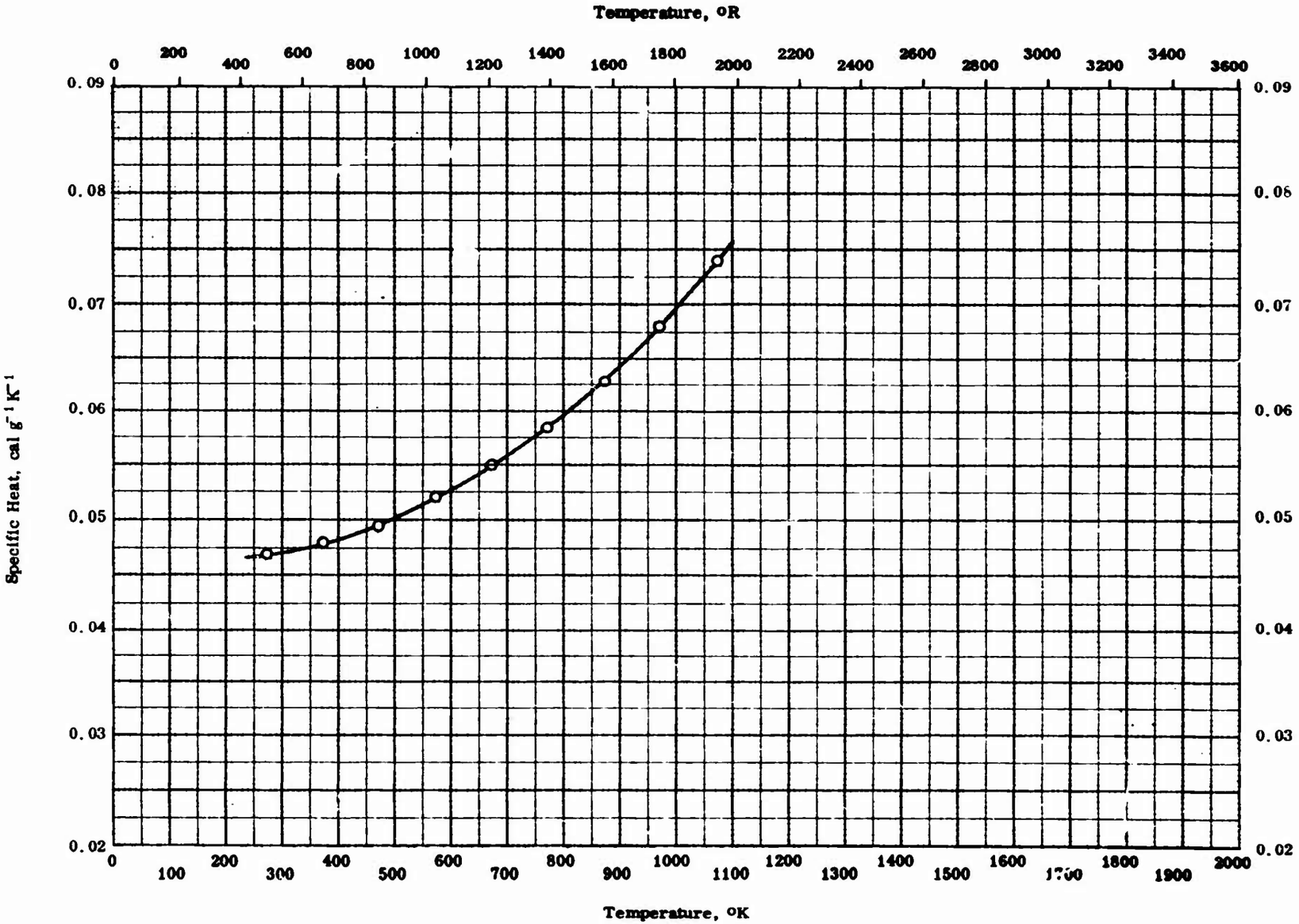
TPRC

ELECTRICAL RESISTIVITY -- PRASEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	55-28 also 57-38	298-1123	±1	0.1> Ce, 0.05> Ca, 0.2> each Mg, Si, Nd, and 0.005> each Fe, La.	Cast, rolled and swaged at room temperature, annealed 1 hr at 300 C in vacuum; heated to within 100 C of melting point.
□	62-13	298		α - Pr.	
Δ	62-13	1093		β - Pr.	

TPRC



SPECIFIC HEAT -- PRASEODYMIUM

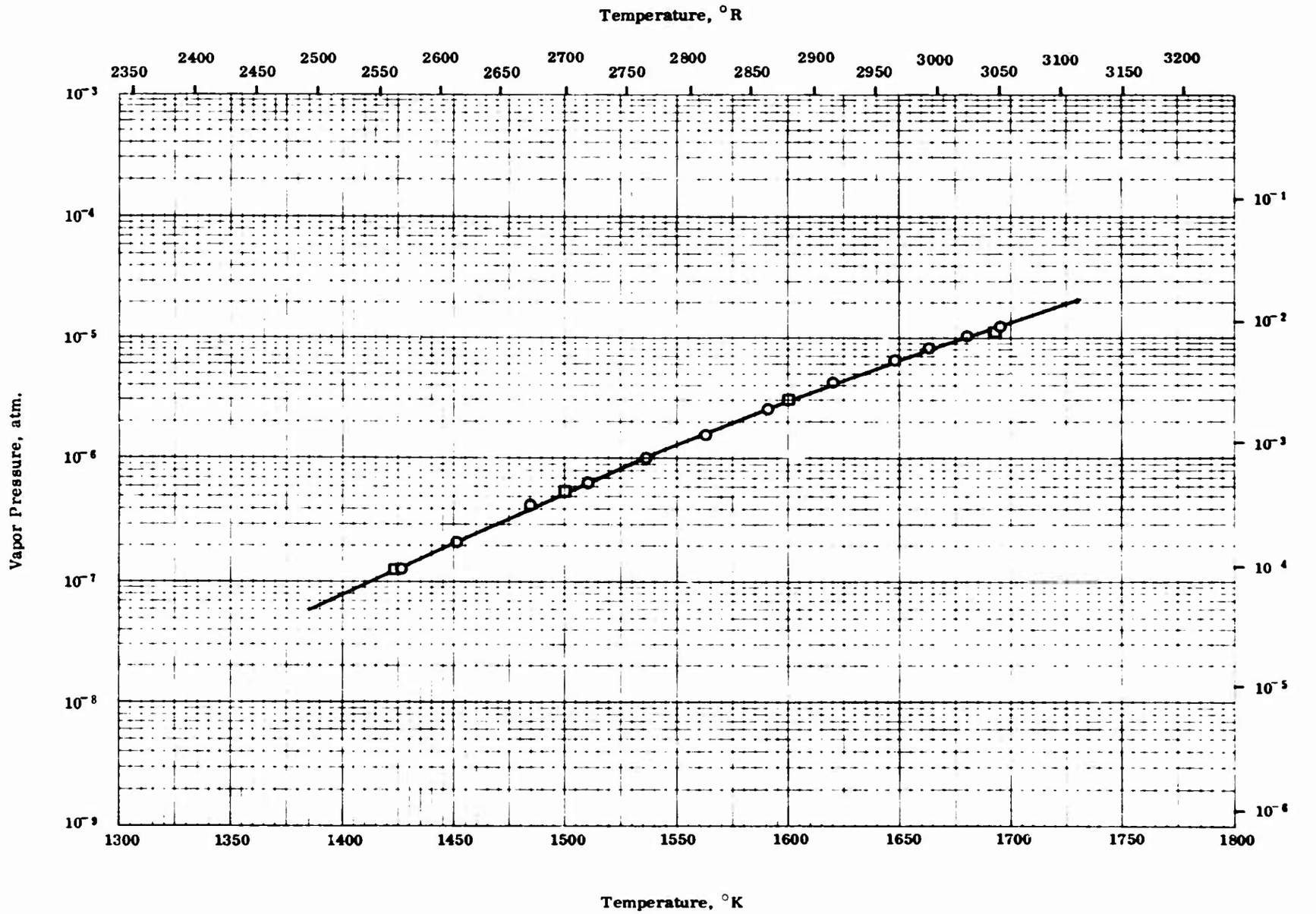
TPRC

SPECIFIC HEAT -- PRASEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	58-18	273-1071		0.10> each Ce, La, Nd, Ta, 0.05> Ca, 0.02> Si, 0.01> Fe.	

TPRC



VAPOR PRESSURE -- PRASEODYMIUM

TPRC

911

VAPOR PRESSURE -- PRASEODYMIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-11	1428-1695		Very pure.	
□	62-13	1423-1693		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{17188 \pm 243}{T(K)} + 8.098 \pm 0.156.$

TPRC

PROPERTIES OF PROMETHIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Melting Point.	1572	2830
Heat of Fusion	21	37
Heat of Sublimation	483	870

REPORTED VALUES

Melting Point		K	R
	O	1572	2830
Heat of Fusion		**cal g^{-1}**	**Btu lb^{-1}**
	□	21	37
Heat of Sublimation		**cal g^{-1}**	**Btu lb^{-1}**
	△	483	870

PROPERTIES OF PROMETHIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-54	1572		Very high purity.	
□	56-54	1572		Very high purity.	
△	56-54	---		Very high purity.	

TPRC

PROPERTIES OF PROTACTINIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	15.37	959.5
Melting Point	1773	3192

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	15.37 ± 0.08	959.5 ± 5
	△	15.37	959.5
Melting Point		K	R
	□	< 1873	< 3371
	▽	1673	3012

PROPERTIES OF PROTACTINIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-32	298		Not given.	Density computed from x-ray measurements of lattice.
□	55-46	1873		Not given.	M. P. by observation of flow during preparation.
△	51-38	298		Not given.	Prepared by Ba reduction in vacuum in double crucible from PaF_4; computed from x-ray measurement.
▽	51-38	1673		Not given.	Same as above; M. P. estimated.

PROPERTIES OF RHENIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	21.1	1320
Melting Point	3450	6220
Heat of Sublimation	1003_{0K}	1805_{0R}

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	21.02 ± 0.01	1312 ± 0.6
	□	20.82 ± 0.01	1299 ± 0.6
	△	20.9 ± 0.1	1304 ± 6
	◇	20.75 ± 0.01	1295 ± 1
	▽	21.04	1313
	◁	19.8 ± 0.1	1238 ± 6
	▷	21.3	1330
	●	21.1	1320
Melting Point		**K**	**R**
	■	3280 ± 90	5910 ± 160
	▲	3450 ± 20	6220 ± 40
	▼	3453 ± 5	6215 ± 9
	◆	3450 ± 25	6220 ± 40
Heat of Sublimation		**$cal\ g^{-1}$**	**$Btu\ lb^{-1}$**
	◀	$1002 \pm 5_{0K}$	$1805 \pm 10_{0R}$
	▶	1004_{0K}	1807_{0R}
	◑	$1003 \pm 7_{0K}$	$1805 \pm 12_{0R}$

PROPERTIES OF RHENIUM

REFERENCE INFORMATION

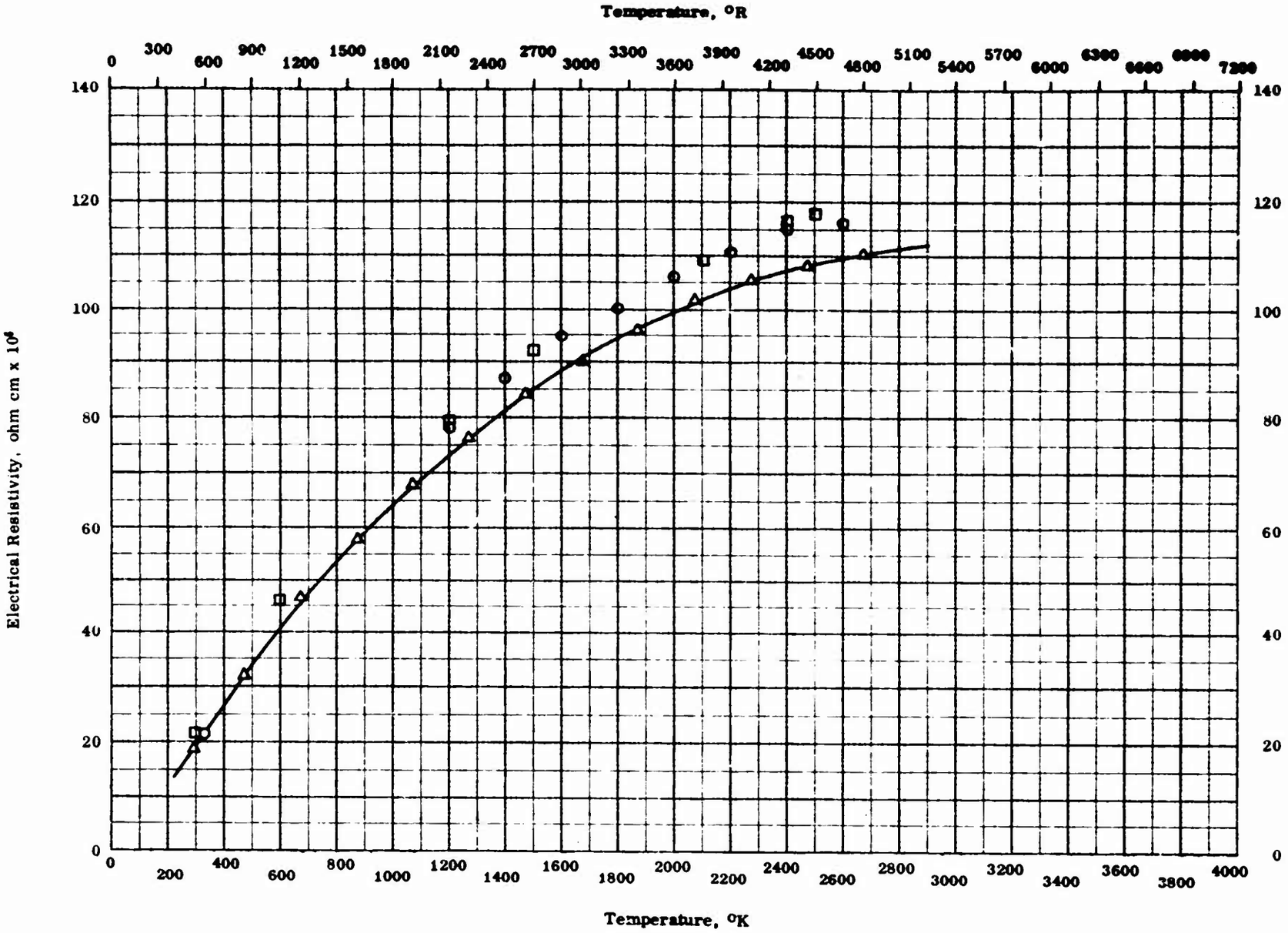
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-38, 54-10, also 55-38	293		0.04 Al, 0.04 Fe, 0.025 Mg, and 0.018 Ca.	Sintered and swaged rod; density data from weight and volume by water displacement.
■	53-38, 54-10, also 55-38	3280		Same as above.	Same as above except M. P. from filling of black body.
◀	53-38, 54-10, also 55-38	0		Same as above.	Δh_s from vapor pressure data.
□	53-38, 54-10, also 55-38	293		0.08 Fe, 0.035 Mg, 0.02 Al, and 0.02 Ca; crystal bar.	Swaged; density data from weight and volume by water displacement.
▲	53-38, 54-10, also 55-38	3450		Same as above.	Same as above except M. P. from filling of black body.
△	53-38, 54-10, 55-38	293		Same as above; crystal bar.	Unworked.

(Continued onto next page)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◇	53-38, 54-10, also 55-38	293		Not given.	Hot worked sintered sheet; density from weight and volume by water displacement.
▽	55-44	293		99.795 pure, 0.094 Al, 0.038 Mg, 0.028 Si, 0.024 Fe, 0.017 Ca, 0.0021 Cu, and 0.002 Mn; crystal bar.	Density computed from x-ray lattice measurement.
▼	55-44	3453		Same as above.	M. P. by filling of black body hole.
◆	54-35	3433-3478		0.039 Si, 0.015 Fe, 0.012 Mg, 0.005 each Ca, Al, and Mn, and 0.0015 Cu.	M. P. by filling of black body hole.
▶	54-35	0		Same as above.	Δh_s from vapor pressure data.
◁	55-10	298		Not given.	
◑	55-10	0		Not given.	Δh_s from vapor pressure data.
▷	57-40	298		99.5+ pure, 0.1> total of Cu, Fe, and Mo.	
●	57-40	298		Same as above.	Density from x-ray lattice measurement.



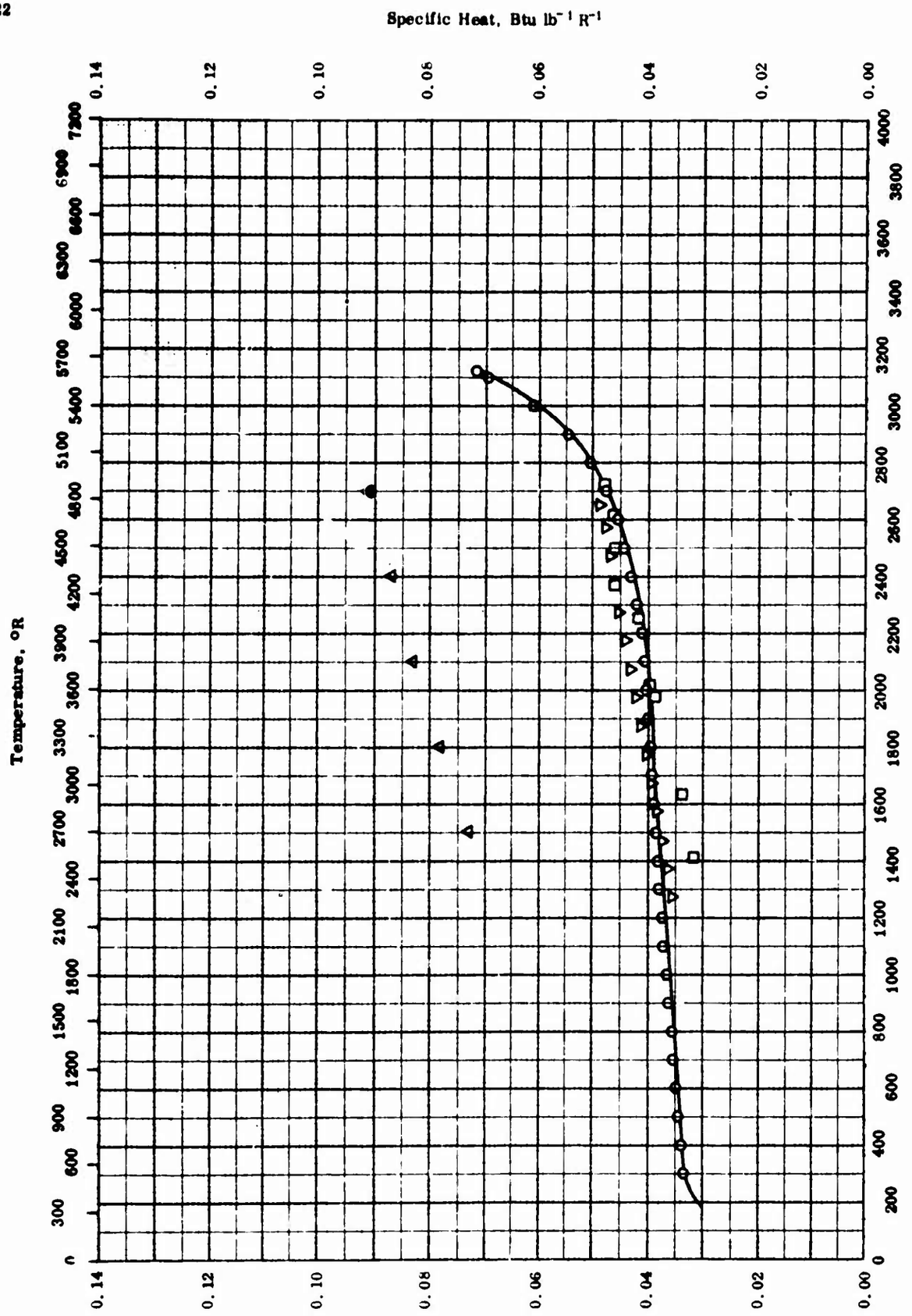
ELECTRICAL RESISTIVITY -- RHENIUM

TPRC

ELECTRICAL RESISTIVITY -- RHENIUM

REFERENCE INFORMATION

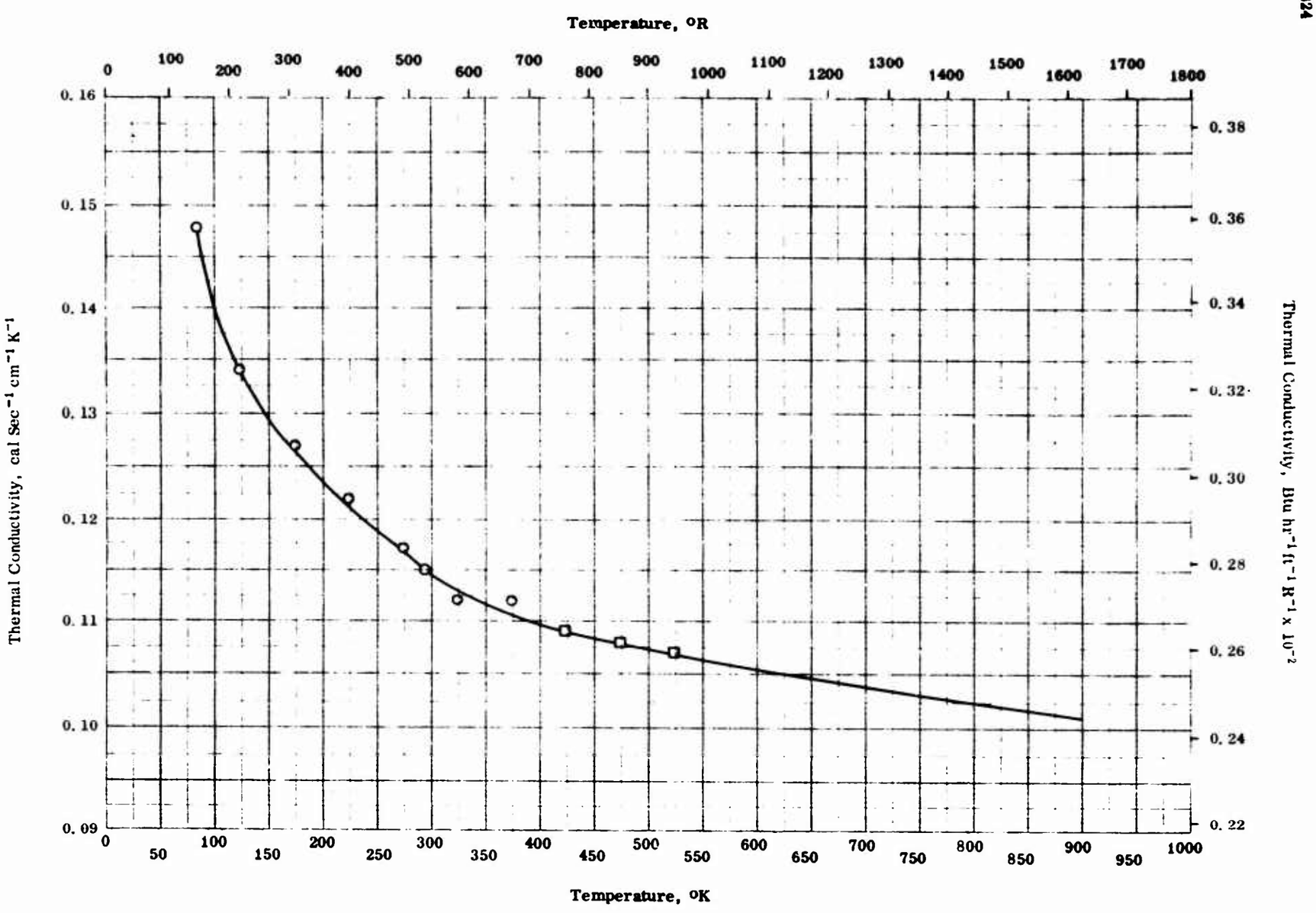
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-15	306-2540		0.097 Al, 0.034 Mg, 0.028 ea. Si, Fe, 0.010 Ca, 0.0045 Cu, and 0.001 Mn; powder.	Sintered and swaged.
□	54-10	293-2500		0.094 Al, 0.038 Mg, 0.028 Si, 0.024 Fe, and 0.017 Ca.	In vacuum $< 10^{-8}$ mm Hg.
△	55-33, 56-20, also 57-35	293-2673		99.942 Re, 0.015 Al, 0.014 Sn, 0.010 ea. Si, Ca, 0.005 Mg, 0.004 Mo, 0.0005 Cu, and 0.1 > Au; in wire form.	Swaged and drawn; annealed 2 hrs at 1750 C.



SPECIFIC HEAT -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-22	300-3120	4.0	Not given.	
□	62-19	1410-2720	± 10.0	Not given.	
△	56-20	1500-2700		99.942 Re, 0.015 Al, 0.014 Sm, 0.010 Ca, Si, 0.005 Mg, 0.004 Mo, 0.0005 Cu, 0.0X Au.	Swaged, drawn, and annealed for 2 hrs at 1750 C.
▽	65-2	1273-2643		99.98 Re.	

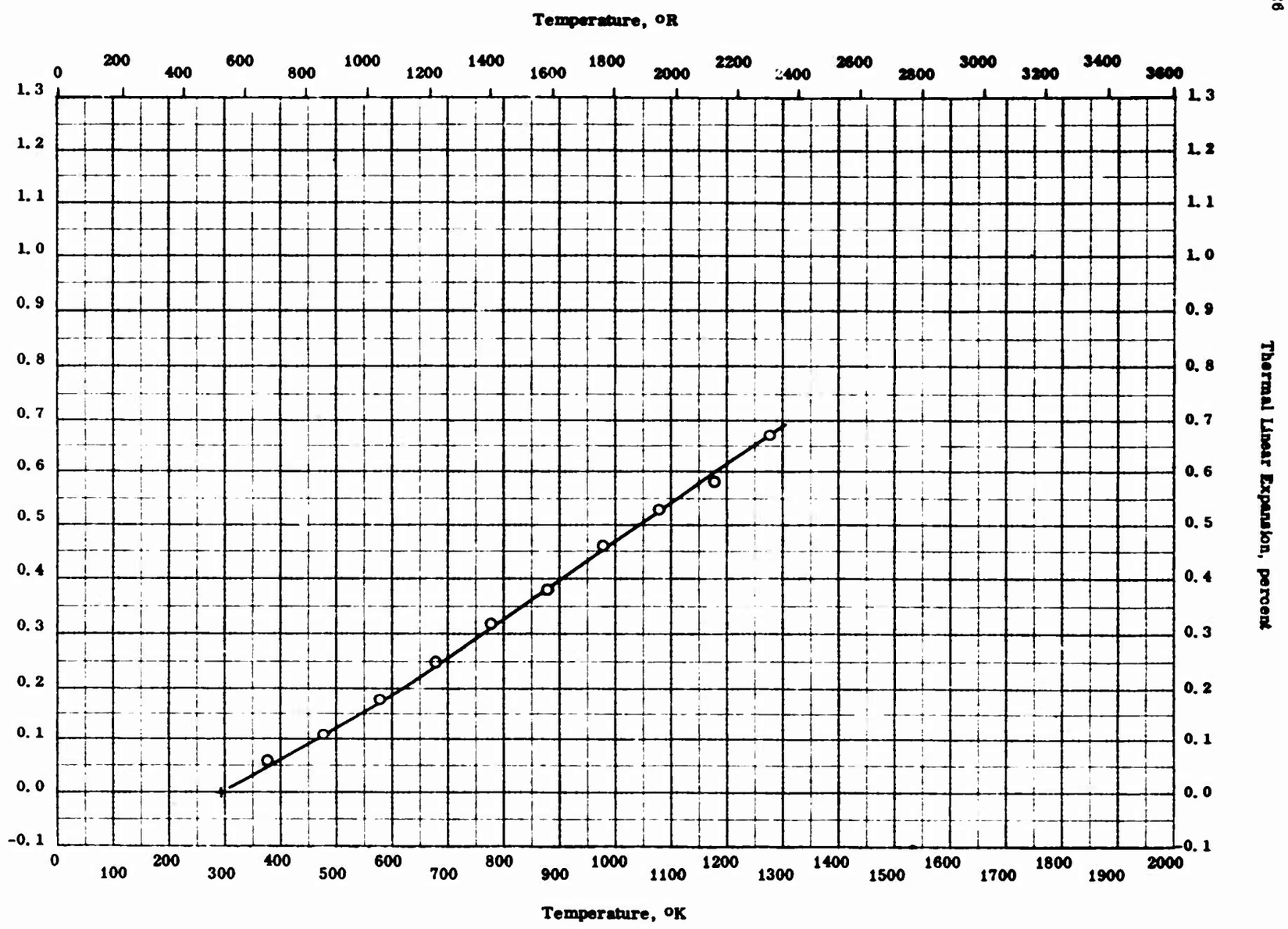


THERMAL CONDUCTIVITY -- RHENIUM

THERMAL CONDUCTIVITY -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-8	83-373		High purity with traces of noble metals; density 20.98 g ml^{-1}.	
□	63-8	423-523		Same as above.	

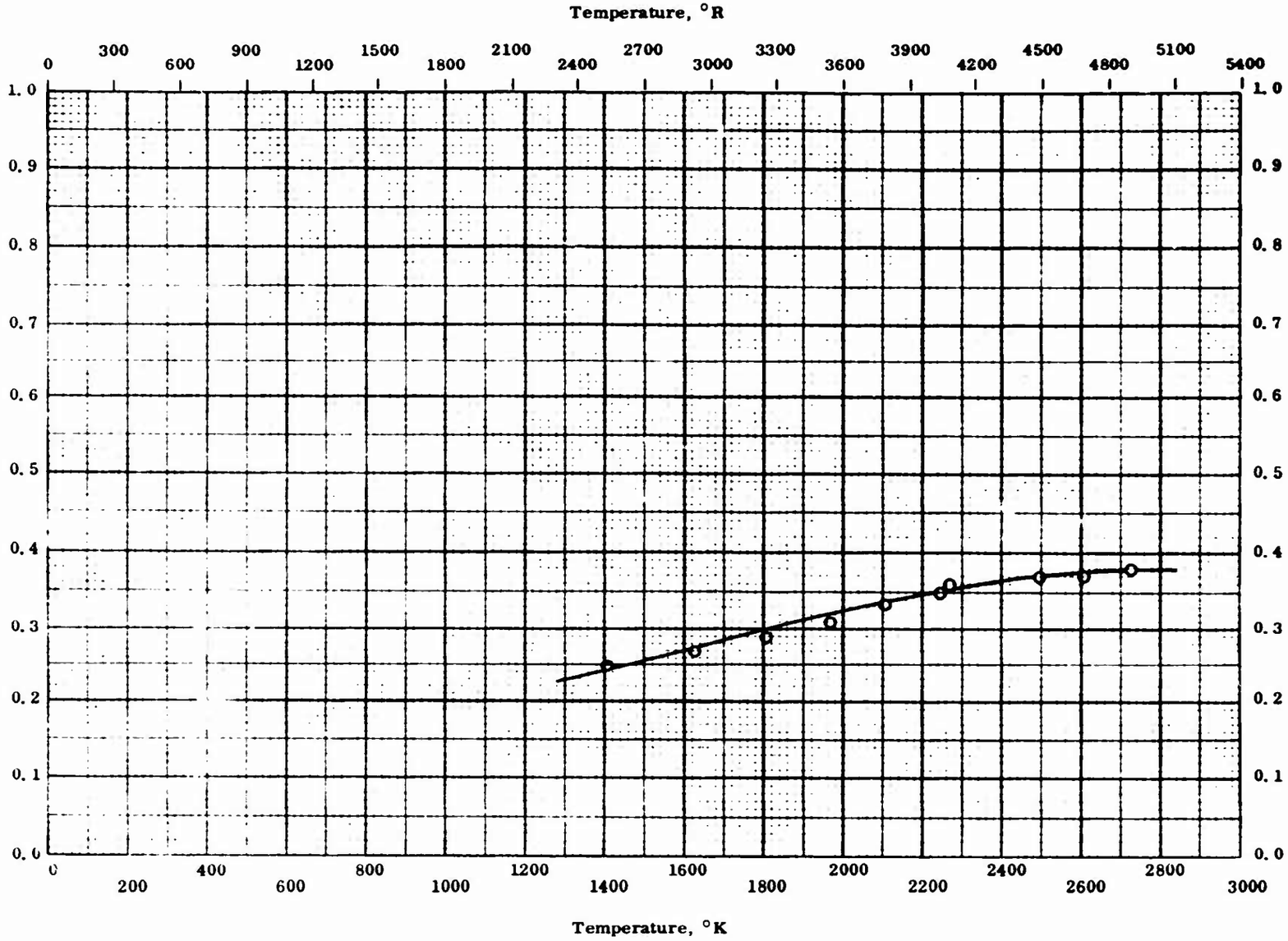


THERMAL LINEAR EXPANSION -- RHENIUM

THERMAL LINEAR EXPANSION -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	54-10 also 55-38	293-1278		0.094 Al, 0.038 Mg, 0.028 Si, 0.024 Fe, 0.017 Ca, 0.0021 Cu, 0.002 Mn, and no evidence of Sb, Ba, Be, Bi, B, Nb, Cd, Cr, Co, Ga, Ge, Au, Pb, Mo, Ni, Pt, K, Ag, Na, Sr, Te, Ti, W, V, Zn, or Zr.	H_2 reduced from Ammonium Perrhenate; presintered 2 hrs at 1200 C in vacuum and sintered 1 hr. at 2700 C in H_2.



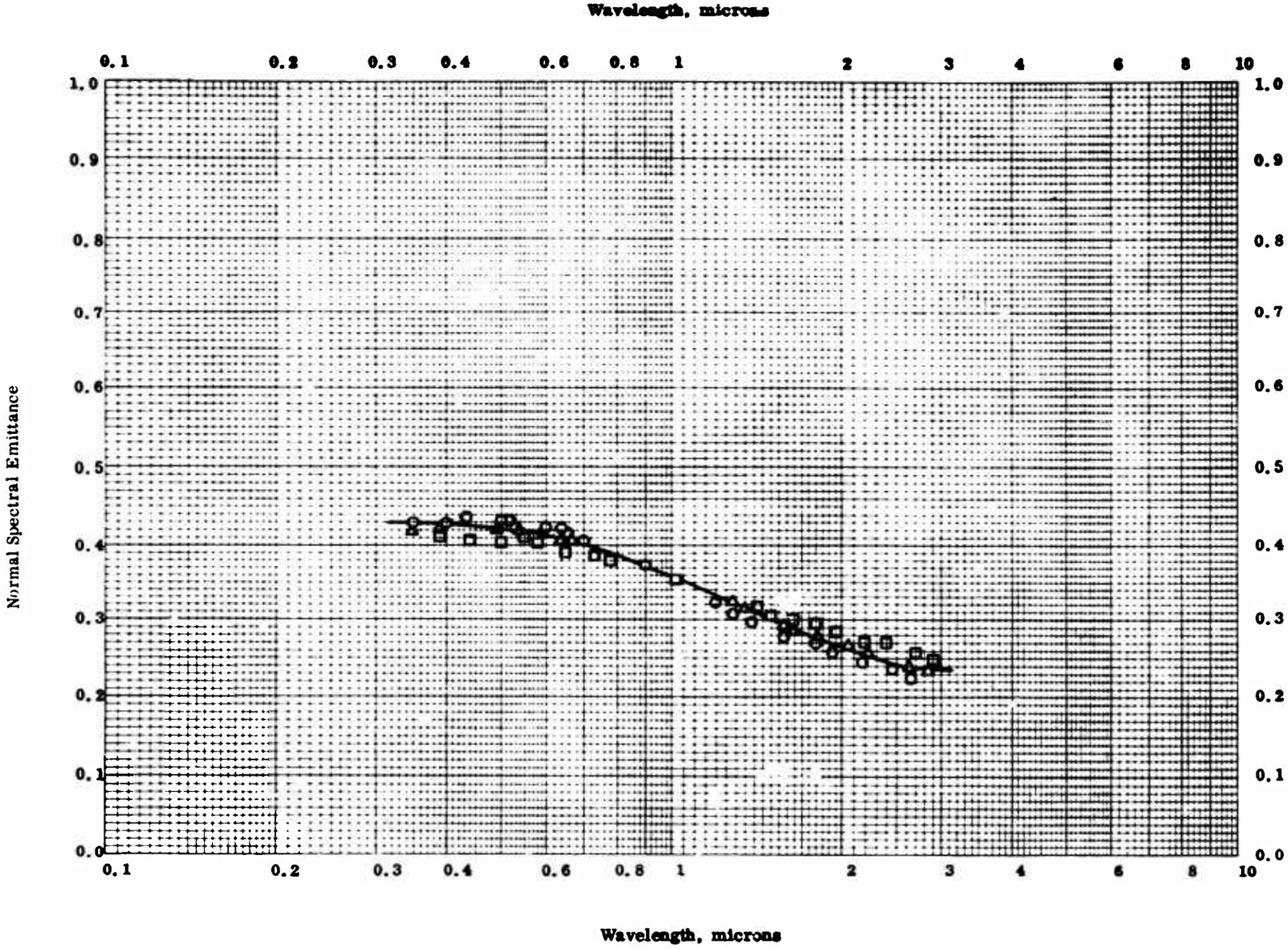
HEMISPHERICAL TOTAL EMITTANCE -- RHENIUM

TPRC

HEMISPHERICAL TOTAL EMITTANCE -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
O	62-19	1410-2730		Not given.	Measured in vacuum (10^{-5} mm Hg).

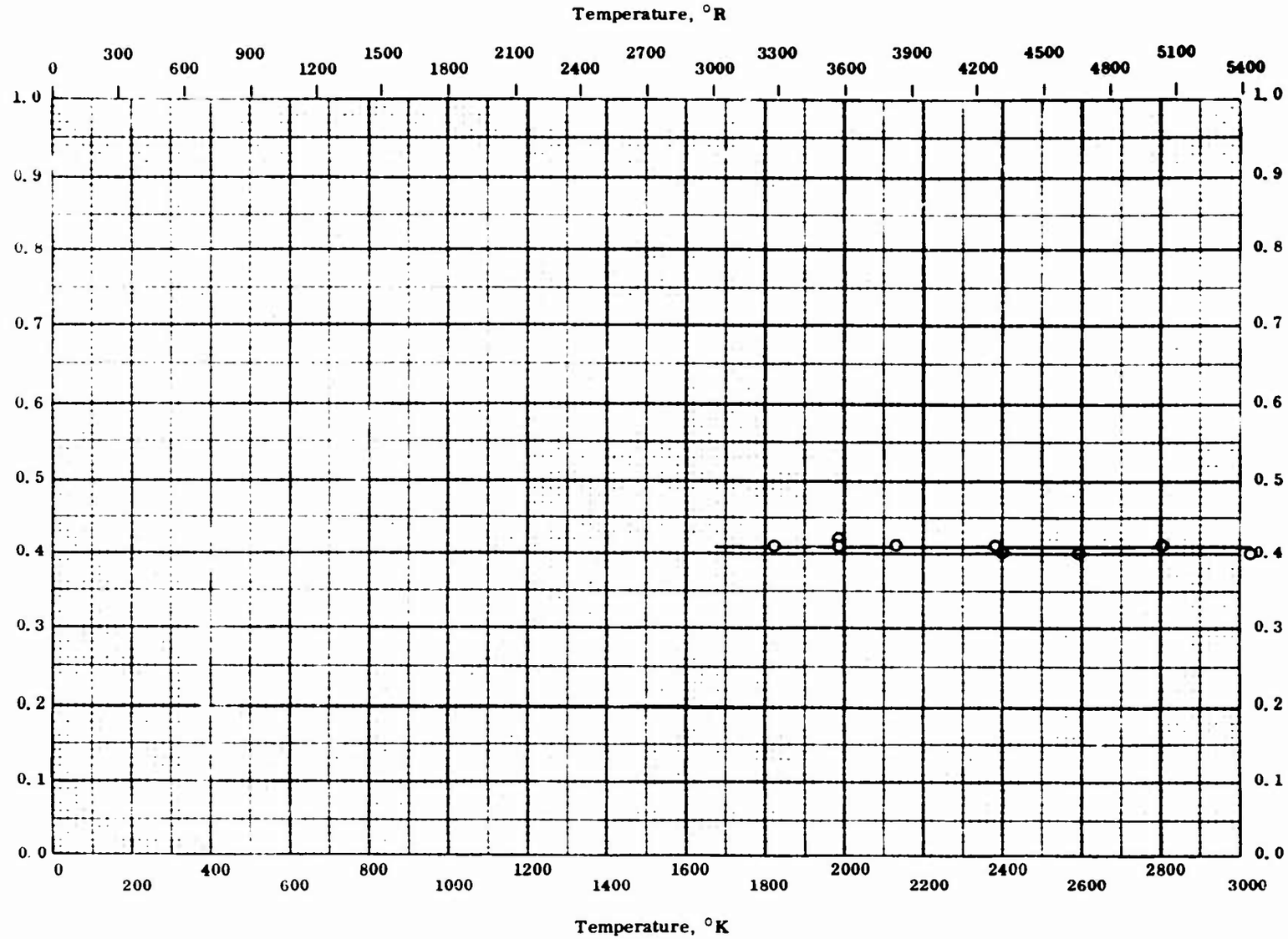


NORMAL SPECTRAL EMITTANCE -- RHENIUM

NORMAL SPECTRAL EMITTANCE -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	56-44	1810	0.35-2.65	±4.5	Not given.	Sheet (0.005 in. thickness) formed into tube; measured in vacuum.
△	56-44	2388	0.35-2.85	±4.3	Same as above.	Same as above.
□	56-44	3045	0.39-2.90	±4	Same as above.	Same as above; measured in argon.



TPRC

NORMAL SPECTRAL EMITTANCE -- RHENIUM

NORMAL SPECTRAL EMITTANCE -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
O	56-44	0.65	1823-3033		Not given.	Sheet (0.005 in. thickness) formed into tube; measured in vacuum for T < 2473 K and in argon for T > 2473 K.

Temperature, °R

4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900

10^{-4} 10^{-5} 10^{-6} 10^{-7} 10^{-8} 10^{-9} 10^{-10}

Vapor Pressure, atm.

10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7}

Vapor Pressure, mm Hg

2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300

Temperature, °K

VAPOR PRESSURE -- RHENIUM

VAPOR PRESSURE -- RHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	54-10	2494-2999		0.04 ea. Al, Fe, 0.025 Mg, and 0.018 Ca.	Vacuum at 10^{-5} mm Hg.
□	53-15 also 55-10	2495-3000		0.097 Al, 0.034 Mg, 0.028 ea. Fe, Si, 0.01 Ca, 0.0045 Cu, and 0.001 Mn.	Prepared by H_2 reduction of ammonium perrhenate; sintered and swaged.

PROPERTIES OF RHODIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	12.45	777
Melting Point	2233	4019

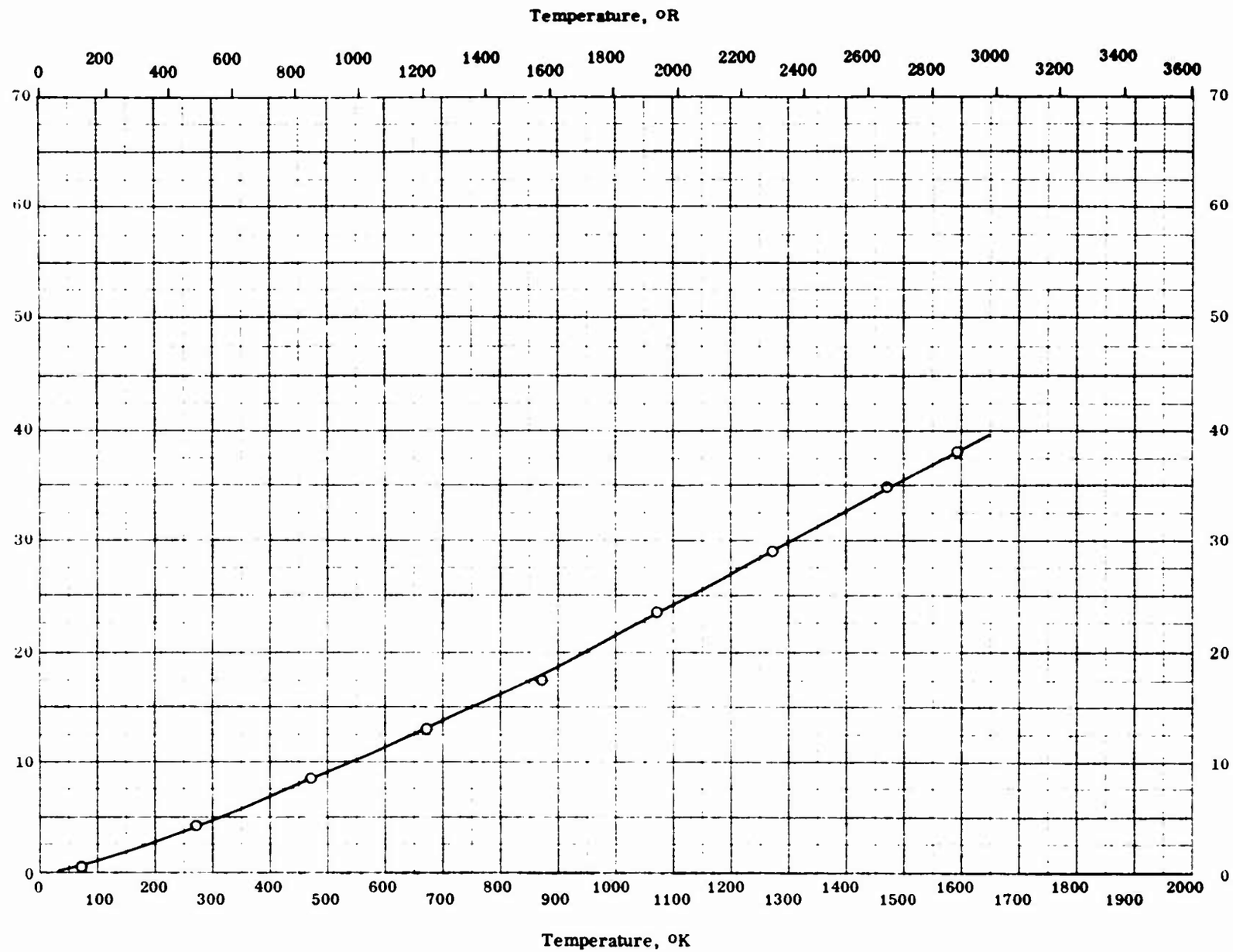
REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	□	12.45	777.2
Melting Point		K	R
	○	2239 ± 3	4030 ± 5
	△	2233	4019

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-29	2240		99.5+ pure.	M. P. from loss of electric continuity in wire in vacuum of 1-2 microns Hg.
□	55-1	293		0.1-0.03 Ir, 0.005 Fe, 0.002-0.005 Ag, and 0.001-0.003 Pd.	Annealed at 1336 C.
△	62-56	2233		Pure.	

TPRC



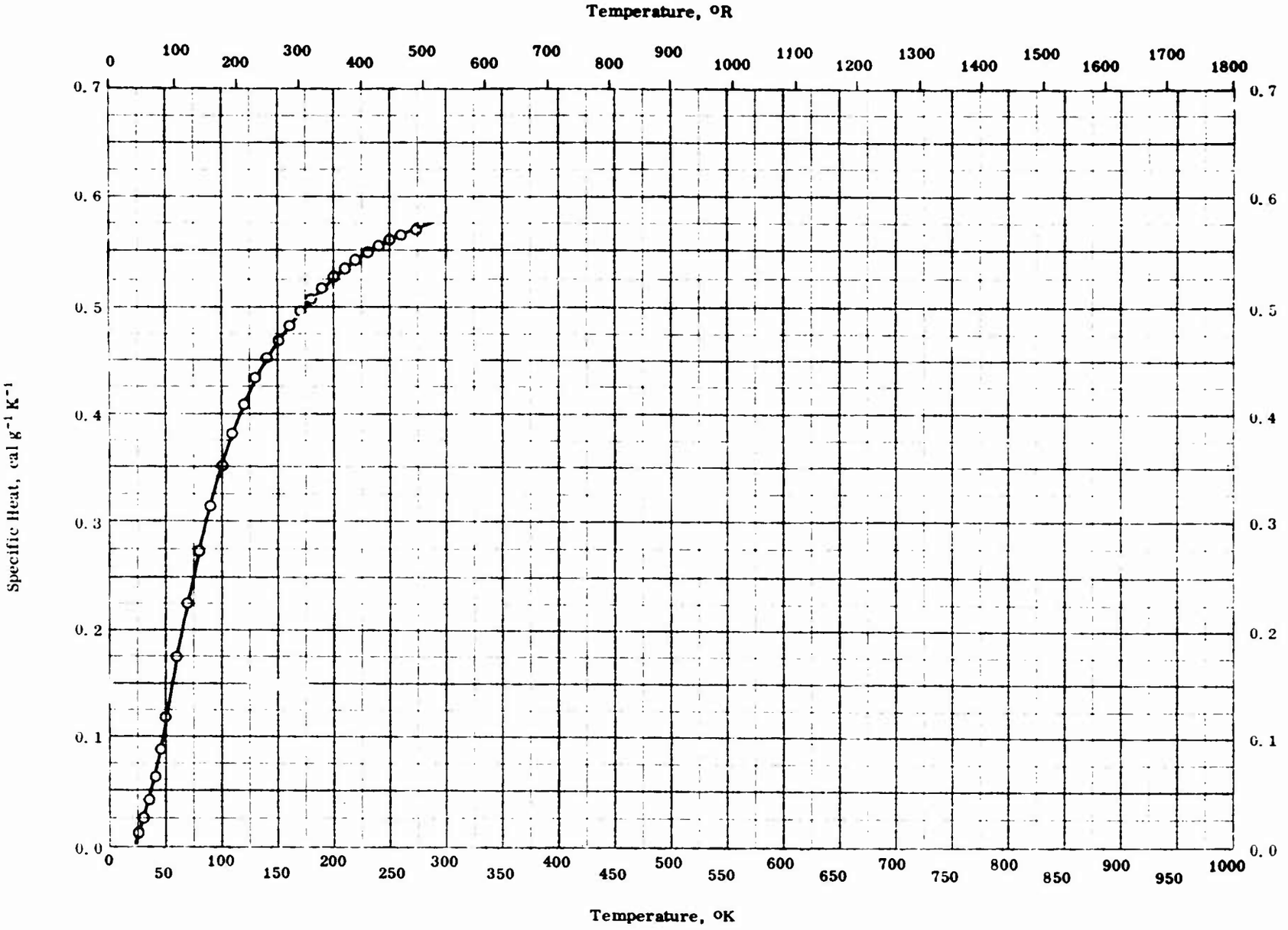
TPRC

ELECTRICAL RESISTIVITY -- RHODIUM

ELECTRICAL RESISTIVITY -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-34	73-1593		0.03-0.1 Ir, 0.005 Fe, 0.002-0.005 Ag, and 0.001-0.003 Pd; density 12.44 g ml^{-1}; 5.0 cm in length and 0.345 cm dia.	

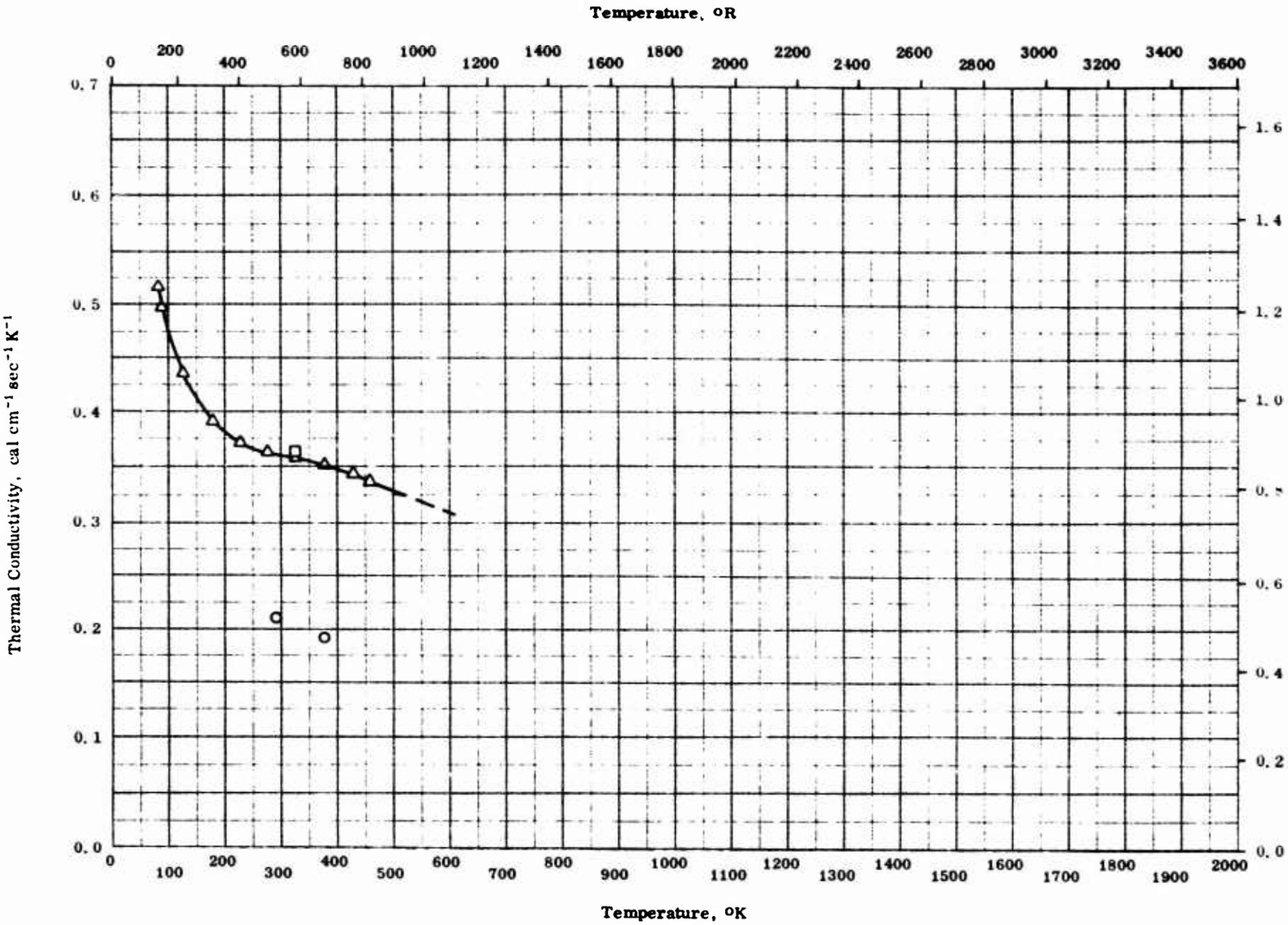


SPECIFIC HEAT -- RHODIUM

SPECIFIC HEAT -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range ^{o}K	Rept. Error %	Sample Specifications	Remarks
O	55-22	10-268		99.9 Rh, 0.0X Pt type metals, traces of Ag, Cu, Fe.	Cast.

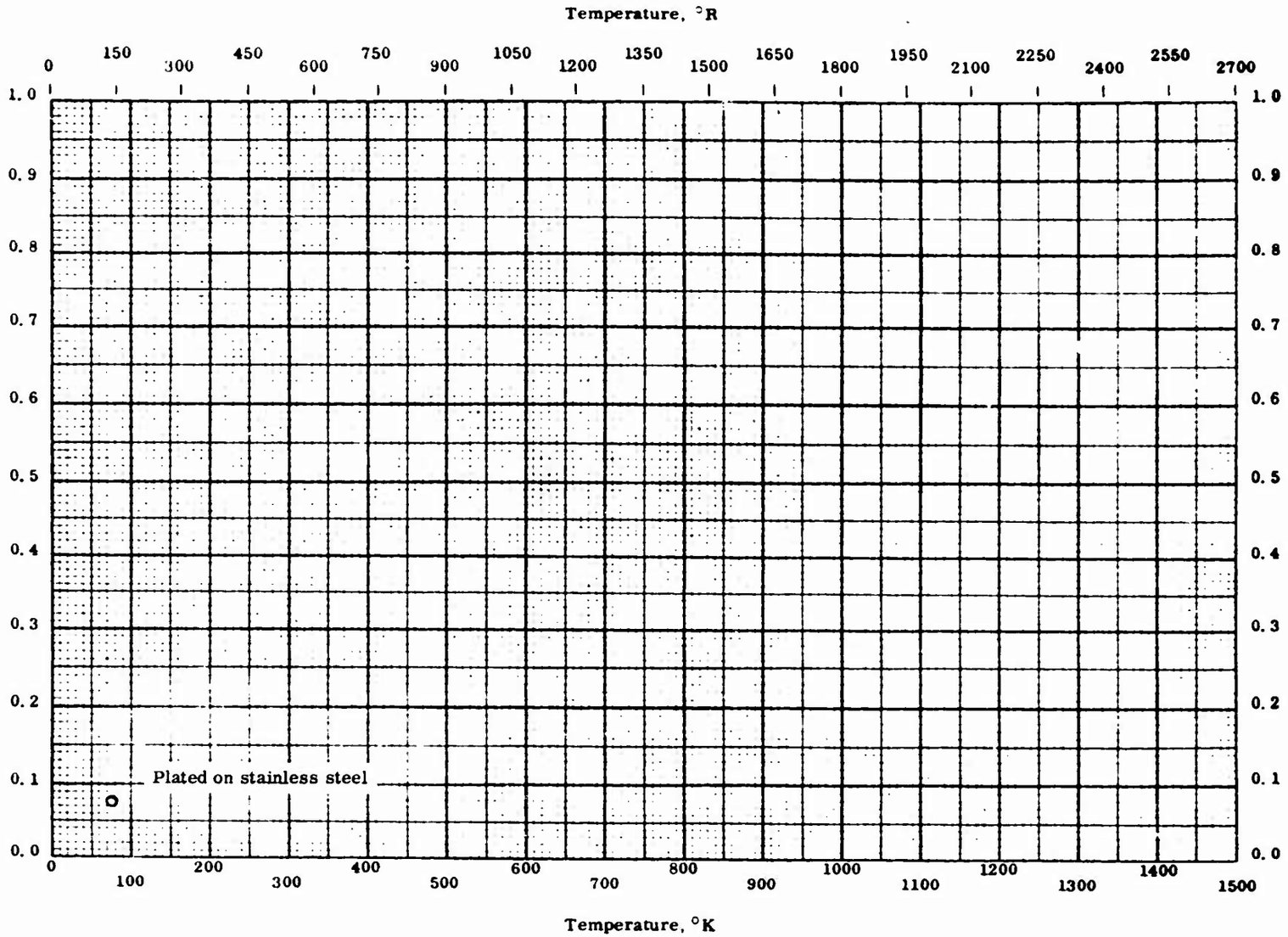


THERMAL CONDUCTIVITY -- RHODIUM

THERMAL CONDUCTIVITY -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-2	290-373		Pure.	
□	55-1	323		0.03-0.10 Ir, 0.005 Fe, 0.002-0.005 Ag, and 0.001-0.003 Pd; density 12.45 g cm^{-3} at 25 C.	Annealed at 1336 C.
△	62-34	78-463		0.03-0.1 Ir, 0.005 Fe, 0.002-0.005 Ag, and 0.001-0.003 Pd; 5.0 cm long and 0.348 cm dia rod with density 12.44 g ml^{-1}.	

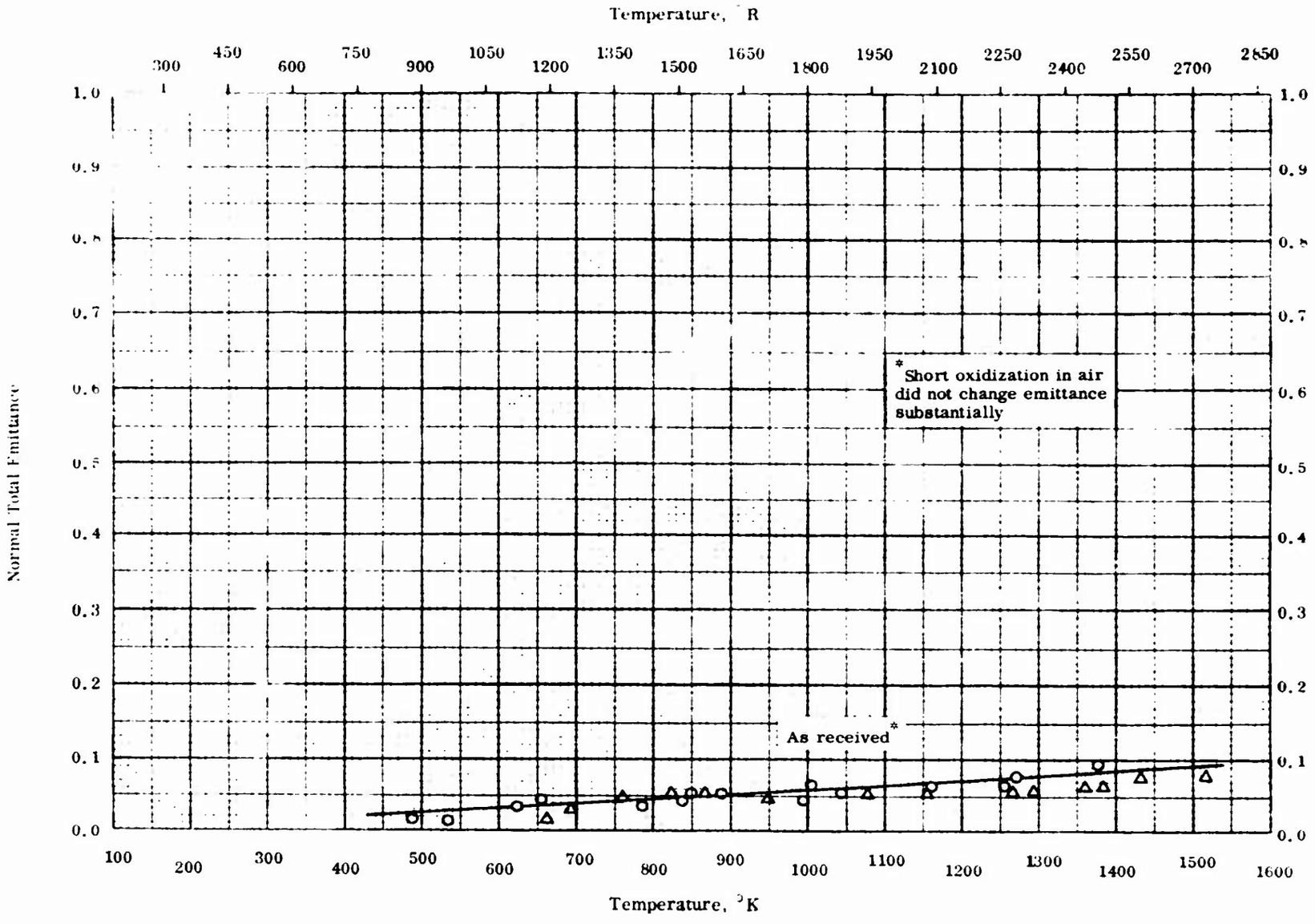


HEMISPHERICAL TOTAL EMITTANCE -- RHODIUM

HEMISPHERICAL TOTAL EMITTANCE -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-38	76	5	Plated on stainless steel.	Measured in vacuum.



NORMAL TOTAL EMITTANCE -- RHODIUM

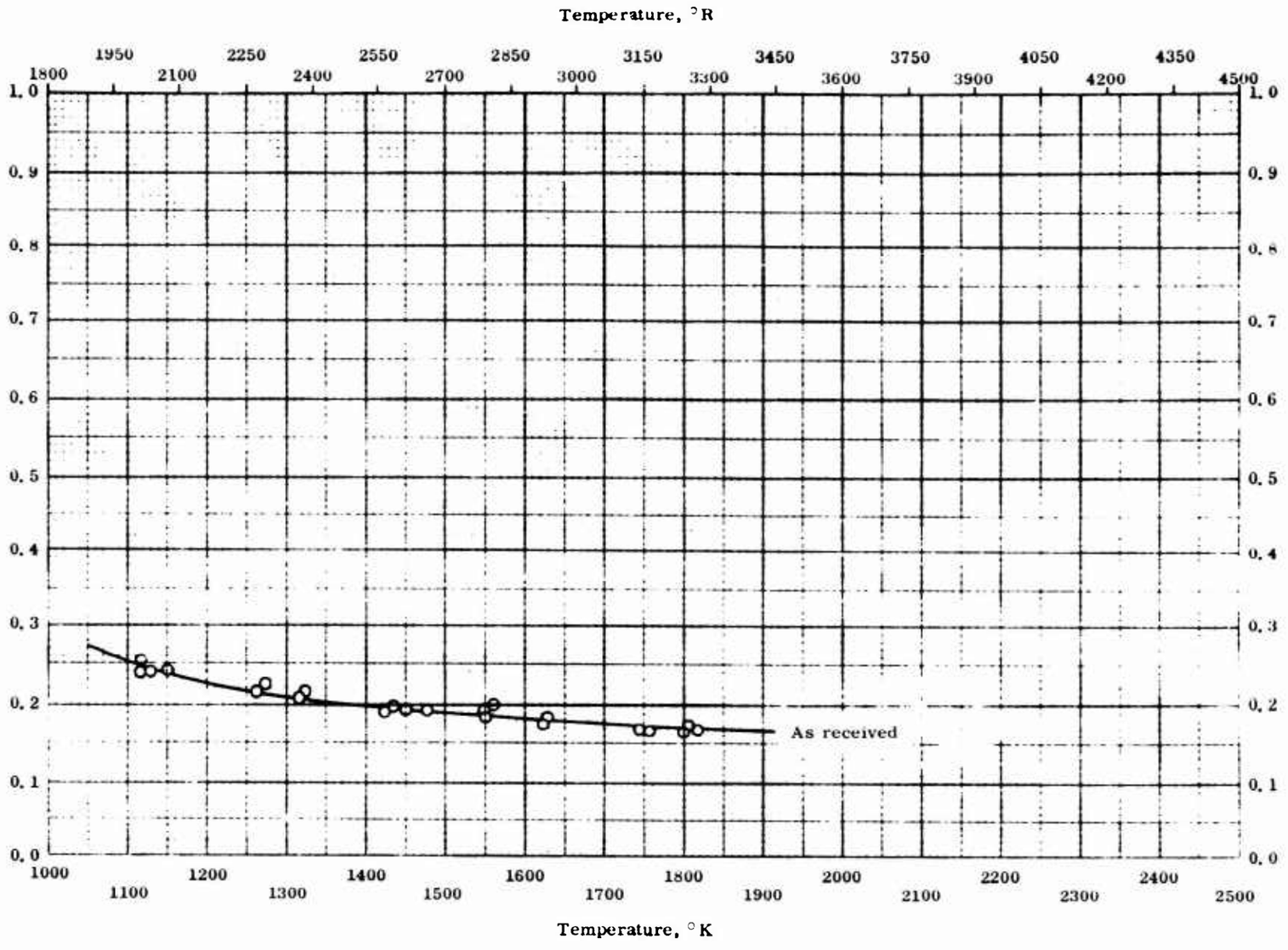
TPRC

NORMAL TOTAL EMITTANCE -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-41	488-1378	10	Pure.	As received; measured in vacuum (5×10^{-4} mm Hg).
Δ	57-41	661-1516	10	Same as above.	Oxidized in air at red heat for 30 min., measured in vacuum (5×10^{-4} mm Hg).

TPRC

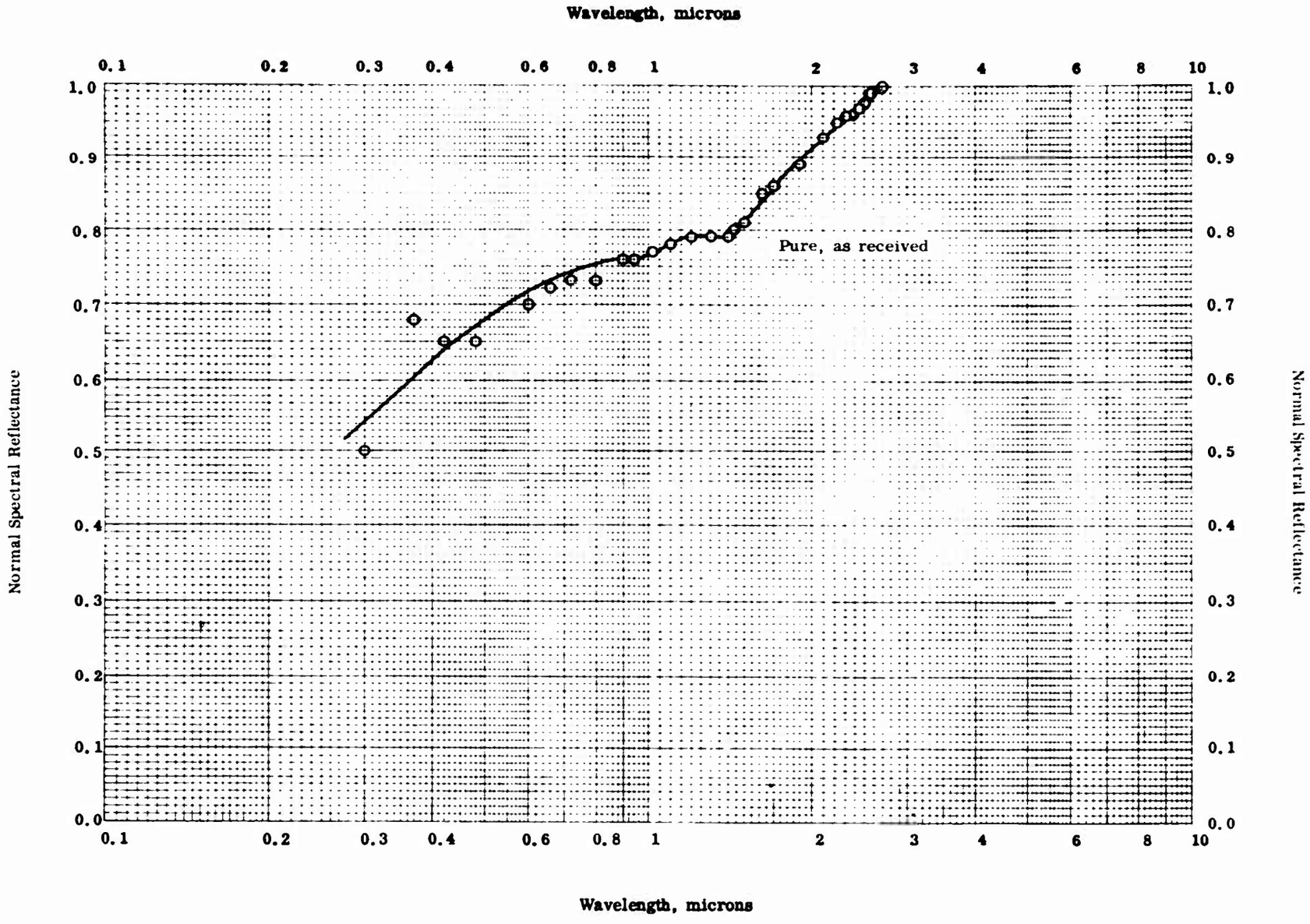


NORMAL SPECTRAL EMITTANCE -- RHODIUM

NORMAL SPECTRAL EMITTANCE -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-41	0.665	1116-1816		Pure.	As received; measured in vacuum.



NORMAL SPECTRAL REFLECTANCE -- RHODIUM

NORMAL SPECTRAL REFLECTANCE -- RHODIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	57-41	298	0.30-2.70	±4	Pure.	As received; data taken from smooth curve; 6 - 9 degree illumination, hemispherical viewing; $MgCO_3$ as reference standard.

TPRC

PROPERTIES OF RUTHENIUM

MOST PROBABLE VALUES

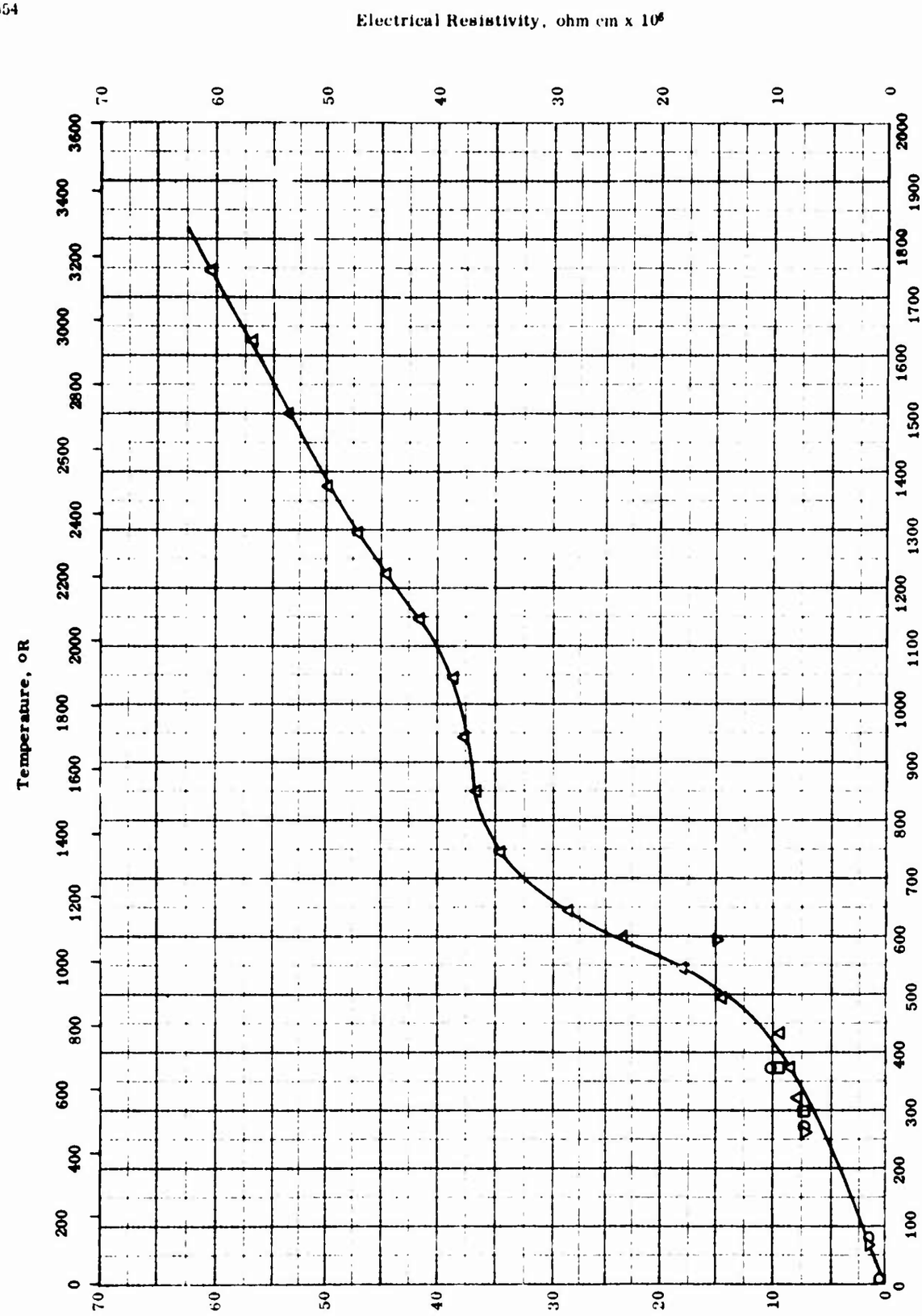
Property	C.G.S. Units	Brit. Eng. Units
Density.	12.2	762
Melting Point	2673	4811
Heat of Sublimation	1559	2806

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	11.556	721.42
	□	11.9	742.9
Melting Point		K	R
	▽	2673 ± 25	4811 ± 45
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	△	1559 ± 4	2806 ± 7

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-8	298		99.99 pure, 0.01 Ca and Mg, and small traces of Cu.	Presintered in H_2 at 1150 C and sintered in vacuum at 2200 C; author considered given value as 93.9% of theoretical.
□	57-37	298		99.79 pure, 0.09 Rh, 0.08 Ir, and 0.01 Pt; author suspects some porosity.	Sintered in vacuum 36 hrs at 1100 C and 10 hrs at 1700 C, and cooled slowly.
△	61-20	298		Not given.	
▽	60-56	2673-2723		Not given.	



ELECTRICAL RESISTIVITY -- RUTHENIUM

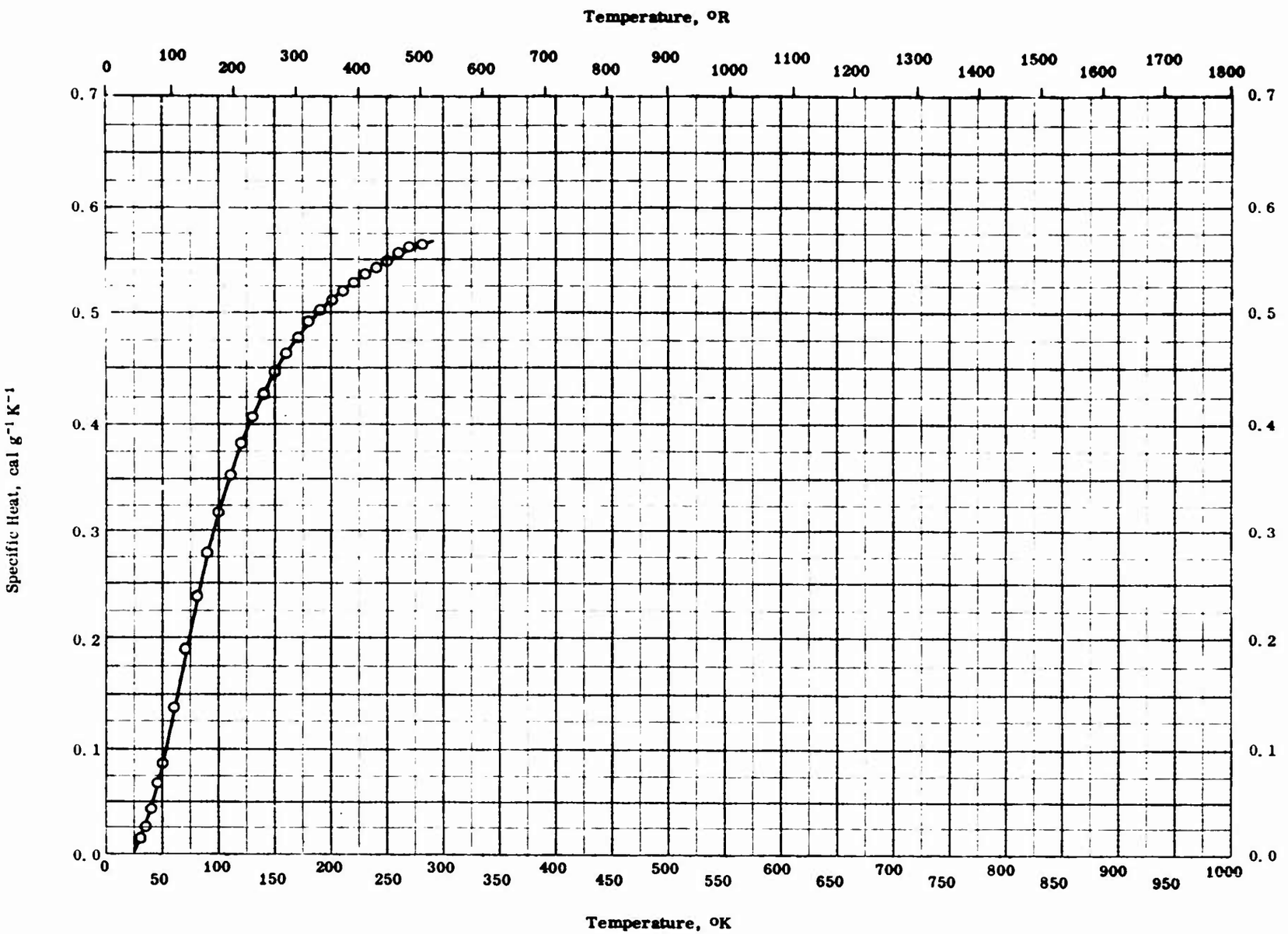
Electrical Resistivity, ohm cm x 10⁶

ELECTRICAL RESISTIVITY -- RUTHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-8	21-373		99.99 Ru, 0.01 Ca, Mg, and small trace of Cu; density 721 lb ft^{-3} (93.9% of theoretical).	Powder pressed into rod; presintered at 1150 C in H_2 and sintered at 2200 C in vacuum.
□	57-37	318-373		99.79 Ru, 0.08 Ir, 0.02 Rh, and 0.01 Pt.	Sintered in vacuum 36 hrs at 1100 C and 10 hrs at 1700 C, slowly cooled.
△	41-4	273-1748		Not given.	Sintered; tested in vacuum; relative data; plotted points based on datum of Ref. 49-8.
▽	62-34	73-593		0.03 Rh, 0.01 Fe, 0.002 Pt, 0.001 Cu, 0.001 Ni, and 0.0005 Pd; density 12.36 g ml^{-1}; 2.5 cm in length and 0.660 cm dia.	Argon-arc melted and ground.

TPRC

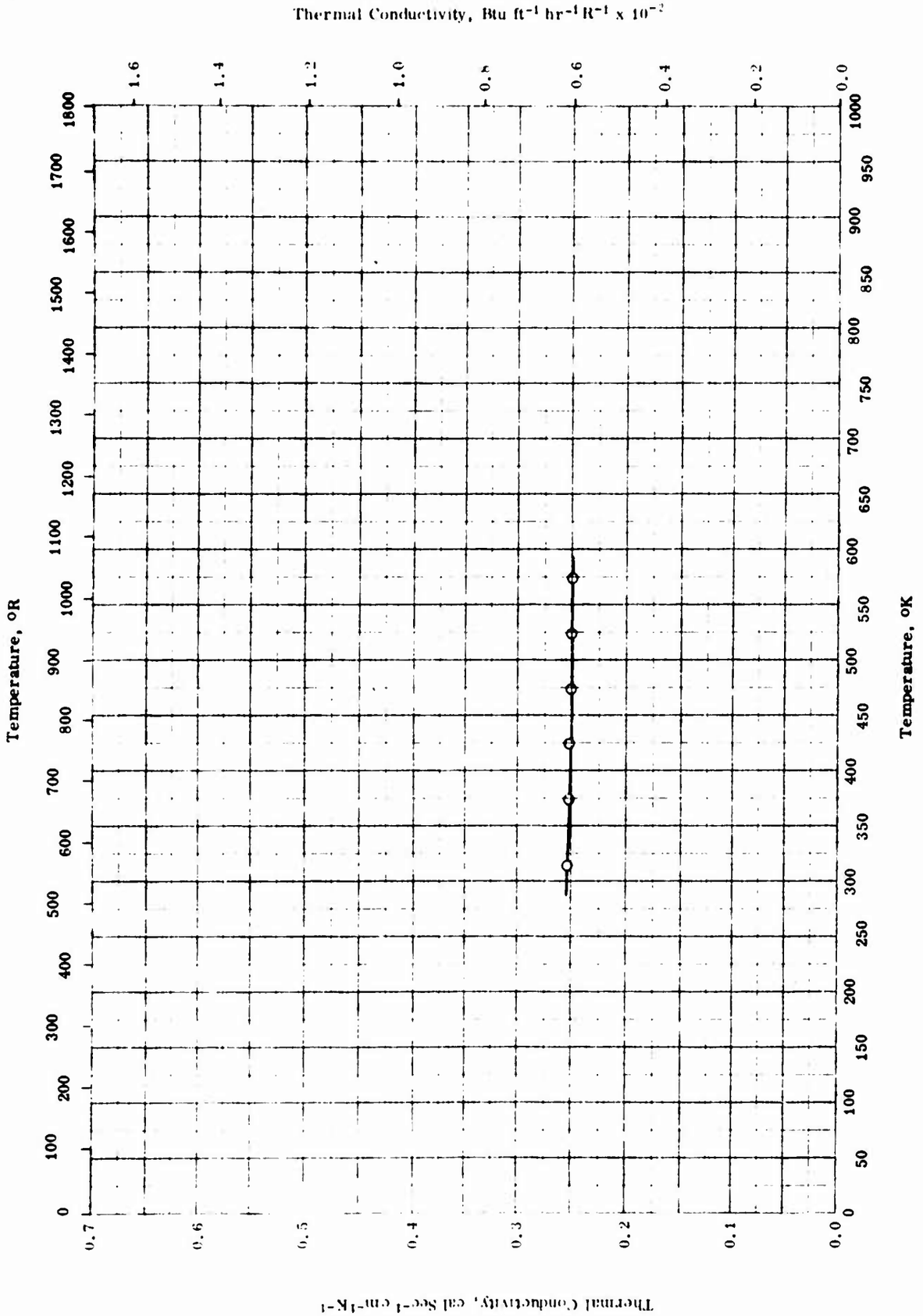


SPECIFIC HEAT -- RUTHENIUM

SPECIFIC HEAT -- RUTHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	59-21	11-272		Not given.	Treated with HNO_3, washed with water and dried for 2 days at 1400 C.

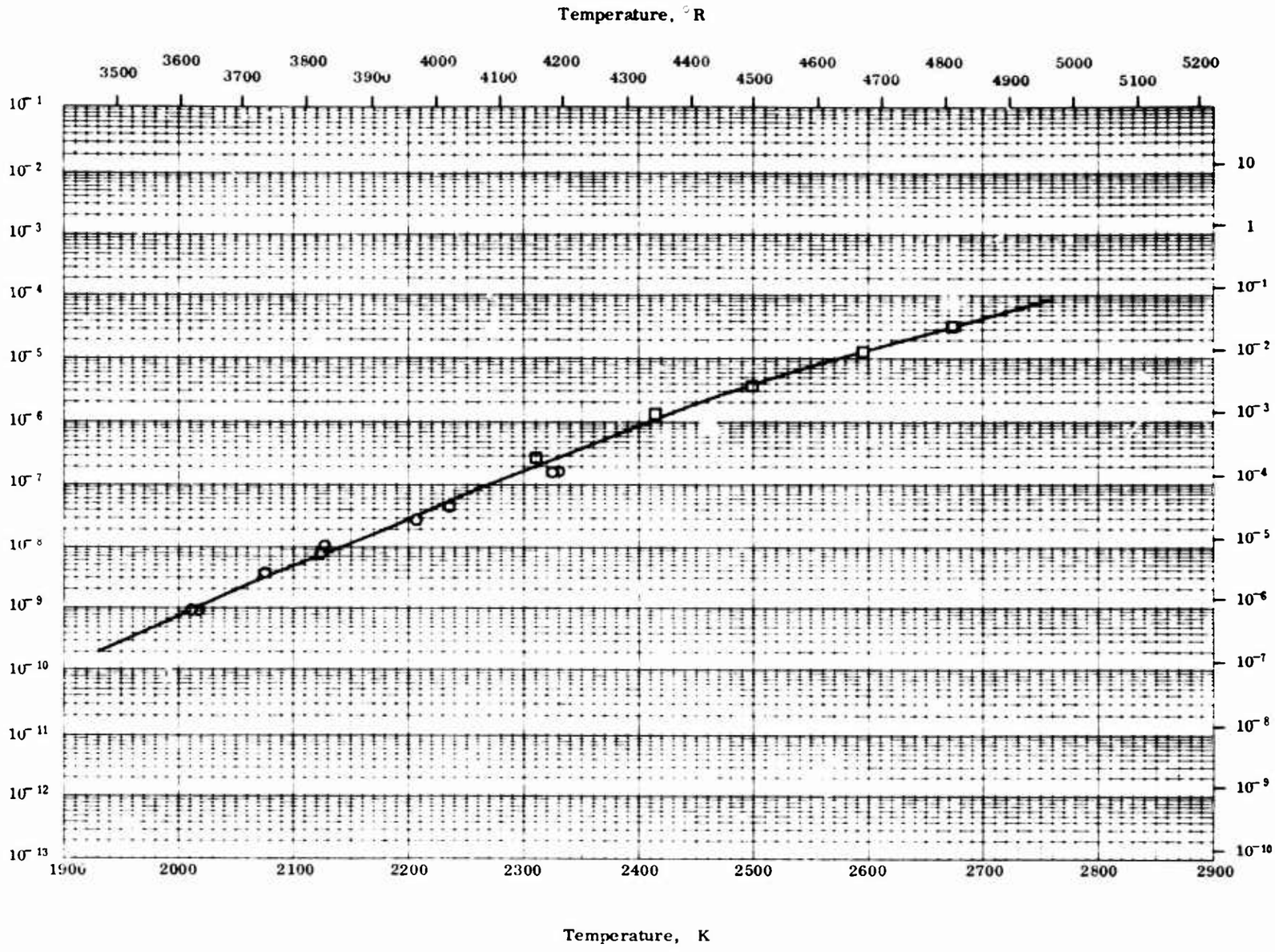


THERMAL CONDUCTIVITY -- RUTHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-34	313-573		0.03 Rh, 0.01 Fe, 0.002 Pt, 0.001 Cu, 0.001 Ni, and 0.0005 Pd; 2.5 cm long and 0.660 cm dia rod with density 12.36 g ml^{-1}.	Argon-arc melted and ground.

TPRC



VAPOR PRESSURE -- RUTHENIUM

TPRC

VAPOR PRESSURE -- RUTHENIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specificat	Remarks
○	61-20	2011-2330		99. 8 Ru.	
□	61-21	2310-2673		Not given.	

PROPERTIES OF SAMARIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7.54	471
Melting Point	1345	2421
Heat of Fusion	20	36
Heat of Vaporization	306	551
Heat of Sublimation	320_{810K}	580_{1460R}

REPORTED VALUES

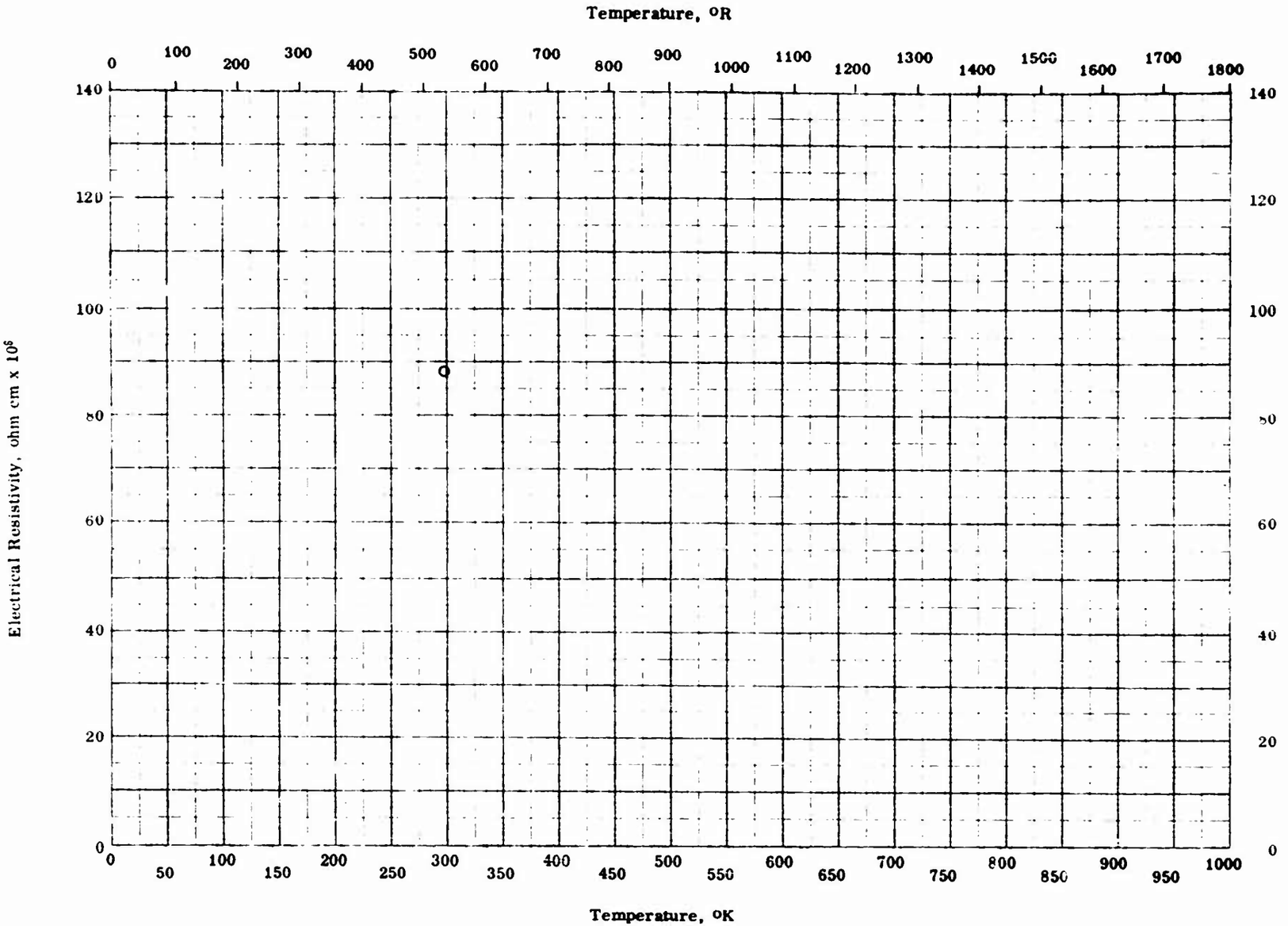
Density		g cm^{-3}	lb ft^{-3}
	○	.540	470.7
	▲	7.499	468.2
	▼	7.509	468.8
	◆	7.495	467.9
	■	7.50	468.0
Melting Point		K	R
	□	1345.2	2421
	△	1325	2384
	◇	1673	3012
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	◁	17	31
	●	13.8	24.8
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	▷	306	551
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	▽	$324_{812K} \pm 3$	$583_{1462R} \pm 5$

PROPERTIES OF SAMARIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	58-18	1345		0.2> Eu, 0.05 > Ca, and 0.01> each Fe, La, Mg, and Si.	Based upon heat capacity measurements.
△	54-11	1325		Very pure.	M. P. from thermal analysis; heating and cooling rates at 10 C min^{-1}.
◇	53-37	1673		Not given.	
▽	56-40	812		High purity.	Δh_S from vapor pressure data.
◁	56-54	1325		Very high purity.	
▲	53-44	297		0.1 Bi, 0.08 Eu, 0.01> each Ba, Si, and Sn, and 0.001> each Li, Na, Mg, Ca, Mn, Fe, and Cu.	As made; density by weight in air and in acetylene tetrabromide.
▼	53-44	297		Same as above.	Recast; density measurements same as above.
◆	53-44	297		Same as above.	Distilled; density measurements same as above.
●	62-13	1190		Not given.	Transition $\alpha \rightarrow \beta$ at 1190 K.
■	62-13	298		Not given.	
▷	62-13	298		Not given.	

TPRC



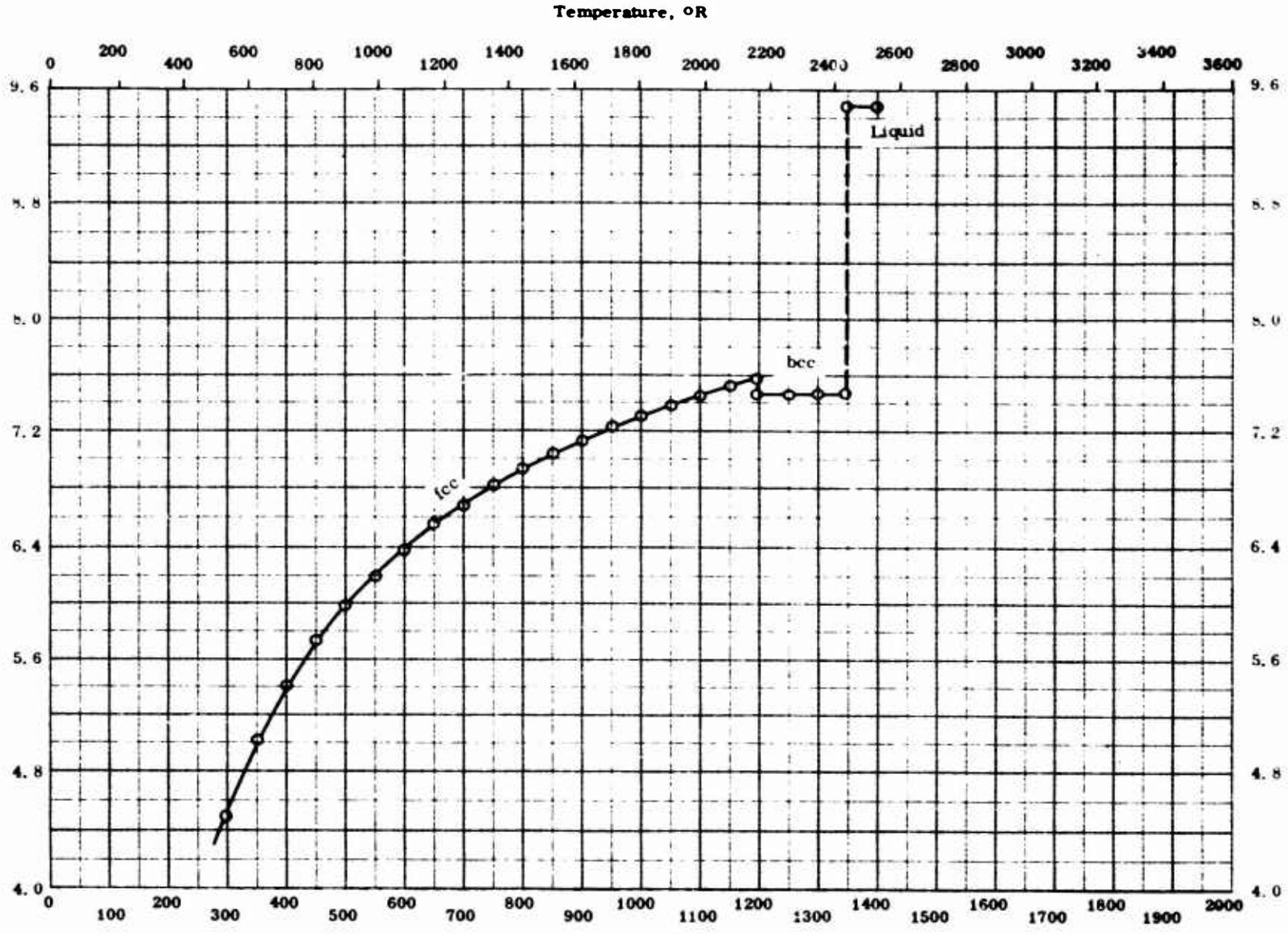
ELECTRICAL RESISTIVITY -- SAMARIUM

TPRC

ELECTRICAL RESISTIVITY -- SAMARIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		α-phase.	



SPECIFIC HEAT -- SAMARIUM

TPRC

SPECIFIC HEAT -- SAMARIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-25	298-1398	0.14	0.2 > Eu, 0.05 > Ca, 0.01 > Fe, 0.01 > La, 0.01 > Mg, and 0.01 > Si.	

TPRC

PROPERTIES OF SCANDIUM

MOST PROBABLE VALUES

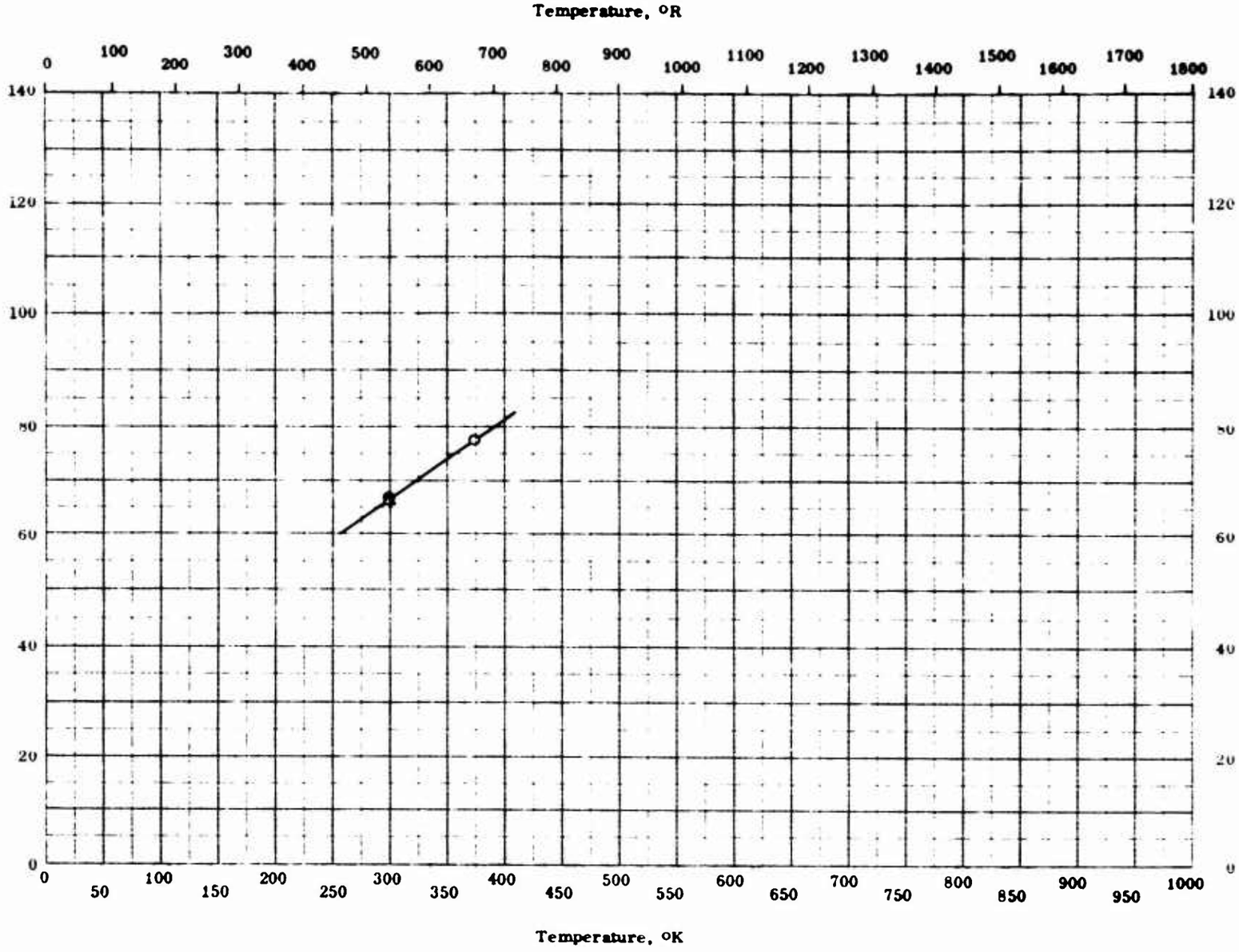
Property	C.G.S. Units	Brit. Eng. Units
Density.	3.00	187
Melting Point	1811	3260
Heat of Fusion	80	150
Heat of Vaporization. . .	1796	3233
Heat of Sublimation . . .	1747	3145

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	2.995	187.0
	△	3.016	188.3
	◇	3.00	187.2
Melting Point		K	R
	□	1673	3012
	▲	1845 ± 25	3321 ± 45
	◁	1811	3260
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	●	84	150
	■	93.3	167.9
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▼	1796	3233
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◆	1620	2920
	▽	1747	3145

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	53-37	1673			
△	56-54	298		Very high purity.	
▲	56-54	3225		Same as above.	
●	56-54	3225			
◆	56-54	---			
▽	60-23	1505-1748		Not given.	
◇	62-13	298			
■	62-13	1723-1748			Transition $\alpha \rightarrow \beta$.
▼	62-13	298			
◁	60-23	1811		High purity.	

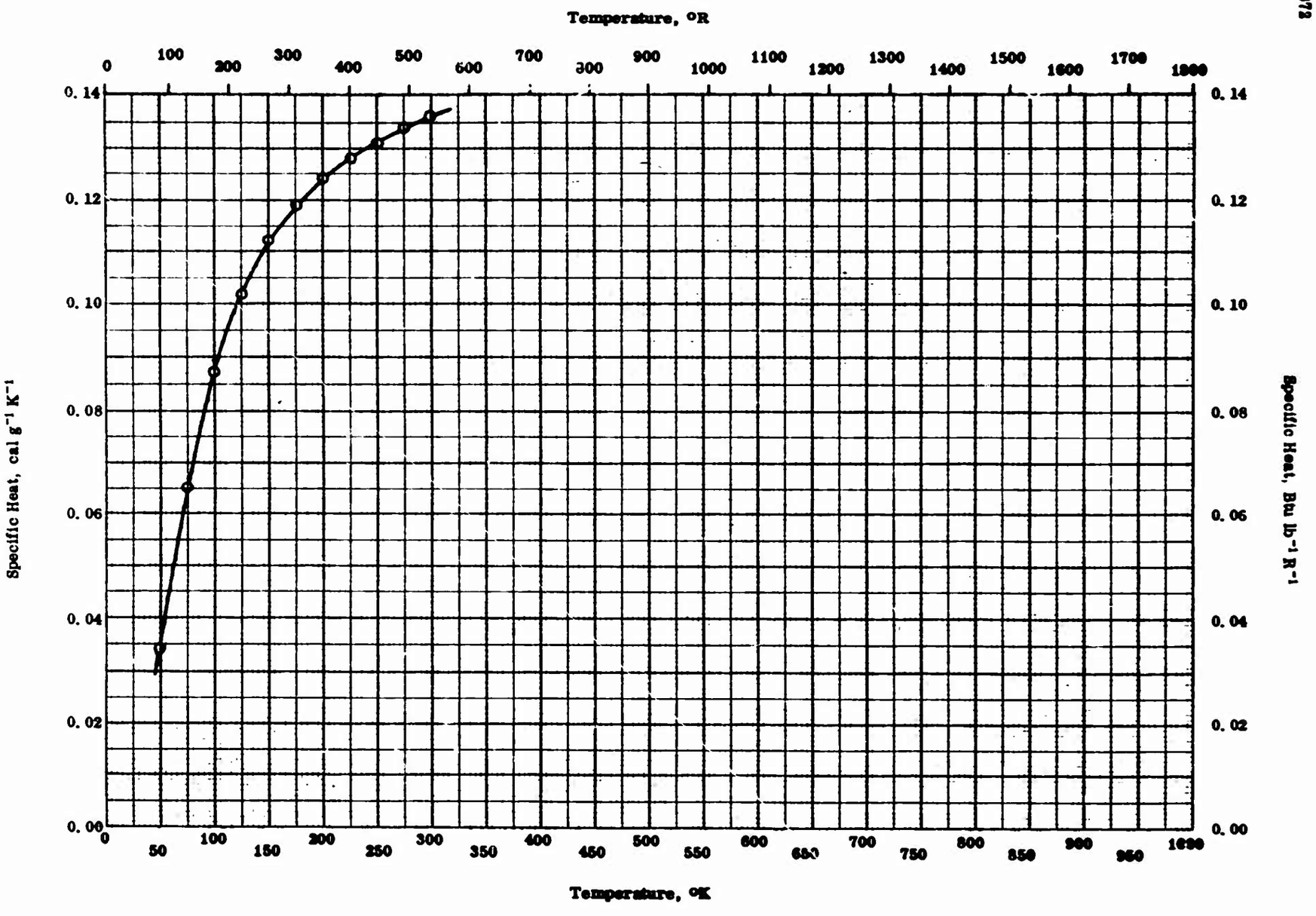


TPRC

ELECTRICAL RESISTIVITY -- SCANDIUM

REFERENCE INFORMATION

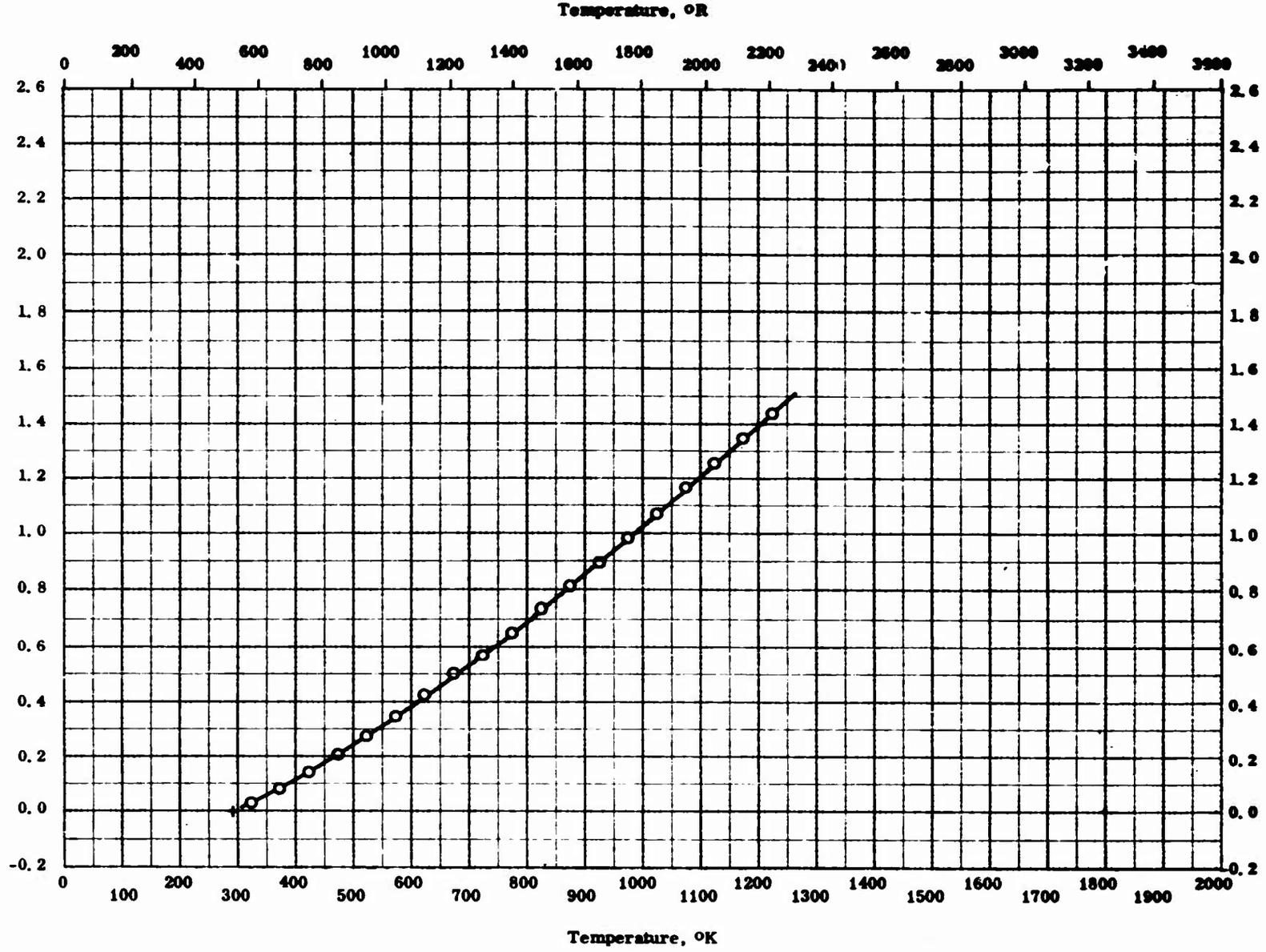
Symbol	Ref.	Temp. Range °K	Rept. Error σ_r	Sample Specifications	Remarks
O	60-23	299-373			
Δ	62-13	299		α-phase.	



SPECIFIC HEAT -- SCANDIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-16	52-296	0.3	0.06 Cu, 0.02 Pb, 0.01 Al, 0.01 Fe, 0.01 Ti, 0.01 Y; crystalline.	



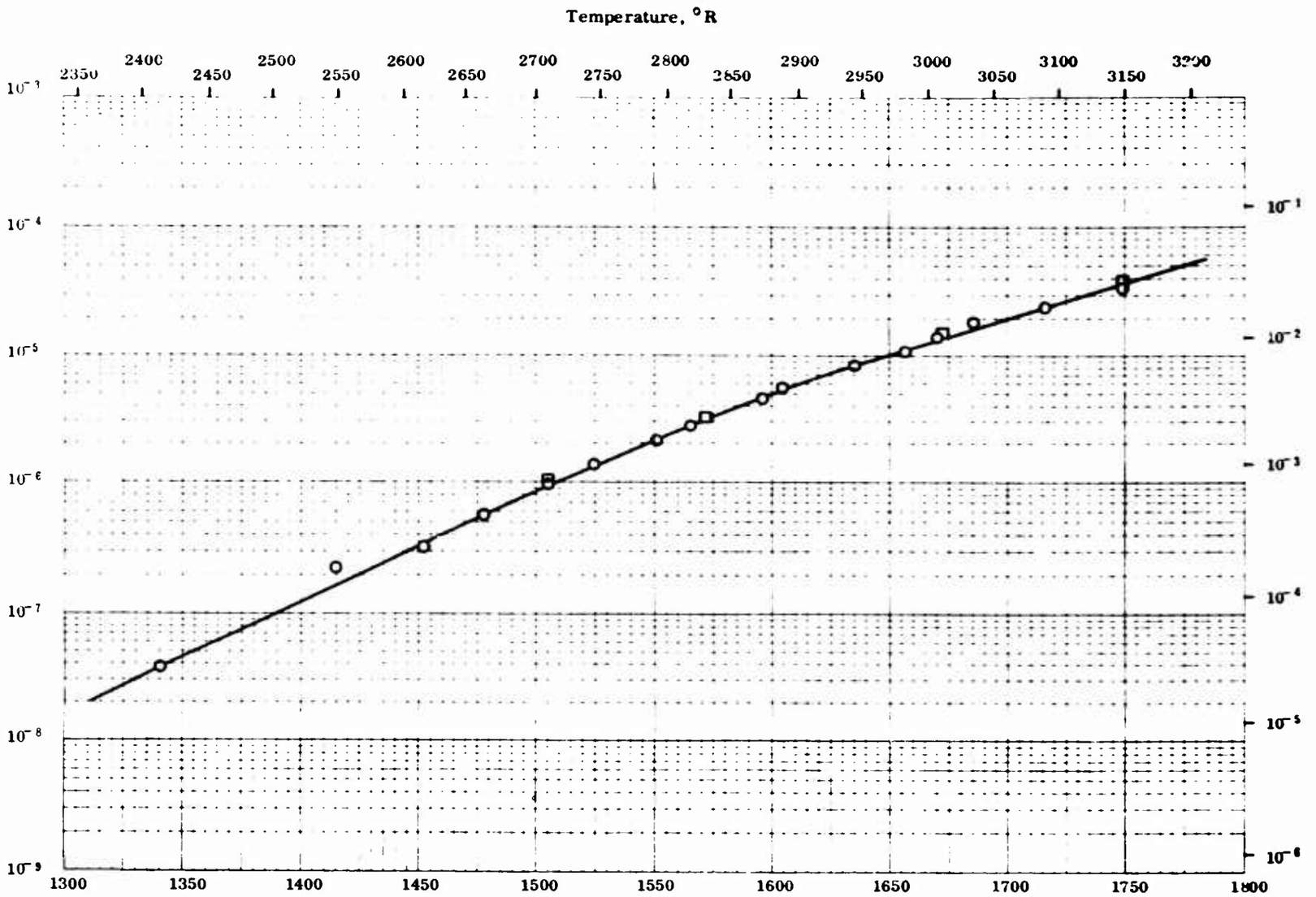
THERMAL LINEAR EXPANSION -- SCANDIUM

TPRC

THERMAL LINEAR EXPANSION -- SCANDIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-52	298-1223		Density 3.05 g cm^{-3}.	Specimen produced at Metals Res. Lab by calcium reduction of scandium fluoride and subsequent distillation of the metal; measured in argon.



VAPOR PRESSURE -- SCANDIUM

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-23	1340-1748		0.10 Fe, 0.1 O_2, 0.06 Cr, 0.02 Ca, and 0.02 Mg.	
□	62-13	1505-1748		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{17180}{T(K)} + 8.298$.

TPRC

PROPERTIES OF SILICON

MOST PROBABLE VALUES

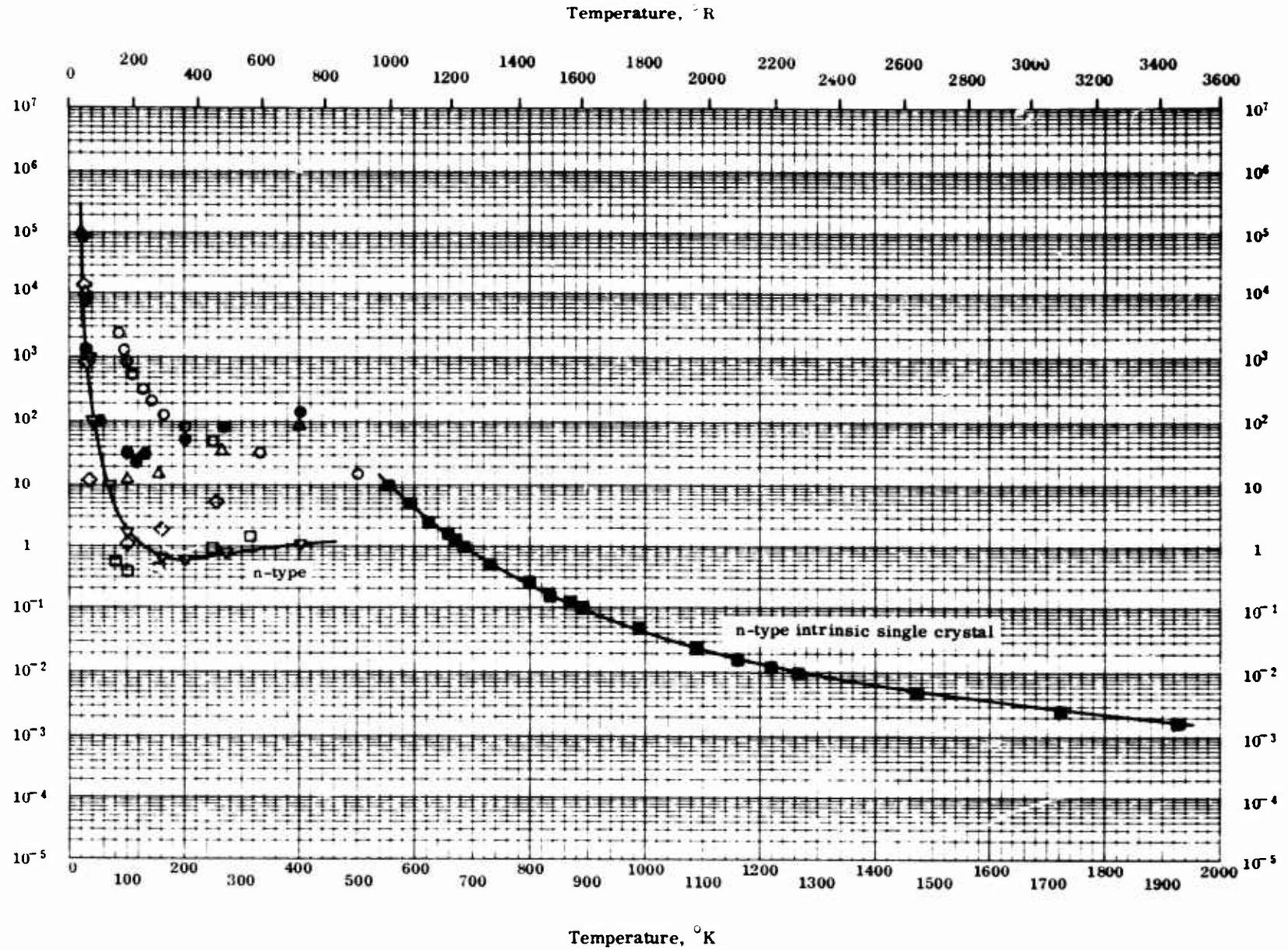
Property	C.G.S. Units	Brit. Eng. Units
Density.	2.33	145
Melting Point	1685	3031
Heat of Fusion	43[illegible]	776
Heat of Sublimation . . .	3744_{1550K}	6740_{2790}

REPORTED VALUES

		g cm^{-3}	lb ft^{-3}
Density			
	▽	2.3283	145.36
	●	2.33067	145.500
	■	2.3305	145.49
	▲	2.330	145.5
	▼	2.327 ± 0.0015	145.2 ± 0.1
Melting Point		K	R
	○	1713	3084
	△	1681 ± 2	3026 ± 4
	◇	1685 ± 2	3034 ± 4
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	◆	431 ± 4	776 ± 6
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
Gas phase; Si_1	□	3744_{1550K} ± 428	6740_{2790R} ± 700
Gas phase; Si_2	□	2406_{1550K} ± 214	4330_{2790R} ± 380
Gas phase; Si_3	□	1650_{1550K}	2970_{2790R}
Gas phase; Si_4	□	1300_{1550K}	2340_{2790R}

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-32	1713		Not given.	M. P. from collapse of black body hole in sample.
□	54-31	1550		Not given.	Δh_s from vapor pressure data.
△	57-49	1681		Not given.	M. P. from collapse of sample.
◇	57-47	1686		99.99+ pure, trace of Fe, and slight traces of B, Mg, and Cu.	M. P. from break in enthalpy and temperature curve.
◆	57-47	1686		Same as above.	Δh_f from enthalpy of solid and liquid by drop method into adiabatic calorimeter.
▽	52-17	293		99.97 Si and 0.03 C; powdered sample.	Density by weighting in air and water.
●	55-51	298		Pure.	Zone-refined.
■	55-51	298		Pure.	Density computed from x-ray measurements.
▲	57-60	295		Pure.	Density from weight in air and in CCl_4.
▼	57-60	295		Arsenic-doped.	Total 5 samples.



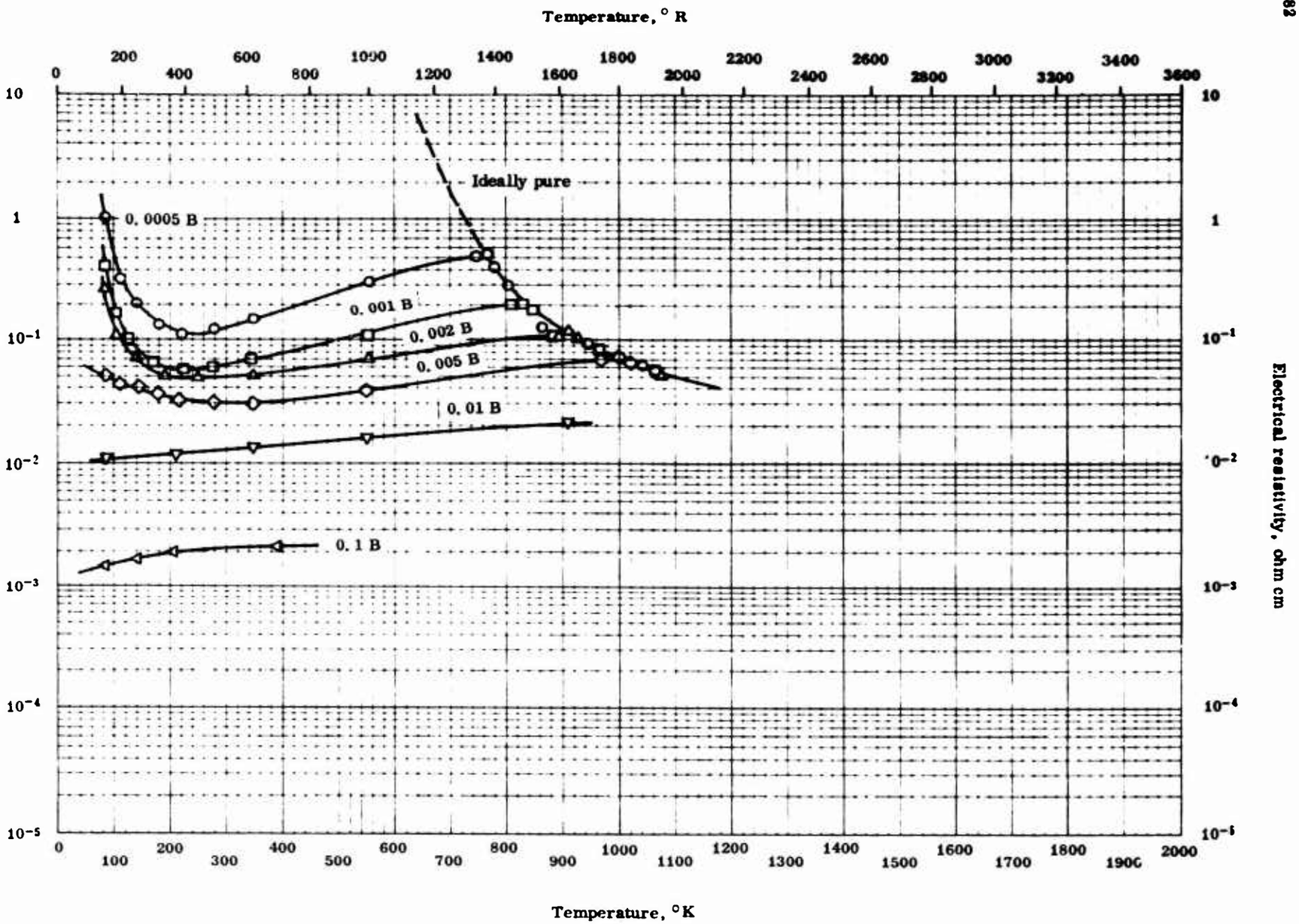
ELECTRICAL RESISTIVITY -- SILICON

TPRC

ELECTRICAL RESISTIVITY -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-9	38-1000		99.9 pure.	
□	55-30	79-316		High purity.	
△	55-31	100-400		Monacrystalline; n-type.	
▽	55-31	100-400		Same as above.	Rotated during growth, held 48 hrs at 1000 C, and annealed 6 days at room temp.
◇	55-31	100-400		Same as above.	Rotated during growth, held 48 hrs at 1000 C, and air quenched.
●	55-31	100-400		Same as above.	Held 48 hrs at 1000 C, and air quenched.
■	56-31	553-1923		n-type intrinsic single crystal.	



ELECTRICAL RESISTIVITY -- SILICON
(0.0005-0.1 B)

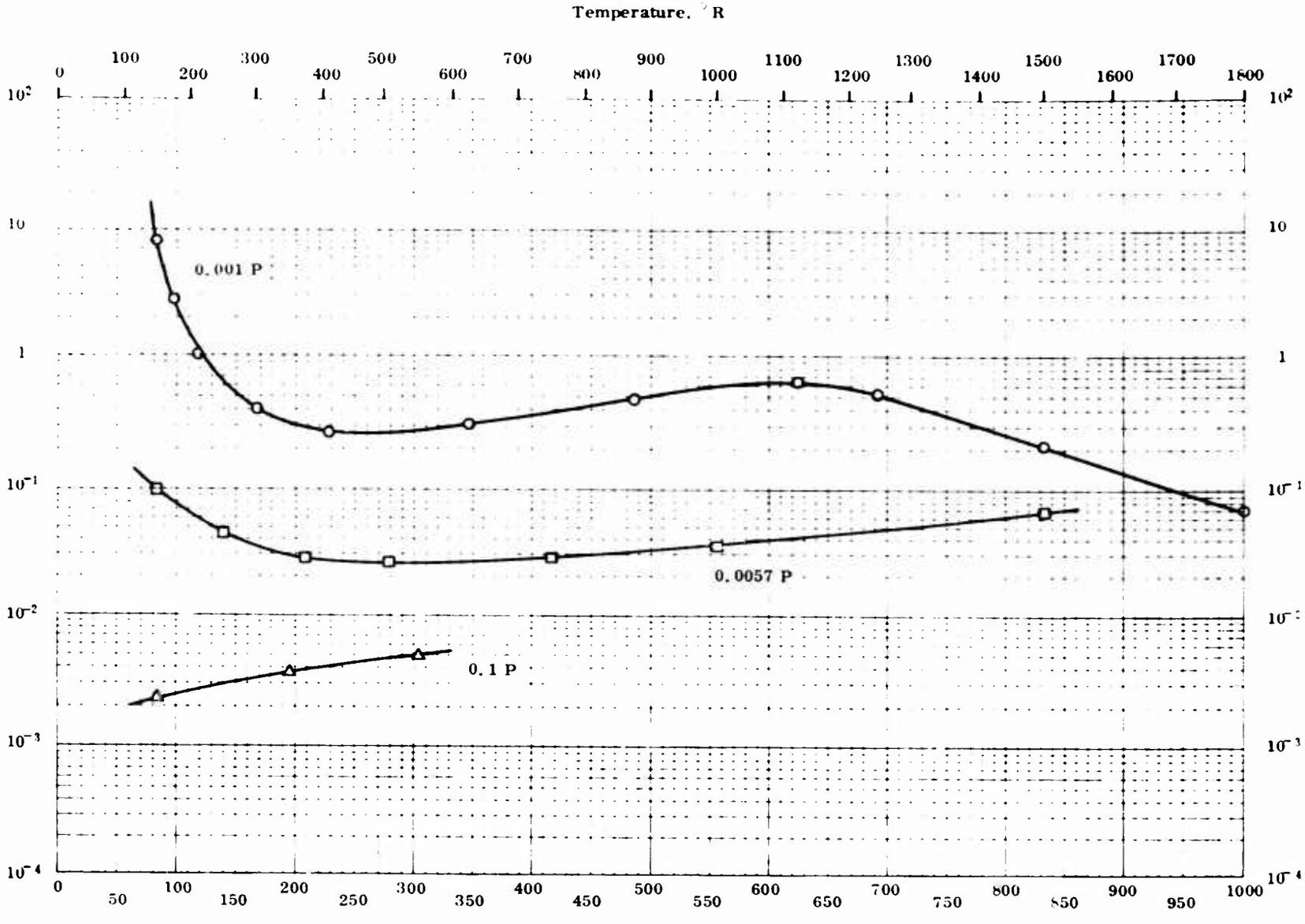
Electrical resistivity, ohm cm

ELECTRICAL RESISTIVITY -- SILICON
(0. 0005-0. 1 B)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-9	83-1000		0. 0005 B.	
□	49-9	83-1000		0. 001 B.	
△	49-9	83-1000		0. 002 B.	
◇	49-9	83-1000		0. 005 B.	
▽	49-9	83-911		0. 01 B.	
◁	49-9	83-333		0. 1 B.	

TPRC



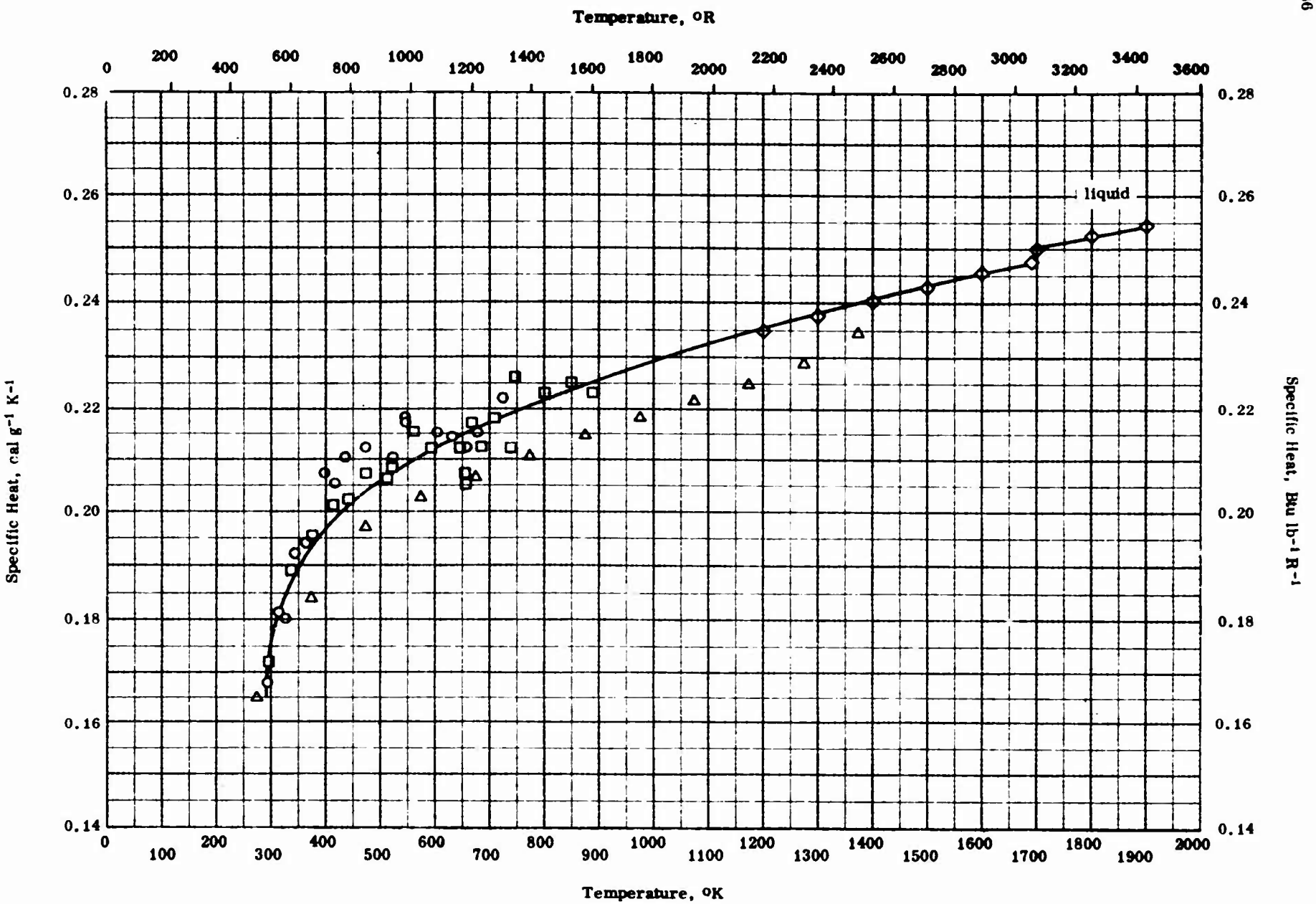
ELECTRICAL RESISTIVITY -- SILICON
(0.001 - 0.1 P)

ELECTRICAL RESISTIVITY -- SILICON
(0.001 - 0.1 P)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-9	83-1000		0.001 P.	
□	49-9	83-833		0.0057 P.	
△	49-9	83-303		0.1 P.	

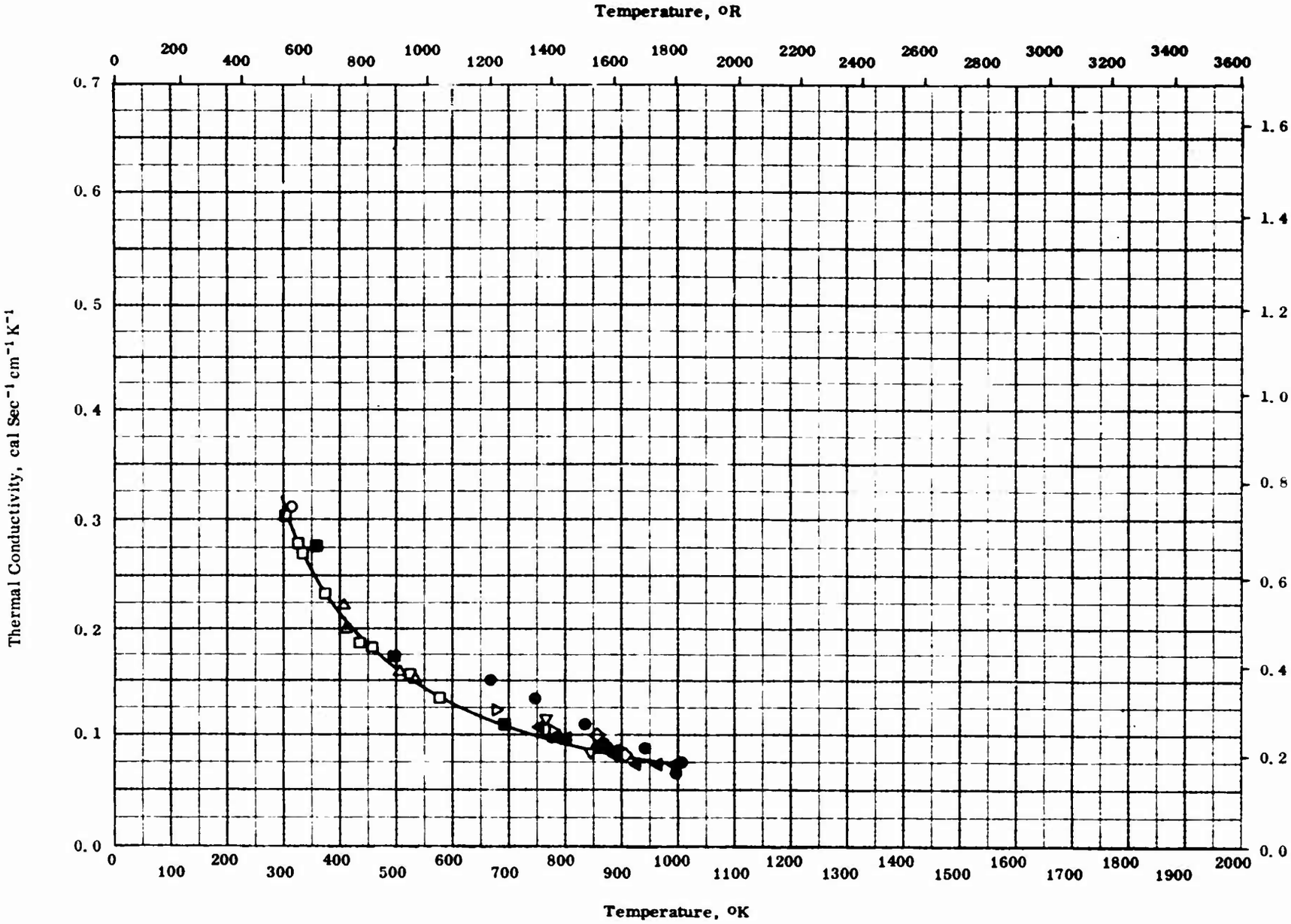
TPRC



SPECIFIC HEAT -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-11	295-723	< 3.0	Si-4-690-2; 0.003 ohm cm resistivity; n-type.	
□	64-11	297-889	< 3.0	Si-4690-1; 0.003 ohm cm resistivity; n-type.	
△	63-13	273-1373	0.5	4 A; single crystal, p-type; 10> ohm cm resistivity at 300 K, orientation (1, 1, 1).	
◇	60-27	1200-1900		Highest purity.	



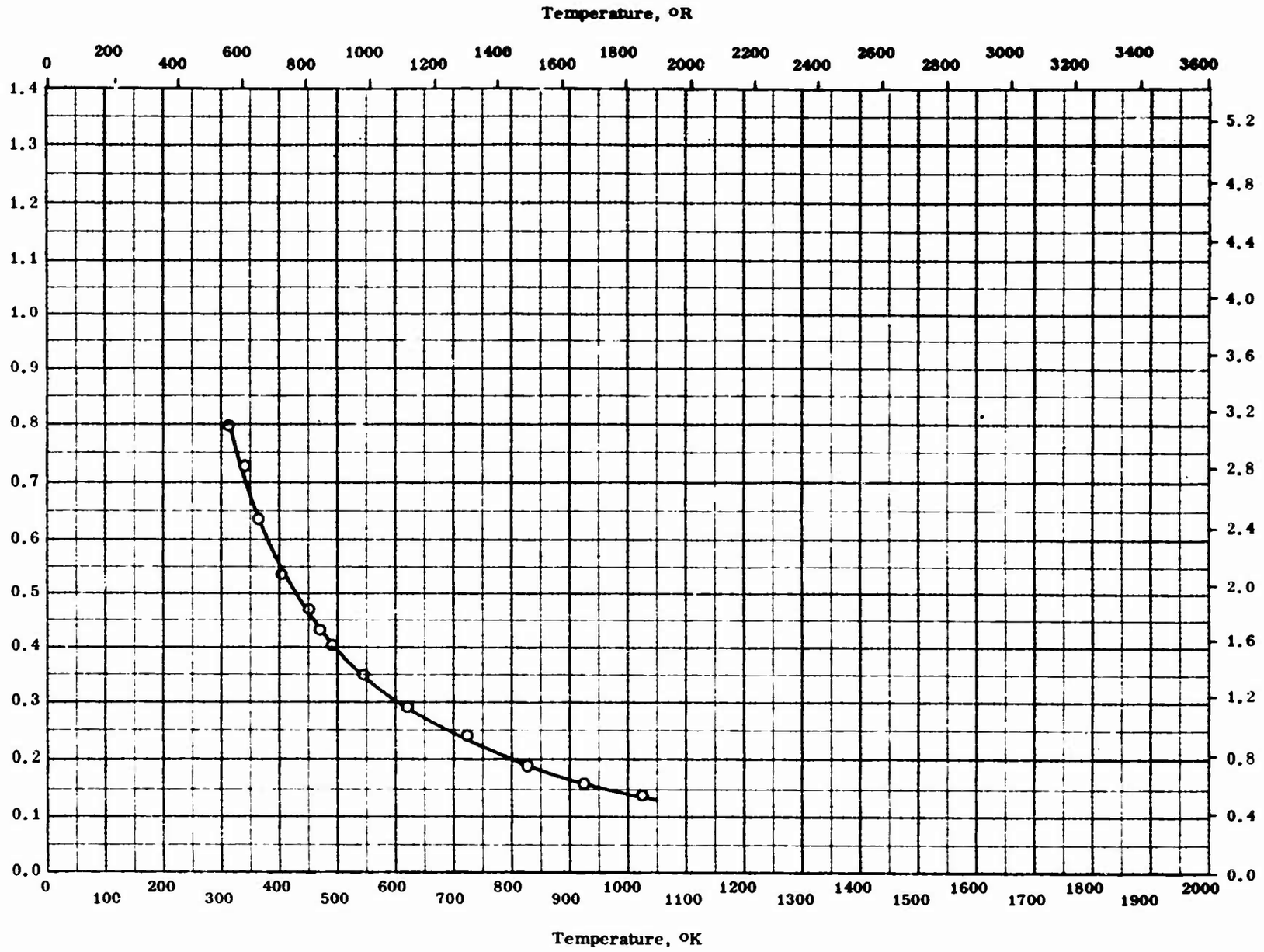
THERMAL CONDUCTIVITY -- SILICON

TPRC

THERMAL CONDUCTIVITY -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-8	314		p-type.	Rod in vacuum.
□	60-9	303-579	± 5	p-type single crystal; room temperature resistivity about 3 ohm cm.	
△	60-9	328-533	± 5	n-type single crystal with same room temperature resistivity as the above sample.	
▽	62-5	767-846	± 20	p-type single crystal with (111)orientation; acceptor concentration 10^{18} per cm^3. [Author design.: KA-1]	First run.
◀	62-5	756-997	± 20	Same as above.	Third run.
▷	62-5	679-778	± 20	n-type single crystal with (111) orientation; donor concentration 5×10^{16} per cm^3. [Author design.: KB-1]	
◇	62-5	857-906	± 20	Same as above except author designated as KB-2.	First run.
●	62-5	669-1002	± 20	Same as above.	Third run.
■	61-4	303-693		p-type single crystal; sample 12 mm dia and 7 mm long.	

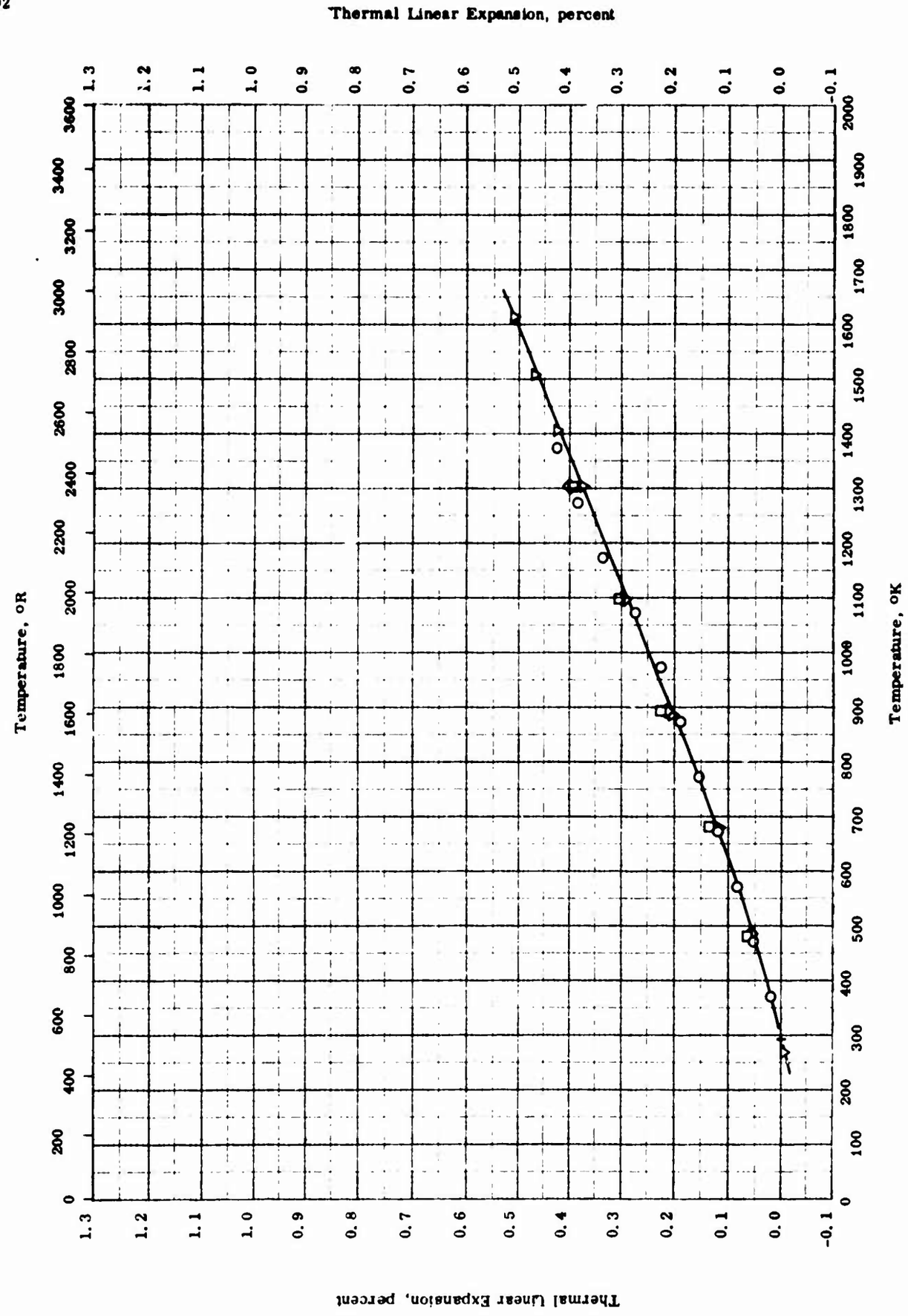


THERMAL DIFFUSIVITY -- SILICON

THERMAL DIFFUSIVITY -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-6	308-1020	±2	Si 142; electrical resistivity 100 ohm-cm.	

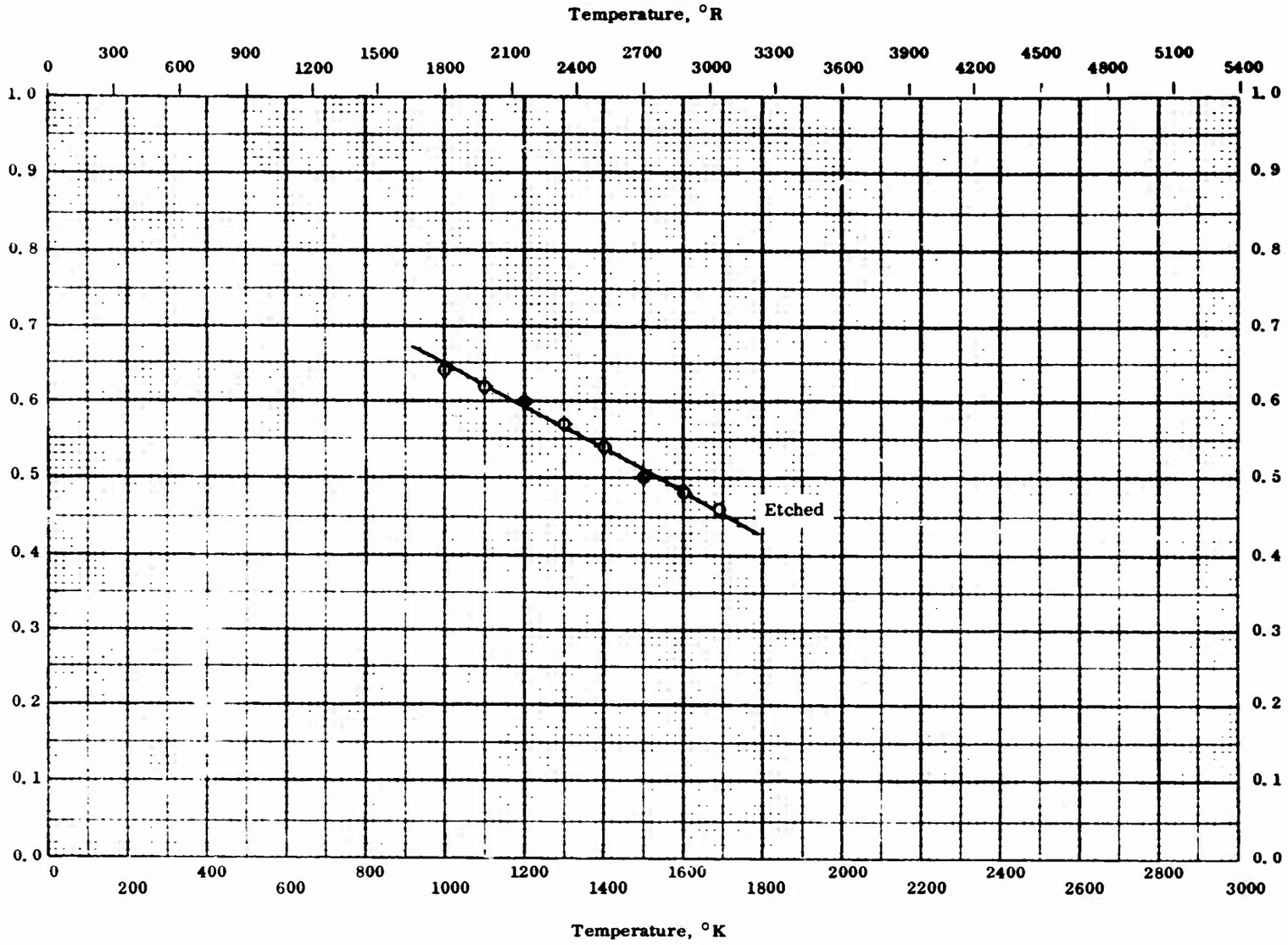


THERMAL LINEAR EXPANSION -- SILICON

THERMAL LINEAR EXPANSION -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-44	373-1373		99.7 - 99.9 pure; cubic.	X-ray diffraction.
□	54-42	303-1303		Commercial grade.	X-ray diffraction.
◇	55-54	273-1303		0.001 - 0.01 Fe, 0.0001 - 0.001 each Al, Ca, Cu, Mg, and 0.0001 > Mn.	Bell Telephone Labs preparation; sintered at 1050 C in Al_2O_3; tested in He atm.; x-ray diffraction.
▽	57-65	273-1612		99.97 pure with slight traces of Al, Ca, Cu, Mg, Na.	Heated to 1133 C in vacuum, tested during cooling; x-ray diffraction method.

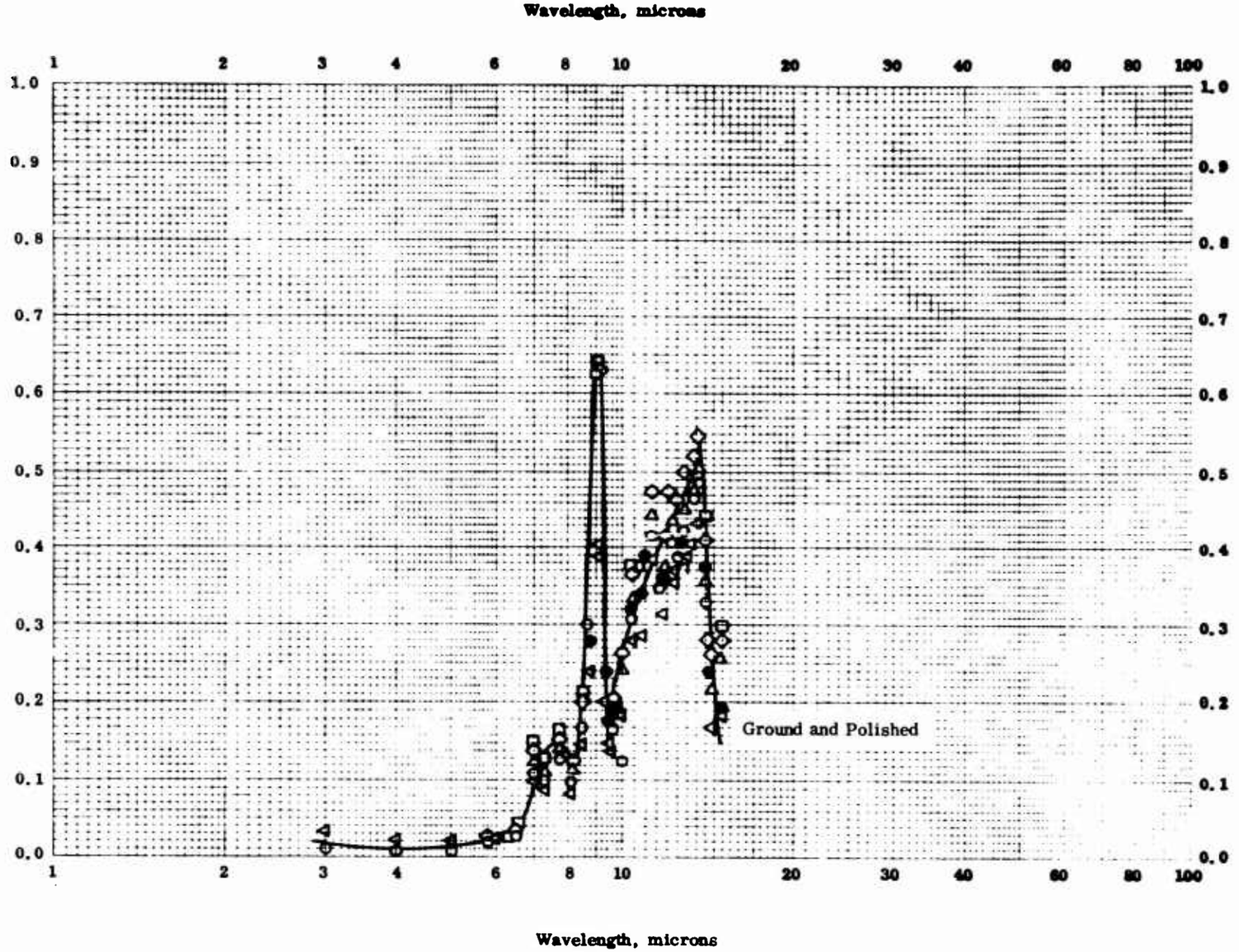


NORMAL SPECTRAL EMITTANCE -- SILICON

NORMAL SPECTRAL EMITTANCE -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	57-43	0.65	1000-1688	± 10	Single crystal.	Etched; measured in vacuum (10^{-7} - 10^{-9} mm Hg).

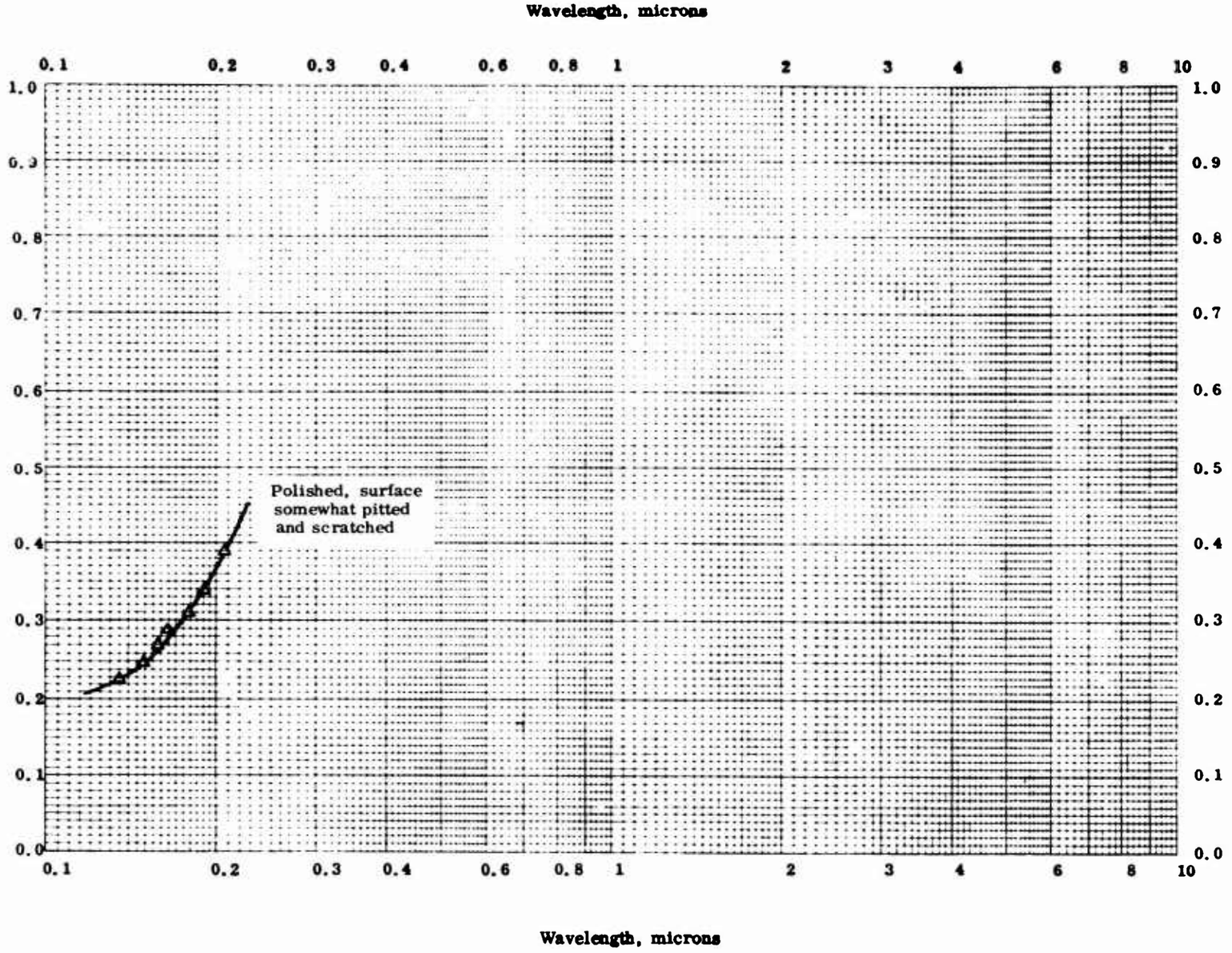


NORMAL SPECTRAL EMITTANCE -- SILICON

NORMAL SPECTRAL EMITTANCE -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	61-34	333	3-15		n-type, single crystal, resistivity 30 - 60 ohm-cm.	Ground and polished; measured in vacuum; data taken from smooth curve.
△	61-34	373	3-15		Same as above.	Same as above.
◇	61-34	413	3-15		Same as above.	Same as above.
□	61-34	433	3-15		Same as above.	Same as above.
◁	61-34	353	3-15		p-type, single crystal.	Ground and polished; measured in vacuum; data taken from smooth curve.
●	61-34	433	3-15		Same as above.	Same as above.



NORMAL SPECTRAL REFLECTANCE -- SILICON

NORMAL SPECTRAL REFLECTANCE -- SILICON

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
△	41-3	298	0.135-0.203		Not given.	Polished with tin oxide; surface somewhat pitted and scratched; measured in vacuum (~0.001 mm Hg).

PROPERTIES OF SILVER

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	10.5	656
Melting Point	1233.5	2220
Heat of Fusion	20	40
Heat of Vaporization. . .	580_{1234K}	1040_{2222R}
Heat of Sublimation . . .	610_{1234K}	1090_{2222R}

REPORTED VALUES

Density		g cm^{-3}	lb ft^{-3}
	○	10.4994	655.461
	□	10.49	654.6
Melting Point		K	R
	△	1234.43 ± 0.05	2221.97 ± 0.09
	◆	1233.5	2220
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	●	24.2	43.5
Heat of Vaporization		cal g^{-1}	Btu lb^{-1}
	▽	580.3_{1234K}	1044_{2222R}
Heat of Sublimation		cal g^{-1}	Btu lb^{-1}
	◇	417_{1053K}	751_{1896R}
	■	606.8_{1234K}	1092_{2222R}
	▲	613	1104

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	40-6	293		99.99+ pure.	Density from weight in air and CCl_4.
□	43-2	298		Pure.	Density from weight in air and water.
△	56-49	1234		Sample apparently of very high purity.	M. P. from thermal analysis.
◇	54-34	973-1133		Not given.	
▽	52-6	1234		99.99+ pure.	Δh_s from vapor pressure data.
□	52-6	1234		99.99+ pure.	Δh_v from vapor pressure data.
●	52-6	1222		Not given.	Δh_f by flowing air calorimeter.
◆	63-38	1233		99.9 Ag, 0.05 Cu, 0.03 H_2O, and 0.02 others.	

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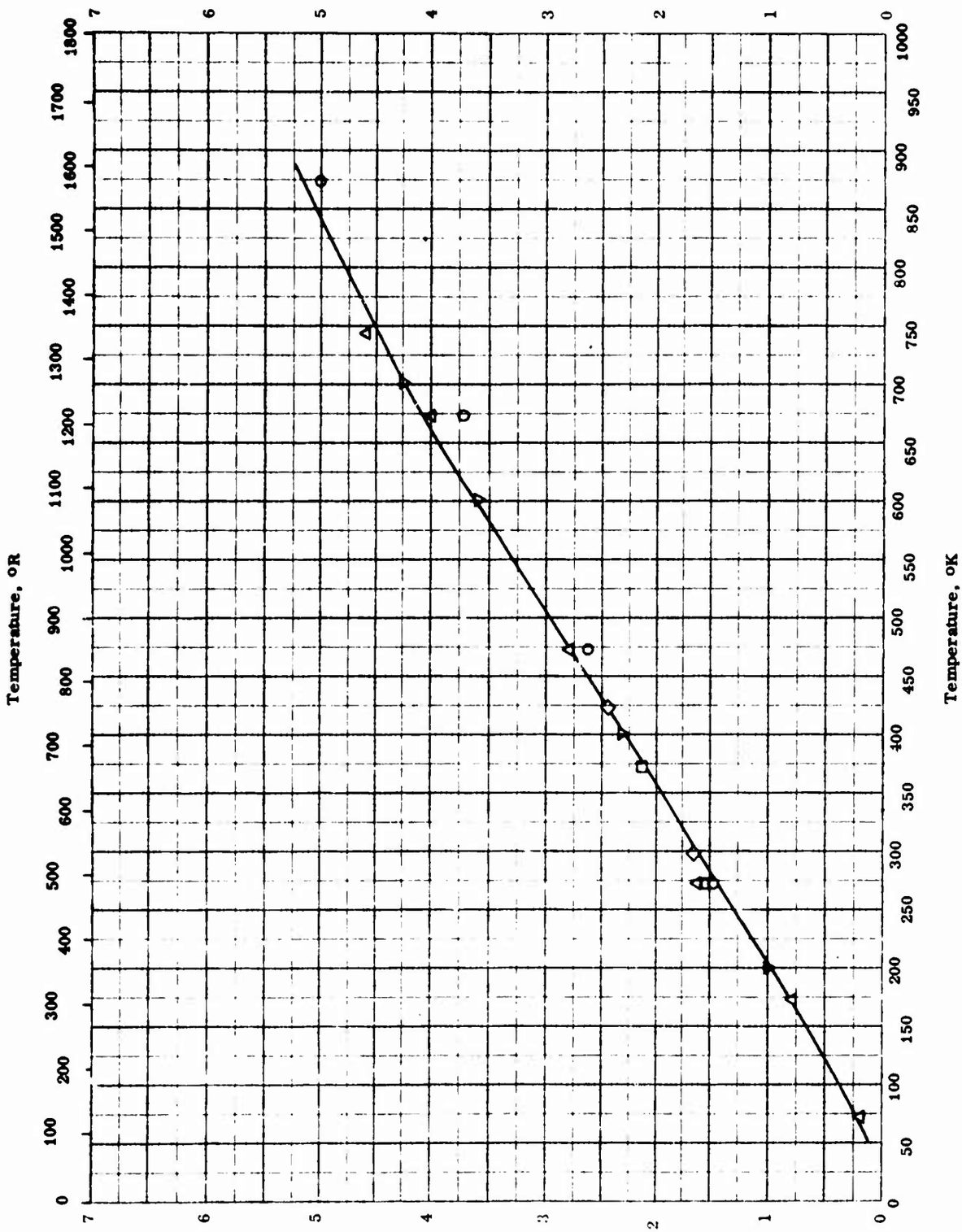


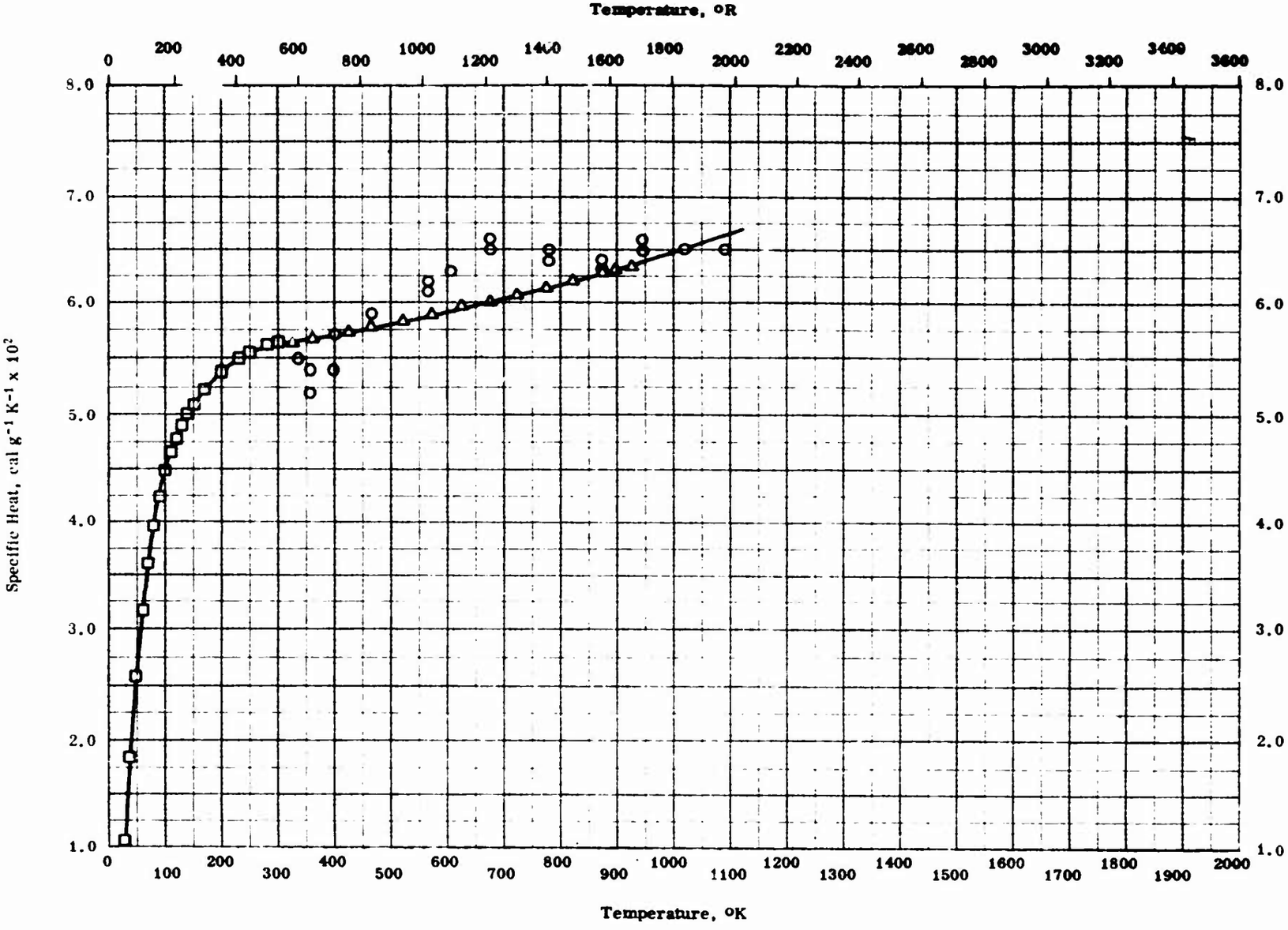
ELECTRICAL RESISTIVITY -- SILVER

Electrical Resistivity, ohm cm x 10⁶

ELECTRICAL RESISTIVITY -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	43-2	273-373		Not given.	
△	56-33	73-773		99.9 pure.	Swaged and annealed 1 hr at 500 C.
◇	57-30	298-423		Not given; 0.1 mm dia wire.	Relative values; computed resistivity based on 1.67μ ohm cm at 537 R.
○	62-40	273-873		Pure.	
▽	62-39	200-700		Pure.	

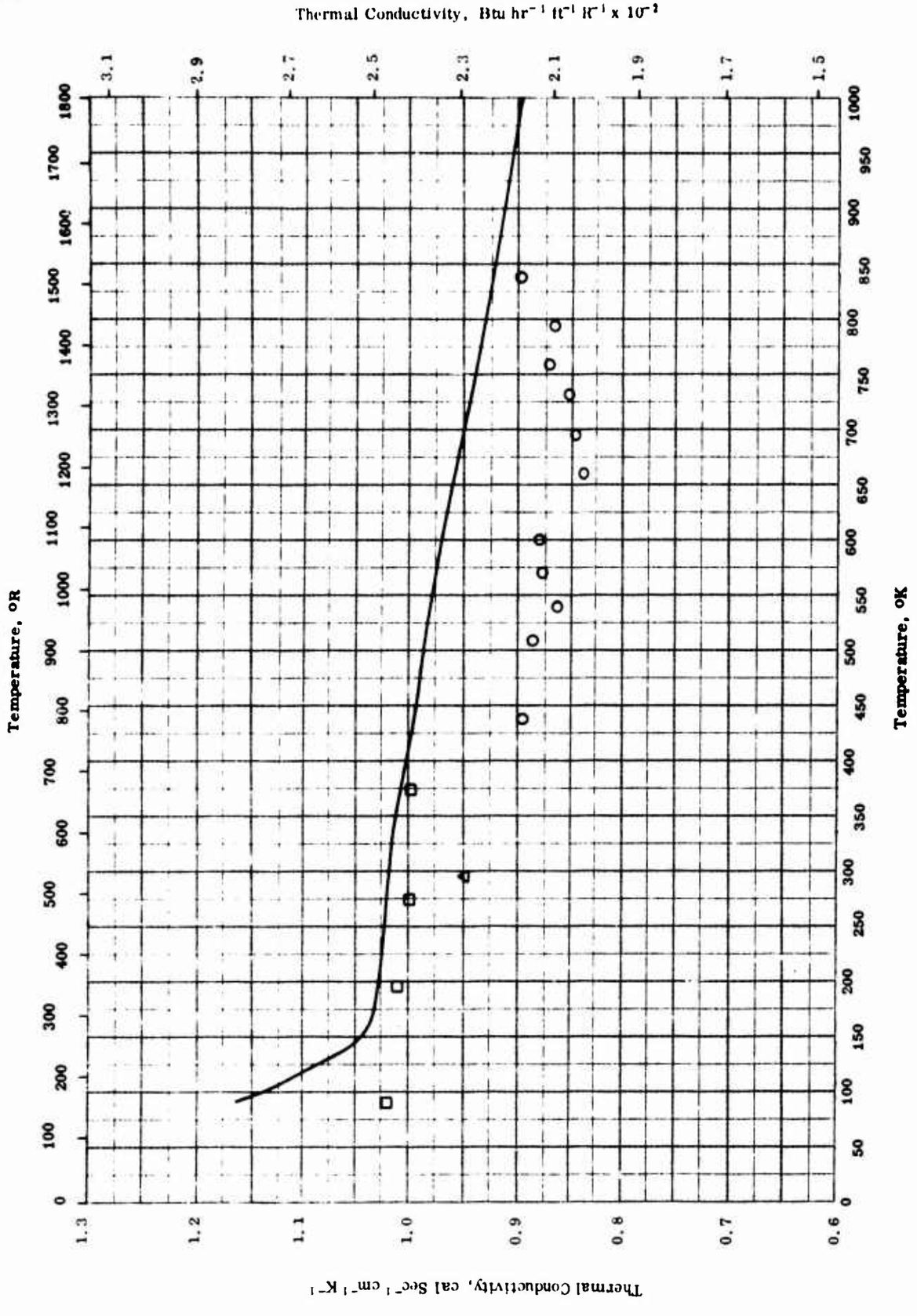


SPECIFIC HEAT -- SILVER

SPECIFIC HEAT -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-16	465-1090		Not given.	Specimen's surface plated with platinum black.
□	63-43	15-300		99.99 Ag.	Melted and crystallized in an atmosphere of nitrogen and cooled over a period of 5 days.
△	36-1	325-925		Inquartation silver.	Heated in argon atmosphere at reduced pressure.

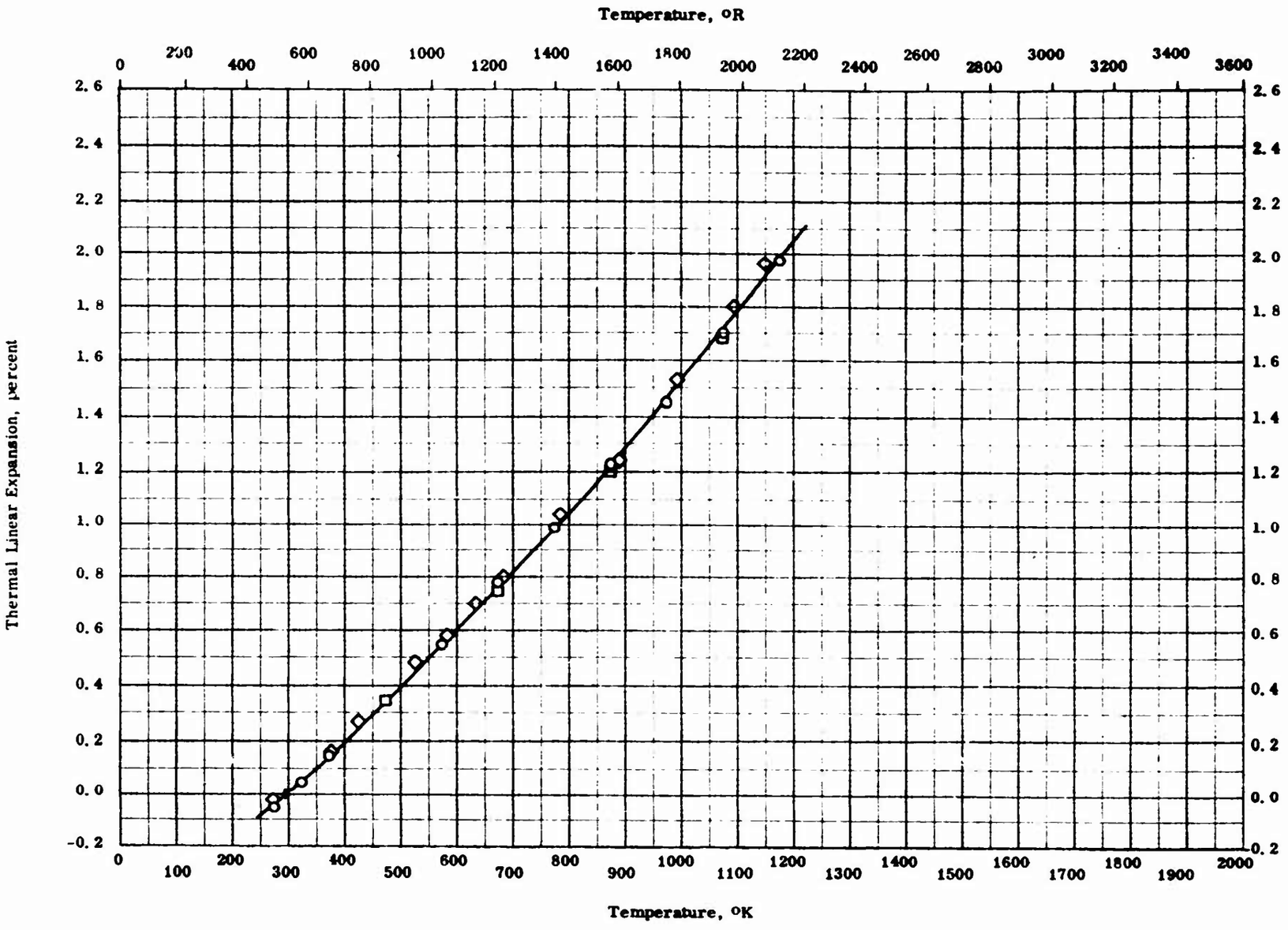


THERMAL CONDUCTIVITY -- SILVER

THERMAL CONDUCTIVITY -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	31-1	437-838		99.9 pure.	
□	33-1	90-373		Traces of Cu, Pb, Bi, Mg, Cd, Na, and Si.	Annealed at 500 C.
△	61-4	295	±5	Pure; density 10.49 g cm^{-3} at 20 C.	



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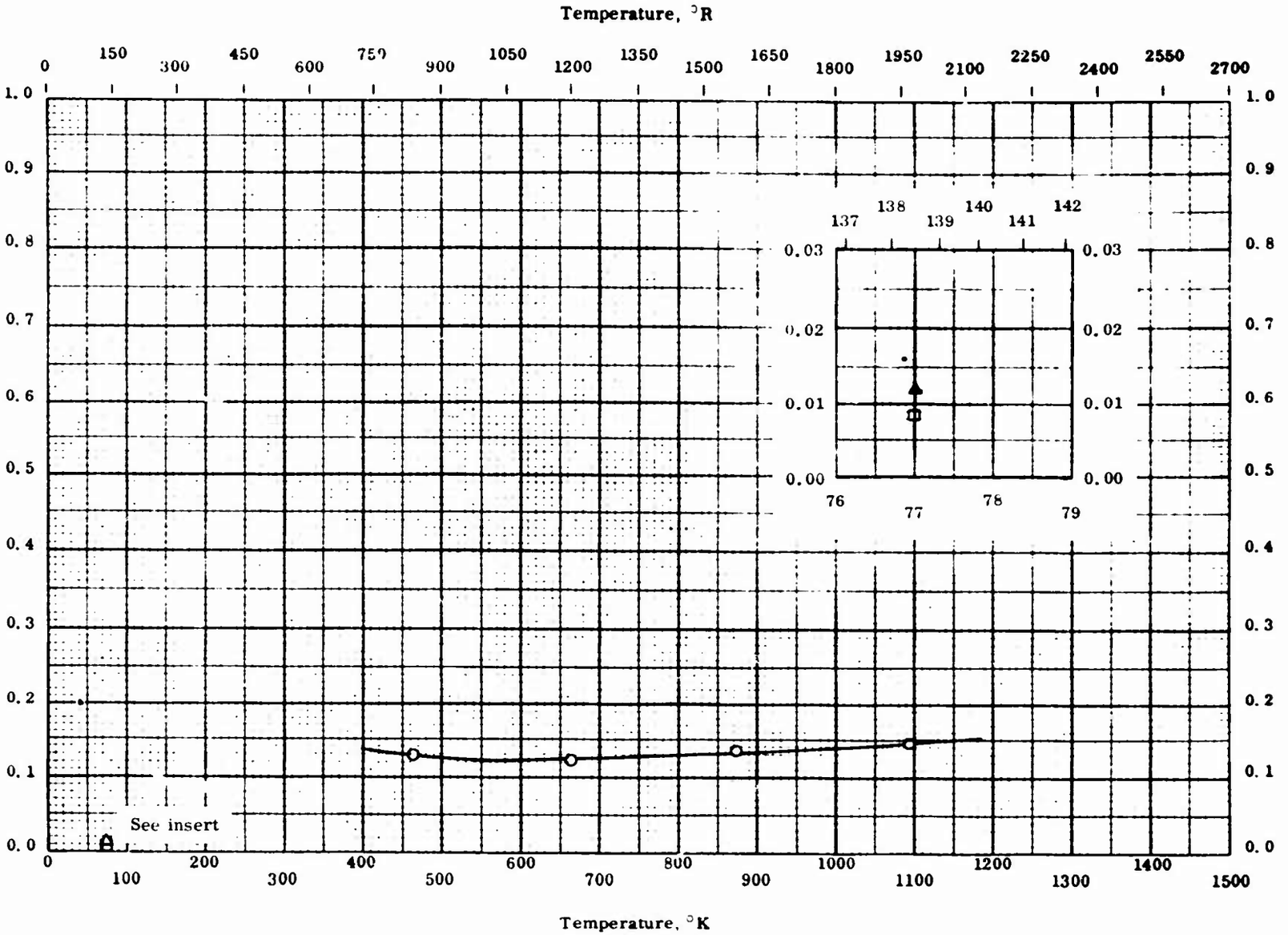
THERMAL LINEAR EXPANSION -- SILVER

THERMAL LINEAR EXPANSION -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	41-8	273-1173		Spectroscopically pure.	Annealed 1 hr at 900 C.
□	51-29	293-1073		99.9+ pure.	Annealed.
◇	55-54	273-1150		99.999 pure: from A.D. Mackay, Inc.	X-ray diffraction method.

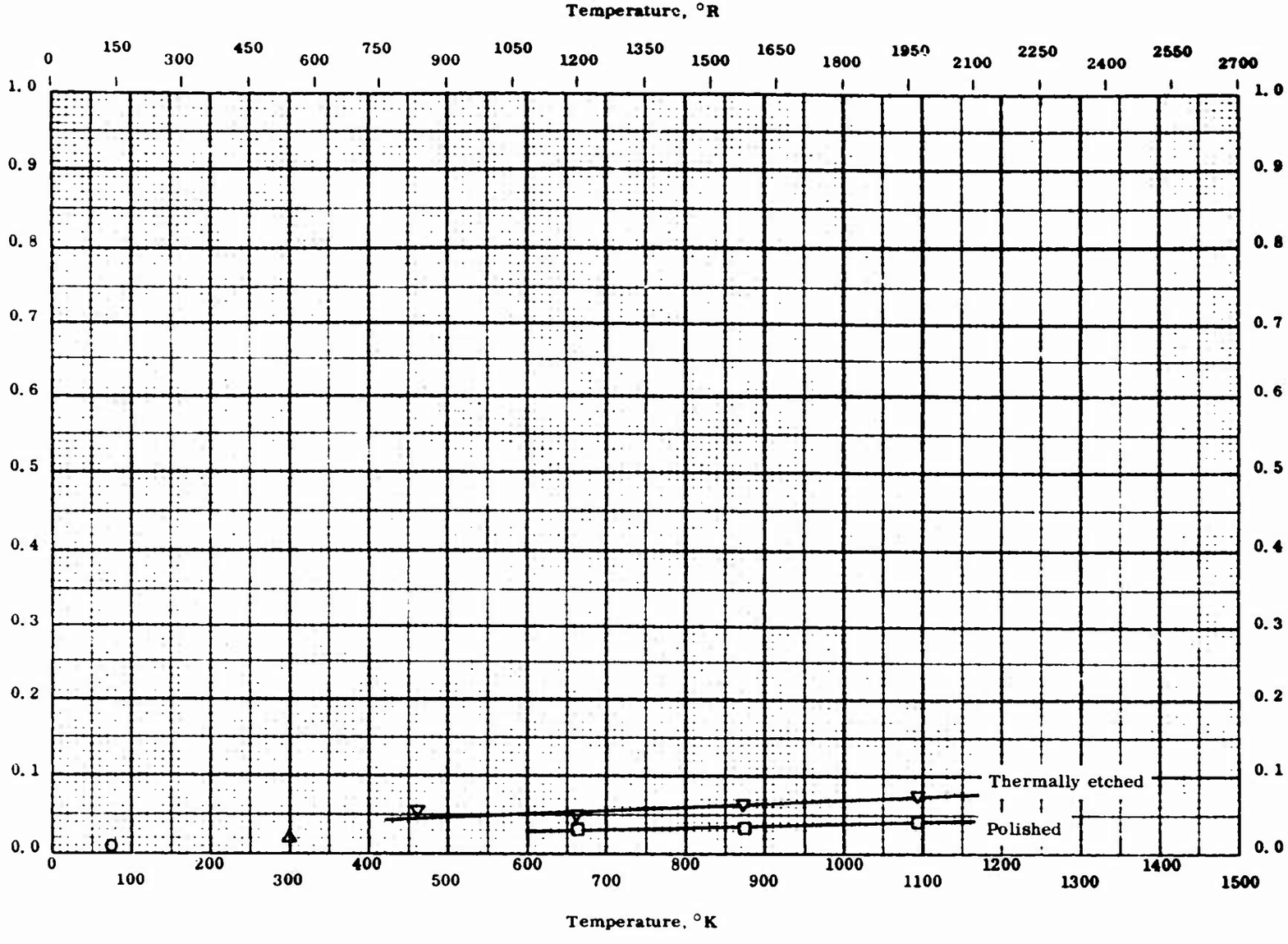


SOLAR ABSORPTANCE -- SILVER

SOLAR ABSORPTANCE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-39	463-1093	≤10	9.99 + fine; commercial rolled plate.	Ground with 600 grit carborundum, polished on a wet cloth, lap with either Linde Alumina type B-5125 or unlevigated jeweler's rouge; measured in vacuum (10^{-5} mm Hg).
△	55-35	77	± 10	Matte silver; plating, ~0.0003 in. thickness.	Measured in vacuum (3×10^{-6} mm Hg).
□	55-35	77	± 10	Silver lume; plating, ~0.0003 in. thickness.	Same as above.

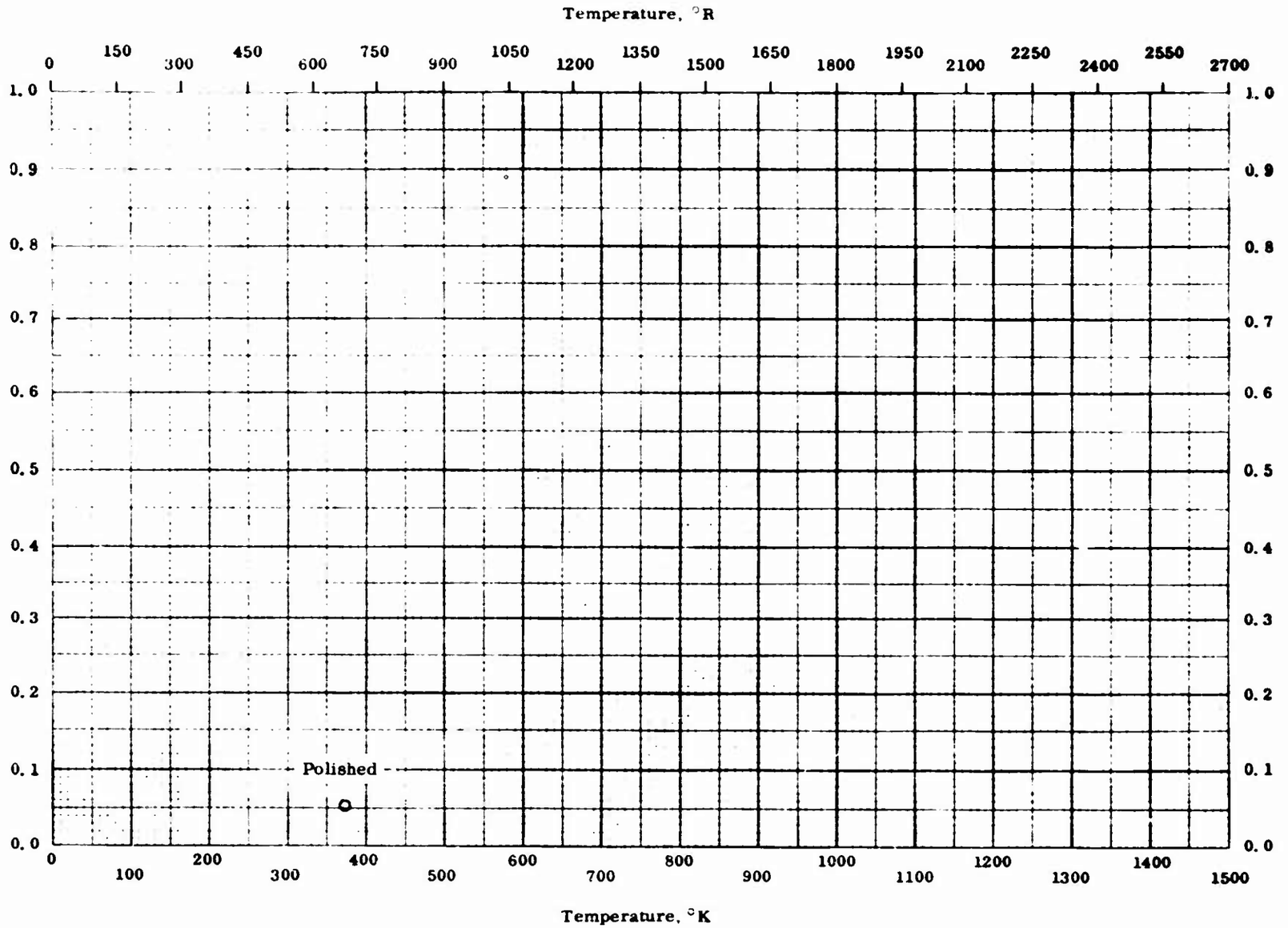


HEMISPHERICAL TOTAL EMITTANCE -- SILVER

HEMISPHERICAL TOTAL EMITTANCE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-38	76	5	Foil.	Solvent cleaned.
△	55-35	300	± 20	Plating ~0. 0003 in. thick.	Measured in vacuum (3×10^{-6} mm Hg).
□	61-39	663-1093	≤ 10	Commercial rolled plate, 999+ fine.	Ground with 600 grit carborundum, polished on a wet cloth, lap with either Linde Alumina type B-5125 or unlevigated jewelers rouge, before thermal etching; measured in vacuum (10^{-5} mm Hg).
▽	61-39	463-1093	≤ 10	Same as above.	Same as above; after thermal etching.



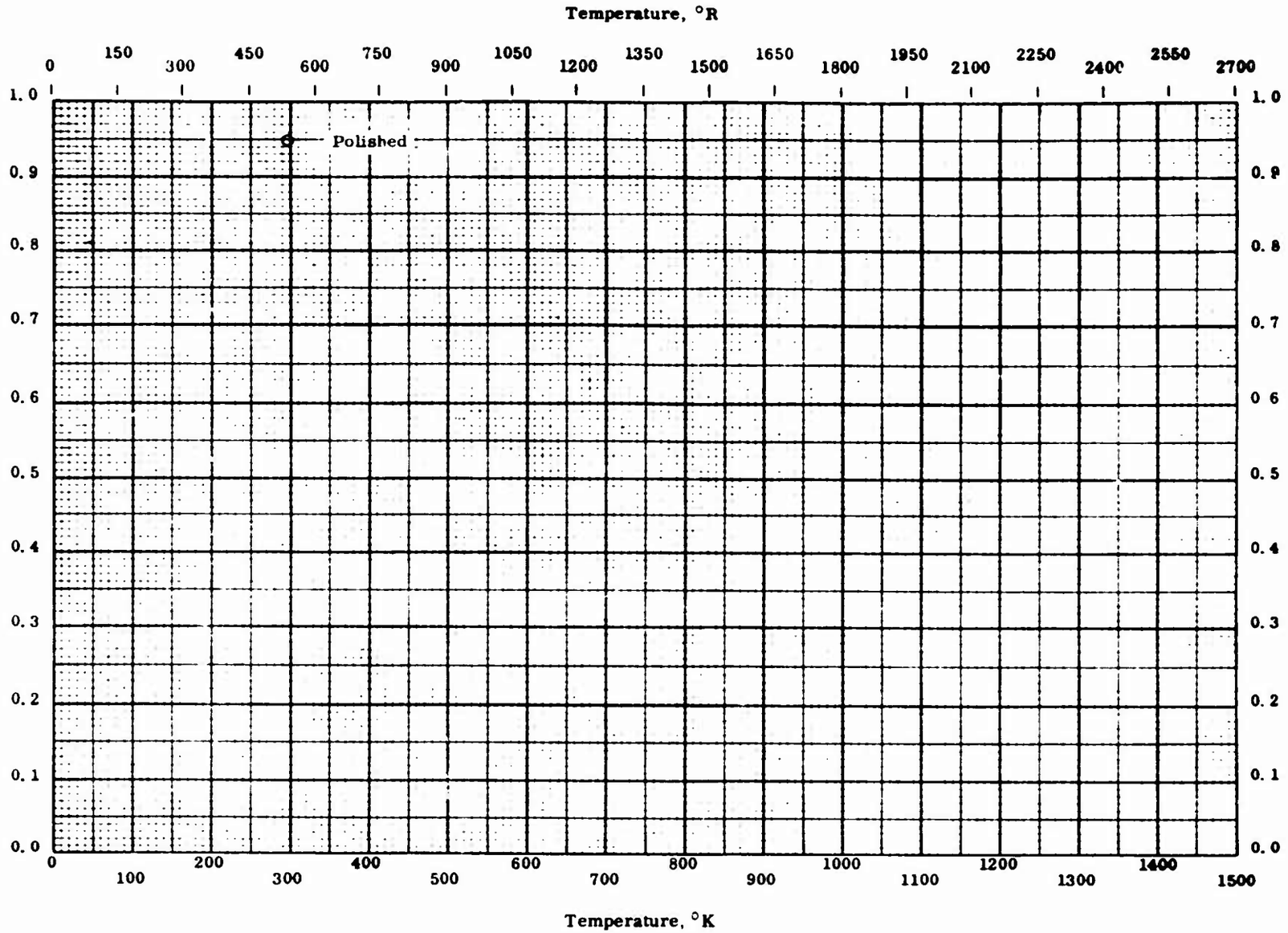
NORMAL TOTAL EMITTANCE -- SILVER

TPRC

NORMAL TOTAL EMITTANCE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	47-9	373		Not given.	Polished.

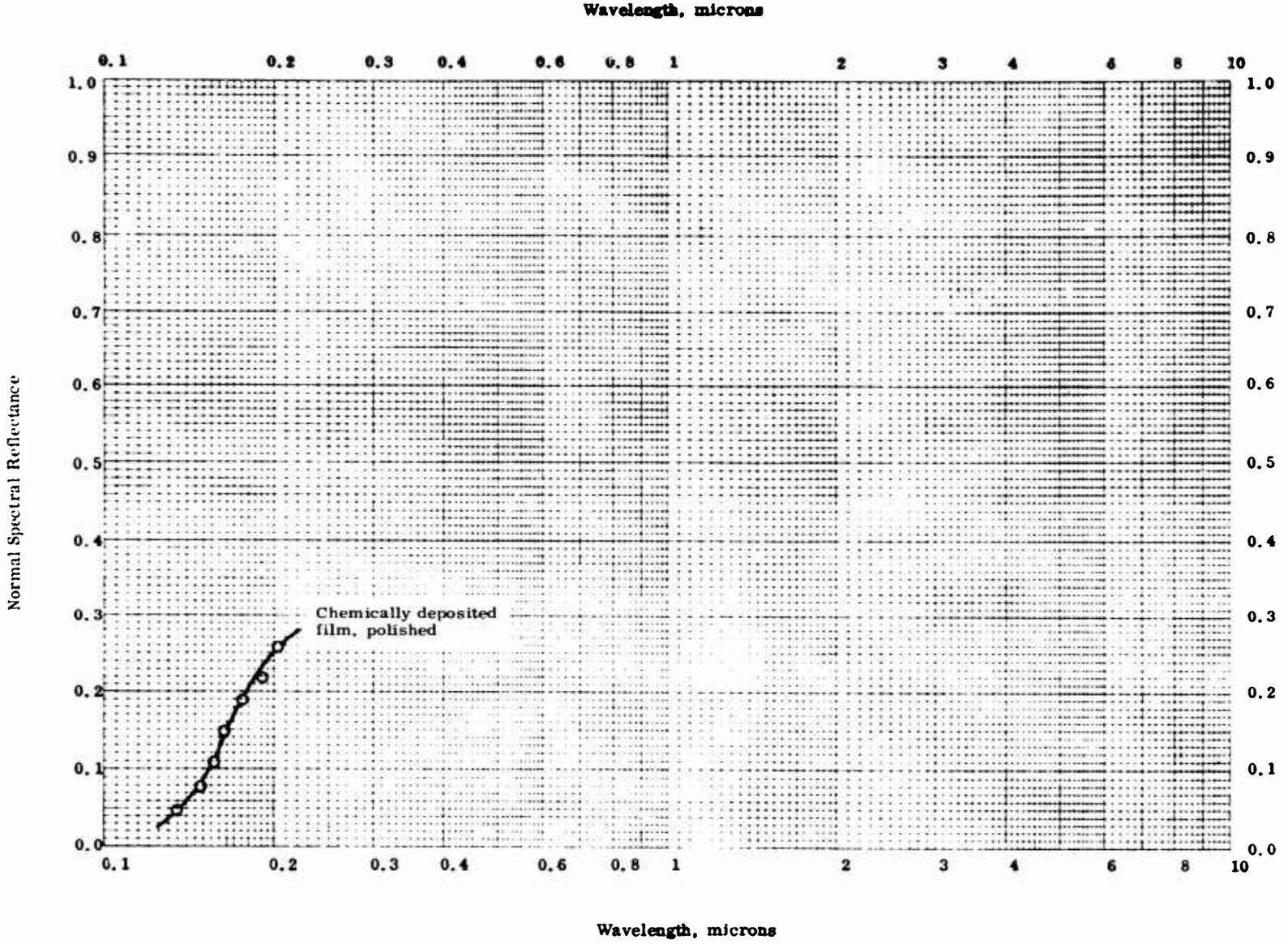


NORMAL TOTAL REFLECTANCE -- SILVER

NORMAL TOTAL REFLECTANCE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	53-29	298		Commercial.	Polished with commercial silver polish; calculated from spectral data.

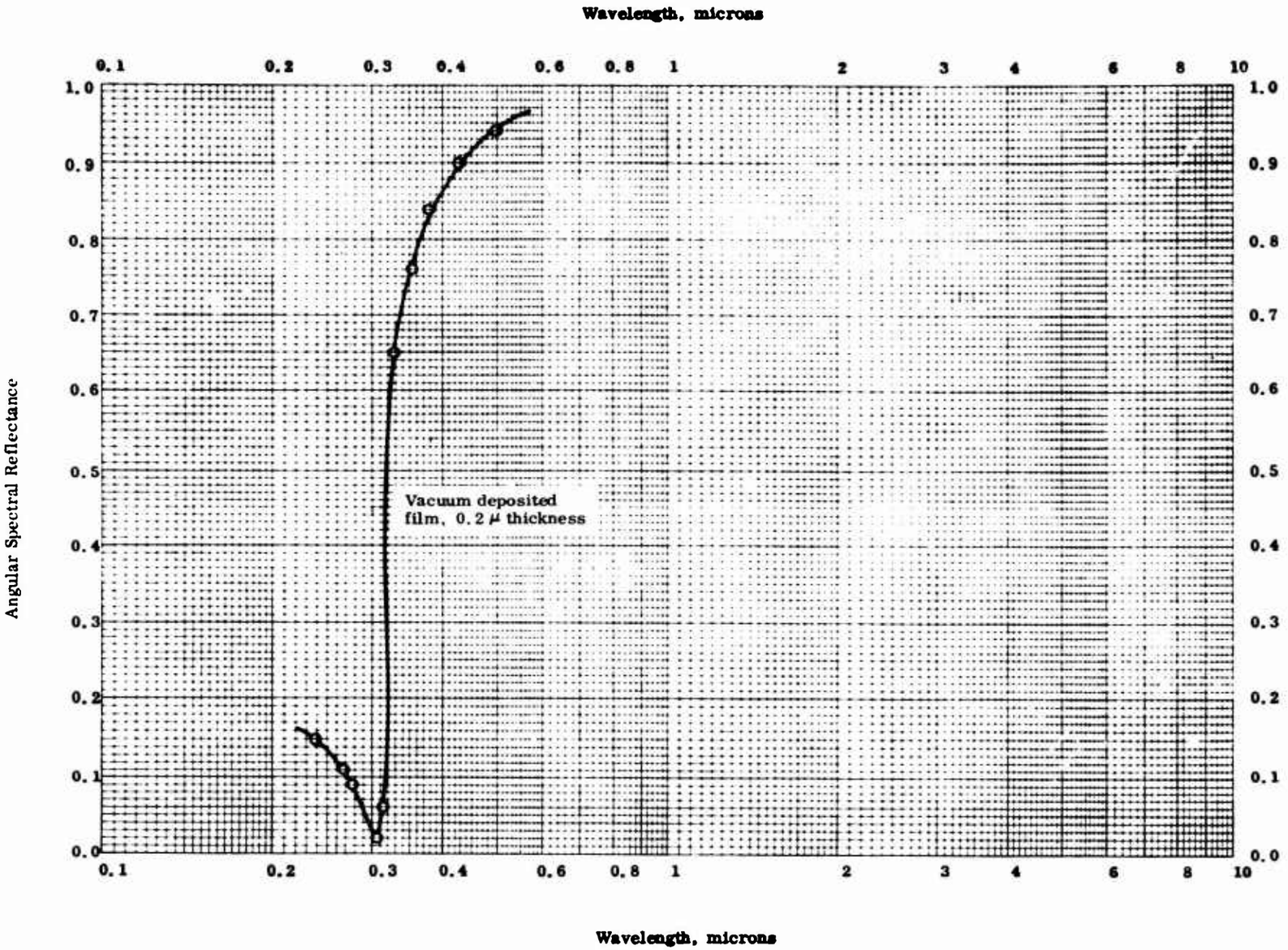


NORMAL SPECTRAL REFLECTANCE -- SILVER

NORMAL SPECTRAL REFLECTANCE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	41-3	298	0.135-0.203		Opaque film on glass.	Film chemically deposited and polished with rouge and cotton wool; measured in vacuum (0.001 mm Hg).

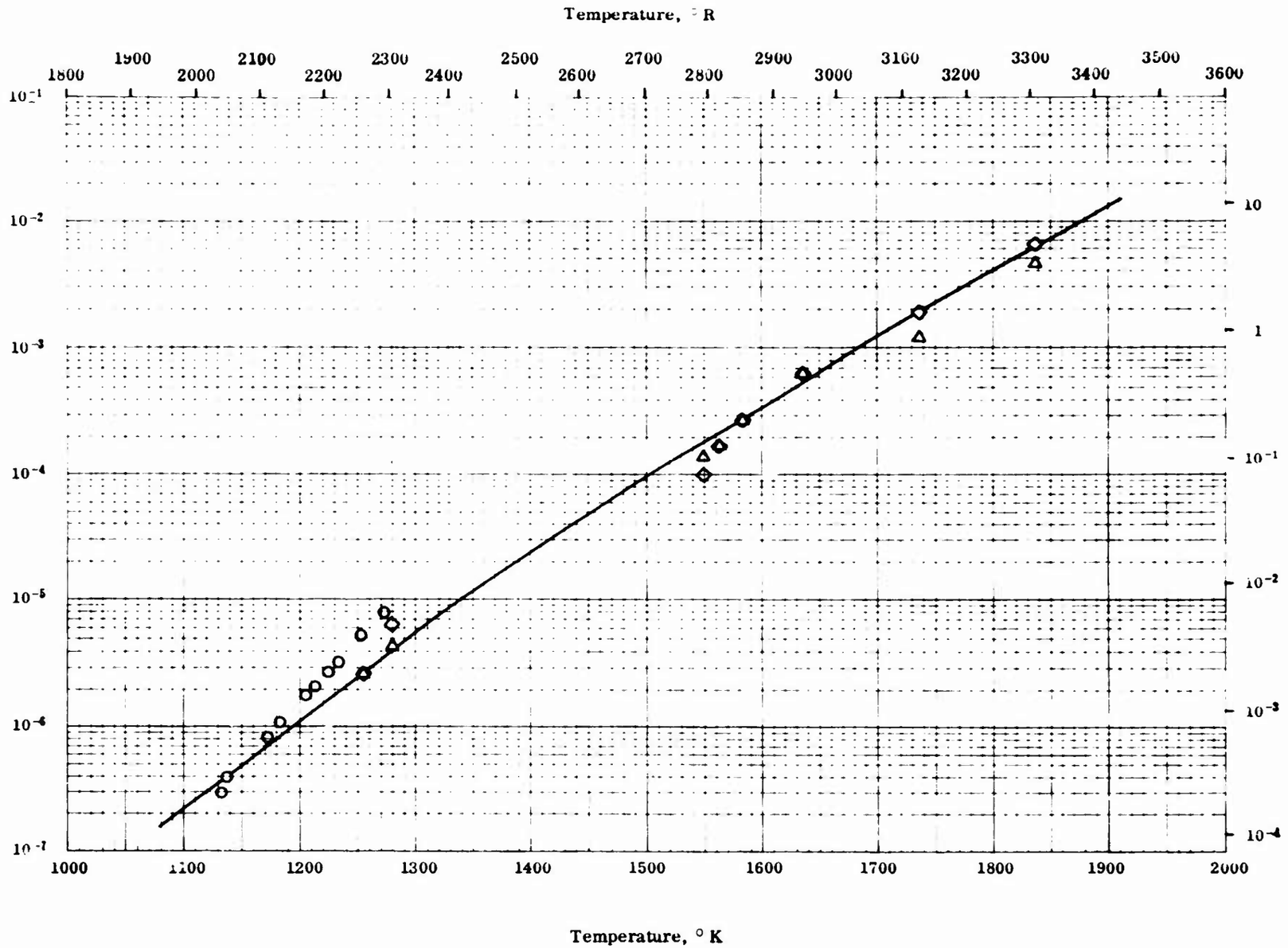


ANGULAR SPECTRAL REFLECTANCE -- SILVER

ANGULAR SPECTRAL REFLECTANCE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
O	61-37	298	0.24-0.50		Film, 0.2μ thickness.	Vacuum deposited on glass; data taken from smooth curve; 45 degree incidence, 45 degree viewing.



VAPOR PRESSURE -- SILVER

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-6	1133-1273		99.99+ pure (U.S. mint proof silver).	
△	53-16	1310-1840		Not given.	
◇	53-16	1310-1840		Not given.	

TPRC

PROPERTIES OF STRONTIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	2.6*	162.3
Melting Point	1042	18°6

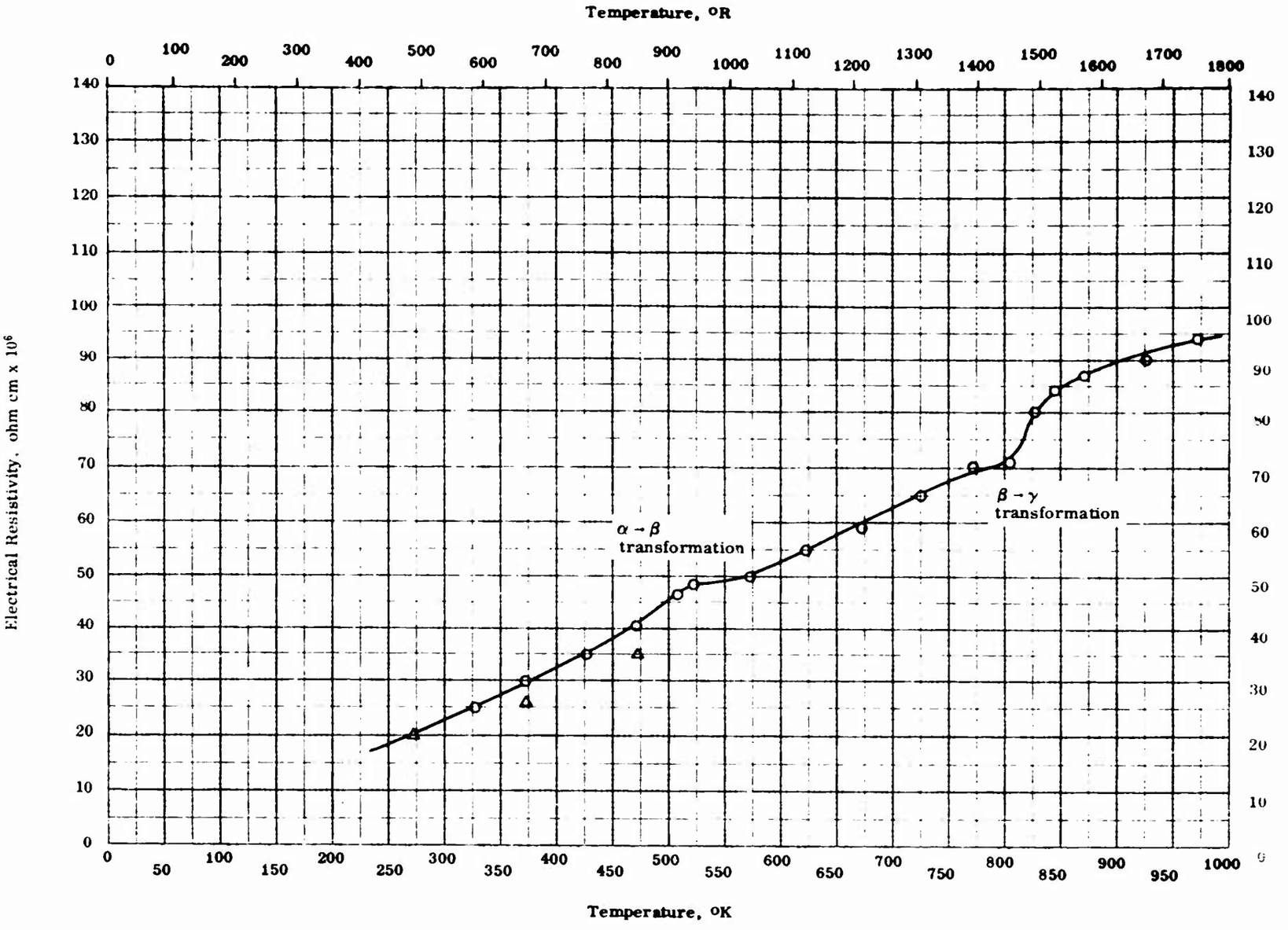
*Handbook of Chemistry and Physics (Ref. 64-28)

REPORTED VALUES

Melting Point	K	R
	○ 1042	1876

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	52-10	1042		Not given.	Double distilled in vacuum and handled exclusively in A atm; M. P. by thermal analysis.



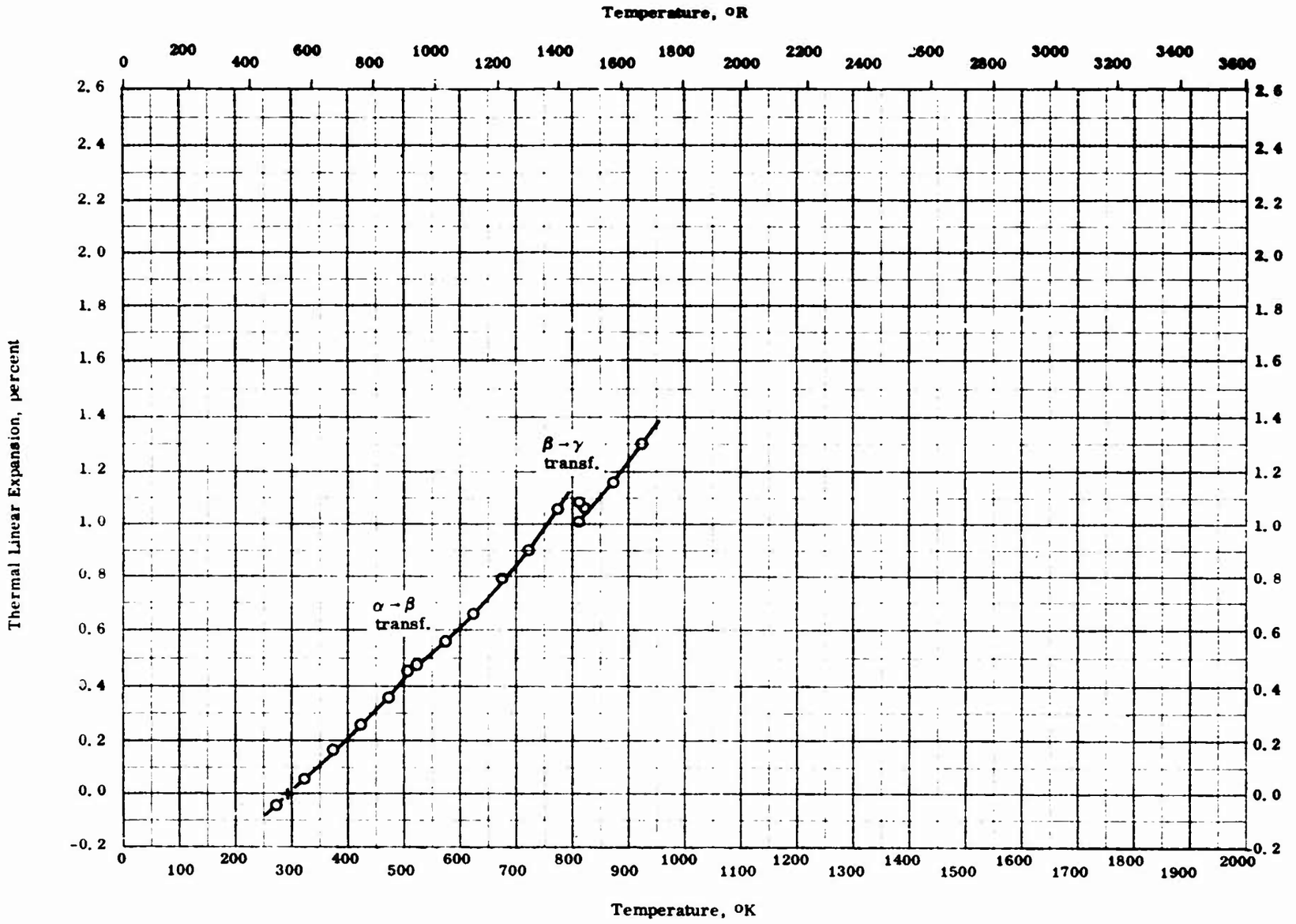
ELECTRICAL RESISTIVITY -- STRONTIUM

TPRC

ELECTRICAL RESISTIVITY -- STRONTIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	52-10	275-973		Not given.	Double distilled in vacuum; handled exclusively in argon.
Δ	55-24	273-473		Not given.	Extruded at 230 C into 0.020 in. dia. wire; relative values; computed resistivity based on 20μ ohm cm at 492 R.



THERMAL LINEAR EXPANSION -- STRONTIUM

THERMAL LINEAR EXPANSION -- STRONTIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	52-10	273-923		Not given.	Data shown assuming that ordinate scale of published graph was mislabeled.

PROPERTIES OF TANTALUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	16.6	1037
Melting Point	3269	5884
Heat of Sublimation . . .	1026_{0K}	1846_{0R}

REPORTED VALUES

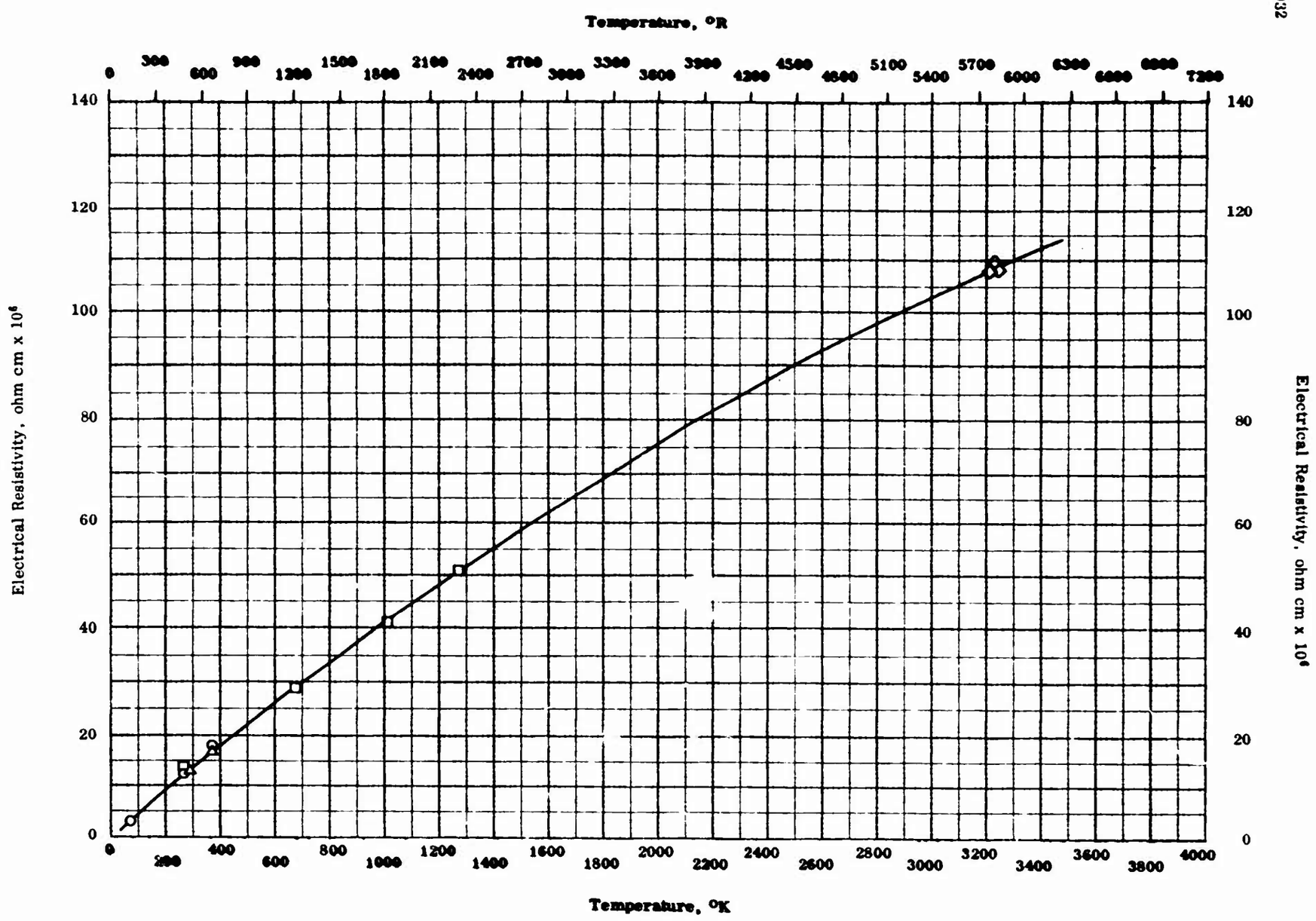
Density	$g\ cm^{-3}$	$lb\ ft^{-3}$
□	16.566 ± 0.01	1034.2 ± 0.6
▽	15.08	942
■	16.47	1029
●	16.6	1037

Melting Point	K	R
△	3225 ± 15	5805 ± 27
◇	3260 ± 30	5868 ± 54
▲	3123	5622
▼	3269	5884
◆	3233 ± 20	5819
◁	3053	5495
▷	3269	5884

Heat of Sublimation	$cal\ g^{-1}$	$Btu\ lb^{-1}$
○	$1026 \pm 2_{0R}$	$1846 \pm 3_{0R}$

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-14 also 50-4	0		99.9+ Ta and 0.03> each C and Fe.	Δh_s from vapor pressure data.
□	41-7	291		99.9 pure with very slight traces of [illegible] Cu, and Nb.	
△	53-18	3210-3240		Not given.	Outgassed 30 min at 2500 K in vacuum; M. P. by visual observation.
◇	53-18	3230-3290		Not given.	Same as above; M. P. by change of sample resistivity.
▽	56-4	298		Not given.	Sintered.
▬	56-8	298		0.052 N_2 and traces of Ca, Cu, and Mg.	Sintered.
▲	56-55	3123		Not given.	
●	62-12	293		Not given.	
▼	63-38	3269		Not given.	
◆	61-48	3213-3253		Flat.	
◁	61-48	3053		V-shape.	
▷	62-56	3269		Not given.	



TPRC

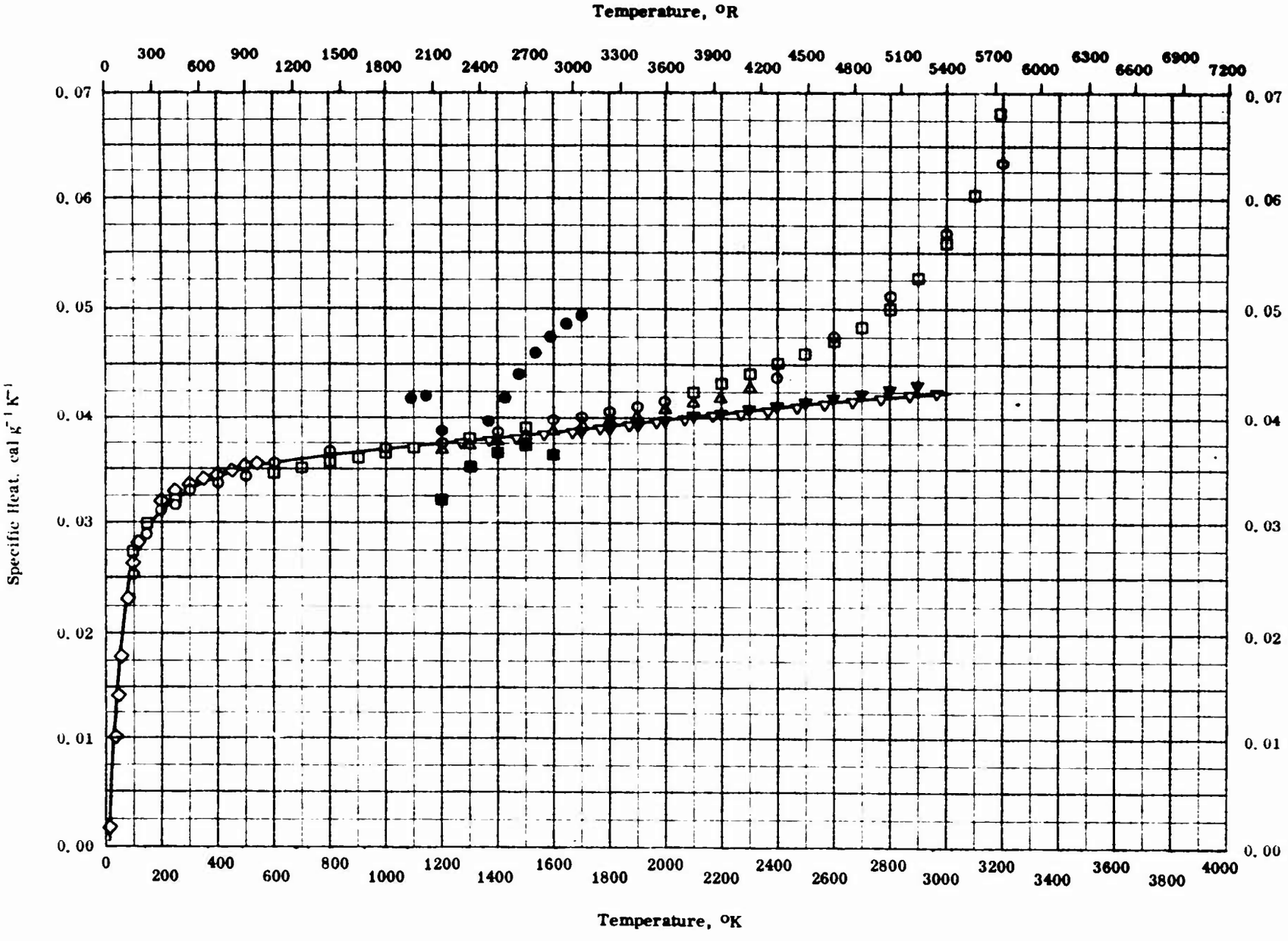
ELECTRICAL RESISTIVITY -- TANTALUM

ELECTRICAL RESISTIVITY -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	43-1	78-373		99.9 pure.	Aged 2750 hrs at 1800 C and 2000 C; tested in vacuum.
□	57-32	273-1273		0.00 O_2.	Auth. derives: $r = 13.6 \times 10^{-6} (1 + 2.7 \times 10^{-3} t + 0.44c)$ where; t = C; c = concentration of O_2; r = ohm cm.
△	50-9	293-373		< 0.02 Fe, < 0.01 Ni, Faint trace of W, Cu, Ca, Si, No trace of Cb, Pb, Sn, Cr.	Vac. annealed at 2600 C; wire drawing or annealing did not affect resistivity.
◇	53-18	3210-3240		Not given.	Auth. reports data relative to 2000 K; computed by assuming $r_{2000\ K} = 75 \times 10^{-6}$ ohm cm; values for 3 samples.

TPRC

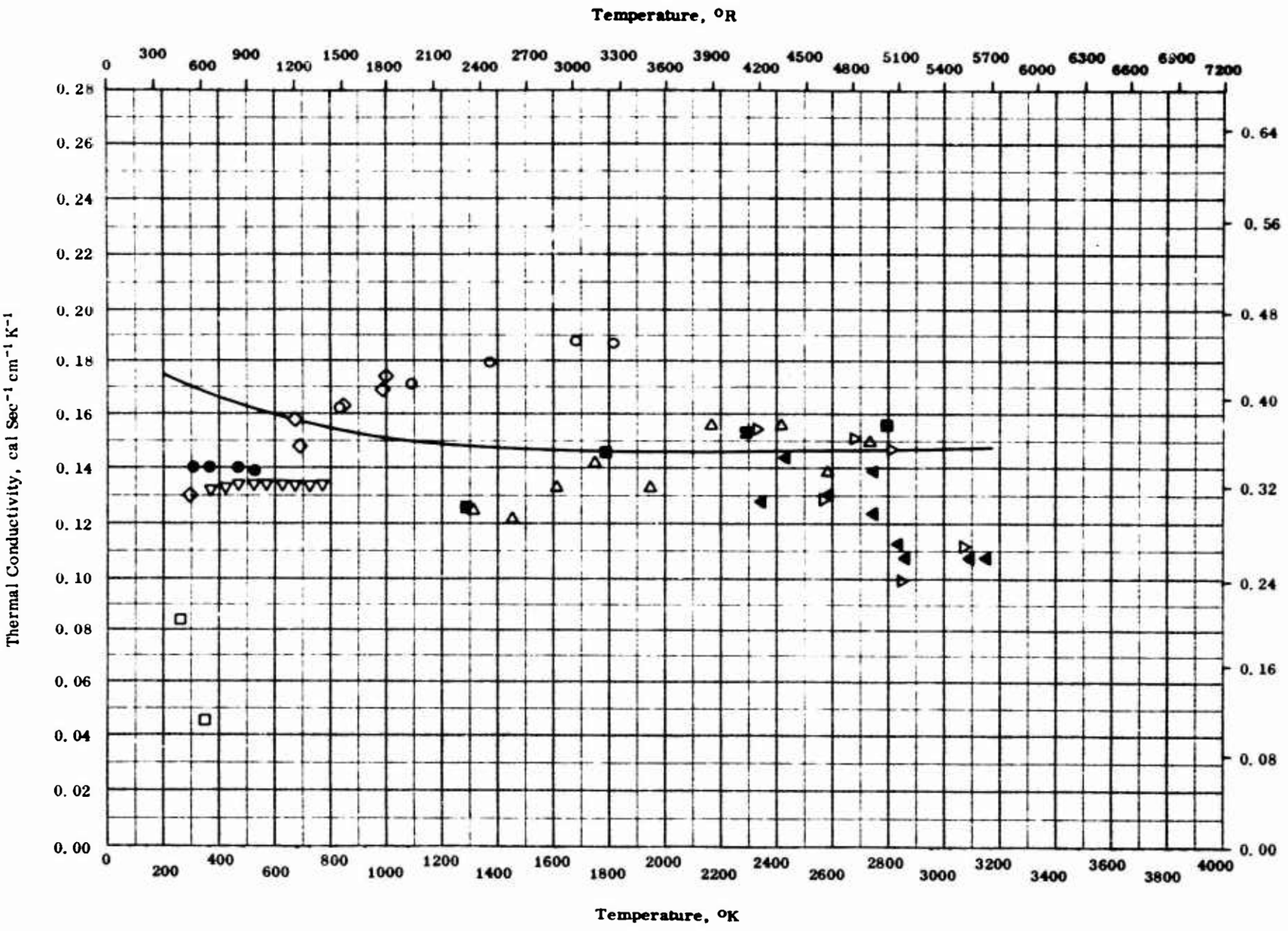


SPECIFIC HEAT -- TANTALUM

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-26	100-3200		Not given.	
□	61-22	100-3195	4.0	Not given.	
△	63-14	1200-2400	2.5	99.90 Ta, 0.05 Nb, 0.02 W, 0.015 C, 0.015 O_2, 0.01 Fe, 0.01 Mo, 0.01 Si, 0.01 Ti, 0.01 Zr, 0.005 N_2.	Outgassed and sealed under $< 1 \times 10^{-6}$ mm Hg.
◇	58-12	12-543	0.15	99.90 Ta.	
■	62-26	1200-1700	< 10	Not given.	
▽	61-27	1273-2939	1.0	99.90 Ta.	Sealed under vacuum; degassed for 2 hrs at 2150 C.
▼	63-16	1200-2900	1.0	Not given.	Sealed under vacuum.
●	60-32	1088-1700		Tan 9-4; 99.854< Ta, 0.05 Nb, 0.02> Si, 0.02> Ti, 0.02> W, 0.014 O_2, 0.005 C, 0.004 Fe, and 0.003 Mo.	

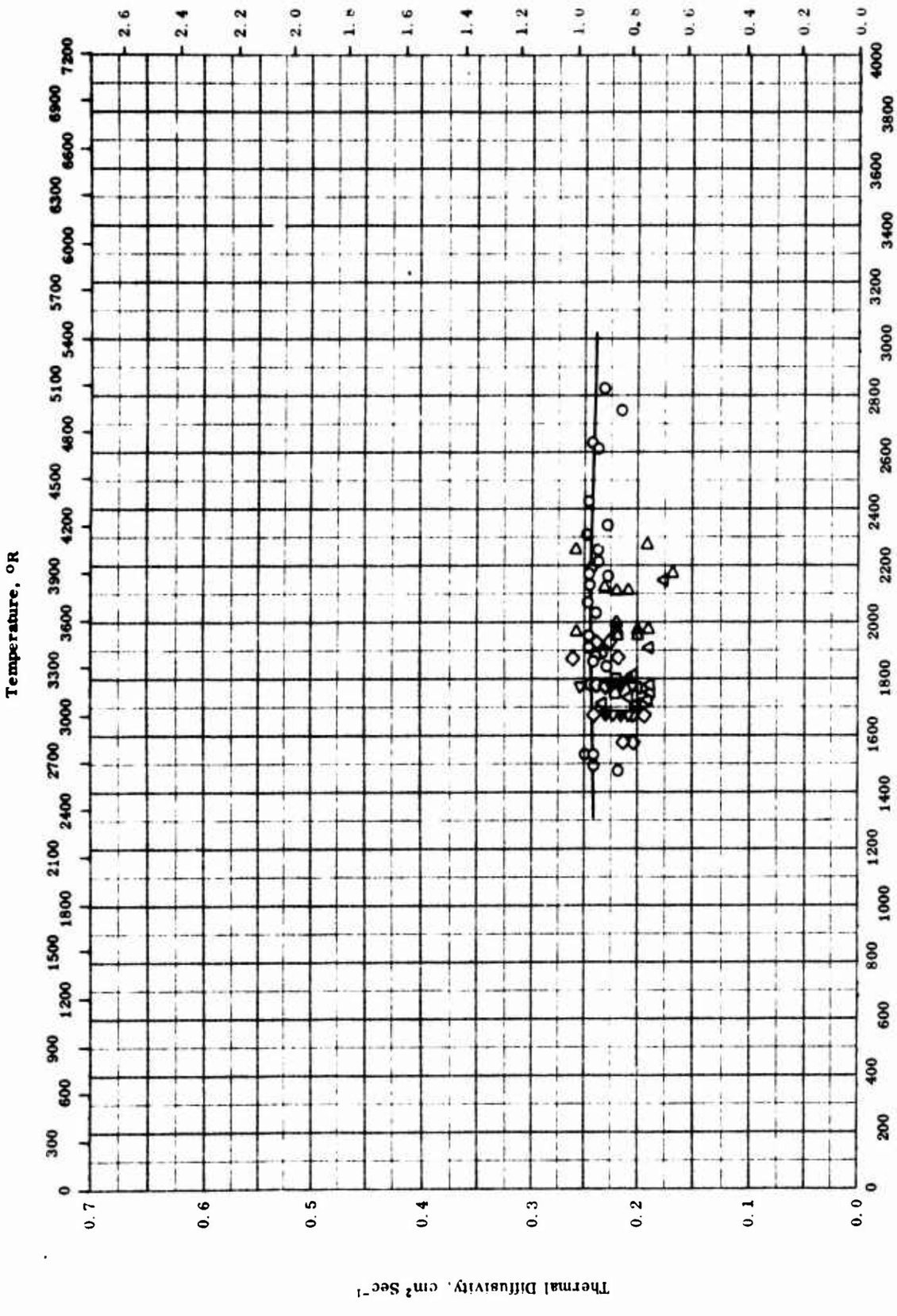


THERMAL CONDUCTIVITY -- TANTALUM

THERMAL CONDUCTIVITY -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-8	841-1820		Composition before the test; 0.052 N_2, traces of Ca, Cu, Mg, and after test 0.12 O_2, 0.044 N_2, 0.0061 H_2, traces of Al, Ca, Cu, Fe, Mg; density 1029 $lb_m ft^{-3}$.	Sintered; flat plate.
□	43-1	273-373		99.9 Ta.	Aged at 1800 C and 2000 C for 2750 hr.
△	56-9	1316-2736	5	0.0073 Zr, 0.0073 Cu, 0.0021 Fe, 0.0009 Ni, 0.0008 C, 0.0007 Co, 0.000? Mn, 0.0002 Si, and 0.00017 Al.	
▽	58-7	373-773	5	99.896 Ta, 0.014 O_2, 0.03 Nb, 0.01 Zn, 0.01 W, 0.006 N, 0.0025 C, 0.0025 H, and 0.003 each of Zr, Sn, and Pb, and trace V.	
◀	60-12	2343-3148		Commercially pure; 0.02 >Si, 0.005 Fe, 0.003 Mo, 0.0008 C, 0.52 others.	Pressed and sintered Ta powder; hot and cold rolled.
▷	60-12	2326-3071		Commercially pure; 0.0035 Nb, 0.0028 Fe, 0.0032 - 0.0050 O, 0.0016 C, 0.0010 > N, and 0.0175 others.	Cast in vacuum; cold rolled, swaged, and cold drawn.
◇	61-8	299-1000		From Fanstell Metallurgical Corp.; 99.9 pure; density 16.4 g cm^{-3} and electrical resistivity 15.1 x 10^{-6} ohm cm.	
●	61-9	311-527		Commercially pure.	
■	60-13	1283-2783		Pure; density 16.66 g cm^{-3}	

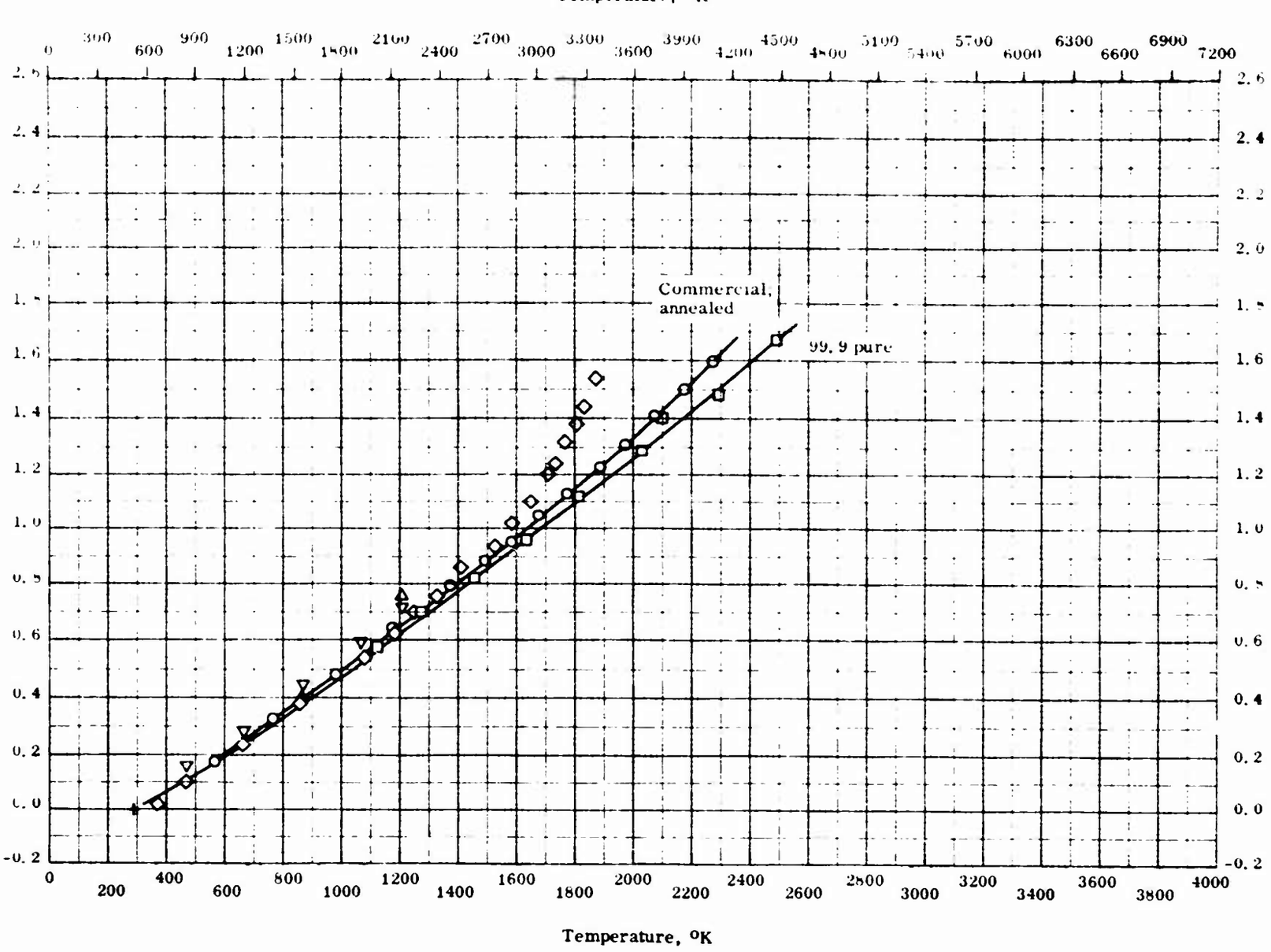


THERMAL DIFFUSIVITY -- TANTALUM

THERMAL DIFFUSIVITY -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▷	63-2	1948-2268	± 20	[Author's design.: 2].	Total of seven runs.
◁	62-1	1673-1773	7	Cylindrical sample. [Author's design.: 1].	Total of six runs.
◇	62-1	1573-1923	7	Cylindrical sample. [Author's design.: 2].	Total of eight runs.
○	65-1	1470-2825		From Murex; 0.1>Nb, 0.01>C, and traces of other elements; average grain size after testing 140μm; 0.040 in. thick sheet.	Vacuum beam melted.
◀	64-7	1673-1773		Density 16.67 g cm^{-3}; impurities not determined.	
△	64-7	1573-2268		0.05 Si, 0.05>Fe, 0.05>Ni, 0.05>Zr, 0.01 Ca, 0.01 Cu, and 0.002 Mg; density 16.66 g cm^{-3}.	
□	64-7	1753-1788		Same as above.	

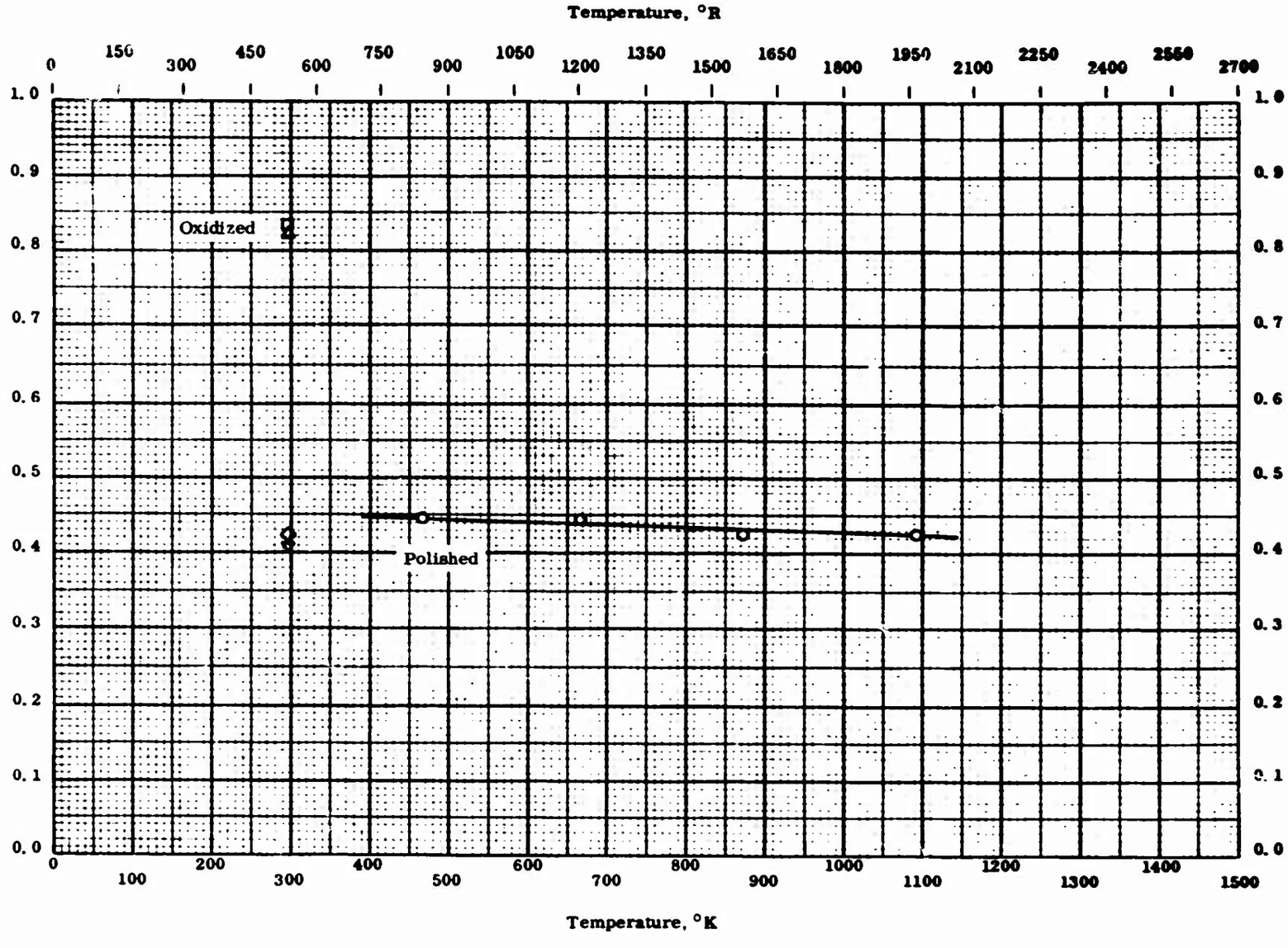


THERMAL LINEAR EXPANSION -- TANTALUM

THERMAL LINEAR EXPANSION -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	51-41	291-2495		99.9 pure with principal impurities < 0.03 each Fe and C.	X-ray diffraction method.
◇	56-4	343-1872	±2	Density 950 lb ft^{-3}.	Sintered.
▽	54-7	273-1213		"Murex" bar.	Measured perpendicular to axis of bar.
△	54-7	273-1213		"Heraeus" bar.	Measured parallel to axis of bar.
○	64-30	293-2270	< 3	Commercial rod material.	Annealed at above 2000 C for 1-1, 2 to 2 hrs; measured at pressure not exceeding 1 to 2×10^{-5} mm Hg.

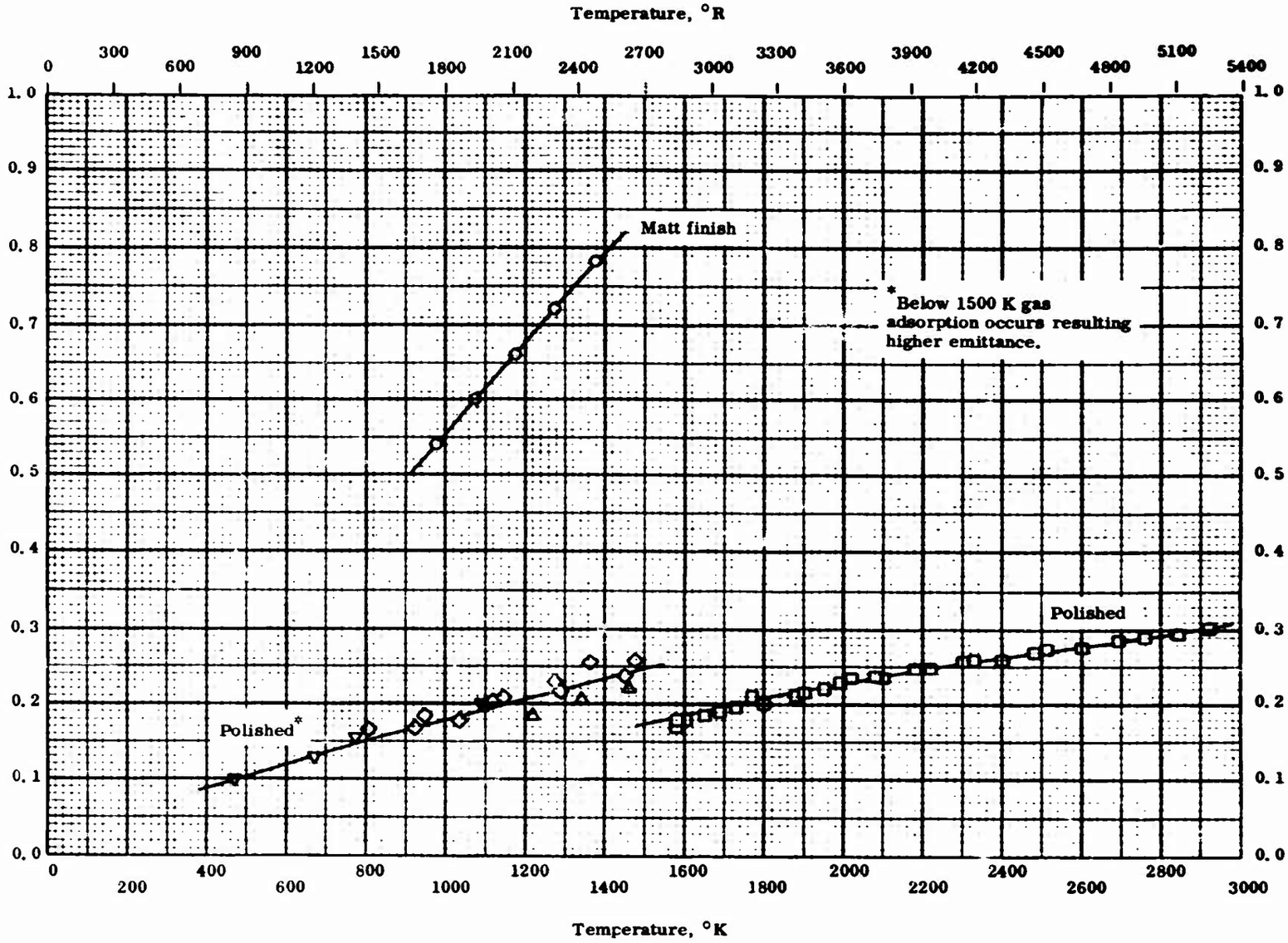


SOLAR ABSORPTANCE -- TANTALUM

SOLAR ABSORPTANCE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-39	468-1093	≤10	Commercially pure.	Ground with 600 grit carborundum, polished on a wet cloth, lapped with either Linde Alumina type B-5125 or unlevigated jeweler's rouge; measured in vacuum (10^{-5} mm Hg).
△	57-41	298		Pure.	Oxidized in air at red heat for 30 min.; above temperature.
□	57-41	298		Pure.	Same as above except at sea level.
▽	57-41	298		Pure.	As received; above atmosphere.
◇	57-41	298		Pure.	Same as above except at sea level.



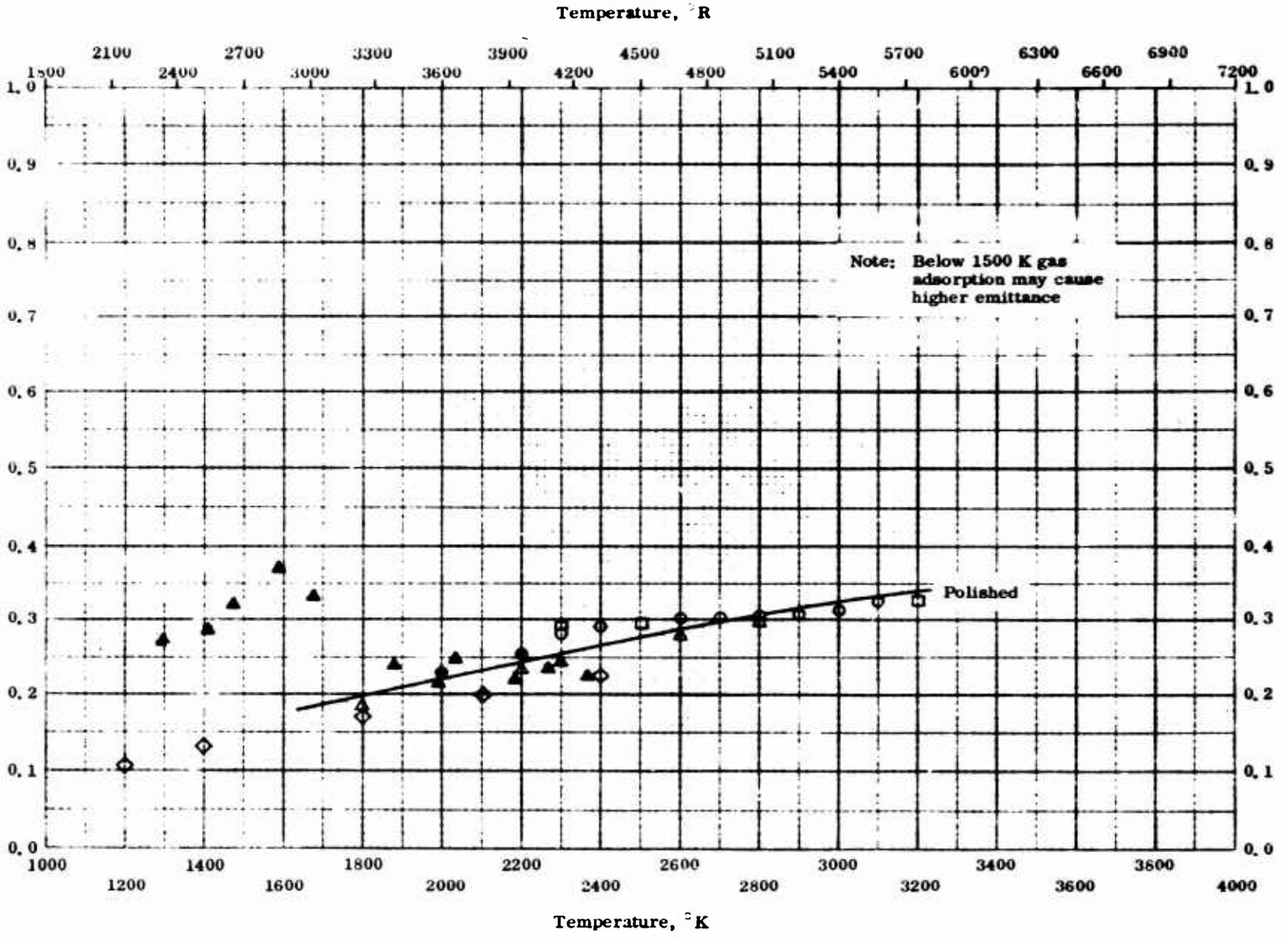
HEMISPHERICAL TOTAL EMITTANCE -- TANTALUM

TPRC

HEMISPHERICAL TOTAL EMITTANCE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-44	973-1373	± 2.5	Commercial sheet.	Lightly etched in hydrochloric acid to form a fine matt finish; measured in vacuum ($< 5 \times 10^{-6}$ mm Hg).
△	63-35	1220-1460	± 5	Ribbon.	Optically smooth and contamination free; measured in vacuum (3×10^{-7}-10^{-6} mm Hg).
□	63-35	1485-2920	± 5	Same as above.	Same as above.
◇	63-35	810-1477		Not given.	Measured in vacuum (10^{-7}-10^{-6} mm Hg).
▽	61-39	468-1093		Commercially pure.	Ground with 600 grit carborundum, polished on a wet cloth, lapped with either Linde Alumina type B-5125 or unlevigated jeweler's rouge.



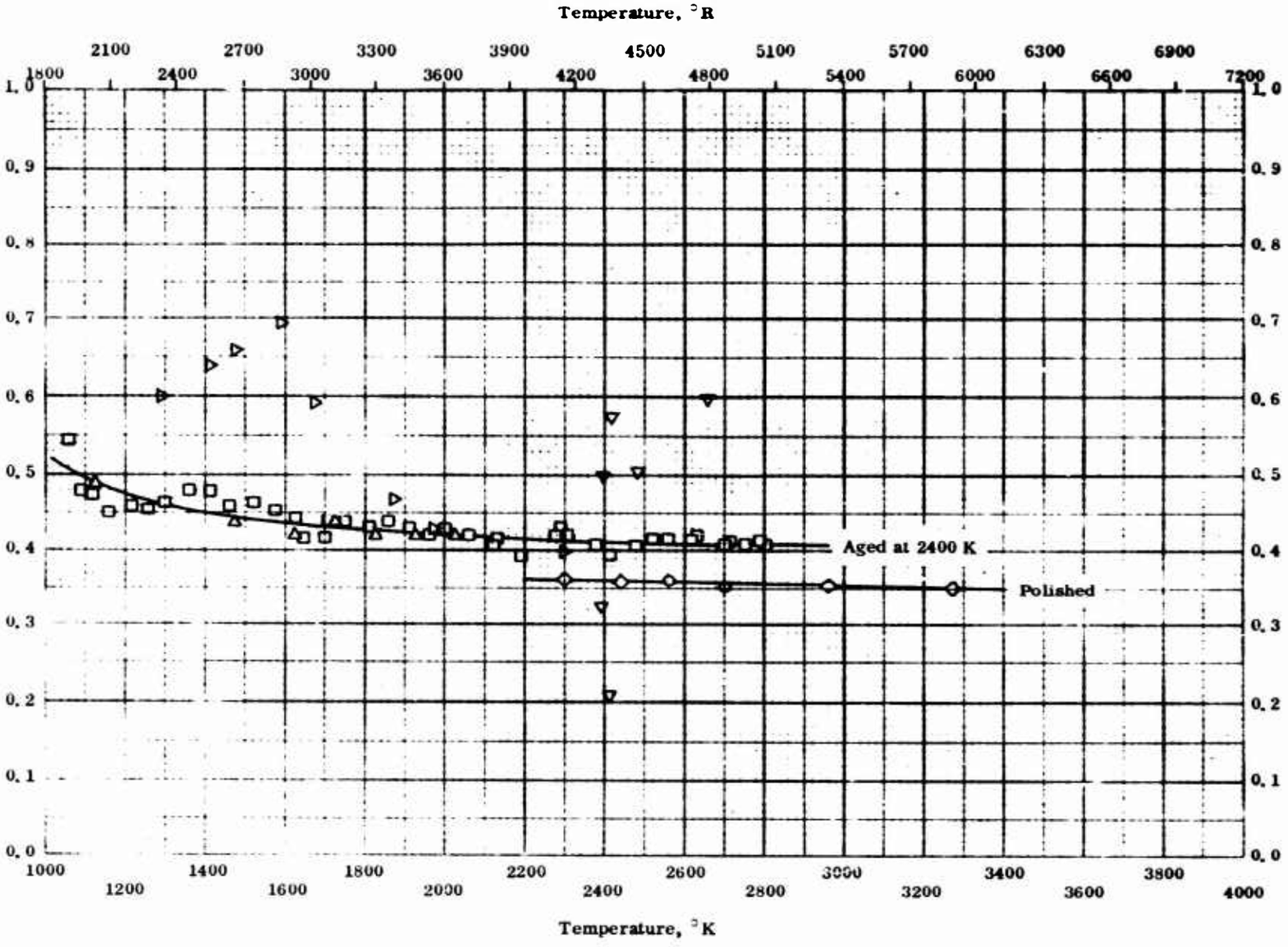
NORMAL TOTAL EMITTANCE -- TANTALUM

TPRC

NORMAL TOTAL EMITTANCE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-12	2300-3100		0.005 Fe, < 0.02 Si, 0.003 Mo, 0.0008 C and 0.052 other impurities.	Pressed, sintered, hot-and cold-rolled, successively polished with No. 1-, 0-, 00-, 000- and 0000- abrasive papers; measured in argon (slightly > 1 atm).
□	60-12	2300-3200		0.0035 Nb, 0.0032 O_2, 0.0028 Fe, 0.0016 C, < 0.0019 N_2 and 0.0175 other impurities.	Cast and cold-rolled; same as above.
△	62-51	1800-2800		Not given.	Polished and etched; data taken from smooth curve.
◇	63-35	1200-2400	± 5	Ribbon.	Optically smooth, contamination free surface, measured in vacuum (3×10^{-1}-10^{-6} mm Hg); data taken from smooth curve.
●	63-24	1800-2800		99.9 pure.	Polished to an optically smooth surface, washed and dried; data taken from smooth curve; calculated from spectral data.
▲	63-34	1295-2366		Surface roughness: 0.5-1.0 μ RMS.	Polished; measured in vacuum (3-4 μ Hg).



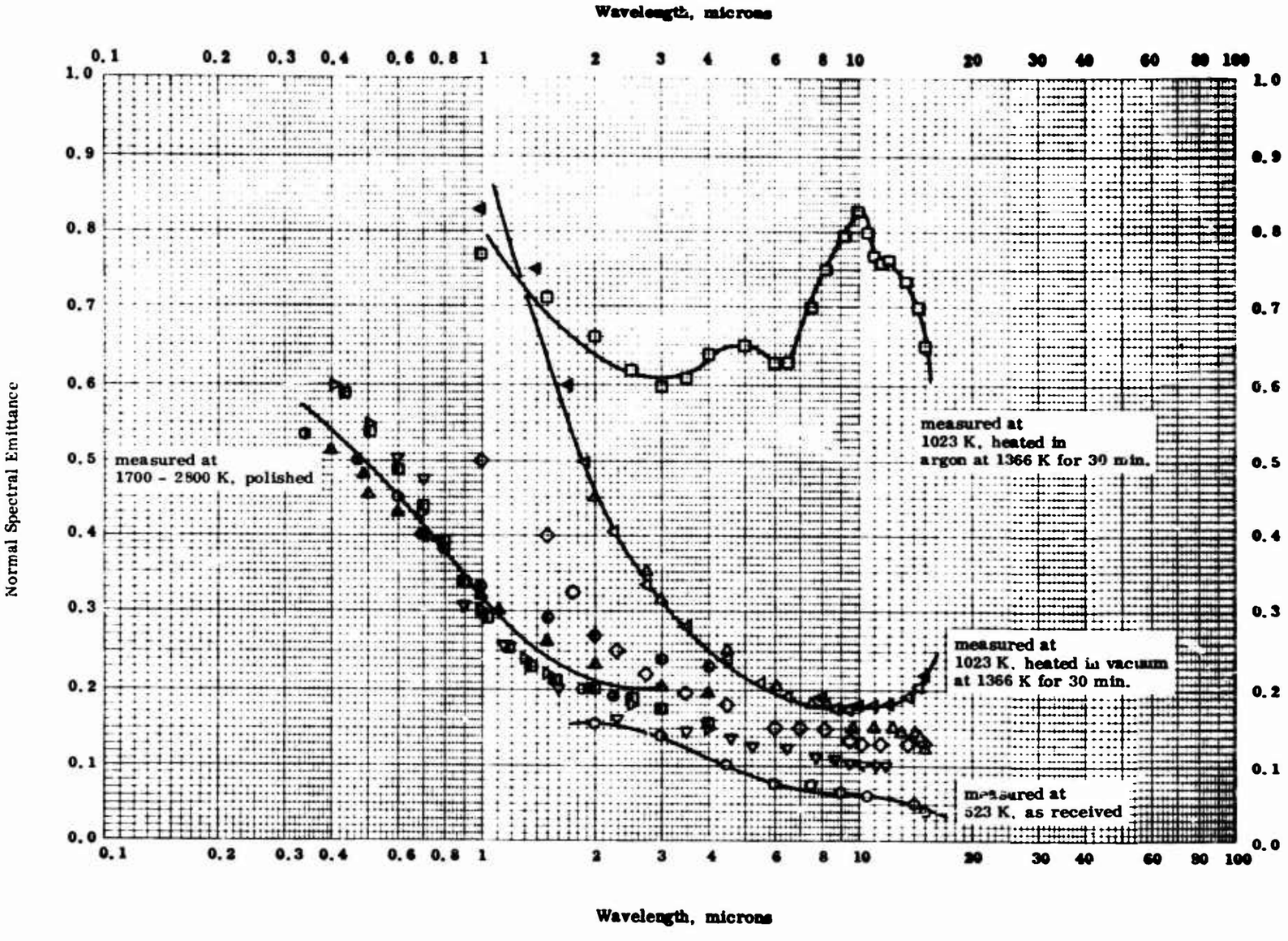
TPRC

NORMAL SPECTRAL EMITTANCE -- TANTALUM

NORMAL SPECTRAL EMITTANCE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	60-12	0.65	2560-2700		0.005 Fe, < 0.02 Si, 0.003 Mo, 0.0008 C and 0.052 other impurities.	Pressed and sintered, hot and cold rolled; successively polished with No. 1-, 0-, 00-, 000- and 0000- abrasive papers; measured in argon (slightly > 1 atm).
◇	60-12	0.65	2300-3270		0.0035 Nb, 0.0032 O_2, 0.0028 Fe, 0.0016 C, < 0.0010 N_2 and 0.0175 other impurities.	Cast and cold-rolled; same as above.
△	60-50	0.65	1123-2023		Pure.	Not given.
□	63-35	0.65	1060-2800	± 5	Ribbon.	Optically smooth; aged at 2400 K for 15 min., measured in vacuum (3×10^{-7} mm Hg).
▷	63-34	0.65	1290-2299		Not given; surface roughness 0.5-1.0 μ RMS.	Polished; measured in vacuum (3-4 μ Hg).
▽	62-42	0.69	2383-2661		Not given.	Uncoated material ground to a smooth finish; measured in dried argon or helium after evacuation.

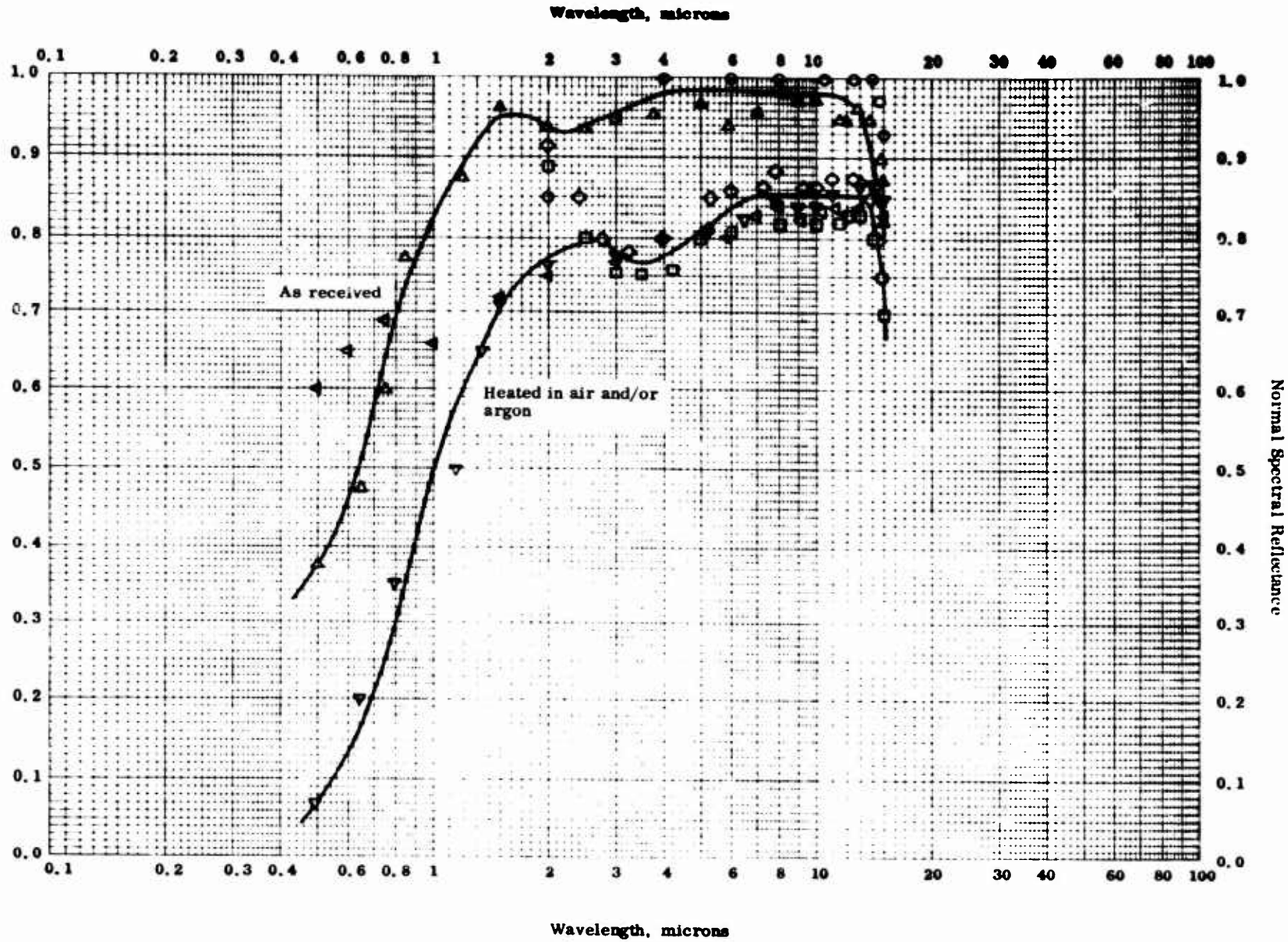


NORMAL SPECTRAL EMITTANCE -- TANTALUM

NORMAL SPECTRAL EMITTANCE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	62-45	523	2.0-15.0		Chemically pure.	As received.
△	62-45	523	2.0-15.0		Same as above.	Heated in argon at 1366 K for 30 min.
□	62-45	1023	1.0-15.0		Same as above.	Same as above.
◇	62-45	773	1.0-15.0		Same as above.	Heated in vacuum (22×10^{-2} mm Hg) at 1366 K for 30 min.
◁	62-45	1023	1.0-15.0		Same as above.	Same as above.
▽	64-23	1478	0.4-11.8		Not given.	Measured in vacuum ($\geq 10^{-6}$ mm Hg).
▷	62-51	1700	0.41-4.00		Same as above.	Polished and etched; data taken from smooth curve.
◐	62-51	2800	0.40-4.00		Same as above.	Same as above.
◧	63-24	1700	0.44-4.00		99.9 pure.	Polished to an optically smooth surface, washed and dried; data taken from smooth curve.
▲	63-24	2400	0.4-4.0		Same as above.	Same as above.
◍	64-15	2200	0.34-2.25		Pure; from fine powders.	Hot-pressed and sintered; etched and polished; measured in vacuum (10^{-5} mm Hg).

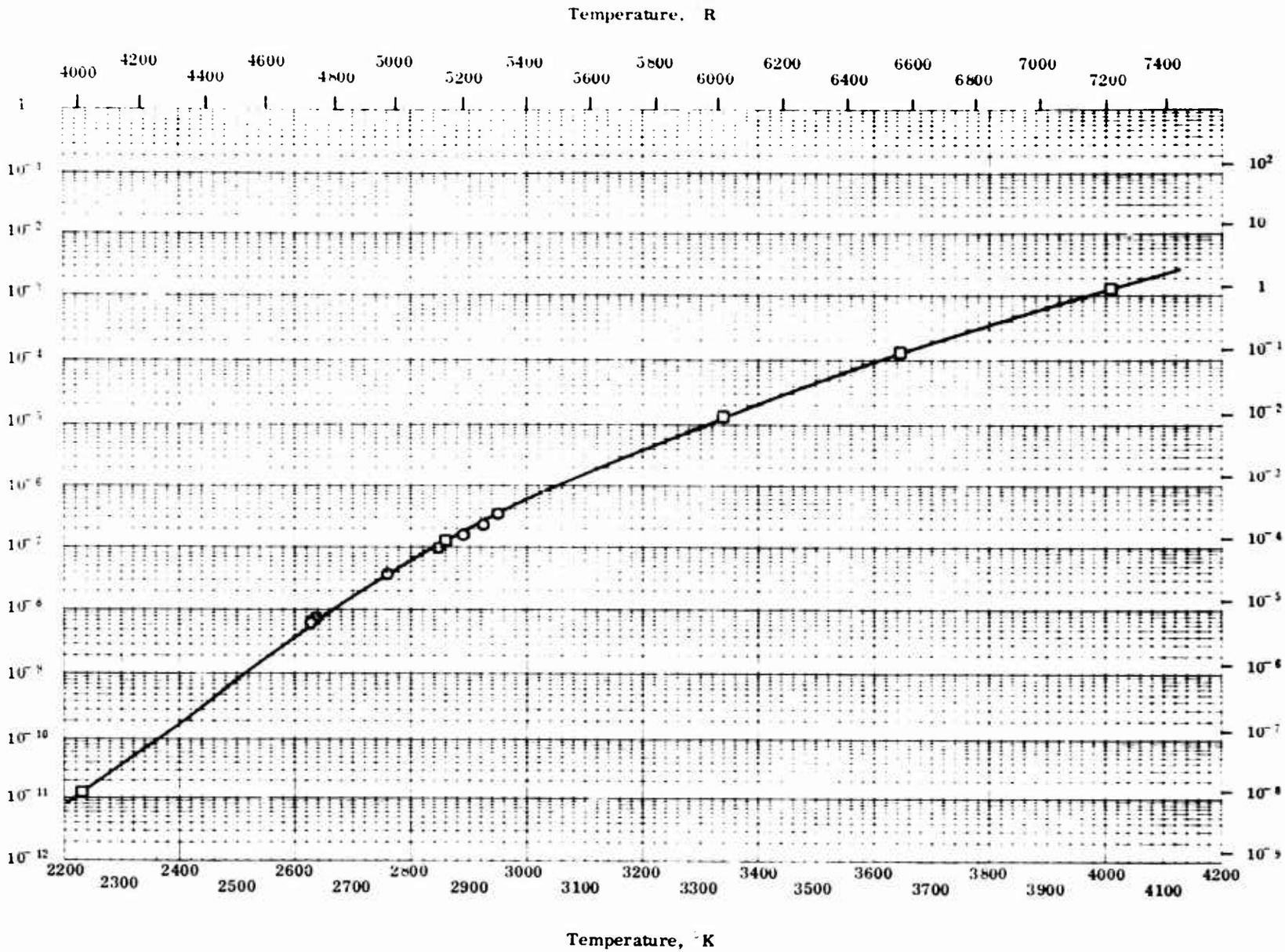


NORMAL SPECTRAL REFLECTANCE -- TANTALUM

NORMAL SPECTRAL REFLECTANCE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	62-45	< 322	2.0-15.0		Chemically pure.	As received; hemispherical illumination, normal viewing; 523 K source temperature
△	62-45	< 322	0.5-15.0		Same as above.	Same as above except 1273 K source temperature.
□	62-45	< 322	2.0-15.0		Same as above.	Heated in argon at 1366 K for 30 min; hemispherical illumination, normal viewing; 523 K source temperature.
▽	62-45	< 322	0.5-15.0		Same as above.	Same as above except 1273 K source temperature.
◇	62-45	< 322	2.0-15.0		Same as above.	Heated in vacuum (2.2×10^{-5} mm Hg) at 1366 K for 30 min; hemispherical illumination, normal viewing; 523 K source temperature.
◁	62-45	< 322	0.5-15.0		Same as above.	Same as above except 1273 K source temperature.



VAPOR PRESSURE -- TANTALUM

VAPOR PRESSURE -- TANTALUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	50-4 also 51-14	2624-2948		99.9+ Ta and < 0.03 ea. C, Fe.	
□	62-12	2230-4010		Not given.	

PROPERTIES OF TERBIUM

MOST PROBABLE VALUES

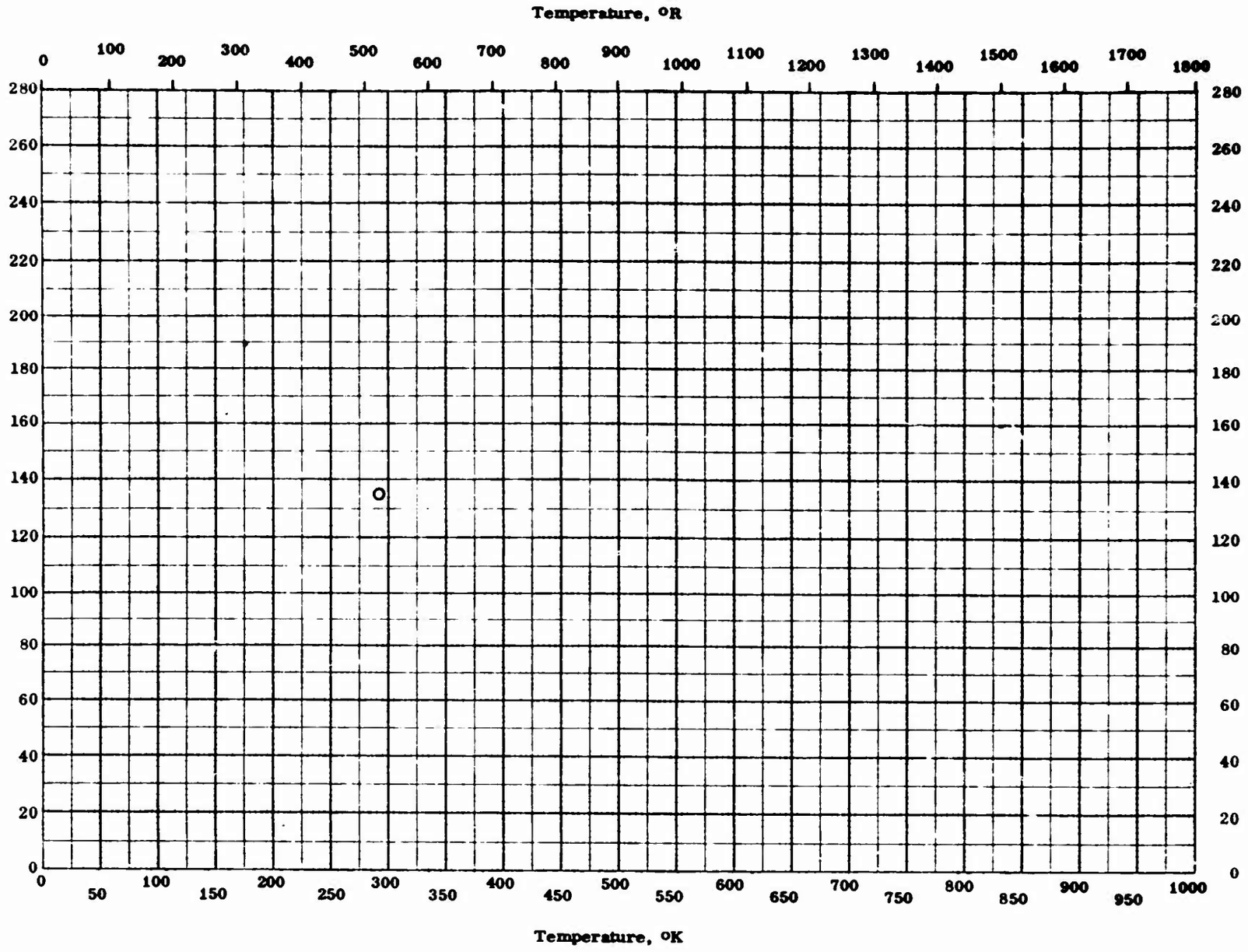
Property	C.G.S. Units	Brit. Eng. Units
Density.	8.25	515
Melting Point	1722	3100
Heat of Fusion	20	40
Heat of Vaporization . .	441	794
Heat of Sublimation . . .	438	790

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	8.253	515.2
	▽	8.19	511.1
Melting Point		K	R
	□	1722 ± 50	3100 ± 90
	▲	1640	2950
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	△	24	44
	◇	13.8	24.8
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▼	441	794
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	●	438	790

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	54-11	1672-1772		Very pure.	M. P. from observation of flow during preparation; approx. values.
▲	56-54	1639		Very high purity.	M. P. by thermal analysis.
△	56-54	1639		Very high purity.	
●	56-54	---		Very high purity	
◇	62-13	1599		Not given.	Transition: $\alpha \xrightarrow{1599K} \beta$.
▽	62-13	298		Not given.	
▼	62-13	298		Not given.	



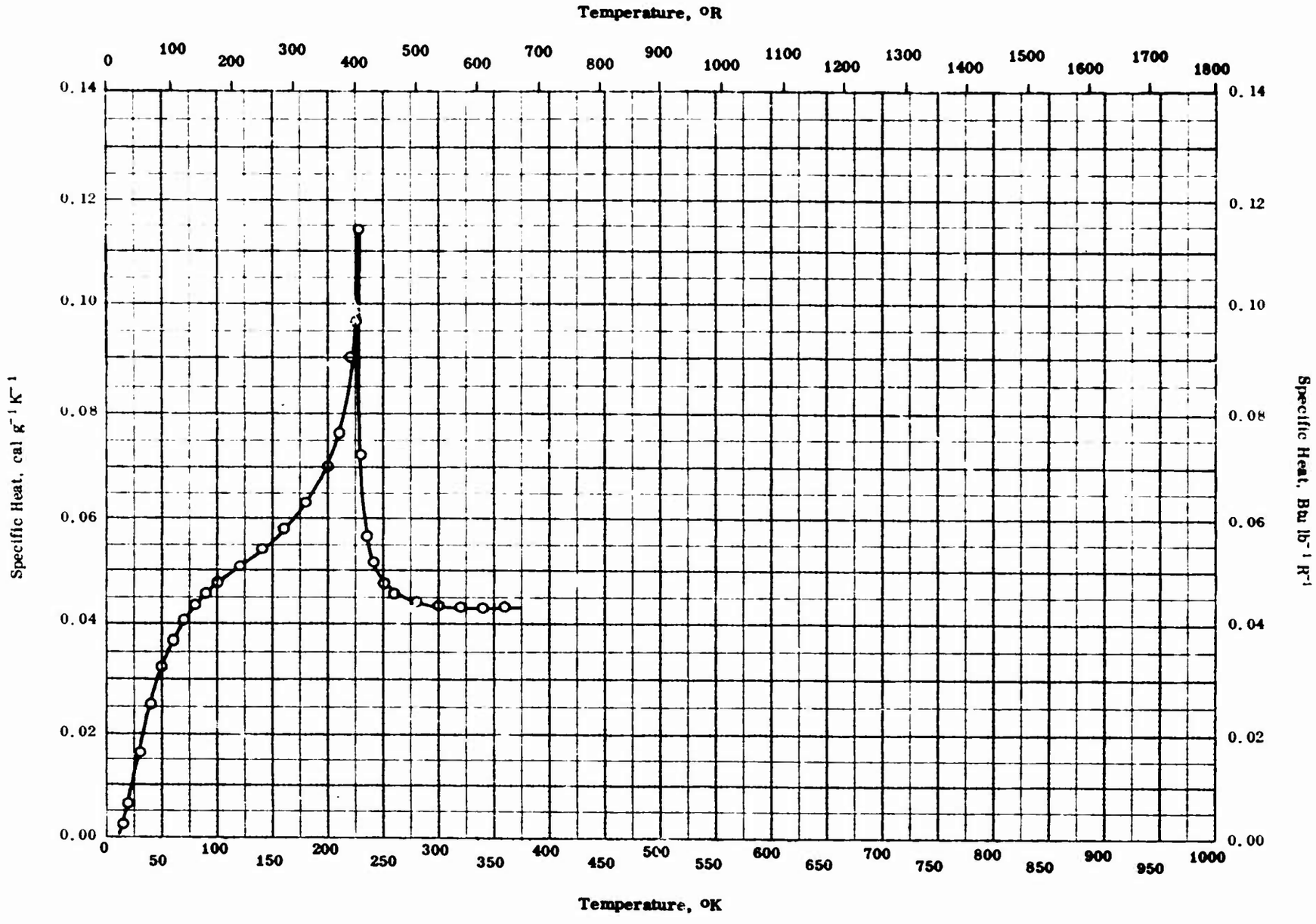
ELECTRICAL RESISTIVITY -- TERBIUM

TPRC

ELECTRICAL RESISTIVITY -- TERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	291		α-phase.	

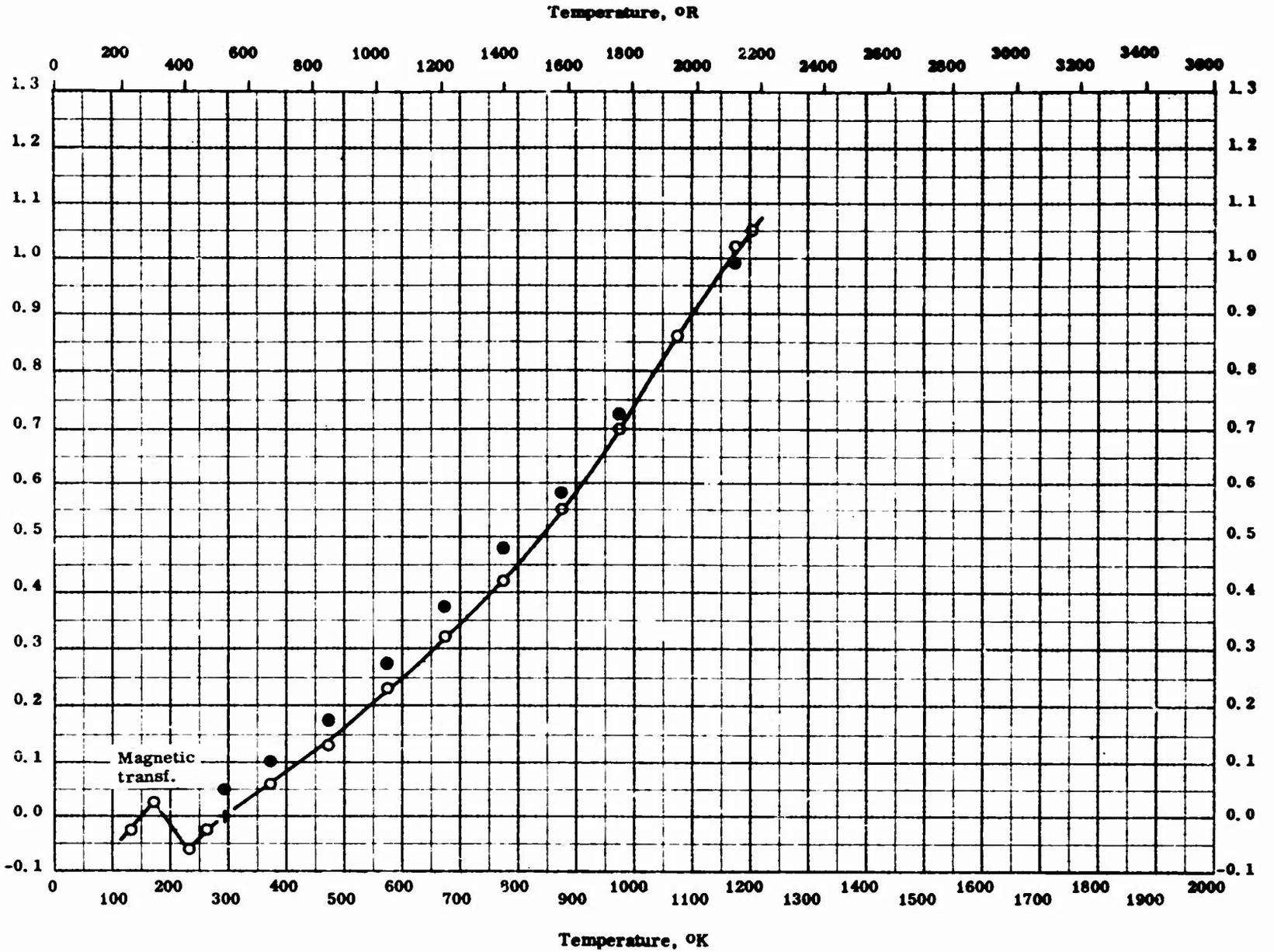


SPECIFIC HEAT -- TERBIUM

SPECIFIC HEAT -- TERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-25	15-360	0.1	Not given.	

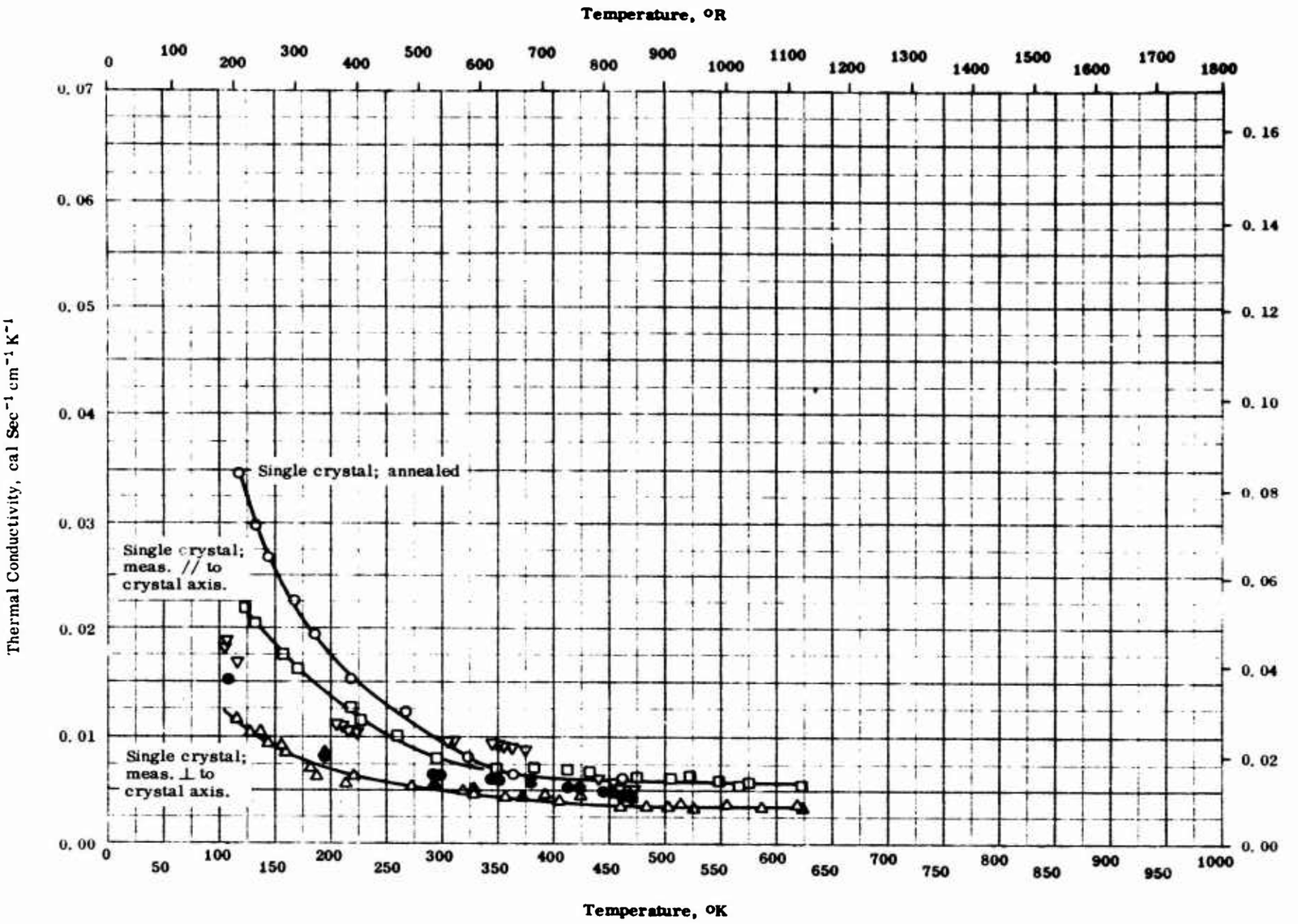


THERMAL LINEAR EXPANSION -- TERBIUM

THERMAL LINEAR EXPANSION -- TERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	57-62	103-1203		0.05 Dy, 0.05 Gd, and 0.04 Ca.	Heating.
●	57-62	293-1203		Same as above.	The above specimen; cooling.



THERMAL CONDUCTIVITY -- TELLURIUM

THERMAL CONDUCTIVITY -- TELLURIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-7	118-462		Single crystal.	Tempered in vacuum for 24 hrs at 400 C.
□	59-7	122-622		Single crystal.	Heat flow parallel to crystal axis.
△	59-7	115-622		Single crystal.	Heat flow perpendicular to crystal axis.
▽	59-8	105-472		Single crystal with hole concentration 9×10^{15} cm^{-3}	
●	59-8	108-471		Single crystal with hole concentration 9×10^{16} cm^{-3}.	
▲	59-8	195-373		Single crystal with hole concentration 5×10^{8} cm^{-3}.	

PROPERTIES OF THORIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	11.7	730
Melting Point	1980	3565
Heat of Fusion	4.33	7.79

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	11.59	723.5
	□	11.50	717.9
	△	11.724	731.91
	◇	11.7	730
	▽	11.48	716.7
	◁	11.64	726.7
	▷	11.58	722.9
	●	11.755	733.84
	■	11.77	734.8
	▲	11.55	721
	▼	11.71	731.0
	◀	11.50 ± 0.01	717.9 ± 0.62
	▶	11.66 ± 0.01	727.9 ± 0.62
	◆	11.61	724.8
	◑	11.5	717.9

Melting Point		K	R
	◨	2048	3675
	◭	1413 ± 20	2544 ± 36
	▼	1993	3588
	◀	1975	3555
	▶	1966	3539
	◆	2125 ± 50	3822 ± 90
	◐	1975 ± 7	3555 ± 13
	◧	1970	3550
	◭	1953	3516

PROPERTIES OF THORIUM (continued)

Melting Point (continued)		K	R
	▼	1968	3543
Heat of Fusion		cal g^{-1}	Btu lb^{-1}
	◆	4.325 ± 0.021	7.785 ± 0.038

PROPERTIES OF THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_r	Sample Specifications	Remarks
○	49-6	293		99.7 Th, 0.12 Fe, traces of O_2 and Si, and balance ThO_2; rod sample.	Author recommended 11.7 g cm^{-3} for pure Th; density by weighting in air and water.
□	49-6	293		Same as above; sheet sample.	Same as above.
△	56-51	298		0.1 metal impurities, 0.02 C, 0.01 O_2, and 0.01 N_2.	Density computed from x-ray measurements.
◇	57-53 50 57-45	300		Not given.	Density by weighting in air, water, and ethylene bromide.
▽	45-5	298		0.12 C, 0.06 Be, and 0.35 N_2.	Cast; author recommended 11.7 g cm^{-3} for pure Th; density by measuring weight and volume by displacement in liquid.
◁	45-5	298		Same as above.	Same as above except density which is computed by x-ray measurements.
◨	45-5	2048		Not given.	M. P. by observation.
▷	49-18	298		0.005 Si.	Deposited on W wire; density computed from x-ray measurements.
▲	49-18	1393-1433			M. P. by visual observation.
▼	53-41	1993			M. P. by break in time-temperature curve.
●	53-41	298		0.04 C, 0.02 Be, 0.01 Fe, and 0.005 Si.	Annealed; density computed from x-ray lattice measurements.

(Continued onto next page)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
■	53-41	298		Same as above.	Quenched from 1300 C; density obtained same as above.
▲	53-41	298		Same as above.	Cold-worked; same as above.
◀	52-28	1975		Crystal bar.	Cold-compacted, hot-compacted in vacuum at 750 C and extruded at 600 C; M. P. from measurements of temperature of liquid-solid interface of drip melting sample.
▶	52-28	1966		Not given.	Same method in obtaining M. P. as above.
▼	52-32	298		Not given.	
◆	52-32	2123		Not given.	
◐	55-48	---		Not given.	Δh_f from cooling curve in calorimeter.
◀	45-6	298		Not given.	Density corrected for air buoyancy.
▶	45-6	298		Not given.	Sintered, forged, and rolled; density corrected for air buoyancy.
●	53-45	1967-1982		Not given.	
◧	52-29	1972		0.037 C, 0.015 N, 0.014 Fe, 0.012 O, 0.009 Al, 0.009 Si, 0.003 Be, and traces of Zn; sponge material.	M. P. from break in time-temperature curve.
◑	50-20	298		Not given.	Average observed.
▲	50-20	1953		Not given.	

(Continued onto next page)

PROPERTIES OF THORIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σc	Sample Specifications	Remarks
◆	50-20	298		Not given.	Density computed from x-ray measurement of lattice.
▼	49-25	1968		0.09 C and traces of O_2 and N_2.	M. P. by visual observation.

TPRC

ELECTRICAL RESISTIVITY -- THORIUM

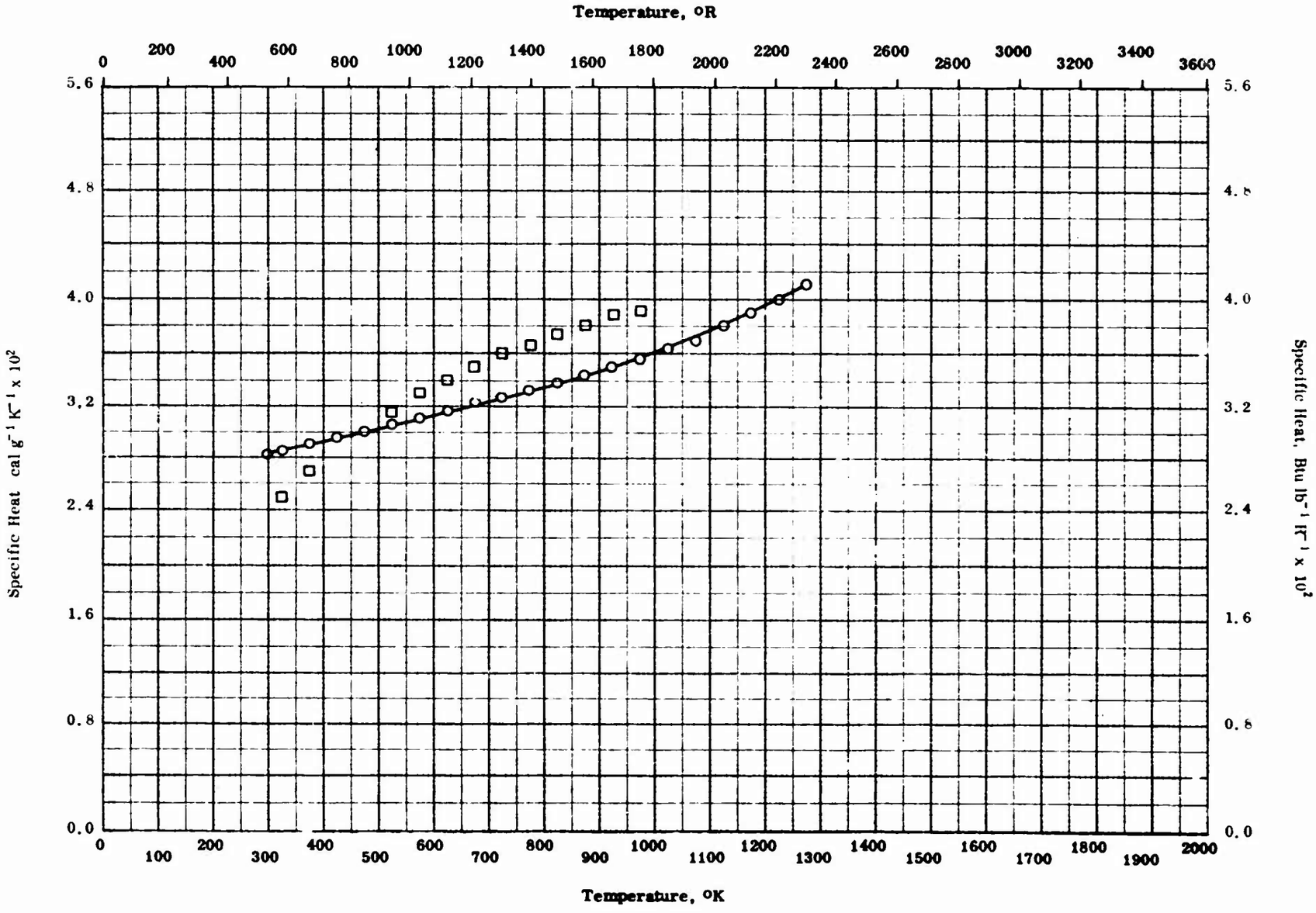
Electrical Resistivity, ohm cm x 10⁶

ELECTRICAL RESISTIVITY -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-11	315-1176	± 0.4	0.06 Be, 0.04 C, 0.02 N, and 0.01> Al	Annealed 4 hrs at 650-700 C.
□	52-11	303-936	± 0.4	Same as above.	Annealed 1 hr at 650 C.
△	52-11	301-1176	± 0.4	0.11 C, 0.03 Be, and 0.01> ea. Al, N.	Annealed 9 hrs at 650-700 C.
◇	52-11	303-1238	± 0.4	Same as above.	Annealed 2.5 hrs at 800-900 C.
◆	52-11	303-1238	± 0.4	Same as above.	The above specimen, cooling.
▽	49-6	273-1073		99.7 Th, 0.12 Fe, traces of O_2, Si, and balance ThO_2; rod of 4 mm dia. and 20 cm length.	Aged several hrs at 1000 C.
●	49-6	273-1073		Same as above; sheet 0.05 mm thick.	
▲	56-40	318-1273		Not given.	Annealed at 900 C.
▼	54-18 also 50-7	823-1983		99.8 pure.	Relative resistance given; resistivity calculated from assumed r of 51 μ ohm cm at 500 C.
■	45-1	293-373		Probably impure; from Westinghouse Lamp. Co.	
◁	55-27	1448-1848		Iodide process; before test: 0.0200 ea. C, O, 0.00077 H, and 0.0006> N; after test: 0.0500 C, 0.0260 O, 0.00011 H, and 0.0006> N; 80 mil wire.	Measured in vacuum of 7×10^{-5} mm Hg with liq. N_2 trap in vacuum system; first heating.
◀	55-27	1448-1848		Same as above.	The above specimen, second heating.

TPRC



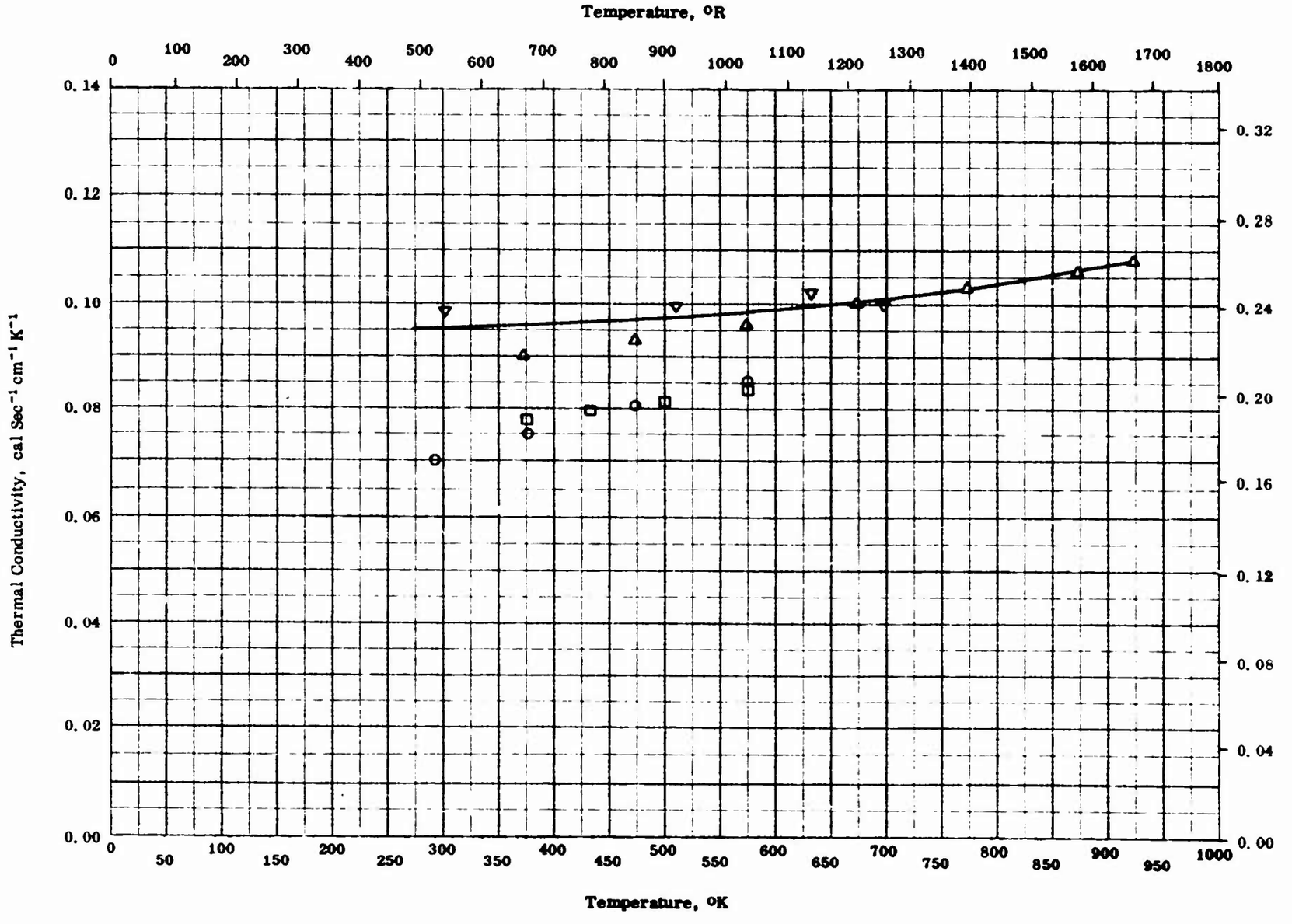
SPECIFIC HEAT -- THORIUM

TPRC

SPECIFIC HEAT -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-33	298-1273	2.0	Crystal bar; 0.02 Zr, 0.0075 C, 0.00583 O_2, 0.005> Si, 0.003 Al, 0.002> Be, 0.002 Ca, 0.002> Fe, 0.002> Mg, 0.002> Mn, 0.002> Ni, 0.00035 H_2, and 0.00033 N_2.	Annealed at 100 C for at least one hr under 10^{-5} mm Hg pressure; cooled to room temperature at 40 C per hr; arc melted; cleaned with hot nitric acid in sodium fluosilicate.
□	59-16	323-973	< 2.0	99.81 Th.	



THERMAL CONDUCTIVITY -- THORIUM

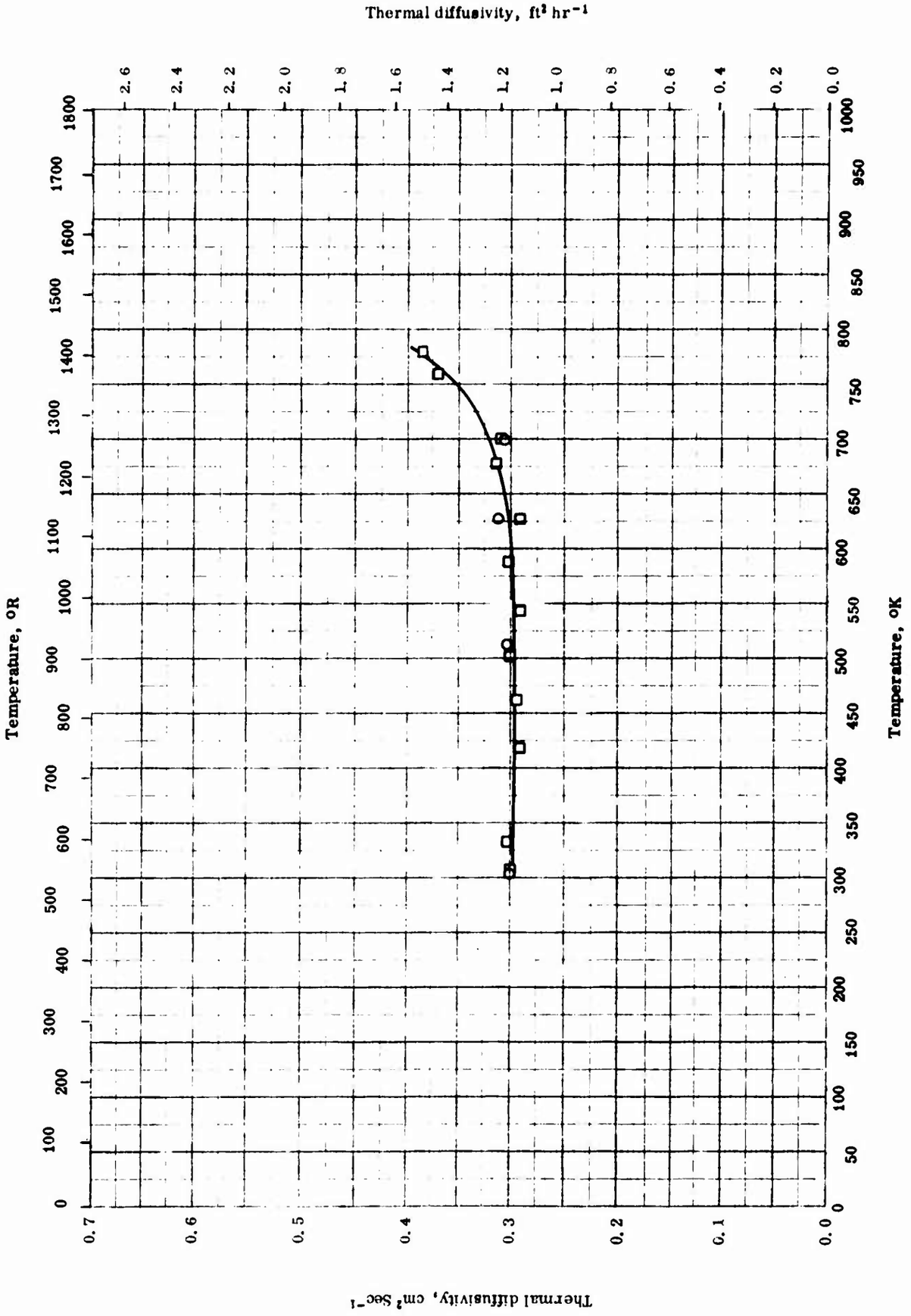
TPRC

THERMAL CONDUCTIVITY -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ	Sample Specifications	Remarks
○	45-1	293-573		Probably impure; from Westinghouse Lamp Co.	
□	45-2	377-582			
△	51-6	373-923			Ca reduced; hot rolled at 788 C and air cooled.
▽	51-1	301-697		Pure.	

TPRC



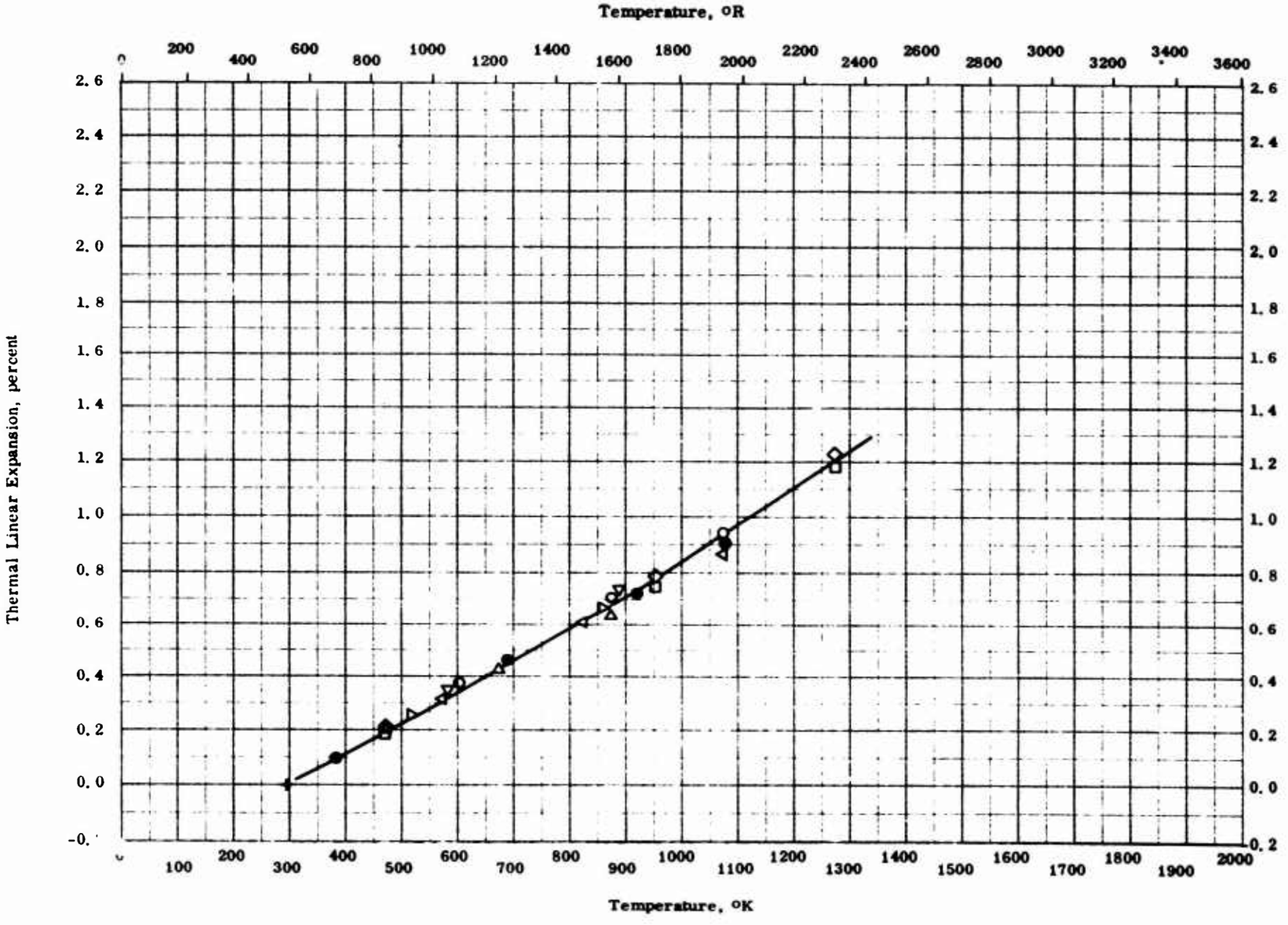
THERMAL DIFFUSIVITY -- THORIUM

TPRC

THERMAL DIFFUSIVITY -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-1	301-697	< ± 13	Approximately 1/8 in. in dia and 50 cm in length; density 11.358 g cm^{-3}.	
□	53-2	305-778		99.85 Th.	

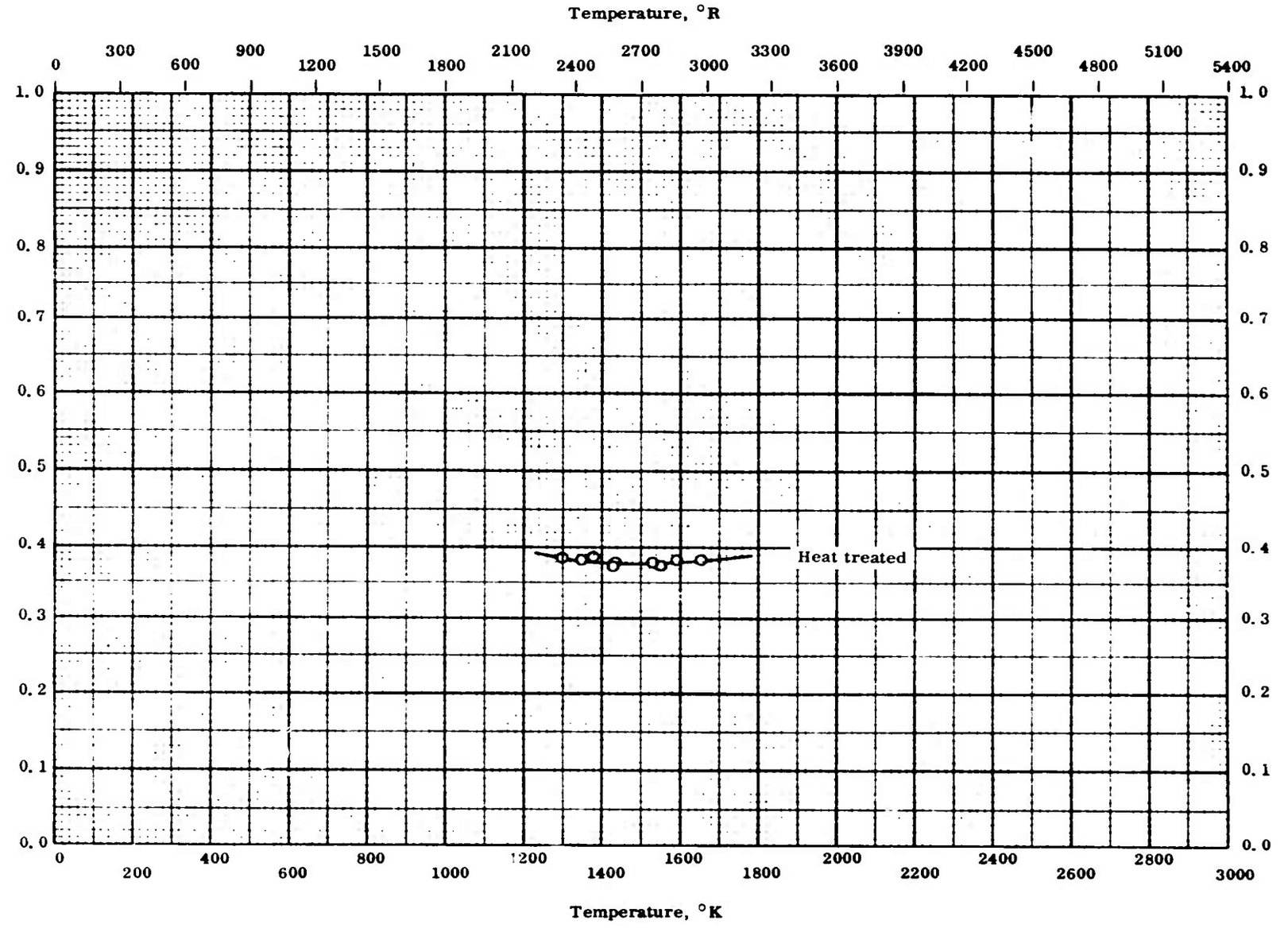


THERMAL LINEAR EXPANSION -- THORIUM

THERMAL LINEAR EXPANSION -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◇	45-6	293-1273		Not given.	Sample as sintered from Westinghouse.
□	45-6	293-1273		Not given.	Sample extruded from Ames.
△	52-36	293-1073		Not given.	
▽	52-37	293-1073		Not given.	Cooling data, sample cold swaged.
○	52-37	293-1073		Not given.	Same as above, another sample.
◁	52-37	293-1073		Not given.	Cooling data; sample swaged at 700 C in Pb bath.
▷	52-37	293-1073		Not given.	Same as above, another sample.
●	52-37	293-1073		Not given.	Same as above, a third sample.

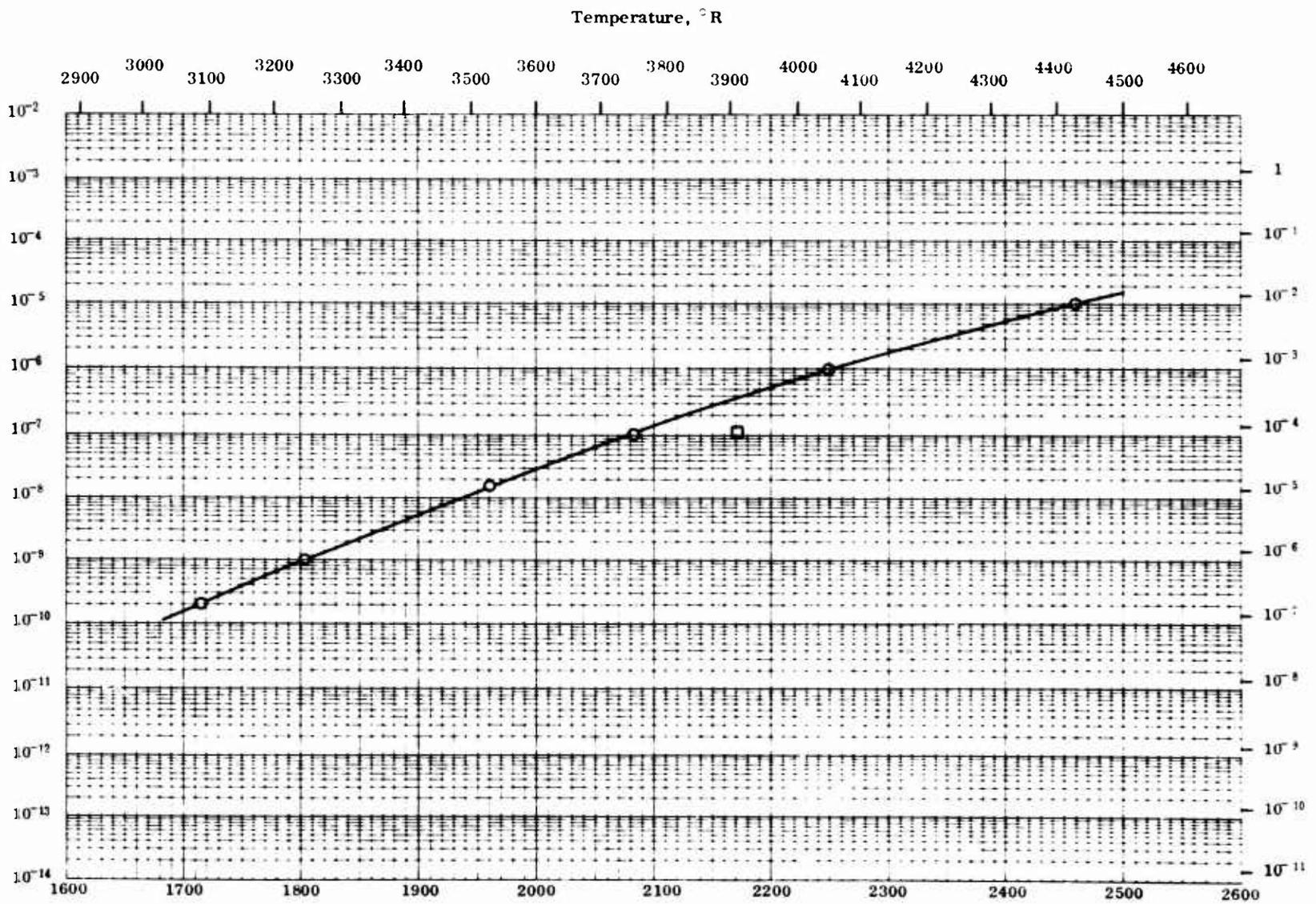


NORMAL SPECTRAL EMITTANCE -- THORIUM

NORMAL SPECTRAL EMITTANCE -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	35-1	0.667	1300-1700		Not given.	Heat-treated for 600 hrs.



VAPOR PRESSURE -- THORIUM

VAPOR PRESSURE -- THORIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-15	1720-2463		High purity.	Melted high purity crystal bar in outgassed Ta crucible, another sample bomb reduced by Natl. Lead.
□	57-14	2173		"Pure".	A preliminary run on new equipment.

PROPERTIES OF THULIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density	9.318	581.7
Melting Point	1873	3372
Heat of Fusion	26	47
Heat of Vaporization	346	623
Heat of Sublimation	350_{298K}	630_{537R}

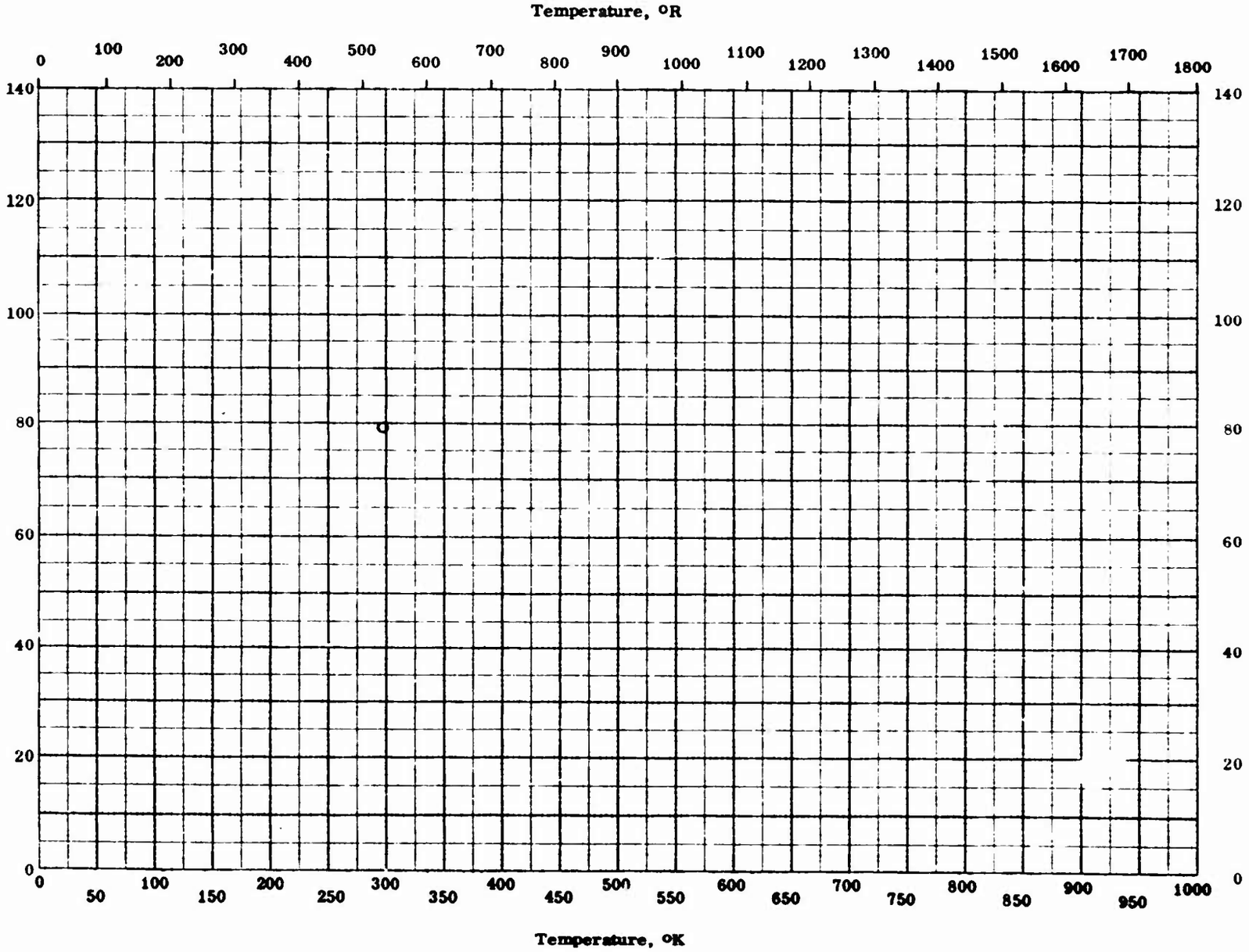
REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	□	9.318	581.7
	■	9.20	574.1
Melting Point		K	R
	○	1873 ± 50	3372 ± 90
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▽	26	47
	●	25.5	45.9
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▲	346	623
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	△	350_{298K}	630_{537R}
	△	340_{1014K}	612_{1825R}
	◇	$332_{937K} \pm 2$	$597_{1687R} \pm 4$

PROPERTIES OF THULIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-11	1823-1923		Very pure.	M. P. from observing of flow during preparation.
□	55-28	298		Not given.	Density computed from x-ray measurement.
△	57-19	298		Not given.	Δh_s from vapor pressure data.
◇	56-40	937		High purity.	Δh_s from vapor pressure data.
▽	56-54	1922		Very high purity.	
●	62-13	---		Not given.	
■	62-13	298		Not given.	
▲	62-13	298		Not given.	



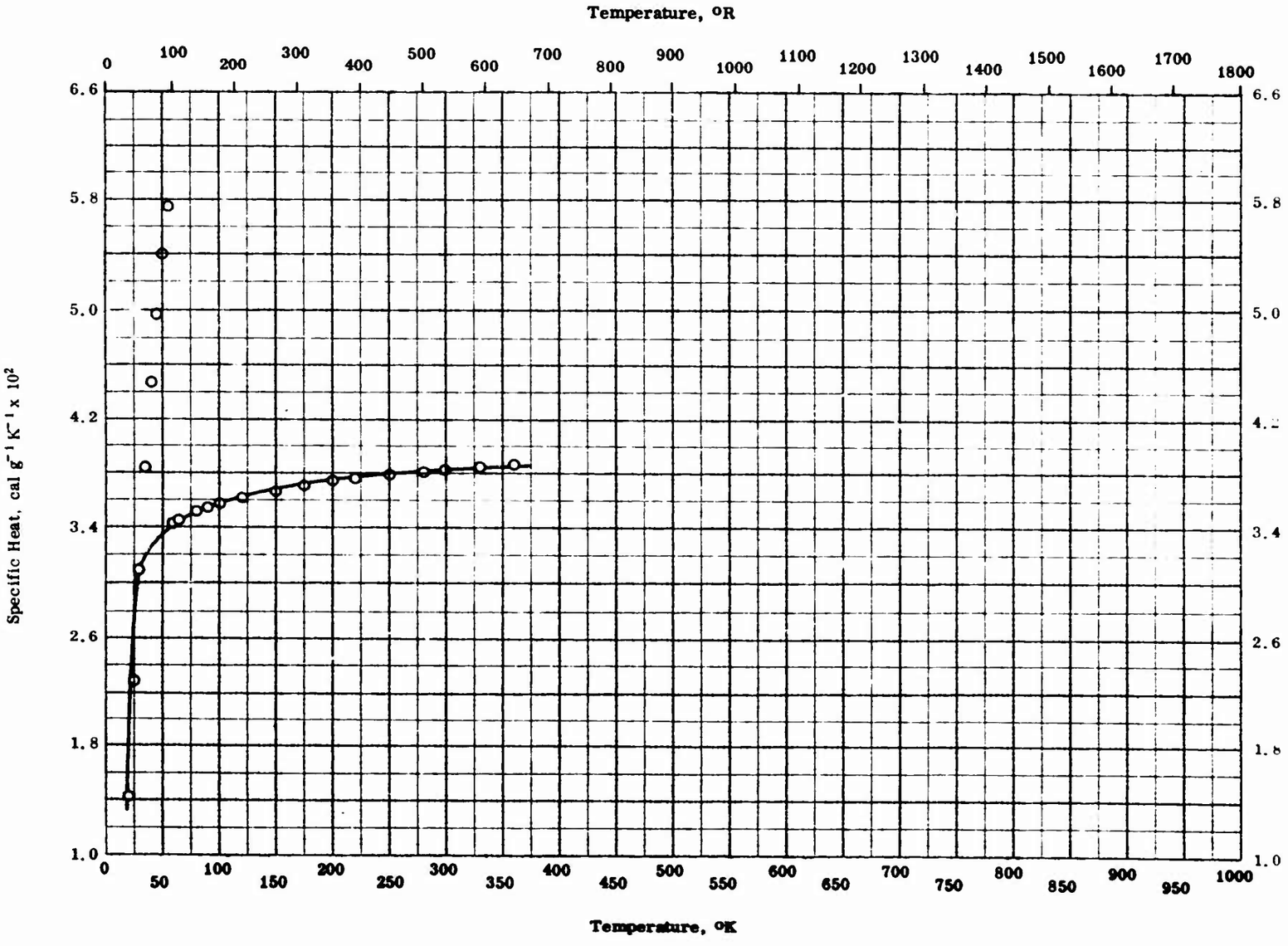
ELECTRICAL RESISTIVITY -- THULIUM

ELECTRICAL RESISTIVITY -- THULIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		Not given.	

TPRC

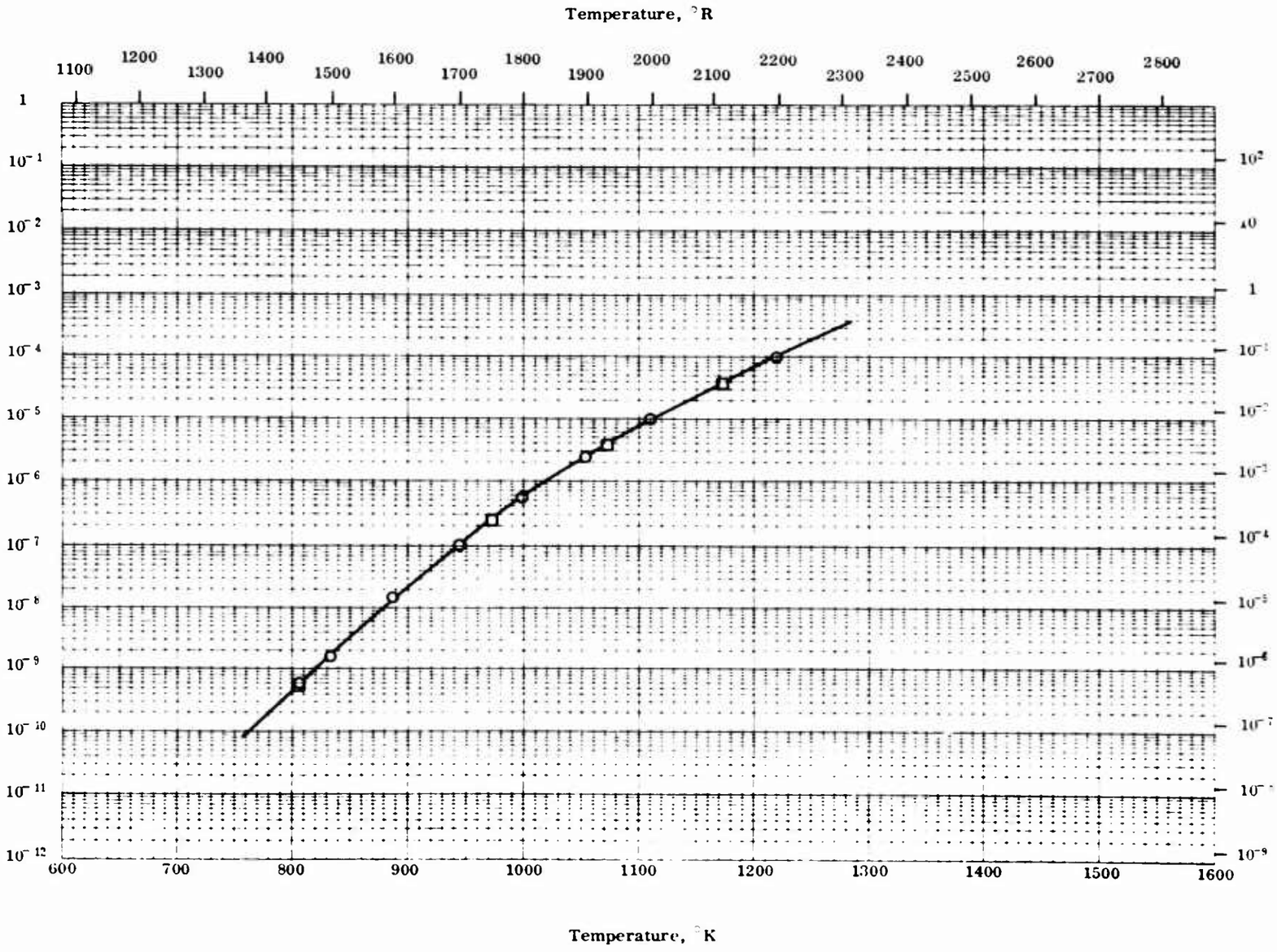


SPECIFIC HEAT -- THULIUM

SPECIFIC HEAT -- THULIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	61-26	14-360	0.1	0.4 Ta, 0.02-0.005 Fe, 0.02 rare earth, and 0.01 > Mg.	Cast and machined; data corrected for impurities.



VAPOR PRESSURE -- THULIUM

VAPOR PRESSURE -- THULIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-19	809-1219		Not given.	Redistilled from mixture of Tm and La.
□	62-13	808-1173		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{12552 \pm 45}{T(K)} + 9.176 \pm 0.046.$

TPRC

PROPERTIES OF TITANIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	4.6	287
Melting Point	1950	3510
Heat of Sublimation	2354_{0K}	4237_{0R}

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	□	4.52	282.16
	△	4.54	283
	○	4.454	278.1
	▽	4.52	282
	◁	4.6	287
	▷	4.5	280

Melting Point		K	R
	◇	1953	3315
	●	1933 ± 10	3480 ± 18
	■	1941 ± 10	3494 ± 18
	▲	1946 ± 4	3502 ± 7
	▼	1953	3515
	◀	1997 ± 10	3595 ± 20
	▶	1938 ± 1	3489 ± 2
	◆	1878 ± 4	3391 ± 7
	◐	2093	3767

Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◑	2354_{0K}	4237_{0R}
	◨	1983_{1725K}	3570_{3105R}
	▲	$2319_{0K} \pm 12$	$4174_{0R} \pm 22$
	▼	$2315_{1735K} \pm 100$	$4167_{3128R} \pm 180$
	◀	2394_{298K}	4310_{536R}
	▶	2351_{298K}	4231_{536R}

PROPERTIES OF TITANIUM

REFERENCE INFORMATION

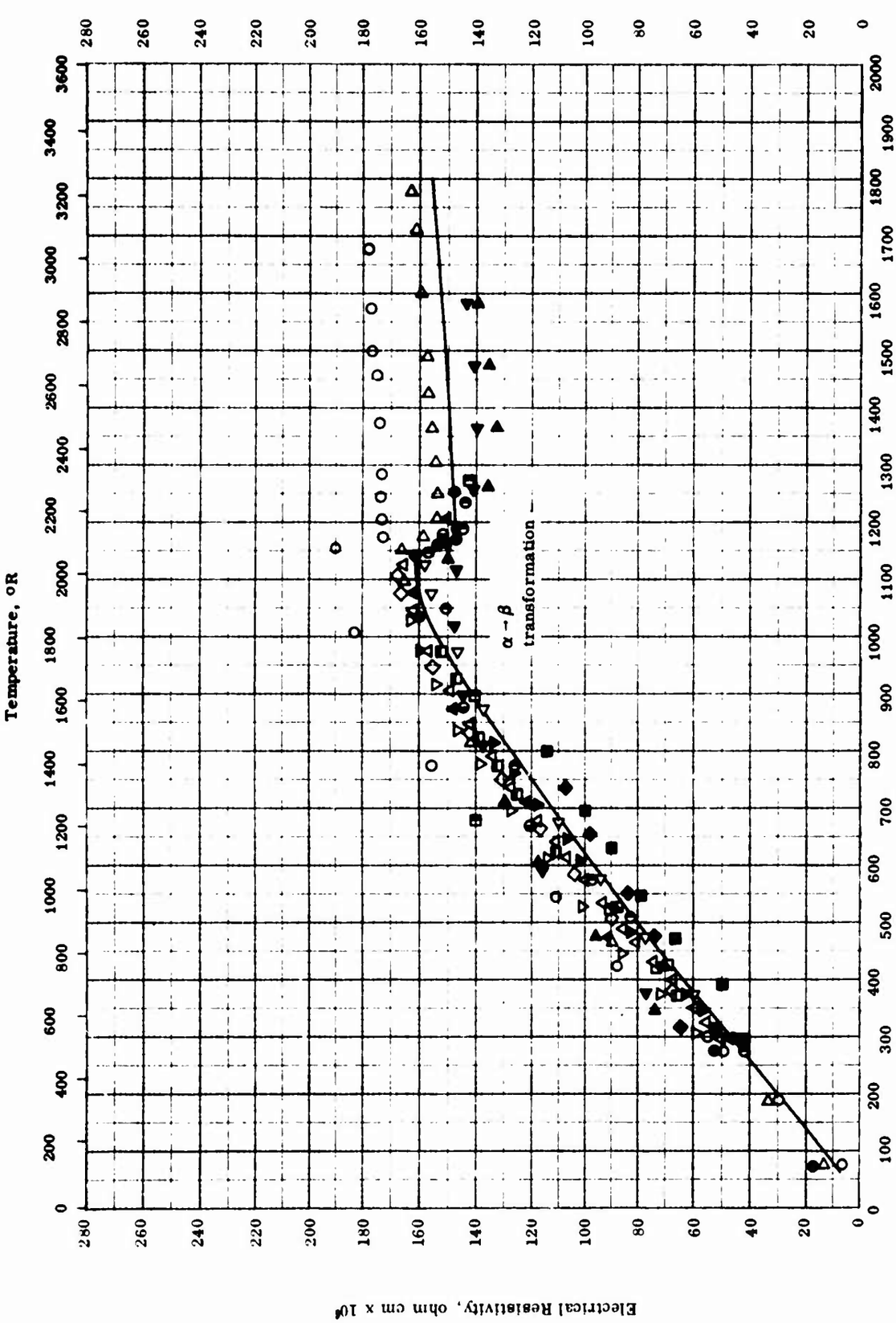
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	49-15	298	±0.5	Not given.	Density by weighting on micro balance.
□	52-14	---		99.6 Ti.	Density by weight in water in air.
◇	52-14	1895-1950		98.2 - 99.6 pure; believed to contain O_2.	M. P. from liquid forming in black body cavity of the sample.
◑	53-13	0		99.884 Ti, 0.03 Si, 0.02 each Mg and Cu, 0.01 each Mo and Fe, 0.01> Ca, 0.005 each Al, Sn, and Mn, and 0.001 Cr.	Δh_S from vapor pressure data.
▽	49-14	293		0.3> Fe, 0.1 N_2, 0.07 C, and traces of Pb, Si, Mn, Mg, Zn, Cu, and Co.	Annealed 10 min at 820 C; density by weight and volume and by weight in air and in water.
▲	54-29	1946		Iodide.	Arc-melted; M. P. from loss of electric continuity; measured in vacuum of 1 - 2 microns Hg.
◁	54-33	298		Not given.	Density by weight in air and in water.
◭	49-2	0		99.7 - 99.9 pure.	Δh_S from vapor pressure data.
▼	57-46	1953		99.96 pure iodide Ti.	Annealed 40 hrs at 850 C and furnace cooled; M. P. by liquid forming in black body cavity of the sample.
◨	49-13	1650-1800		Not given.	
△	52-15	≈400		99.92 Ti and remainder Mn, Fe, Al, Pb, Cu, Sn, Mg, N_2, and H_2.	Density by weight in air and in water.

(Continued onto next page)

TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
●	53-31	1928, 1933		Two samples: (1) 0.17 Fe, 0.05 Si, 0.015 O_2, 0.01> N_2, and 0.006 C, and (2) 0.03 O_2, 0.03 H_2, 0.0065 Al, 0.0055 Mn, 0.0045 Fe, 0.0025 Pb, 0.0025 Sn, 0.002 Cu, 0.001 N_2, and 0.0005 Mg.	4 measurements made on each sample by liquid forming in black body cavity in sample at (1) 1652 - 1658 C and (2) 1657 - 1662 C; author recommends 1660 ±10 C for M. P.
■	56-46	1941		0.05 Zr, 0.01 O_2, 0.004> Cr, 0.002> each Al, Si, and V, 0.0015 Mg, 0.001 Fe, 0.001> Mo, and 0.0005 each Cu and Ni.	M. P. from liquid forming in black body cavity of sample; reproducible within ±3 C.
▷	49-19	298		0.05 Al, 0.04 Si. 0.04 Fe, 0.03 C, 0.002 - 0.003 N, and 0.002 S.	Iodide process.
◀	49-19	1986-2008		Same as above.	
▼	51-8	1735		Not given; Mg reduced or iodide process Ti.	Δh_s from vapor pressure data.
◀	51-8	298		Not given.	Same as above.
▷	51-8	298		Not given.	Same as above except mean value of pts from 7 individual experiments by $\Delta H_T = T\Delta S_T + \Delta G_T = T\Delta S_T - RT\ln P/P_o$.
▶	53-45	1937-1940		High purity crystal bar.	M. P. from visual observation.
◆	53-45	1875-1882		DuPont Ti.	Same as above.
◧	56-55	1953		Not given.	
◐	63-38	2093		Not given.	



ELECTRICAL RESISTIVITY -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-28	76-1680		"Iodide"; 99.9 Ti, 0.06 Pb, 0.012 A, 0.010 Mn, 0.004 Fe, 0.003 Sn, 0.002 N, and 0.001 ea. Cu, Mg.	Data reported as r/r(77 F).
△	52-11	297-1121	± 0.4	"Iodide titanium".	Annealed 12 hrs at 650-700 C; heating and cooling runs at 45-60 F hr^{-1}.
◇	52-11	301-1110	± 0.4	Same as above.	Annealed 10 hrs at 675-700 C; heating run; other conditions as above.
▽	52-11	306-1110		Same as above.	Annealed 8 hrs at 700-725 C; heating run; other conditions as above.
◁	56-24	298-1123	± 1	"Iodide titanium" α-hexagonal modification.	High temp. work in vacuum of 10^{-6} mm Hg.
▷	53-28	76-1775		Ti-75A; 99.74 Ti, 0.08 Si, 0.06 O_2, 0.03 ea. Fe, Cl, 0.02 Mg, 0.015 Mn, 0.01 Al, 0.002 ea. N_2, Sb, Pb, W, Cr, Ni, and 0.001 ea. Sn, Cu, V, Mo.	Data reported as r/r(77 F).
■	57-11	311-800		Iodide titanium; 99.9 pure.	Annealed 5 hrs at 700 C in vacuum.
◆	57-11	314-733		99.6 pure.	Forged; same as above.
●	57-27	77-1253		Crystal bar; 0.07 O_2, 0.032 C.	
◨	56-25	707-1273		β-phase.	
▲	56-38	293-1198		Iodide titanium; 99.99 pure.	
▼	58-9	311-811	± 1	A-55 (formerly RC-55); unalloyed nominal; 100 Ti.	

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TPRC

ELECTRICAL RESISTIVITY -- TITANIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▶	54-21	293-1645		99.8 pure; 0.10 Fe, 0.02 N_2, and low O_2.	Grain growth 20 fold during test; auth. believes broad trans. range and decrease in resistivity due to impurities; heating.
◀	54-21	293-1645		Same as above.	Same as above; cooling.
◐	56-32	293-1193		Pure iodide Ti.	Difference between heating and cooling runs less than 3%.
◑	56-28	273-1231		0.028 O_2, 0.002 N_2, and Mo, Al, Si, Cu, Mg, Mn, Fe, and Sn also present as impurities.	High purity iodine titanium and pure TiO_2 fused in He atm. and remelted several times.
◪	61-11	323-573		Normal commercial grade.	
◪	61-11	323-573		High purity grade.	
◧	61-11	293		Very high purity grade.	
◘	61-31	323-973		99.7 Ti.	

SPECIFIC HEAT -- TITANIUM

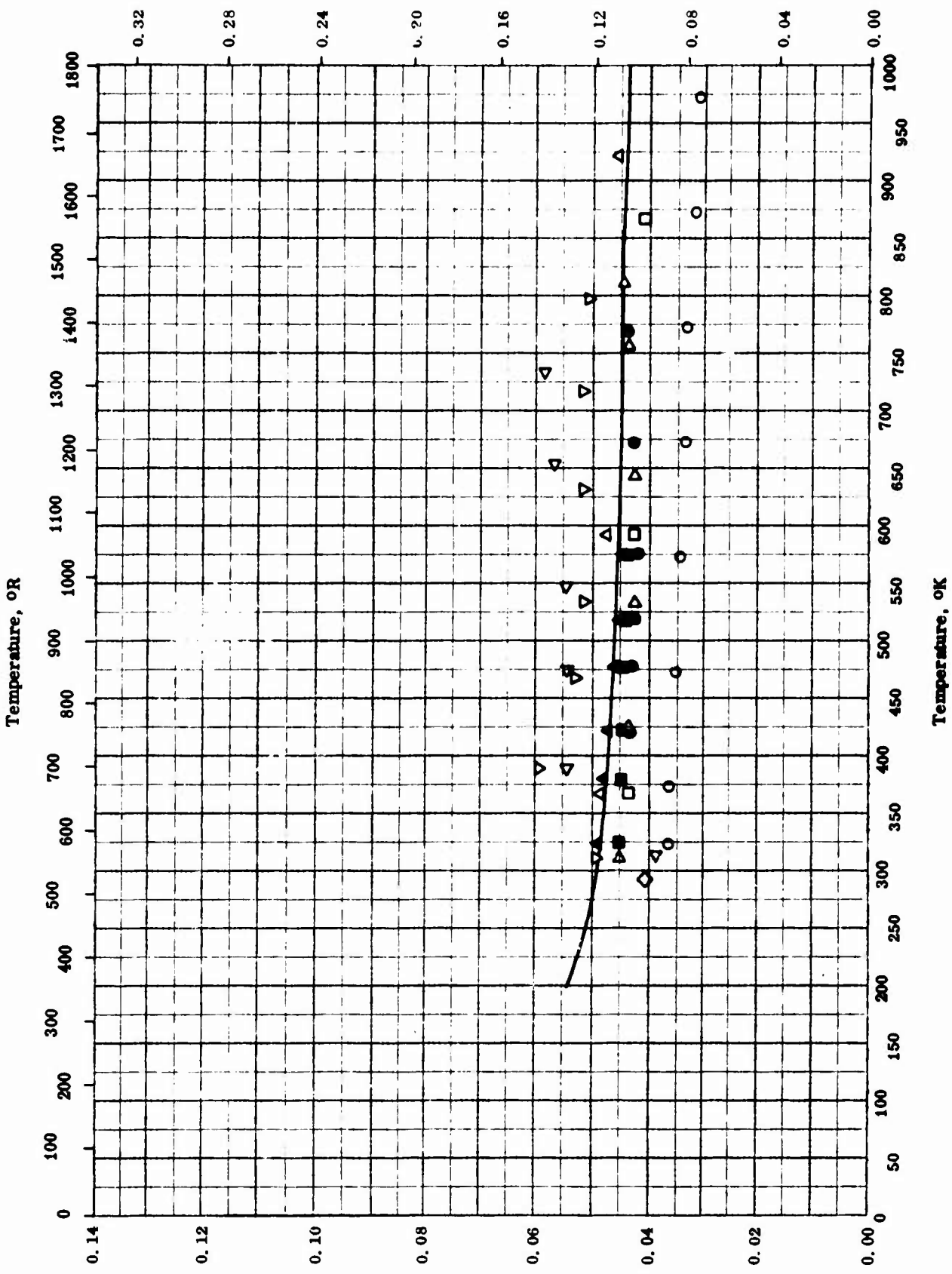
SPECIFIC HEAT -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-20	298-1400	± 1.6	Not given.	
□	63-18	599-1154	≤10.0	0.2> C, few tenths percent maximum O_2, N_2, and Fe. [Author's design.: Filament No. 2]	Sealed under vacuum.
△	63-18	758-1345	≤10.0	Same as above. [Author's design.: Filament No. 3]	Same as above.
⊖	58-17	868-1348	± 5.0	Commercial grade.	Sealed under vacuum.
◇	56-21	422-977	18	99.9 Ti.	
⊖	57-23	323-1233		Iodide titanium; 0.032 C, 0.030 Fe, 0.011 O_2, 0.0067 H_2, 0.001 Cu, 0.00077 N_2.	
▲	56-10	310-1033		Ti 75A; 99.75 Ti, 0.131 O_2, 0.07 Fe, 0.06 C, 0.048 N_2, and 0.0068 H_2.	
●	61-23	294-1923		99.705 Ti, 0.08 Fe, 0.07 Si, 0.05 C, 0.03 N_2, 0.02 O_2, 0.005 H_2, 0.04 other impurities.	

TPRC

THERMAL CONDUCTIVITY -- TITANIUM

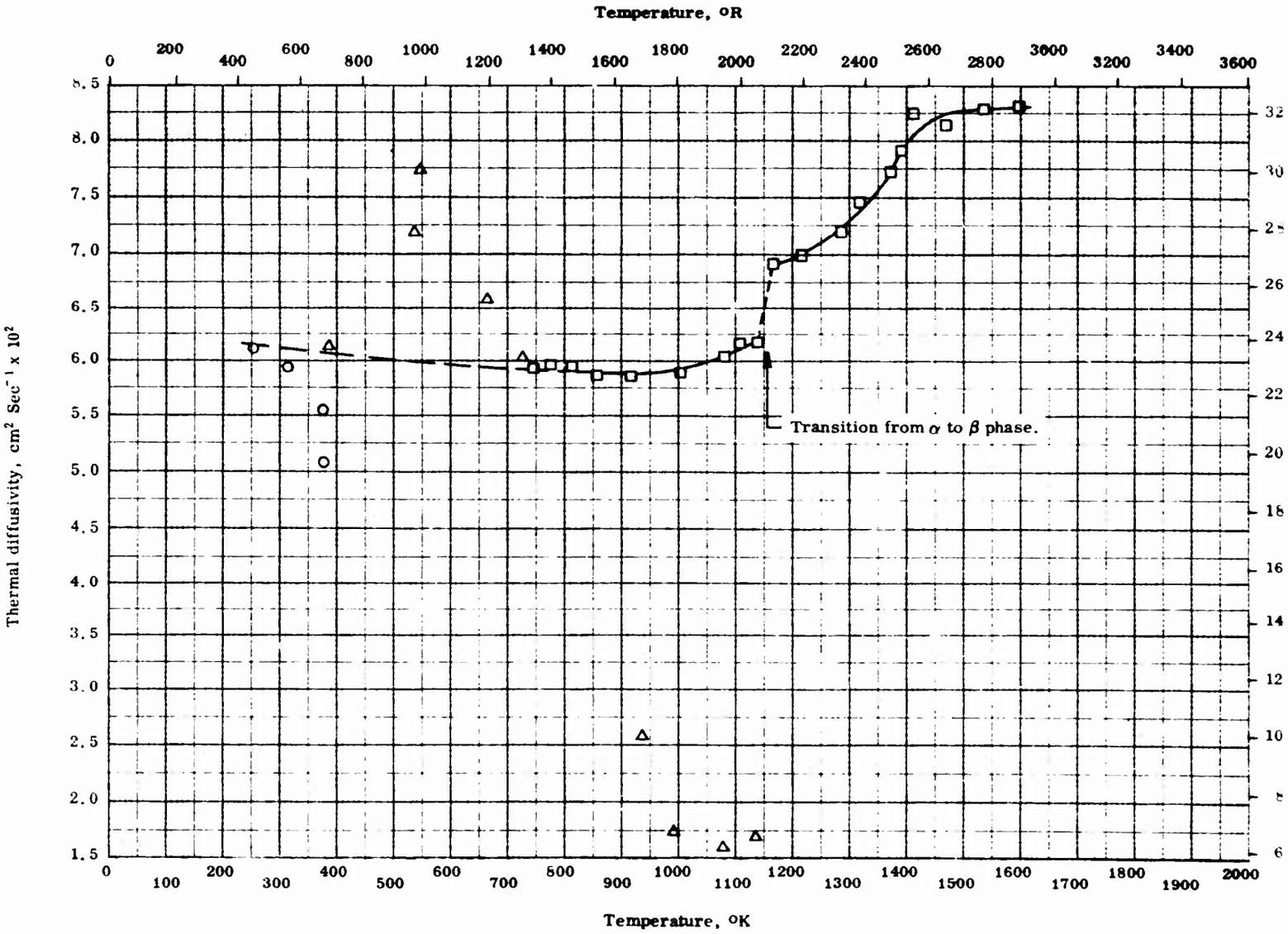


THERMAL CONDUCTIVITY -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-4	323-973		99.815 Ti, 0.10 Mn, 0.04 Fe, 0.035 C, and 0.01 Mg.	Rod.
□	56-10	367-867	< 7	99.64 Ti, 0.123 O_2, 0.12 Fe, 0.08 C, 0.028 N_2, and 0.0073 H_2.	Rod.
△	56-10	367-867	< 7	99.75 Ti, 0.131 O_2, 0.07 Fe, 0.06 C, 0.048 N_2, and 0.0068 H_2.	Rod.
▽	57-11	311-800		Iodine titanium; 99.9 Ti.	Annealed at 700 C for 5 hrs in vacuum.
◁	57-11	314-733		99.6 Ti.	Forged and then same treatment as the above.
▷	58-9	311-811		A - 55 (formerly RC -55)	In mild annealed condition.
◇	56-12	293			
■	61-11	324-575		Normal commercial grade.	
▲	61-11	324-575		High purity.	
●	61-11	380-769		99.64 - 99.75 pure.	

TPRC



THERMAL DIFFUSIVITY -- TITANIUM

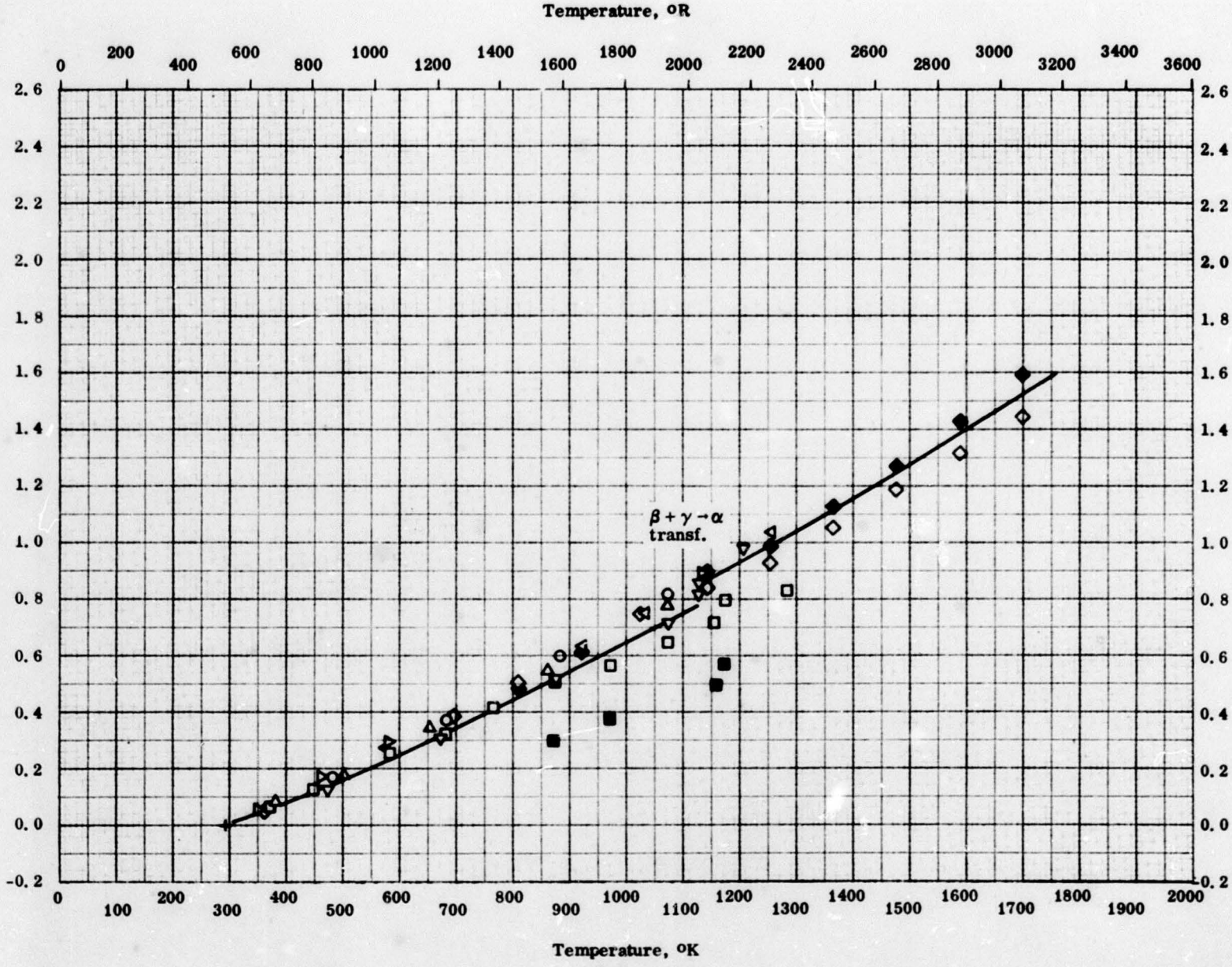
TPRC

1003

THERMAL DIFFUSIVITY -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	54-1	253-375	±6.8		
□	63-1	746-1598	±5		
△	62-2	388-1133		VT-1; pure α-titanium; cylindrical sample with 3 mm in dia and 300 mm in length.	Vacuum annealed for 5 hrs at 720 C and again annealed in apparatus before measurements.

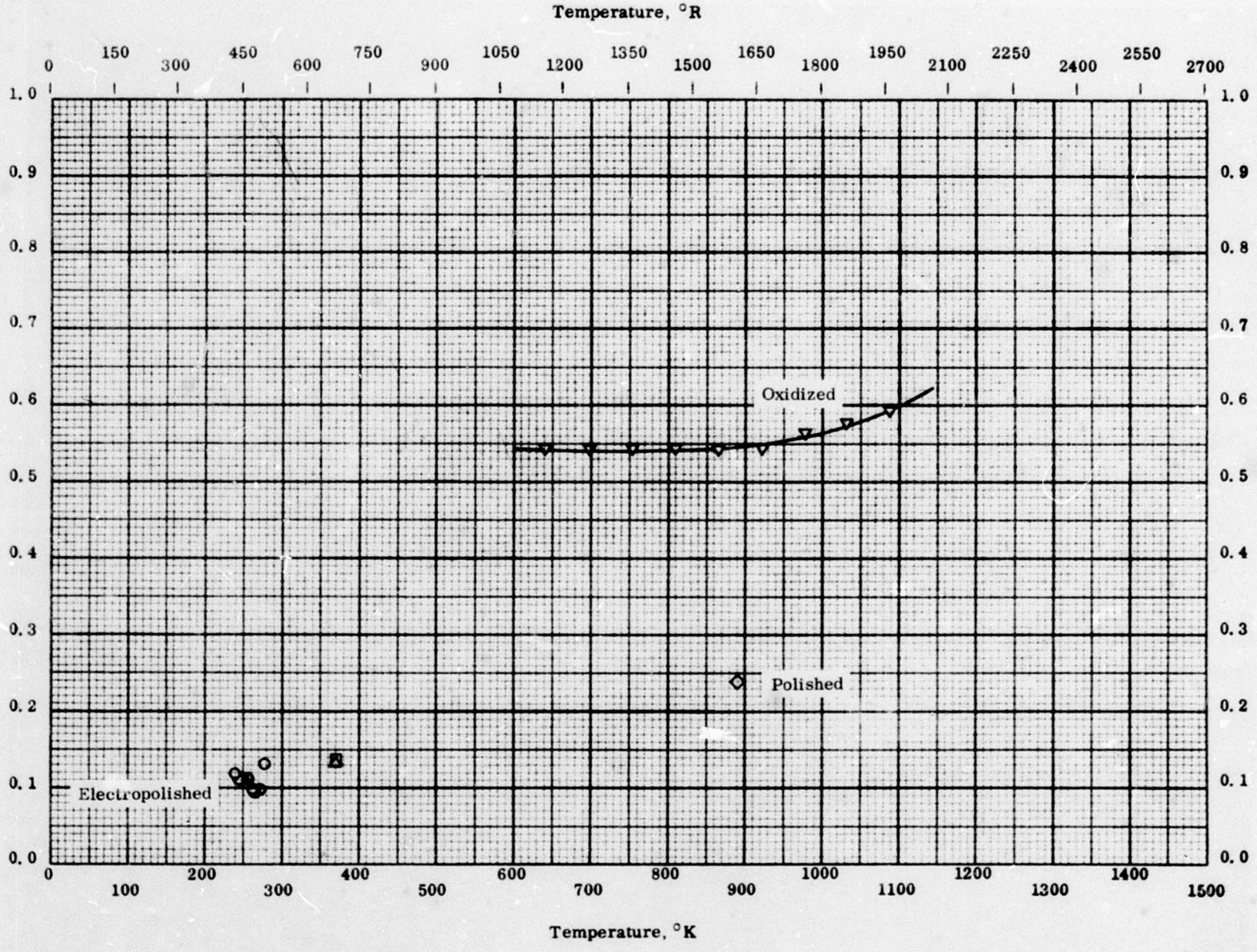


THERMAL LINEAR EXPANSION -- TITANIUM

THERMAL LINEAR EXPANSION -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	48-13	303-1073		"Ductile"; 0.12 Mg, 0.06 Mn, < 0.03 Ca, Cu, Fe, Sn, V each, 0.01> Si, 0.005> Al, Na not detected, and O, N not tested but small.	Sintered compact; annealed and cold swaged with intermediate vacuum anneals at 800 - 1000 C; measured in helium.
△	48-13	303-1073		"Ductile"; 0.04 Mg, 0.03 Mn, Si each, 0.005> Cu, Fe, Al, Na, 0.001> Ca, Sn and V not detected, and O, N not tested but small.	Cold swaged with intermediate anneals; measured in helium.
▽	54-7	273-1206		Not given.	Measured parallel to axis of sample; average results for 20 samples.
□	57-46	373-1283		99.96 pure iodide Ti.	Annealed at 850 C for 40 hrs and cooled in furnace to room temperature; author gives relative data at 100 C assumed to be 0.07.
■	57-38	873-1283		Same as above.	Cooling data of above specimen.
◇	61-50	293-1700		Commercially pure A-55 grade Ti; specimen 5/8 in. dia. rod.	Annealed; measured in vacuum of about 3×10^{-4} mm Hg.
◆	61-50	293-1700		Same as above.	Cooling data of above specimen.
◁	64-32	293-1255		Crucible A-70; commercially pure.	
▷	64-32	293-1255		Crucible A-55; commercially pure.	



HEMISPHERICAL TOTAL EMITTANCE -- TITANIUM

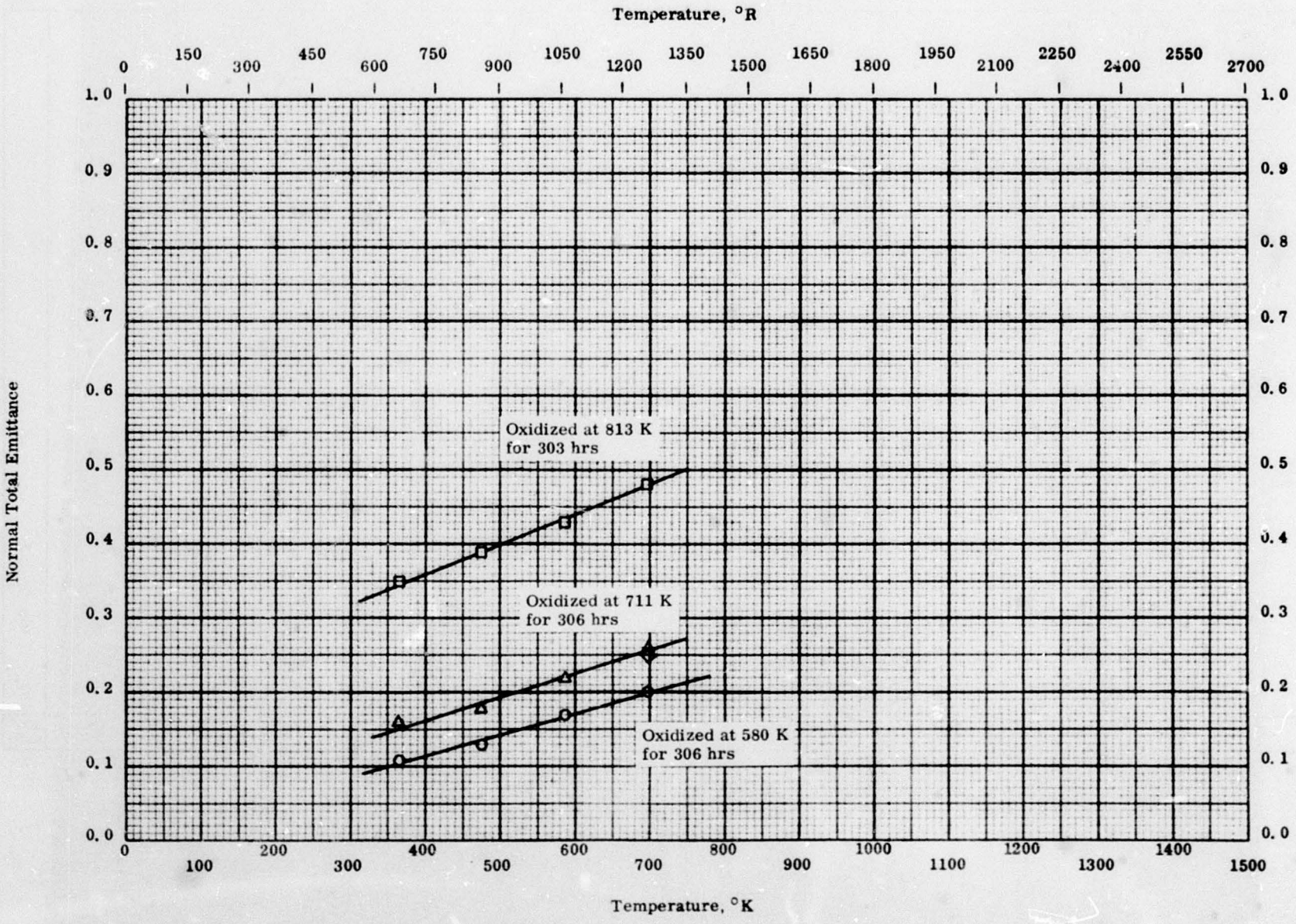
TPRC

1007

HEMISPHERICAL TOTAL EMITTANCE -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	63-32	241-279	±3	Pure.	Polished; measured in vacuum (10^{-3} mm Hg).
△	63-23	373±10		99.9 pure.	Prefinished with 600 grit aluminum oxide powder on felt and electropolished; measured in vacuum (10^{-5} mm Hg).
□	63-23	373±1		Same as above.	Same as above; after 9.86×10^{-20} ions cm^{-2} hydrogen ion bombardment.
◇	60-52	891	8	Not given.	Highly polished; measured in vacuum (10^{-5} mm Hg).
▽	58-19	644-1089	<2	TMCA Ti-75 A; nominal composition: 0.1 Fe, 0.08 W, 0.04 C and 0.02 N_2.	Stably oxidized in quiescent air at 1089 K.

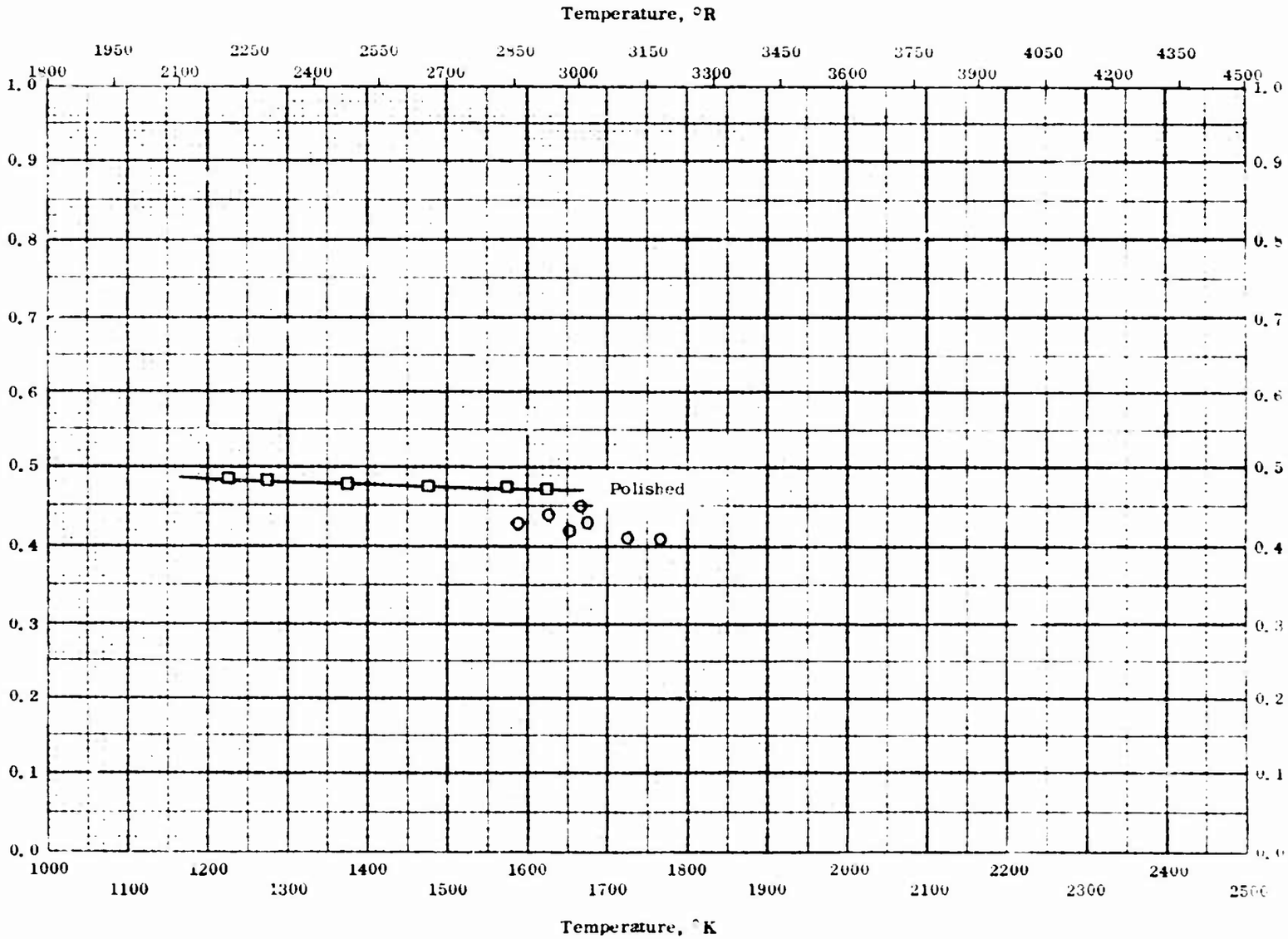


NORMAL TOTAL EMITTANCE -- TITANIUM

NORMAL TOTAL EMITTANCE -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	58-22	366-700	15-27	Ti - 75 A, AMS 4901; nominal composition: 0.1 Fe, 0.08 W, 0.04 C and 0.02 N_2.	Oxidized at 580 K for 306 hrs.
△	58-22	366-700	12-19	Same as above.	Oxidized at 711 K for 306 hrs.
◇	58-22	366-700	12-19	Same as above.	Oxidized at 739 K for 303 hrs.
□	58-22	366-700	6-9	Same as above.	Oxidized at 813 K for 303 hrs.



NORMAL SPECTRAL EMITTANCE -- TITANIUM

TPRC

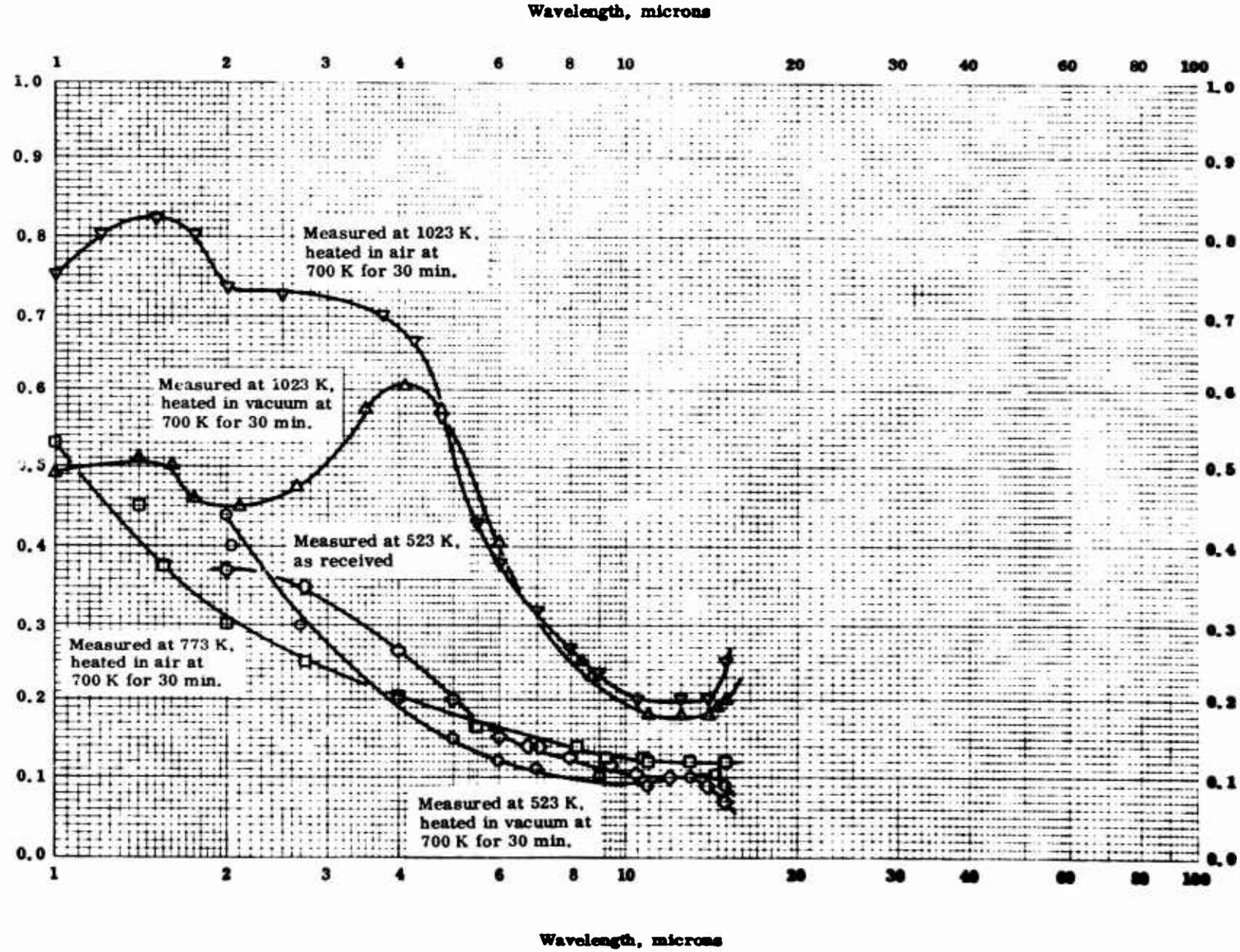
Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept Error%	Sample Specifications	Remarks
○	53-30	0.65	1587-1764		0.03 Si, 0.02 Mg, 0.02 Cu, 0.01 Mo, 0.01 Fe, < 0.01 Ca, 0.005 Sn, 0.005 Mn, 0.005 Al and 0.001 Cr.	Not given.
□	50-10	0.65	1223-1623	2	0.19 N_2, 0.096 Fe, 0.073 O_2, 0.059 C, 0.056 Si, 0.002 Ni and < 0.002 Mg; body centered cubic.	Surface polished with magnesia by metallographic method.

TPRC



NORMAL SPECTRAL EMITTANCE -- TITANIUM

TPRC

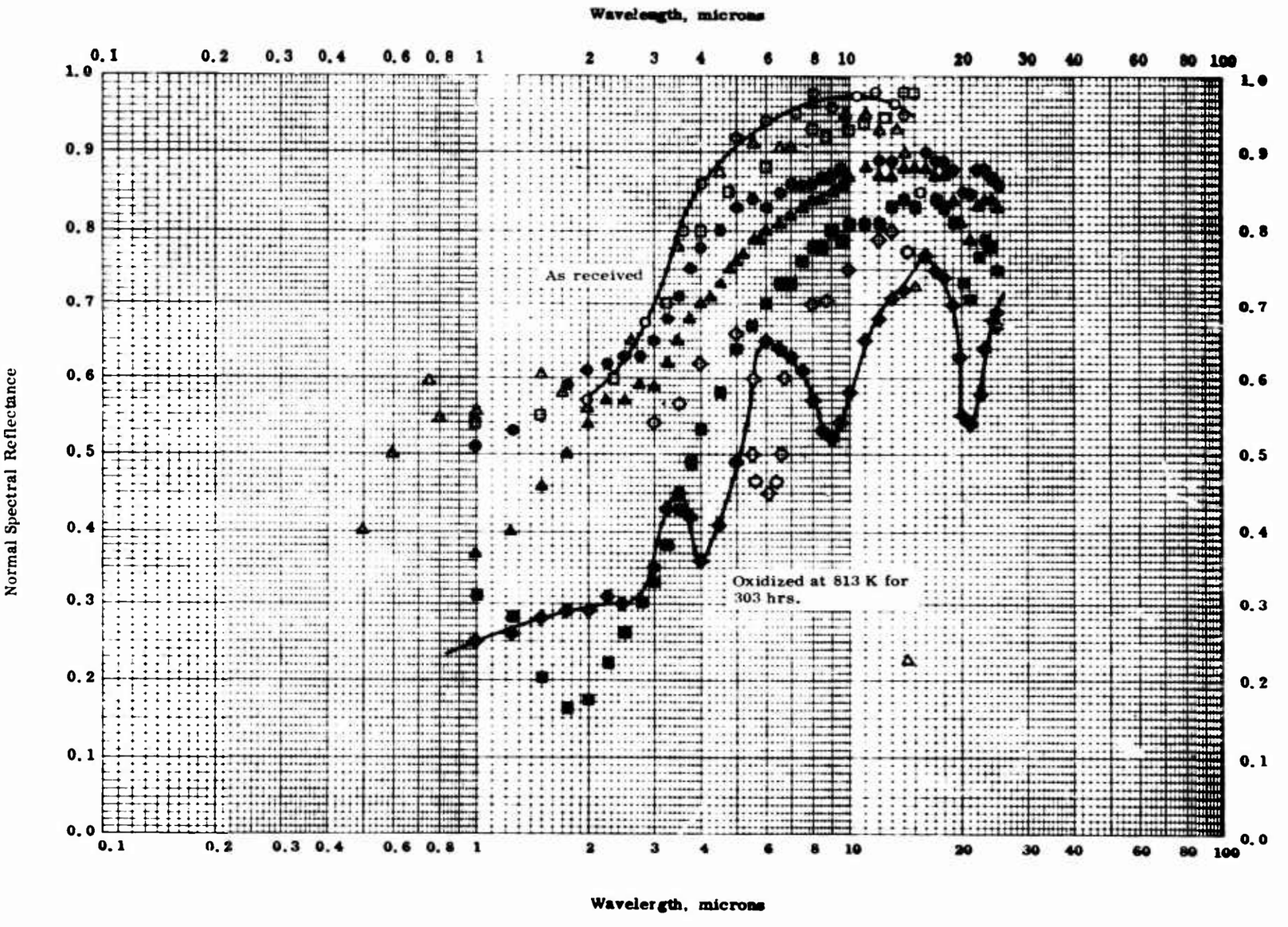
Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	62-45	523	2.0-15.0		Commercially pure.	Heated in vacuum (2.8×10^{-6} mm Hg) at 700 K for 30 min.
△	62-45	1023	1.0-15.0		Same as above.	Same as above except for different specimen.
□	62-45	773	1.0-15.0		Same as above.	Heated in air at 700 K for 30 min.
▽	62-45	1023	1.0-15.0		Same as above.	Same as above except for different specimen.
◇	62-45	523	2.0-15.0		Same as above.	As received.

TPRC



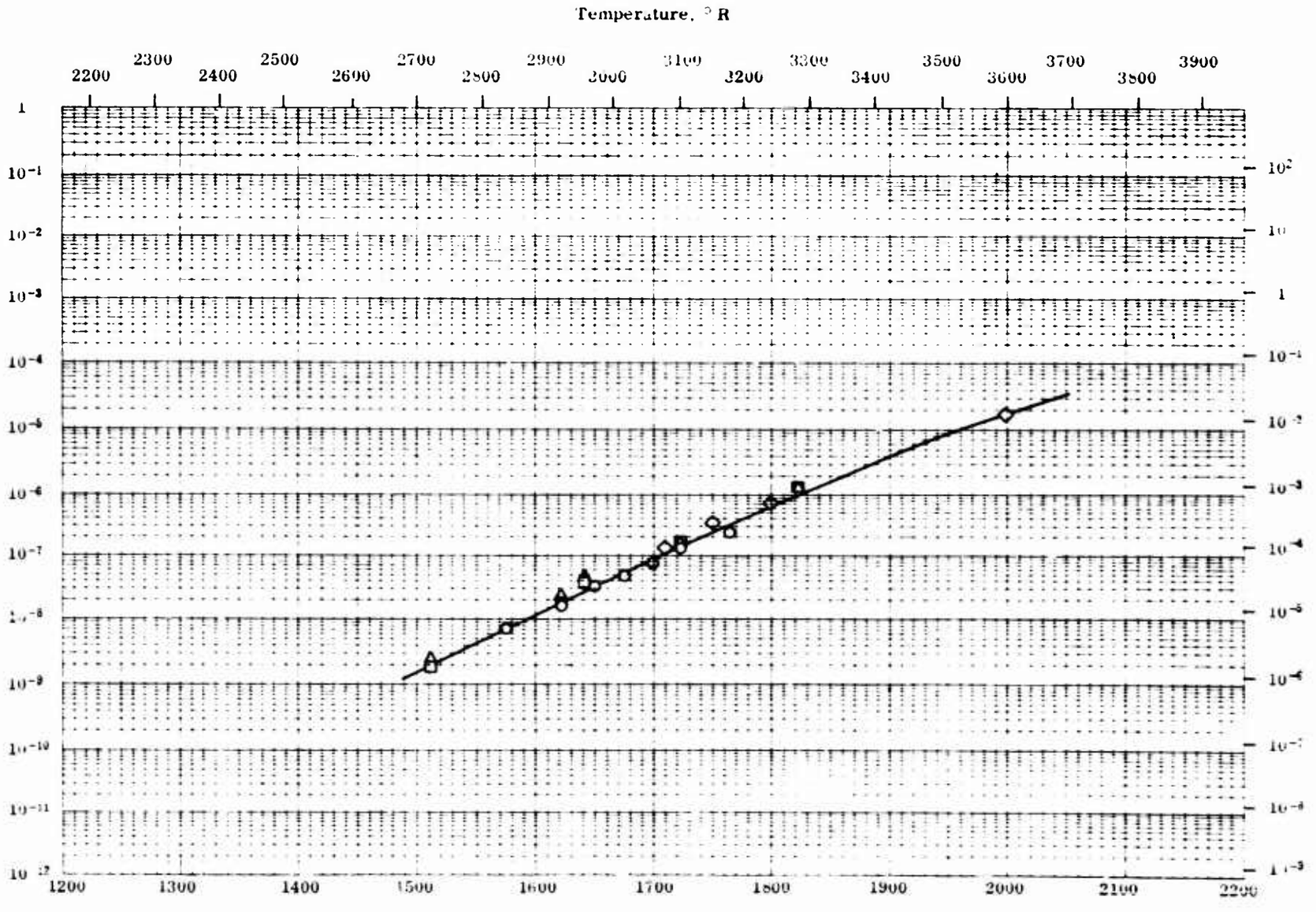
NORMAL SPECTRAL REFLECTANCE -- TITANIUM

NORMAL SPECTRAL REFLECTANCE -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
●	58-22	311	1-25	±4	Ti-75A, AMS 4901; nominal composition: 0.1 Fe, 0.08 W, 0.04 C, and 0.02 N_2.	
▲	58-22	311	1-25	±5.4	Same as above.	Oxidized at 705 K for 100 hrs.
■	58-22	311	1-25	±12.5	Same as above.	Oxidized at 739 K for 303 hrs.
◆	58-22	311	1-25	±8	Same as above.	Oxidized at 813 K for 303 hrs.
○	62-45	<322	2.0-15.5		Commercially pure.	As received; source temperature 523 K.
△	62-45	<322	0.5-15.0		Same as above.	Same as above except source temperature 1273 K.
□	62-45	<322	1.0-15.0		Same as above.	Heated in air at 700 K for 30 min; source temperature 773 K.
◇	62-45	<322	2.0-15.0		Same as above.	Heated in vacuum (2.8 × 10^{-6} mm Hg) at 700 K for 30 min.

TPRC



VAPOR PRESSURE -- TITANIUM

VAPOR PRESSURE -- TITANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-13	1585-1764		99.884 Ti, 0.03 Si, 0.02 ea. Mg, Cu, 0.01 ea. Fe, Mo, <0.01 Ca, 0.005 ea. Al, Sn, Mn, 0.001 Cr, and 0.000 Ag, iodide process Ti.	
□	49-2	1510-1822		99.7 - 99.9 pure Ti.	Prepared by reducing $TiCl_4$ with Mg; weight loss determined by measuring change in electrical resistance.
△	49-2	1510-1822		Same as above.	Weight loss determined directly.
◇	51-8	1706-2000		2 samples: (a) magnesium reduced; (b) iodide, purity better than "magnesium reduced titanium".	Data supercedes Carpenter and Reavell (1949) and Blocher and Campbell (1949).

TPRC

PROPERTIES OF TUNGSTEN

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	19.3	1210
Melting Point	3650	6570

REPORTED VALUES

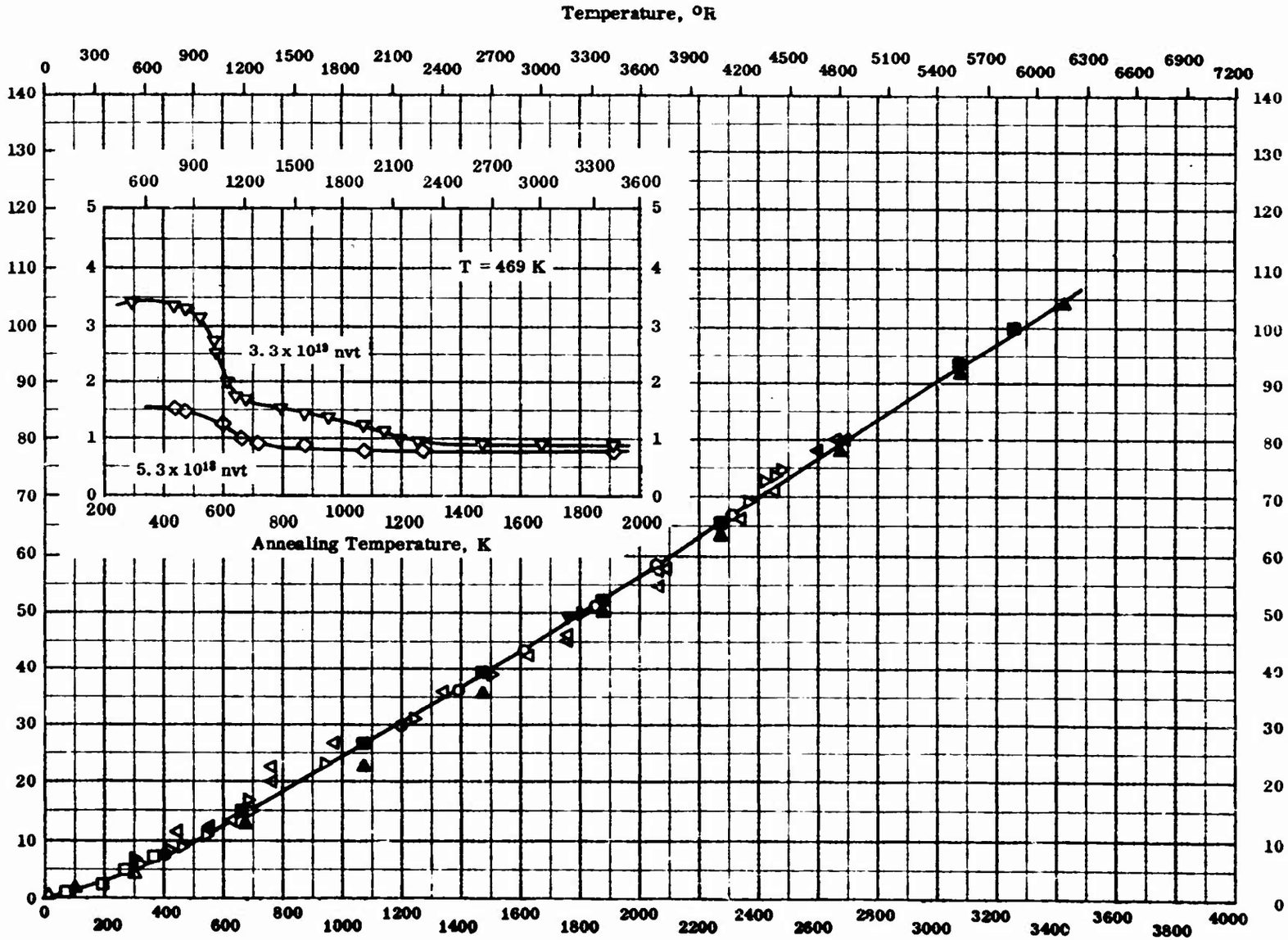
Density	g cm^{-3}	lb ft^{-3}
■	18.88	1178
○	18.714	1168.3
□	18.98	1185
▽	19.33	1207
◕	19.3	1205

Melting Point	K	R
▲	3650	6570
△	3523 ± 10	6342
◆	3683.3	6630
▼	3683	6629

PROPERTIES OF TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-29	298		Not given.	Density from weight in air and distilled water.
□	57-55	293		Pure.	Density from weight in air and in liquid lead.
▽	50-17	298		Not given.	
▲	56-55	293		Not given.	
●	62-12	293		Not given.	
■	62-7	293		0.003 Fe, 0.0026 Si, 0.0020 O_2, 0.001 S, 0.001 P and Ni.	Arc-cast; max. exposure temperature 5010 F; 98.4% theoretical density.
△	61-48	3513-3533		Flat plate.	
◆	64-21	3683.3		Not given.	
▼	62-56	3683		Not given.	



TPRC

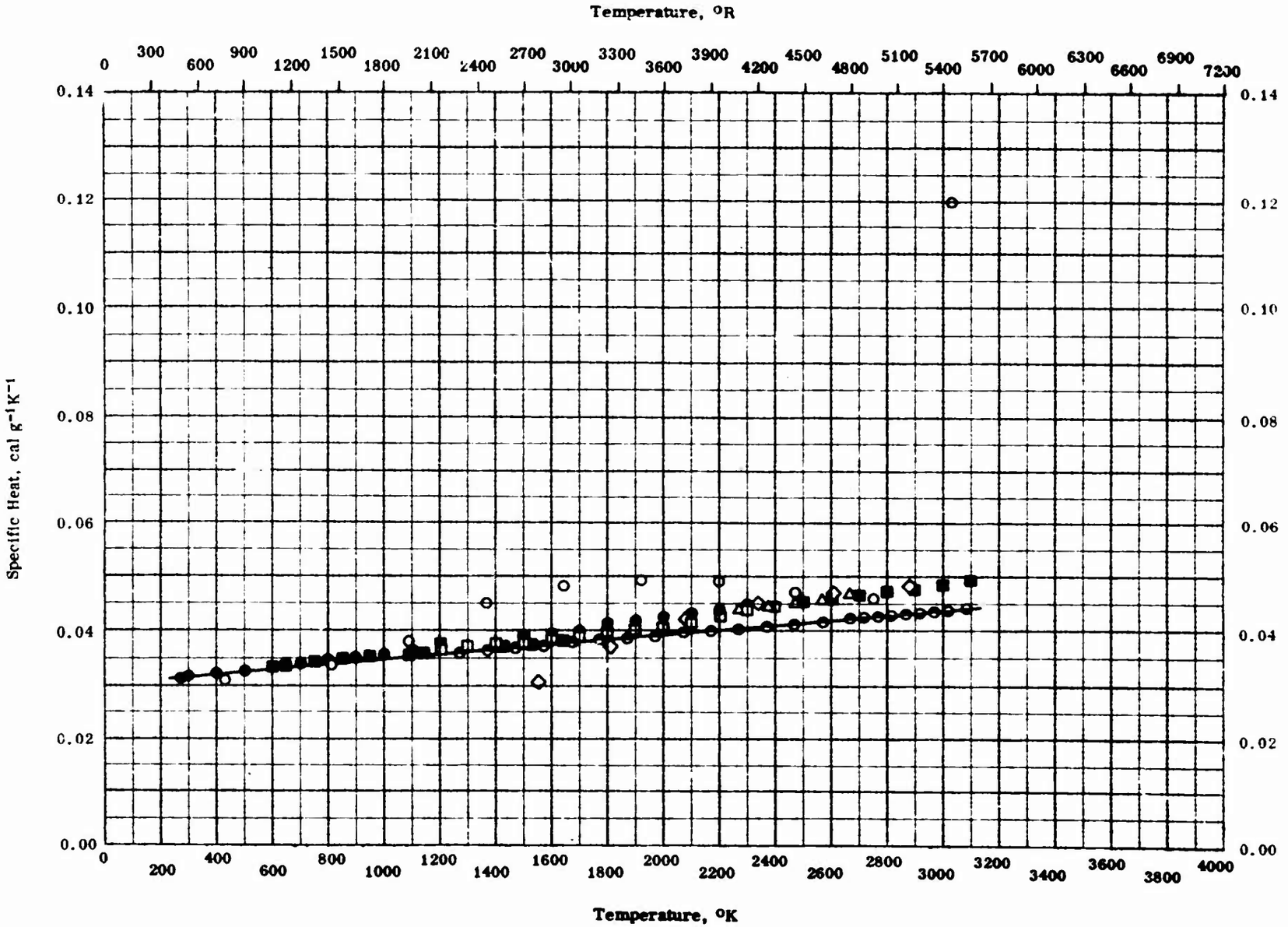
ELECTRICAL RESISTIVITY -- TUNGSTEN

1021

ELECTRIC RESISTIVITY -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	43-1	78-373		High purity.	
○	41-1	1200-2300		Traces of metallic impurities.	
△	57-40	10-300		0.01 Mo and traces Fe, Si, Cu.	Electropolished to 1 mm dia. and vac. annealed at 1300 C; authors' smoothed data within ± 1 % of exp. values.
◁	62-35	297-2677	2.4	Very pure; supplied by General Electric Co.	Arc-cast; max. exposure temperature 5100 F.
▷	62-35	297-2472	2.4	Very pure; supplied by Carborundum Co.	Hot-pressed; max. exposure temperature 5100 F; macro cracked.
●	64-12	4-400	± 2	Spectral pure.	
■	63-22	273-3253		Commercial grade.	
▲	62-36	273-3423		Doped tungsten containing residue Al_2O_3 in the order of 0.02.	Sintered.
▽	64-14	469		Pure.	Irradiated to 3.3×10^{19} nvt; annealed in argon for 1 hr; measured against annealing temperature.
◇	64-14	469		Pure.	Same as above except irradiated to 5.3×10^{18} nvt.



SPECIFIC HEAT -- TUNGSTEN

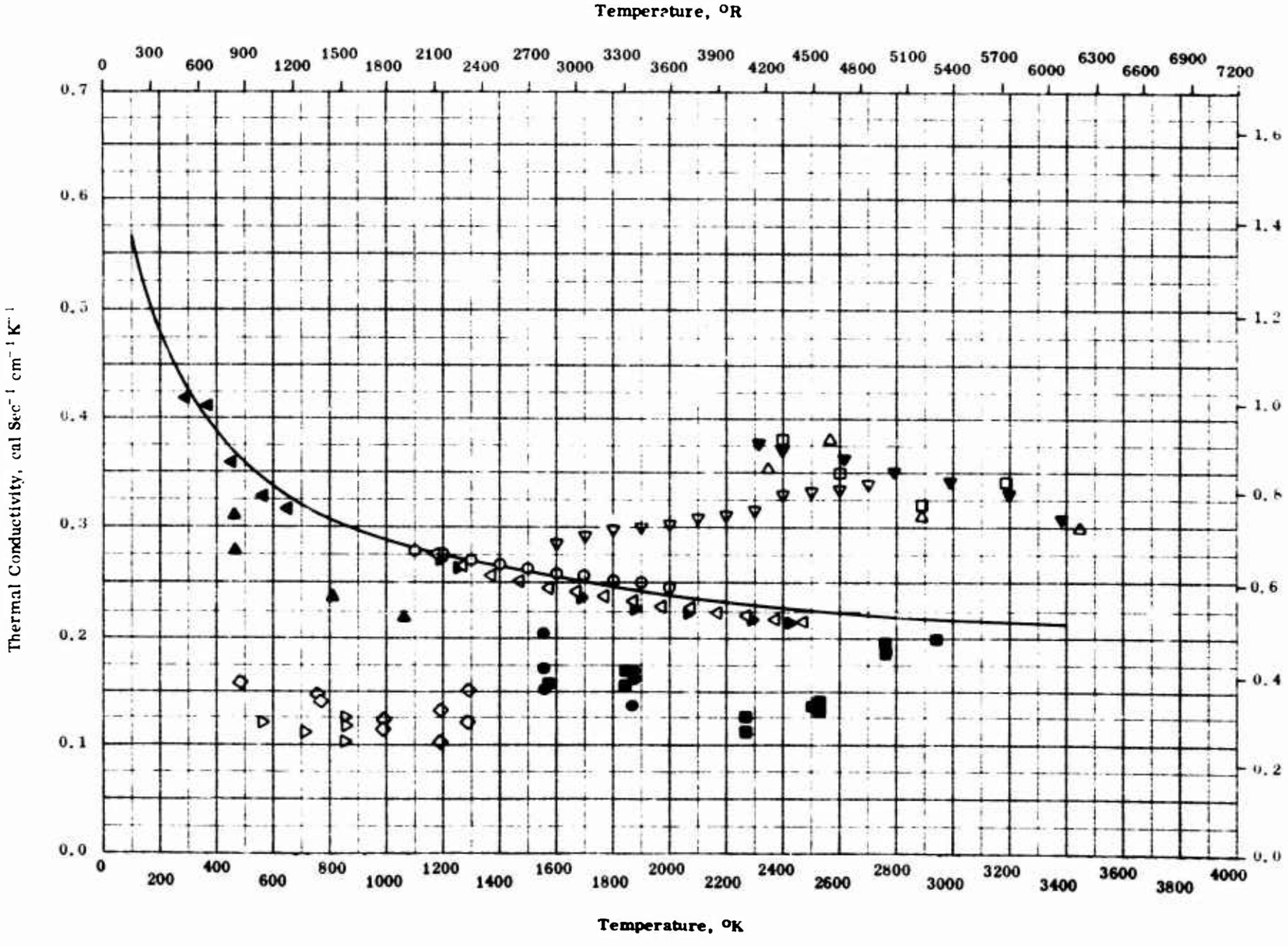
TPRC

1023

SPECIFIC HEAT -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	62-7	533-3033	~ 5.0	0.008 Fe, 0.0026 Si, 0.0020 O_2, 0.0010 Cu, H_2, Ni, N_2, and P, and remainder W.	
□	63-14	1200-2400	< 2.0	99.9 W, residuals WC.	Outgassed and sealed under < 1 x 10^{-6} mm Hg.
△	62-23	2273-2673	~ 1.2	99.95 W.	Powder metallurgy; sealed under 10^{-2}-10^{-3} mm Hg.
◇	62-19	1550-2850	± 10.0	Not given.	
⊖	61-27	1273-2893	1.0	99.8 W.	Degassed at 2150 C for 2 hrs; sealed under vacuum.
⊖	62-25	2673-3093	≤ 0.5	99.95 W and 0.05 impurities.	Surface polished.
●	62-22	273-2600	< 1.2	99.95 W and 0.05 impurities.	Surface polished.
■	60-32	1089-1700		99.90 W and 0.02 - R_2O_3.	
▲	62-21	1500-2200	< 4.0	Not given.	Sealed under argon atmosphere.
◆	63-17	600-3100	< 1.2	0.05 - impurities.	Prepared by powder metallurgy.



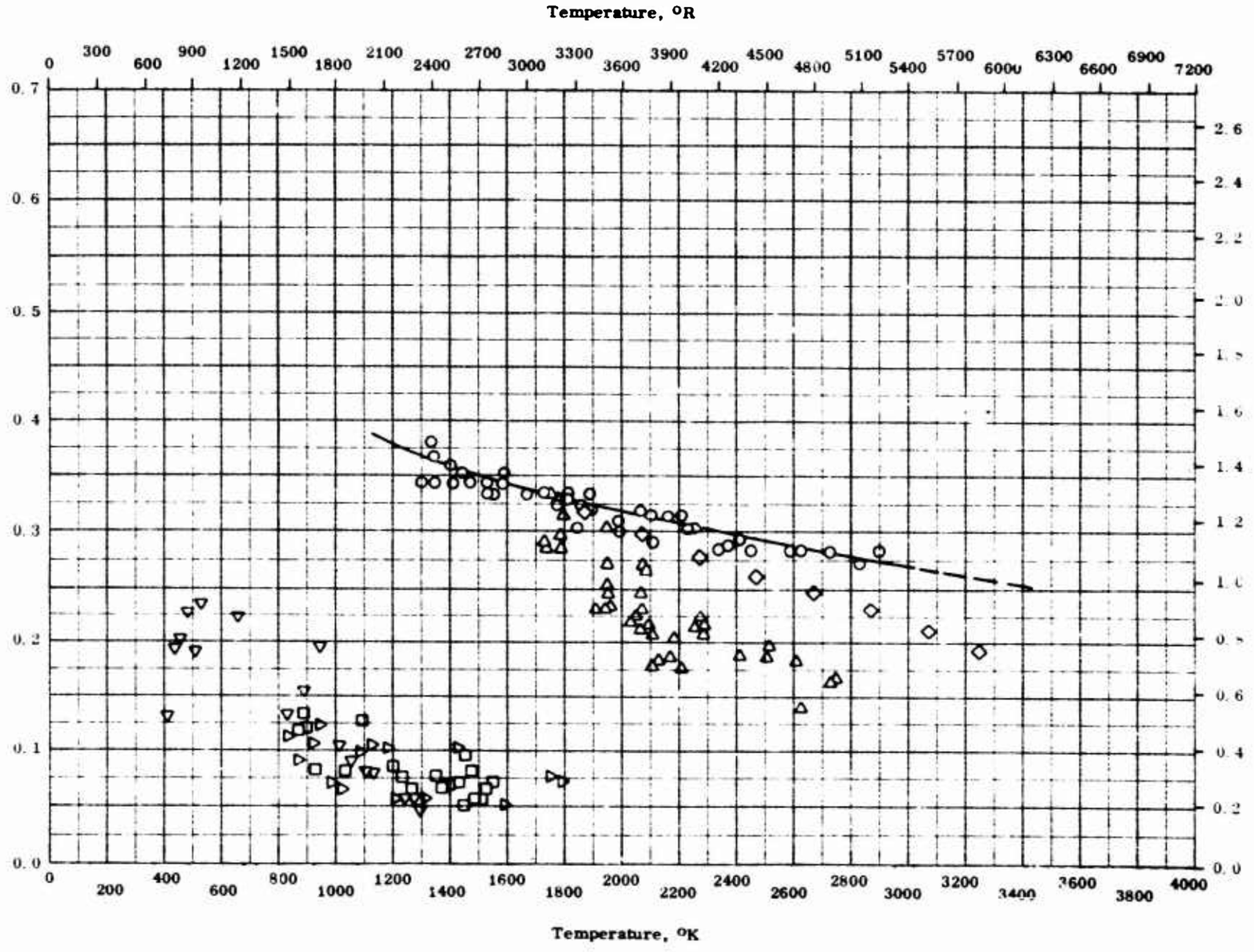
THERMAL CONDUCTIVITY -- TUNGSTEN

THERMAL CONDUCTIVITY -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref	Temp. Range °K	Repr. Error %	Sample Specifications	Remarks
○	41-1	1100-2000		Traces of metallic impurities.	Aged 2 hrs at 2700 K.
□	60-12	2400-3194		0.04 Mo, 0.006 O_2, 0.005 Ni, 0.005 Ti, 0.004 Fe, and 0.027 others.	Pressed and sintered metal powder; hot worked.
△	60-12	2344-3451		0.04 Mo, 0.002 Cu, and 0.008 others.	Pressed and sintered metal powder, hot worked.
▽	59-11	1000-2700		Spectrographically pure wire of 0.010 in. dia.	
◁	61-14	1173-2473	±6	Spectrally pure 2.2 mm die. wire.	Shaped and annealed for 1 hr at 1700 C in a high vacuum; measured in vacuum.
▷	62-7	559-860	2-4	0.003 Fe, 0.0026 Si, 0.0020 O_2, 0.0010 S, 0.0010 P, and Ni, Cu, H, and N impurities; density 1178 lb ft^{-3}, 98.4 % theoretical.	Arc cast; max. exposure temperature 5010 F.
◇	62-7	484-1247	2-4	Same as above.	Same as above.
●	62-7	1555-1872	2-4	Same as above.	Same as above.
■	62-7	1571-2939	2-4	Same as above.	Same as above.
▲	59-9	464-1061		Not given.	
▼	59-10	2311-3083		0.04 Mo, 0.006 O_2, 0.005 Ni, 0.005 Ti, 0.004 Fe, and 0.027 others.	
◀	56-13	283-644		Not given.	
▶	61-10	1183-2422		Not given.	

TPRC



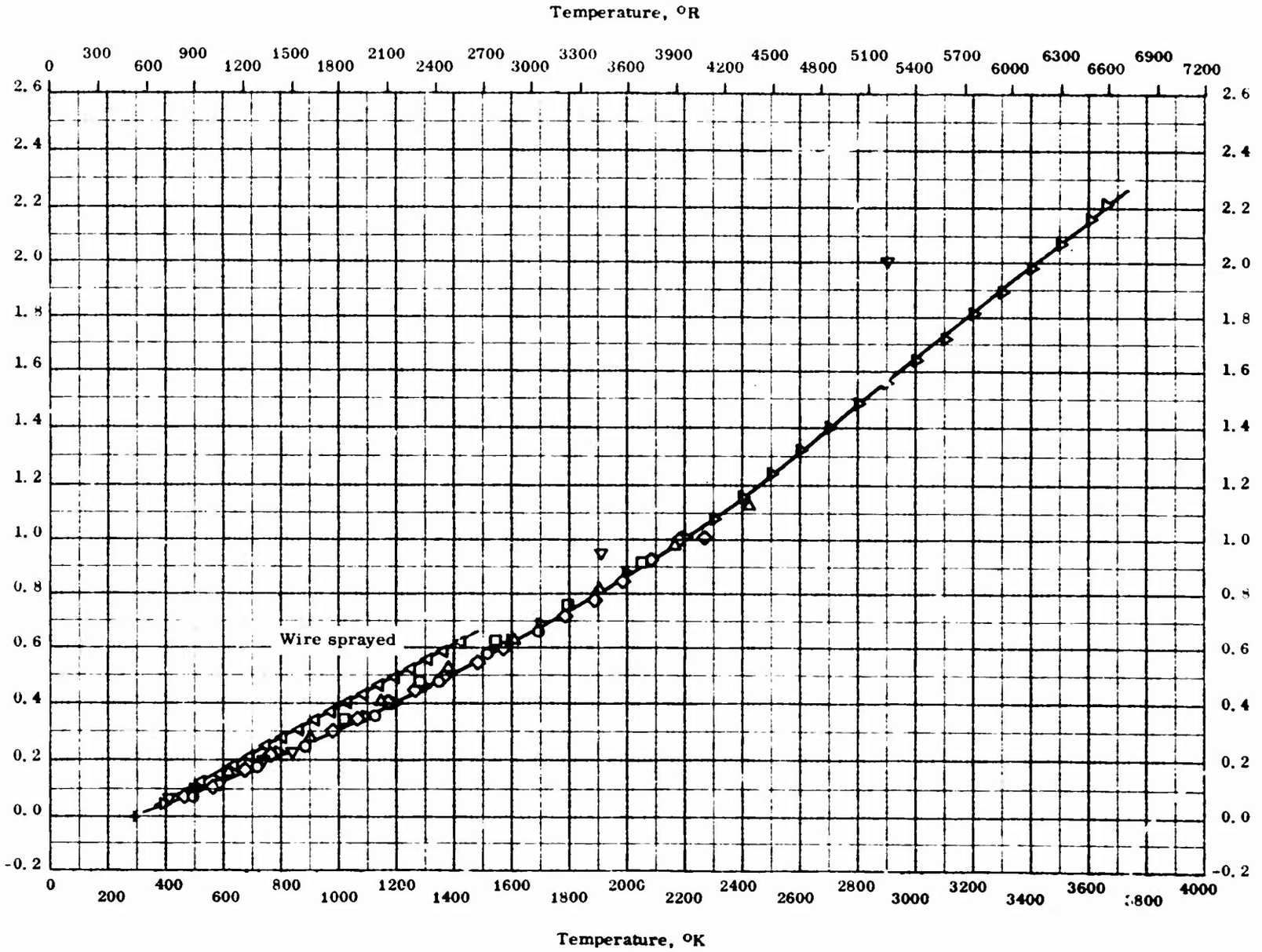
THERMAL DIFFUSIVITY -- TUNGSTEN

TPRC

THERMAL DIFFUSIVITY -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▽	58-2	407-1298	±30	Cylindrical sample with 1.0 cm dia and 4.5 cm long	Machined. data taken at fifth run.
□	58-2	868-1543	±30	Same as above.	Sixth run of the above sample
▷	58-2	828-1793	±30	Same as above.	Seventh run of the above sample.
◇	63-3	1873-3223	±5	Made from surface polished plates. sample in disc form with 7-8 mm dia and 0.2 mm thick.	Rolled measured in a pressure 10^{-5} mm Hg.
○	65-1	1300-2900		99.5 undoped pure tungsten from G.E.C. Osram Lamp Works with Fe, Mo impurities and traces of other elements, average grain size 46 μm.	1.5 mm thick disks cut from a swaged rod
△	64-7	1728-2743		0.05 Si, 0.03 Ca, 0.03 Ti, 0.01 Cu, 0.002 Mg, and 0.001 Ag density 18.54 g cm^{-3}.	



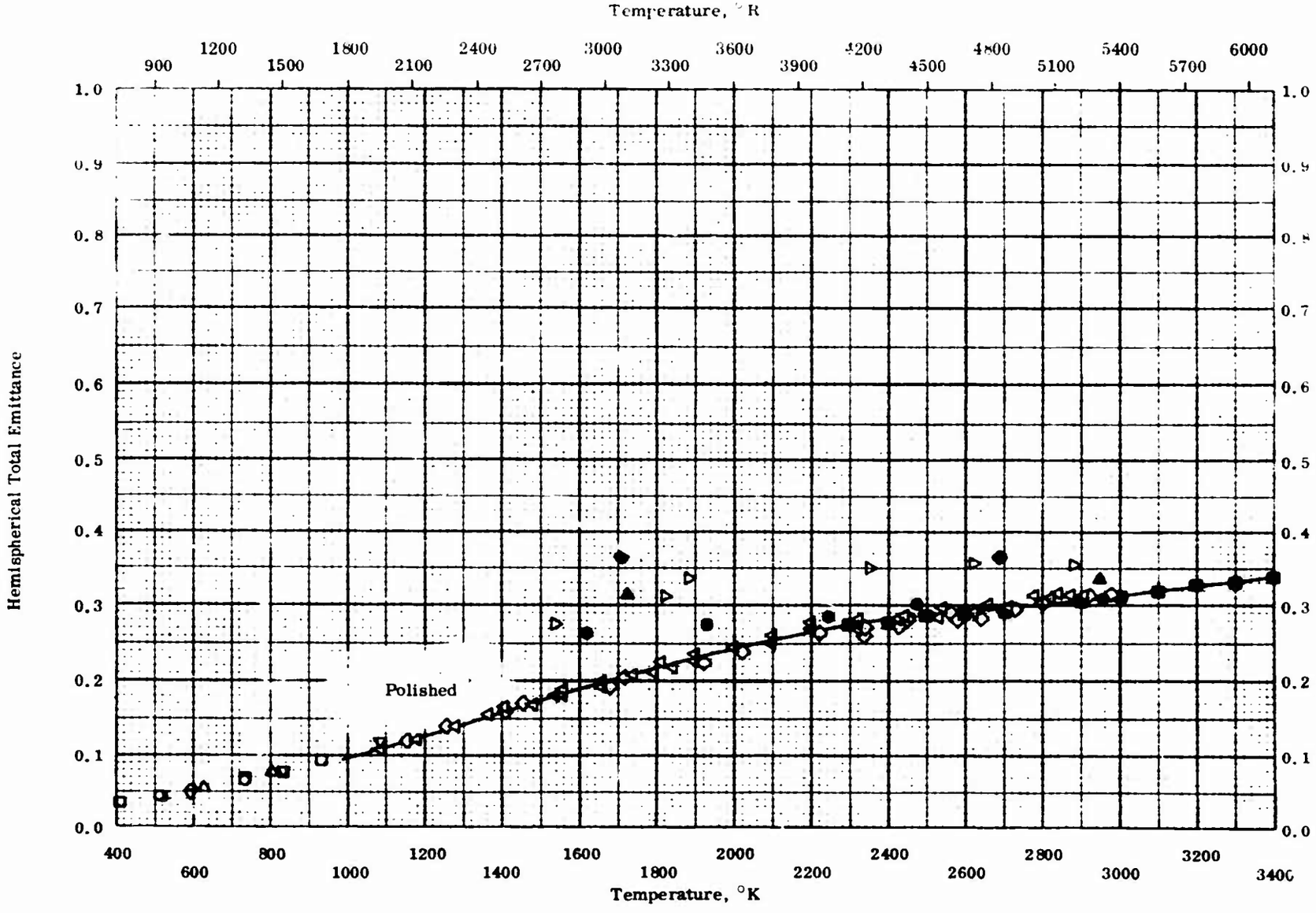
THERMAL LINEAR EXPANSION -- TUNGSTEN

TPRC

THERMAL LINEAR EXPANSION -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	53-47	301-1691		0.05 K, 0.04 SiO_2, and 0.01 Mo, Al_2O_3, Fe each.	Sintered at 1400 C in hydrogen atm.; x-ray diffraction method; measured in helium atm.
△	45-9	293-2423		Not given.	Measured in argon atm.; author notes transformations at 1626 R and 2904 R.
▽	51-40	295-2900		99.9 pure.	Heating rate: 200 F sec^{-1}.
□	63-45	298-2050		Prepared from 99.95 pure Wah Chang powders of less than 200 mesh.	Pressed at 16000 psi and then annealed in a flowing hydrogen atm. at 1400 C for 2 hrs; data obtained from (222) and (321).
◇	64-30	293-2273	<3	Commercial rod material.	Annealed at above 2000 C for 1-1/2 to 2 hrs; measured at pressure not exceeding 1 to 2×10^{-5} mm Hg.
>	63-46	293-3655		Not given.	
◁	61-53	297-1422		High purity, 0.002 O and 0.0006 N.	Wire sprayed, mandrel removed by leaching, heat treated in vacuum for 2 hrs at 4000 F, then machined into 0.19 in. dia. by 2.5 in. long specimen.

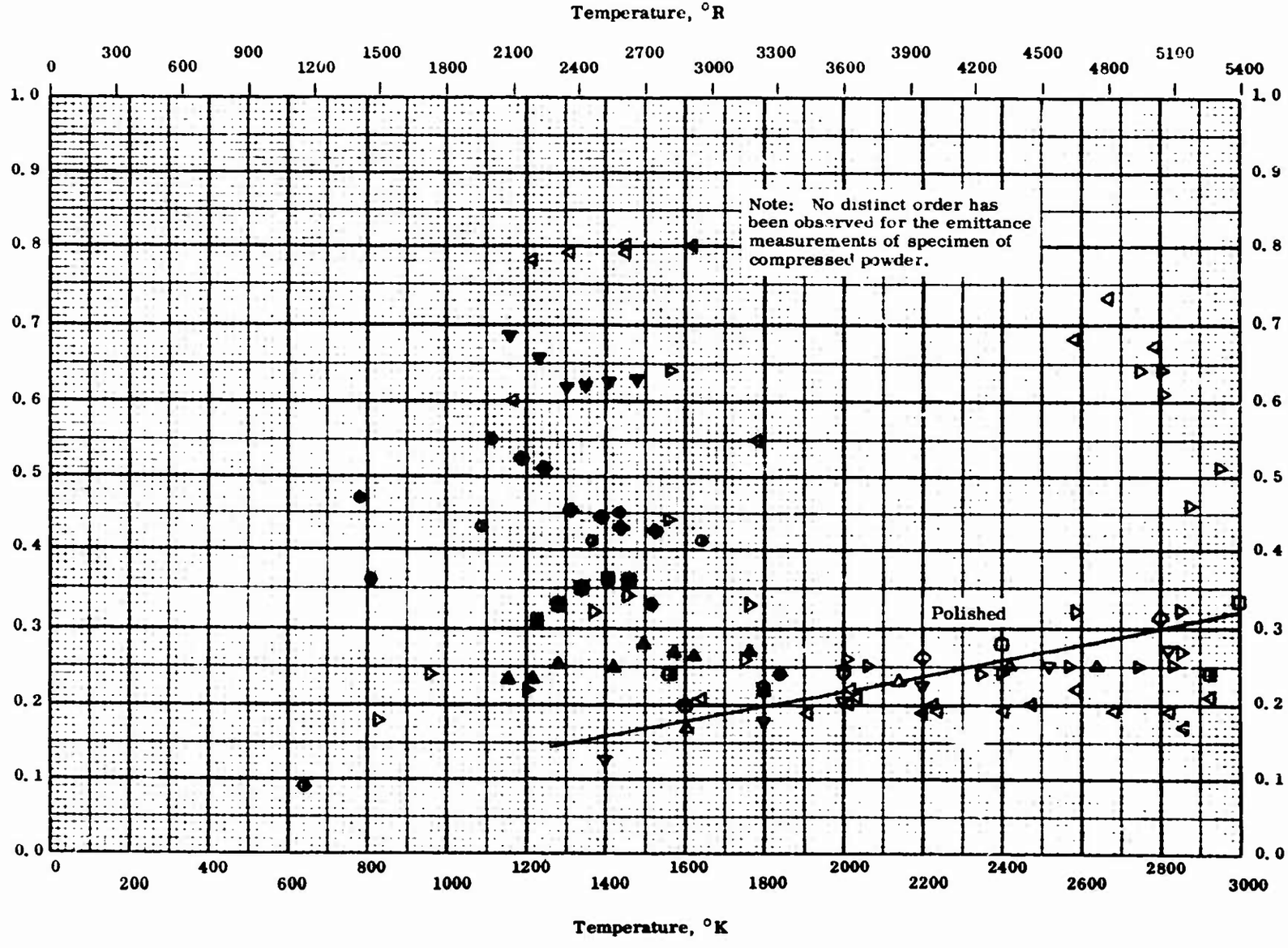


HEMISPHERICAL TOTAL EMITTANCE -- TUNGSTEN

HEMISPHERICAL TOTAL EMITTANCE -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-23	515-734		Not given.	Measured in vacuum (>10^{-5} mm Hg); first run heating.
△	64-23	629-808		Same as above.	Same as above; first run cooling.
□	64-23	409-935		Same as above.	Same as above; second run heating.
▽	64-23	596-1086		Same as above.	Same as above; second run cooling.
◇	63-35	1080-2980	± 5	Ribbon.	Aged at 2400 K for approximately 30 min; measured in vacuum (10^{-5} - 10^{-7} mm Hg); temperature measured with thermocouple.
◁	63-35	1085-2910	± 5	Ribbon.	Same as above; temperature measured with optical pyrometer.
▷	60-53	1540-2880	± 10	Spectrographically pure.	Measured in vacuum (10^{-5} mm Hg).
●	59-11	1620-2960		Same as above.	Measured in vacuum (<10^{-6} mm Hg).
■	60-12	2300-3400		0.04 Mo, 0.006 O_2, 0.005 Ti, 0.005 Ni, 0.004 Fe, and 0.027 other impurities.	Pressed, sintered and hot worked; successively polished with No. 1-, 0-, 00-, 000- and 0000- abrasive papers; measured in argon (slightly >1 atm).
▲	62-50	1723-2948		Porous; density 90 %.	Measured in argon atmosphere.
◆	62-50	1713-2688		Porous; density 71.5 %.	Same as above.



NORMAL TOTAL EMITTANCE -- TUNGSTEN

NORMAL TOTAL EMITTANCE -- TUNGSTEN

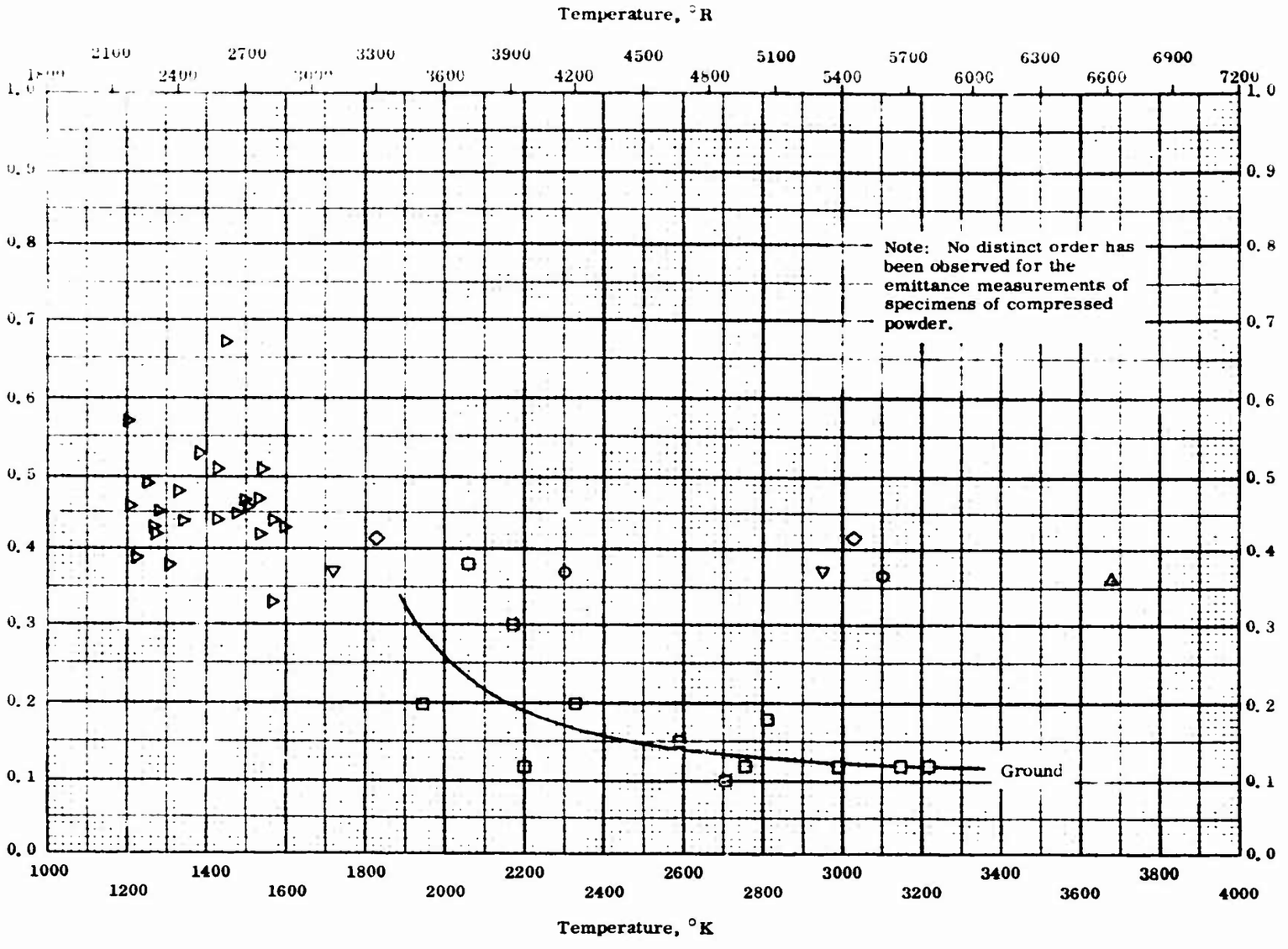
REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	64-18	1800-2000		Not given.	Polished; measured in argon (1.5 atm); calculated from spectral data.
△	64-18	1605-2639		Same as above.	Same as above.
□	62-51	1600-3000		Same as above.	Polished, etched; data taken from smooth curve.
▽	63-35	1400-2820	± 5	Ribbon.	Aged at 2400 K for approximately 30 min; measured in vacuum ($3 \times 10^{-5} - 10^{-7}$ mm Hg) data taken from smooth curve.
◇	63-24	1600-3000		99.9 pure.	Polished to an optically smooth surface, washed and dried; data taken from smooth curve; calculated from spectral data.
◁	62-35	1172-2788	10	From Carborundum Co.; density 19.1 g cm^{-3}.	Hot-pressed; measured in argon, first run.
▷	62-35	827-3088	10	Same as above.	Same as above; second run.
●	62-42	789-1839		Not given.	Air tarnished; N_2 purge.
■	61-43	1228-1465		Porous, engine material; powder with grain diameter 1 μ.	Billets of compressed powder; measured in vacuum ($4 \times 10^{-6} - 2 \times 10^{-5}$ mm Hg).
▲	61-43	1155-1765		Same as above.	Same as above; polished to a mirror finish.
◆	61-43	1190-1528		Same as above.	Same as above; sintered for 20 hrs.
▼	61-43	1165-1482		Powder with grain diameter 20 μ.	Compressed and sintered for 20 hours; measured in vacuum ($4 \times 10^{-6} - 2 \times 10^{-5}$ mm Hg).

(continued onto next page)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◑	60-41	644-1644		Surface finish 63.	Unalloyed, sintered, forged, stress relieved; purged with dry helium; specimen oxidized during test.
◨	62-42	1561-2922	20	Not given.	Ground to a smooth finish; measured in dried argon or helium.
▲	61-41	1800-2000		Lamp grade.	Polished using graded papers through No. 600 grit, finished using Linde "A" polishing compound and a a silk cloth; measured in vacuum; calculated from spectral data.

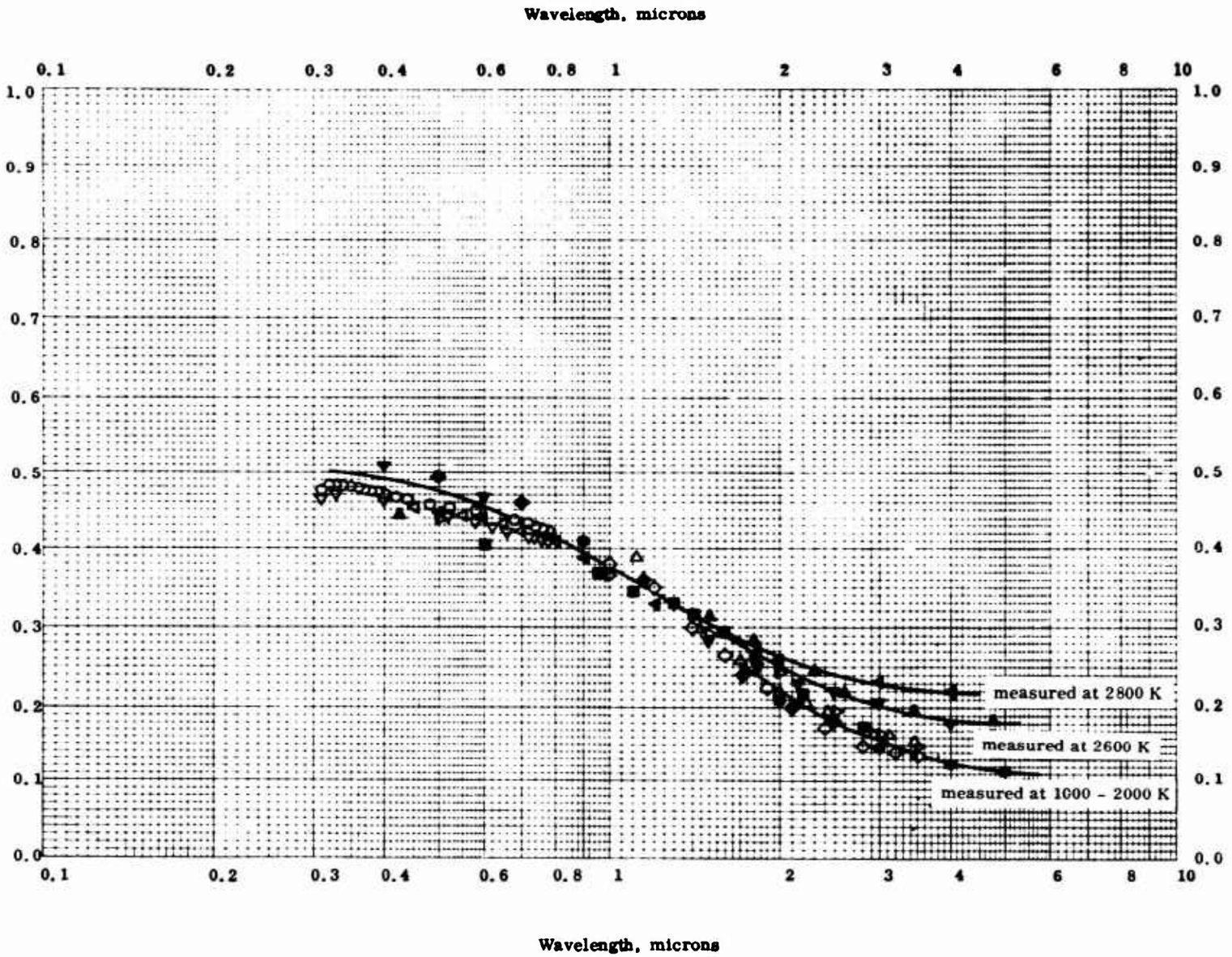


NORMAL SPECTRAL EMITTANCE -- TUNGSTEN

NORMAL SPECTRAL EMITTANCE -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	60-12	0.65	2300-3100		0.04 Mo, 0.006 O_2, 0.005 Ti, 0.005 Ni, 0.004 Fe and 0.027 other impurities.	Pressed and sintered, hot worked, successively polished with No. 1-, 0-, 00-, 000- and 0000- abrasive papers; measured in argon (slightly >1 atm).
△	60-12	0.65	3650		0.04 Mo, 0.002 Cu, and 0.008 other impurities.	Same as above.
□	62-42	0.69	1944-3216	20	Not given.	Ground to a smooth finish; measured in dride argon or helium.
▽	62-50	0.65	1723-2948		90% of theoretical density, porous.	Measured in argon.
◇	62-50	0.65	1825-3025		70% of theoretical density, porous.	Measured in argon.
▷	61-40	0.65	1266-1596		Powder 1μ diameter; porous.	Compressed and sintered at 1780 K for 20 hrs.



NORMAL SPECTRAL EMITTANCE -- TUNGSTEN

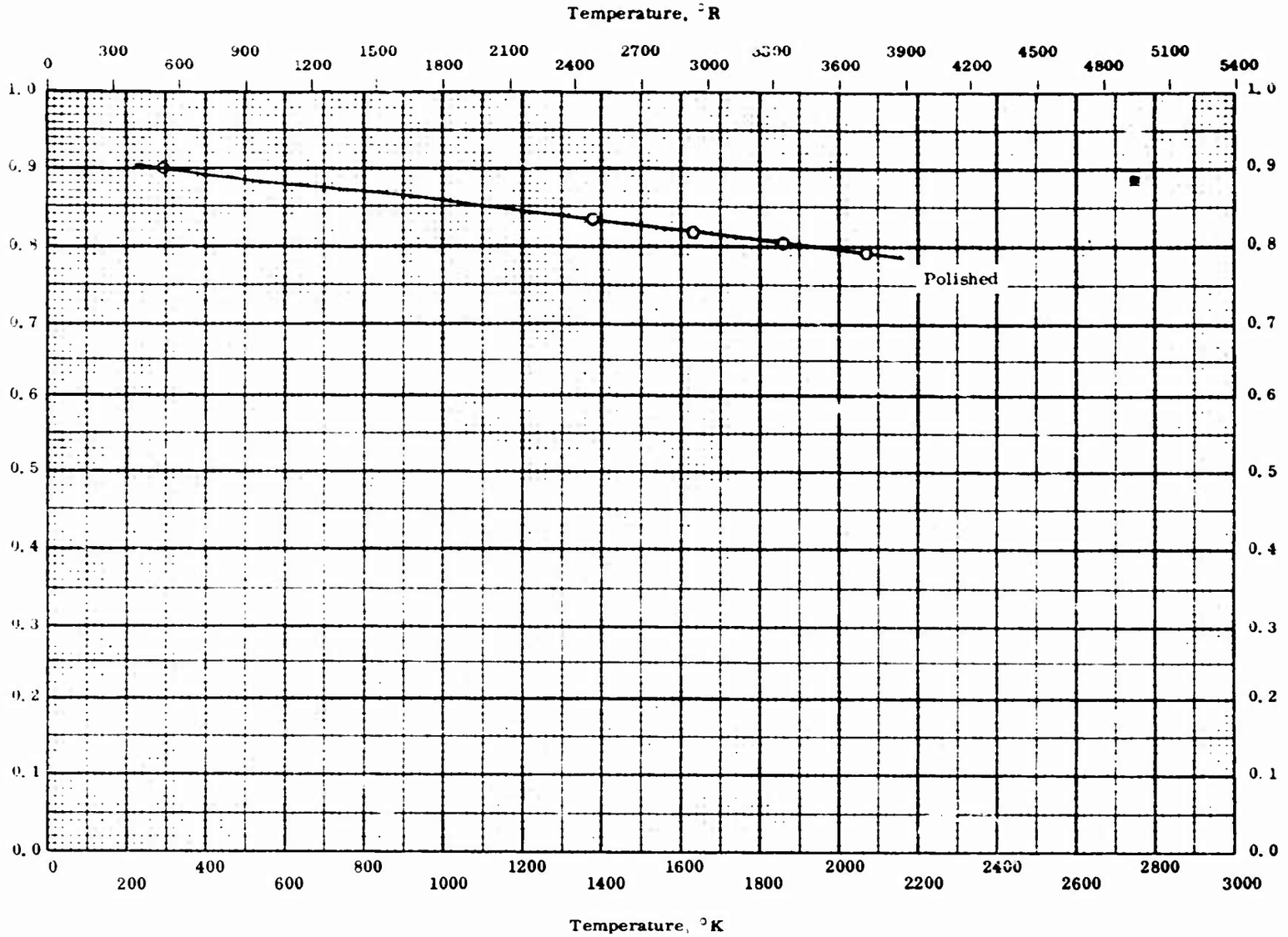
Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	59-25	1600	0.31-0.80	< 1	> 99.99 purity, flat ribbon.	Heat at 2750 K for 30 min, 2500 K for 30 hrs, 2800 K for 30 min, and 2500 K for 20 hrs.
▽	59-25	2400	0.31-0.80	< 1	Same as above.	Same as above.
△	61-35	1000	1.1-3.5		Not given.	Heated in image arc furnace; measured in argon atmosphere.
▷	61-35	2040	0.5-3.5		Same as above.	Induction heated; measured in vacuum.
◇	61-41	1830	0.5-3.5		Lamp grade.	Polished using graded papers through No. 600 grit, finished using Linde "A" polishing compound and a silk cloth; measured in vacuum; data taken from smooth curve.
■	61-41	2040	0.5-3.5		Same as above.	Same as above.
▲	64-18	2639	0.43-4.75		Single crystal (200) plane.	Polished; measured in argon (1.5 atm).
◁	64-23	1972	0.45-0.80		Not given.	Measured in vacuum ($\leq 10^{-6}$ mm Hg).
●	63-27	1605	0.4-5.0		(002) plane.	Polished; measured in argon (1.5 atm).
◆	62-51	1600	0.5-4.0		Not given.	Polished and etched; data taken from smooth curve.
◀	62-51	2800	0.4-4.0		Same as above.	Same as above.
▼	63-24	2000	0.5-4.0		99.9 pure.	Polished to an optically smooth surface, washed and dried; data taken from smooth curve.

TPRC

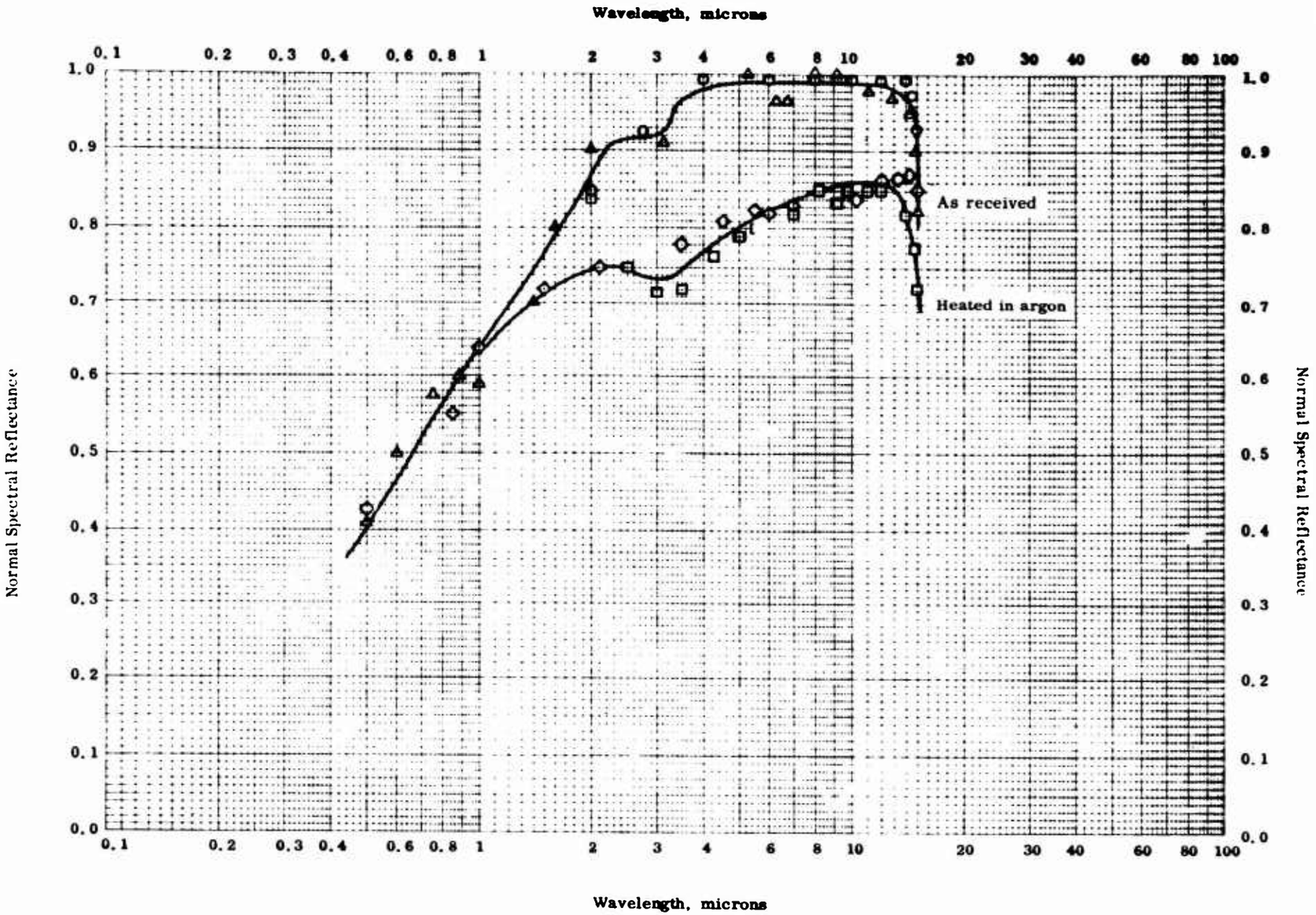


NORMAL SPECTRAL REFLECTANCE -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range K	Rept. Error %	Sample Specifications	Remarks
O	19-2	2.0	293-2067		Not given.	Preheated in vacuo at temperature > 2067 K, polished with sulphur-flour and rouge; measured in vacuum; 10^{-5} illumination.

TPRC

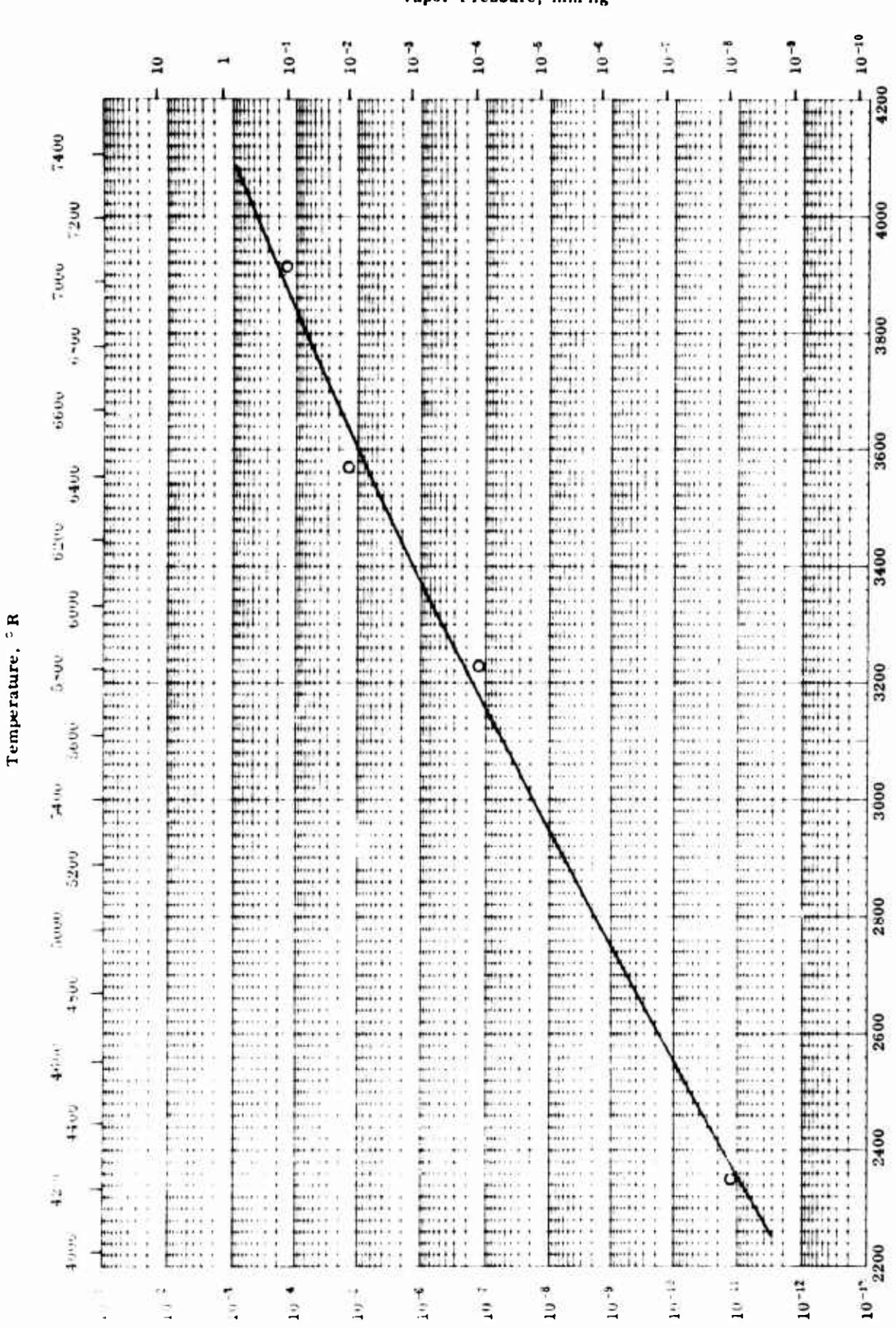


NORMAL SPECTRAL REFLECTANCE -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	62-45	< 322	2.0-15.0		Chemically pure.	As received; hemispherical illumination, normal viewing; 523 K source temperature.
△	62-45	< 322	0.5-15.0		Same as above.	Same as above except 1273 K source temperature.
□	62-45	< 322	2.0-15.0		Same as above.	Heated in argon at 1366 K for 30 min; hemispherical illumination, normal viewing; 523 K source temperature.
◇	62-45	< 322	0.5-15.0		Same as above.	Same as above except 1273 K source temperature.

TPRC



VAPOR PRESSURE -- TUNGSTEN

VAPOR PRESSURE -- TUNGSTEN

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-12	2350-3915		Not given.	

PROPERTIES OF URANIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	19.1	1190
Melting Point	1406	2530

REPORTED VALUES

		$g\ cm^{-3}$	$lb\ ft^{-3}$
Density	○	18.56	1159
	□	19.05	1189
	▽	18.6	1160
	◁	18.89 ± 0.05	1179 ± 3
	▷	18.9 ± 0.03	1180 ± 2
	●	18.79	1173
	■	18.3 ± 0.4	1140 ± 20
	▲	18.966	1184.0
	▼	18.766	1171.5
	◀	18.855	1177.1
	▶	19.12	1194
	◆	18.86	1177

		K	R
Melting Point	△	1406 ± 2	2531 ± 4
	◇	1363 ± 2	2454 ± 4
	◑	1405.6 ± 0.6	2530.1 ± 1.1
	◧	1407	2533
	▲	1402	2524
	▼	1398	2517
	◀	1406	2531
	▶	1405	2530

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_c	Sample Specifications	Remarks
○	52-16	293		β-phase.	Density from x-ray photographs.
□	55-43	291		99.993 pure.	
△	49-16 also 49-17	1404-1408		99.99 pure and 0.11 carbide noted in crust.	M. P. by thermal analysis in He atm.
◇	50-13	1361-1370		99.96 pure, 0.02 Si, 0.01 Fe, and traces of Be.	Same as above except in purified A atmos.
▽	55-9	298		Not given.	
◁	48-11 also 49-20	298		Pure; γ-phase (stable above 1860 R).	Density from x-ray measurement and extrapolated back to room temperature.
◑	57-57	1405-1406		High purity ingots.	M. P. by break in time-temperature curve in vacuum.
◨	57-28	1407		Biscuit type.	M. P. by filling of hole in resistance heated sample in vacuum.
▲	57-28	1402		Not given.	Arc-melted; same as above.
▷	52-3	298		α-phase.	Rolled at 500 C, heated 30 min at 725 C, water quenched, annealed 1 hr at 525 C, and furnace cooled.
●	53-5 also 52-19	298		Not given.	

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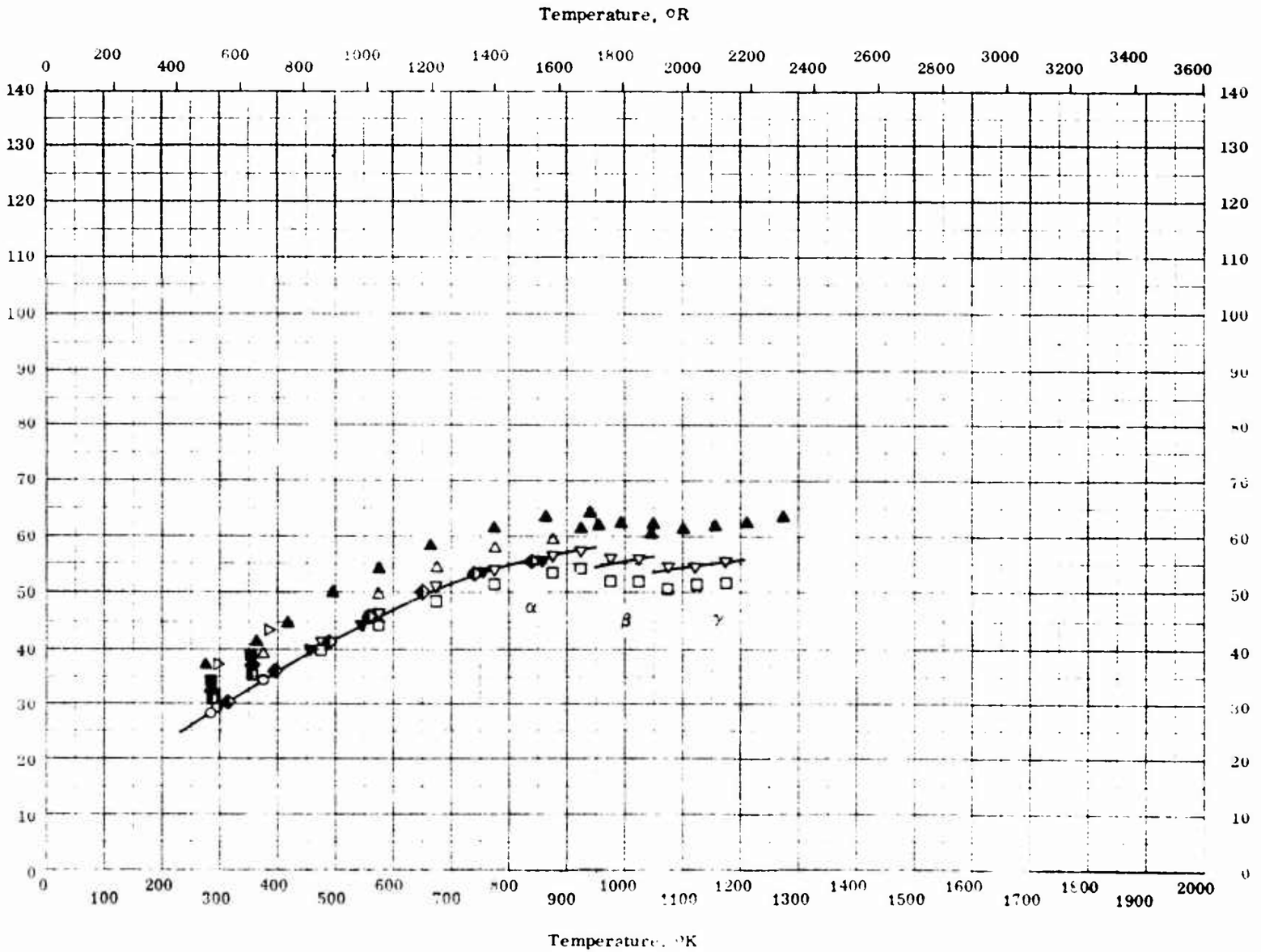
PROPERTIES OF URANIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
■	58-23	298		Not given; microgram size samples.	Density from weight on fibre torsion microbalance, and volume in dibulyl phthalate in micropycnometer with about 200μ I. D.
▼	50-22	1398		Not too pure.	M. P. from break in time-temperature curve.
▲	55-50	298		α-phase.	Density computed from x-ray measurement.
▼	55-50	298		β-phase.	Same as above.
◀	55-50	298		γ-phase.	Same as above except extrapolated from U-Mo alloys to 100 U.
◀	49-24	1406		Not given.	
▶	49-24	298		α-phase; single crystal.	Density computed from x-ray data.
◆	49-24	1033-1406		γ-phase.	Same as above.
▷	49-23	1406		99.9% pure.	M. P. from break in time-temperature curve.



ELECTRICAL RESISTIVITY -- URANIUM

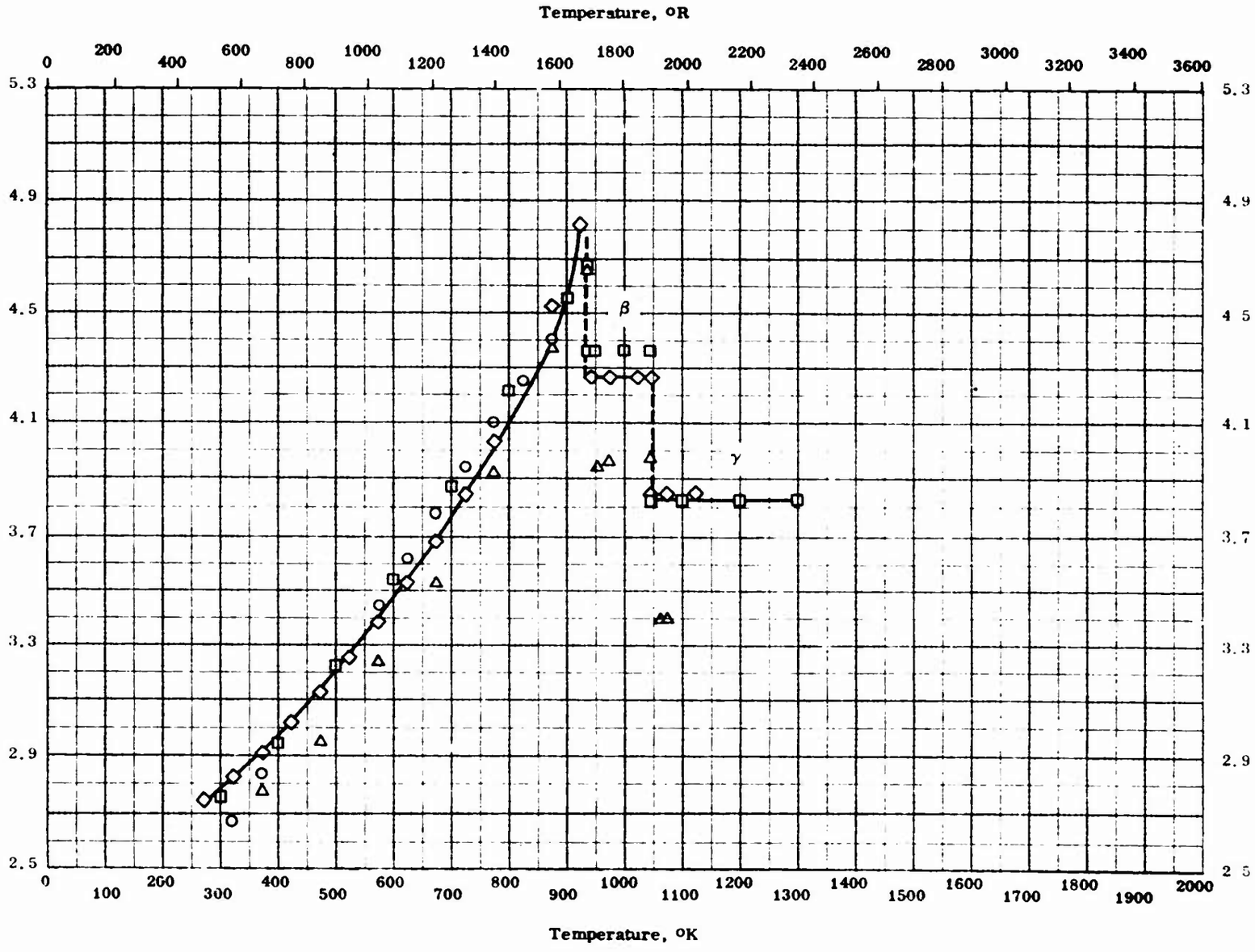
TPRC

1049

ELECTRICAL RESISTIVITY -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	47-7	293-373		99.9 U and 0.01 > ea Al, Be, Si, Fe, Mn, Cu.	Molten in vacuum.
▷	47-7	293-373		99.5 U, 0.1 > ea Al, Be, Si, Fe, Mn, and 0.01 > Cu; density 1143 lb ft^{-3}.	Two samples of same composition.
△	55-4	373-873	± 5	Pure.	Annealed.
□	47-6	273-1173		99.9 pure.	Annealed in He 30 min. at 1110 F and in vacuum for 30 min. at 1670 F; data given as r/r(492 R); plotted points based on datum taken from other listed references; five samples from 3 sources tested.
▽	47-6	273-1173		Same as above.	Same as above.
▲	47-8	273-1275		99.5 U and 0.1 ea. Al, Si, Be, Fe, Mn.	Heating rate: 1 C min^{-1} in high vacuum.
▼	57-28	288-873		Not given.	Hanford slug; data smoothed by authors.
◧	53-21	289-356		0.0437 C 0.0060 Fe, 0.0028 Si, 0.0010 Al, 0.0010 Ni; all others each < 0.001.	Beta heat-treated.
◆	53-21	289-356		Same as above.	Alpha rolled recrystalized before irradiation.
■	53-21	289-356		Same as above.	Alpha rolled recrystalized after irradiation.
◈	56-11	288-895	± 5	0.06 C, 0.005 N_2, and 0.0001 H_2.	Induction melted.



SPECIFIC HEAT -- URANIUM

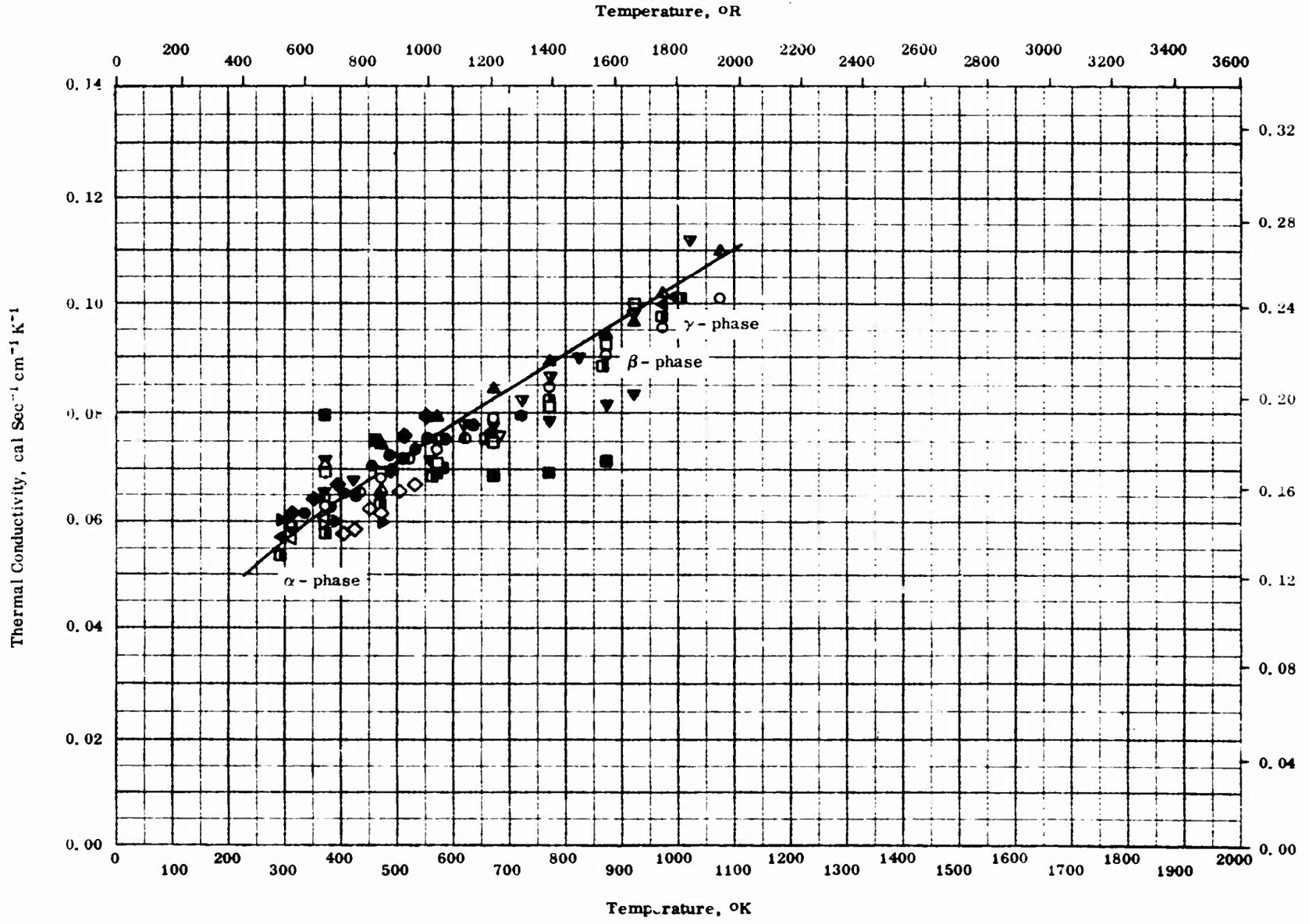
TPRC

1951

SPECIFIC HEAT -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	59-16	323-873	< 2.0	99.72 U.	
□	47-4	298-1300		99.71 U.	Sealed under helium.
△	56-23	373-1073		0.10 C, 0.046 Si, 0.017 N_2, 0.010 Ni, 0.0095 Fe, 0.0035 Cr, 0.0007 Mn, 0.0005 Cu, and 0.0002 Co.	
◇	47-5	273-1073		99.96 U, 0.015 C, 0.003 N_2, 0.002 O_2, and 0.0005 H_2.	Capsulated in nichrome V.



THERMAL CONDUCTIVITY -- URANIUM

TPRC

1053

THERMAL CONDUCTIVITY -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-4	373-1068		Pure.	Annealed.
□	57-10	373-923	± 7		
△	52-3	313-373		Density 1177-1182 lb ft^{-3}.	Rolled 50% at 500 C; heat treated 1/2 hr at 725 C, water quenched, then alpha annealed for 1 hr at 525 C, and furnace cooled.
▽	52-3	313-373		Fine grained (10 - 20 micro); density 1179 lb ft^{-3}.	Prepared by decomposing UH_3 under hot pressing.
◁	52-3	313-373		Hot pressed U compact; density 1177 lb ft^{-3}.	Same as above.
▷	52-3	313-373		Coarse grained (1/4 - 1/2 mm dia); density 1176 lb ft^{-3}.	Same as above.
◇	44-2	341-721		0.068 C, 0.004 Si, 0.0035 Fe, 0.002 Ni, 0.0009 N, 0.0002 Cr, Ag each, and 0.00014 B.	Extruded rod; measured parallel to direction of extrusion.
●	44-2	341-721		0.072 C, 0.015 Fe, 0.010 Ag, 0.0028 N_2, 0.0020 Ni, 0.00176 Si, 0.0005 Cu, 0.0003 Cr, and 0.00012 B.	Same as above.
■	54-6	373-873	± 6		
▲	54-7	373-923	± 2	Springfields cast bar.	Cast in α - phase.
▼	54-7	373-923		Same as above.	Above sample heated at 690 C for several hr, and then cooled to room temperature at a rate near transformation 4.2 C min^{-1}; measured in β-phase.
◀	55-5	293-998			
▶	45-1	293-473		"Metal X".	

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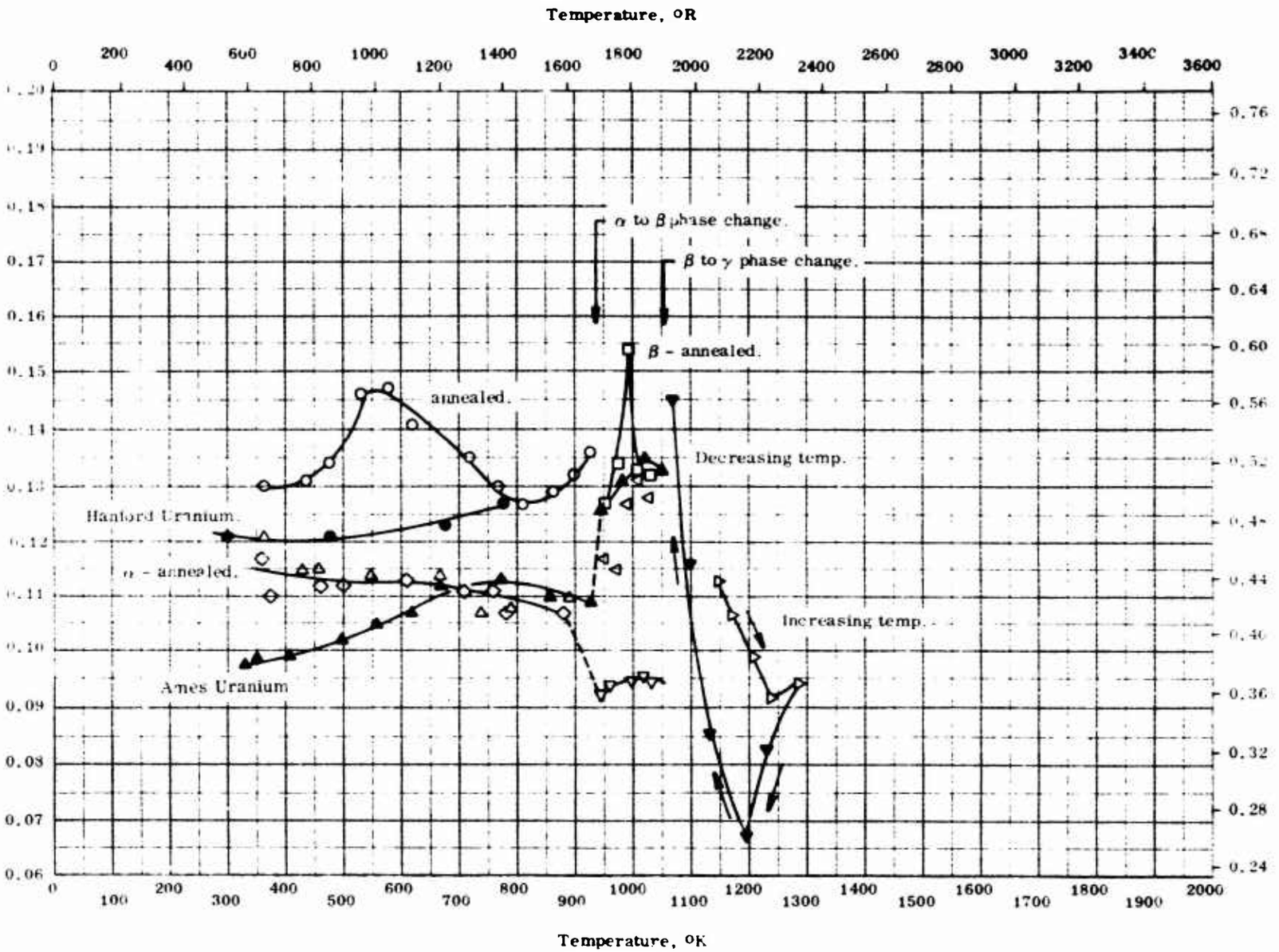
TPRC

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_0	Sample Specifications	Remarks
◆	53-7	313-553			Cast rod.
◐	45-2	373-623		Pure.	
◨	56-11	295-1006		Five samples with identical results: (1) 0.005 C, 0.004 N_2, 0.0004 H_2. (2) 0.05 Cr, 0.03 C, 0.004 N_2, 0.0005 H_2. (3) 0.06 C, 0.095 N_2, 0.0001 H_2. (4) 0.08 Ti, 0.02 C, 0.001 N_2, H_2 each. (5) 0.17 Si, 0.01 C, 0.005 N_2, 0.0002 N_2.	
▲	58-10	295-1073	< ± 5	Pure.	Unclad; measured before irradiation.
▼	61-15	423-1023		High purity.	Cast.



THERMAL DIFFUSIVITY -- URANIUM

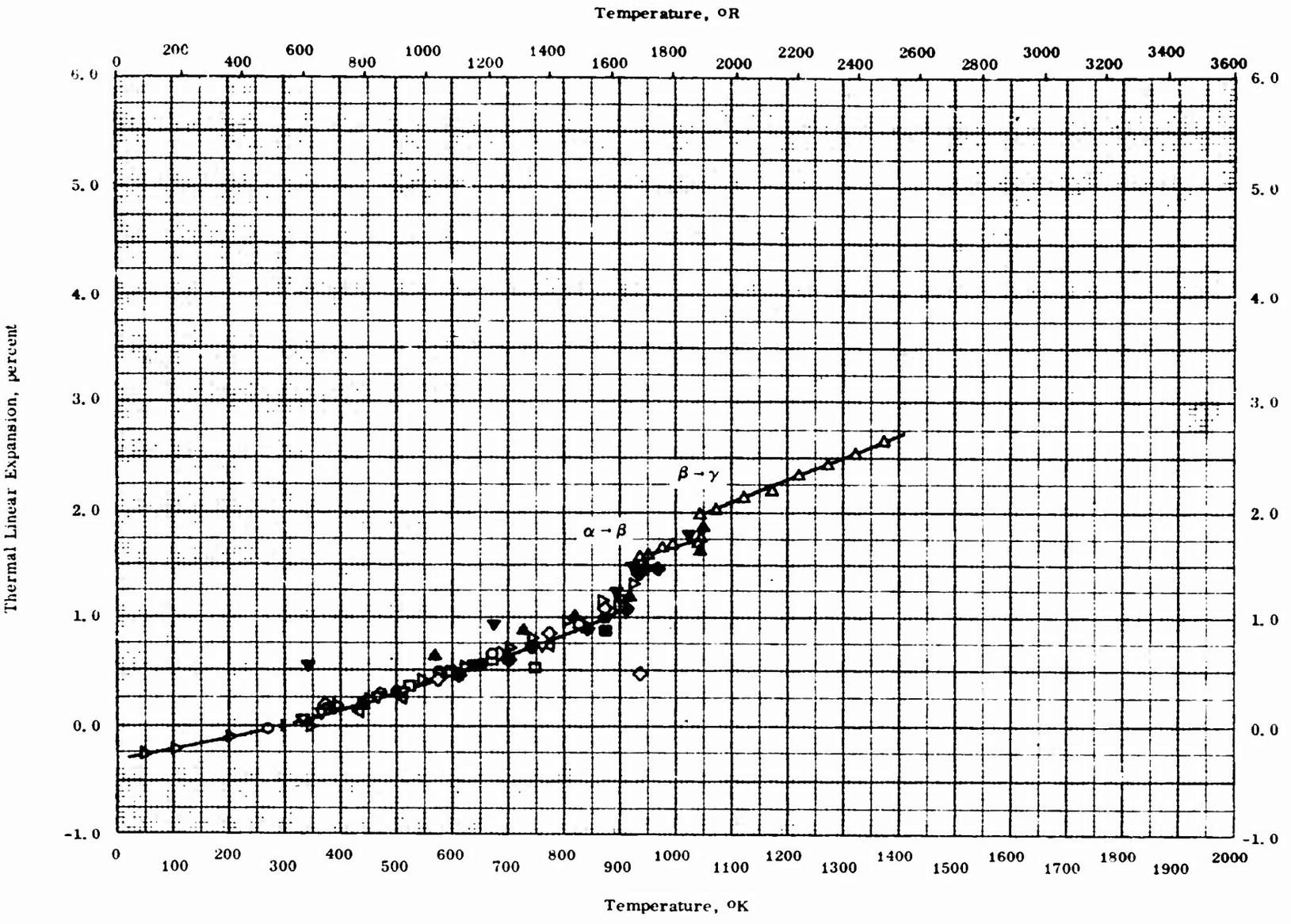
THERMAL DIFFUSIVITY -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-2	360-923		Average grain dia 0.03 mm	Annealed for 1 hr at 625 C
□	56-2	959-1028		Same as above	The above sample β - annealed for 1 hr at 700 C after cooled to room temperature
△	56-2	360-956		Same as above	The above sample again α - annealed after cooled to room temperature
▽	56-2	941-1028		Same as above	The above sample measured in β - region.
▷	56-2	1144-1283		Same as above	The above sample measured in γ - region after γ - annealed at 850 C.
▼	56-2	1064-1283		Same as above	The above sample measured as temperature decreases from 1283 to 1064 K
◁	56-2	948-1026		Same as above	The above sample measured in β - region.
◇	56-2	358-879		Same as above	The above sample measured in α - region after cooled to room temperature.
●	54-2	298-773		Hanford uranium; sample 1/8 in. in dia; density 18.97 g cm^{-3}.	
▲	54-2	328-1048		Ames uranium.	

TPRC

1057



THERMAL LINEAR EXPANSION -- URANIUM

TPRC

THERMAL LINEAR EXPANSION -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	47-7	273-773		99.5 U, 0.1> Al, Be, Si, Fe, Mn each, and 0.01> Cu; density 1143 lb ft^{-3}.	Vacuum melted.
□	57-66	293-993		α-uranium.	Heated above α-β transformation temperature; water quenched and annealed several hrs at 600 C.
◇	56-64	293-935		α-phase.	From x-ray measurements of lattice.
△	56-64	935-1373		β-and γ-phase.	Same as above.
▽	57-69	293-900		α-phase.	Water quenched from β phase; measured in vacuum.
▷	56-65	50-923		"Pure".	Annealed at 600 C in vacuum; x-ray diffraction method.
◁	13-4	293-773		Not given.	Cast in graphite.
●	56-11	472-872		5 samples: a) 0.005 C, 0.004 N, and 0.0004 H. b) 0.06 C, 0.005 N, and 0.0001 H. c) 0.05 Cr, 0.03 C, 0.004 N, and 0.0005 H. d) 0.17 Si, 0.01 C, 0.005 N, and 0.0002 H. e) 0.08 Ti, 0.02 C, 0.001 N, and 0.001 H.	Data identical for 5 samples; tested at 3 C min^{-1} heating rate in vacuum; sample (a) arc melted and sample (b) induction melted.
■	55-55	293-873		Single crystal; χ-phase.	
◆	53-50	611-967		99.9 U and 0.1> C.	Pressed U powder at 600 C at 24000 psi; measured in hydrogen with heating and cooling rate 1 C min^{-1}.

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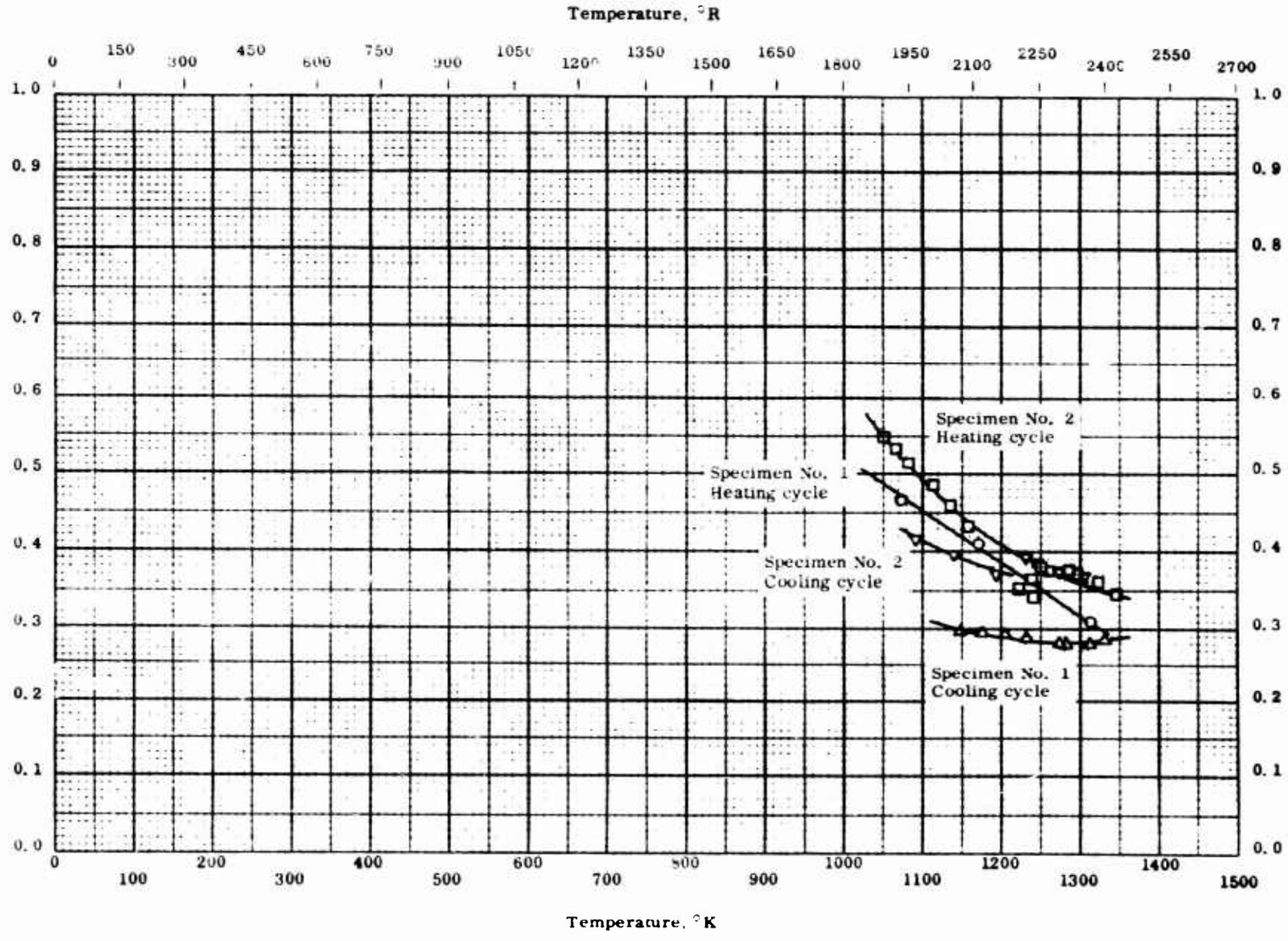
THERMAL LINEAR EXPANSION -- URANIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▲	55-50	570-1063		Not given.	Heating.
▼	55-50	343-1063		Same as above.	Cooling data of above specimen.

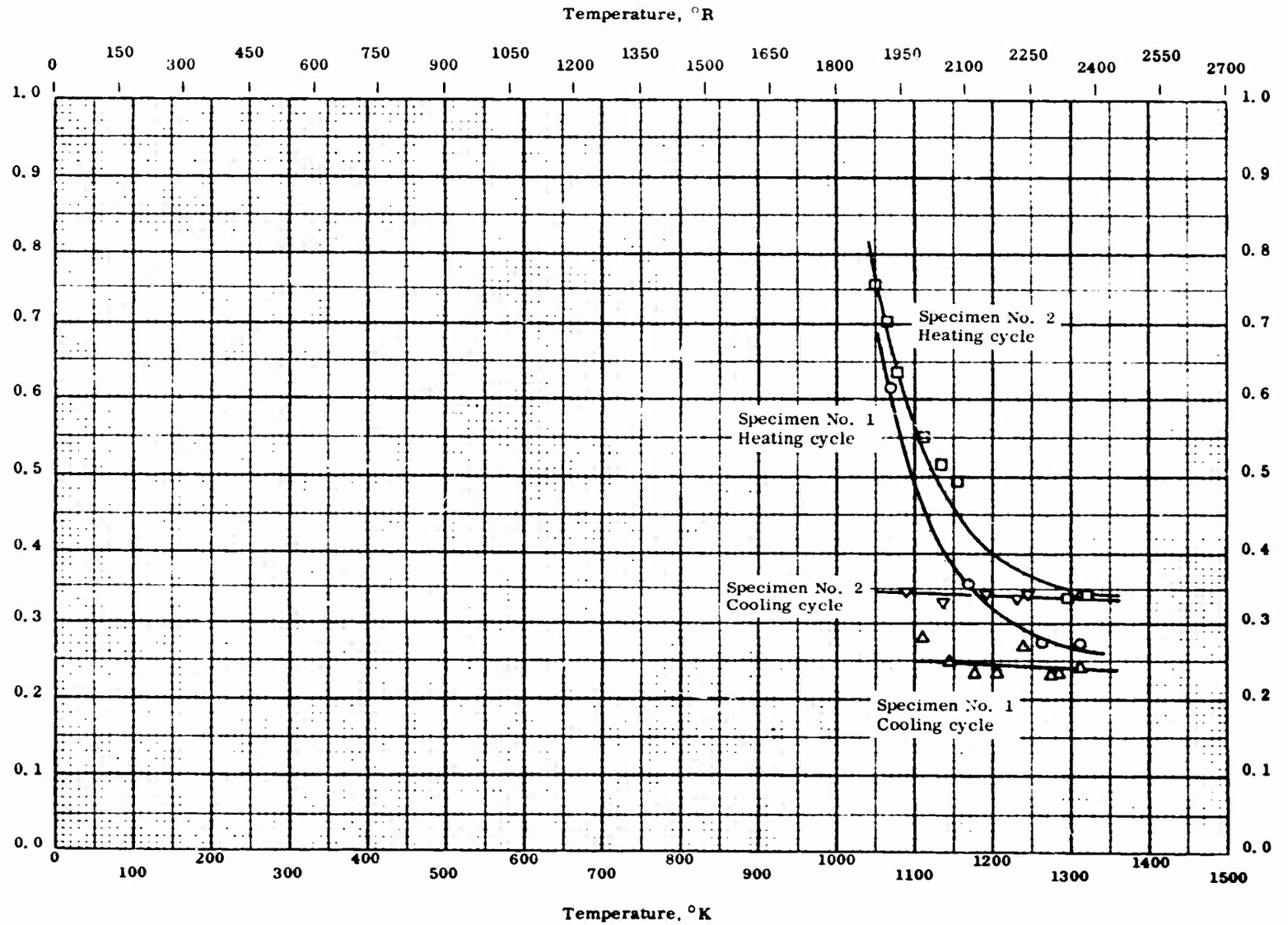


HEMISPHERICAL TOTAL EMITTANCE -- URANIUM

HEMISPHERICAL TOTAL EMITTANCE -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-44	1073-1314		Unalloyed; specimen 1.	Tube formed by rolling sheet metal (0.005 in. thickness), heated in vacuum at 873 K for 4 hrs; measured in vacuum; heating cycle.
△	57-44	1148-1330		Same as above.	Same as above, cooling cycle.
□	57-44	1052-1346		Unalloyed; specimen 2.	Same as above; heating cycle.
▽	57-44	1092-1305		Same as above.	Same as above; cooling cycle.



Normal Spectral Emittance

Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- URANIUM

TPRC

1963

NORMAL SPECTRAL EMITTANCE -- URANIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	57-44	0.65	1070-1312		Unalloyed; specimen 1.	Tube formed by rolling sheet metal (0.005 in. thickness), heated in vacuum at 873 K for 4 hrs.. measured in vacuum; heating cycle.
△	57-44	0.65	1110-1311		Same as above.	Same as above; cooling cycle.
□	57-44	0.65	1052-1321		Unalloyed; specimen 2.	Same as above, heating cycle.
▽	57-44	0.65	1091-1305		Same as above.	Same as above; cooling cycle.

PROPERTIES OF VANADIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	6.10	381
Melting Point	2161	3890
Heat of Sublimation	2394_{0K}	4308_{0R}

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	○	6.1042	381.07
	●	6.05	378
	■	6.09	380
	▲	6.076	379.3
	▼	6.099	380.8

Melting Point		K	R
	△	2133	3840
	◆	2133 ± 20	3840 ± 36
	◇	2192 ± 2	3946 ± 4
	▽	2176 ± 4	3917 ± 7
	◁	2118	3813
	▷	1973	3552
	◀	2118 ± 10	3813 ± 18
	▶	2161 ± 10	3890

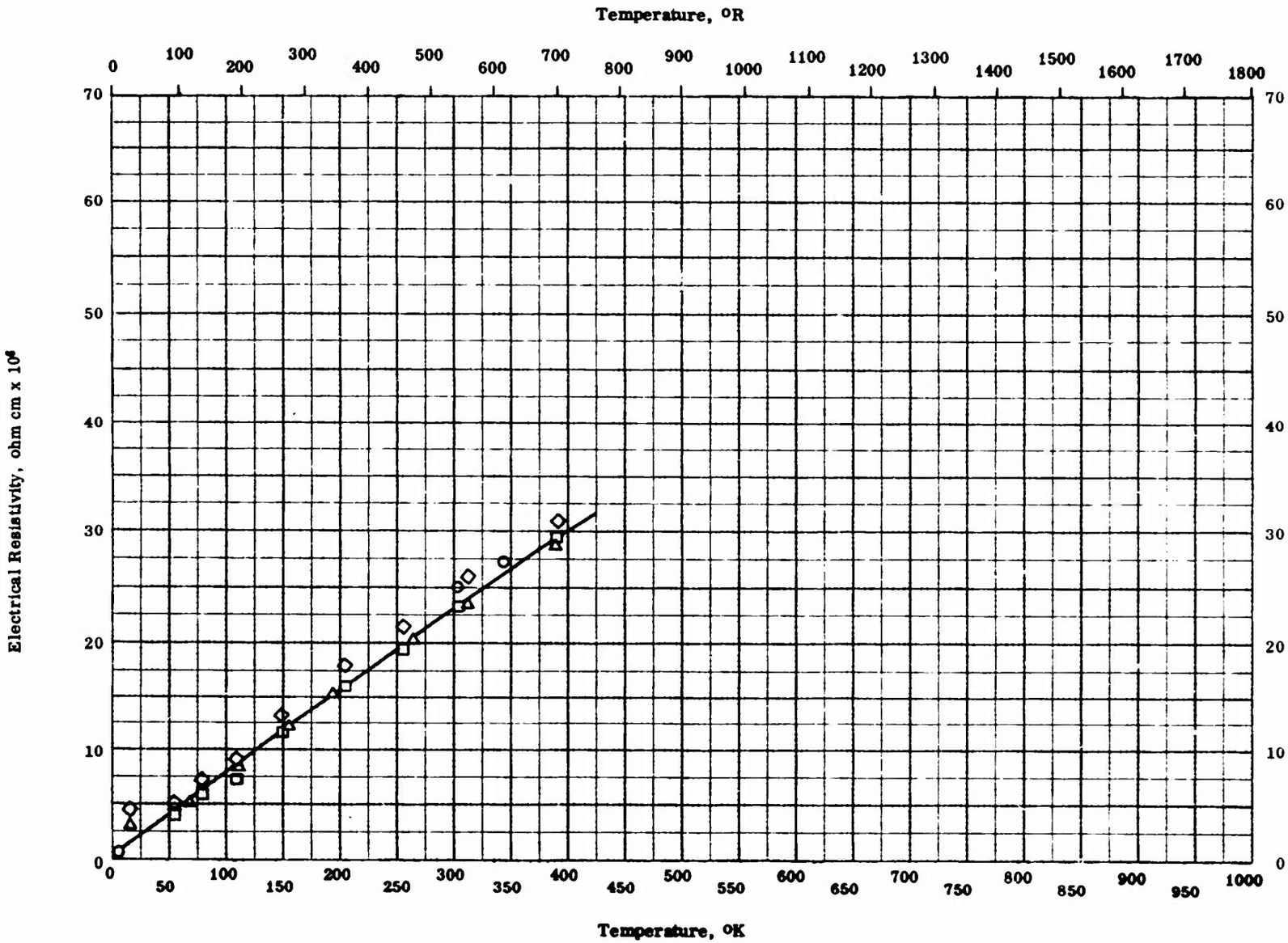
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	□	2394_{0K}	4308_{0R}

PROPERTIES OF VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	52-14	298		99.55 pure.	Density by weight in air and in water.
▲	52-14	298		99.55 pure.	Density from x-ray measurements.
◆	52-14	2127-2157		99.1 - 99.55 pure; beleived to contain O_2.	M. P. by liquid forming in black body cavity; author considers 1860 ± 20 C the best value based on results over given temperature range.
□	51-10 also 51-7	0		99.6 V, 0.2 C, 0.1 H_2, and 0.1 total Fe, Si, Mn, Cu, Ca, etc.	Δh_S from vapor pressure data.
△	54-30	2133		0.08 - 0.10 C, 0.02 - 0.05 N_2, and spectroscopic traces of Ca, Fe, Mn, Zr, Cr, Nb, and Si.	M. P. by liquid forming in black body cavity.
◇	54-29	2192		99.8 - 99.9 pure.	M. P. from loss of electric continuity.
▽	54-29	2176		99.5 - 99.7 pure; calcium reduced.	Same as above.
●	57-48	298		0.23 O_2, 0.02 Cl, 0.01 Fe, 0.007 N_2, and 0.004 H_2; button sample.	Density by weight in air and in water.
■	57-48	298		Same as above; sheet sample.	Same as above.
▼	53-41	298		0.19 C, 0.095 N_2, 0.036 O_2, 0.0014 H_2, and 0.1 all others.	Density from x-ray measurements.
◁	53-41	2118		Same as above.	M. P. from time-temperature curve.
▷	56-55	1973		Not given.	
◀	54-39	2108-2128		Prepared from c. p. grade VO_5.	M. P. from observation of first liquid drop.
▶	62-55	2151-2171		Not given.	

TPRC



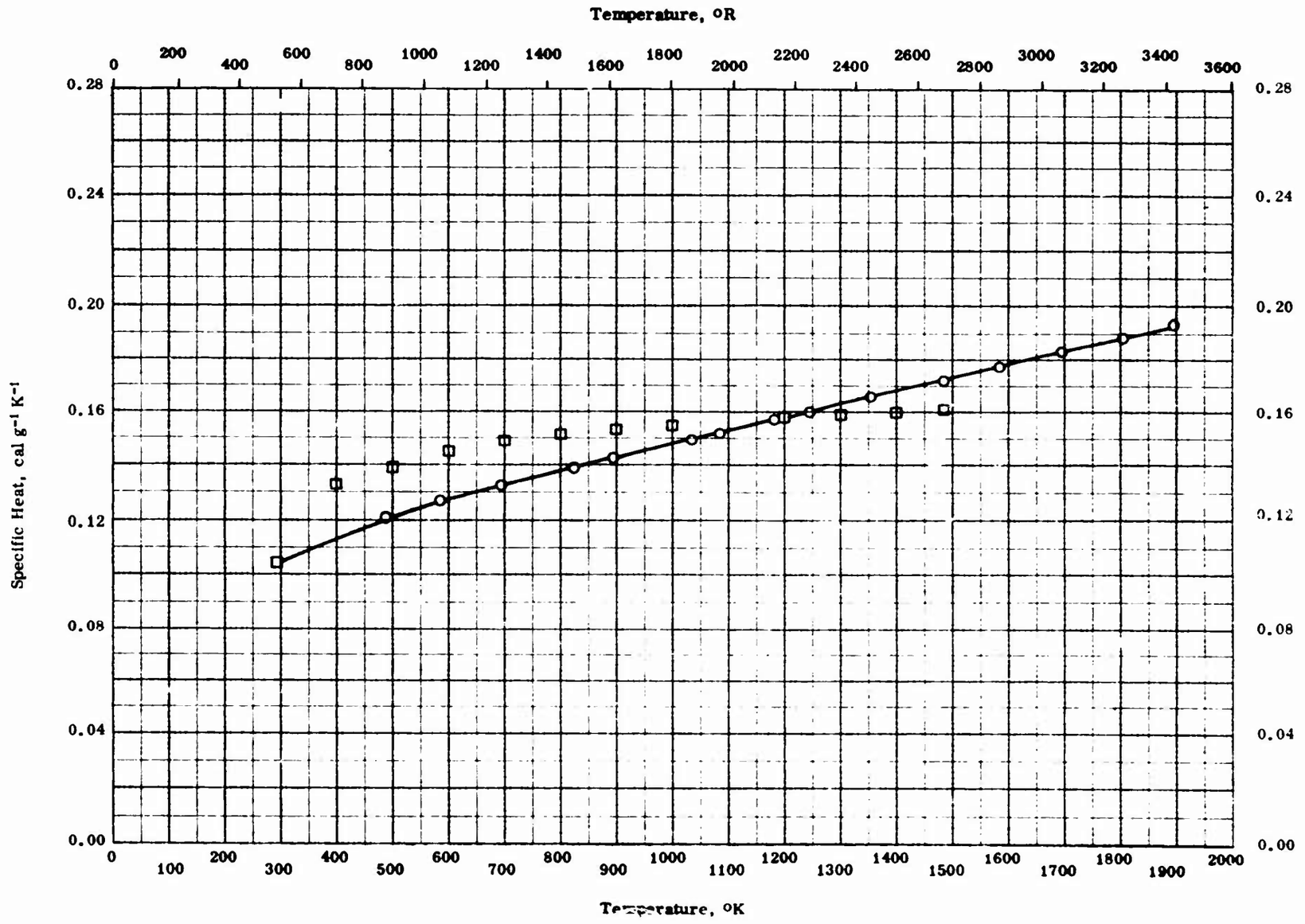
ELECTRICAL RESISTIVITY -- VANADIUM

TPRC

ELECTRICAL RESISTIVITY -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	56-27	304-332		0.05 ea C, O, N, and 0.001 H; residual resistivity 2×10^{-6} ohm-cm at 4.2 K.	Auth. est. room temp. value of r accurate within ± 10%; no effort made to attain precision.
□	57-39	8.4-390		99.7 pure; $r_o = 2.97 \times 10^{-6}$ ohm cm at room temp; 0.0005 in. foil from A. D. Mackay Inc., N.Y.	
△	57-39	8.4-390		99.9 pure; $r_o = 3.10 \times 10^{-6}$ ohm cm at room temp; from Electrometallurgical Co.	As received rod.
◇	57-39	8.4-390		99.9 pure; $r_o = 4.83 \times 10^{-6}$ ohm cm at room temp; from Electrometallurgical Co.	Vacuum annealed 1300 C.



SPECIFIC HEAT -- VANADIUM

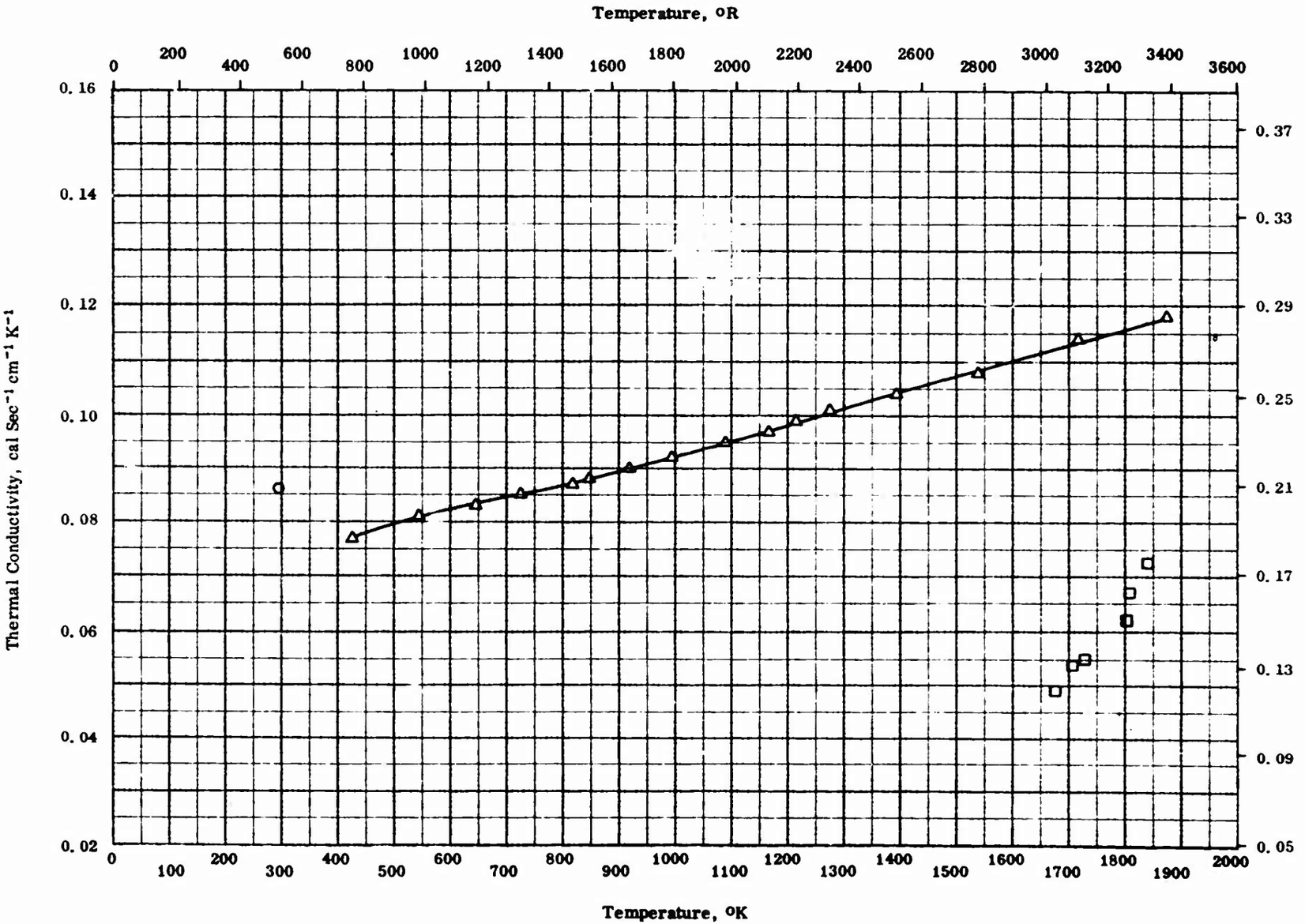
TPRC

1069

SPECIFIC HEAT -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-13	479-1894	3.0	99.74 V, 0.073 O_2, 0.048 Fe, 0.043 N_2, and 0.042 C; density 378 lb ft^{-3}.	Hot rolled and annealed; sealed under helium.
□	62-28	298-1485	1.7	99.8 V, 0.1 C, 0.07 O_2, and 0.03 N_2.	



THERMAL CONDUCTIVITY -- VANADIUM

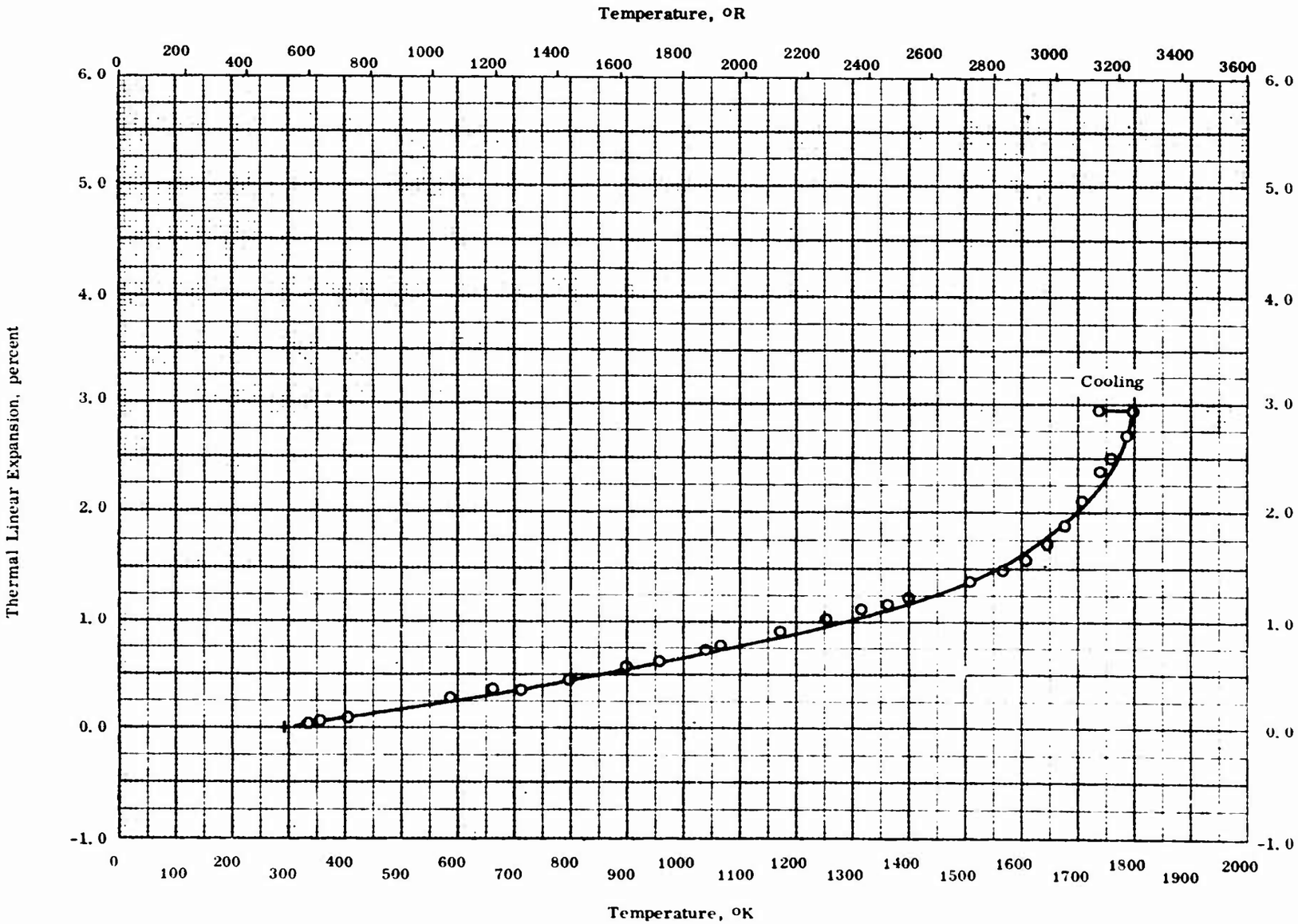
TPRC

1071

THERMAL CONDUCTIVITY -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-9	293		Not given.	Unalloyed.
□	62-6	1671-1840	20		Localized heating within 0.003 in. of the surface to 1000 - 3000 C in high vacuum (10^{-5} mm Hg) by high frequency induction; measured with cylindrical axis parallel to magnetic field.
△	61-13	423-1876	< 5	99.74 V, 0.073 O, 0.048 Fe, 0.043 N, and 0.042 C.	Sample in disc form.

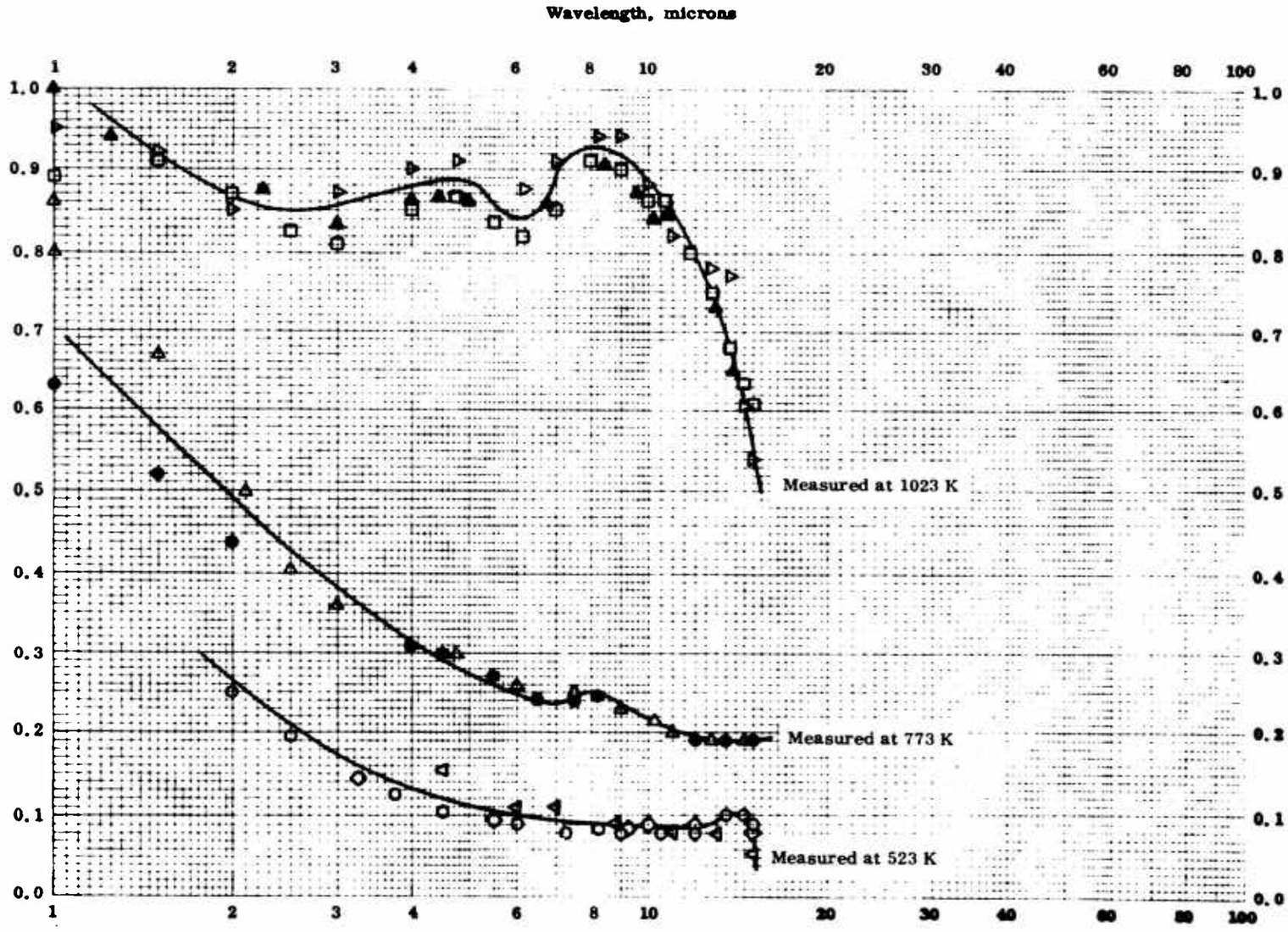


THERMAL LINEAR EXPANSION -- VANADIUM

THERMAL LINEAR EXPANSION -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error σ_r	Sample Specifications	Remarks
O	61-13	294-1736		99.74 V, 0.073 O, 0.048 Fe, and 0.043 N and C each; density 6.05 g cm^{-3}.	Hot rolled and annealed.



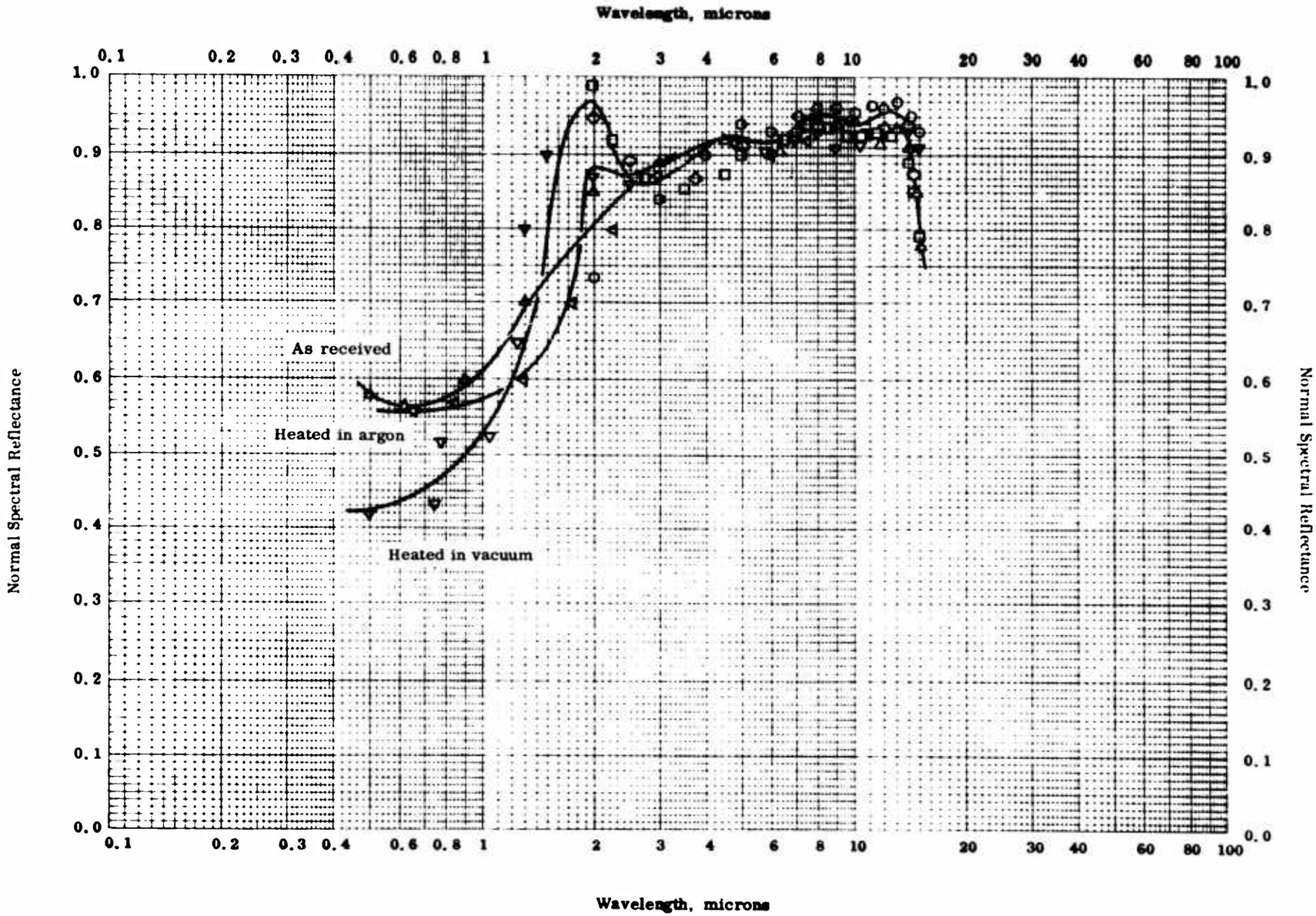
NORMAL SPECTRAL EMITTANCE -- VANADIUM

NORMAL SPECTRAL EMITTANCE -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	62-45	523	2.0-15.0		Chemically pure.	Heated in vacuum (2.1×10^{-6} mm Hg) at 589 K for 30 min.
△	62-45	773	1.0-15.0		Same as above.	Same as above; different specimen.
□	62-45	1023	1.0-15.0		Same as above.	Same as above; different specimen.
◇	62-45	523	2.0-15.0		Same as above.	Heated in argon at 589 K for 30 min.
●	62-45	773	1.0-15.0		Same as above.	Same as above; different specimen.
▲	62-45	1023	1.0-15.0		Same as above.	Same as above; different specimen.
◁	62-45	523	2.0-15.0		Same as above.	As received.
▷	62-45	1023	1.0-15.0		Same as above.	As received.

TPRC

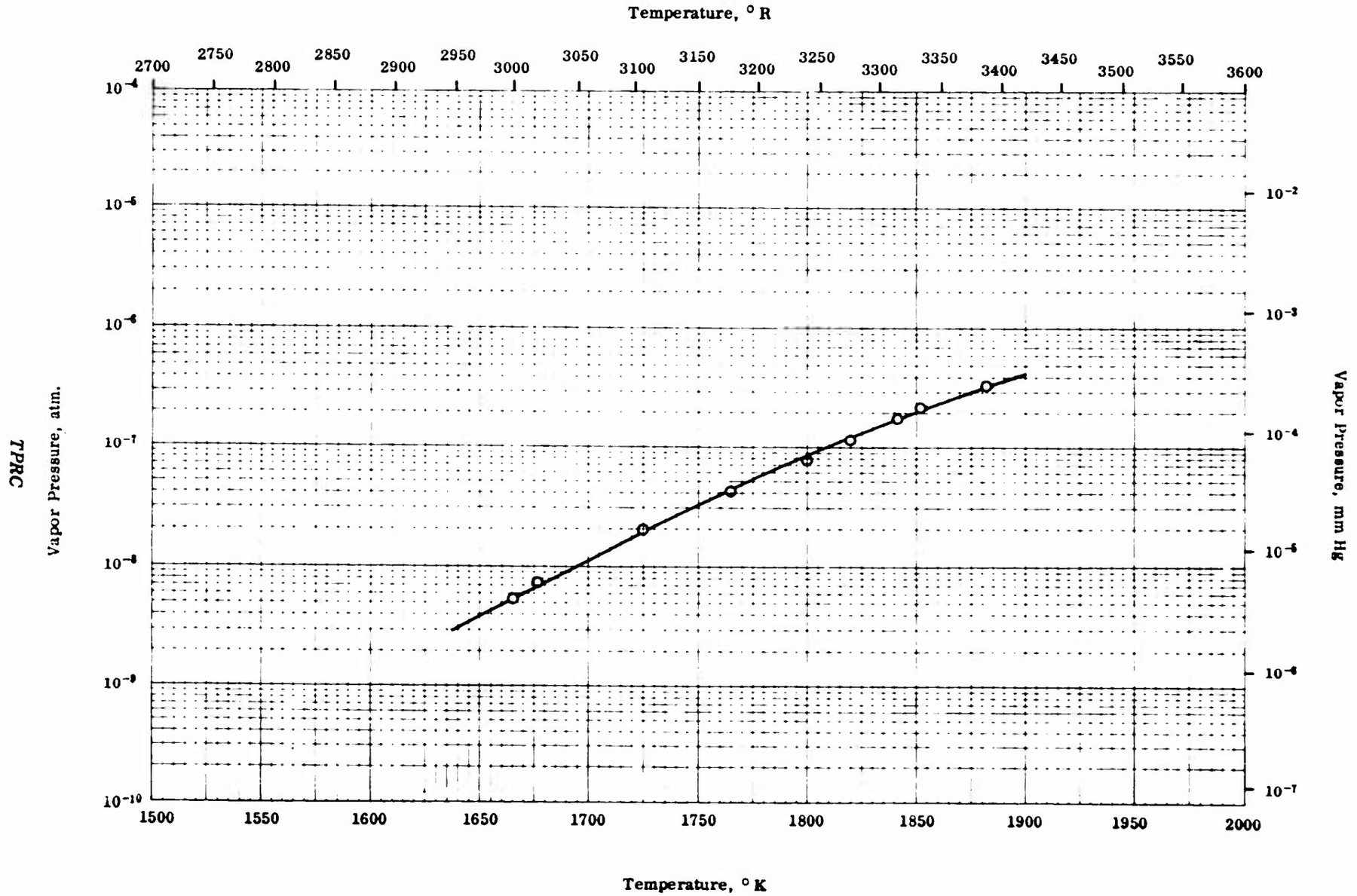


NORMAL SPECTRAL REFLECTANCE -- VANADIUM

NORMAL SPECTRAL REFLECTANCE -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error %	Sample Specifications	Remarks
○	62-45	< 322	2.0-15.0	< ± 2	Chemically pure.	As received; hemispherical illumination, normal viewing; 523 K source temperature.
△	62-45	< 322	0.5-15.0	< ± 2	Same as above.	Same as above; 1273 K source temperature.
□	62-45	< 322	2.0-15.0	< ± 2	Same as above.	Heated in argon at 589 K for 30 min; hemispherical illumination, normal viewing; 523 K source temperature.
▽	62-45	< 322	0.5-15.0	< ± 2	Same as above.	Same as above; 1273 K source temperature.
◇	62-45	< 322	2.0-15.0	< ± 2	Same as above.	Heated in vacuum (2.1×10^{-6} mm Hg) at 589 K for 30 min; hemispherical illumination; normal viewing; 523 K source temperature.
◁	62-45	< 322	0.5-15.0	< ± 2	Same as above.	Same as above; 1273 K source temperature.



TPRC

VAPOR PRESSURE -- VANADIUM

1079

VAPOR PRESSURE -- VANADIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	51-7 also 51-10	1664-1883		99.6 V, 0.2 C, 0.1 H_2, and traces of Fe, Si, Mn, Cu, Ca, etc. totaling 0.1.	

PROPERTIES OF YTTERBIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	7.02	438
Melting Point	1097	1974
Heat of Fusion	13	23
Heat of Vaporization. . .	240	432
Heat of Sublimation . . .	228_{657K}	411_{1200R}

REPORTED VALUES

Density	g cm^{-3}	lb ft^{-3}
○	6.959	434
■	7.02	438

Melting Point	K	R
□	1097	1974

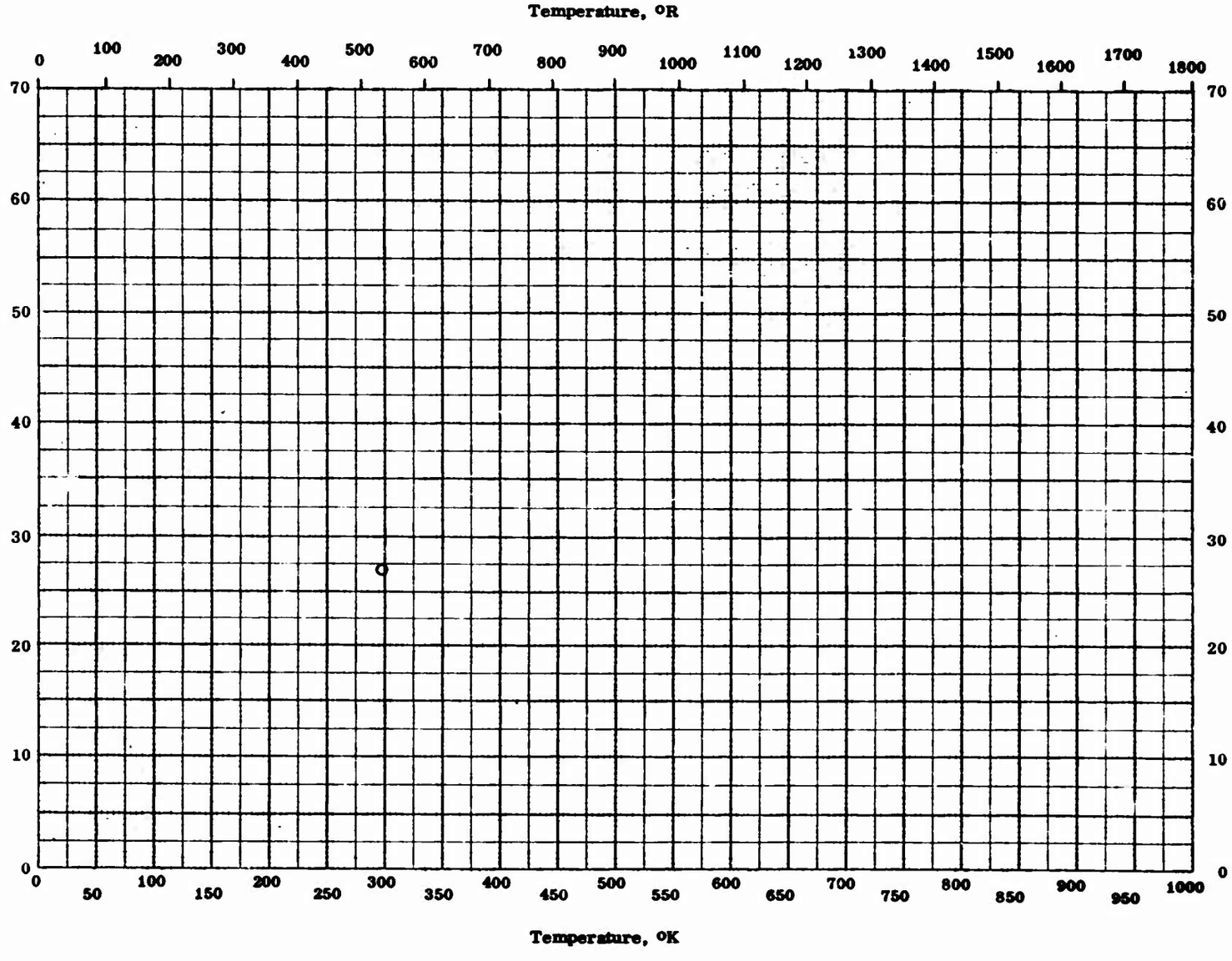
Heat of Fusion	cal g^{-1}	Btu lb^{-1}
◇	13	23
●	26	46.8

Heat of Vaporization	cal g^{-1}	Btu lb^{-1}
■	240	432

Heat of Sublimation	cal g^{-1}	Btu lb^{-1}
△	$228_{667K} \pm 3$	$411_{1200R} \pm 5$
◆	223	420

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-28	298		Not given.	Density computed from x-ray measurement.
□	54-11	1097		Very pure.	Heating and cooling rates at 10 C min^{-1}; M. P. from thermal analysis.
△	56-40	667		High purity.	Δh_s from vapor pressure data.
◇	56-54	1097		Very high purity.	
◆	56-54	---		Same as above.	
●	62-13	1067		Not given.	Transition $\alpha \xrightarrow{1067K} \beta$.
■	62-13	298		Not given.	



TPRC

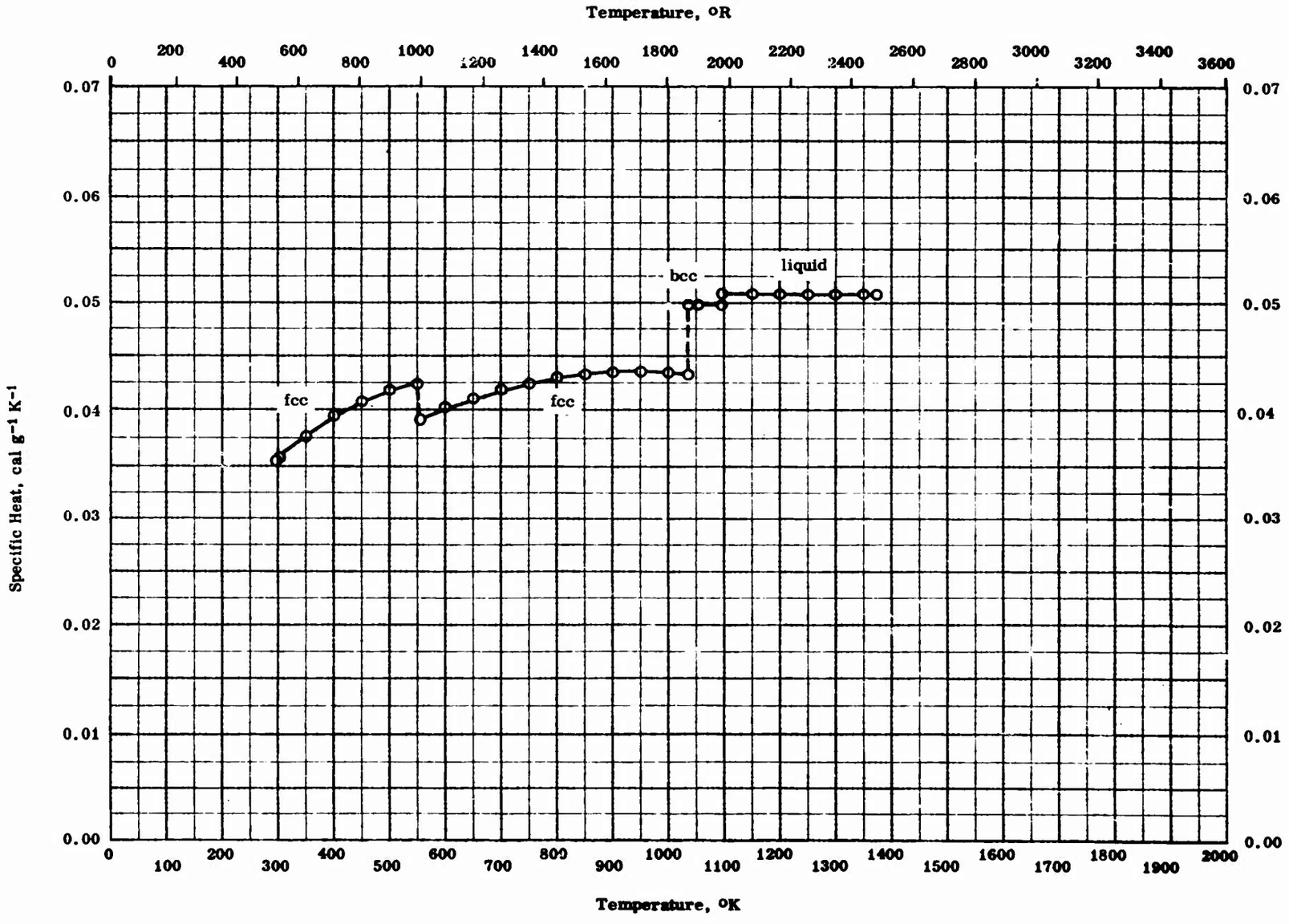
ELECTRICAL RESISTIVITY -- YTTERBIUM

1083

ELECTRICAL RESISTIVITY -- YTTERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		α-phase.	



SPECIFIC HEAT -- YTTERBIUM

SPECIFIC HEAT -- YTTERBIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-31	298-1373		99.92< Yb, 0.06> Ca, 0.05> Ta, 0.0225 O_2, 0.02> Mg, 0.011> C, 0.01> Fe, 0.01> Si, 0.01> Y, 0.0035 H_2, 0.002> Er, 0.001> Cr, 0.001> Lu, 0.001> Sc, 0.001> Tm, and 0.0001 N_2.	Cast into 1/2 inch rods; sealed under helium atmosphere.

TPRC

PROPERTIES OF YTTRIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density	4.50	280.8
Melting Point	1820	3280
Heat of Fusion	46	83
Heat of Vaporization . . .	929	1672
Heat of Sublimation . . .	900	1620

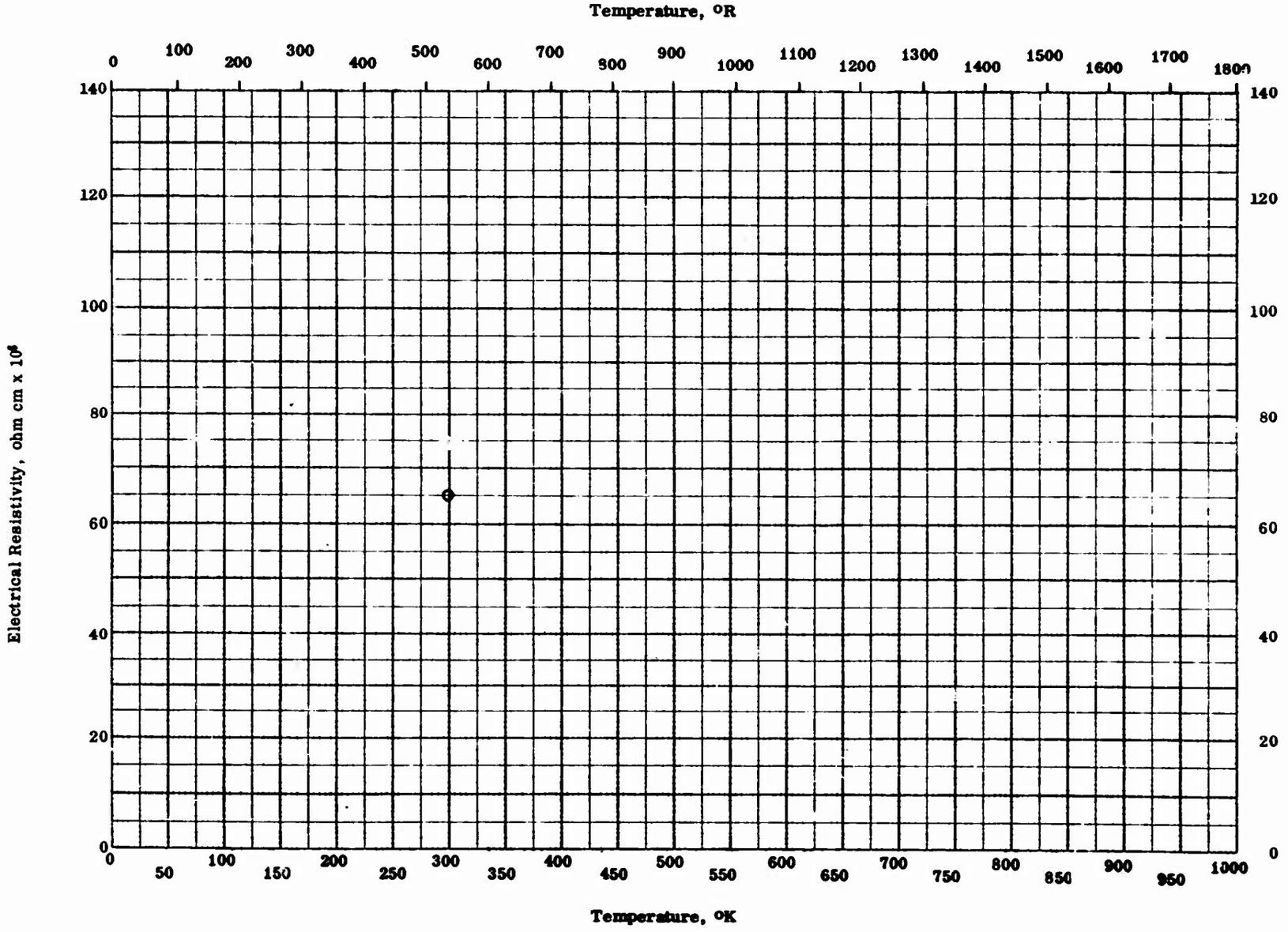
REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	◇	4.472	279.2
	●	4.50	280.8
Melting Point		K	R
	□	1773	3192
	△	1673	3012
	▽	1820	3280
Heat of Fusion		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▲	46	83
	○	47.2	85
Heat of Vaporization		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	◆	929	1672
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▼	900	1620

PROPERTIES OF YTTRIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
□	54-11	1773		Very pure.	M. P. from observation of flow during preparations.
△	53-37	1673		Not given.	
◇	55-28	298		Not given.	Density from x-ray measurement.
▽	56-54	1822		Very high purity.	
▼	56-54	---		Very high purity.	
▲	56-54	1822		Very high purity.	
●	62-13	298		Not given.	
○	62-13	---		Not given.	
◆	62-13	298		Not given.	



TPRC

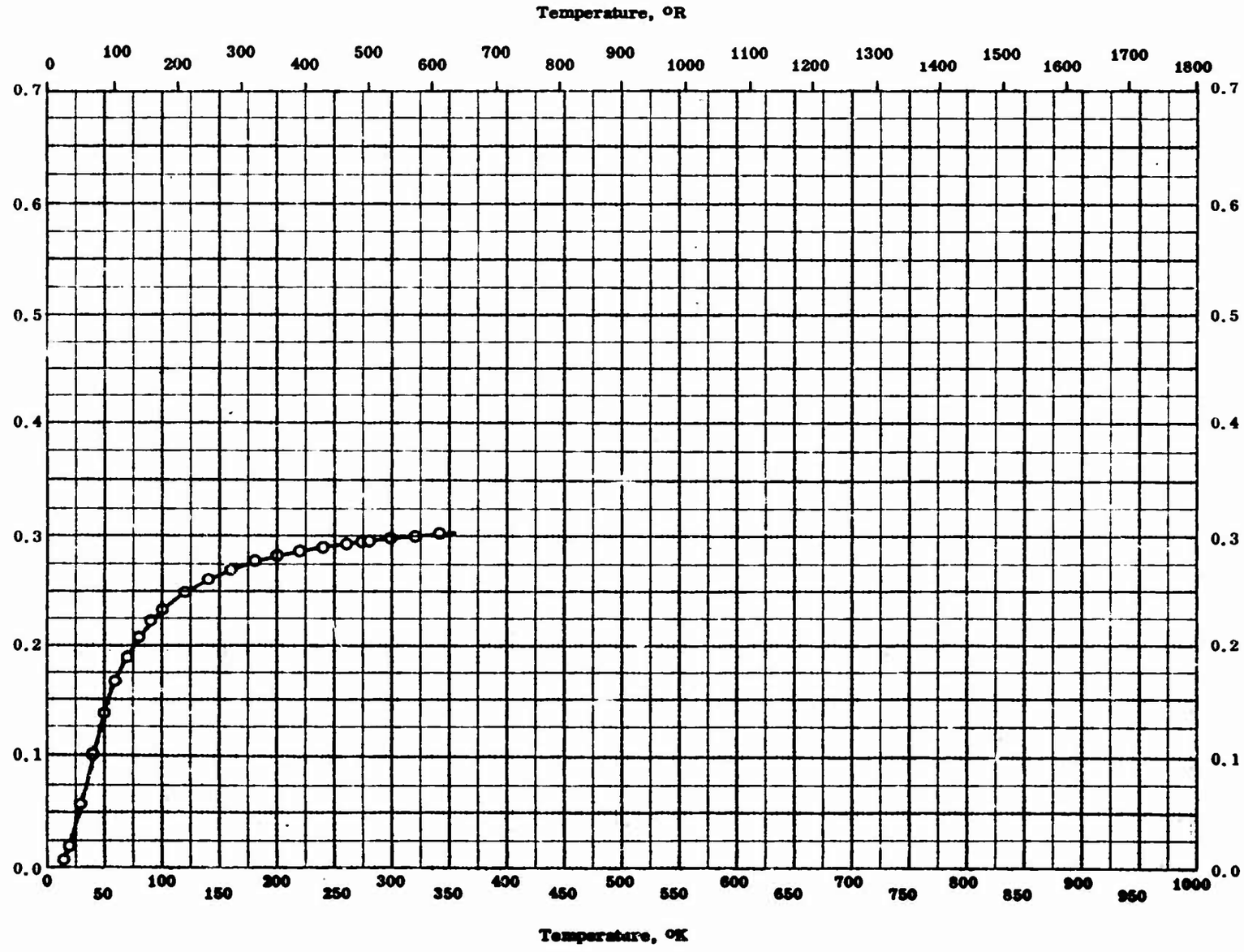
ELECTRICAL RESISTIVITY -- YTTRIUM

1089

ELECTRICAL RESISTIVITY -- YTTRIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	298		α-phase.	



TPRC

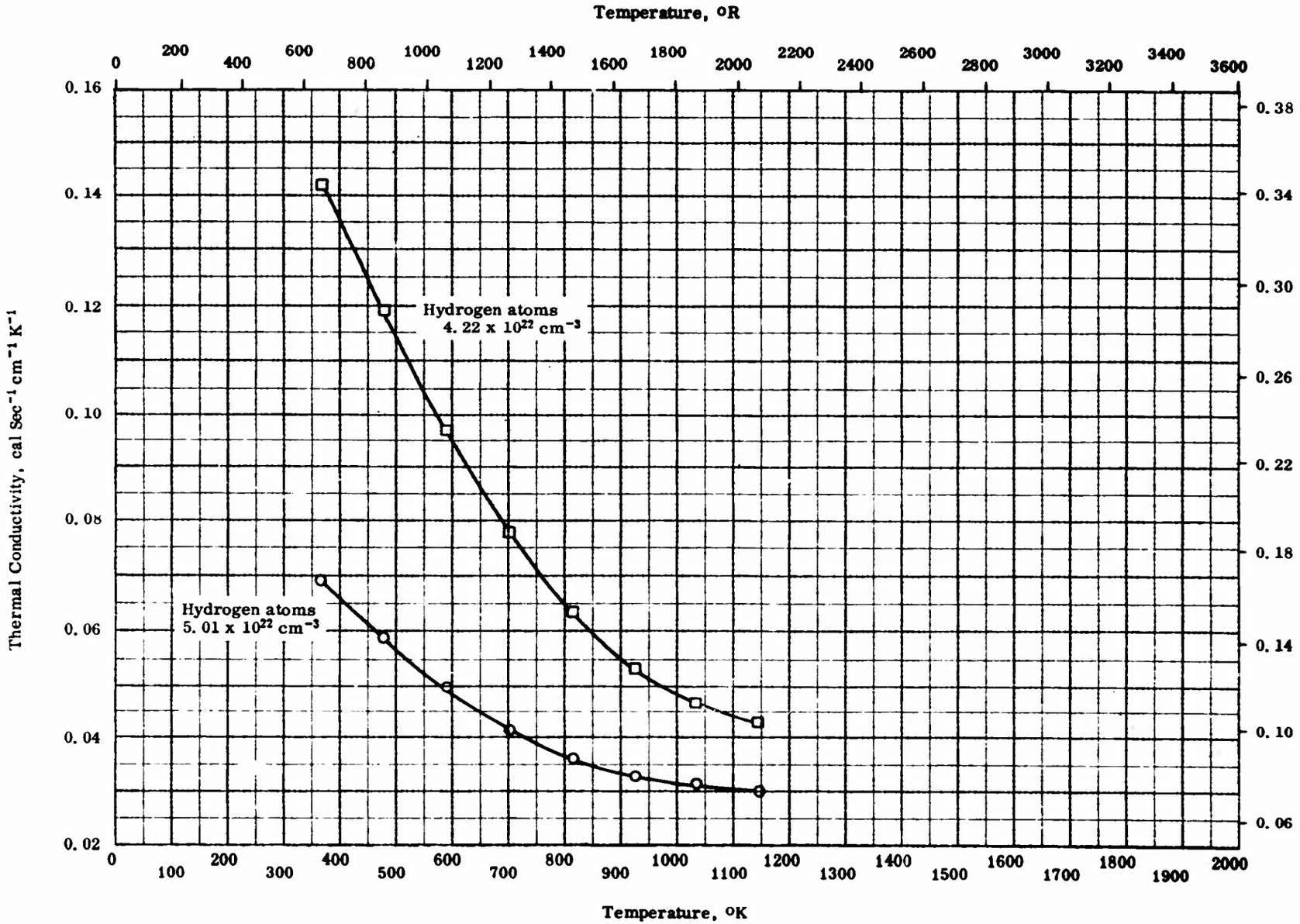
SPECIFIC HEAT -- YTTRIUM

1691

SPECIFIC HEAT -- YTTRIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	60-29	12-340	0.3	0.5> total of Ca, Cr, Dy, Gd, Mg, 0.025 N_2, and 0.015 C; after heat capacity measurements, chemical analysis showed 0.97 YOF and 0.44 Ta.	Corrected for impurities.

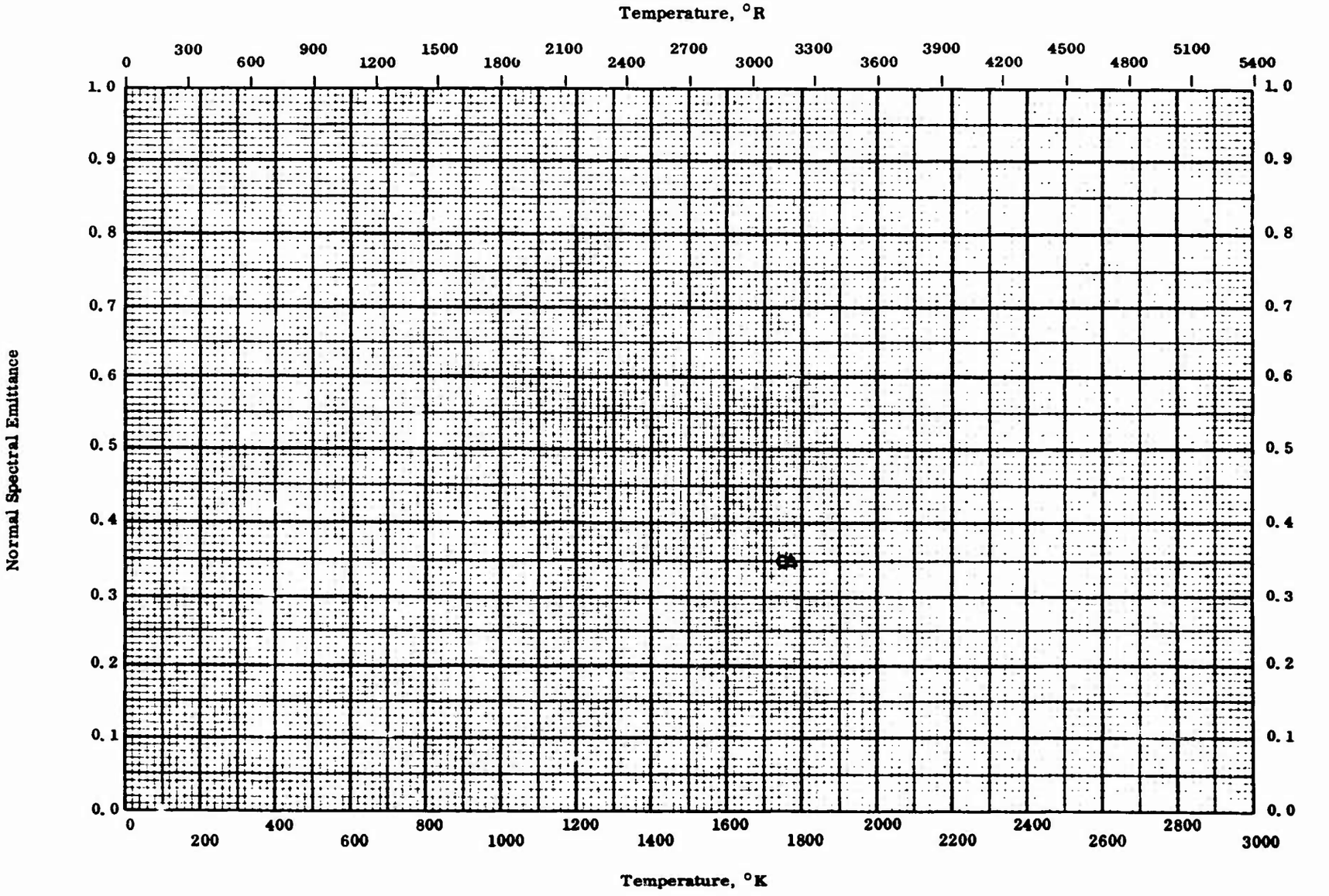


THERMAL CONDUCTIVITY -- YTTRIUM

THERMAL CONDUCTIVITY -- YTTRIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	60-16	367-1145		Hydrogen atoms 5.01 x 10^{22} cm^{-3}.	
□	60-16	367-1145		Hydrogen atoms 4.22 x 10^{22} cm^{-3}.	

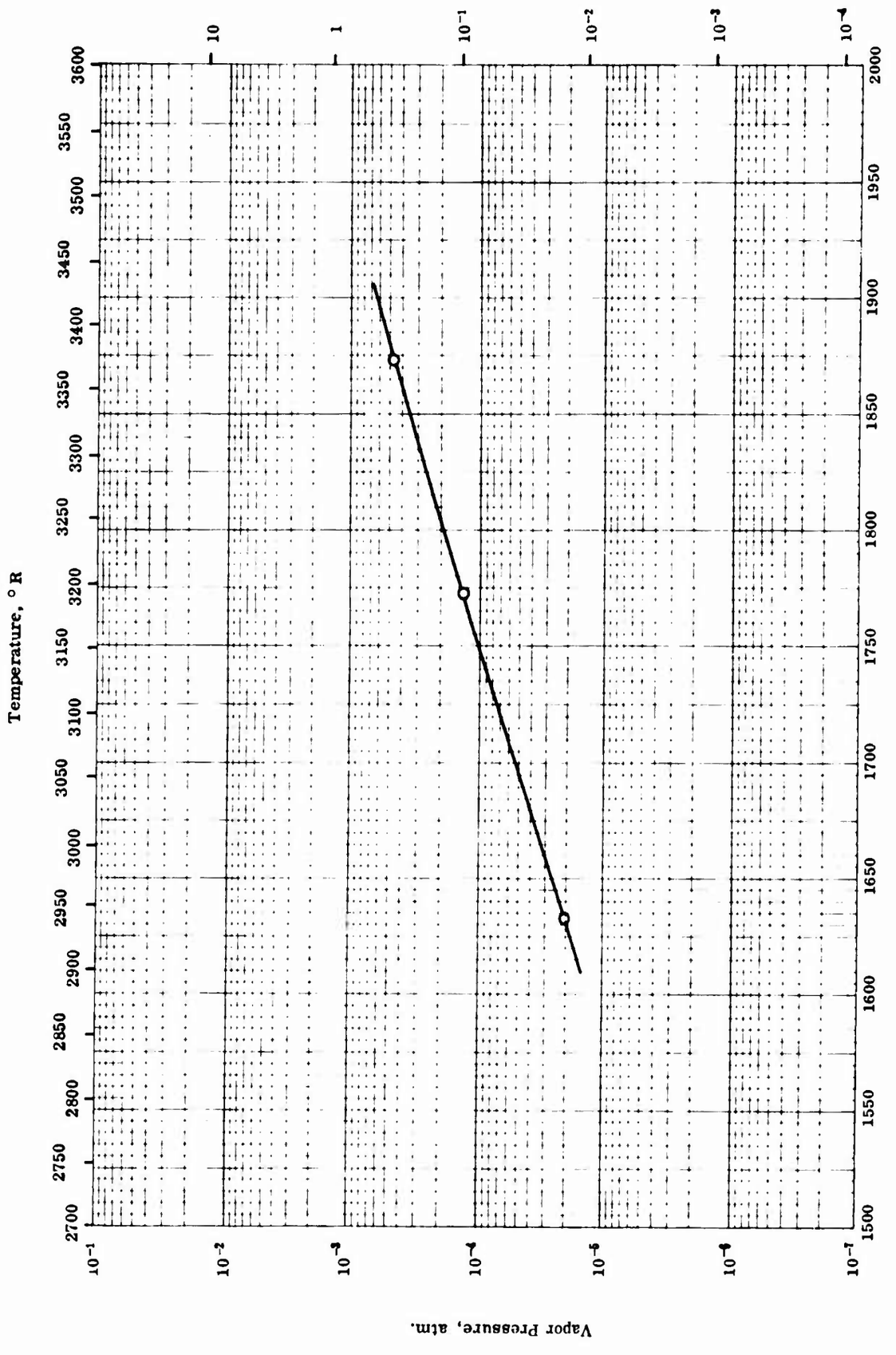


NORMAL SPECTRAL EMITTANCE -- YTTRIUM

NORMAL SPECTRAL EMITTANCE -- YTTRIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
O	15-1	0.65	< MP	1	Not given.	Measured in hydrogen.
△	15-1	0.65	> MP	1	Liquid state.	Measured in hydrogen.



VAPOR PRESSURE -- YTTRIUM

TPRC

VAPOR PRESSURE -- YTTRIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	62-13	1633-1873		Not given.	Calculated from: $\log P\ (\text{mm Hg}) = -\frac{17500}{T(K)} + 8.91$.

TPRC

PROPERTIES OF ZIRCONIUM

MOST PROBABLE VALUES

Property	C.G.S. Units	Brit. Eng. Units
Density.	6.50	406
Melting Point	2141	3854
Heat of Sublimation	1655_{0K}	2980_{0R}

REPORTED VALUES

Density		$g\ cm^{-3}$	$lb\ ft^{-3}$
	□	6.490 ± 0.001	405.2 ± 0.06
	◇	6.501 ± 0.005	405.8 ± 0.3
	△	6.6	410
	▽	6.406 ± 0.011	399.9 ± 0.7
	◁	6.490	405.2
	▷	6.56	410
	●	6.5	406
	▼	6.5514	408.89
Melting Point		K	R
	○	2118 ± 25	3813 ± 45
	▲	2141 ± 10	3854 ± 18
	▼	2128 ± 15	3831 ± 27
	◀	2138 ± 3	3849 ± 5
	▶	2097 ± 31	3775 ± 55
	◆	2125 ± 2	3825 ± 4
	◐	2118	3813
	◧	2125 ± 10	3825 ± 18
	▲	2203	3966
Heat of Sublimation		$cal\ g^{-1}$	$Btu\ lb^{-1}$
	▼	1655_{0K}	2980_{0R}

PROPERTIES OF ZIRCONIUM

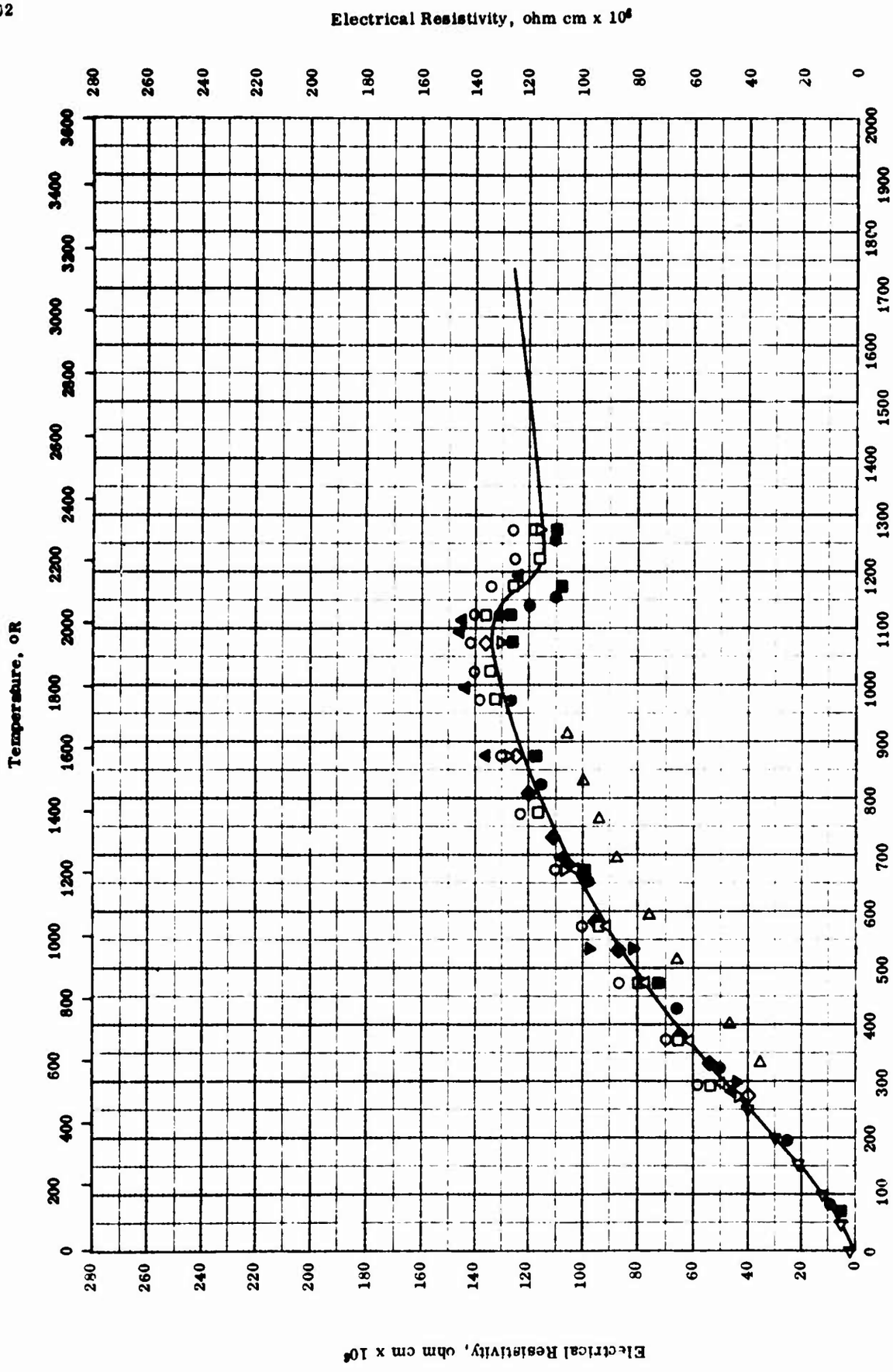
REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-20	2118		0.024 Hf, 0.019 Si, 0.007 Fe, 0.005> each Al and Ti; iodide crystal bar.	As deposit.
□	51-20	293		0.021 Al, 0.012 Fe, 0.007 Ti, 0.005> Si, and 0.004 Hf; iodide crystal bar.	Cold-swaged and annealed at 750 C; density by weight and volume; average value for 3 samples.
◇	53-35	298		1.92 Hf, 0.10 W, and 0.11 others (including Al and Si); α-phase.	Density by x-ray diffraction; value corrected for impurities.
▽	53-35	298		Same as above; β-phase.	Same as above.
▲	54-29	2141		Iodide.	M. P. from loss of electric continuity.
▼	56-46	2128		0.025 Fe, 0.010 O_2, 0.008 Hf, 0.002 each Cu and Al, 0.002> each Si and V, 0.0015 Ti, 0.001 Mg, 0.001> each Mo and Cr, and 0.0005> Ni.	M. P. from temperature in black body cavity in sample; data reproducible to ±3 C and deviation included calibration of optical pyrometer.
△	51-28	298		Not given.	
▼	ND-1	0		Not given.	Δb_S from vapor pressure data.
◁	54-38	293		0.026 C, 0.025 each Fe and Ti, 0.013 O, 0.0035 Al, 0.0015 each Cr, Ni, Si, and Sn, 0.0029> all others.	Annealed; density computed from x-ray data.
▷	53-42	298		Not given.	Double arc melted; heated 24 hrs at 575 C and furnace cooled.
◀	50-16 also 51-31	2136-2141		Not given.	M. P. by visual observation.

(Continued onto next page)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
▶	52-28	2067-2128		Grade I.	M. P. from measuring temperature of liquid solid interface of drip melting sample in 10^{-4} mm Hg.
◆	53-43	2123-2135		Crystal bar.	
◑	52-29	2118		0.02O, 0.01 C, 0.02 Fe, 0.004 Hf and 0.003 each Al and Si.	M. P. by break in time-temperature curve.
●	50-20	298		Not given.	
◨	51-36	2115-2135		Iodide process grade 3 crystal bar from Westinghouse.	Cleaned and arc-melted; M. P. from metallographic inspection for signs of chilled liquid in samples quenched from various temperature levels.
▲	56-55	2203		Not given.	
▼	57-54	298		0.18 Fe.	Alloy made by 2 consumable electrode melts in sequence in arc furnace with He atm and extruded repeatedly; average value of 2 - 4 tests from weight and volume by CCl_4 displacement.



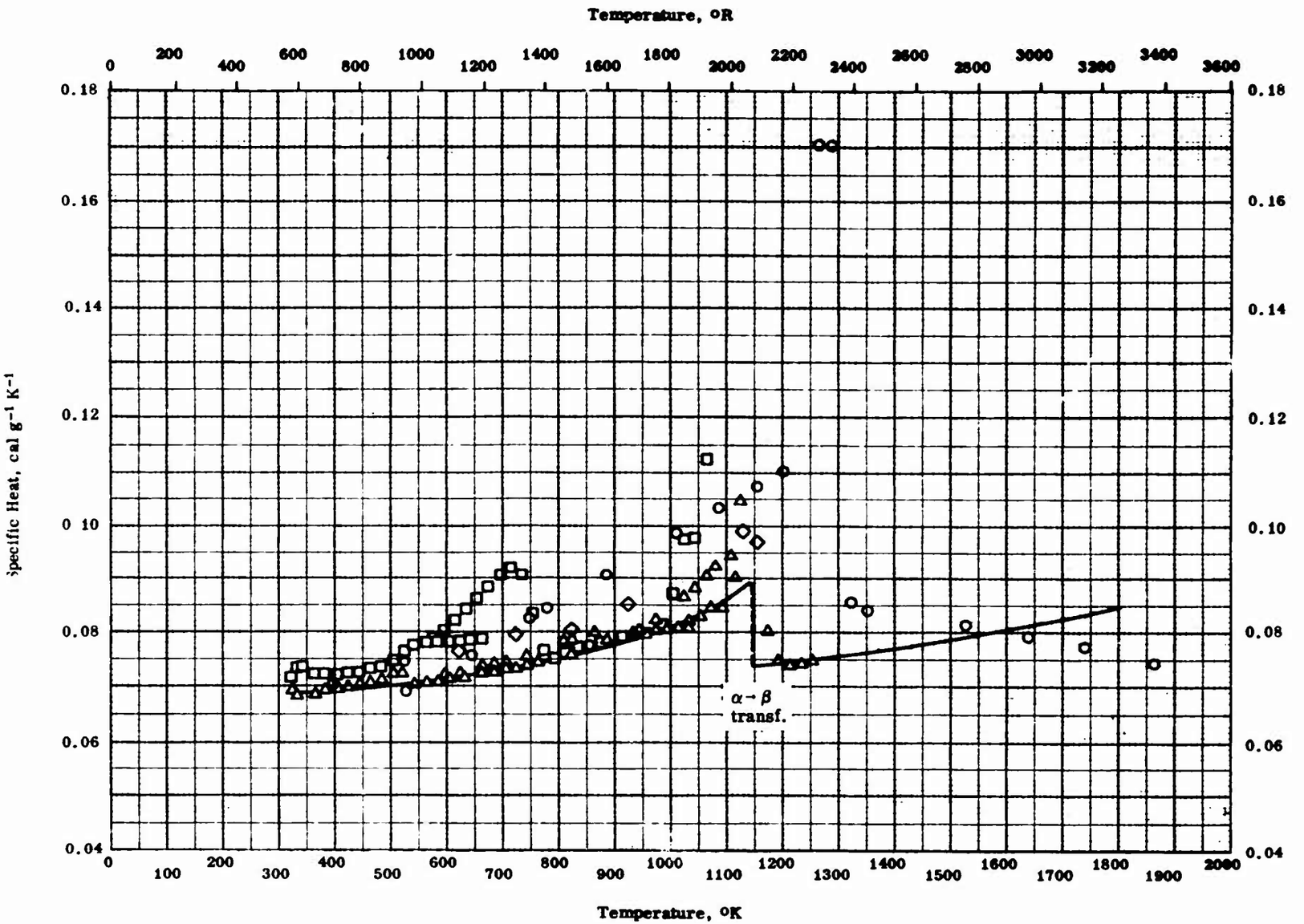
ELECTRICAL RESISTIVITY -- ZIRCONIUM

Electrical Resistivity, ohm cm x 10⁶

ELECTRICAL RESISTIVITY -- ZIRCONIUM

REFERENCE INFORMATION

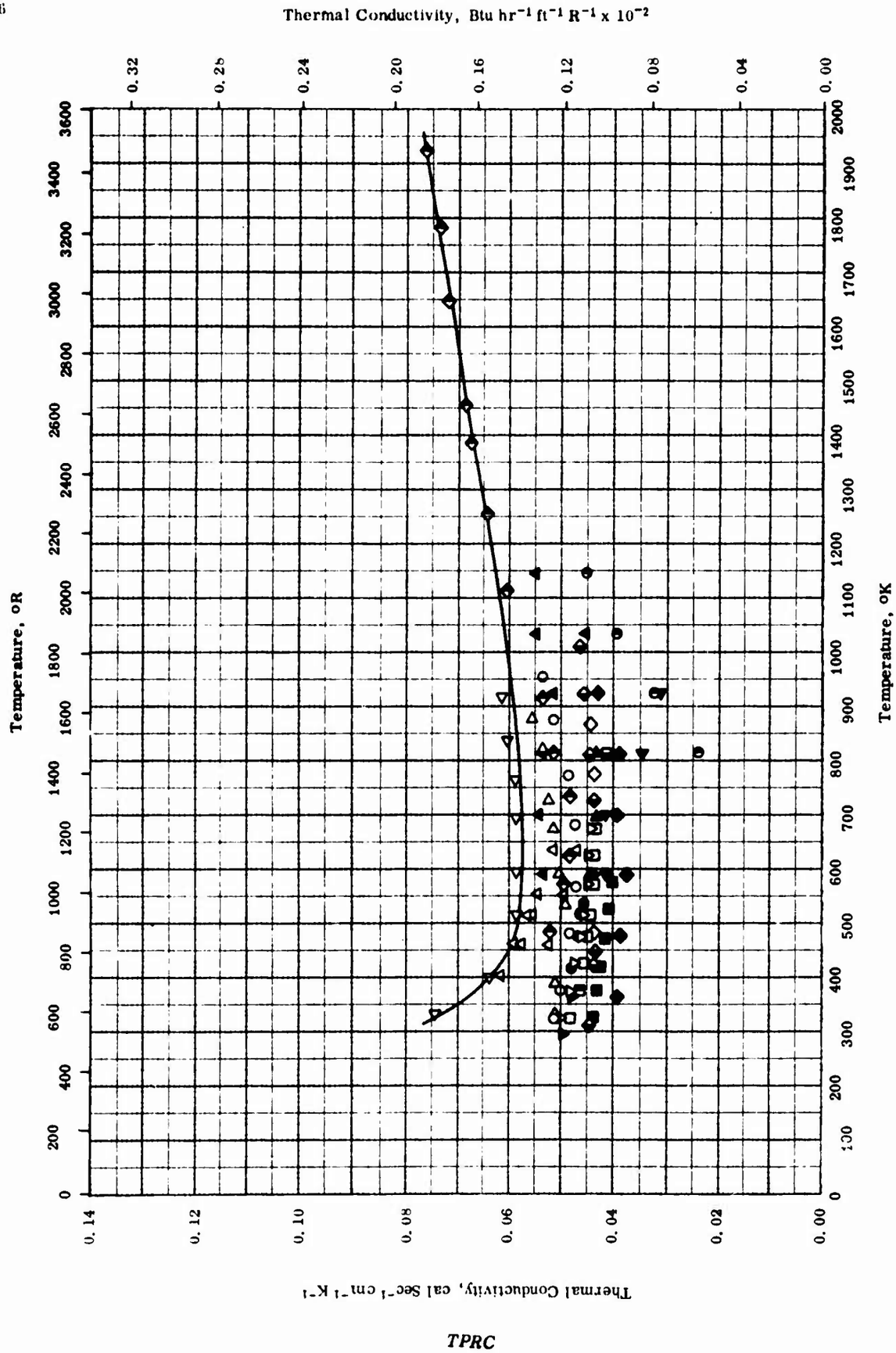
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
△	54-25	298-675		0.1050-0.1300 O, 0.04-0.05 Fe, and 0.0082-0.009? Hf.	Arc melted; Kroll process.
○	54-28	293-1273	±2	Sponge zirconium.	
□	54-28	293-1273	±2	Iodide zirconium chips.	
▽	51-20	273-1273		0.10 Hf, 0.020 Fe, and 0.005> ea Ti, Al, and Si.	Cold swaged.
◇	51-20	273-1073		0.036 Hf and 0.005> ea Si, Al, Ti, Fe.	As deposited iodide crystal bar.
◁	56-29	0-300		Nominal 99.99 purity.	Annealed 5 hrs at 950 C in vacuum.
▷	57-11	331-920		99.9 pure (iodide process).	Annealed 8 hrs at 700 C in vacuum.
■	57-27	73-1273		0.05 Fe, 0.04 Hf, 0.023 O_2, and 0.01 ea C, W.	
●	50-8	73-1273		0.08 Si, 0.04 ea Hf, Fe, 0.01 Mg, 0.005 Cu, 0.005> Ca, 0.004 Al, 0.003 ea Ni, Cr, 0.001 ea Pb, Mo, Ti, and 0.001 Mn.	Same as above.
▼	51-5	298-533		16 samples ranging: 0.04-0.8 Hf, 0.03-0.1 Fe, 0.001-0.05 Sn, 0.001-0.004 Al, 0-0.18 N, 0.001-0.007 Ti, 0.006-0.02 N, and 0.014-0.33 C.	Author lists various treatments of crystal bar.
▲	54-27 also 55-32	303-1195		0.05> Hf, 0.02> Fe, 0.014 Si, 0.005 Cu, 0.003> ea Al, Cr, 0.002 Ni, <0.002 Ti, and 0.001> ea Ca, Mg.	
◆	57-11	331-881		0.14 Hf and 0.08 C.	Annealed 2 hrs at 700 C and water quenched.



SPECIFIC HEAT -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	61-13	528-1863	3.0	99.95 Zr, 0.029 Fe, 0.017 C, 0.0045 Hf, 0.031> all other elements; density 405 lb ft^{-3}.	Sealed under helium atmosphere.
□	57-23	323-1063		99.966 Zr and 0.03 H_2.	Homogenized at 1300 C for 14 days; sealed under vacuum.
△	57-23	363-883		Iodide zirconium; 0.022 C, 0.015 O_2, 0.013 Fe, 0.0075 N_2, 0.007 Hf, 0.004 K, 0.0035 H_2, 0.003 Na, Ni, 0.0018 Si, W, 0.0014 Cu, 0.0007 Cr, 0.0006 Ca, 0.0005 Mg, Pb, 0.0004 Al, Sn.	Sealed under 0.01 μ Hg vacuum.
◇	57-26	323-1154		99.91 Zr, 0.03 Fe, 0.02 C, and 0.0145 P^{+}.	Corrected for impurities.



THERMAL CONDUCTIVITY -- ZIRCONIUM

REFERENCE INFORMATION

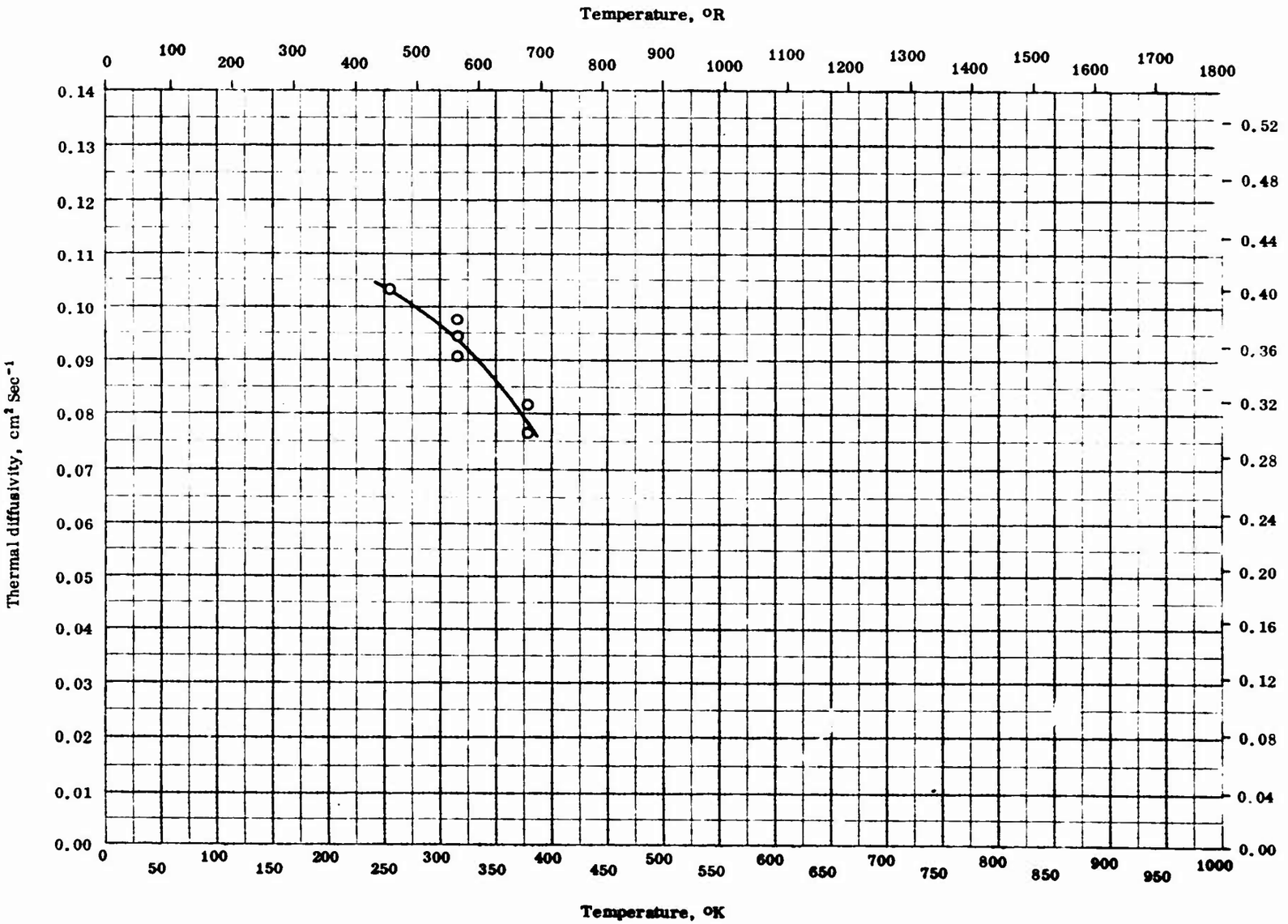
Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	55-2	323-953	±2		Ingot, single melted.
□	53-6	323-673		WAPD Grade I crystal bar; low Hf.	Arc-melted; measured in A atm.
△	53-6	323-673		Bur. Mines sponge.	Same as above.
▽	51-4	402-639		Crystal bar; lot No. D-151 from Argonne Nat'l. Lab.; assumed to be pure.	
◁	57-11	331-920		Iodide process Zr (99.9).	Annealed 8 hrs at 700 C in vacuum.
▷	57-11	332-881		0.14 Hf, and 0.08 C.	Annealed 2 hrs at 700 C in vacuum and water-quenched.
◇	57-6	326-861		From Bureau of Mines; density 98-100% theo.	
●	51-5	323-573	±3	0.04 Hf, Fe each, 0.02 N_2, 0.007 Ti, 0.001 Sn, Al each.	Arc-melted ingot of crystal bar; forged at 1250 F.
■	51-5	323-573	±3	99.84 Zr, 0.16 Ta, 0.10 Fe, 0.06 Al, 0.02 C, 0.015 N_2, and 0.005 Ti.	
◧	56-12	373		Crystal bar; containing Hf.	
▼	59-12	294-590		Prepared by direct hydriding of wrought reactor grade; no hydrogen atoms.	
◀	59-12	478-923		Same as above except 2.16 x 10^{22} hydrogen atoms per cm^3.	
▶	59-12	294-812		Same as above except 2.70 x 10^{22} hydrogen atoms per cm^3.	
◆	59-12	367-923		Same as above except 2.89 x 10^{22} hydrogen atoms per cm^3.	
◑	59-12	701-1145		Same as above except 3.92 x 10^{22} hydrogen atoms per cm^3.	

(Continued onto next page)

THERMAL CONDUCTIVITY -- ZIRCONIUM (continued)

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
◧	59-12	294-812		Same as above except 4.00 x 10^{22} hydrogen atoms per cm^3.	
▲	59-12	701-1033		Same as above except 4.10 x 10^{22} hydrogen atoms per cm^3.	
▲	59-12	590-1145		Same as above except 4.89 x 10^{22} hydrogen atoms per cm^3.	
◈	61-13	484-1925		99.95 Zr, 0.029 Fe, 0.017 C, 0.0045 Hf, and all others <0.031	Sample in disc form.
◐	61-12	311-1011		No. 715; 0.1 O_2, 0.043 C, 0.018 Fe, 0.0075 N_2, and 0.007 Al and Nb.	Extruded graphite melted Zr.



THERMAL DIFFUSIVITY -- ZIRCONIUM

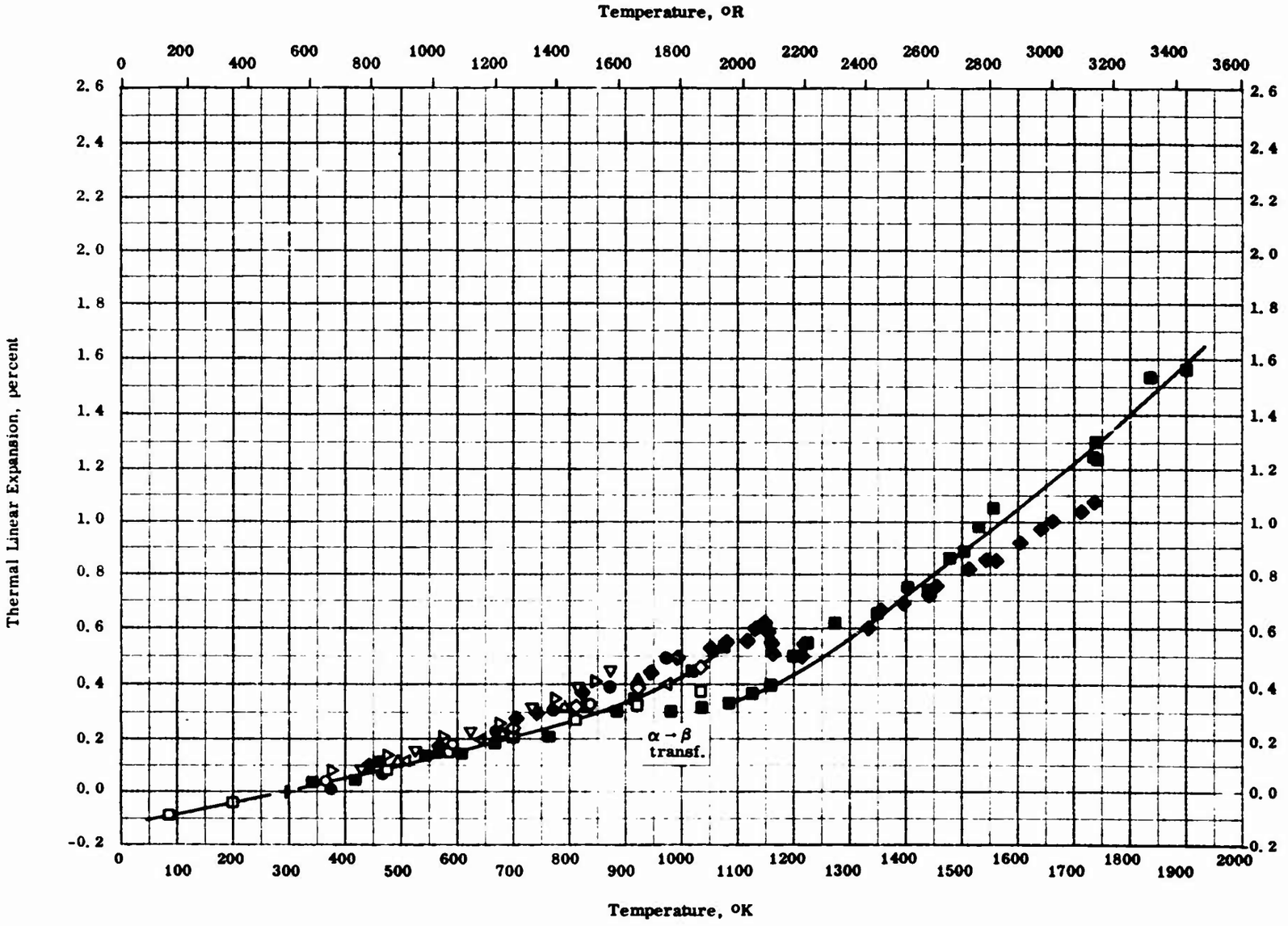
TPRC

1109

THERMAL DIFFUSIVITY -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	54-1	254-376	±6.8		



THERMAL LINEAR EXPANSION -- ZIRCONIUM

TPRC

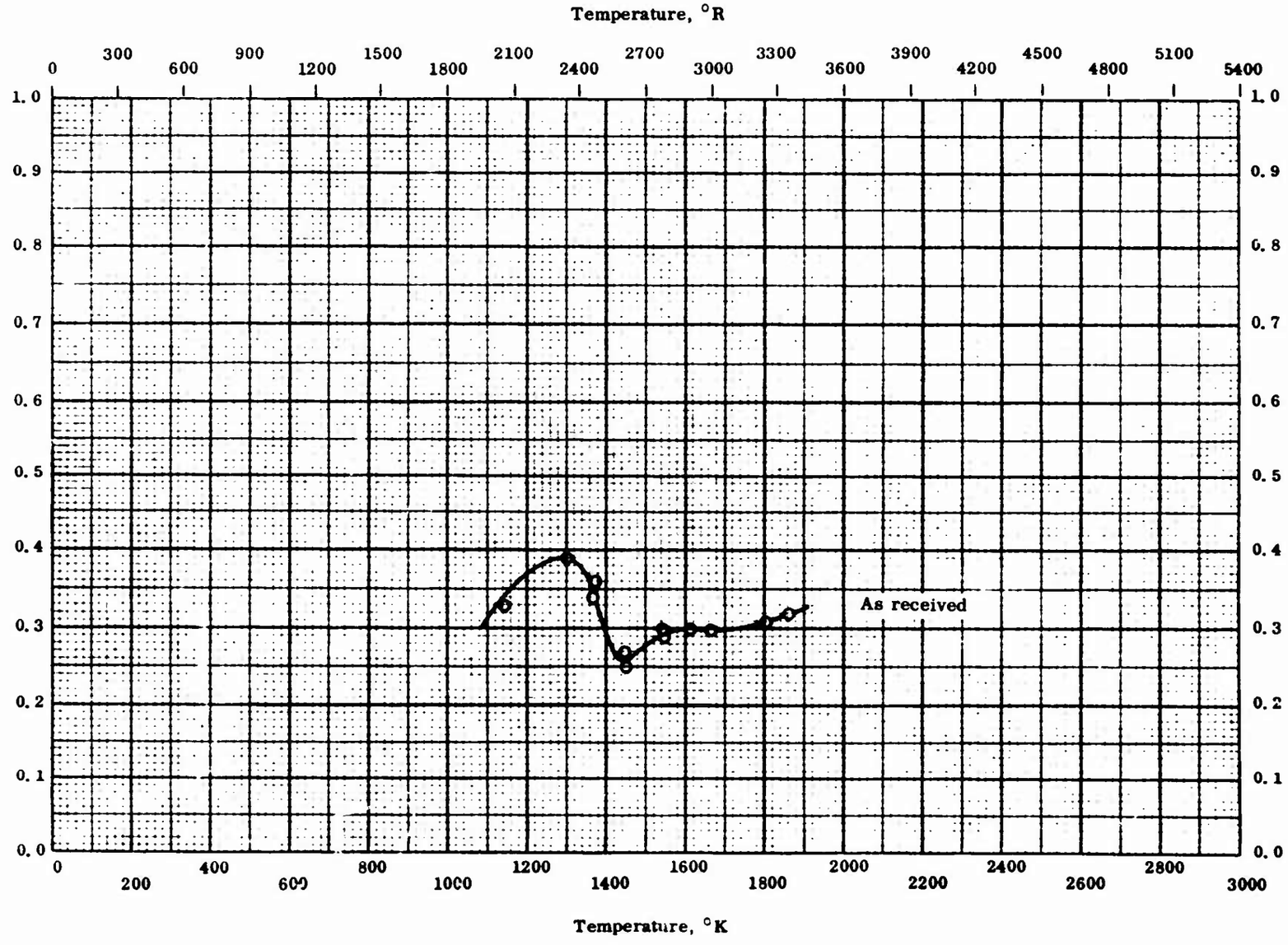
Thermal Linear Expansion, percent

THERMAL LINEAR EXPANSION -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	57-9	297-839		Not given.	
□	51-20	91-1033		0.062 Hf, 0.032 O, 0.024 Si, 0.011 Al, 0.004 Fe, < 0.003 Ti.	Cold swaged from iodide crystal bar free from second phase.
◇	51-20	478-1033		Same as above.	Same as above except annealed.
△	51-20	478-1033		0.024 Hf, 0.019 Si, 0.007 Fe, < 0.005 Al, Ti each.	As deposited iodide crystal bar.
▽	54-38	272-889		α - Zr; hexagonal closed packed; 0.026 C, 0.025 Fe, 0.013 O, < 0.01 Hf, 0.0035 Al, 0.0025 Ti, < 0.01 V, < 0.009 others.	Annealed; x-ray diffraction method.
▷	52-38	303-843		Not given.	Mechanically pulverized grade C sponge Zr hydride powder (-325 mesh), pressed at 75 tsi, and sintered 10 hrs at 1270 C in vacuum.
◁	58-26	298-978		Not given.	Expansion measured after several thermal cycles.
●	60-62	298-973		Crystal bar.	
■	61-13	294-1900		99.95 Zr, 0.029 Fe, 0.017 C, 0.0045 Hf, and 0.031> others; density 6.49 g cm^{-3}.	Phase change at about 1500 F.
◆	64-30	293-1736	< 3	Not given.	Prepared by iodide method; annealed at 1450 C for 1-1/2 to 2 hrs; measured at pressure not exceeding 1 to 2 x 10^{-5} mm Hg.

TPRC

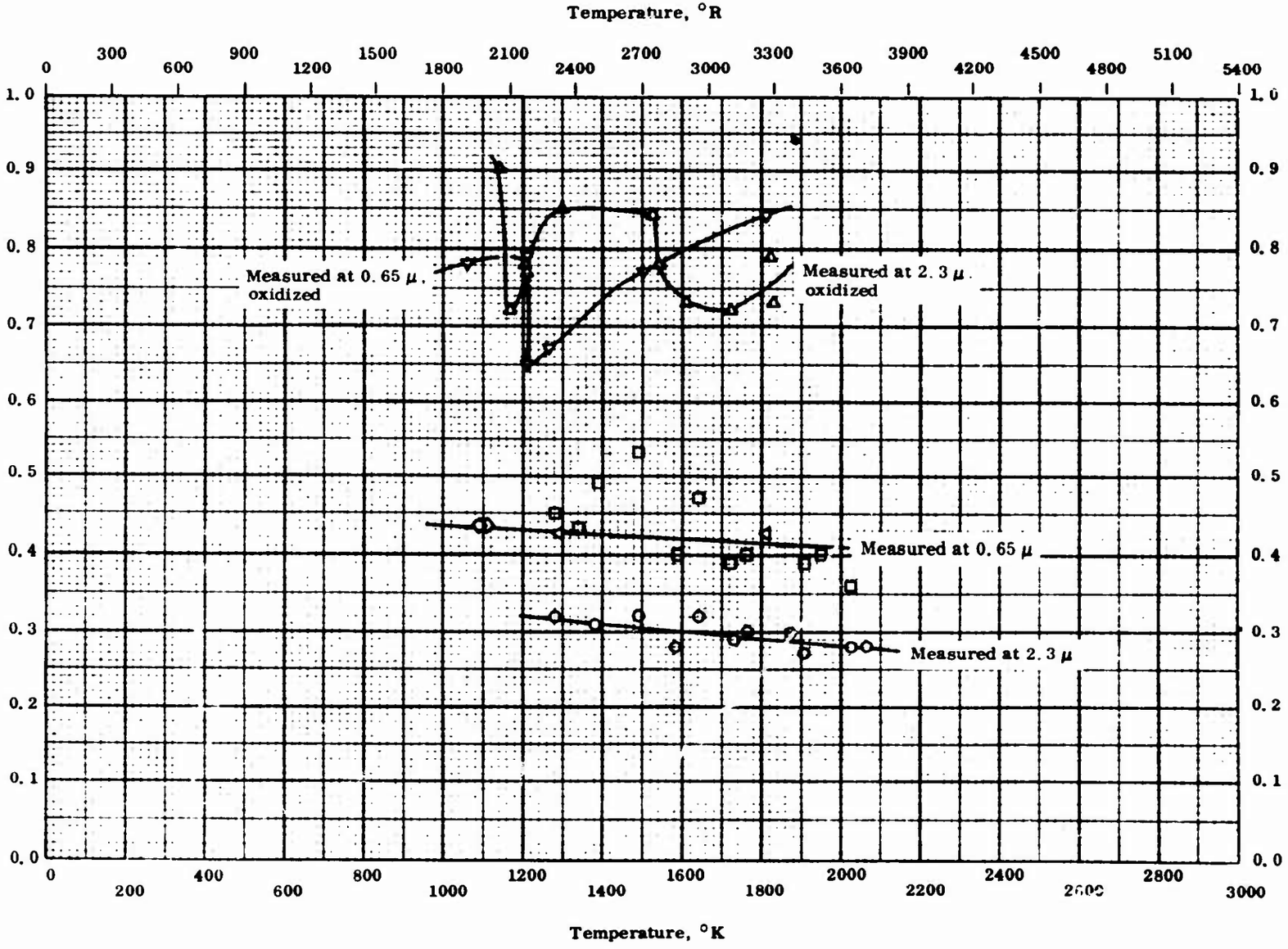


NORMAL TOTAL EMITTANCE -- ZIRCONIUM

NORMAL TOTAL EMITTANCE -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
O	63-30	1144-1866		Not given.	As received.



Normal Spectral Emittance

Normal Spectral Emittance

NORMAL SPECTRAL EMITTANCE -- ZIRCONIUM

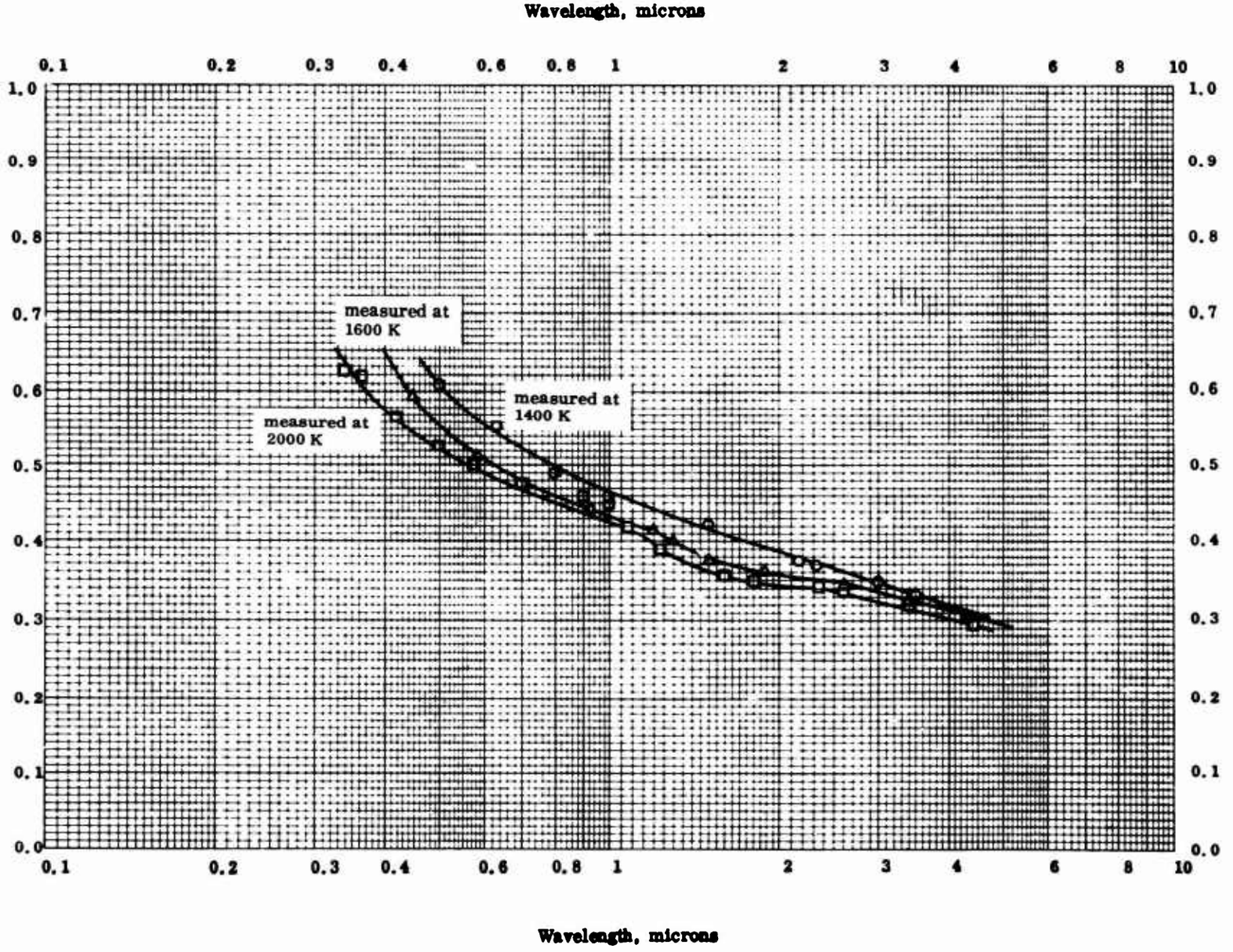
TPRC

1115

NORMAL SPECTRAL EMITTANCE -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Wavelength μ	Temp. Range °K	Rept. Error%	Sample Specifications	Remarks
○	60-54	2.3	1283-2063		Not given.	Measured in argon with low moisture content and 13% oxygen.
△	60-54	2.3	1143-1833		Not given.	Oxidized.
□	60-54	0.65	1283-2023		Not given.	Measured in argon with low moisture content and 13% oxygen.
▽	60-54	0.65	1063-1813		Not given.	Oxidized.
◇	50-10	0.65	1093-1113	2.3	0.36 Fe, 0.17 N_2, 0.13 Si, 0.075 O_2, 0.048 C, 0.02 Ni, and 0.002> Mg, hexagonal.	
◁	50-10	0.65	1293-1813	2.3	Same as above except body center cubic.	

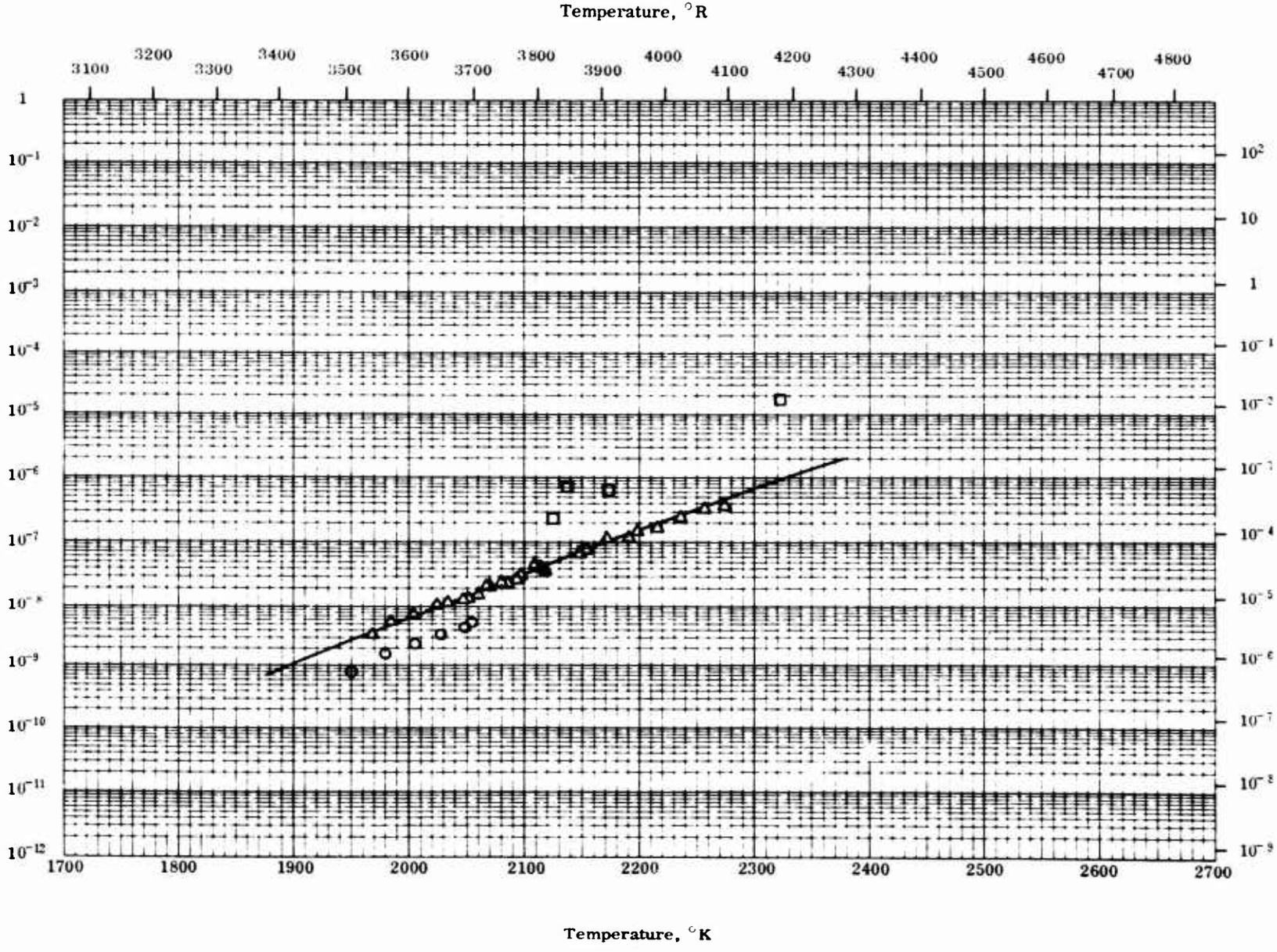


NORMAL SPECTRAL EMITTANCE -- ZIRCONIUM

NORMAL SPECTRAL EMITTANCE -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. °K	Wavelength Range, μ	Rept. Error%	Sample Specifications	Remarks
○	63-24	1400	0.5-4.3		99.9 pure.	Polished to an optically smooth surface, washed and dried; measured in vacuum (10^{-6} mm Hg); data taken from smooth curve.
△	63-24	1600	0.45-4.3		Same as above.	Same as above.
□	63-24	2000	0.34-4.4		Same as above.	Same as above.



VAPOR PRESSURE -- ZIRCONIUM

VAPOR PRESSURE -- ZIRCONIUM

REFERENCE INFORMATION

Symbol	Ref.	Temp. Range °K	Rept. Error %	Sample Specifications	Remarks
○	51-15	1949-2054		0.02 Hf, 0.0001 W, and 0.001 of other impurities including Si and Al.	
□	ND-1	2137-2322		Not given.	
△	62-11	1968-2274		Not given.	

REFERENCES

1911

1. Coblentz, W. W. Natl. Bur. Standards Bull., 87, 197-225.

1915

1. Burgess, G. K. and Waltenberg, R. G., Natl. Bur. Standards Bull., 11, 591-605.

1919

1. Konno, S., Sci. Repts. Tohoku Imp. Univ., 8, 169-79.
2. Weniger, W. and Pfund, A. H., Phys. Rev., 14, 427-33.

1920

1. Konno,S., Phil. Mag., 40, 542-52.

1925

1. Smith, A. W., Ohio State Univ. Studies Eng. Exp. Sta. Bull., No. 31.

1929

1. Coblentz, W. W. and Stair, R., J. Research, Natl. Bur. Standards, 2, 343-54.

1931

1. Bailey, L. C., Proc. Roy. Soc. (London), A134, 57-76.

1932

1. Jaeger, F. M., Rosenbohm, E., and Botlema, J. A., Proc. Acad. Sci. (Amsterdam), 35, 772-9.

1933

1. Kannuluik, W. G., Proc. Roy. Soc. (London), A141, 159-68.

1934

1. Jaeger, F. M. and Veenstra, W. A., REC Trav. Chim., 53, 677-87.

2. Wulff, J., J. Opt. Soc. Amer., 24, 223-6.

1935

1. Whitney, L. V., Phys. Rev., 48, 458-61.

1936

1. Moser, H., Phys. Z., 37 (21), 737-53.

1938

1. Taylor, C. S., Willey, L. A., Smith, D., and Edwards, J. D., Metals and Alloys, 7 (8), 189-192.

1939

1. Taylor, C. S. and Edwards, J. D., Heating, Piping, and Air-Conditioning, 11(1), 59-63.

2. Stephens, R. E., J. Opt. Soc. Am., 29(4), 158-61.

1940

1. Hase, R., Heierberg, R., and Walkenhorst, W., Aluminum, 22, 631-5.

2. Sochtig, H., Ann. Physik, 38, 97-120.

3. Jaeger, F. M., Rosenbohm, E., and Zuithoff, A. J., Rec. Trav. Chim., 59, 831-56

4. Awberg, J. H. and Griffiths, E., Proc. Roy. Soc. (London), 174 A, 1-15.

5. Erfling, H. D., Ann. Physik, 37, 162-8.

6. Stockdale, D., J. Inst. Metals, 66 (8), 287-310.

1941

1. Osborn, R. H., J. Opt. Soc. Am., 31, 428-32.

2. Schneider, A. and Stoll, E. K., Z. Elektrochem, 47, 519-26.

3. Johnson, B. K., Proc. Phys. Soc. (London), 53, 258-64.

4. Jaeger, F. M. and Rosenbohm, E., Proc. Acad. Sci. Amsterdam, 44, 144-52.

1941 (Continued)

5. Hidnert, P., J. Res. Natl. Bur. Standards, 26( ), 81-91, Res. Paper No. 1361.
6. Giauque , W. F. and Meads, P. F., J. Am. Chem. Soc., 63, 1897-1901.
7. Keesom, B. K. and Desirant, M., Physica, 8, 273-88.
8. Esser, H. and Eusterbrock, H., Arch. Eisenhuttenwesen, 14, 341-55.
9. Nix, F. C. and MacNair, D., Phys. Rev., 60, 597-605.
10. Richards, J. W., Univ. Microfilms (Ann Arbor, Mich.) Publ. No. 276, 1-30.
11. Richards, J. W., Am. Soc. Metals, Preprint, 51, 10.

1942

1. Cleaves, H. E. and Hiegel, J. M., J. Res. Natl. Bur. Standard (Res. paper No. 1472), 28, 643-67.
2. Erfling, H. D., Ann. Physik., 41, 100-2.
3. Goetz, A. and Holser, A., Trans. Electrochem. Soc., 82, 1-6.
4. Wahlin, H. B. and Wright, R., J. Appl. Phys., 13, 40-2.
5. Cherton, R., Bull. Soc. Roy. Sci. Liege, 11, 203-9.
6. Wilson, A.J.C., Proc. Phys. Soc., 54 (6),487-91.

1943

1. Cox, M., Phys. Rev., 64, 241-7.
2. Powell, H. and Evans, E. J., Phil. Mag., 34 (230), 145-61.
3. Seybold, A. U., USAEC Publ. AECD-2434, also LADC-141, 1-10.
4. Chicago Univ., Metallurgical Lab., USAEC Publ. CT-422, 1-37.

1944

1. Mikryukov, V. E. and Rabotonov, S. N., Uchen. Zapiski Moskov Ordena Lenia Gosudarst. Uni. M. V. Lomonosova, 74, 167-79.
2. Kratz, H. R. and Raeth, C. H., Univ. of Chicago, Metall. Lab., USAEC Rept. CP-2315, 1-14.
3. Buerschaper, R. A., J. Appl. Phys., 15, 452-4.
4. Schuman, R. and Garrett, A. B., J. Am. Chem. Soc., 66, 442-4.

1945

1. Powell, R. W., Great Brit. Natl. Phys. Lab., England, BR-669, 1-13.

2. Battelle Memorial Inst., USAEC, Rept. CT-2700, 1-50.

3. Geller, R. F. and Yavorsky, P.J., J. Res. Natl. Bur. Standards, 34 (4) , 395-401.

4. Cueilleron, J., Compt. Rend., 221 (23), 698-9.

5. Keller, W. H. et. al., USAEC Publ. CT-2951, 1-20.

6. Russell, H. W., Nelson, H. R., and Grenel, L. H., USAEC Publ. CT-2983, 1-28.

7. Friend, S., USAEC Publ. CN-3053, 1-6.

8. Atlee, Z. J., Modern Metals, 1, 7-8.

9. Demarquay , J., Compt. rend., 220 (2), 81-3.

1946

1. Kelley, K. K., Naylor, B. F., and Shomate, C. E., U.S. Bur. Mines Tech. Paper, USBM Tech. paper 686, 1-34.

2. Awbery, J. H., Challoner, A. R., Pallister, P. R., and Powell, R. W., J. Iron Steel Inst. (London) 154 (2), 83-111.

3. Pierrey, J., Compt. rend., 223, 501-3.

4. Krishnan, R. S., Proc. Indian Acad. Sci., 24 A 33-44.

1947

1. Bidwell, C.C. and Hogan, C. L., J. Appl. Phys., 18, 776-9.

2. Neubert, R. J., Royal, J., Van Dyken, A. R., ANL-4022, 1-57.

3. Argonne Natl. Lab., USAEC Publ. ANL 4000, 1-127.

4. Moore, G. E. and Kelley, K. K., J. Am. Chem. Soc., 69, 2105-7.

5. Ginnings, D. C. and Corruccini, R. J., J. Res. Natl. Bur. Standards, 39, 309-16.

6. Dahl, A. I. and Van Dusen, M. S., J. Res. Natl. Bur. Standards, 39, 53-8.

7. Ebert, H. and Schulze, A., Metallforschung, 2, 46-9.

8. Balz, G., Metallforschung., 2, 144-6.

9. Barnes, B. T., Forsythe, W. E., and Adams, E. Q., J. Opt. Soc. Am., 37(10), 804-7.

10. Price, D. J., Proc. Phys. Soc. (London), 59, 118-31.

11. Van Dusen M.S. and Dahl, A. I., Science, 106, 428-9.

12. Argonne Natl. Lab., USAEC Publ. ANL-4185 (Del.), 1-145.

1948

1. Holden, R. J., Speiser, R., and Johnson, H. L.,J. Am. Chem. Soc., 70, 3897-9.
2. Brewer, L., Gilles, P. W., and Jenkins, F. A., J. Chem. Phys., 16, 797-807.
3. Trice, J. B., Neely, J. J., and Teeter, C. E., NEPA 816-SCR-28, 1-12.
4. Nemilov, V. A. and Rudnitsky, A. A., Izvest. Sekt. Platiny., 234-8.
5. Wahlin, H. B., Phys. Rev., 73, 1458-9.
6. Blackman, M.,Egerton, A., and Truter, E. V., Proceedings of the Royal Soc., A194, 147-69.
7. Dunkle, R. V. and Gier, J. T., Univ. Calif., Berkeley, Dept. of Engn., ONR, 1-24.[ATI 91560]
8. Bueche, F., J. Opt. Soc. Am., 38, 806-10.
9. Brewer, L., J. Chem. Phys., 16, 1165-6.
10. Ames Lab., USAEC Publ. ISC-25,1-35.
11. Wilson, A. S. and Rundle, R. E., USAEC Publ.AECD-2046, 1-8.
12. Fine, M.E. and Ellis, W. C., Bell. Tel. System Tech. Publ. Monograph B-1547, 1-13 (See Met. Abs., 15, 569).
13. Greiner, E. S. and Ellis, W. C., Metal Technol. AIMME Tech.Publ. No. 2466, 15, 1-9.

1949

1. Garth, R. C. and Sailer, V. L., USAEC Publ.BNL-69, 1-18.
2. Blocher, J. and Campbell, I. E., J. Am. Chem. Soc., 71, 4040 -2.
3. Brewer, L. and Mastick, D. F., USAEC Publ. URCL-534, 1-20.
4. Simpson, O. C., Thorn, R. J., and Winslow, G. H., ANL., AECD-2680, 1-85.
5. Pallister, P. R., J. of Iron and Steel Inst., 161, 87-90.
6. Bender, Z. Metallkunde, 40, 257-60.
7. Fisher, D. H., USAEC Rept. NEPA-905, 1-28.
8. Justi, E., Z. Naturforsch. 4A (7), 472-4.
9. Pearson, G. L. and Bardeen, J., Phys. Rev., 75, 865-83.
10. Potter, E. V., Lukens, H. C., and Huber, R. W., J. Metals, 1, (7), 399-404.
11. Putley, E. H., Proc. Phy. Soc., 62, 284-92.
12. Best, G., J. Opt. Soc. Am., 39, 1009-11.
13. Carpenter, L. G. and Reavell, F. R., Nature, 163, 527.
14. Worner, H. W., Metallurgia, 40 (236). 69-76.
15. Ehrlich, P., Z. Anorg. Chem., 259, 1-41.
16. Dahl, A. I. and Cleaves, H. E., J. Res. Natl. Bur. Standards, 43, 513-7.

1949 (Continued)

17. Dahl, A. I. and Cleaves, H. E., USAEC Publ. AECD-2541, 1-8.

18. D'Eye, R.W.M. AERE C-R 425, 1-6.

19. Litton, F. B. and Gonser, B. W., Metal Progress, 44, 346-7.

20. Wilson, A. S. and Rundle, R. E., Acta Cryst., 2, 126-7.

21. Carlile, S. J., Christian, J. W., and Hume-Rothery, W., J. Inst. Metals, 76 (2), 169-94.

22. Fried, S., USAEC Publ. NNES, 143, 1085.

23. Wilhelm, H. A. and Carlson O. N., USAEC Publ. AECD-2717, 1-20.

24. Tucker, C. W. Jr., USAEC Publ. AECD-2716, 1-17.

25. Wilhelm, H.A. and Chiotti, P., USAEC Publ. AECD-2718, 1-22.

26. Pierrev, J., Ann. Chim., 12(4), 133-95.

27. Kurnakov, N. N. and Troneva, M. Ya., Doklady Akad Nauk, SSSR, 68, 73-6.

28. Kochanovaka, A., Physica, 15, 191-6.

1950

1. Mizushima, S., Proc. Fujihara Mem. Fac. Eng. Keio Univ., 3, 70-4.

2. Erway, N. D. and Simpson, O. C., J. Chem. Phys., 18, 953-7.

3. Spelser, R., Johnston, H. L., and Blackburn, P., J. Am. Chem. Soc., 72, 4142-3.

4. Edwards, J. W., Johnston, H. L., and Blackburn, P. F. ,OSU Cryogenic Lab., USAEC Publ. NP-1933, Tech. Rept. No. 6, 1-15.

5. Marshall, A. L. and Norton, F. J., J. Am. Chem.Soc., 72, 2166-71.

6. Armstrong, L. D. and Grayson-Smith, H., Can. J. Res., 28A (1), 51-59.

7. Chiotti, P., USAEC Publ. AECD-3072, 1-61.

8. Cook, L. A., Castlemen, L. S., and Johnson, W. E., Naval Reactor Program, 1-20. [AD 81 744]

9. Myers, R. T., Metallurgia, 21, 301-4.

10. Bradshaw, F. J., Proc. Phys. Soc. (London), B63 573-7.

11. Kubaschewski, O., Z. Metallk., 41, 445-51.

12. Kubaschewski, O., Brizgys, P., Huchler, O., Jauch, R., and Reinartz, K., Z. Elektrochem., 54, 2750-88.

13. Allendorfer, A., Z. Naturforsch, 5a (4), 234-5.

14. Westrum, E. F. Jr. and Eyring, L., USAEC Publ. AEC-2980, ANL-EFW-37, PC-1235, 1-13.

15. Yamamoto, M., Sci. Rept. Res. Inst. Tohoku Univ. Ser. A2 , 871-7.

16. Cubicciotti, D., USAEC Publ. NP-1899, Tech. Rept. 6, II, 1-17.

1950 (Continued)

17. Johnson, P. D., J. Am. Ceram. Soc., 33, 168-71.

18. Greenaway, H. T., Johnstone, S.T.M., and McQuillan, M. K., J. Inst. Metals, 80, 109-14.

19. Wallman, J. C., Crane, W. W. T., and Cunningham, B. B., USAEC Publ. AECD-2912, 1-4.

20. Carlson, C. N., USAEC Publ. AECD-3206, ISC-102, 1-72.

21. Mass. Inst. of Tech., USAEC Publ. MIT-1052, I, 1-74.

22. Gordon, P. and Kaufmann, A. R., USAEC Publ. AECD-2683, 1-41.

23. Andrew, J. H., Lee, H., Chang, P. L., Fang, Guenot, R., Brookes, P. E., Bourne, L., Wilson, D. V., Bhat, U. V., and Lloyd, H. K., J. Iron Steel Inst. (London), 165, 145-84 and 369-95.

1951

1. Sidles, P. H. and Danielson, G. C., USAEC, ISC-198, 1-23

2. Bungardt, W. and Kallenback, R., Z. Metallkunde, 42, 82-91.

3. Parkinson, D. H., Simon, F. E., and Spedding, F. H., Proc. Roy. Soc., A207, 137-55.

4. Vianney, L. R., DIC Project 6627, 1-6. [AD 140 931; PB 123 175]

5. Bing, G., Fink, F. W., and Thompson, H. B., USAEC Publ. BMI-65, 1-19.

6. Marsh, L. L. Jr. and Keeler, J. R., USAEC, BMI-76, 1-16.

7. Edwards, J. W., Johnston, H., and Blackburn, P. E., USAEC Publ. NP3057.

8. Carpenter, L. G. and Mair, W. N., Proc. Phys. Soc. (London), B64, 57-66.

9. Hall, L. D., J. Am. Chem. Soc., 73, 757-60.

10. Edwards, J. W. and Johnson, H. L., J. Am. Chem. Soc., 73, 4727-9.

11. Brewer, L. and Searcy, A. W., J. Am. Chem. Soc., 73, 5308-14.

12. Wessel, G., Z. Physik, 130, 539-48.

13. Searcy, A. W., USAEC Publ. UCRL-1404, 1-10.

14. Edwards, J. W., Johnston, H. L., and Blackburn, P. E., J. Am. Chem. Soc., 73, 172-4.

15. Skinner, G. B., Edwards, J. W., and Johnston, H. L., J. Am. Chem. Soc., 73, 174-6.

16. Edwards, J. W. and Johnston, H. L., J. Am. Chem. Soc., 73, 4729-32.

17. Redfield, T. A. and Hill, J. H., USAEC, ORNL-1087, 1-9.

18. Johnston, H. L., Hersh, H. N., and Kerr, E. C., J. Am. Chem. Soc., 73, 1112-7.

19. Ginnings, D. C., Douglas, T. B., and Ball, A. F., J. Am. Chem. Soc., 73, 1236-40.

20. Adenstedt, H. K., Am. Soc. Metals Preprint, 1-19.

21. Fine, M. E., Greiner, E. S., and Ellis, W. C., J. Metals, 191, 56-8.

22. Fox, G. W., Caldwell, W. C., Carlson J. F., et al., USAEC Publ. ISC-175, 1-34.

1951 (Continued)

23. Horn, F. H., Phys. Rev., 84, 855-6.

24. Lampson, F. K., USAEC Publ. NEPA-1860, 1-9.

25. Thomas, H., Z. Physik, 129, 219-32.

26. Searcy, A. W., USAEC Publ. UCRL-1403, 1-10.

27. Greenaway, H. T., Australia Dept. Supply, Aeronaut. Res. Labs., Rept. No. Sm-163, 1-11.

28. Kalish, H. S., Hausner, H. H., and Angier, R. P., SEP-44, 1-32.

29. Gebbardt, E. and Dorner, S., Z. Metallkunde, 42, 353-8.

30. Hoard, J. L., J. Am. Chem. Soc., 72, 1892-3.

31. Cubicciotti, D., J. Am. Chem. Soc., 73, 2032-5.

32. Zachariasen, W. H., USAEC Publ. ANL-4632.

33. Russell, R. B., USAEC Publ. MIT-1073, 1-41.

34. Isobe, M., Sci. Rep. Res. Inst. Tohoku Univ., 3 (A), 78-81.

35. Crane, W. W. T., USAEC Publ. AECD-3161, 1-34.

36. McPherson, D. J. and Hansen, M., USAEC Publ. COO-30, 1-21.

37. Brewer, L. and Mastick, D. F., J. Chem. Phys., 19, 334-43.

38. Sellers, P., Fried, S., Elson, R., and Zachariasen, W., USAEC Publ. AECD-3167, 1-10.

39. Burdick, M. D., Zweig, B., and Moreland, R. E., J. Res. Natl. Bur Standards, 47, 35-40.

40. Apblett, W. R. and Pellini, W. S., Am. Soc. Metals Preprint (2W), 1-15.

41. Edwards, J. W. Speiser, R., and Johnston, H., J. Appl. Phys., 22 (4), 424-8.

1952

1. Goglia, M. J., Hawkins, G. A., and Deverall, J. E., Anal. Chem., 24, 493-6.

2. Mikol, E. P., Engineering Experimental station, College of Engineering, U. of Alabama, 1-7, (Reprint of Oak Ridge Natl. Lab. Rept. ORNL-1131, Tech. Rept. No. 2)

3. Deem, H. W. and Nelson, H. R., USAEC, BMI-745, 7-15.

4. Euler, J., Naturwissenschaften, 39, 568-9.

5. Ames Lab., USAEC Publ. ISC-299, 1-26.

6. McCabe, C. L., and Birchenall, C. E., Tech. Rept. Nov. 53 (Reprint from J. of Metals, 707-9) 1-3. [AD 56030]

7. Edwards, J. W., Johnston, H. L., and Blackburn, P. E., J. Am. Chem. Soc., 74, 1539-40.

8. Broom, T., Proc. Phys. Soc., 65B, 871-81.

9. Glaser, F. W., Arhiter, W., Ford, M. J., and others, Summary prog. Rept. USN Contr. No. -ONR-256, 1-146.

TPRC

1952 (Continued)

10. Rinck, E., Compt. rend., 234, 845-7.

11. Weiner, L., Chiotti, P., and Wilhelm, H. A., USAEC Publ. ISC-305, 1-82. [AD 18 042]

12. Sully, H., Brandes, E. A., and Waterhouse, R. B., Brit. J. of Appl. Phys., 3, 97-101.

13. Lund, H. and Ward, L., Proc. Phys. Soc. (London), B65, 535-40.

14. Powers, R. M. and Wilhelm, H. A., USAEC Publ. ISC-228, 1-165. [AD 18838].

15. Lenning, G. A., Craighead, C. M., and Jaffee, R. I., BMI, Summary Rept. No. 1, 1-64. [AD 7533]

16. Thewlis, J., Acta Cryst., 5, 790-4.

17. Straumanis, M. E. and Aka, E. Z., J. Appl. Phys., 23 (3), 330-4.

18. Elliott, R. O. and Tate, R. E., LA-1390, 1-20.

19. Weeks, J. L. and Seifert, R. L., USAEC Publ. ANL-4938, 1-14.

20. Wittig, F. E., Z. Metallkunde, 43(5), 158-61.

21. Johnson, R. G., Hudson, D. E., and Spedding, F. H., ISC-293, 1-107. [AD 28 259]

22. Searcy, A. W., J. Am. Chem. Soc., 74, 4789-91.

23. Greiner, E. S., J. Metals, 4(10), 1044.

24. Doehaerd, Th., Goldfinger, P., and Waelbroeck, F., J. Chem. Phys., 20, 757.

25. Farber, M. and Darnell, A. J., J. Am. Chem. Soc., 74, 3941-2.

26. Leontis, T. E., J. Metals, 4, 287-94.

27. Hirabayashi, M., Nippon-Kinzoku-Gakkai-Shi., 16, 295-300.

28. Mass. Inst. of Tech., USAEC Publ., MIT-1086, 1-105.

29. Gibson, E. D., Loomis, B. A., and Carlson, O. N., Trans. Amer. Soc. Metals, 50, 1-22.

30. Zachariasen, W. H., USAEC Publ., AECD-3336 (also ANL-FWHZ-199 and ANL-4788).

31. Juel, L. H., USAEC Publ. AECD-3751, 1-33.

32. Murray, J. R., U. S. AEREM/R-2242, 1-38.

33. Geballe, T. H. and Giauque, W. F., J. Am. Chem. Soc., 74, 2368-9.

34. Trombe, F. and Foex, M., Compt. rend., 235 (1), 42-4.

35. Hidnert, P. and Krider, H. S., J. Res. Natl. Bur. Standards, 48, 209-20.

36. Danielson, G. C., Murphy, G., et al., USAEC Publ. ISC-200, 1-120.

37. Danielson, G. C., Murphy, G., Peterson, D., and Rogers, B. A., USAEC Publ. ISC-208, 1-35.

38. Moskowitz, M. and Kates, L. W., USAEC Publ. SEP-91, 1-10, (Under USAEC Contr. No. AT-30-1-Gen-366).

1. Udy, M. C., Shaw, H. L., and Boulger, F. W., Nucleonics, 11 (5), 52-59.

2. Sidles, P. H. and Danielson, G. C., ISC, ISC-311, 1-33. [AD 16 202]

3. Powell, R. W., Phil. Mag., 44, 645-63.

4. Silverman, L., J. Metals, 5, 631-2.

5. Weeks, J. L. and Seifert, R. A., Rev. Sci. Instr., 24 (10), 1054-7.

6. Deem, H. W., USAEC, BMI-849, 1-9.

7. Bates, J. C., RBD (W) / TN-78, (Great Brit.), 1-12. [AD 212 839]

8. Berman, R. and Simon, F. E., Ziman, J., Proc. Roy. Soc. (London), A220, 171-83.

9. Foster, K. W., USAEC MLM-901, 1-9.

10. Searcy, A. W. and McNees, R. A. Jr., Tech. Rept. No. 8, 1-9. [AD 19324]

11. Carniglia, S. C., UCRL-2389, 1-76. [AD 23 277]

12. Ahman, D. H., Iowa State Coll. J. Sci., 27, 120.

13. Edwards, J. W. and Johnson, H. L., J. Am. Chem. Soc., 75, 2467-70.

14. Hersh, H. N., J. Am. Chem. Soc., 75, 1529-31.

15. Sims, C. T., Gideon, D. N., et al, BMI 1-52. [Contr. AF 33(616) 232]. [AD 100 581]

16. Lyubimov, A. P. and Granovakaya, A. A., Zhur. Fiz. Khim, 27, 473-5.

17. Pochapsky, T. E., ACTA Met., 1 (6), 747-51.

18. Chiotti, P., USAEC Publ., ISC-434, 1-24.

19. Domenicali, C. A., Quarterly Progress Rept. No. P-2292-4, 1-9. [AD 5400]

20. Esaki, L., Phys. Rev., 89, 1026-34.

21. Kemper, R.S. and Boyd, C. L., USAEC Publ. HW-28309, 1-9.

22. Kinchin, G. H., Proc. Roy. Soc. (London), A217, 9-26.

23. Legvold, S. and Spedding, F. H., Revs. Mod. Phys., 25, 129-30.

24. Lagrenaudie, J., J. Phys. Radium, 14, 14-18.

25. Pchapsky, T. E., Acta Met., 1, 747-51.

26. Sully, A. H., Brandes, E. A., and Mitchell, K. W, J. Inst. Metals, 81, 585-97.

27. Tyler, W. W. and Wilson, A. C. Jr., Phys. Rev., 89, 870-5.

28. Wyatt, J. L., J. Metals, 5 (7), 903-5.

29. Bloom, F. K., Metal Progr., 63, 67-72.

30. Edwards, J. W., Johnston, H. L., and Ditmars, W. E., J. Am. Chem. Soc., 75, 2467-70.

31. Schofield, T. H. and Bacon, A. E., J. Inst. Metals, 82(4), 167-9.

32. Alliegro, R. A., Coffin, L. B., and Tinklepaugh, J. R., N. Y. State College of Ceramics, Alfred Univ., Quarterly Progr. Rept. No. 5, 1-29. [AD 17 643]

1953 (Continued)

33. Johnson, R. G., Caldwell, W. C., Hudson, D. E., and Spedding, F. H., Phys. Rev., 91, 466.

34. Kojima, T. and Kiguchi, K., J. Electrochemical Soc. Japan, 21, (4), 177-80.

35. Skinner, G. B. and Johnston, H. L., J. Chem. Phsy., 21, 1383-4.

36. White, G. K., Australian J. Phys., 6, 397-404.

37. Trombe, F., Bull. Soc. Chim., France, 1010-2.

38. Sims, C. T., Wyler, E. N., et al., BMI, 1-44 [contr. AF 33(616) 232]. (Incomplete reference citation given in the original handbook).

39. Chupka, W. A. and Inghram, M. G., J. Chem. Phys., 21, 371-2.

40. Chupka, W. A. and Inghram, M. G., J. Chem. Phys., 21, 1313.

41. Levingston, H. L. and Rogers, B. A., USAEC Publ., AECD-3602 and ISC-340, 1-20.

42. Saller, H. A. and Rough, F. A., USAEC Publ., TID-10046, 1-22.

43. Keeler, J. H., USAEC Publ. SO-2512, 1-5.

44. Onstott, E. I., LA-1622 1-8.

45. Wilhelm, H. A., Carlson, O. N., and Lunt, H. E., USAEC Publ. AECD-3603 and ISC-408, 1-22.

46. Farr, J. D., Giorgi, A., et al., USAEC Publ. LA-1545.

47. Mauer, F. A. and Bolz, L. H., Natl. Bur. Standards, NBS Rept. No. 3148, Progress Rept. No. 3, 1-39. [AD 29 676]

48. Finc, M. E., J. Appl. Phys., 24(3), 338-40.

49. Barson, F., Legvold, S., and Spedding, F. H., USAEC Publ. ISC-424, 1-64. [AD 27 154]

50. Resnick, R., Frank, L., and Balluffi, R. W., USAEC Publ. SEP-216, 1-15.

1954

1. McIntosh, G.E., Hamilton, D. C., and Sibbitt, W. L., Trans. ASME, 76, 407-10.

2. Sidles, P. H., USAEC, ISC, TID-5185 (Rev.) (Del.), I, 110-6.

3. Francl, J. and Kingery, W. D., J. Am. Ceram. Soc., 37, 99-107.

4. Krishnan, K. S. and Jain, S. C., Brit. J. Appl. Phys., 5, 426-30.

5. Bell, I. P., UKAEA, RDB(C) TN-101, 1-16.

6. Ames Lab., USAEC Publ. ISC-533, 1-14.

7. Bell, I. P. and Makin, S. M., RDB (C)/ TN-70, 1-17.

8. Tomlin, D. H., Proc. Phys. Soc. (London), B67, 787-94.

9. Douglas, P. E., Proc. Phys. Soc. (London), B67, 783-6.

10. Sims, C. T., Craighead, C. M., Jaffee, R., et al., WADC TR 54-371, 1-138. [AD 48 279]

11. Spedding, F. H. and Daane, A. H., J. Metals, 6(5), 504-10.

12. Picklesimer, M. L., Ph.D. Thesis, The Univ. of Tennessee, 1-106.

13. Hagel, W. C., Pound, G. M., and Mehl, R. F., Metals Res. Lab. Car., 1-103. [AD 39 272]

14. Kraig, R. S., Krier, C. A., Coffer, L. W., Bates, E. A., and Wallace, W. E., J. Am. Chem. Soc., 76, 238-40.

15. Ames, S. L. and McQuillan, A. D., Acta Met., 2, 831-6.

16. Busch, G. and Vogt, O., Helv. Phys. Acta, 27 (3), 241-48

17. Ball, J. G., Robertson, J. A. L., et al., Nature, 173, 534-35.

18. Chiotti, P., J. Electrochem. Soc., 101, 567-70.

19. Faris, F. E. and Hove, J. E., et al., USAEC Publ. NAA-SR-1013, 1-48.

20. Johnson, H. A., Dow Chem. Co., WADC-TR-83, III, 1-37.

21. Lampson, F. K., Rowe, G. H., et al., US AEC Publ. NEPA-1826, 1-10.

22. Meechan, C. J. and Eggleston, R. R., USAEC Publ. NAA-SR-879, 1-11.

23. Meechan, C. J. and Eggleston, R. R., Acta Met., 2, 680-3.

24. Gier, J. T., Dunkle, R. V., and Bevans, J. T., J. Opt. Soc. Am., 44 (7), 558-62.

25. Nelson, R. G. and Kato, H., US Bur. Mines, Rept. Invest. no. 5063, 1-13.

26. Rasor, N. S. and Smith, A. W., NAA-SR-862, 1-37. [AD 85 006]

27. Rogers, B. A. and Atkins, D. F., USAEC Publ. ISC-500, 1-39.

28. Saller, H. A. and Dickerson, R. F., USAEC, BMI-908, 5-37. [AD 29 367]

29. Oriana, R. A. and Jones, T. S., Rev. Sci. Instr., 25, 248-51.

30. Wilhelm, H. A., Carlson, O. N., and Dickinson, J. M., Trans. Am. Inst. Min. Met. Eng., 200 (8), 915-8.

31. Honig, R. E., J. Chem. Phys., 22, 1610-1.

32. Honig, R. E., J. Chem. Phys., 22, 1610.

33. Maykuth, D. J., Ogden, H. R., Jaffee, R. I., et al., 1-94. (Incomplete reference citation given in the original handbook). [AD 49 904]

34. Finkelshtein, R. N. and Vanshchikova, A. T., Doklady Akad. Nauk. SSSR, 98, 781-2.

35. Sims, C.T., Gideon, D.N. et al. BMI Quarterly Progr. Rept. No. 7. [AD 33 442]

36. Chupka, W.A. and Inghram, M.G., J. Chem. Phys., 22, 1472.

37. Honig, R.E., J. Chem. Phys., 22, 126-31.

38. Russell, R. B., Trans. Am. Inst. Min. Met. Eng., 200 (9), 1045-52.

39. Carlson, O.N., Kenney, D. J., and Wilhelm, H. A., USAEC Publ. ISC-448, 1-28.

1954 (Continued)

40. Schelton, S. M., Dilling, E. D., et al., USAEC Publ. USBM-C-22, 1-41.

41. Dow Chemical Co., Progress Quarterly Rept. No. 1, II, 1-11. [AD41190]

42. Mauer, F. A. and Bolz, L. H., Natl. Bur. Standards, NBS Rept. No. 3463, Progress Rept. No. 5, 1-22. [AD38644]

43. Bibring, H. and Sevilleau, F., Compt. rend. 238 (9), 1026-8.

44. Mauer, F. A. and Boltz, L. H., Natl. Bur. Standards, NBS Rept. No. 3644, Progress Rept. No. 6, 1-20. [AD46601]

45. Shevlin, T. S. and Hauck, C. A., WADC-TR-54-173, I, 1-51. [AD49092]

46. Lord, W. B. H., Nature, 173, 534-5.

47. Baldwin, E. E., USAEC Rept. No. KAPL-M-EEB-7, 1-14.

1955

1. Powell, R. W. and Tye, R. P., Proc. of the IX th Intern. Congress of Refrigeration, 1, 2083-7.

2. Moss, M., Rev. Sci. Instr., 26, 276-80.

3. Bell, I. P., U. K. Atomic Energy Authority, R. and DB (C) TN-127, 1-10.

4. Eriksen, V. O. and Halg, W., J. Nuclear Energy, 1, 232-3.

5. Dayton, R. W. and Tipton, C. R. Jr., USAEC Publ. BMI-1057 (Del.) 1-70.

6. Semchysen, M. and Barr, R. Q., Summary Rept., Climax Molybdenum Co. of Michigan, Naval Res., Project NR 039-002, contract no. N8onr-78700, Tesk Order N8 onr-78701, 243-6. [AD90229]

7. Rasor, N. S., NAA-SR-1061, 1-23. [AD50086]

8. Brown, A. R. G., Royal Aircraft Estab., Gt. Brit., Rept. No. Met.-87, 1-59. [AD79083]

9. Snyder, T. M. and Kamm, R. L., USAEC Publ. C-192, 1-56. [contract. no. W-7401-Eng-37(A-230)]

10. Sherwood, E. M. et al., J. Electro Chem. Soc., 102, 650-4.

11. Powell, L. S., J. Am. Chem. Soc., 77, 3211.

12. Searcy, A. W. and Freeman, R. D., J. Chem. Phys., 23, 88-90.

13. Chupka, W. A. and Inghram, M. C., J. Phys. Chem, 59, 100-4.

14. Hoch, M., J. Phys. Chem., 59, 97-9.

15. Kornev, Yu. V. and Golubkin, V. N., Fiz. Metal I Metalloved, 1 286-97.

16. Skochdopole, R. E., Griffel, M., and Spedding F. H., J. Chem. Phys., 23, 2258-63.

17. Strittmater, R. C. and Danielson, G. C., USAEC Rept. ISC-666, 1-27. [AD96968]

18. Stull, D. R. and McDonald, R. A., J. Am. Chem. Soc., 77, 5293.

19. Lyubimov, A. P. and Belashchenko, D. K., Sbornik Moskovskogo Instituta Stali., 33, 3-11.

20. Krauss, F. and Warncke, H., Z. Metallkunde, 46, 61-9.

21. Hirano, K., Maniwa, H., and Takagi, Y., J. Phys. Soc. Japan, 10, 909-10

22. Clausius, K. and Losa, C. G., Z. Naturforsch, 10 a, 545-51.

23. Baldwin G. J., Shilts, J. L., and Coomes, E. A., Notre Dame Univ., Ind., 1-18. (contract Nonr-162300). [AD78005]

24. Bridgman, P. W., Proc. Am. Acad. Sci., 84, 111-29.

25. Dauphinee, T. M. and Mooser, E., Rev. Sci. Instruments, 26, 660-4.

26. Domenicali, C. A. and Offei, F. A., J. Appl. Phys., 26, 377-80.

27. Deem, H. W. and Winn, R. A., USAEC, Publ. BMI-1052, 1-8. [AD79192]

28. Herrmann, K. W., Daane, A. H., and Spedding, F. H., USAEC Publ., ISC-702, 1-92.

29. Jette, E. R., J. Chem. Phys., 23, 365-8.

30. Levitas, A., Phys. Rev., 99, 1810-4.

31. Raytheon Mfg. Co., Waltham, Mass. Quarterly Interim Tech. Rept. No. 13, 1-45. (Contract NObsr-57323).

32. Rogers, B. A. and Atkins, D. F., J. Metals, 7, 1034-41.

33. Sims, C. T., Gaines, G. B., et al., Quarterly Progress Rept. No. 12, 1-11. [AD68891]

34. Wang, C. C., Sylvania Elec. Products, Inc., Final Rept. for contract NObsr-63180, 1-41. [AD58414]

35. Zimmermann, F. J., Arthur D. Little, Inc., J. Appl. Phys., 26, 1483-8.

36. Dukes, W. H. and Schnitt, A. (Editors), Bell Aircraft Corp., Buffalo, WADC-TR-55-305, I, 1. [AD98114]

37. Oelsen, W., Rieskamp, K. H., and Oelsen, O., Arch. Eisenhuttenw, 26, 253-66.

38. Sims, C. T., Craighead, C. M., and Jaffee, R. I., J. Metals, 7, 168-78.

39. Wood, J. E. (Ed.) Dow Chem. Co., WADC-TR-55-160, II, 1-27. [AD90584; PB134201]

40. Hall, T. H., J. Phys. Chem., 59, 1144-6.

41. Hassion, F. X., Thurmond, C. D., and Trumbore, F. A., J. Phys. Chem., 59, 1076-8.

42. Petersen, D., Lyon, W., and Keller, W. H., USAEC Publ. TID-5212, 37-40.

43. Blumenthal, B., J. Metals 7 and AIME Trans. 203, 1199-1205.

44. Sims, C. T., Craighead, C. M., and Jaffee, R. I., Trans. Am. Inst. Min. Met., 203 (1), 168-79.

45. Carniglia, S. C. and Cunningham, B. B., J. Am. Chem. Soc., 77, 1451-3.

46. Cunningham, B. B., Proc. Intern. Conf. Peaceful Uses Atomic Energy, Geneva, 7, 225-30.

47. Konobeeyskii, S. T., Conf. Acad. Sci. USSR, Peaceful Uses Atomic Energy, Session Div. Chem. Sci., 207-14.

48. Oelsen, W., Oelsen, O., and Thiel, D., Z. Metallkunde, 46, 555-60.

49. Shevlin, T. S. and Hauck, C. A., J. Am. Ceram. Soc., 38(12), 450-4.

50. Bostrom, W. A., Burkart, M. W., Halteman, E. K., Leggett, R. D., McGeary, R. K., and Padden, T. R., Westinghouse Electric Corp., Atomic Power Div., USAEC Rept. WAPD-127, 1-163.

1955 (Continued)

51. Horn, F. H., Phys. Rev., 97, 1521-25.

52. Matuyama, E., J. Sci. Instr., 32, 229-31.

53. Mokhov, V. M., Agladze, R. I., and Topchiashvili, L. I., Fiz. Metal. I Metalloved, Akad. Nauk. SSR., Ural Filial, 1, 450-4.

54. Mauer, F. A. and Bolz, L. H., Natl. Bur. Standards, WADC-TR-55-473, 1-63. [AD 95329]

55. Lehr, P. and Langeron, J. P., Compt. rend., 241, 1130-3.

1956

1. El-hifni, M. A. and Chao, B. T., Trans. Am. Soc. Mech. Engrs., 78, 813-21.

2. Chiotti, P. and Carlson, O. N., USAEC, ISC-709, 17-22.

3. Lucks, C. F. and Deem, H. W., Battelle Memorial Inst., WADC TR 55-496, 1-65. [AD 97185]

4. Fieldhouse, I. B., Hedge, J. C., et al., Armour Res. Foundation, WADC TR 55-495, I, 1-64. [AD 110404]

5. Mikryukov, V. E., Vestnik Moskov. Univ. Ser. Mat., Mekh., Astron., Fiz. i Khim., 11(2), 53-70.

6. Kuprovsky, B. B. and Gel'd, P. V., Fizika Metallov i Metallovedenie, 3, 182-3.

7. Zolotukhin, G. E., Fiz. Metal i Metalloved. akad Nauk SSSR, 3, 508-12.

8. Fieldhouse, I. B., Hedge, J. C., and Waterman, T. E., ARF, WADC TR 55-495, II, 1-10. [AD 110 526]

9. Rasor, N. S. and McClelland, J. D., WADC TR 56-400, I, 1-53. [AD 118 144]

10. Loewen, E. G., Trans. Am. Soc. Mech. Engrs., 78, 667-70.

11. Saller, H. A., Rough, F. A., and Chubb, W., USAEC Publ. BMI-1068, 1-28.

12. Smith, K. F. and Chiswik, H. H., USAEC Publ. ANL-5339, 1-16.

13. Lang, S. M. and Knudsen, F. P., J. Am. Ceram. Soc., 39 (12), 416-24.

14. Smith, A. W. and Rasor, N. S., Atomic International, NAA-SR-1590, 1-24. [AD 106 065]

15. Noguchi, T. and Miyazaki, Y., TANSO (Carbons), 5, 36-9.

16. Euler, J., Ann. der Physik, 6, 18, 345-69.

17. Jamieson, C. P. and Mrozowski, S., Proc. of the First and Second Conf. on Carbon, 1953, Waverly Press. Inc., Baltimore, 155-66.

18. Neubert, T. J., Royal, J., and Van Dyken, A. R., ANL, USAEC Publ. ANL-5524. [AD 90739]

19. Rauh, E. G., USAEC Publ. ANL5534, 1-21.

20. Sims, C. T., Craighead, C. M., Jaffee, R. I., Gideon, D. N., Kleinschmidt, W. W., Nexsen, W. E. Jr., Gaines, G. B., Todd, F. C. Peet, C. S., Rosenbaum, D. M., Runck, R. J., and and Campbell, I. E., BMI, WADC-TR-54-371, Suppl. 1, 1-79. [AD 97301; PB 121 653]

21. Rea, J. A., M. S. Thesis 1949, Oklahoma A. and M. Coll., Stillwater, 1-52. [AD 94417]

22. Pawel, R. E., Ph. D. Thesis, The Univ. of Tennessee, 1-143.

23. North, J. M., Atomic Energy Res. Estab/ GT BRIT/AEREM/R1016, 1-9.

24. Ames, S. L. and McQuillan, A. D., Acta Met., 4, 619-26.

25. Ames, S. L. and McQuillan, A. D., Acta Met., 4 (6), 602-10.

26. Bullock, G., J. Iron Steel Inst., 183, 362-7.

27. Cleary, H. J., Nuclear Metals, Inc., USAEC Publ. NMI-1161, 1-34.

28. Depue, L. A. and Chapin, E. J., Naval Research Lab. Rept. No. 4638, 1-23.

29. Kemp, W.R.G. et al., Australian J. Phys., 9, 180-8.

30. Kanai, Y. and Nii, R., J. Phys. Soc. Japan, 11, 83-4.

31. Law, J. T. and Francois, E. E., J. Phys. Chem., 60(3), 353-8.

32. Munster, A., Sagel, K., and Zwicker, U., Acta Met 4(5), 558-60.

33. Otter, F. A., J. Appl. Phys., 27, 197-200.

34. Pollock, D. D. and Finch, D. I., Trans. Amer. Inst. Min. Met. Eng., 206, 203-10.

35. Yoshida, S. and Tsuya, Y., J. Phys. Soc. Japan, 11, 1206-7.

36. Smith, A. W. and Rasor, N. S. , Phys. Rev., 104, 885-91.

37. Smith, J. F., Carlson, O. N., and Vest, R. W., J. Electro Chem. Soc., 103, 409-13.

38. Sagel, K., Z. Metallkunde, 47 (8).

39. Wessel, E. T., USAEC Publ. AECU-3693, 1-46.

40. Ames Lab., USAEC Publ. ISC-758, 1-37.

41. Ward, L., Proc. Phys. Soc. (London), 69B , 339-43.

42. Betz, H. T., Olson, O. H., Schurin, B. D., and Morris, J.C., ARF, WADC-TR-56-222, I, 1-43. [AD 110 458]

43. Armour Research Foundation, Ill. Inst. of Tech., WADD, 1-8. [AD 122 711]

44. Marple, D. T. F., J. Opt. Soc. Am., 46 (7), 490-4.

45. Lambertson, W. A. and Handwerk, J. H., Argonne Natl. Lab., ANL-5053, 1-48.

46. Deardorff, D. K. and Hayes, E. T., J. Metals, 8, 509-11.

47. Pawlek, F. and Reichel, K., Z. Metallkunde, 47, 347-56.

48. Grigor'ev, A. T., Sokolovskaya, E. M., Budennaya, L. D., Iyutina, I. A., and Maksimova, M. V., Zhur. Neorg. Khim, 1, 1052-63.

49. Oiski, J., Awano, M., and Mochizuki, T., J. Phys. Soc. Japan, 11, 311-21.

50. Collins, F. M., Proceedings of the first and second conf. on carbon, 1953-1955, Waverly Press, Inc., Baltimore, 177-87.

51. James, W. J. and Straumanis, M. E., Acta Cryst., 9, 376-9.

52. Johnson, R. G., Hudson, D. E., Caldwell, W. C., et al., J. Chem. Phys., 25, 917-25.

53. Catterall, J. A., Grogan, J. D., and Pleasance, R. J., J. Inst. Metals, 85, 63-7.

1956 (Continued)

54. Spedding, F. H., Legvold, S., Daane, A. H., and Jennings, L. D., Progress in Low Temperature Phys., 2, 368-94.

55. Samsonov, G. V., Izvest. Sektora. Fiz. Khim. Anal. Inst. Obshchei Neorg. Khim. Akad. Nauk. SSSR., 27, 97-125.

56. Edwards, A. R. and Johnstone, S. T. M., J. Inst. Metals, 84(8), 313-7.

57. Bruch, C. A. and Cashin, W. M., USAEC Publ. KAPL-1564 (Del.), 1-45.

58. Riley, W. C. and Woodruff, E. M., USAEC Publ. HW-43-395, 1-29.

59. Ellinger, F. H., J. Metals, 8, AIME Trans. 206, 8, 1256-9.

60. Lehr, P., Compt. rend., 242, 632-5.

61. Thewlis, J. and Davey, A. R., Phil. Mag., 8 (1), 409-14.

62. Barson, F., Legvold S., and Spedding, F. H., USAEC Publ. ISC-831, 1-71.

63. Lefort, H. G., Spriggs, R. M., and Bennett, D. G., USAEC Publ. WACD Tech. Rept. 55-491.[PB 121 941]

64. Chiotti, P., Hanford Slug Program Semi-annual Summary Res. Rept. for July-December, 1956, 1-19. (Insufficient reference citation from original handbook).

65. Bridge, J. R., Schwartz, C. M., and Vaughan, D. A., J. of Metals, 8, 2, 1282-5.

1957

1. Butler, C. P., and Inn, E. C. Y., USNRDL-TR-177, 1-27. [AD 143 863]

2. Powell, R. W. and Tye, R. P., J. Inst. Metals, 85, 185-95.

3. Przybycien, W. M. and Linde, D. W., USAEC, KAPL-M-WMP-1, 1-24.

4. Sheer, C., Mead, L., Rothacker, D. L., and Johnson, L. H., Vitro Laboratories, WADC TR 57-226, 1-53. [AD 142 093, PB 131 601]

5. Perova, V. I. and Knoroz, L. I., Tsentral. Nauch-Issledovatel. Inst. Tekhnol. i Mashinostroen., 79, 159-74.

6. McCreight, L. R., KAPL, USAEC Publ. TID-10062, 1-19.

7. Tottle, C. R., J. Inst. Metals, 85, 375-8.

8. Stuckes, A. D. and Chasmar, R. P., Rep. Meeting on Semi-Conductors (Phys. Soc.).

9. Rentschler, R. R., Master Thesis, Air Force Inst. of Tech., Air Univ., 1-48.

10. Pearson, G. J., Davey, P. Q., and Danielson, G. C., Proc. Iowa Acad. Sci., 64, 461-5.

11. Mikryukov, V. E., Vestnik Moskov Univ., 12(5), 73-80.

12. Fletcher, J. F. and Snyder, W. A., Am. Ceram. Soc. Bull., 36(3)

13. Clements, J. F. and Vyse, J., Trans. Brit. Ceram. Soc., 56, 296-308.

14. Yosim, S. J. and Milne, T. A., N. Am. Aviation, USAEC Publ. NAA-SR-1797, 1-23. [AD 123 479]

1957 (Continued)

15. Yosim, S. J. and Milne, T. A., Semi-Annual Prog. Rept., 1-37.

16. McCabe, C. L. and Hudson, R. G., Trans. Am. Inst. Min. Met. Engr., 209, 17-9.

17. Burlakov, V. D., Fiz. Metal. i Metalloved, 5, 91-101.

18. Thorn, R. J. and Winslow, G. H., J. Chem. Phys., 26, 186-96.

19. Spedding, F. H., Barton, R. J., and Daane, A. H., J. Am. Chem., 79, 5160-3.

20. Ivanov, L. I. and Matveeva, M. P., Trudy Inst. Met in A. A. Baikova, 1, 104-7.

21. Vintaikin, E. Z., Doklady Akad. Nauk. SSSR, 117, 632-4.

22. Saba, W. G., Sterrett, K. F., Craig, R. S., and Wallace, W. E., J. Am. Chem. Soc., 79, 3637-8.

23. Scott, J. L., ORNL, ORNL-2328, 1-122. [AD 138 838]

24. McElroy, D. L., Ph. D. Thesis, The Univ. of Tennessee, 1-57.

25. Jennings, L. D., Stanton, R. M., and Spedding, F. H., J. Chem. Phys., 27(4), 909-13.

26. Douglas T. B. and Victor, A. C., NBS, WADC-TR-57-374, II, 1-75. [AD 150 128]

27. Bostrom, W. A., WAPD-T-176, 1-13.

28. Chiotti, P. and Carlson, O. N., USAEC Publ. ISC-398 (Del.), 1-32.

29. Durand, R. E. and Klein, D. J., USAEC Publ. NAA-SR-1520, 1-33.

30. Epelboin, I. and Vapaille, A., Compt. Rend., 244, 314-6.

31. Schindler, A. I., Smith, R. J., and Salkovitz, E. I., NRL Rept. No. 4974, 1-6. [AD 138 499]

32. Gebhardt, E. and Seghezzi, H. D., Z. Metallk., 48, 430-5.

33. Gast, Th., Hellwege, K. H., and Kohlhepp, E., Kolloid-Z., 152, 24-31.

34. Greiner, E. S. and Gutowski, J. A., J. Appl. Phys., 28, 1364-5.

35. Gaines, G. B., and Sims C. T., Am. Soc. Testing Materials Proc., 57, 759-69.

36. Harper, A. F. A., et al., Phil. Mag., 2, 577-83.

37. Rudnitskii, A. A. and Polyakova, R. S., Zhur. Neorg. Khim., 2, 2758-61.

38. Spedding, F. H., Daane, A. H., and Herrmann, K. W., J. Metals (9), AIME Trans. (209).

39. White, G. K. and Woods, S. B., Canad. J. Phys., 35, 892-900.

40. White, G. K. and Woods, S. B., Canad. J. Phys., 35, 656-65.

41. Betz, H. T., Olsen, O. H., Schurin, B. D., and Morris, J. C., ARF, WADC-TR-56-222, II, 1-184. [AD 202 493]

42. Fulk, M. M. and Reynolds, M. M., J. Appl. Phys., 28 (12), 1464-7.

43. Allen, F. G., J. Appl. Phys., 28(12), 1510-1

44. Deem, H. W., Elridge, E. A., and Lucks, C. F., BMI-1192, 46-71.

45. Poole, D. M., Williamson, G. K., and Marples, J. A. C., J. Inst. Metals, Paper No. 1813, 86 (4), 172-6.

1957 (Continued)

46. Savitskii, E. M., and Burhkanov, G. S., Zhur. Neorg. Khim., 2, 2609-16.

47. Olette, M., Compt. rend., 244, 1033-6.

48. Brown, A.R.G. and Gates, P.M. R., Tech. Note No. Met. 259, 1-13. [AD 154 781]

49. Pell, E. M., Phys. and Chem. Solids, 3, 77-81.

50. Powell, R.L., Rogers, W. M., and Coffin, D.O., J. Res. Natl. Bur. Standards, Res. Paper 2805, 59, 349-55.

51. Baker, H., Dow Chem. Co., WADC-TR-57-194, II, 1-28. [AD 131034; PB 131436]

52. Zachariasen, W. H. and Ellinger, F., J. Chem. Phys., 27, 811-2.

53. Poole, D. M., Williamson, G. K., and Marples, J.A.C., AERE M/R-2156, HX-2827, 1-18. [AD 156 314]

54. Beard, A.P., Harrison, J.W., and Clark, W.B., USAEC Publ., KAPL-1555, 1-30.

55. Pelzel, E., Metall., 11, 954-9.

56. Ames Lab., Semi-annual Summary Res. Rept. in Phys. for July through December, 1-60. (Incomplete reference citation given by original handbook)

57. Argonne Natl. Lab., USAEC Publ. ANL-5717, 1-67.

58. Oelsen, W., Arch. Eisenhuttenwesen, 28, 1-6.

59. Dies, K., Metall., 11, 933-41.

60. Oak Ridge National Lab., USAEC Publ. ORNL-2413, 1-33.

61. Clausuis, K., Losa, C. G., and Franzosini, P., Z. Naturforsh, 12A, 34-8.

62. Barson, F., Legvold S., and Spedding, F. H., Phys, Rev., 105, 418-24.

63. Skinner, B. J., Am. Minerologist., 42, 39-55.

64. Kingery, W. D., J. Am. Ceram. Soc., 40, 351-2.

65. Mauer, F. A. and Bolz, L. H., NBS Rept. No. 5837, suppl. 1 to WADC-TR-55-473(AD 95 329, 1-47). [AD 155 555]

66. Z. G., Atomnaya Energiya, 3, 272.

67. Waldron, M. B., Atomics, 8, 383-6.

68. Hidnert, P., J. Res. Natl. Bur. Standards, 58, 89-92.

69. Lehr, P. and Langeron, J. P., Rev. Met., 54, 257-69.

1. Lucks, C. F. and Deem, H. W., ASTM Special Tech. Publication No. 227, 1-29.
2. Sheer, C., Fitz, C. D., Mead, L. H., Holmgren, J. D., Rothacker, D. L., and Allmond, D., WADC TR 58-142, 75-96. [AD 205 364]
3. Bode, K. H. and Fritz, W., Z. Angew. Phys., 10, 470-9.
4. Pott, F. P., Z. Naturforsch., 13 a, 215-21.
5. Abdullaev, G. B., Aliev, G. M., and Chetverikov, N. I., Zhur. Tekh. Fiz., 28(11), 2368-71.
6. Fieldhouse, I. B., Hedge, J. C., and Lang, J. I., WADC TR 58-274, 1-79. [AD 206 892; PB-151 583]
7. Deverall, J. E., USAEC, LA-2269, 1-62.
8. Francis, E. L., U. K. Atomic Energy Authorities, IGR-R/R-304.
9. Deem, H. W., Wood, W. D., and Lucks, C. F., Trans. Met. Soc. AIME 212, 520-3.
10. Lucks, C. F. and Deem, H. W., USAEC, BMI-1273, 7-9.
11. Hove, J. E., Ind. Carbon and Graphite Paper Conf., London, 501-10.
12. Sterrett, K. F. and Wallace, W. E., J. Am. Chem. Soc., 80, 3176-7
13. Krauf, F., Z. Metallk, 49 (7), 386-92.
14. Dean, D. J., Kay, A. E., and Lousby, R. G., J. Inst. of Metals, 86(10), 464.
15. Dempsey, E. and Kay, A. E., J. Inst. Metals, 86, 379-89.
16. Butler, C. P. and Inn, E. C. Y., US. Naval Radiological Defense Lab., USNRDL-TR-235, 1-30. [AD 200 857]
17. Backhurst, I., J. Iron Steel Inst., 189, 124-34.
18. McKeown, J. J., Univ. Microfilms Publ. L. C. Card No. MiC 58-2194, 1-113.
19. Wade, W. R., Langley Aeronaut. Lab., Natl. Advisory Comm. Aeronaut. Tech. Note No. 4206, 1-45.
20. Aref, M. N., ASME-AIChE Joint Heat Transfer Conf., Chicago, Ill., Pap. 58-HT-18, 1-15.
21. Olson, O. H. and Morris, J. C., ARF, WADC-TR-56-222, II, suppl. 1, 1-31. [AD 202 494]
22. Bevans, J. I., Gier, J. T., and Dunkle, R. V., Trans. ASME, 80(7), 1405-16.
23. Fried, S., Westrum, E. F. Jr., et al., J. Inorg. Nuclear Chem., 5, 182-9.
24. Wagner, P., Driesner, A. R., and Kmetko, E. A., Second United Nations International Conf. on Peaceful Uses of Atomic Energy, A/Conf. 15/P/702, 1-28. [PB 161 733]
25. Desnoyers, J. E. and Morrison, J. A., Phil. Mag., 3 (25), 42-8.
26. Custer, B. C., Air Force Inst. of Tech., Masters's Thesis (Rept. No. GNE-58-8), 1-44. [AD 157 591]

1. Abeles, B., Bernoff, R., Cody, G. D., Hockings, E. F., and Rosi, F. D., RCA Labs., Princeton, N. J., 1-36. [AD 241 247]
2. Jaffee, R. I., Stanford Research Inst., 80-108. [AD 249 297]
3. Abeles, B., Cody, G. D., and Novak, R., WADC, RCA Labs, 13-33. [AD 225 854]
4. Pankove, J. I., Rev. Sci. Instr., 30(6), 495-6.
5. Kettel, F., J. Phys. Chem. Solids, 10, 52-8.
6. Abeles, B., J. Phys. Chem. Solids, 8, 340-3.
7. Amirkhanov, Kh. I., Bagduev, G. B., and Kazlaev, M. A., Akademiia Nauk SSSR, Doklady, 124 (3), 554-6.
8. Devyatkova, E. D., Moizhes, B. Ya., and Gmirnov, I. A., Fiz. Tverdogo Tela., 1(4), 613-27.
9. Dukes, W. H., Anthony, F. M., and Pearl, H. A., Third Quarterly Progr. Rept., No. 7008-0252-009, Bell Aircraft Corp., (Contract no. AF 33(616)-6034).
10. Glasier, L. F. Jr., Allen, R. D., Saldinger, I. R., Aerojet-General Corp., M-1826.
11. Jenkins, R. J., Parker, W. J., and Butler, C. P., Res. and Development Tech. Rept. USNRDL-TR-348. [AD 226 896]
12. Parker, D. S. and Huffine, C. L., Gen. Elec. Cincinnati, O., USAEC, Rept. APEX-561.
13. National Carbon Co., Parma, O., Buships 1-29. [AD 220 537; PB 162 240]
14. Mikryukov, V. E., Teploprovodnost i Elektroprovodnost Metalov i Splavov, Moscow Metallurgizdat, 1-260.
15. Tret'yakov, Y. D., Troshkina, V. A., and Khomyakov, K. G., Zhur. Neorg. Khur., 4 (1), 5-12.
16. Metkina, Y. A., Atommaya Energiya, 7(2), 163-5.
17. Lyvsternik, V. E., Instr. and Tech. of Expt., (4), 127-9.
18. Hultgren, R. and Land, C., Trans. Met. Soc. AIME, 215(1), 165-6. [AD 216 259]
19. Gul'yaev, P. V. and Petrov, A. V., Fizika Trerdogo Tela, 1 (3), 368-72.
20. Golutvin, Y. M., Russian J. Phys. Chem., 33, (8), 164-8.
21. Clusius, K. and Piesbergen, U., Z. Naturforsch, 14 a (1) 23-7.
22. Flubacher, P., Leadbatter, A. J., and Morrison, J. A., Phil. Mag., 4 (39), 273-94.
23. Allen, R. D., Jet Propulsion Lab., CIT Progress Rept. No. 30-20, 1-17. [AD 235 454]
24. Grenis, A. F. and Levitt, A. P., Watertown Arsenal Labs., Mass., WAL-TR-397.1/2, 1-17. [AD 227 964; PB144 329]
25. Larrabee, R. D., J. Opt. Soc. Am., 49 (6), 619-25.
26. Paine, R. M., Stonehouse, A. J., and Beaver, W. W., WADC-TR-59-29, Pt. II, 1-119. [AD 244 758]

1. Sonnenschein, G. and Winn, R. A., WADC TR 59-273. [AD 236 600]

2. Dennis, J. E., Hirschman, A., Derksen, W. L., and Monahan, T. I., Naval Material Lab., DASA-1187, 1-10. [AD 242 669]

3. Abeles, B., Beers, D., Cody, G., Novak, R., and Rosi, F., WADD TR 60-266, 1-51. [AD 246 620]

4. Taga, M., Bull. JSME, 3, 346-52.

5. Fritz, W. and Bode, K. H., Z. Angew. Phys., 12(3), 121-4.

6. Abeles, B., Cheng, K. L., Cody, G. D., Baughan, B. E., Hockings, E. F., Lindenblad, N. I., and Muha, G. M., RCA Quarterly Progress Rept No. 6, NAVBUSHIPS, 9-12. [AD 245 858]

7. Mrozowski, S., Andrew, J. F., Juul, N., Okada, J., Strauss, H. E., and Wobschall, D. C. Buffalo Univ., N. Y., Carbon Res. Lab., WADC TR 58-360, II, 1-84. [AD 236 663]

8. Slack, G. A. and Glassbrenner, C., Phys. Rev., 120(3), 782-9.

9. Stuckes, A. D., Phil. Mag., 8, 5, 84-99.

10. Oak Ridge National Lab., ORNL-2964, TID-4500, 1-255.

11. Lanbitz, M. J., Canadian J. of Phys., 38, 887-907.

12. Allen, R. D., Glasier, L. F. Jr., and Jorden, P. L., J. Appl. Phys., 31(8), 1382-7.

13. Rasor, N. S. and McClelland, J. D., J. Phys. Chem. Solid, 15, 17-26.

14. Morris, R. G. and Hurst, J. G., Phys. Rev., 124, 1426-30.

15. Lebedev, V. V., Fiz. Metal. i Metalloved, 10(2), 187-90.

16. Parker, D. S., Gen. Elec., Cincinnati, O., USAEC, Rept. APEX-558, 1-25.

17. Lebedev, V. V., Phys. Metals and Metallog. USSR, 10(2), 31-4.

18. Lucks, C. F., Deem, H. W., and Wood, W. D., Am. Ceram. Soc. Bull., 39(6), 313-9.

19. Atomics International Div., North Amer. Aviation, Inc., Canoga Park, Calif., USAEC, NAA-SR-5350.

20. Sutton, W. H., J. Am. Ceram. Soc., 43(2), 81-6.

21. Breckenridge, R. G., (Compiler), Union Carbide Corp., Parma, O., Bu Ships, 1-20. [AD 246 217]

22. Strauss, H. E., Carbon Res. Lab., U. of Buffalo, Proc. 4th Conf. Carbon, Buffalo, 473-81.

23. Spedding, F. H., Daane, A. H., Wakefield, G., and Dennison, D. H., Trans. AIME, 218, 608-11.

24. Wallace, D. C., Sidles, P. H. and Danielson, G. C., J. Appl. Phys., 31(1), 168-76.

25. Spedding, F. H., McKeown, J. J., and Daane, A. H., J. Phys. Chem., 64, 3, 289-94.

26. Lehman, G. W., Atomics International Div., NAA, WADD-TR-60-581, 1-19. [AD 247411]

27. Kantor, P. B., Kisel, A. M., and Formichev, E. M., UKraiv. Fiz. Zhur. 5, 358-62.

28. Kantor, P. B., Krasovitskaya, R. M., and Kisel, A. M. Phys. Metal and Metallog. USSR, 10(6), 42-4. (MCL-950 / 1, 1-6).

29. Jennings, L. D., Miller, R. E., and Spedding, F. H., J. Chem. Phys., 33(6), 1849-52.

1960 (Continued)

30. Fieldhouse, I. B., Lang, J. I., and Blau, H. H., Armour Research Foundation, WADC-TR-59-744, 4, 1-78. [AD 249 166]

31. Beaumont, R. H., Chihara, H., and Morrison, J. A., Phil. Mag., 5, (50), 188-91.

32. Boggs, J. H. and Wiebelt, J. A., Oklahoma State U., Stillwater, USAEC, TID-5734, 1-91.

33. Wallace, D. C., Phys. Rev., 120, 84-8.

34. Wise, S. S., Margrave, J. L., and Altman, R. L., J. Phys. Chem., 64, 915-7.

35. Rasor, N. S., WADC-TR-59-439.

36. Westinghouse Res. Lab., Pittsburgh, Quarterly Progr. Rept. No. 1, US Navy-Bushipe. [AD 244 959]

37. Blau, H. H., Chaffee, E., Jasperse, J. R., and Martin, W. S., Arthur D. Little, Inc., Cambridge, Mass., USAF, AFCRC-TN-60-165, 1-71. [AD 236 394]

38. Fulk, M. M., Reynolds, M. M., and Park, O. E., Advan. Cryog. Engr., 1, Plenum Press, N.Y., 224-9.

39. Lozier, W. W., National Carbon Co., WADC-TR-59-789, 1, 98. [AD 239-259]

40. Coffman, J. A., Kibler, G. M., and Riethof, T. R., GE ARPA, 1-38. [AD 245 223]

41. Anthony, F. M. and Pearl, H. A., Bell Aircraft Corp., Buffalo, N. Y., WADC-TR-59-744, 3, 1-347. [AD 247 110L]

42. Butler, C.P., USNRDL, USNRDL and USAF, USNRDL- TR-483, 1-23. [AD 250 948]

43. Seban, R. A. and Rolling, R. E., Univ. Calif., Berkeley, Inst. of Eng. Research, WADD-TR-60-370, I, 1-110. [AD 270 454]

44. Nelson, J. R. and Crocker, W. C., Convair, ARPA, ZPh-075, Scientific Rept. No. 4, ARPA Order No. 116-60, III-179-186.

45. Plunkett, J. D. and Kingrey, W. D., MIT, Proc. Conf. Carbon, Buffalo 4th 1959, 457-72.

46. Faulkenberry, B. H., Gen. Dynamics/Convair, Navy Bureau of Aeronautics MP-59-191. [AD 606 107]

47. Ziegler, W. T. and Cheung, H., Advan. Cryog, Eng., 2, 100-3.

48. Pratt and Whitney Aircraft, PWA-1877, 1-73.

49. Maki, A. G., Stair, R., and Johnston, R. G., J. Res. Natl. Bur. Standard, 64C (2), 99-102.

50. Serebryakova, T. I., Paderno, Yu. B., and Samsonov, G. V. Optics and Spectroscopy, 8, (3), 212-3.

51. Rudkin, R. L., USNRDL-TR-433, 1-19. [AD 244 211; PB 155 892]

52. Cairns, J. H., J. Sci. Instr., 37(3), 84-7.

53. Rudkin, R. L., Parker, W. J., and Westover, R. W., USNRDL-TR-419, 1-24. [AD 240185L; PB 171 185]

54. Furman, S. C. and McManus, P. A., Gen. Elect. Co., Vallecitos Atomic Lab., USAEC, GEAP-3338, 1-46.

55. Sibley, L. B., Mace, A.E., Grieser, D. R., and Allen, C. M., WADD-TR-60-54, 1-27. [AD 243 897]

56. Pears, C.D. and Neel, D.S., Ceram. Age, 76(5), 30-5.

1960 (Continued)

57. Bradstreet, S. W., Atlas, L. M., Bartz, S.A., Land, H. H., and Nakamura, H. H., Armour Res. Foundation, WADC-TR-59-706, 1-23. [AD 238 026]

58. General Dynamics Corp., General Atomic Div., USAEC, Rept. No. GA-1280, 1-27.

59. Steward, E. G. and Cook, B. P., Nature, 185 (4706), 78-80.

60. Steward, E. G., Cook, B. P., and Kellett, E. A., Nature, 187 (4742), 1015-6.

61. Diefendorf, R. J., General Elec. Res. Lab., Rept. No. GERL-60-RL-2572 M 1-14.

62. Toy, S. M. and Vetrano, J. B., USAEC, NAA-SR-1244, 1-21.

1961

1. Jenkins, R. J. and Parker, W. J., USNRDL, WADD TR 61-95, 1-27. [AD 268 752; PB181 139]

2. Schmidt, D. L., WADD TR 60-862, 1-21. [AD 268 078]

3. Cutler, M, J. Appl. Phys. 32, 6, 1075-82.

4. Parker, W. J., Jenkins, R. J., Butler, C. P., and Abbott, G. L., J. Appl. Phys (U.S.A.) 32 (9), 1679-84.

5. Mrozowski, S., Andrew, J. F., Juul, N., Strauss, H. E., and Wobschall, D. C., Univ. of Buffalo, N. Y., Carbon Res. Lab., WADC TR 58-360, III, 1-54. [AD 258 531]

6. Booker, J., Paine, R. M., and Stonehouse, A. J., Brush Beryllium Co., WADD TR 60-889, 1-133. [AD 265 625]

7. Bode, K. H., Allgem. Warmetech., 10 (7), 125-42.

8. Cutler, M., Snodgrass, H. R., Cheney, G. T., Appel, J., Mallon, C. E., and Meyer, C. H. Jr., USAEC Rept. GA-1939, 1-99.

9. Tye, R. P., J. Less-Common Metals, 3, 202-15.

10. Gunsenyuk, V. S. and Lebedev, V. V., MCL-1165/1 + 2, Fiz. Metal. i Metalloved., 2(1).

11. Powell, R. W. and Tye, R. P., J. Less-Common Metals, 3, 226-33.

12. Powell, R. W. and Tye , R. P., J. Less-Common Metals, 3, 202-15.

13. Fieldhouse, I. B. and Lang, J. I., ARF, WADD TR 60-904, 1-119. [AD 268 304]

14. Gumenyuk, V. S. and Lebedev, V. V., Phys. Metals and Metallog. USSR, 11(1), 30-5.

15. Zegler, S. T. and Nevitt, M. V., USAEC, ANL-6116, 1-50.

16. VanSant, J. H., Gen. Atomics Div., Gen. Dynamics Corp., USAEC Rept. GAMD-2089, 1-21.

17. Anthony, F. M., Merrihew, F. A., Mistretta, A. L. and Dukes, W. H., WADC TR 59-744, I, 1-263. [AD 264 861]

18. National Carbon Corp., USAF, WADD-TN-61-18, 1-98. [AD 266 408]

19. Pappis, J. and Blum, S. L., J. Am. Ceram. Soc., 44(12), 592-7.

1961 (Continued)

20. Paule, R. C. and Margrave, J. L., USAEC Publ. No. TID-13678, 1-15.

21. Hasapis, A. A., Melveger, A. J., Panish, M. B., Reif, L., and Rosen, C. L., AVCO Corp., Quarterly Tech. Summary Rept. No. 5, 1-31. [AD 255 758]

22. Taylor, R. E. and Finch, R. A., NAA-SR-6034, 1-32.

23. Serebryannikov, N. N. and Gel'd, P. V., Izvest. Vysshikh Ucheb. Zavedenii, Tsvetnaya Met., 4 (4), 80-6.

24. Lazareva, L. S., Kantor, P. B., and Kandyba, V. V., Phys. Metals and Metallog. USSR, 11(4), 133-4. (MCL-124B/1, 1-5). [AD 269 639]

25. Kochetkova, N. M. and Rezukhina, T. N., Semiconductor Materials Conference, Moscon, 26-8.

26. Jennings, L. D., Hill, E., and Spedding, F. H., J. Chem. Phys., 34, 2082-9.

27. Hoch, M. and Johnston, H. L., J. Phys. Chem., 65 (5), 855-60.

28. Howse, P. T., Pears, C. D., and Oglesby, S., WADD TR 60-657, 1-137. [AD 260 065]

29. Schweitzer, D. and Singer, R., Brookhaven National Lab., USAEC, BNL-671(S-58), 56-57.

30. Schweitzer, D. and Singer, R., Brookhaven National Lab., USAEC, BNL-696 (S-59), 56-58.

31. Krzhizhanovskii, R. E., Teploenergetika, 8(6), 56-61.

32. Tye, R. P., J. Less-Common Metals, 3, 13-8.

33. Reynolds, P. M., Brit. J. Appl. Phys., 12(3), 111-4.

34. Stierwalt, D. L., Naval Ordance Lab., NavWeps and NOLC, NAVWEPS Rept. 7160 and NOLC Rept. 7160 and NOLC Rept. 537, 1-34. [AD 250 530]

35. Riethof, T. R., Gen. Elec. Co., Space Sci. Lab., Philadelphia, R 61SD004, 1-34. [AD 250 274]

36. Haas, G. and Waylonis, J. E., J. Opt. Soc. Am., 51 (7), 719-23.

37. Nachtrieb, N. H., Tomizuka, C. T., Schulz, L. G., U.S. Dept. Com., Office Tech. Serv., 3.1-3.93. [PB 145 836]

38. Gaumer, R. E., Clauss, F. J., Sibert, M. E., and Shaw, C. C., Lockheed Missiles and Space Div., Sunnyvale, Calif., WADD-TR-60-773, 117-38. [AD 267 310]

39. Butler, C.P., Jenkins, R. L., Rudkin, R. L., and Laughridge, F. I,. US Naval Radiological Defense Lab., USAF, WADD-TR-60-773, 229-52. [AD 267 310]

40. Lockwood, D. L. and Cybulski, R. J., NASA-TN-D-766.

41. Coffman, J. A., Kibler, G. M., Riethof, J. R., and Watts, A. A., WADD-TR-60-646, I., 1-89. [AD 257 747]

42. Abbott, G. L., Alvares, N. J., and Parker, W. J., USNRDL, USAF, WADD-TR-61-94, 1-48. [AD 270 470]

43. Reynolds, T. W. and Kreps, L. W., NASA-TN-D-871, 1-43. [AD 262 047]

44. Code, C. M., IRE Trans on Electron Devices, ED-8, 56-69.

45. Douglass, R. W. and Adkins, E. F., Trans. AIME, 221, 248-9.

1961 (Continued)

46. Lippmann, D. Z. and Stoltenberg, M. P., The Fulton-Irgon Div., Lithium Corp. of Am., N. J., Rept. GT-6009-9, 1-108.

47. Phillips, B., Somiya, S., and Muan, A., J. Am. Ceram. Soc., 44(4), 167-9.

48. Shaffer, P. T. B. and Watts, R. L., Carborundum Co., Niagara Falls, NOrd, 1-40. [AD 268 076]

49. Martens, H. E. and Kotlensky, W. V., JPL, Tech. Rept. No. 32-181, 1-11. (Additional information obtained from author) [AD 267 945]

50. William, D. N., Trans. AIME, 221, 411-2.

51. Zelikman, A. N., Kislyakov, I. P., and Bal'shin, M. Yu., ASTIA-TT MCL-681/1, 1-210. [AD 256 155]

52. Geiselman, D., Union Carbide Metals Co., Metal Res. Lab., WADD-TR-60-894, 1-54. [AD 268 188]

53. Levingstein, M. A., Gen. Elec. Co., Flight Propulsion Lab., USAF, WADD-TR-60-654, 1-93. [AD 264 223]

1962

1. Taylor, R. E. and Nakata, M. M., WADD Tech. Rept. 60-581, III, 1-12. [AD 285 236]

2. Karagezyan, A. G., Phys. Metals Metalloy (USSR), 12 (4), 39-44. (English translation of Fiz. Metal i Metalloved, 12(4), 507-12, 1961).

3. Deem, H. W. and Wood, W. D., Rev. of Sci. Instr., 33(10), 1107-9.

4. Mrozowski, S., Andrew, J. F., Juul, N., Strauss, H. E., Tsuzuku, T., and Wobschall, D. C., State Univ. of New York at Buffalo, N. Y., Carbon Res. Lab., WADC-TR-360, IV, 1-45. [AD 282006]

5. Martin, J. J., M. S. Thesis, South Dakota School of Mines and Tech., 1-39. [AD 284 751]

6. Hock, M. and Nitti, D. A., Univ. of Cincinnati, ASD-TR-61-528, 1-20.

7. Neel, D. S., Pears, C. D., and Oglesby, S. Jr., Southern Res. Inst., WADD-TR-60-924, 58-201. [AD 275 536; Nb2-12987]

8. Hoch, M. and Vardi, J., ASD-TDR-62-608, I, 1-19.

9. Baratta, F., ARS J., 32, 83-6.

10. Merryman, R. G., Wagner, P., and MacMillan, D. P., Los Alamos Scientific Lab., U. of Calif., LAMS-2725 (TID-4500). (Additional Information obtained from Dr. Wagner).

11. Trulson, O. C. and Goldstein, H. W., Union Carbide Res. Inst., Quarterly Progr. Rept. P.III-16. [AD 274 186]

12. Pattee, H. E. and Evans, R. M., DMIC, DMIC memo. No. 153, 1-21. [AD 278 193]

13. Savitskii, E. M., Terekhova, V. F., Burov, I. V., Markov, I. A., and Naumkin, O. P., Publishing House of The Acedamy of Science, USSR, Moscow. (Translated by the U. S. Joint Publication Res. Services, N. Y. AEC-tr-6151).

1962 (Continued)

14. Birkebak, R. C., Hartnett, J. P., and Eckert, R. G., ASME Second Symposium on Thermophysical Properties, Princeton, N. J., 563-74.

15. Yurkov, V. A. and Ivoninskaya, L. A., Izv. Vysshikh Vchebin. Zavedenii. Fiz. (1), 138-43.

16. Kendall, W. B., Orr, R. L., and Hultgren, R., J. Chem. Eng. Data, 7, 1, 516-8.

17. Victor, A. C., J. Am. Chem. Phys., 36, 1903-11.

18. Schmidt, E. O. and Leidenfrost, W., ASME Second Symp. on Thermophysical Properties, Princeton, N. J., 178-84.

19. Rudkin, R. L., Parker, W. J., and Jenkins, R. J., Temp. Meas. Control Sci. Ind., 2,3, 523-34.

20. Masuda, Y., Sci. Rept. Res. Inst., Tohoku Univ., 14 (3), 156-64.

21. Kraftmakher, Y. A., Zhur. Prikl. Mekhan i Tekhn. Fiz., 1962 (5), 176-80.

22. Kirillin, V. A., Sheindlin, A. E., and Chokhovskoi, V. Y., Tepoenergetika, 9 (2), 63-6.

23. Kirillin, V. A., Sheindlin, A. E., and Chekhovskoi, V. Ya., Proc-Acad. Sci. USSR, Phys. Chem. Sect., 142 (6), 184-6.

24. Kirillin, V. A., Sheindlin, A. E., and Chekhovskoi, V. Y., Int. J. Heat Mass Transfer, 5, 1-9.

25. Kirillin, V. A., Sheindlin, A. E., Chekhovskoi, V. Y., and Petrov, V. A., Doklady Akad. Nauk. USSR., 144 (2), 390-1

26. Hildenbrand, D. L., Theard, L. P., and Potter, N. D., Aeronutronic, Newport Beach, Calif., BuNavWeps, AERO-U-1606, 1-49. [AD 273 792]

27. Raytheon Co., Research Div., Progress Rept. July 1962, 1-11. [AD 282047]

28. Golutvin, Y. M. and Kozlovskaya, T. M., Russian J. Phys. Chem., 36 (2), 183-4.

29. Eichelberger, J. F., Mound Lab., Miamisburg, O., USAEC, MLM-1133, 1-31.

30. Chepkhovskoi, V. Y., Inzh. Fiz. Zh., Akad Nauk Belorussk, SSR, 5 (6), 43-7.

31. Berg, J. R., Spedding, F. H., and Daane, A. H., Ames Lab., Iowa State Univ. of Sci. and Tech., USAEC, IS-3270, 1-35.

32. Barriault, R. J., Bender, S. L., Dreikorn, R. E., Einwohner, R. C., Feber, R. E., Gannon, P. L., Hanst, M. E., Ihnat, M. E. Phaneuf, J. P., Schick, H. L., and Ward, C. H., AVCO Corp., USAF, ASD-TR-61-260, 1, I, 1-404. [AD 278 633]

33. Anderson, P. D. and Hultgren, R., AIME Trans. Met. Soc., 224 (4), 842-5.

34. Powell, R. W., Tye, R. P., and Woodman, M. J., Platimum Metals Rev., 6 (4), 138-43.

35. Pears, C. D., Southern Res. Inst. USAF, ASD-TDR-62-765, 1-420. [AD 298061]

36. General Electric Co., Product Data Sheet 1300-C.

37. Kohlhaas, R. and Richter, F., Arch. Fuer. Das Eisenhuettenw, 33 (5), 291-9.

38. Olsen, C. E. and Elliott, R. O., J. Phys. Chem. Solids, 23, 1225-40.

39. Sirota, N. N., Soviet Phys-Doklady, 7(3), 217-9.

1962 (Continued)

40. Sproull, R. L., Sci. Am., 207 (6), 92-102, 104.

41. Gaumer, R. E, McKellar, L. A., Streed, E. R., Frame, K. L., and Grammer, J. R., ASME Second Symposium on Thermophysical Properties, Princeton, N. J , 575-87.

42. Pears, C. D., ASME Second Symposium On Thermophysical Properties, Princeton, N. J., 558-98.

43. Carpenter, W. G. D. and Sewell, J. H., Royal Aircraft Establishment (GT. Brit.), RAE Rept. CHEM-538, 1-6. [AD 295 648]

44. Grenis, A. F. and Levitt, A. P., Watertown Arsenal Labs., Mass., U. S. Army, WAL-TR-851.2/1, 1-23. [AD 276 966]

45. Adams, J. G., Northrop Corp., Norair Div., Hawthorne, Calif., NOR-61-189, 1-259. [AD 433 441 and 274 558]

46. Adams, J. G., Northrop Space Labs., Hawthorne, Calif., NSL-62-198, 1-101.

47. Janssen, J., Luck, J., and Torborg, R., Tech. Proc. Am. Electroplaters Soc., 49, 126-32.

48. Seban, R. A., Univ. of Calif., Berkeley, WADD-TR-60-370, II, 1-72. [AD 286 863]

49. Howl, C. D. A. and Davis, A. F., Brit. J. Appl. Phys., 13(5) 223-6.

50. Allen, R. D., ARS J., 32(6), 965-7.

51. Riethof, T. R. and DeSantis, V. J., Space Sci. Lab., Gen. Elect. Co., NASA, NBS, and USAF, NASA-SP-31, 365-84.

52. Schatz, E. A. and McCandless, L. C., Am. Machine and Founday Co., USAF, ASD-TR-62-443, 1-92. [AD 281821]

53. Crowell, C. R., Spitzer, W. G., Hawarth, L. E., and LaBate, E. E., Phys. Rev., 127 (6), 2006-15.

54. Abbott, G. L., Alvares, N. J., and Parker, W. J., U.S. Naval Radiological Defense Lab., WADD-TR-61-94, II 1-31.

55. Storms, E. and McNeal, R., J. Phys. Chem., 66, 1401.

56. Nassau, K. and Broyer, A. M., J. Am. Ceram. Soc., 45 (10), 474-8.

57. Aramaki, S. and Roy, R., J. Am. Ceram. Soc., 45 (5), 229-42.

58. Raytheon Co., Research Div., Progress Rept. July 1962, 1-11. [AD 282 047]

1963

1. Rudkin, R. L., Parker, W. J., and Jenkins, R. J., ASD-TDR-62-24, 1-20. [AD 297 836; NASAN63-13636]

2. Taylor, R. E. and Nakata, M. M., Atomics International, ARPA, 1-16. [AD406098]

3. Kraev, O. A. and Stel'makh, A. A., High Temperature, 1 (1), 5-8. (English translation of Teplofizika Vysokikh Temperature 1, 8-11.)

4. Mustaechi, C. and Giuliani, S., Joint Nuclear Res. Center, Ispra Establishment, Italy, EURATOM EUR 337.e, 1-27.

TPRC

1963 (Continued)

5. Juul, N., Sato, S., and Strauss, H. E., State Univ. of New York at Buffalo, Progress Rept. No. 17, 1-10. [AD405 540]

6. Mrozowski, S., Andrew, J. F., Juul, N., Sato, S., Strauss, H. E., and Tsuzuku, T., State Univ. of New York at Buffalo, WADC TR 58-360, V, 1-68. [AD427 104; N-15068]

7. Jones, T. I., Street, K. N., Scoberg, J. A., and Baird, J., Canadian Met. Quart., 2(1), 53-72.

8. Powell, R. W., Tye, R. P., and Woodman, M. J., J. Less-Common Metals, 5, 49-55.

9. Juul, N., Sato, S., and Strauss, H. E., USAEC NP-12878, 1-11. [AD416276]

10. Sklarew, S. and Albom, M. J., Marquardt Corp., NASA-CR-50404, 1-30.

11. Pike, J. N., Parma Res. Lab., Union Carbide Corp., Res. Rept. No. C-16, NP-12796, 1-27. [AD415 061]

12. Powell, R. W. and Tye, R. P., British J. Appl. Phys., 14, 662-6.

13. Shanks, H. R., Maycock, P. D., Sidles, P. H., and Denielson, G. C., Phys. Rev., 130,1743-8.

14. Lowenthal, G. C., Austral. J. Phys., 16(1), 47-67.

15. Kohlhaas, R. and Braun, M., Archiv fur das Eisenhuttenwesen, 34 (5), 391-9.

16. Kraftmakher, Ya. A., Zh. Prikl. Mekhan. i Tekhn. Fiz. 1963 (2), 158-60.

17. Kirillin, V. A., Sheindlin, A. E., Chekhovskoi, V. I., and Petrov, V. A., Zh. Fiz. Khim., 37 (10), 2249-57.

18. Holland, L. R., J. Appl Phys., 34 (8), 2350-9.

19. Dench, W. A. and Kubaschewski, O., J. Iron Steel Inst., 201 (2), 140-3.

20. Mitacek, P. Jr. and Aston, J. G., J. Am. Chem. Soc., 85, 137-41.

21. Hawkins, D. T., Onillon, M., and Orr, R. L., J. Chem. Eng. Data, 8 (4), 628-9.

22. Battelle Memorial Inst., Defense Metal Information Center Rept. No. 191, 1-128. [AD425 547]

23. Anderson, D. L. and Nothwang, G. J., Ames Research Center, Moffett Field, Calif., NASA-TN-D-1646, 1-36.

24. Coffman, J. A., Kibler, G. M., Lyon, T. F., and Acchione, B. D., Gen. Elec. Co., Cincinnati, O., USAF, WADD-TR-60-646, II, 1-183. [AD 297 946]

25. Jenkins, R. J., Butler, C. P., and Parker, W. J., Naval Radiological Defense Lab., USAF, USNRDL-TR-663, SSD-TDR-62-189, 1-57. [AD 419 067]

26. Haury, G. L., Aeronautical System Div., Dir/Materials and Processes, Phys. Lab., ASD-TR-63-146, 1-16. [AD411 140]

27. Kibler, G. M., Lyon, T. F., Linevsky, M. J., and DeSantis, V. J., Gen. Elec. Co., Cincinnati, O., USAF, 1-34. [AD403 529 and 405 520]

28. Seban, R. A., Univ. of Calif, Berkeley, USAF, WADD-TR-60-370, III, 1-68. [AD419 028]

29. Null, M. R. and Lozier, W. W., Union Carbide Corp., Parma, O., WADD-TR-61-72, 21, 1-59. [AD426 665; N64-15578]

30. Konopken, S. and Klemm, R., North Am. Aviation, Inc., NASA, NBS, and USAF, NASA-SP-31, 505-13.

31. Southern Research Inst., Birmingham, Ala., NASA-CR-55073, 1-77. [N64-12156]

32. Carpenter, W. G. D. and Sewell, J. H., R.A.E. Tech. Note CPM-20, 1-9. [AD 418612]

33. Schwartz, H., NASA, Lewis Res. Center, Neclear Tech. Branch, PWA-2309, NASA-CR-58054, 1-83. [N64-26808]

34. Sklarew, S. and Rabensteine, A. S., Marquardt Corp., USAF, PR-281-3Q-1, 1-37. [AD 299417]

35. Abbott, G. L., U S. Naval Radiological Defense Lab., WADD-TR-61-94, III, 1-30.

36. Kirshenbaum, A. D. and Grosse, A. V., USAEC Publ. TID-18951, 1-36.

37. Hildenbrand, D. L., Theard, L. P., Hall, W. F., LaViola, F. S., and Potter, N. D., Res. Lab., Ford Motor Co., Aeronutronic Div., 4th Quarterly Tech. Rept., 1-36. [AD 407005]

38. Pendleton, W. W., ASD-TDR-63-164. [AD 414198]

39. Lowell, C. E., National Carbon Co., WADD-TR-61-72, XXIV, 1-12. [AD427 185]

40. Garber, A. M., Nolan, E. J., and Scala, S. M., General Elec. Co., Missile and Space Div., Rept. No. R63SD84, 1-57. [AD 429731]

41. Richardson, J. H. and Zehms, E. H., Aerospace Corp., Material Sci. Lab., Rept. No. TDR-269 (4240-10)-3, USAF Space System Div. No. SSD-TDR-63-340, 1-23. [AD 427346]

42. Worth, K. and Taylor, J., General Dynamics Corp., General Atomic Div., USAEC, GA-3559, 1-36.

43. Gangopadhyay, A. K. and Margrave, J. L., J. Chem. Eng. Data, 8(2), 201-5.

44. Franzosini, P. and Clusuis, K., Z. Naturforsch, 18a (12), 1243-6.

45. Houska, C. R., Union Carbide Res. Inst., ARPA Tech. Rept. C-17, 1-23. [AD413 534]

46. Gerchikova, N. S., Kolobnev, N. I., Stepanova, M. G., and Fridlyander, I. N., JPRS: 17818, 1-15. [OTS 63-21205]

47. Matveyev, B. I., Kishnev, P. V., Khanova, I. R., JPRS: 17818, 123-8. [OTS 63-21205]

48. Agte, C. and Vacek, J., NASA-TT-F135, 1-293.

1964

1. Godfrey, T. G., Fulkerson, W., Kollie, T. G., Moore, J. P., and McElroy, D. L., USAEC, ORNL-3556, 1-67.

2. Powell, R. W., Cobalt, No. 24.

3. Hoch, M., Univ. of Cincinnati, ML-TDR-64-59, 1-12. [AD601 315]

4. Powell, R. W., Hickman, M. J. and Tye, R. P., Metallurgia, 66, 159-61.

5. Vozzella, P. A., Miller, A. D., and Decrescente, M. A., J. Chem. Phys., 41, 589-90.

6. Martin, J. J. and Sidles, P. H., USAEC Rept. IS-1018, V-D-1-7.

1964 (Continued)

7. Taylor, R. E. and Nakata, M. M., Atomics International, WADD-TR-60-581, IV, 1-109. [AD428669]

8. Bode, K. H., PTB-Mitteilungen, No. 5, 416-20.

9. Westrum, E. F. Jr., Authur D. Little, Inc., ASD-TDR-62-204, III, 1-222. [AD601424]

10. Kay, A. E., Loasby, R. G., and Aldanmaster, A.W.R.E., Phil. Mag , 9(97), 37-49.

11. Dismukes, J. P., Ekstrom, L., Hockings, E., Kudman, I., Lindenlad, N. E., Miller, R. E., Rosi, F. D., and Steigmeier, E. F., RCA, BuShips, 1-100. [AD441794]

12. Backlund, N. G., Thermal Conductivity Conference, National Phys. Lab., Teddington, England.

13. Dull, R. B., Union Carbide Corp., Carbon Products Div., USAF, 1-66. [AD454905]

14. General Electric Co., Third Annual Rept. No. GEMP-270A, 1-159.

15. Kibler, G. M., Lyon, T. F., Linevsky, M. J., and DeSantis, V. J., Gen. Elec. Co., WADD-TR60-646, III, Vol. II, 1-167. [AD438050]

16. Porter, J. and Butler, E. A. W., Royal Aircraft Establishment, Farnborough, England, RAE-TN-S-64, 1-24. [AD447164; N65-20735]

17. Hall, W. M., Jet Propulsion Lab., JPL-TR-32-596, NASA-CR-56037, 1-8. [N64-20604]

18. Kibler, G. M., Lyon, T. F., Linevsky, M. J., and Desantis, V. J., Gen. Elec. Co., Evendale, O., WADD-TR-60-646, IV, 1-141. [AD606836; N65-19549]

19. Cox, J. T., Hass, G., and Ramsey, J. B., U. S. Army R. and D Labs., Fort Belvoir, Va., Proc. 1964 Army Sci. Conf. U.S. Military Acad., West Point, N. Y., 1, 193-205. [AD612134]

20. Aerospace Corp., El Segundo, Calif., ATN-64 (9990) LH-4, 1-14. [AD459907]

21. Reader, A. F., Baehr, E. F., Russell, W. E., and Talisiak, C., NASA SP-5015, I.

22. Dull, R. B., National Carbon Co., WADD-TR-61-72, XXVI, 1-448. [AD602607]

23. Askwyth, W. H., Yahes, R. J., House, R. D., and Mikk, G., Pratt and Whitney Aircraft Div., United Aircraft Corp., NASA, PWA-2206, NASA-CR-56496 (vol. 1), X-64-14692, 1-277.

24. Gebhardt, J. J. and Berry, J. M., General Elec. Co., Tech. Information Series Rept No. R64SD26, 1-31. [AD437144]

25. Howard, R. A. and Racicot, R. L., National Carbon Co., WADD-TR-61-72, Suppl. to XIII, 1-16. [AD602-606]

26. Knibbs, R. H. and Mason, I. B., Nature, 203 (4949), 58-60.

27. Waylett, C. E., Carter, M. B., and Spring, M. A., National Carbon Co., WADD-TR-61-72, XXXI, 1-53. [AD602737]

28. Weast, R. C., Selby, S. M., and Hodgman, C. D., Handbook of Chemistry and Physics, 45th. ed , The Chemical Rubber Co., Cleveland, O., 1964-5.

29. Merryman, R. G., Univ. of Calif., Los Alamos Sci. Lab., USAEC Rept. LA-2687, 1-98.

30. Amonenko, V. M., V'yugov, P. N., and Gumenyuk, V. S., Teplofizika Vysokikh Temperature, 2(1), 29-31.

31. Totskii, E. E., High Temperature, 2(2), 181-9.

1964 (Continued)

32. Crucible Steel Co. of Am., Bull. No. TDS-2001-5M-10/64, 1-20.

1963

1. Wheeler, M. J., Brit. J. Appl. Phys., 16 (3), 365-76.

2. Conway, J. B., and Hein, R. A., Third ASME Symp. on Thermophysical Properties, Purdue U., 131-7.

3. West, E. D. and Ishihara, S., Third ASME Symp. on Thermophysical Properties, Purdue, U. 146-51.

4. Cezairliyan, A., Third ASME Symp. on Thermophysical Properties, Purdue U., 253-63.

5. Powell, R. W., Tye, R. P. Woodman, M. J., Third ASME Symp. on Thermophysical Properties, Purdue Univ., 277-88.

6. Huntington Alloy Div., International Nickel Co., Inc., No. 25 M1-65 S-9.

No Date Given (ND)

1. Chupka, W. A., Berkowitz, J., and Inghram, M. G., in cooperation with Argonne Natl. Lab., sponsored by OOR, 1-12. [AD 107 062]

MATERIAL INDEX

MATERIAL INDEX

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
A																
Acrylics	6-II	1020	1020	-	-	-	-	1022	1024	-	1026	-	-	-	-	-
Actinium (Ac)	1	3	3	3	3	-	-	-	-	-	-	-	-	-	-	5
Aggregates	5	-	-	-	-	-	-	1023	1025	-	-	-	-	-	-	-
AISI 201	3	-	-	-	-	-	-	-	-	-	114	-	-	-	-	-
AISI 202	3	-	-	-	-	-	-	-	-	92	-	-	-	-	-	-
AISI 301	3	145	140	-	-	-	-	159	172	182	203	-	243	274	-	-
AISI 302	3	-	140	-	-	-	-	-	166	186	227	-	236	-	-	-
AISI 302B	3	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AISI 303	3	-	140	-	-	-	151	-	176	-	-	-	236, 245	-	-	-
AISI 304	3	145	140	-	-	-	151	161	-	189	211	-	257, 262	286	-	-
AISI 304L	3	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AISI 305	3	-	140	-	-	-	-	-	-	-	-	-	-	-	-	-
AISI 308	3	-	140	-	-	-	-	-	-	-	-	-	-	-	-	-
AISI 309	3	-	140	-	-	-	-	-	-	193	-	-	-	286	-	-
AISI 310	3	140	141	-	-	-	153	164	180	-	213	-	233	286	-	-
AISI 310 coated with Hastelloy C	6-II	-	-	-	-	-	-	-	-	-	-	-	1337	-	-	-
AISI 310 coated with Hastelloy X	6-II	-	-	-	-	-	-	-	-	-	-	-	1339	-	-	-
AISI 310 coated with Kennametal K-151A	6-II	-	-	-	-	-	-	-	-	-	-	-	1491	-	-	-
AISI 310 coated with Kennametal K-162B	6-II	-	-	-	-	-	-	-	-	-	-	-	1493	-	-	-
AISI 310 coated with spinal enamel	6-II	-	-	-	-	-	-	-	-	-	-	-	1515	-	-	-
AISI 310 coated with strontium titanate	6-II	-	-	-	-	-	-	-	-	-	-	-	1393	-	-	-
AISI 314	3	-	-	-	-	-	-	-	-	-	223	-	-	-	-	-
AISI 316	3	140, 145	141	-	-	-	149	161	174	184	209	229	236, 247, 259, 264	276	-	-
AISI 317	3	-	141	-	-	-	-	-	-	-	-	-	-	-	-	-
AISI 321	3	140, 145	-	-	-	-	-	-	-	186	205	227	236, 249, 259, 266	278	-	-
AISI 321 coated with rinsed-Mason black enamel	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1513	-	-
AISI 321 plated with silver	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1321	-	-
AISI 330	3	-	-	-	-	-	-	-	-	-	213, 407	-	-	-	-	-
AISI 347	3	-	141	-	-	-	149	161	176	186	208	-	251	-	-	-
AISI 403	3	-	53	-	-	-	-	-	79	87	110	-	-	-	-	-
AISI 405	3	-	53	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
AISI 410	3	55	53	-	-	-	-	-	-	87	110	120	122	138	-	-
AISI 414	3	-	-	-	-	-	-	-	-	-	197	-	-	-	-	-
AISI 416	3	-	53	-	-	-	-	-	169	87	110	-	-	-	-	-
AISI 420	3	-	-	-	-	-	-	73	166	87	110, 195	-	-	138	-	-
AISI 422	3	-	-	-	-	-	-	-	-	-	104	-	-	-	-	-
AISI 430	3	-	53	-	-	-	-	73	79	90	-	-	-	138	-	-
AISI 430F	3	-	53	-	-	-	-	-	-	-	-	-	-	-	-	-
AISI 431	3	-	-	-	-	-	-	-	-	-	197	-	-	286	-	-
AISI 440A	3	-	53	-	-	-	-	-	-	-	112	-	-	-	-	-
AISI 440B	3	-	53	-	-	-	-	-	-	-	112	-	-	-	-	-
AISI 440C	3	-	53	-	-	-	-	-	81	-	112	-	-	-	-	-
AISI 446	3	55	53	-	-	-	59	67, 73	79	94	98	120	124, 131	138	-	-
AISI 446 coated with aluminum oxide coating	6-II	-	-	-	-	-	-	-	-	-	-	-	1349	-	-	-
AISI 446 coated with Rokide A coating	6-II	-	-	-	-	-	-	-	-	-	-	-	1351	-	-	-
AISI 611	3	-	-	-	-	-	-	-	-	-	452	-	-	-	-	-
AISI 612	3	-	-	-	-	-	-	-	-	-	353	-	-	-	-	-
AISI 613	3	-	-	-	-	-	-	-	-	-	353	-	-	-	-	-
AISI 650	3	-	-	-	-	-	-	-	-	-	401	-	-	-	-	-
AISI 660	3	-	-	-	-	-	-	-	-	-	401	-	-	-	-	-
AISI 661	3	-	-	-	-	-	-	-	-	-	219	-	-	-	-	-
AISI 662	3	-	-	-	-	-	-	-	-	-	401	-	-	-	-	-
AISI 663	3	-	-	-	-	-	-	-	-	-	401	-	-	-	-	-
AISI 664	2-II	-	-	-	-	-	-	-	-	-	1265	-	-	-	-	-
AISI 665	3	-	-	-	-	-	-	-	-	-	401	-	-	-	-	-
AISI 681	2-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
AISI 682	2-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
AISI 690	2-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
AISI C1006	3	-	-	-	-	-	-	-	-	329	-	-	-	-	-	-
AISI C1010	3	-	310	-	-	-	312	316	325	329	335	-	-	-	-	-
AISI C1018	3	-	-	-	-	-	-	-	-	333	-	-	-	-	-	-
AISI C1020	3	-	-	-	-	-	-	-	-	329	-	345-347	-	-	-	-
AISI C1045	3	-	-	-	-	-	-	-	-	333	-	-	-	-	-	-
AISI 3140	3	-	-	-	-	-	-	-	-	365	-	-	-	-	-	-
AISI 4130	3	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-
AISI 4340	3	-	-	-	-	-	-	-	387	395	-	-	-	-	-	-
AISI 8630	3	-	-	-	-	-	-	-	-	-	337	-	-	-	-	-
Akermanite	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
Alathon-10	6-II	1030	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alberit 1005	6-II	-	-	-	-	-	1082	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Alberit 8391-80	6-II	-	-	-	-	-	1082	-	-	-	-	-	-	-	-	-
Alcoa	1	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-
Alkali and alkaline earth aluminum borosilicate glass	4-II	-	-	-	-	-	-	-	-	-	1715	-	-	-	-	-
Alkyd-isocyanate foam	6-II	952	-	-	-	-	-	954	956	-	958	-	-	-	-	-
Alumina	4-I	3	3	-	-	3	5	8	11-18	20	22-26	-	28-32	34	37	39
Alumina + Mullite	4-II	-	-	-	-	-	-	-	1534	-	-	-	-	-	-	-
Aluminide coating on niobium	6-II	-	-	-	-	-	-	-	-	-	-	-	1435-1437	1439	-	-
Aluminide coating on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1441-1443	1445	-	-
Aluminide coating on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	1447-1449	1451	-	-
Aluminized-silicone paint on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1497	-	-
Aluminum (Al)	1	7	7	7	7	7	9	11	13	15	17	-	19-23	25	28	30
Aluminum clad boron carbide	5	979	-	-	-	-	-	981	-	-	-	-	-	-	-	-
Aluminum coated with silicon (di-)oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1391	-	-
Aluminum coated with silicon (mon-)oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1389	-	-
Aluminum coating on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1287	-	-
Aluminum, Kaiser	1	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-
Aluminum + ΣX_i	2-II	-	-	-	-	-	-	-	829	831	-	-	-	-	-	-
Aluminum + Beryllium	2-I	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Aluminum + Beryllium + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	729	-	-	-	-	-
Aluminum + Copper	2-I	-	-	-	-	-	5	7	9	-	11	-	-	-	-	-
Aluminum + Copper + ΣX_i	2-II	731	731	731	-	-	733	735	737-739	741	743-752	-	754-757	759	-	-
Aluminum + Iron	2-I	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-
Aluminum + Magnesium	2-I	-	-	-	-	-	15	-	17	-	-	-	-	-	-	-
Aluminum + Magnesium + ΣX_i	2-II	763	763	-	-	-	765	-	767	-	769	-	771	773	-	-
Aluminum + Manganese	2-I	-	-	-	-	-	-	-	-	-	-	-	19-21	-	-	-
Aluminum + Nickel + ΣX_i	2-II	-	-	-	-	-	775	-	778	-	781	-	-	-	-	-
Aluminum + Silicon	2-I	-	-	-	-	-	-	-	-	-	23	-	-	-	-	-
Aluminum + Silicon + ΣX_i	2-II	-	-	-	-	-	783-785	-	788-794	-	796-804	-	-	-	-	-
Aluminum + Silver	2-I	25, 431	-	-	-	25	27	29	-	-	-	-	-	-	-	-
Aluminum + Uranium	2-I	-	-	-	-	-	-	-	31	-	34	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Aluminum + Zinc + ΣX_i	2-II	806	806	806	-	-	809	810	812	814	816	-	818-823	825	-	-
Aluminum alloys (Special designations)																
2S	2-II	-	-	-	-	-	-	-	829	831	-	-	-	-	-	-
14S	2-II	-	-	-	-	-	-	-	739	-	-	-	-	-	-	-
17S	2-II	-	-	-	-	-	-	-	-	-	743	-	-	-	-	-
24S	2-II	731	-	-	-	-	-	735	737	741	745	-	754-757	759	-	-
75S	2-II	806	-	-	-	-	-	810	812	814	816	-	818-823	825	-	-
1075	1	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-
1100	2-II	-	-	-	-	-	-	-	-	831	-	-	-	-	-	-
2024	2-II	731	-	-	-	-	-	735	737	741	745	-	754-757	759	-	-
2219	2-II	-	-	-	-	-	-	-	-	-	-	-	-	759	-	-
3003	2-I	-	-	-	-	-	-	-	-	-	-	-	19-21	-	-	-
6061	2-II	-	-	-	-	-	-	-	-	-	-	-	771	773	-	-
7075	2-II	806	-	-	-	-	-	810	812	814	816	-	818-823	825	-	-
Alpax Gamma	2-II	-	-	-	-	-	785	-	794	-	802	-	-	-	-	-
C-46	2-II	731	731	731	-	-	-	-	-	-	747	-	-	-	-	-
Duralite	2-II	731	731	731	-	-	-	-	739	-	743	-	-	-	-	-
Gamma, γ	2-II	-	-	-	-	-	-	-	-	-	747	-	-	-	-	-
Hydronalium 5	2-I	-	-	-	-	-	15	-	17	-	-	-	-	-	-	-
Hydronalium 7	2-II	-	-	-	-	-	765	-	767	-	-	-	-	-	-	-
Hydronalium 51	2-II	-	-	-	-	-	765	-	767	-	-	-	-	-	-	-
L'A-Z5G	2-II	806	806	806	-	-	808	810	812	-	816	-	-	-	-	-
Lo-Ex	2-II	-	-	-	-	-	785	-	794	-	798	-	-	-	-	-
RAE 40C	2-II	-	-	-	-	-	775	-	778	-	781	-	-	-	-	-
RAE 47B	2-II	-	-	-	-	-	775	-	778	-	781	-	-	-	-	-
RAE 47D	2-II	-	-	-	-	-	775	-	778	-	-	-	-	-	-	-
RAE 55	2-II	-	-	-	-	-	775	-	778	-	781	-	-	-	-	-
RAE 470	2-II	-	-	-	-	-	-	-	-	-	781	-	-	-	-	-
RAE SA1	2-II	-	-	-	-	-	785	-	792	-	798	-	-	-	-	-
RAE SA44	2-II	-	-	-	-	-	785	-	792	-	798	-	-	-	-	-
RR50	2-II	-	-	-	-	-	783	-	-	-	796	-	-	-	-	-
RR50C	2-II	-	-	-	-	-	-	-	788	-	-	-	-	-	-	-
RR53C	2-II	-	-	-	-	-	783	-	788	-	796	-	-	-	-	-
RR59	2-II	-	-	-	-	-	733	-	739	-	745	-	-	-	-	-
RR77	2-II	-	-	-	-	-	808	-	812	-	816	-	-	-	-	-
RR131D	2-II	-	-	-	-	-	765	-	767	-	769	-	-	-	-	-
Thermafond C3-INA	2-II	731	731	731	-	-	-	-	739	-	743	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Aluminum alloys (Special designations) (cont.)																
Y	2-II	-	-	-	-	-	733	-	739	-	-	-	-	-	-	-
Aluminum antimonide (AlSb)	6-I	-	-	-	-	-	45	47	-	-	49	-	-	-	-	-
Aluminum borate ($2Al_2O_3 \cdot B_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1035
Aluminum borides																
AlB_{10}	6-I	-	160	-	-	-	-	-	-	-	-	-	-	-	-	-
AlB_{12}	6-I	-	160	-	-	-	162	-	-	-	-	-	-	-	-	-
Aluminum bubbles - graphite fibers composite system	6-II	-	-	-	-	-	-	-	1279	-	-	-	-	-	-	-
Aluminum carbide (Al_4C_3)	5	-	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum carbide + Aluminum oxide	5	-	-	-	-	-	-	803	-	-	-	-	-	-	-	-
Aluminum-chromium-molybdenum cermets	6-II	930	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum fluoride (AlF_3)	5	407	407	-	-	407	-	-	-	-	-	-	-	-	-	-
Aluminum-nickel-titanium cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum niobate ($Al_2O_3 \cdot Nb_2O_5$)	4-II	-	1121	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum nitride (AlN)	5	481	481	-	-	-	-	483	485	-	487	-	489-491	493	-	-
Aluminum oxides																
Aluminum oxide (Al_2O_3)	4-I	3	3	-	-	3	5	8	11-18	20	22-26	-	28-32	34	37	39
38-900	4-I	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-
AD-85	4-I	-	-	-	-	-	-	-	-	-	-	-	637	-	639	-
AD-94	4-I	-	-	-	-	-	-	-	-	-	-	-	637	-	639	-
AD-96	4-I	-	-	-	-	-	-	-	-	-	-	-	32	-	37	-
AD-99	4-I	-	-	-	-	-	-	-	-	-	-	-	32	-	37	-
AD-995	4-I	-	-	-	-	-	-	-	-	20	-	-	32	-	-	-
AP-30	4-I	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-
AP-35	4-I	-	-	-	-	-	-	-	-	20	-	-	32	-	37	-
AV-30	4-I	-	-	-	-	-	-	-	-	-	-	-	32	-	37	-
FS-54	4-I	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-
GD-10	4-I	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-
Gulton HSB	4-I	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-
LA-603	4-I	-	-	-	-	-	-	-	-	-	-	-	28-30	-	-	-
RA-4213	4-I	-	-	-	-	-	-	-	-	-	-	-	28-30	-	-	-
TWA 2, A402	4-I	-	-	-	-	-	-	-	-	-	-	-	32	-	-	-
Wesgo Al-300	4-I	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-
Aluminum oxide foam	4-I	-	-	-	-	-	-	-	18	-	26	-	-	-	-	-
Aluminum oxide reinforced by molybdenum fibers	6-II	-	-	-	-	-	-	-	1261	-	1263	-	-	-	-	-

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Aluminum oxide coating on AISI 446	6-II	-	-	-	-	-	-	-	-	-	-	-	1349	-	-	-
Aluminum oxide + ΣX_i	4-I	-	-	-	-	-	-	-	-	-	635	-	637	-	639	-
Aluminum oxide + Aluminum cermet	6-II	-	-	-	-	-	-	-	-	-	729	-	-	-	-	-
Aluminum oxide + Aluminum silicate	4-II	-	-	-	-	-	-	-	1534	-	-	-	-	-	-	-
Aluminum oxide + Beryllium oxide + Magnesium oxide . . .	4-I	-	-	-	-	-	-	-	-	-	599	-	-	-	-	-
Aluminum oxide + Chromium cermet	6-II	731	-	-	-	-	-	-	911	-	733	-	735	-	-	-
Aluminum oxide + Chromium (sesqui-) oxide	4-I	-	-	-	-	-	601	-	-	-	603	-	605	-	-	-
Aluminum oxide + Chromium + + Molybdenum cermet	6-II	737	-	-	-	-	-	-	-	-	739	-	-	-	-	-
Aluminum oxide + Iron cermet .	6-II	-	-	-	-	-	-	-	-	-	741	-	-	-	-	-
Aluminum oxide + Magnesium oxide + Beryllium oxide . . .	4-I	-	-	-	-	-	-	-	-	-	607	-	-	-	-	-
Aluminum oxide + Nickel aluminide	5	-	-	-	-	-	-	-	-	-	-	-	747-749	751	-	-
Aluminum oxide + Nickel (mon-) oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	603	-	-	-
Aluminum oxide + Niobium (pent-) oxide	4-I	-	611	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum oxide + Silicon (di-) oxide	4-I	-	-	-	-	-	613	-	615	-	617	-	619	-	-	-
Aluminum oxide + Silicon (di-) oxide + Titanium (di-) oxide	4-I	-	-	-	-	-	-	-	621	-	-	-	-	-	-	-
Aluminum oxide + Thorium (di-) oxide	4-I	-	623	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum oxide + Thorium (di-) oxide + Beryllium oxide .	4-I	-	625	-	-	-	-	-	-	-	627	-	-	-	-	-
Aluminum oxide + Titanium aluminide	5	-	-	-	-	-	-	-	-	-	-	-	753-755	757	-	-
Aluminum oxide + Titanium (di-) oxide + Chromium + + Molybdenum cermet	6-II	-	-	-	-	-	-	-	-	-	-	-	747	-	-	-
Aluminum oxide + Tungsten + + Chromium cermet	6-II	-	-	-	-	-	-	-	-	-	743	-	745	-	-	-
Aluminum oxide + Uranium (di-) oxide	4-I	629	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum oxide + Zirconium (di-) oxide	4-I	-	-	-	-	-	-	-	631	-	-	-	-	-	-	-
Aluminum oxide + Zirconium (di-) oxide + Beryllium oxide .	4-I	-	633	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum phosphate coating on nickel	6-II	-	-	-	-	-	-	-	-	-	-	-	1429	-	-	-
Aluminum phosphide (AlP) . . .	5	-	-	-	-	-	-	627	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Aluminum silicates	4-II	-	-	-	-	-	1187	1189	1191	1193	1195-1197	-	1199-1201	-	1203	-
$Al_2O_3 \cdot SiO_2$	4-II	-	-	-	-	-	-	1189	1191	-	1195	-		-	-	-
$3\,Al_2O_3 \cdot 2\,SiO_2$	4-II	-	-	-	-	-	-	1189	1191	1193	1197	-	1501	-	1203	-
Aluminum silicate + Aluminum oxide	4-II	-	-	-	-	-	-	-	1562	-	-	-	-	-	-	-
Aluminum silicate + Magnesium oxide	4-II	-	1564	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum silicate glass	4-II	-	-	-	-	-	-	1675	-	1677	-	-	1679	1681	1683-1685	-
Aluminum titanate ($Al_2O_3 \cdot TiO_2$)	4-II	1368	1368	-	-	-	-	1370	1372	-	1374	-	-	-	-	-
Aluminum titanate, vitreous bonded	5	-	-	-	-	-	949-953	-	-	-	955 977	-	-	-	-	-
Aluminum titanate body	4-II	-	-	-	-	-	-	-	-	-	1374	-	-	-	-	-
Aluminum-vanadium intermetallics (Al_3V)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Alundun	4-I	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-
Americium (Am)	1	32	-	-	-	32	-	-	-	-	-	-	-	-	-	34
Americium fluoride (AmF_3)	5	343	-	-	343	343	-	-	-	-	-	-	-	-	-	345
Analcite	4-II	-	-	-	-	-	-	1324	-	-	-	-	-	-	-	-
Anatase	4-I	445	-	-	-	-	-	454	-	-	-	-	-	-	-	-
Andalusite	4-II	-	-	-	-	-	-	1189	-	-	1195	-	-	-	-	-
Anilin resin	6-II	-	-	-	-	-	-	1078	-	-	-	-	-	-	-	-
Anorthite	4-II	-	-	-	-	-	-	1233	-	-	-	-	-	-	-	-
Antimony (Sb)	1	38	36	36	-	-	40	42	44	-	-	-	-	46	-	-
Antimony bismuth telluride ($Sb_{2-x}Bi_xTe_3$)	6-I	-	-	-	-	-	549	-	551	-	-	-	-	-	-	-
Antimony sulfide (Sb_2S_3)	5	-	-	-	-	-	-	643	-	-	-	-	-	645	-	-
Antimony telluride (Sb_2Te_3)	6-I	543	543	-	-	-	545	-	547	-	-	-	-	-	-	-
Antimony telluride + Bismuth telluride	6-I	-	-	-	-	-	705	-	-	-	-	-	-	-	-	-
Antimony telluride + Indium telluride	6-I	-	-	-	-	-	-	-	707	-	709	-	-	-	-	-
Antimony-zirconium intermetallics ($SbZr_2$)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Araldite casting resin 501	6-II	-	-	-	-	-	-	-	-	-	1012	-	-	-	-	-
Armalon 410L	6-II	-	-	-	-	-	-	-	1218	-	-	-	-	-	-	-
Armco iron	1	578	-	-	-	-	581	583	585	587	589	592	594, 598	602	-	-
Armofoam	6-II	962	-	-	-	-	-	-	-	-	966	-	-	-	-	-
Arsenic aluminides																
AsAl	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
As_2Al_3	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic sulfide (As_2S_3)	5	-	-	-	-	-	-	647	-	-	-	-	-	-	-	-
Arsenic telluride (As_2Te_3)	6-I	-	-	-	-	-	-	-	640	-	-	-	-	-	-	-

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B																
Baddeleyite	4-I	-	-	-	-	-	-	-	-	-	585	-	-	-	-	-
Bakelites																
BM-261	6-II	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
BM-704	6-II	-	-	-	-	-	-	-	-	-	998	-	-	-	-	-
BM-3510	6-II	-	-	-	-	-	-	-	-	-	996	-	-	-	-	-
BM-13014	6-II	-	-	-	-	-	-	-	-	-	992	-	-	-	-	-
BM-13080	6-II	-	-	-	-	-	-	-	-	-	994	-	-	-	-	-
BM-13335	6-II	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
BM-14316	6-II	-	-	-	-	-	-	-	-	-	998	-	-	-	-	-
BM-14726	6-II	-	-	-	-	-	-	-	-	-	994	-	-	-	-	-
BM-15140	6-II	-	-	-	-	-	-	-	-	-	992	-	-	-	-	-
BM-16468	6-II	-	-	-	-	-	-	-	-	-	992	-	-	-	-	-
BM-17711	6-II	-	-	-	-	-	-	-	-	-	994	-	-	-	-	-
BM-17849	6-II	-	-	-	-	-	-	-	-	-	1000	-	-	-	-	-
DYNH	6-II	-	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
Barium + Strontium	2-I	-	36	36	-	-	-	-	-	-	-	-	-	-	-	-
Barium aluminates																
$BaO \cdot Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	977	-	-	-	-	-
$3\,BaO \cdot Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	977	-	-	-	-	-
Barium aluminum silicate ($BaO \cdot Al_2O_3 \cdot 2\,SiO_2$)	4-II	-	-	-	-	-	-	1205	-	-	1207	-	-	-	-	-
Barium beryllium titanate ($BaO \cdot BeO \cdot TiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1390	-	-	-	-	-
Barium borate glass	4-II	-	-	-	-	-	-	-	-	-	1609	-	-	-	-	-
Barium (hexa-)boride (BaB_6)	6-I	-	296	-	-	-	300	-	-	-	302	-	-	-	-	-
Barium calcium silicate	4-II	-	-	-	-	-	-	-	-	-	1211	-	-	-	-	-
Barium calcium titanate [$(Ca_xBa_{1-x})O \cdot TiO_2$]	4-II	-	-	-	-	-	-	-	1392	1394	-	-	-	-	-	-
Barium carbide (BaC_2)	5	-	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium cerium lead titanate [$(Ba_{1-x-y}Pb_xCe_y)O \cdot TiO_2$]	4-II	-	-	-	-	-	1398	-	-	-	-	-	-	-	-	-
Barium cerium titanate [$(Ba_{1-x}Ce_x)O \cdot TiO_2$]	4-II	-	-	-	-	-	1306	-	-	-	-	-	-	-	-	-
Barium cerium titanate silicate [$(Ba_{1-x}Ce_x)O \cdot (Ti_{1-x}Si_x)O_2$]	4-II	-	-	-	-	-	1209	-	-	-	-	-	-	-	-	-
Barium cerium titanate stannate [$(Ba_{1-x}Ce_x)O \cdot (Ti_{1-y}Sn_y)O_2$]	4-II	-	-	-	-	-	1354	-	-	-	-	-	-	-	-	-
Barium cerium titanate zirconate [$(Ba_{1-x}Ce_x)O \cdot (Ti_{1-y}Zr_y)O_2$]	4-II	-	-	-	-	-	1500	-	-	-	-	-	-	-	-	-
Barium copper silicate ($BaO \cdot CuO \cdot 4\,SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1213	-	-	-	-	-
Barium crown glass	4-II	-	-	-	-	-	-	1827	-	-	-	-	-	-	-	-
Barium fluoborate glass	4-II	-	-	-	-	-	-	-	-	-	1611	-	-	-	-	-

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Barium fluoride (BaF_2)	5	-	-	-	-	-	-	-	347	-	-	-	-	349	-	-
Barium lanthanum titanate [$(La_xBa_{1-x})O \cdot TiO_2$)]	4-II	-	-	-	-	-	1400	-	1402	-	-	-	-	-	-	-
Barium-lead intermetallics (Ba_3Pb)	6-I	-	-	-	-	-	-	-	642	-	-	-	-	-	-	-
Barium lead silicate glass	4-II	-	-	-	-	-	1689	-	-	-	-	-	-	-	-	-
Barium lead titanates	4-II	-	-	-	-	-	-	-	-	-	1404	-	-	-	-	-
Barium magnesium silicates																
$BaO \cdot 3\ MgO \cdot SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1215	-	-	-	-	-
$BaO \cdot 4\ MgO \cdot 3.5\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1215	-	-	-	-	-
Barium magnesium aluminum silicate ($3\ BaO \cdot 2\ MgO \cdot 8\ Al_2O_3 \cdot 26\ SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1217-1221	-	-	-	-	-
Barium nitride (Ba_3N_2)	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium oxide (BaO)	4-I	-	-	-	-	-	49	51	53	-	-	-	-	-	-	-
Barium oxide + Strontium oxide	4-I	-	-	-	-	-	-	-	641	-	-	-	-	-	-	-
Barium oxide + Strontium oxide + + Zirconium cermet	6-II	-	-	-	-	-	-	-	911	-	-	-	-	-	-	-
Barium oxide + Strontium oxide + + Zirconium (di-)oxide	4-I	-	-	-	-	-	-	-	643	-	-	-	-	-	-	-
Barium phosphide (Ba_3P_2)	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium selenide (BaSe)	6-I	-	365	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium silicate glass	4-II	-	-	-	-	-	-	-	-	1687	-	-	-	-	-	-
Barium silicide ($BaSi_2$)	6-I	-	371	-	-	-	-	-	-	-	373	-	-	-	-	-
Barium stannide (Ba_2Sn)	6-I	-	-	-	-	-	-	-	531	-	-	-	-	-	-	-
Barium strontium ferrites [$(Ba_xSr_{1-x})O \cdot 6\ Fe_2O_3$]	4-II	1067	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium strontium titanates	4-II	-	-	-	-	-	-	-	-	-	1406	-	-	-	-	-
Barium sulfide (BaS)	5	649	649	-	-	-	-	651	-	-	-	-	-	-	-	-
Barium telluride (BaTe)	6-I	-	636	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium titanates																
$BaO \cdot TiO_2$	4-II	-	1376	-	-	-	1378-1380	1382	1384	1386	1388	-	-	-	-	-
$BaO \cdot 3\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1388	-	-	-	-	-
$BaO \cdot 4\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1388	-	-	-	-	-
$BaO \cdot 5\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1388	-	-	-	-	-
$BaO \cdot 6\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1388	-	-	-	-	-
$BaO \cdot 18\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1388	-	-	-	-	-
$2\ BaO \cdot TiO_2$	4-II	-	1376	-	-	-	-	1382	-	-	-	-	-	-	-	-
Barium titanate coating on niobium-zirconium alloy	6-II	-	-	-	-	-	-	-	-	-	-	-	1369	-	-	-
Barium titanate + Calcium titanate	4-II	-	1579	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium titanate + Lead titanate	4-II	-	-	-	-	-	-	1581	-	-	-	-	-	-	-	-
Barium titanate + Manganese niobate	4-II	-	-	-	-	-	-	-	1583	-	-	-	-	-	-	-

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Barium titanate + Strontium titanate	4-II	-	-	-	-	-	-	1585	-	-	-	-	-	-	-	-
Barium titanium germanium oxide ($BaO \cdot TiO_2 \cdot 3\ GeO_2$)	4-II	-	-	-	-	-	-	-	-	-	1127	-	-	-	-	-
Barium titanium silicate glass	4-II	-	-	-	-	-	-	-	-	-	1691	-	-	-	-	-
Barium uranate ($BaO \cdot UO_3$)	4-II	-	1482	-	-	-	-	1484	-	-	-	-	-	-	-	-
Barium zirconate ($BaO \cdot ZrO_2$)	4-II	-	-	-	-	-	-	1196	-	-	1498	-	-	-	-	-
Beetle	6-II	-	-	-	-	-	-	-	-	-	1002	-	-	-	-	-
Beryl	4-II	-	-	-	-	-	-	-	1225	-	123 7	-	-	-	-	-
Beryllia	4-I	55	55	55	55	-	57	59	61	65	o7	7'	73-77	79-81	83	85
Beryllium (Be)	1	48	48	48	48	48	50	53	55	57	59	-	61	63	-	65
Beryllium QM-V	1	-	-	-	-	-	51	-	-	-	-	-	-	-	-	-
Beryllium + ΣX_i	2-II	841	-	-	-	-	-	843	845	-	847	-	-	-	-	-
Beryllium + Aluminum	2-I	38	-	-	-	-	-	-	40	42	-	-	44	-	-	-
Beryllium + Aluminum + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	833	-	-	-	-	-
Beryllium + Beryllium oxide cermet	6-II	751	-	-	-	751	-	753	757	-	762	-	-	-	-	764-766
Beryllium + Magnesium + ΣX_i	2-II	835	-	-	-	-	837	-	839	-	-	-	-	-	-	-
Beryllium aluminate ($BeO \cdot Al_2O_3$)	4-II	-	-	-	-	-	-	979	-	-	981	-	-	-	-	-
Beryllium aluminosilicate ($3\ BeO \cdot Al_2O_3 \cdot 6\ SiO_2$)	4-II	-	-	-	-	-	-	-	1225	-	1227	-	-	-	-	-
Beryllium borides																
BeB	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BeB_2	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
BeB_4	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
BeB_6	6-I	295	296	-	-	-	-	-	-	-	-	-	-	-	-	-
BeB_9	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Be_2B	6-I	295	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Be_3B	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium indium selenide ($InBeSe_3$)	6-I	-	-	-	-	-	-	-	329	-	-	-	-	-	-	-
Beryllium carbide (Be_2C)	5	15	15	15	15	-	-	17	-	-	19	-	-	-	-	21
Beryllium carbide + ΣX_i	5	-	-	-	-	-	-	303	305	-	-	-	-	-	-	-
Beryllium cermet BM15	6-II	-	-	-	-	-	-	-	757	-	-	-	-	-	-	-
Beryllium cermet LYB 1102	6-II	-	-	-	-	-	-		757	-	-	-	-	-	-	-
Beryllium cermet Y6825	6-II	-	-	-	-	-	-	-	757	-	-	-	-	-	-	-
Beryllium cermet Y6826	6-II	-	-	-	-	-	-	-	757	-	-	-	-	-	-	-
Beryllium cermet Y9384	6-II	-	-	-	-	-	-	-	757	-	-	-	-	-	-	-
Beryllium cermet YB1000	6-II	-	-	-	-	-	-	-	31	-	-	-	-	-	-	-
Beryllium cermet YB9052	6-II	-	-	-	-	-	-	753	757	-	762	-	-	-	-	-
Beryllium cermet YB9053	6-II	-	-	-	-	-	-	-	-	-	762	-	-	-	-	-
Beryllium cermet YB9054	6-II	-	-	-	-	-	-	753	-	-	762	-	-	-	-	-

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Beryllium chromite ($BeO \cdot Cr_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1049	-	-	-	-	-
Beryllium fluoride (BeF_2)	5	351	351	351	351	351	-	-	-	-	-	-	-	-	-	353
Beryllium nitrides																
Be_3N_2	5	-	495	495	495	-	-	-	497	-	-	-	-	-	-	-
Be_3N_4	5	-	495	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium oxides																
Beryllium oxide (BeO)	4-I	55	55	55	55	-	57	59	61	65	67	71	73-77	79-81	83	85
BD-98	4-I	-	-	-	-	-	-	-	61	65	-	-	77	-	-	-
UOX grade	4-I	-	-	-	-	-	-	-	61	-	-	-	-	-	-	-
Beryllium oxide + Aluminum oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	-	-	645	-	-	-	-	-
Beryllium oxide + Aluminum oxide + Thorium (di-)oxide	4-I	-	-	-	-	-	-	-	647	-	649	-	-	-	-	-
Beryllium oxide + Aluminum oxide + Thorium (di-)oxide + + Magnesium oxide	4-I	-	-	-	-	-	-	-	651	-	-	-	-	-	-	-
Beryllium oxide + Aluminum oxide + Zirconium (di-)oxide	4-I	-	-	-	-	-	-	-	653	-	-	-	-	-	-	-
Beryllium oxide + Aluminum oxide + Zirconium (di-)oxide + + Magnesium oxide	4-I	-	-	-	-	-	-	-	655	-	-	-	-	-	-	-
Beryllium oxide + Beryllium cermet	6-II	-	-	-	-	751	-	755	760	-	762	-	-	-	-	-
Beryllium oxide + Beryllium + +Molybdenum cermet	6-II	-	-	-	-	-	-	768	770	-	772	-	-	-	-	-
Beryllium oxide + Beryllium + + Silicon cermet	6-II	-	-	-	-	-	-	-	774	-	776	-	-	-	-	-
Beryllium oxide + Magnesium oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	657	-	-	-	-	-	-	-
Beryllium oxide + Magnesium oxide + Aluminum oxide + + Thorium (di-)oxide	4-I	-	-	-	-	-	-	-	659	-	-	-	-	-	-	-
Beryllium oxide + Magnesium oxide + Aluminum oxide + + Zirconium (di-)oxide	4-I	-	-	-	-	-	-	-	661	-	-	-	-	-	-	-
Beryllium oxide + Magnesium oxide + Zirconium (di-)oxide + + Aluminum oxide	4-I	-	-	-	-	-	-	-	663	-	-	-	-	-	-	-
Beryllium oxide + Molybdenum cermet	6-II	-	-	-	-	-	-	778	-	-	-	-	-	-	-	-
Beryllium oxide + Molybdenum beryllide	5	-	-	-	-	-	-	759	-	-	-	-	-	-	-	-
Beryllium oxide + Niobium cermet	6-II	780	-	-	-	-	-	-	-	-	782	-	-	-	-	-
Beryllium oxide + Niobium beryllide	5	-	-	-	-	-	-	761	-	-	-	-	-	-	-	-
Beryllium oxide + Tanatlum beryllide	5	-	-	-	-	-	-	763	-	-		-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Beryllium oxide + Thorium (di-)oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	-	-	665	-	-	-	-	-
Beryllium oxide + Titanium beryllide	5	-	-	-	-	-	-	765	-	-	-	-	-	-	-	-
Beryllium oxide + Uranium (di-)oxide	4-I	-	-	-	-	-	-	-	667	-	-	-	-	-	-	-
Beryllium oxide + Zirconium beryllide	5	-	-	-	-	-	-	767	-	-	-	-	-	-	-	-
Beryllium oxide + Zirconium (di-)oxide + Magnesium oxide + + Aluminum oxide	4-I	-	-	-	-	-	-	-	669	-	-	-	-	-	-	-
Beryllium oxide porcelain type 4811	5	1003	-	-	-	-	-	-	1017	-	-	-	-	-	-	-
Beryllium silicate ($2\ BeO \cdot SiO_2$)	4-II										1223					
Beryllium sulfide (BeS)	5	653	653	-	-	-	-	-	-	-	-	-	-	-	-	655
Beryllium titanates																
$BeO \cdot TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1408	-	-	-	-	-
$2\ BeO \cdot TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1408	-	-	-	-	-
$4\ BeO \cdot TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1408	-	-	-	-	-
$6\ BeO \cdot TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1408	-	-	-	-	-
Bismuth-cerium intermetallics																
BiCe	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
$BiCe_3$	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Bi_3Ce_4	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth selenide tellurides ($Bi_2Te_{3-x}Se_x$)	6-I	-	-	-	-	-	564	-	566	-	-	-	-	-	-	-
Bismuth stannate ($Bi_2O_3 \cdot 3\ SnO_2$)	4-II								1357							
Bismuth telluride (Bi_2Te_3)	6-I	553	553	-	-	-	555	557	559	561	-	-	-	-	-	-
Bismuth telluride + Bismuth selenide	6-I	-	-	-	-	-	711	-	713	-	-	-	-	-	-	-
Bismuth tellurium sulfide (Bi_2Te_2S)	5	-	-	-	-	-	657	-	659	-	-	-	-	-	-	-
Boral clad with boron carbide	5	979	-	-	-	-	-	981	-	-	-	-	-	-	-	-
Borate glasses	4-II	1605	-	-	-	-	1607	-	-	-	1609-1633	-	-	-	-	-
Borolites																
Borolite	6-II	842	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borolite I, grade F	6-II	-	-	-	-	-	-	846	-	-	-	-	-	-	-	-
Borolite I, grade G	6-II	-	-	-	-	-	844	-	-	-	850	-	-	-	-	-
Borolite I, grade S	6-II	-	-	-	-	-	844	846	-	-	-	-	-	-	-	-
Borolite IV	6-II	913	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (B)	1	67	67	-	67	67	69	71	-	-	-	-	-	-	-	73
Boron coating on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	-	1289	-	-	-
Boron coating on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1291	-	-	-
Boron + ΣX_i	2-II	849	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Boron + Iron	2-I	-	-	-	-	46	-	-	-	-	-	-	-	-	-	48
Boron + Silicon	2-I	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-
Boron aluminate ($2\ B_2O_3 \cdot 9\ Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	983	-	-	-	-	-
Boron carbide (B_4C)	5	25	23	-	-	-	-	27	29	31	33	-	35	-	-	37
Boron carbide clad with aluminum	5	979	-	-	-	-	-	981	-	-	-	-	-	-	-	-
Boron carbide coating on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1403	1405	-	-
Boron carbide + Iron cermet	6-II	928	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron oxide (B_2O_3)	4-I	-	-	-	-	-	-	87	-	-	-	-	-	-	-	89
Boron oxide glass	4-II	-	-	-	-	-	-	1635	-	-	-	-	-	-	-	-
Boron nitride (BN)	5	499	499	-	499	-	501	503	505	-	507	-	509-513	515	-	-
Boron nitride + Boron oxide	5	-	-	-	-	-	832	834	836	-	838	-	-	-	-	-
Boron nitride + Graphite	5	-	-	-	-	-	-	828	830	-	-	-	-	-	-	-
Boron phosphide (BP)	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron silicides																
B_4Si	6-I	-	-	-	-	-	-	-	-	-	-	-	375-377	379	-	-
B_6Si	6-I	-	-	-	-	-	-	-	-	-	-	-	375-377	379	-	-
Borosilicate glass	4-II	1693	1693	-	-	-	1695	1697	1699	1701	1703	-	1705-1707	1709	1711-1713	-
Brass	2-I	-	-	-	-	-	170	172	-	174	-	-	178-180	182	-	-
	2-II								1000							
Brass, aluminum	2-II	-	-	-	-	-	-	-	-	-	1004	-	-	-	-	-
Brass, free cutting leaded	2-I	168	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brass, red	2-II	-	-	-	-	-	-	-	-	-	1002	-	-	-	-	-
Brass, yellow	2-I	-	-	-	-	-	-	-	-	174	-	-	176	-	-	-
	2-II								1000							
Brazing alloy																
GE-62	2-II	-	-	-	-	-	-	-	-	-	1168	-	-	-	-	-
GEH62-V	2-II	-	-	-	-	-	-	1130	-	-	-	-	-	-	-	-
GE-76	2-II	-	-	-	-	-	-	-	-	-	1378	-	-	-	-	-
Bricks																
Bricks	5	-	-	-	-	-	1029	-	1031-1033	-	1035-1037	-	1039-1043	-	-	-
Chrome-magnesite	5	-	-	-	-	-	1029	-	-	-	-	-	1039	-	-	-
Chromomagnesite	4-I	-	-	-	-	-	-	-	741	-	-	-	-	-	-	-
Forsterite	5	-	-	-	-	-	1029	-	1033	-	-	-	-	-	-	-
K-30 insulating	5	-	-	-	-	-	-	-	-	-	1035	-	-	-	-	-
Magnesia	5	-	-	-	-	-	1029	-	-	-	-	-	-	-	-	-
Magnesite	4-I	-	-	-	-	-	-	-	743	733, 737	-	-	-	-	-	-

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Bricks (cont.)																
Magnesite-chrome	5	-	-	-	-	-	1029	-	-	-	-	-	-	-	-	-
Magnesite "hu"	5	-	-	-	-	-	-	-	1033	-	-	-	-	-	-	-
Mica	5	-	-	-	-	-	-	-	989	-	-	-	-	-	-	-
Mica, white	5	-	-	-	-	-	-	-	989	-	-	-	-	-	-	-
Silica	4-I	-	-	-	-	-	-	-	816	363, 796, 818	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	1037	-	1041	-	-	-
Silicon carbide	5	-	-	-	-	-	-	-	125	-	-	-	-	-	-	-
Sillimanite	4-I	-	-	-	-	-	-	-	615	-	-	-	-	-	-	-
Vermiculite insulating	5	-	-	-	-	-	-	-	989	-	-	-	-	-	-	-
Bromyrite	5	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-
Bronze	2-I	154	-	-	-	-	156	-	-	-	-	-	162	-	-	-
	2-II	-	-	-	-	-	-	-	-	-	998	-	-	-	-	-
Bronze, aluminum	2-II	-	-	-	-	-	-	-	-	-	950	952	954-958	960	-	-
Bronze, lead	2-II	-	-	-	-	-	-	-	-	-	976	-	-	-	-	-
Bronze, phosnic	2-I	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
Bronze, silicon	2-II	-	-	-	-	-	-	-	-	-	994	-	-	-	-	-
Bronze, tellurium-aluminum	2-II	-	-	-	-	-	-	-	-	-	950	-	-	-	-	-
Bronze, Tin-Zinc	2-II	-	-	-	-	-	-	-	-	-	998	-	-	-	-	-
Buna S	6-II	-	-	-	-	-	-	-	-	1066	-	-	-	-	-	-
Butadiene-acrylonitrile copolymer	6-II	-	-	-	-	-	-	1054	-	1060	-	-	-	-	-	-
Butyl GR-1	6-II	-	-	-	-	-	-	-	-	1062	-	-	-	-	-	-
C																
CA-2, carbide tool steel	6-II	-	-	-	-	-	-	-	889	-	-	-	-	-	-	-
CA-4, carbide tool steel	6-II	-	-	-	-	-	-	-	889	-	-	-	-	-	-	-
Cadmium (Cd)	1	-	-	-	-	-	-	-	-	-	-	-	75	-	-	-
Cadmium + Silver	2-I	-	52	52	-	-	-	-	-	-	-	-	-	54	-	-
Cadmium lead silicate glass	4-II	-	-	-	-	-	1731	-	-	-	-	-	-	-	-	-
Cadmium oxides																
CdO	4-I	91	91	-	-	91	-	93	-	-	-	-	-	-	-	97
Cd_2O_3	4-I	-	-	-	-	-	-	-	-	-	95	-	-	-	-	-
Cadmium sulfide (CdS)	5	-	-	-	-	-	661	663	-	-	-	-	665	-	-	-
Cadmium telluride (CdTe)	6-I	-	-	-	-	-	568	570	-	-	-	-	-	-	-	-
Calcia	4-I	99	99	-	-	-	101	103	105	-	107	-	-	-	-	109
Calcium (Ca)	1	-	77	77	-	-	79	-	-	-	-	-	-	-	-	81
Calcium + Magnesium	2-I	-	56	-	-	-	58	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Calcium aluminates																
$CaO \cdot Al_2O_3$	4-II	-	-	-	-	-	-	987	-	-	-	-	-	-	-	-
$CaO \cdot 2\ Al_2O_3$	4-II	985	985	-	-	-	-	987	-	-	-	-	-	-	-	-
$CaO \cdot 6\ Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	991	-	-	-	-	-
$3\ CaO \cdot Al_2O_3$	4-II	-	-	-	-	-	-	987	-	-	-	-	-	-	-	-
$3\ CaO \cdot 5\ Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	989	-	-	-	-	-
$12\ CaO \cdot 7\ Al_2O_3$	4-II	-	-	-	-	-	-	987	-	-	-	-	-	-	-	-
Calcium aluminate + Molybdenum disilicide cermet	6-II	-	-	-	-	-	-	-	-	-	784	-	-	-	-	-
Calcium aluminum silicates																
$CaO \cdot Al_2O_3 \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	1233	-	-	1235	-	-	-	-	-
$2\ CaO \cdot Al_2O_3 \cdot SiO_2$	4-II	-	-	-	-	-	-	1233	-	-	1235	-	-	-	-	-
$2\ CaO \cdot 2\ Al_2O_3 \cdot 8\ SiO_2 \cdot 7\ H_2O$	4-II	-	-	-	-	-	-	1233	-	-	-	-	-	-	-	-
Calcium barium cerium titanate $[(Ba_{1-x-y}Ca_xCe_y)O \cdot TiO_2]$	4-II	-	-	-	-	-	1420	-	-	-	-	-	-	-	-	-
Calcium borates																
$CaO \cdot B_2O_3$	4-II	-	1037	1037	-	-	-	1039	-	-	-	-	-	-	-	-
$CaO \cdot 2\ B_2O_3$	4-II	-	1037	1037	-	-	-	1039	-	-	-	-	-	-		-
$2\ CaO \cdot B_2O_3$	4-II	-	1037	1037	-	-	-	1039	-	-	-	-	-	-	-	-
$3\ CaO \cdot B_2O_3$	4-II	-	1037	1037	-	-	-	1039	-	-	-	-	-	-	-	-
Calcium borate glass	4-II	-	-	-	-	-	-	-	-	-	1613	-	-	-	-	-
Calcium (hexa-)boride (CaB_6)	6-I	-	296	-	-	-	300	-	-	-	302	-	-	-	-	-
Calcium carbide + Calcium oxide	5	-	-	-	-	-	-	805	-	-	-	-	-	-	-	-
Calcium carbonate ($CaCO_3$)	4-II	-	-	-	-	-	-	-	-	-	-	-	-	1045	-	-
Calcium copper silicate ($CaO \cdot CuO \cdot 4\ SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1238	-	-	-	-	-
Calcium ferrites																
$CaO \cdot Fe_2O_3$	4-II	-	-	-	-	-	-	1069	-	-	-	-	-	-	-	-
$2\ CaO \cdot Fe_2O_3$	4-II	-	-	-	-	-	-	1069	-	-	-	-	-	-	-	-
Calcium fluoride (CaF_2)	5	355	355	-	-	-	-	-	357	-	359	-	-	361	-	-
Calcium hafnate ($CaO \cdot HfO_2$)	4-II	1107	1107	-	-	-	-	-	-	-	1109	-	-	-	-	-
Calcium lanthanum manganese oxide ($La_xCa_{1-x}MnO_3$)	4-II	-	-	-	-	-	1129	-	1131	-	-	-	-	-	-	-
Calcium-lead intermetallics (Ca_2Pb)	6-I	-	-	-	-	-	-	-	646	-	-	-	-	-	-	-
Calcium lead silicate glass	4-II	-	-	-	-	-	1733	-	-	-	-	-	-	-	-	-
Calcium magnesium silicates																
$CaO \cdot MgO \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
$2\ CaO \cdot MgO \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
$3\ CaO \cdot MgO \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
$2\ CaO \cdot 5\ MgO \cdot 8\ SiO_2 \cdot 2\ H_2O$	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
Calcium molybdate ($CaO \cdot MoO_3$)	4-II	-	-	-	-	-	-	1111	-	-	-	-	-	-	-	-
Calcium nitrides																
CaN	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Ca_3N_2	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-

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Calcium oxide (CaO)	4-I	99	99	-	-	-	101	103	105	-	107	-	-	-	-	109
Calcium oxide + Titanium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	671	-	-	-	-	-
Calcium selenides (CaSe)	6-I	-	365	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium silicates																
$CaO \cdot SiO_2$	4-II	-	-	-	-	-	-	1229	-	-	1231	-	-	-	-	-
$2\ CaO \cdot SiO_2$	4-II	-	-	-	-	-	-	1229	-	-	1231	-	-	-	-	-
$3\ CaO \cdot SiO_2$	4-II	-	-	-	-	-	-	1229	-	-	-	-	-	-	-	-
Calcium silicate glass	4-II	-	-	-	-	-	-	-	-	-	-	-	-	-	1729	-
Calcium silicides																
CaSi	6-I	-	523	-	-	-	-	-	-	-	-	-	-	-	-	-
$CaSi_2$	6-I	-	523	-	-	-	-	-	-	-	-	-	-	-	-	-
Ca_2Si	6-I	-	523	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium stannate ($CaO \cdot SnO_2$)	4-II	-	-	-	-	-	-	-	1359	-	-	-	-	-	-	-
Calcium strontium barium cerium titanate $[(Ba_{1-x-y-z}Ca_xSr_yCe_z)O \cdot TiO_2]$	4-II	-	-	-	-	-	1422	-	-	-	-	-	-	-	-	-
Calcium titanates																
$CaO \cdot TiO_2$	4-II	1410	1410	-	-	-	1412	1414	1416	-	1418	-	-	-	-	-
$3\ CaO \cdot 2\ TiO_2$	4-II	-	-	-	-	-	-	1414	-	-	1418	-	-	-	-	-
Calcium titanate coating on niobium-zirconium alloy	6-II	-	-	-	-	-	-	-	-	-	-	-	1371	-	-	-
Calcium tungstate ($CaO \cdot WO_3$)	4-II	-	-	-	-	-	-	1472	-	-	-	-	-	-	-	-
Calcium uranate ($CaO \cdot UO_3$)	4-II	-	1482	-	-	-	-	1486	-	-	-	-	-	-	-	-
Calcium vanadates																
$CaO \cdot V_2O_5$	4-II	-	-	-	-	-	-	1488	-	-	-	-	-	-	-	-
$2\ CaO \cdot V_2O_5$	4-II	-	-	-	-	-	-	1488	-	-	-	-	-	-	-	-
$3\ CaO \cdot V_2O_5$	4-II	-	-	-	-	-	-	1488	-	-	-	-	-	-	-	-
Calcium zirconate ($CaO \cdot ZrO_2$)	4-II	1502	1502	-	-	-	-	1504	-	-	1506	-	-	-	-	-
Carbide tool steels	6-II	-	-	-	-	-	-	-	889	-	-	-	-	-	-	-
Carbofrax	5	-	-	-	-	-	-	-	307	-	-	-	309-311	-	-	-
Carboloy 44A	6-II	887	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carboloy 55A	6-II	887	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbons																
Carbon (C)	1	83	-	-	-	83	85	-	87	-	-	-	91-93	95	-	-
Amorphous	1	-	-	-	-	-	83	-	87	-	-	-	-	-	-	-
GA grade	1	-	-	-	-	-	-	-	-	-	-	-	91	95	-	-
Pyrolytic	1	83	-	-	-	-	-	-	89	-	-	-	-	-	-	-
Carbon coating on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	1293	1295	-	-	-
Carbon electrode	1	-	-	-	-	-	85	-	87	-	-	-	-	-	-	-
Carbon impregnated graphite	1	-	-	-	-	-	-	-	358	-	-	-	-	-	-	-
Carbon-phenolic laminate MX-4926	6-II	-	-	-	-	-	-	1134	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Carbon steels	3	-	-	-	-	3	5, 312	7-10	-	12-14	16-20	-	-	-	-	22
Carbonyl nickel	1	-	694	-	-	-	-	-	-	-	-	-	-	-	-	-
Cast iron	3	27	-	-	-	-	-	-	29-37, 437	-	39-41, 444	-	-	-	-	-
Cast iron, gray (see grey cast iron)																
Cast iron, nodular (see Nodular cast iron)																
Castolite	6-II	974	-	-	-	-	-	-	976	1082	978	-	-	-	-	-
Catalin	6-II	-	-	-	-	-	-	-	-	-	986	-	-	-	-	-
Cellulose acetates	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Cellulose acetate, expanded	6-II	-	-	-	-	-	-	-	939	-	-	-	-	-	-	-
Cellulose acetate butyrate	6-II	-	-	-	-	-	-	-	-	-	946	-	-	-	-	-
Cellulose propionate	6-II	-	-	-	-	-	-	-	-	-	944	-	-	-	-	-
Cement-barytes aggregate	5	-	-	-	-	-	-	1023	1025	-	-	-	-	-	-	-
Ceramic laminate	6-II	-	-	-	-	-	-	-	-	-	1225	-	-	-	-	-
Cercor	4-II	-	-	-	-	-	-	-	-	1591	-	-	-	-	-	-
Ceria	4-I	111	111	-	-	-	113	115	119	-	121	-	124-128	-	-	-
Cerium (Ce)	1	402	402	402	402	402	404	406	-	-	-	-	-	-	-	408
Cerium + ΣX_i	2-II	-	853	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium + Neodymium	2-I	-	-	-	-	-	-	-	-	-	60	-	-	-	-	-
Cerium + Silicon + ΣX_i	2-II	-	851	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium aluminate ($2CeO \cdot 3Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	993	-	-	-	-	-
Cerium aluminides																
CeAl	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeAl_2$	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeAl_4$	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_3Al_2	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium aluminum silicides ($Ce_2Al_3Si_2$)	5-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-bismuth intermetallics (CeBi)	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium borides																
CeB_4	6-I	296	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CeB_6	6-I	295, 296	296	-	-	-	300	-	-	-	302	-	-	-	-	-
Cerium (tri-)bromide ($CeB4_3$)	5	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-cadmium intermetallics																
CeCd	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCd_2$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCd_3$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCd_{11}$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Cerium carbides																
CeC_2	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium (tri-) chloride ($CeCl_3$)	5	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-cobalt intermetallics																
$CeCo_2$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCo_5$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-copper intermetallics																
CeCu	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCu_2$	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCu_4$	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeCu_6$	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium (tri-) fluoride (CeF_3)	5	363	363	-	-	-	-	365	-	-	-	-	-	-	-	-
Cerium-gallium intermetallics ($CeGa_2$)	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-gold intermetallics																
CeAu	6-I	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeAu_2$	6-I	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeAu_3$	6-I	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Au	6-I	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium hydride (CeH_2)	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-indium intermetallics ($CeIn_3$)	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium (tri-) iodide (CeI_3)	5	-	477	-	-	-	-	-	-	-	-	-	-	-	-	
Cerium-lead intermetallics																
$CePb_3$	6-I	662	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Pb	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-magnesium intermetallics																
CeMg	6-I	662	663	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeMg_3$	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeMg_9$	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_4Mg	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-mercury intermetallics (CeHg)	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-nickel intermetallics																
$CeNi_2$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeNi_3$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeNi_5$	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Ni_7	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium nitride (CeN)	5	621	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-osmium intermetallics ($CeOs_2$)	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Cerium oxides																
CeO	4-I	111	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CeO_2	4-I	111	111	-	-	-	113	115	119	-	121	-	124-128	-	-	-
Ce_2O_3	4-I	111	-	-	-	-	-	117	-	-	-	-	-	-	-	-
Cerium (di-)oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	673	-	-	-	-	-	-	-
Cerium (di-)oxide + Uranium oxides	4-I	675	-	-	-	-	-	-	677	-	-	-	-	-	-	-
Cerium phosphide (CeP)	5	635	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-platinum intermetallics ($CePt_2$)	6-I	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium selenides																
CeSe	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Se_4	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium silicide ($CeSi_2$)	6-I	523	523-524	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-silver intermetallics																
CeAg	6-I	662	662	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeAg_2$	6-I	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeAg_3$	6-I	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium stannides																
$CeSn_3$	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Sn	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Sn_3	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium sulfides																
CeS	5	667	667	-	-	-	670	672	674	-	676	-	-	-	-	678
CeS_2	5	667	667	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2S_3	5	667	667	-	-	-	-	672	674	-	676	-	-	-	-	-
Ce_3S_4	5	667	667	-	-	-	-	-	-	-	-	-	-	-	-	678
Cerium tellurides																
$CeTe_2$	6-I	636	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_3Te_4	6-I	636	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium-thallium intermetallics																
CeTl	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
$CeTl_3$	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Ce_2Tl	6-I	-	663	-	-	-	-	-	-	-	-	-	-	-	-	-
Cerium vanadate ($Ce_2O_3 \cdot V_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1490	-	-	-	-	-
Cermets (also see individual cermets)																
Aluminum-chromium-molybdenum cermets	6-II	930	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum-nickel-titanium cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Cermets (also see individual cermets) (cont.)																
Aluminum oxide + Aluminum cermet	6-II	-	-	-	-	-	-	-	-	-	729	-	-	-	-	-
Aluminum oxide + Chromium cermet	6-II	731	-	-	-	-	-	-	911	-	733	-	735	-	-	-
Aluminum oxide + Chromium + + Molybdenum cermet	6-II	737	-	-	-	-	-	-	-	-	739	-	-	-	-	-
Aluminum oxide + Iron cermet	6-II	-	-	-	-	-	-	-	-	-	741	-	-	-	-	-
Aluminum oxide + Titanium (di-)oxide + Chromium + + Molybdenum cermet	6-II	-	-	-	-	-	-	-	-	-	-	-	747	-	-	-
Aluminum oxide + Tungsten + + Chromium cermet	6-II	-	-	-	-	-	-	-	-	-	743	-	745	-	-	-
Barium oxide + Strontium oxide + Zirconium cermet	6-II	-	-	-	-	-	-	-	911	-	-	-	-	-	-	-
Beryllium + Beryllium oxide cermet	6-II	751	-	-	-	751	-	753	757	-	762	-	-	-	-	764-766
Beryllium oxide + Beryllium cermet	6-II	-	-	-	-	751	-	755	760	-	762	-	-	-	-	-
Beryllium oxide + Beryllium + + Molybdenum cermet	6-II	-	-	-	-	-	-	768	770	-	772	-	-	-	-	-
Beryllium oxide + Beryllium + + Silicon cermet	6-II	-	-	-	-	-	-	-	774	-	776	-	-	-	-	-
Beryllium oxide + Molybdenum cermet	6-II	-	-	-	-	-	-	778	-	-	-	-	-	-	-	-
Beryllium oxide + Niobium cermet	6-II	780	-	-	-	-	-	-	-	-	782	-	-	-	-	-
Boron carbide + Iron cermet	6-II	928	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium aluminate + + Molybdenum (di-)silicide cermet	6-II	-	-	-	-	-	-	-	-	-	784	-	-	-	-	-
Chromium-molybdenum-silicon cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-silicon-titanium cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium boride + Chromium-molybdenum intermetallic cermet	6-II	913	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium silicide cermets	6-II	-	-	-	-	-	-	-	-	-	915	-	-	-	-	-
Chromium-titanium intermetallics + Copper cermets	6-II	917	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-titanium intermetallics + Molybdenum cermets	6-II	919	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt-chromium alloys + + Titanium (di-)boride cermet	6-II	930	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Cermets (also see individual cermets) (cont.)																
Europium oxide + Iron-chromium alloy cermet . . .	6-II	-	-	-	-	-	-	-	-	-	786	-	-	-	-	-
Hafnium carbide + Zirconium cermet	6-II	-	-	-	-	-	-	-	-	-	852	-	-	-	-	-
Magnesium oxide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	788	-	-	-	-	-
Molybdenum (di-) silicide + + Copper cermets	6-II	923	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum-silicon-titanium cermet	6-II	930	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon carbide + Magnesium oxide + Nickel aluminide cermet	6-II	-	-	-	-	-	-	-	-	-	854	-	-	-	-	-
Silicon carbide + Silicon cermet	6-II	-	-	-	-	-	-	-	856	-	-	-	-	-	-	-
Silicon (di-) oxide + Aluminum cermet	6-II	-	-	-	-	-	-	-	-	-	790	-	-	-	-	-
Sodium fluoride + Beryllium ferride cermet	6-II	-	-	-	-	-	-	-	911	-	-	-	-	-	-	-
Strontium titanate + Cobalt cermet	6-II	-	-	-	-	-	-	-	792	-	-	-	-	-	-	-
Tantalum carbide + Iron cermet	6-II	858	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tantalum carbide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	860	-	-	-	-	-
Thorium (di-) oxide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	794
Titanium carbide + Cobalt cermet	6-II	862	-	-	-	-	-	-	911	-	864	-	-	-	-	-
Titanium carbide + Molybdenum + Tungsten cermet. .	6-II	-	-	-	-	-	-	-	-	-	866	-	-	-	-	-
Titanium carbide + Nickel cermet	6-II	868	-	-	-	-	-	871	873	-	875-877	-	-	-	-	-
Titanium carbide + Niobium carbide + Nickel cermet . .	6-II	-	-	-	-	-	-	-	911	-	-	-	-	-	-	-
Titanium carbide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	879	-	-	-	-	-
Titanium nitride + Chromium + + Titanium cermet	6-II	-	-	-	-	-	-	-	-	-	909	-	-	-	-	-
Titanium (mon-) oxide + + Chromium-titanium alloys cermet	6-II	-	-	-	-	-	-	-	-	-	796	-	-	-	-	-
Titanium tungsten (di-) carbide + Cobalt cermet . . .	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-
Titanium tungsten (di-) carbide + Tantalum cermet . .	6-II	-	-	-	-	-	-	-	-	-	883	-	-	-	-	-
Tungsten carbide + Chromium-cobalt alloys cermet	6-II	-	-	-	-	-	-	-	-	-	895	-	-	-	-	-

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Cermets (also see individual cermets) (cont.)																
Tungsten carbide + Cobalt cermet	6-II	-	-	-	-	-	-	-	889	-	897-905	-	-	-	-	-
Tungsten carbide + Nickel cermet	6-II	-	-	-	-	-	-	-	-	-	907	-	-	-	-	-
Uranium (mono-) carbide + + Molybdenum cermet	6-II	-	-	-	-	-	-	-	-	-	891	-	-	-	-	-
Uranium (mono-) carbide + + Uranium cermet	6-II	-	-	-	-	-	-	-	-	-	893	-	-	-	-	-
Uranium (di-) oxide + + Chromium cermet	6-II	-	-	-	-	-	798	-	800	-	802	-	-	-	-	-
Uranium (di-) oxide + + Molybdenum cermet	6-II	-	-	-	-	-	804	-	806	-	808	-	-	-	-	-
Uranium (di-) oxide + + Niobium cermet	6-II	-	-	-	-	-	810	-	812	-	-	-	-	-	-	-
Uranium (di-) oxide + Stainless steel cermet	6-II	-	-	-	-	-	814	-	816	-	818	-	-	-	-	-
Uranium (di-) oxide + + Zirconium cermets	6-II	820	-	-	-	-	-	-	822	-	824	-	-	-	-	-
Zirconium (di-) boride cermet	6-II	842	-	-	-	-	844	846	848	-	850	-	-	-	-	-
Zirconium (di-) oxide + + Titanium cermet	6-II	-	-	-	-	-	-	826	828	830	832	-	-	-	-	-
Zirconium (di-) oxide + + Yttrium oxide + Zirconium cermet	6-II	-	-	-	-	-	-	-	834	-	-	-	-	-	-	-
Zirconium (di-) oxide + + Zirconium cermet	6-II	-	-	-	-	-	-	-	-	836	838	-	-	-	-	840
Cesium chloride (CsCl)	5	-	-	-	-	-	-	315	-	-	-	-	-	-	-	-
Chemaco 342	6-II	-	-	-	-	-	-	-	-	-	948	-	-	-	-	-
Chemaco 343	6-II	-	-	-	-	-	-	-	-	-	948	-	-	-	-	-
Chemaco 344	6-II	-	-	-	-	-	-	-	-	-	948	-	-	-	-	-
Chemaco 345	6-II	-	-	-	-	-	-	-	-	-	948	-	-	-	-	-
Chemaco 346	6-II	-	-	-	-	-	-	-	-	-	948	-	-	-	-	-
Chemaco SPZ 325	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 326	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 327	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 327-MS	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 329	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 330	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 331	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chemaco SPZ 332	6-II	-	-	-	-	-	-	-	-	-	941	-	-	-	-	-
Chloromethyoxetane, 3, 3 bis-	6-II	-	1076	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromalloy W-2 coating on molybdenum-titanium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1505-1509	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Chromium (Cr)	1	410	410	-	-	410	412	414	416	418	420	-	422-426	428-432	-	434
Chromium, electrolytic	1	-	-	-	-	-	412	-	416	-	420	-	-	-	-	-
Chromium + ΣX_i	2-II	873	-	-	-	873	875	-	877	-	-	-	-	-	-	-
Chromium + Aluminum + ΣX_i . .	2-II	-	-	-	-	-	-	855	-	-	-	-	-	-	-	-
Chromium + Iron	2-I	-	62	-	-	-	64	66	-	-	-	-	-	-	-	-
Chromium + Iron + ΣX_i	2-II	857	-	-	-	-	-	859	-	-	861	-	-	-	-	-
Chromium + Molybdenum . . .	2-I	-	-	-	-	-	-	-	-	-	68	-	-	-	-	-
Chromium + Molybdenum + ΣX_i .	2-II	863	-	-	-	-	-	-	-	-	865	-	-	-	-	-
Chromium + Nickel	2-I	-	-	-	-	-	-	-	-	-	70	-	-	-	-	-
Chromium + Nickel + ΣX_i . . .	2-II	-	867	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium + Silicon	2-I	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium + Silicon + ΣX_i . . .	2-II	869	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium + Tungsten	2-I	74	-	-	-	-	-	-	-	-	76	-	-	-	-	-
Chromium + Tungsten + ΣX_i . .	2-II	871	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium alloys (special designations)																
Ferrochromium	2-II	-	-	-	-	-	-	859	-	-	-	-	-	-	-	-
Aluminothermic chromium .	2-II	-	-	-	-	-	-	859	-	-	-	-	-	-	-	-
Chromium aluminides																
CrAl	6-I	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
$CrAl_3$	6-I	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
Cr_9Al	6-I	-	3	-	-	-	-	-	-	-	5	-	-	-	-	-
Chromium beryllide ($CrBe_2$) . .	6-I	-	158	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium borides																
CrB	6-I	164	164	-	-	-	-	166	-	-	-	-	-	-	-	-
CrB_2	6-I	164	164	-	-	-	-	166	-	-	168	-	-	-	-	-
Cr_2B	6-I	-	164	-	-	-	-	-	-	-	-	-	-	-	-	-
Cr_3B_4	6-I	-	164	-	-	-	-	-	-	-	-	-	-	-	-	-
Cr_4B	6-I	-	164	-	-	-	-	-	-	-	-	-	-	-	-	-
Cr_5B_3	6-I	-	164	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (di-)boride + + Chromium-molybdenum intermetallic cermet	6-II	913	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (di-)boride + + Titanium (di-)boride	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (di-)boride + + Vanadium (di-)boride . . .	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium carbides																
CrC	5	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-
Cr_3C_2	5	39	39	-	-	-	-	41	-	-	45	-	-	-	-	-
Cr_4C	5	-	-	-	-	-	-	43	-	-	-	-	-	-	-	-
Cr_5C_2	5	-	-	-	-	-	-	43	-	-	-	-	-	-	-	-
Cr_7C_3	5	-	39	-	-	-	-	43	-	-	-	-	47	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Chromium carbides (cont.)																
$Cr_{23}C_6$	5	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium carbide-cobalt blend on iron	6-II	-	-	-	-	-	-	-	-	-	-	1407	1409	-	-	-
Chromium-molybdenum silicides																
$(Cr, Mo)Si_2$	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$(Cr, Mo)_5Si$	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-molybdenum-silicon cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-niobium intermetallics (Cr_2Nb)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium nitrides																
CrN	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Cr_2N	5		621													
Chromium (sesqui-)oxide (Cr_2O_3)	4-I	-	-	-	-	-	130	132	-	-	134	-	136-138	140	-	-
Chromium (sesqui-)oxide + + Aluminum oxide	4-I	-	-	-	-	-	679	-	-	-	681	-	683	-	-	-
Chromium (sesqui-)oxide + + Molybdenum (di-)silicide	5	-	-	-	-	-	-	-	-	-	-	-	769	-	-	-
Chromium (sesqui-)oxide + + Nickel (mon-)oxide	4-I	-	-	-	-	-	685	-	-	-	-	-	-	-	-	-
Chromium (sesqui-)oxide + + Niobium (pent-)oxide	4-I	-	-	-	-	-	687	-	-	-	-	-	-	-	-	-
Chromium (sesqui-)oxide + + Titanium-chromium intermetallics	5	-	-	-	-	-	-	-	-	-	-	-	771-773	775	-	-
Chromium (sesqui-)oxide + + Yttrium oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	689	-	-	-
Chromium phosphides (CrP)	5	635	635	-	-	-	639	-	-	-	-	-	-	-	-	-
Chromium silicides																
CrSi	6-I	-	381	-	-	-	383	385	-	-	389	-	-	-	-	-
$CrSi_2$	6-I	-	381	-	-	-	383	385	387	-	389	-	-	-	-	-
Cr_3Si	6-I	-	381	-	-	-	-	385	-	-	389	-	391-393	395	-	-
Cr_3Si_2	6-I	-	-	-	-	-	-	-	-	-	389	-	-	-	-	-
Cr_5Si	6-I	-	381	-	-	-	-	-	-	-	-	-	-	-	-	-
Cr_5Si_3	6-I	-	-	-	-	-	-	385	-	-	-	-	-	-	-	-
Chromium silicide cermets	6-II	-	-	-	-	-	-	-	-	-	915	-	-	-	-	-
Chromium (di-)silicide + + Molybdenum (di-)silicide	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-silicon-titanium cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-tantalum intermetallics (Cr_2Ta_2)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Chromium-titanium intermetallics + Chromium (sesqui-) oxide	5	-	-	-	-	-	-	-	-	-	926	-	928-930	932	-	-
Chromium-titanium intermetallics + Copper cermets	5	917	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium-titanium intermetallics + Molybdenum cermets	6-II	919	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium zirconate ($Cr_2O_3 \cdot ZrO_2$)	4-II	-	-	-	-	-	-	-	-	-	1508	-	-	-	-	-
Chromium-zirconium intermetallics (Cr_2Zr)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Chronin	2-I	-	-	-	-	-	-	-	-	-	70	-	-	-	-	-
Chrycote coating on copper	6-II	-	-	-	-	-	-	-	-	-	-	-	1499	-	-	-
Clad steel	6-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
Clinoenstatite	4-II	-	-	-	-	-	-	-	-	-	1295	-	-	-	-	-
Coatings																
Aluminide on niobium	6-II	-	-	-	-	-	-	-	-	-	-	-	1435-1437	1439	-	-
Aluminide on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	1447-1449	1451	-	-
Aluminized-silicone paint on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1497	-	-
Aluminum on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1267	-	-
Aluminum oxide on AISI 446	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1349	-	-
Aluminum phosphate on nickel	6-II	-	-	-	-	-	-	-	-	-	-	-	1431	-	-	-
Barium titanate on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1371	-	-	-
Boron on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	-	1289	-	-	-
Boron on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1291	-	-	-
Boron carbide on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1403	1405	-	-
Calcium titanate on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1371	-	-	-
Carbon on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	1293	1295	-	-	-
Chromalloy W-2 on molybdenum-titanium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1505-1509	-	-	-
Chromium carbide-cobalt blend on iron	6-II	-	-	-	-	-	-	-	-	-	-	1407	1409	-	-	-
Chrycote on copper	6-II	-	-	-	-	-	-	-	-	-	-	-	1499	-	-	-
Cobalt oxide on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1373-1375	-	-	-
Copper on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1301	-	-
Dow-Corning XP-310 on Ti-75A (AMS 4901)	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1497	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Coatings (cont.)																
Durak MG on molybdenum-titanium alloy	6-II	-	-	-	-	-	-	-	-	-	-	-	1501-1503	-	-	-
Enamel on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1515	-	-	-
Enamel on AISI 321	6-II	-	-	-	-	-	-	-	-	-	-	-	1513	-	-	-
Enamel on Inconel	6-II	-	-	-	-	-	1511	-	-	-	-	-	-	-	-	-
Gold on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1307	-	-
Gold on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	1303	1305	-	-
Graphite, pyrolytic, on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1297-1299	-	-	-
Hafnium (di-)oxide on tungsten	6-II	-	-	-	-	-	-	-	-	-	-	-	1377-1379	-	-	-
Hastelloy C on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1337	-	-	-
Hastelloy X on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1339	-	-	-
Iron(ic) oxide on stellite no. 25 (L-605)	6-II	-	-	-	-	-	-	-	-	-	-	-	1381-1383	-	-	-
Iron titanate on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1385	-	-	-
Kennametal K-151A on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1491	-	-	-
Kennametal K-162B on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1493	-	-	-
Magnesium fluoride on quartz	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1425	1427	-
Molybdenum on iron	6-II	-	-	-	-	-	-	-	-	-	-	1309	1311	-	-	-
NBS coating A-418 on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	1361-1363	-	-	-
NBS coating A-418 on stainless steel	6-II	-	-	-	-	-	-	-	-	-	-	-	1365-1367	-	-	-
NBS coating N-143 on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	1353-1355	-	-	-
NBS coating N-143 on stainless steel	6-II	-	-	-	-	-	-	-	-	-	-	-	1357-1359	-	-	-
Nickel aluminide on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	1453-1455	1457	-	-
Nickel chromite on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1387	-	-	-
Nickel-chromium alloys on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1333	1335	-	-
Niobium aluminide on niobium	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1459	-	-
Platinum on copper	6-II	-	-	-	-		-	-	-	-	-	-	1313	-	-	-
Platinum on quartz	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1317	1319	-
Platinum on stainless steel	6-II	-	-	-	-	-	-	-	-	-	-	-	1315	-	-	-

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Coatings (cont.)																
Rokide A on AISI 446	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1351	-	-
Rokide C on titanium alloy Ti-6 Al-4 V	6-II	-	-	-	-	-	-	-	-	-	-	-	1345-1347	-	-	-
Silicide on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	-	1467-1469	1471	-	-
Silicide on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1473-1475	1477	-	-
Silicide on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	1479-1481	1483	-	-
Silicide on tungsten	6-II	-	-	-	-	-	-	-	-	-	-	-	1485-1487	1489	-	-
Silicon carbide on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1415	-	-	-
Silicon carbide on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1411-1413	-	-	-
Silicon (mon-)oxide on aluminum	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1389	-	-
Silicon (di-)oxide on aluminum	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1391	-	-
Silicone on Inconel	6-II	-	-	-	-	-	1495	-	-	-	-	-	-	-	-	-
Silver on AISI 321	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1321	-	-
Silver on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1323	-	-
Silver sulfide on silver	6-II	-	-	-	-	-	-	-	-	-	-	1431	1433	-	-	-
Strontium titanate on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1393	-	-	-
Tantalum aluminide on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1461-1463	1465	-	-
Tantalum carbide on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1417	1419	-	-
Titanium (di-)oxide and aluminum on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	-	1395	-	-	-
Tungsten on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1329	1331	-	-
Tungsten on iron	6-II	-	-	-	-	-	-	-	-	-	-	1325	1327	-	-	-
Tungsten-cobalt alloys on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1341	1343	-	-
Tungsten carbide on iron	6-II	-	-	-	-	-	-	-	-	-	-	1421	1423	-	-	-
Zirconium (di-)oxide on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1397	-	-
Zirconium (di-)oxide on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1399	1401	-	-
Cobalt (Co)	1	436	436	-	-	-	438	440	442	-	444	446	448-450	-	-	-
Cobalt + Chromium + ΣX_i	2-II	879, 882	879	-	-	-	-	884	886-888	890	892-906	-	908-914	916	-	-
Cobalt + Copper + ΣX_i	2-II	-	918	-	-	-	920	-	-	-	-	-	-	-	-	-
Cobalt + Gold	2-I	-	-	-	-	-	78	-	-	-	-	-	-	-	-	-
Cobalt + Gold + ΣX_i	2-II	-	922	-	-	-	924	-	-	-	-	-	-	-	-	-

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Cobalt + Iron	2-I	-	-	-	-	80	82	84	-	-	-	-	86	-	-	88
Cobalt + Iron + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	926-930	-	-	-	-	-
Cobalt + Manganese + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	932	-	-	-	-	-
Cobalt + Nickel	2-I	92	-	-	-	90	-	-	-	-	-	-	94	-	-	96
Cobalt + Nickel + ΣX_i	2-II	-	-	-	-	-	-	-	934	936	938	-	-	-	-	-
Cobalt + Palladium + ΣX_i	2-II	-	940	-	-	-	942-944	-	-	-	-	-	-	-	-	-
Cobalt + Vanadium	2-I	-	-	-	-	-	-	-	-	-	98	-	-	-	-	-
Cobalt alloys (special designations)																
Hastelloy 25	2-II	-	-	-	-	-	-	-	-	-	898	-	-	-	-	-
Haynes 152	2-II	-	-	-	-	-	-	-	-	-	898	-	-	-	-	-
HE 1049	2-II	-	-	-	-	-	-	884	888	-	900	-	-	-	-	-
J-1570	2-II	-	-	-	-	-	-	-	934	-	938	-	-	-	-	-
Jessop G32	2-II	879	-	-	-	-	-	-	888	-	892	-	-	-	-	-
Lohm	2-I	-	-	-	-	-	-	-	138	-	-	-	-	-	-	-
MAR-M302	2-II	-	-	-	-	-	-	-	-	-	898	-	-	-	-	-
PWA-653-A	2-II	-	-	-	-	-	-	-	-	-	898	-	-	-	-	-
Rexalloy 33	2-II	-	-	-	-	-	-	-	-	-	906	-	-	-	-	-
S-816	2-II	-	-	-	-	-	-	-	888, 934	890, 936	896, 938	-	-	-	-	-
SM-302	2-II	-	-	-	-	-	-	-	-	-	898	-	-	-	-	-
Stellites (see Stellite)																
V-36	2-II	-	-	-	-	-	-	-	-	-	896	-	-	-	-	-
Vitallium	2-II	-	879	-	-	-	-	-	-	-	894	-	-	-	-	-
WI-52	2-II	-	-	-	-	-	-	-	888	-	-	-	-	-	-	-
X-40	2-II	-	-	-	-	-	-	-	888	-	-	-	-	-	-	-
X-63	2-II	-	-	-	-	-	-	-	888	-	-	-	-	-	-	-
Cobalt aluminates																
$CoO \cdot Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	995	-	-	-	-	-
$Co_2O_3 \cdot Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	995	-	-	-	-	-
Cobalt aluminide (CoAl)	6-I	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-
Cobalt beryllide (CoBe)	6-I	-	158	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt blue glass	4-II	-	-	-	-	-	-	-	-	-	-	-	1847	1849	1851	-
Cobalt (mono-) boride (CrB)	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt carbide (Co_3C)	5	-	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt-chromium alloys + Titanium (di-) boride cermet	6-II	-	930	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt-chromium intermetallics (CoCr)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt ferrite ($CoO \cdot Fe_2O_3$)	4-II	-	-	-	-	-	1071	1073	-	-	-	-	-	-	-	-
Cobalt-lead silicate glass	4-II	-	-	-	-	-	1735	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Cobalt-molybdenum intermetallics (CoMo)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt-niobium intermetallics (Co_3Nb_2)	6-I	-	683	-	-	-	-		-	-	-	-	-	-	-	-
Cobalt oxides																
CoO	4-I	-	-	-	-	-	-	142	-	-	116	-	-	-	-	-
Co_3O_4	4-I	-	-	-	-	-	-	144	-	-	-	-	-	-	-	-
Cobalt oxide coated tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1373-1375	-	-	-
Cobalt(ous) oxide + Copper(ic) oxide	4-I	-	-	-	-	-	-	691	-	-	-	-	-	-	-	-
Cobalt(ous) oxide + Nickel (mon-)oxide	4-I	-	-	-	-	-	-	693	-	-	-	-	-	-	-	-
Cobalt (ortho-)phosphate ($3\,CoO \cdot P_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1169	-	-	-	-	-
Cobalt phosphide (Co_2P)	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt silicides																
CoSi	6-I	-	397	-	-	-	399	401	529	-	403	-	-	-	-	-
$CoSi_2$	6-I	-	397	-	-	-	-	-	-	-	-	-	-	-	-	-
$CoSi_3$	6-I	-	397	-	-	-	-	-	-	-	-	-	-	-	-	-
Co_2Si	6-I	-	397	-	-	-	-	-	-	-	-	-	-	-	-	-
Co_3Si	6-I	-	397	-	-	-	-	-	-	-	403	-	-	-	-	-
Cobalt-titanium intermetallics																
CoTi	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
$CoTi_2$	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt-tungsten intermetallics (CoW)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt-zirconium intermetallics (Co_4Zr)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Coke	1	-	-	-	-	-	85	-	87	-	-	-	-	-	-	-
Coke, graphitized	1	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Composite systems																
Alumina bubbles - graphite fibers system	6-II	-	-	-	-	-	-	-	1279	-	-	-	-	-	-	-
Dexiglas paper - aluminum foil - graphite fiber system	6-II	-	-	-	-	-	-	-	1283	-	-	-	-	-	-	-
Fiberfrax paper - tantalum shield - graphite fibers system	6-II	-	-	-	-	-	-	-	1285	-	-	-	-	-	-	-
Graphite fibers - tantalum shield system	6-II	-	-	-	-	-	-	-	1281	-	-	-	-	-	-	-
Concrete	5	-	-	-	-	-	-	-	1027	-	-	-	-	-	-	-
Conolon N-1 laminate	6-II	-	-	-	-	-	-	-	-	-	1174	-	-	-	-	-
Container glasses	4-II	-	-	-	-	-	-	-	-	-	-	-	1833	1835	1837	-
Contracid	2-II	-	-	-	-	-	-	-	1261	-	-	-	-	-	-	-
Copolyvinyl chloride + Acetate	6-II	-	-	-	-	-	-	-	-	-	960	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Copper (Cu)	1	452	452	452	452	452	454	456	458	460	462	464	466-470	472-477	-	479
Copper, commercial coalesced .	1	452	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper DS (British aircraft material spec.)	1	-	-	-	-	-	-	-	-	-	-	-	-	472	-	-
Copper, electrolytic	1	452	452	-	-	-	-	456	-	-	462	-	466	472	-	-
Copper, electrolytic tough pitch (Fed. Spec. QQC-502)	1	452	-	-	-	-	-	456	458	-	462	464	468	474	-	-
Copper, electrolytic tough pitch (Fed. Spec. QQC-576)	1	-	-	-	-	-	-	456	458	-	462	464	468	474	-	-
Copper, OFHC	1	-	-	-	-	-	-	-	458	460	-	-	-	-	-	-
Copper, tellurium	2-I	-	-	-	-	-	-	-	-	-	152	-	-	-	-	-
Copper coated with chrycote . .	6-II	-	-	-	-	-	-	-	-	-	-	-	1499	-	-	-
Copper coated with platinum coating	6-II	-	-	-	-	-	-	-	-	-	-	-	1313	-	-	-
Copper coating on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1301	-	-
Copper + Aluminum	2-I	100	-	-	-	-	102-104	106	108	-	110	-	-	-	-	-
Copper + Aluminum + ΣX_i . . .	2-II	-	-	-	-	-	946	-	948	-	950	952	954-958	960	-	-
Copper + Beryllium	2-I	-	-	-	-	-	-	112	-	-	-	-	-	-	-	-
Copper + Chromium	2-I	-	-	-	-	-	114	-	116	-	-	-	-	-	-	-
Copper + Chromium + ΣX_i . . .	2-II	-	-	-	-	-	962	-	964	-	-	-	-	-	-	-
Copper + Cobalt	2-I	-	-	-	-	-	-	-	118	-	-	-	-	-	-	-
Copper + Cobalt + ΣX_i	2-II	-	966	-	-	-	968	-	970-972	-	-	-	-	-	-	-
Copper + Gold																
$CuAu_3$	2-I	-	-	-	-	-	-	204	-	-	206	-	-	-	-	-
Cu_3Au	2-I	-	-	-	-	-	-	204	-	-	206	-	-	-	-	-
Copper + Iron	2-I	-	-	-	-	-	120	122	124	-	-	-	-	-	-	-
Copper + Iron + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	-	-	974	-	-	-
Copper + Lead	2-I	126	-	-	-	-	-	-	-	-	128	-	-	-	-	-
Copper + Lead + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	976	-	-	-	-	-
Copper + Manganese	2-I	-	-	-	-	-	130	132	-	-	-	-	-	-	-	-
Copper + Manganese + ΣX_i . . .	2-II	-	-	-	-	-	978	-	980	-	-	-	-	-	-	-
Copper + Nickel	2-I	-	-	-	-	-	134	136	138	-	-	-	-	-	-	
Copper + Nickel + ΣX_i	2-II	-	-	-	-	-	982	-	984-986	-	988	-	-	-	-	-
Copper + Palladium	2-I	-	-	-		-	140	-	142	-	-	-	-	-	-	-
Copper + Palladium + ΣX_i . . .	2-II	-	990	-	-	-	992	-	-	-	-	-	-	-	-	-
Copper + Platinum	2-I	-	-	-	-	-	144	-	-	-	-	-	-	-	-	-
Copper + Silicon	2-I	-	-	-	-	-	146	-	-	-	-	-	-	-	-	-
Copper + Silicon + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	994	-	-	-	-	-
Copper + Silver	2-I	-	-	-	-	-	-	-	-	-	148	-	-	-	-	-
Copper + Tellurium	2-I	150	-	-	-	-	-	-	-	-	152	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Copper + Tin	2-I	154	-	-	-	-	156	-	158	-	160	-	162	-	-	-
Copper + Tin + ΣX_i	2-II	-	-	-	-	-	-	-	996	-	998	-	-	-	-	-
Copper + Titanium	2-I	164	164	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper + Uranium	2-I	166	166	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper + Zinc	2-I	168	-	-	-	-	170	172	-	174	-	-	176-180	182	-	-
Copper + Zinc + ΣX_i	2-II	-	-	-	-	-	-	-	1000	-	1002-1004	-	-	-	-	-
Copper + Zirconium	2-I	184	-	-	-	-	186	-	188	-	-	-	-	-	-	-
Copper + Zirconium + ΣX_i	2-II	-	-	-	-	-	1006	-	1008	-	-	-	-	-	-	-
Copper alloys (special designations)																
Admiralty nickel	2-II	-	-	-	-	-	-	-	-	-	968	-	-	-	-	-
Aterite	2-II	-	-	-	-	-	-	-	-	-	1004	-	-	-	-	-
Manganin	2-II	-	-	-	-	-	978	-	-	-	-	-	-	-	-	-
Monels (see Monel)																
Ms-58	2-II	-	-	-	-	-	-	-	1000	-	-	-	-	-	-	-
Ms-77-22-2	2-II	-	-	-	-	-	-	-	1000	-	-	-	-	-	-	-
Navy "M"	2-II	-	-	-	-	-	-	-	996	-	-	-	-	-	-	-
Porosint	2-I	-	-	-	-	-	-	-	158	-	-	-	-	-	-	-
Tempaloy 836	2-II	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
Tempaloy 841	2-II	-	-	-	-	-	-	-	-	-	950	-	-	-	-	-
Copper ferrites																
$CuO \cdot Fe_2O_3$	4-II	-	-	-	-	-	1075	1077	-	-	-	-	-	-	-	-
$Cu_xFe_{3-x}O_4$	4-II	-	-	-	-	-	-	1077	-	-	-	-	-	-	-	-
Copper indium telluride ($CuInTe_2$)	6-I	-	-	-	-	-	-	-	572	-	-	-	-	-	-	-
Copper oxide (CuO)	4-I	-	-	-	-	-	118	150	-	-	-	-	-	-	-	152
Copper silver indium tellurides ($Ag_xCu_{1-x}InTe_2$)	6-I	-	-	-	-	-	-	-	640	-	-	-	-	-	-	-
Cordierite	4-II	-	-	-	-	-	1298	1300	1302	-	1304-1308	-	-	-	-	-
Cordierite 202	4-II	-	-	-	-	-	-	-	1302	-	-	-	-	-	-	-
Cordierite, barium-	4-II	-	-	-	-	-	-	-	-	-	1217-1221	-	-	-	-	-
Cordierite, lead-	4-II	-	-	-	-	-	-	-	-	-	1252-1254	-	-	-	-	-
Cordierite, lead-barium	4-II	-	-	-	-	-	-	-	-	-	1256-1258	-	-	-	-	-
Cordierite bodies	4-II	-	-	-	-	-	-	-	-	-	1310	-	-	-	-	-
Corning 0080 glass	4-II	-	-	-	-	-	-	-	1795	1793	-	-	-	-	-	-
Corning 1723 glass	4-II	-	-	-	-	-	-	1675	-	1677	-	-	1679	1681	1683-1685	-
Corning 7740 glass	4-II	-	-	-	-	-	-	1697	-	1701	-	-	1705	1709	1711-1713	-
Corning 7900 glass	4-II	-	-	-	-	-	-	1655	-	1661	-	-	1665	1669	1671-1673	-

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Corning 7940 glass	4-II	-	-	-	-	-	-	1655	-	-	-	-	1665	1669	1671-1673	-
Corning 8325 glass	4-II	-	-	-	-	-	-	-	-	1687	-	-	-	-	-	-
Corning 8362 glass	4-II	-	-	-	-	-	-	-	-	1749	-	-	-	-	-	-
Corning 9752 glass	4-II	-	-	-	-	-	-	-	-	-	-	-	1847	1849	1851	-
Corundum	4-I	-	-	-	-	-	-	8	-	-	22	-	-	-	-	-
Cresol resin	6-II	-	-	-	-	-	-	1004	-	-	-	-	-	-	-	-
Cristobalite	4-I	-	-	-	-	-	-	-	-	-	367	-	-	-	-	-
Crown glass	4-II	1693	1693	-	-	-	-	1697	-	-	1723	-	-	-	-	-
Crystolon-R	5	-	-	-	-	-	-	-	-	-	-	-	131, 135	-	-	-
Curium (Cm)	1	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D																
Dexiglas paper - aluminum foil - graphite fibers composite system	6-II	-	-	-	-	-	-	-	1283	-	-	-	-	-	-	-
Diall 50-01 resin	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Diall 50-51 resin	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Diall 50-52 resin	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Diall 52-01 resin	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Diall 52-20-30 resin	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Diallylphthalate, reinforced	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Diamond	1	392	392	-	-	392	-	394	396	-	398	-	-	400	-	-
Dihydroperfluorobutyl acrylate, 1, 1-	6-II	1051	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dow-Corning XP-310 on Ti-75A (AMS 4901)	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1497	-	-
Durak MG coating on molybdenum-titanium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1501-1503	-	-	-
Duranickel 301	2-II	-	-	-	-	-	-	-	-	-	1117	-	-	-	-	-
Durchy	5	-	-	-	-	-	-	-	-	-	-	-	821	-	-	-
Dures 16274	6-II	-	-	-	-	-	982	-		-	-	-	-	-	-	-
Dures 16694	6-II	-	-	-	-	-	1111	-	-	-	-	-	-	-	-	-
Durold 5600	6-II	1097	-	-	-	-	-	-	1099	-	-	-	-	-	-	-
Dynakon rod F	6-II	-	-	-	-	-	-	-	-	-	1109	-	-	-	-	-
Dynakon sheet A3A	6-II	-	-	-	-	-	-	-	-	-	1109	-	-	-	-	-
Dysprosia	4-I	154	154	-	-	-	-	156	-	-	158	-	-	-	-	-
Dysprosium (Dy)	1	483	483	483	483	483	485	-	-	-	-	-	-	-	-	487
Dysprosium + Tantalum + ΣX_1	2-II	-	-	-	-	-	-	-	-	-	1010	-	-	-	-	-
Dysprosium aluminate (Dy_2O_3 $2\,Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	997	-	-	-	-	-

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Dysprosium borides																
DyB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DyB_6	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysprosium carbide (DyC_2)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysprosium-cobalt intermetallics		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$CyCo_2$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$DyCo_5$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysprosium hydride (DyH_3)	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysprosium niobate ($Dy_2O_3 \cdot Nb_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1123	-	-	-	-	-
Dysprosium oxide (Dy_2O_3)	4-I	154	154	-	-	-	-	156	-	-	158	-	-	-	-	-
Dysprosium oxide + Cerium (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	695	-	-	-	-	-
Dysprosium oxide + Uranium (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	697	-	-	-	-	-
Dysprosium oxide + Zirconium (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	699	-	-	-	-	-
Dysprosium silicide ($DySi_2$)	6-I	523	524	-	-	-	527	-	-	-	-	-	-	-	-	-
Dysprosium sulfides																
DyS_2	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dy_2S_3	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Dy_5S_7	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
E																
Eastman Intran glasses	4-II	-	-	-	-	-	-	1853	-	-	-	-	-	-	-	-
Eccofoam	6-II	1084	-	-	-	-	-	-	1080	-	-	-	-	-	-	-
Elastomer, isocyanate polyester	6-II	960	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electroconducting glass	4-II	-	-	-	-	-	-	-	-	-	-	-	1839	1841	1843-1845	-
Electroconducting glass 547-26	4-II	-	-	-	-	-	-	-	-	-	-	-	1839	1841	1843-1845	-
Electroconducting glass LOF-81E-19778	4-II	-	-	-	-	-	-	-	-	-	-	-	1839	1841	1843-1845	-
Electroconducting glass LOF-PB-19195	4-II	-	-	-	-	-	-	-	-	-	-	-	1839	1841	1843-1845	-
Enamel on Inconel	6-II	-	-	-	-	-	1511	-	-	-	-	-	-	-	-	-
Enamel, rinsed-Mason black, on AISI 321	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1513	-	-
Enamel, spinel, coating on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1515	-	-	-
Enstatite	4-II	-	-	-	-	-	-	-	-	-	1295	-	-	-	-	-
Epoxide	6-II	1006	-	-	-	-	-	-	1010	-	1012	-	-	-	-	-
Epoxide, Hysol 6000-OP	6-II	1006	-	-	-	-	-	-	1010	1082	1012	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Epoxide, reinforced	6-II	-	-	-	-	-	-	1117	1120	1220	1122-1124	-	-	-	-	-
Epoxy, DER332	6-II	-	-	-	-	-	-	1008	-	-	-	-	-	-	-	-
Epoxy and plyophen copolymer resin, reinforced	6-II	-	-	-	-	-	-	-	1218	-	-	-	-	-	-	-
Epoxy resin	6-II	-	-	-	-	-	-	1008	-	-	-	-	-	-	-	-
Epoxy resin, reinforced	6-II	-	-	-	-	-	-	1115-1117	1120	1220	1122-1124	-	-	-	-	-
Erbia	4-I	160	-	-	-	-	-	162	-	-	164	-	166	-	-	-
Erbium (Er)	1	489	489	489	489	489	491	493	-	-	495	-	497	-	-	499
Erbium borides																
ErB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ErB_6	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium carbide (ErC_2)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium-cobalt intermetallics ($ErCo_5$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium-gallium intermetallics ($ErGa_2$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium hydride (ErH_3)	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium-manganese intermetallics ($ErMn_2$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium-nickel intermetallics ($ErNi_5$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium oxide (Er_2O_3)	4-I	160	-	-	-	-	-	162	-	-	164	-	166	-	-	-
Erbium selenides																
ErSe	6-I	-	-	-	-	-	367	-	-	-	-	-	-	-	-	-
Er_2Se_3	6-I	-	-	-	-	-	367	-	-	-	-	-	-	-	-	-
Erbium-silver intermetallics (ErAg)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium sulfides																
ErS	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Er_2S_3	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Er_5S_7	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Erbium tellurides (Er_2Te_3)	6-I	-	-	-	-	-	638	-	-	-	-	-	-	-	-	-
Ethyl cellulose	6-II	-	-	-	-	-	-	-	-	-	948	-	-	-	-	-
Etruria Marl	4-I	-	-	-	-	-	-	-	-	-	802-812	-	-	-	-	-
Eucryptite	4-II	-	-	-	-	-	-	-	-	-	1270	-	-	-	-	-
Europium (Eu)	1	501	501	501	501	501	503	505	-	-	-	-	-	-	-	507
Europium (hexa-)boride (EuB_6)	6-I	296	-	-	-	-	300	-	-	-	-	-	-	-	-	-
Europium oxide (Eu_2O_3)	4-I	168	168	-	-	-	-	170	-	-	172	-	-	-	-	-
Europium oxide + Iron-chromium alloy cermet	6-II	-	-	-	-	-	-	-	-	-	786	-	-	-	-	-
Europium silicide ($EuSi_2$)	6-I	523	524	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Europium sulfides																
EuS	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EuS_2	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eu_3S_4	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Evanohm	2-II	1119	-	-	-	-	1124	-	-	-	-	-	-	-	-	-
F																
Fabrics																
Fiber glass	6-II	-	-	-	-	-	-	-	-	1269	-	-	-	-	-	-
Graphite	6-II	-	-	-	-	-	-	-	-	1271	-	-	-	-	-	-
Nylon	6-II	-	-	-	-	-	-	-	-	1273	-	-	-	-	-	-
Organic fiber	6-II	-	-	-	-	-	-	-	-	1275	-	-	-	-	-	-
Silica	6-II	-	-	-	-	-	-	-	-	1277	-	-	-	-	-	-
Feldspars																
Barium	4-II	-	-	-	-	-	-	1205	-	-	1207	-	-	-	-	-
Calcium	4-II	-	-	-	-	-	-	-	-	-	1235	-	-	-	-	-
Lithium	4-II	-	-	-	-	-	-	-	1266	-	1270	-	-	-	-	-
Lithium-potassium	4-II	-	-	-	-	-	-	-	-	-	1283	-	-	-	-	-
Sodium	4-II	-	-	-	-	-	-	-	-	-	1326	-	-	-	-	-
Sodium-potassium	4-II	-	-	-	-	-	-	-	-	-	1330	-	-	-	-	-
Strontium	4-II	-	-	-	-	-	-	-	-	-	1334	-	-	-	-	-
Ferramic E	4-II	-	-	-	-	-	-	1093	-	-	-	-	-	-	-	-
Ferroferric oxide + Iron(ic) oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	715	-	-	-
Fiber cermets	6-II	928	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fiber glass fabrics	6-II	-	-	-	-	-	-	-	-	1269	-	-	-	-	-	-
Fiberfrax paper - tantalum shield - graphite fibers composite system	6-II	-	-	-	-	-	-	-	1285	-	-	-	-	-	-	-
Fiberite 4030-190	6-II	-	-	-	-	-	1103	-	-	-	-	-	-	-	-	-
Firebricks																
Alumina	4-I	-	-	-	-	-	613	-	621	-	-	-	-	-	-	-
ASTM group no. 16 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
ASTM group no. 20 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
ASTM group no. 23 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
ASTM group no. 26 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
ASTM group no. 28 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
ASTM group no. 30 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
Egyptian	4-I	-	-	-	-	-	-	-	798	800	-	-	-	-	-	-
Firebricks	4-I	-	-	-	-	-	-	-	798	789, 800	-	-	-	-	-	-
K-28 insulating	5	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
Siliceous	5	-	-	-	-	-	-	-	-	-	-	-	1043	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Flint container glass	4-II	-	-	-	-	-	-	-	-	-	-	-	1799	1801	1729	-
Flint glass	4-II	-	-	-	-	-	-	1829	-	-	-	-	-	-	-	-
Fluorothene	6-II	1030	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
FM-5064 graphite-phenolic laminates	6-II	-	-	-	-	-	-	1140	-	-	-	-	-	-	-	-
Forsterite	4-II	1285	1285	-	-	-	1287	-	1291	-	-	-	-	-	-	-
Forsterite 243	4-II	1285	1285	-	-	-	-	-	-	-	-	-	-	-	-	-
Forsterite-stainless steel laminates	6-II	-	-	-	-	-	-	-	1221	-	-	-	-	-	-	-
Fortical 28227	6-II	-	-	-	-	-	-	-	-	-	944	-	-	-	-	-
Fortical 28238	6-II	-	-	-	-	-	-	-	-	-	944	-	-	-	-	-
Fresco FR0020	6-II	-	-	-	-	-	-	1214	-	-	-	-	-	-	-	-
FRLG 2502-1	6-II	-	-	-	-	-	-	-	-	1277	-	-	-	-	-	-
Furfural formaldehyde, wood flour filled	6-II	-	-	-	-	-	-	-		-	1000	-	-	-	-	-
G																
Gadolinia	4-I	174	174	-	-	-	-	176	178	-	180	-	182	-	-	-
Gadolinum (Gd)	1	509	509	509	509	509	511	-	-	-	513	-	-	-	-	-
Gadolinium + Tantalum	2-I	-	-	-	-	-	-	-	-	-	190	-	-	-	-	-
Gadolinium borides																
GdB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GdB_6	6-I	295	296	-	-	-	300	-	-	-	-	-	-	-	-	-
Gadolinium carbides																
GdC_2	5	294	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium-cobalt intermetallics																
GdCo	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdCo_2$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdCo_3$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdCo_4$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdCo_5$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2Co_3	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_3Co	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium-copper intermetallics																
GdCu	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdCu_4$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdCu_5$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium ferrides																
$GdFe_3$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdFe_4$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GeFe_5$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2Fe_3	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-		-

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Gadolinium ferride (cont.)																
Gd_2Fe_7	6-II	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium (tri-)fluoride (GdF_3)	5	-	407	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium-gallium intermetallics ($GdGa_2$)	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium hydrides																
GdH_2	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GdH_3	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium-nickel intermetallics																
GdNi	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdNi_2$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdNi_3$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdNi_4$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$GdNi_5$	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2Ni_7	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2Ni_{17}	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_3Ni	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_3Ni_2	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium-osmium intermetallics (Gd_2Os_3)	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium oxide (Gd_2O_3)	4-I	174	174	-	-	-	-	176	178	-	180	-	182	-	-	-
Gadolinium selenides																
GdSe	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2Se_3	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_3Se_4	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium silicides ($GdSi_2$)	6-I	523	-	-	-	-	527	-	-	-	-	-	-	-	-	-
Gadolinium-silver intermetallics (GdAg)	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium sulfides																
GdS_2	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gd_2S_3	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadolinium tellurides																
Gd_2Te	6-I	-	-	-	-	-	638	-	-	-	-	-	-	-	-	-
Gd_2Te_3	6-I	-	-	-	-	-	638	-	-	-	-	-	-	-	-	-
Gadolinium-yttrium-cobalt intermetallics ($Gd_{1-X}Y_XCo_5$)	6-I	665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Galena	5	-	-	-	-	-	-	-	-	-	-	-	-	688	-	-
Gallium antimonide (GaSb)	6-I	-	-	-	-	-	51	53	-	-	-	-	-	-	-	-
Gallium arsenide (GaAs)	6-I	-	-	-	-	-	-	83	-	85	-	-	-	-	-	-
Gallium (sesqui-) oxide (Ga_2O_3)	4-I	-	-	-	-	-	-	184	-	-	-	-	-	-	-	-
Gallium phosphide (GaP)	5	-	-	-	-	-	-	629	-	-	-	-	-	-	-	-
Gallium telluride (Ga_2Te_3)	6-I	-	-	-	-	-	-	574	-	-	-	-	-	-	-	-
Gehlenite	4-II	-	-	-	-	-	-	1233	-	-	1235	-	-	-	-	-

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German Flake	1	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-
	2-II	841	-	-	-	-	-	-	845	-	-	-	-	-	-	-
Germanium (Ge)	1	515	515	515	515	515	517	519	521	524	526	-	528-530	-	-	532
Germanium + Silicon	2-I	192	-	-	-	-	194	-	-	-	-	-	-	-	-	-
Germanium bismuth telluride ($Ge_{1-x}Bi_xTe$)	6-I	-	-	-	-	-	582	-	584	-	-	-	-	-	-	-
Germanium (di-)oxide (GeO_2)	4-I	-	-	-	-	-	-	186	-	-	188	-	-	-	-	190
Germanium oxide glass	4-II	1637	-	-	-	-	-	1639	-	-	-	-	-	-	-	-
Germanium silicide (GeSi)	6-I	-	-	-	-	-	-	405	-	-	-	-	-	-	-	-
Germanium telluride (GeTe)	6-I	-	-	-	-	-	576	-	578	-	-	-	-	-	-	580
Germanium telluride + Silver antimony telluride	6-I	-	-	-	-	-	715	-	-	-	-	-	-	-	-	-
Glasses (see individual glasses)																
Glass ceramics (see also pyroceram)	4-II	-	-	-	-	-	-	1587	1589	1591	-	-	1593-1599	1601	1603	-
Glucina	4-I	-	-	-	-	-	57	-	-	-	-	-	-	-	-	-
GMGA 5003 silicone	6-II	-	-	-	-	-	1070	-	-	-	-	-	-	-	-	-
Gold (Au)	1	534	534	-	-	534	536	538	540	-	542	544-546	548	550-552	-	554
Gold coating on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	1303	1305	-	-
Gold coating on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1307	-	-
Gold + Cadmium	2-I	196	196	196	-	-	198	-	-	-	-	-	-	-	-	200
Gold + Cobalt	2-I	-	-	-	-	-	202	-	-	-	-	-	-	-	-	-
Gold + Cobalt + ΣX_i	2-II	-	1012	-	-	-	1014	-	-	-	-	-	-	-	-	-
Gold + Copper	2-I	-	-	-	-	-	-	204	-	-	206	-	-	-	-	-
Gold + Copper + ΣX_i	2-II	-	-	-	-	-	1016	-	-	-	-	-	-	-	-	-
Gold + Iron	2-I	208	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gold + Manganese	2-I	210	-	-	-	-	212	-	-	-	-	-	-	-	-	-
Gold + Nickel	2-I	214	-	-	-	-	-	216	-	-	-	-	-	-	-	-
Gold + Palladium	2-I	-	-	-	-	-	218	-	-	-	220	-	-	-	-	-
Gold + Palladium + ΣX_i	2-II	-	1018	-	-	-	1020	-	-	-	-	-	-	-	-	-
Gold + Platinum	2-I	-	-	-	-	-	222	-	-	-	-	-	-	-	-	-
Gold + Silver	2-I	-	-	-	-	-	-	-	-	-	224	-	226	-	-	228
Gold + Uranium	2-I	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gold + Zinc	2-I	-	232	232	-	-	-	-	-	-	-	-	-	234	-	-
Gold alloy (special designations)																
Palau	2-I	-	-	-	-	-	-	-	-	-	220	-	-	-	-	-
Gold-manganese intermetallics (Au_2Mn)	6-I	-	-	-	-	-	648	-	-	-	-	-	-	-	-	-
Gold-titanium intermetallics (Au_2Ti)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Gold-zirconium intermetallics (Au_3Zr)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Goodyear foam-in-place.	6-II	962	-	-	-	-	-	-	-	-	966	-	-	-	-	-
Graphites (Special designations)																
Grade 580	1	-	-	-	-	-	-	-	-	-	-	-	110-112	-	-	-
Grade 896G	1	-	-	-	-	-	371	-	-	-	114	-	-	-	-	-
Grade 942S	1	-	-	-	-	-	371	-	-	-	116	-	-	-	-	-
Grade 3474D	1	-	-	-	-	-	371	118	120	-	122	124	126-128	130	-	-
Grade 3499	1	-	-	-	-	-	371	-	-	-	132	-	-	-	-	-
Grade 7087	1	105	-	-	-	-	-	134	136	138	140	142	144-146	148	-	-
Grade 7100	1	-	-	-	-	-	-	-	-	-	-	-	150-152	-	-	-
Grade AGHT	1	-	-	-	-	-	-	-	154	-	-	-	-	-	-	-
Grade AGKSP	1	-	-	-	-	-	-	-	-	-	-	-	156	158	-	-
Grade AGKT	1	-	-	-	-	-	371	-	-	-	-	-	-	-	-	-
Grade AGOT	1	-	-	-	-	-	160	-	162	-	165	-	-	-	-	-
Grade AGOT-CSF.	1	-	-	-	-	-	160	-	-	-	-	-	-	-	-	-
Grade AGOT-KC	1	-	-	-	-	-	160	-	-	-	-	-	-	-	-	-
Grade AGR	1	-	-	-	-	-	371	-	-	-	167	-	-	-	-	-
Grade AGX	1	-	-	-	-	-	-	-	-	-	169	-	171	-	-	-
Grade ATJ	1	103	-	-	-	-	371	175	177	-	179	-	182-186	190	-	-
Grade ATL-82	1	-	-	-	-	-	-	-	192	-	194	-	-	-	-	-
Grade AUC	1	-	-	-	-	-	-	-	-	-	-	-	196-198	200	-	-
Grade AWG	1	-	-	-	-	-	202	-	204	-	-	-	-	-	-	-
Grade CEP	1	-	-	-	-	-	-	-	-	-	206	-	-	-	-	-
Grade CFW	1	-	-	-	-	-	208	-	-	-	210	-	-	-	-	-
Grade CFZ	1	-	-	-	-	-	-	-	-	-	212	-	-	-	-	-
Grade CS	1	-	-	-	-	-	371	214	216	218	-	-	-	-	-	-
Grade CSF	1	-	-	-	-	-	-	-	220	-	222	-	-	-	-	-
Grade EH	1	-	-	-	-	-	371	-	-	-	224	-	-	-	-	-
Grade GBE	1	-	-	-	-	-	-	-	226	-	228	230	232-234	236	-	-
Grade GBH	1	105	-	-	-	-	-	238	240	-	242	244	246-248	250	-	-
Grade H1LM	1	-	-	-	-	-	-	-	-	-	-	-	252-254	-	-	-
Grade H3LM	1	-	-	-	-	-	371	-	-	-	256	-	258-260	-	-	-
Grade H4LM	1	-	-	-	-	-	-	-	262	-	264	-	-	-	-	-
Grade MH4LM	1	-	-	-	-	-	-	-	266	-	-	-	-	-	-	-
Grade NT-0005	1	-	-	-	-	-	371	-	-	-	349	-	-	-	-	-
Grade R-0008	1	-	-	-	-	-	268	-	270	-	-	-	-	-	-	-
Grade R-0025	1	-	-	-	-	-	-	-	272	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Graphites (special design.) (cont)																
Grad RT-0003	1	-	-	-	-	-	-	-	274	-	-	-	-	-	-	-
Grade RVA	1	-	-	-	-	-	-	-	-	-	276	-	-	-	-	-
Grade RVC	1	-	-	-	-	-	-	-	-	-	278	-	-	-	-	-
Grade RVD	1	-	-	-	-	-	-	-	-	-	280	-	-	-	-	-
Grade SA-25	1	-	-	-	-	-	-	-	282	-	-	-	-	-	-	-
Grade SPK	1	-	-	-	-	-	-	-	-	-	-	-	284	286	-	-
Grade TS	1	-	-	-	-	-	-	-	-	-	288	-	-	-	-	-
Nuclear grade TSP	1	-	-	-	-	-	-	-	290	-	-	-	-	-	-	-
Grade TSX	1	-	-	-	-	-	-	-	-	-	292	-	-	-	-	-
Grade W	1	-	-	-	-	-	-	-	294	-	296	-	-	-	-	-
Grade WSF	1	-	-	-	-	-	-	-	-	-	298	-	-	-	-	-
Grade ZT	1	-	-	-	-	-	300	-	302	-	-	-	-	-	-	-
Grade ZT-5001	1	-	-	-	-	-	-	-	302	-	-	-	-	-	-	-
Grade ZTA	1	-	-	-	-	-	-	-	-	-	305	-	-	-	-	-
Grade ZTB	1	-	-	-	-	-	-	-	-	-	307	-	-	-	-	-
Grade ZTC	1	-	-	-	-	-	-	-	-	-	309	-	-	-	-	-
Grade ZTD	1	-	-	-	-	-	-	-	-	-	311	-	-	-	-	-
Grade ZTE	1	-	-	-	-	-	-	-	-	-	313	-	-	-	-	-
Grade ZTF	1	-	-	-	-	-	-	-	-	-	315	-	-	-	-	-
Graphites, others																
Artificial grades	1	-	-	-	-	-	-	-	360	-	363	-	-	-	-	-
Carbon impregnated	1	-	-	-	-	-	-	-	358	-	-	-	-	-	-	-
Ceylon graphite	1	-	-	-	-	-	352	-	354	-	356	-	-	-	-	-
Coated with grade W graphite	1	-	-	-	-	-	-	-	294	-	296	-	-	-	-	-
Coated with silicon carbide	1		-	-	-	-	-	-	-	-	-	-	386	-	-	-
Cumberland graphite	1	-	-	-	-	-	352	-	354	-	-	-	-	-	-	-
Electrode	1	-	-	-	-	-	-	-	360	-	-	-	365	-	-	-
Experimental grades	1	-	-	-	-	-	337	-	339	343	349	-	-	-	-	-
Flake	1	-	-	-	-	-	-	-	-	-	369	-	-	-	-	-
Great Lakes base stock grades	1	-	-	-	-	-	-	-	-	-	381	-	-	-	-	-
Great Lakes end-cap grades	1	-	-	-	-	-	-	-	-	-	381	-	-	-	-	-
Great Lakes impervious grades	1	-	-	-	-	-	-	-	-	-	381	-	-	-	-	-
Hilger H. S. grade	1	-	-	-	-	-	352	-	354	-	-	-	-	-	-	-
Karbate	1	-	-	-	-	-	-	-	358	-	-	-	-	-	-	-
Lampblack-base	1	-	-	-	-	-	-	-	367	-	-	-	-	-	-	-
Natural graphite-base	1	-	-	-	-	-	352	-	354	-	-	-	-	-	-	-
Pyrolytic	1	-	-	-	-	-	-	-	317	-	319	-	325-331	333-335	-	-
Pyrolytic coating on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	573-575	-	-	-
Pyrolytic nucleated and regenerative	1	-	-	-	-	-	-	-	-	-	319	-	-	-	-	-
Silicon carbide bonded	1	-	-	-	-	-	-	-	-	-	-	-	386	-	-	-

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Graphites, others (cont.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unspecified grades	1	105	105	-	-	105	371	375	377	379	383	-	386-388	-	-	390
Graphite + Silicon carbide	5	-	-	-	-	-	-	737	-	-	-	-	-	-	-	-
Graphite + Thorium (di-)oxide	5	-	-	-	-	-	-	-	739	-	-	-	-	-	-	-
Graphite + Uranium (di-)carbide	5	-	-	-	-	-	-	-	743	-	-	-	-	-	-	-
Graphite + Uranium (di-)oxide	5	-	-	-	-	-	-	-	741	-	-	-	-	-	-	-
Graphite + Zirconium (pyro-)-carbide	5	-	-	-	-	-	-	-	-	-	745	-	-	-	-	-
Graphite fabric	6-II	-	-	-	-	-	-	-	-	1271	-	-	-	-	-	-
Graphite cloth laminates																
PT-0110	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
PT-0111	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
PT-0113	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
PT-0114	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
PT-0154	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
PT-0156	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
Graphite fibers - tantalum shield composite system	6-II	-	-	-	-	-	-	-	1281	-	-	-	-	-	-	-
Graphite-phenolic laminate FM-5064	6-II	-	-	-	-	-	-	1140	-	-	-	-	-	-	-	-
Gray cast iron	3	-	-	-	-	-	-	-	29-33	-	39	-	-	-	-	-
Gray cast iron, ferritic base	3	-	-	-	-	-	-	-	33	-	-	-	-	-	-	-
Gray cast iron, pearlitic base	3	-	-	-	-	-	-	-	31	-	-	-	-	-	-	-
H																
Hafnia	4-I	192	192	-	-	-	194	196	198	-	200	-	202	-	-	204
Hafnium (Hf)	1	556	556	-	-	-	558	560	-	-	562	-	-	-	-	-
Hafnium + Zirconium	2-I	236	236	-	-	-	238	240	242	-	244	-	-	-	-	246
Hafnium antimonide (HfSb)	6-I	-	-	-	-	-	55	-	-	-	-	-	-	-	-	-
Hafnium beryllide (Hf_2Be_{21})	6-I	-	-	-	-	-	-	98	-	-	100	-	-	-	-	-
Hafnium (di-)boride (HfB_2)	6-I	170	170	-	-	-	172	174	176	-	178	-	180	-	-	-
Hafnium carbide (HfC)	5	49	49	-	-	-	51	53	55	57	59	-	61	-	-	-
Hafnium carbide + Zirconium cermet	6-II	-	-	-	-	-	-	-	-	-	852	-	-	-	-	-
Hafnium-chromium intermetallics ($HfCr_2$)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnium-cobalt intermetallics ($HfCo_2$)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnium ferrides ($HfFe_2$)	6-I	-	306	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnium fluoride (HfF_4)	5	-	-	-	-	-	-	367	-	-	-	-	-	-	-	-
Hafnium germanide (HfGe)	6-I	-	-	-	-	-	325	-	-	-	-	-	-	-	-	-
Hafnium-manganese intermetallics ($HfMn_2$)	6-I	-	683	-	-	-	-	-	-	-	-	-	-	-	-	-

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Hafnium-molybdenum intermetallics ($HfMo_2$)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnium-nickel intermetallics ($HfNi_2$)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnium nitride (HfN)	5	517	517	-	-	-	519	521	523	-	525	-	527-529	-	-	531
Hafnium (di-)oxide (HfO_2)	4-I	192	192	-	-	-	194	196	198	-	200	-	202	-	-	204
Hafnium (di-)oxide coating on tungsten	6-II	-	-	-	-	-	-	-	-	-	-	-	1377-1379	-	-	-
Hafnium (di-)oxide + ΣX_i	4-I	-	-	-	-	-	-	-	-	-	711	-	-	-	-	-
Hafnium (di-)oxide + Calcium oxide	4-I	-	-	-	-	-	-	-	-	-	701	-	-	-	-	-
Hafnium (di-)oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	-	-	703	-	-	-	-	-
Hafnium (di-)oxide + Tantalum (pent-)oxide	4-I	-	-	-	-	-	-	-	-	-	705	-	-	-	-	-
Hafnium (di-)oxide + Titanium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	707	-	-	-	-	-
Hafnium (di-)oxide + Titanium (di-)oxide + Zirconium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	709	-	-	-	-	-
Hafnium selenide (HfSe)	6-I	-	-	-	-	-	331	-	-	-	-	-	-	-	-	-
Hafnium silicate (HfO_2 SiO_2)	4-II	-	-	-	-	-	-	-	-	-	1241	-	-	-	-	-
Hafnium silicides																
HfSi	6-I	-	524	-	-	-	-	-	-	-	-	-	-	-	-	-
$HfSi_2$	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnium tellurides (HfTe)	6-I	-	-	-	-	-	638	-	-	-	-	-	-	-	-	-
Hafnium-vanadium intermetallics (HfV_2)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Hafnon	4-II	-	-	-	-	-	-	-	-	-	1241	-	-	-	-	-
Hamilton standard foam-inplace	6-II	962	-	-	-	-	-	-	-	-	966	-	-	-	-	-
Hastelloy 25	2-II	-	-	-	-	-	-	-	-	-	898	-	-	-	-	-
Hastelloy 500	2-II	-	-	-	-	-	-	-	-	-	1154	-	-	-	-	-
Hastelloy A	2-II	-	-	-	-	-	-	-	1261	-	-	-	-	-	-	-
Hastelloy B	2-II	1277	1275	-	-	-	-	1279	1281	-	1287	1289	1293-1295	1297	-	-
Hastelloy C	2-II	1119	-	-	-	-	-	1130	1136	-	1166	-	-	-	-	-
Hastelloy C (AMS-5530)	2-II	1277	-	-	-	-	-	-	1281	-	1283	1289	1291-1295	1297	-	-
Hastelloy C (AMS-5530C)	2-II	-	-	-	-	-	-	-	-	-	-	1289	1293	1297	-	-
Hastelloy C coating on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1337	-	-	-
Hastelloy D	2-II	-	-	-	-	-	-	-	-	-	1301	-	-	-	-	-
Hastelloy F	2-II	-	-	-	-	-	-	-	-	-	1164	-	-	-	-	-
Hastelloy N	2-II	1277	-	-	-	-	-	-	1281	-	1283	-	-	-	-	-
Hastelloy R-235	2-II	1122	-	-	-	-	-	1128	1136-1138	-	1161	-	-	-	-	-

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Hastelloy X	2-II	1119, 1257	-	-	-	-	-	-	1134, 1261	-	1164	-	1172, 1189	1203	-	-
Hastelloy X coating on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1339	-	-	-
Hematite	4-I	-	-	-	-	-	214	218	-	-	22_	-	-	224	-	-
Hidurel 6	2-II	-	-	-	-	-	962	-	964	-	-	-	-	-	-	-
Holmia	4-I	-	-	-	-	-	-	2[illegible]6	-	-	208	-	-	-	-	-
Holmium (Ho)	1	564	564	564	564	564	566	-	-	-	-	-	-	-	-	-
Holmium borides																
HoB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HoB_6	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium carbides																
HoC_2	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ho_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium-cobalt intermetallics																
$HoCo_2$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$HoCo_5$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium ferrides																
$HoFe_2$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$HoFe_5$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium-gallium intermetallics ($HoGa_2$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium-manganese intermetallics																
$HoMn_2$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$HoMn_6$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium-nickel intermetallics																
$HoNi_2$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$HoNi_5$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holmium oxide (Ho_2O_3)	4-I	-	-	-	-	-	-	206	-	-	208	-	-	-	-	-
Honeycombs																
17-7PH stainless steel skin and core	6-II	-	-	-	-	-	-	1236	1230	-	1234	-	-	-	-	-
2024 T-3 aluminum alloy skin and core	6-II	-	-	-	-	-	-	1236	1230	-	1232	-	-	-	-	-
2024 T-3 aluminum alloy skin and alkyd isocyanate foam core	6-II	-	-	-	-	-	-	1236	1239	-	1243	-	-	-	-	-
2024 T-3 aluminum alloy skin and phenolic core	6-II	-	-	-	-	-	-	1236	1239	-	1241	-	-	-	-	-
Metal skin and metal core	6-II	-	-	-	-	-	-	1236	1230	-	1232-1234	-	-	-	-	-
Plastic and metal composites	6-II	-	-	-	-	-	-	1236	1239	-	1241-1245	-	-	-	-	-
Plastic skin and plastic core	6-II	-	-	-	-	-	-	-	1247-1253	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Honeycombs (cont.)																
Polyester P-43 resin skin and 2024 T-3 aluminum alloy core	6-II	-	-	-	-	-	-	1236	1239	-	1245	-	-	-	-	-
Polyester resin no. P-43 skin and polyester honeycomb core	6-II	-	-	-	-	-	-	1236	-	-	-	-	-	-	-	-
Polyester resin skin and epoxy resin core	6-II	-	-	-	-	-	-	-	1247	-	-	-	-	-	-	-
Polyester resin skin and phenolic resin core	6-II	-	-	-	-	-	-	-	1247	-	-	-	-	-	-	-
Polyester Vibrin 135 and 181 fabric faces and phenolic core	6-II	-	-	-	-	-	-	1236	-	-	-	-	-	-	-	-
TAC polyester Vibrin 135 and 181 fabric skin and alkyc isocyanate foam core	6-II	-	-	-	-	-	-	-	-	-	1249	-	-	-	-	-
Reinforced polyester skin and polyester core	6-II	-	-	-	-	-	-	-	-	-	1253	-	-	-	-	-
Hysol 6000-CP epoxide	6-II	1006	-	-	-	-	-	-	1010	1082	1012	-	-	-	-	-
I																
Igelit-PCU	6-II	-	-	-	-	-	-	1078	1086	1082	-	-	-	-	-	-
Ilmenite	4-II	-	-	-	-	-	1427	1429	-	-	1431	-	-	-	-	-
Incoloy	3	-	-	-	-	-	-	383	-	-	-	-	-	-	-	-
Incoloy 713C	2-II	-	-	-	-	-	-	1126	1140	-	1152	-	-	-	-	-
Incoloy 800	3	-	-	-	-	-	-	-	-	-	405	-	-	-	-	-
Incoloy 801	3	-	-	-	-	-	-	-	-	-	405	-	-	-	-	-
Incoloy 804	2-II	-	-	-	-	-	-	-	-	-	1164	-	-	-	-	-
Incoloy 825	2-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
Incoloy 901	2-II	-	-	-	-	-	-	1259	1261	-	-	-	-	-	-	-
Incoloy T	3	-	-	-	-	-	-	-	-	-	405	-	-	-	-	-
Inconel	2-II	1119	1119	-	-	-	1124	1128	1140, 1144, 1145	1148	1158, 1161	-	1172, 1177, 1191	-	-	-
Inconel coated with enamel	6-II	-	-	-	-	-	1151	-	-	-	-	-	-	-	-	-
Inconel coated with NBS coating A-418	6-II	-	-	-	-	-	-	-	-	-	-	-	1361-1363	-	-	-
Inconel coated with NBS coating N-143	6-II	-	-	-	-	-	-	-	-	-	-	-	1353-1355	-	-	-
Inconel coated with nickel aluminides	6-II	-	-	-	-	-	-	-	-	-	-	-	1453-1455	1457	-	-
Inconel coated with silicone	6-II	-	-	-	-	-	1495	-	-	-	-	-	-	-	-	-
Inconel coated with zirconium (di-)oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1397	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Inconel 600	2-II	1219, 1307	-	-	-	-	-	-	1223, 1313	-	1158	-	-	-	-	-
Inconel 604	2-II	-	-	-	-	-	-	-	-	-	1158	-	-	-	-	-
Inconel 625	2-II	-	-	-	-	-	-	-	-	-	1166	-	-	-	-	-
Inconel 700	2-II	-	-	-	-	-	-	-	1223	-	1227	-	-	-	-	-
Inconel 702	2-II	-	1119	-	-	-	-	1128	1144	-	1152	-	1193	1205	-	-
Inconel 718	2-II	-	-	-	-	-	-	-	-	-	1164	-	-	-	-	-
Inconel 721	2-II	-	-	-	-	-	-	-	-	-	1158	-	-	-	-	-
Inconel 722	2-II	-	-	-	-	-	-	-	-	-	1158	-	-	-	-	-
Inconel B	2-II	-	-	-	-	-	-	-	-	-	-	-	1174	-	-	-
Inconel M	2-II	-	-	-	-	-	-	-	-	-	1158	-	-	-	-	-
Inconel W	2-II	-	-	-	-	-	-	-	-	-	1158	-	-	-	-	-
Inconel X	2-II	1119	1119	-	-	-	1124	1128	1140	1148	1158	-	1172, 1177, 1186, 1195	1207	-	-
Inconel X coated with boron carbide	6-II	-	-	-	-	-	-	-	-	-	-	-	1403	1405	-	-
Inconel X coated with nickel-chromium alloy	6-II	-		-	-	-	-	-	-	-	-	-	1333	1335	-	-
Inconel X coated with tantalum carbide	6-II	-		-	-	-	-	-	-	-	-	-	1417	1419	-	-
Inconel X coated with tungsten	6-II	-	-	-	-	-		-	-	-	-	-	1329	1331	-	-
Inconel X coated with tungsten-cobalt alloy	6-II	-	-	-	-	-	-	-	-	-	-	-	1341	1343	-	-
Inconel X coated with zirconium (di-)oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	1399	1401	-	-
Inconel X 750	2-II	1122	-	-	-	-	-	-	1140	-	1158	-	-	-	-	-
Index rod (gas baked coke)	1	-	-	-	-	-	85	-	87	-	-	-	-	-	-	-
Indium antimonide (InSb)	6-I	-	-	-	-		57	59	61	63	65	-	-	-	-	-
Indium arsenide (InAs)	6-I	-	-	-	-	-	87	89	91	-	-	-	-	-	-	-
Indium bismuth selenide ($InBiSe_3$)	6-I	-	-	-	-	-	333	-	-	-	-	-	-	-	-	-
Indium (sesqui-)oxide (In_2O_3)	4-I	-	-	-	-	-	-	-	-	-	210	-	-	-	-	-
Indium phosphide (InP)	5	-	-	-	-	-	631	633	-	-	-	-	-	-	-	-
Indium telluride (In_2Te_3)	6-I	-	-	-	-	-	586	-	588	-	-	-	-	-	-	-
Inquartation silver	1	-	-	-	-	-	-	904	-	-	-	-	-	-	-	-
Insulating bricks (see bricks)																
Insulating firebricks (see firebricks)																
Insurok C-T-601	6-II	1128	-	-	-	-	-	1142	-	-	-	-	-	-	-	-
Insurok XXX-T-640	6-II	1128	-	-	-	-	-	1142	-	-	-	-	-	-	-	-
Intermetallics (see each individual intermetallics)																
Inverse spinel	4-I		-	-	-	-	-	691-693	-	-	-	-	-	-	-	-
Iodide titanium	1	-	993	-	-	-	996	999	1001	-	1005	-	-	-	-	1017

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Iodide zirconium	1	-	1099	-	-	-	1102	1104	1106	-	1111	-	-	-	-	-
Iridium (Ir)	1	568	568	-	-	568	570	572	574	-	-	-	576	-	-	-
Iridium + Rhodium	2-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	248
Iridium (tri-) silicide ($IrSi_3$)	6-I	-	-	-	-	-	407	-	-	-	-	-	-	-	-	-
Iron (Fe)	1	578	578	578	-	578	581	583	585	587	589	592	594-600	602	-	604
Iron, Armco	1	578	-	-	-	-	581	583	585	587	589	592	594, 598	602	-	-
Iron, electrolytic	1	-	578	-	-	578	581	583	-	-	589	-	-	-	-	604
Iron, Svea	1	-	-	-	-	-	-	-	585	-	-	-	-	-	-	-
Iron coated with chromium carbide - cobalt blend	6-II	-	-	-	-	-	-	-	-	-	-	1407	1409	-	-	-
Iron coated with molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	1309	1311	-	-	-
Iron coated with tungsten	6-II	-	-	-	-	-	-	-	-	-	-	1325	1327	-	-	-
Iron coated with tungsten carbide	6-II	-	-	-	-	-	-	-	-	-	-	1421	1423	-	-	-
Iron + ΣX_i	3	461	-	-	-	-	463	-	465	-	-	-	-	-	-	-
Iron + Aluminum + ΣX_i	3	45	-	-	-	-	47-51	-	-	-	-	-	-	-	-	-
Iron + Carbon + ΣX_i (C >2.00)	3	-	-	-	-	3	5	7-10	-	12-14	16-20	-	-	-	-	22
Iron + Carbon + ΣX_i (C >2.00)	3	27	-	-	-	-	-	-	29-37	-	39-41	-	-	-	-	-
Iron + Chromium + ΣX_i	3	55	53	-	-	-	57-63	65-77	79-83	85-94	96-118	120	122-134	136-138	-	-
Iron + Chromium + Nickel + + ΣX_i	3	140, 145	140-141	-	-	-	147-153	155-164	166-180	182-193	195-227	229-231	233-272	274-286	-	-
Iron + Cobalt + ΣX_i	3	-	-	-	-	-	288-290	292-294	296	298	300	-	-	302	-	-
Iron + Copper + ΣX_i	3	-	-	-	-	-	304	306	308	-	-	-	-	-	-	-
Iron + Manganese + ΣX_i	3	310	-	-	-	-	312-314	316-323	325-327	329-333	335-343	-	345-347	349	-	-
Iron + Molybdenum + ΣX_i	3	-	-	-	-	-	-	-	351	-	353	-	-	-	-	-
Iron + Nickel + ΣX_i	3	-	-	-	-	-	355	357-359	361-363	365	367-377	-	-	-	-	-
Iron + Nickel + Chromium + + ΣX_i	3	379	-	-	-	-	381	383	385-393	395-397	399-407	-	409-411	413	-	-
Iron + Platinum + ΣX_i	3	-	-	-	-	-	-	-	-	-	415	-	-	-	-	-
Iron + Silicon + ΣX_i	3	-	-	-	-	-	417-419	421-425	427-437	-	439-442	-	-	-	-	-
Iron + Tellurium + ΣX_i	3	-	-	-	-	-	-	446	-	-	-	-	-	-	-	-
Iron + Titanium + ΣX_i	3	-	-	-	-	-	-	448	-	-	-	-	-	-	-	-
Iron + Tungsten + ΣX_i	3	-	-	-	-	-	-	-	450	-	452	-	454	-	-	-
Iron + Vanadium + ΣX_i	3	-	-	-	-	-	456-458	-	-	-	-	-	-	-	-	-
Iron alloys (see cast irons and steels for special design.)																

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Iron aluminates																
$FeO \cdot Al_2O_3$	4-II	-	-	-	-	-	-	999	-	-	-	-	-	-	-	-
$Fe_2O_3 \cdot 2\ Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	1001	-	-	-	-	-
Iron beryllide ($FeBe_2$)	6-I	-	158	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron borides																
FeB	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Fe_2B	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron carbide (Fe_3C)	5	63	63	-	-	-	-	65	-	-	-	-	-	-	-	-
Iron chromites																
$FeO \cdot Cr_2O_3$	4-II	-	-	-	-	-	-	1051	-	-	1053	-	-	-	-	-
$Fe_2O_3 \cdot 2\ Cr_2O_3$	4-II	-	-	-	-	-	-	-	-	-	1053	-	-	-	-	-
Iron cobaltite ($FeO \cdot Co_2O_3$)	4-II	-	-	-	-	-	-	1065	-	-	-	-	-	-	-	-
Iron lead silicate glass	4-II	-	-	-	-	-	1737	-	-	-	-	-	-	-	-	-
Iron-niobium intermetallics (Fe_6Nb_3)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron nitride (Fe_4N)	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron oxides																
FeO	4-I	-	-	-	-	-	-	216	-	-	222	-	-	-	-	-
Fe_2O_3	4-I	-	-	-	-	-	214	218	-	-	222	-	-	224	-	-
Fe_3O_4	4-I	212	212	-	-	-	-	220	-	-	-	-	-	-	-	-
Iron(ic) oxide coating on Haynes alloy no. 25 (L-605)	6-II	-	-	-	-	-	-	-	-	-	-	-	1381-1383	-	-	-
Iron(ic) oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	-	-	713	-	-	-	-	-
Iron(ic) oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	-	-	717	-	-	-	-	-
Iron(ic) oxide + Silicon (di-)oxide	4-I	-	-	-	-	-	-	719	-	-	-	-	-	-	-	-
Iron(ous) oxide + ΣX_i	4-I	-	-	-	-	-	-	-	-	-	721	-	-	-	-	-
Iron(ous,ic) oxide + Iron(ic) oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	715	-	-	-
Iron phosphites																
Fe_2P	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Fe_3P	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron selenides																
FeSe	6-I	-	-	-	-	-	-	335	-	-	-	-	-	-	-	-
$FeSe_2$	6-I	-	-	-	-	-	-	335	-	-	-	-	-	-	-	-
Fe_3Se_4	6-I	-	-	-	-	-	-	335	-	-	-	-	-	-	-	-
Fe_7Se_8	6-I	-	-	-	-	-	-	335	-	-	-	-	-	-	-	-
Iron (ortho-)silicate ($2\ FeO \cdot SiO_2$)	4-II	-	-	-	-	-	-	1243	-	-	1245	-	-	-	-	-
Iron silicides																
FeSi	6-I	-	409	-	-	-	411	-		-	413	-	-	-	-	-
$FeSi_2$	6-I	-	409	-	-	-	-	-	-	-	413	-	-	-	-	-

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Iron silicides (cont.)																
Fe_3Si	6-I	-	409	-	-	-	-	-	-	-	413	-	-	-	-	-
Fe_5Si_3	6-I	-	409	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron sulfides																
FeS	5	-	-	-	-	-	-	680	-	-	-	-	-	-	-	-
FeS_2	5	-	-	-	-	-	-	680	-	-	-	-	-	682	-	-
Iron tellurides																
FeTe	6-I	-	-	-	-	-	-	590	-	-	-	-	-	-	-	-
$FeTe_2$	6-I	-	-	-	-	-	-	590	-	-	592	-	-	-	-	-
Iron titanate ($FeO \cdot TiO_2$)	4-II	-	1425	1425	-	-	1427	1429	-	-	1431	-	-	-	-	-
Iron titanate coating on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1385	-	-	-
Iron-zirconium intermetallics																
Fe_2Zr	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Fe_3Zr	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Isobutylene and isoprene copolymer	6-I	-	-	-	-	-	-	-	-	1062	-	-	-	-	-	-
Isocyanate polyester elastomer	6-II	960	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isofoam	6-II	962	-	-	-	-	-	-	-	-	966	-	-	-	-	-
K																
Kel-F	6-II	1030	-	-	-	-	-	-	1037	-	1045	-	-	-	-	-
Kennametals																
3047	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
3109	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
3406	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
3411	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
K1	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
K2S	6-II	-	-	-	-	-	-	-	889	-	885	-	-	-	-	-
K3H	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-
K4H	6-II	-	-	-	-	-	-	-	-	-	885	-	-	-	-	-
K5H	6-II	-	-	-	-	-	-	-	-	-	885	-	-	-	-	-
K6	6-II	-	-	-	-	-	-	-	889	-	934	-	-	-	-	-
K7H	6-II	-	-	-	-	-	-	-	-	-	885	-	-	-	-	-
K8	6-II	-	-	-	-	-	-	-	-	-	897	-	-	-	-	-
K9	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
K10	2-I	-	-	-	-	-	-	-	-	-	565	-	-	-	-	-
K11	6-II	-	-	-	-	-	-	-	-	-	897	-	-	-	-	-
K21	6-II	-	-	-	-	-	-	-	-	-	883	-	-	-	-	-
K45	6-II	-	-	-	-	-	-	-	-	-	885	-	-	-	-	-
K68	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
K81	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-

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Kennametals (cont.)																
K82	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-
K84	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-
K86	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-
K90	6-II	-	-	-	-	-	-	-	-	-	903	-	-	-	-	-
K91	6-II	-	-	-	-	-	-	-	-	-	903	-	-	-	-	-
K92	6-II	-	-	-	-	-	-	-	-	-	903	-	-	-	-	-
K94	6-II	-	-	-	-	-	-	-	-	-	901	-	-	-	-	-
K95	6-II	-	-	-	-	-	-	-	-	-	899	-	-	-	-	-
K96	6-II	-	-	-	-	-	-	-	-	-	899	-	-	-	-	-
K138	6-II	136	-	-	-	-	-	-	-	-	864	-	-	-	-	-
K138A	6-II	136	-	-	-	-	-	-	-	-	864	-	-	-	-	-
K150A	6-II	-	-	-	-	-	-	-	-	-	875	-	-	-	-	-
K151	6-II	-	-	-	-	-	-	-	-	-	875	-	-	-	-	-
K151A	6-II	-	-	-	-	-	-	-	-	-	875	-	-	-	-	-
K151B	6-II	-	-	-	-	-	-	-	-	-	877	-	-	-	-	-
K152B	6-II	142	-	-	-	-	-	-	-	-	877	-	-	-	-	-
K161B	6-II	-	-	-	-	-	-	871	873	-	875	-	-	-	-	-
K162B	6-II	-	-	-	-	-	-	-	-	-	877	-	-	-	-	-
K601	6-II	-	-	-	-	-	-	-	-	-	860	-	-	-	-	-
K701	6-II	-	-	-	-	-	-	-	-	-	895	-	-	-	-	-
K801	6-II	-	-	-	-	-	-	-	-	-	907	-	-	-	-	-
KM	6-II	-	-	-	-	-	-	-	-	-	883	-	-	-	-	-
Kennametal K-151A coating on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1491	-	-	-
Kennametal K-162B coating on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1493	-	-	-
Kennertium W-2	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
Kennertium W-10	6-II	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
Kimble N-51A glass	4-II	-	-	-	-	-	-	-	-	-	-	-	1707	1709	1713	-
Kyanite	4-II	-	-	-	-	-	-	1189	1191	-	1195	-		-	-	-
L																
Lamacoid 6045	6-II	-	-	-	-	-	-	-	-	1230	-	-	-	-	-	-
Lamicoid C-6030	6-II	1130	-	-	-	-	-	1144	-	-	-	-	-	-	-	-
Laminac 4129	6-II	-	-	-	-	-	-	-	-	-	968	-	-	-	-	-
Laminates																
Ceramic	6-II	-	-	-	-	-	-	-	-	-	1225	-	-	-	-	-
Forsterite-stainless steel	6-II	-	-	-	-	-	-	-	1223	-	-	-	-	-	-	-
Graphite cloth	6-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
Reinforced epoxide	6-II	-	-	-	-	-	-	1117	1120	1220	1122-1124	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Laminates (cont.)																
Reinforced epoxy resin	6-II	-	-	-	-	-	-	1115-1117	1120	1220	1122-1124	-	-	-	-	-
Reinforced epoxy and plyophen copolymer resin	6-II	-	-	-	-	-	-	-	-	1218	-	-	-	-	-	-
Reinforced copolymer of phenolic and epoxide resins	6-II	-	-	-	-	-	-	-	-	-	1126	-	-	-	-	-
Reinforced melamine-formaldehyde resin	6-II	-	-	-	-	-	-	-	-	1128	-	-	-	-	-	-
Reinforced phenolic resin	6-II	1130	-	-	-	-	-	1132-1146	1148-1156	1159-1170, 1220	1172-1179	-	-	-	-	-
Reinforced phenyl silane resin	6-II	-	-	-	-	-	-	1212	-	1220	-	-	-	-	-	-
Reinforced polyester resin	6-II	1180	-	-	-	-	-	1191	1195-1198	1220	1200	-	-	-	-	-
Reinforced TAC polyester resin	6-II	1180	-	-	-	-	-	1183	1185	1220	1187-1189	-	-	-	-	-
Reinforced polytetrafluoro-ethylene	6-II	-	-	-	-	-	-	1214	1218	1220	-	-	-	-	-	-
Reinforced silicone resin	6-II	1204	-	-	-	-	-	1206	1208, 1218	1220	1200	-	-	-	-	-
Reinforced teflon	6-II	-	-	-	-	-	-	1214	1218	1220	-	-	-	-	-	-
Lampblacks																
Lampblack	1	-	-	-	-	-	-	-	97	-	-	-	99-101	103	-	-
CEP National	1	-	-	-	-	-	-	-	-	-	-	-	-	103	-	-
L 113SP	1	-	-	-	-	-	-	-	-	-	-	-	101	103	-	-
RW Spektral II	1	-	-	-	-	-	-	-	-	-	-	-	-	103	-	-
Lanthana	4-I	226	226	-	-	-	-	228	-	-	230	-	-	-	-	232
Lanthanum (La)	1	606	606	606	606	606	608	610	-	-	612	-	-	-	-	614
Lanthanum + Calcium	2-I	-	250	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum + Magnesium	2-I	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum + Magnesium + ΣX_1	2-II	1022	1022	-	-	-		-	-	-	-	-	-	-	-	-
Lanthanum aluminides																
LaAl	6-I	43	43	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaAl_2$	6-I	43	43	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaAl_4$	6-I	43	43	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Al_2	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum antimonide																
La_2Sb	6-I	-	81	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Sb_2	6-I	-	81	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum arsenide (LaAs)	6-I	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-bismuth intermetallics (LaBi)	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Lanthanum borides																
LaB_4	6-I	295	296	-	-	-	-	-	-	-	-	-	-	-	-	-
LaB_6	6-I	295	296	-	-	-	300	-	-	-	302	-	-	-	-	-
Lanthanum bromide ($LaBr_3$)	5	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-cadmium intermetallics																
LaCd	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaCd_2$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	
$LaCd_{11}$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum carbides																
LaC_2	5	291	-	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum chloride ($LaCl_3$)	5	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-copper intermetallics																
LaCu	6-I	667-668	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaCu_2$	6-I	667-668	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaCu_4$	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaCu_5$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaCu_6$	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum fluoride (LaF_3)	5	-	407	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-gallium intermetallics ($LaGa_2$)	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum germanides ($LaGe_2$)	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-gold intermetallics																
LaAu	6-I	667-668	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaAu_2$	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaAu_3$	6-I	667	668	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Au	6-I	667	668	-	-	-	-	-	-	-	-	-	-	-	-	-
La_3Au	6-I	668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum hydride (LaH_2)	5	427	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-indium intermetallics ($LaIn_3$)	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-lead intermetallics																
LaPb	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaPb_3$	6-I	667	668	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Pb	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-magnesium intermetallics																
LaMg	6-I	667	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaMg_3$	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaMg_9$	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-
La_4Mg	6-I	-	668	-	-	-	-	-	-	-	-	-	-	-	-	-

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Lanthanum-mercury intermetallics																
LaHg	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaHg_2$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaHg_3$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-nickel intermetallics ($LaNi_5$)	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum nitride (LaN)	5	621	-	-	-	-	-	-	-	-		-	-	-	-	-
Lanthanum-osmium intermetallics ($LaOs_2$)	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum oxides																
LaO	4-I	226	-	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2O_3	4-I	226	226	-	-	-	-	228	-	-	230	-	-	-	-	232
Lanthanum phosphide (LaP)	5	635	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum selenides																
LaSe	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Se_3	6-I	365	-	-	-	-	367	-	-	-	-	-	-	-	-	-
La_3Se_4	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum silicides ($LaSi_2$)	6-I	415	415	-	-	-	527	-	-	-	417	-	-	-	-	-
Lanthanum-silver intermetallics																
LaAg	6-I	667-668	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaAg_2$	6-I	667-668	668	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaAg_3$	6-I	667-668	668	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum stannides																
$LaSn_3$	6-I	541	541	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Sn	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Sn_3	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum sulfides																
LaS	5	684	684	-	-	-	-	-	-	-	686	-	-	-	-	-
LaS_2	5	684	-	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2S_3	5	684	684	-	-	-	-	-	-	-	686	-	-	-	-	-
La_3S_4	5	684	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum telluride (La_2Te_3)	6-I	-	-	-	-	-	638	-	-	-	-	-	-	-	-	-
Lanthanum-thallium intermetallics																
LaTl	6-I	-	669	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaTl_3$	6-I	667	669	-	-	-	-	-	-	-	-	-	-	-	-	-
La_2Tl	6-I	-	669	-	-	-	-	-	-	-	-	-	-	-	-	-
Lanthanum-zinc intermetallics																
LaZn	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$LaZn_5$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Lanthanum-zinc intermetallics (cont.)																
$LaZn_{11}$	6-I	667	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lawsonite	4-II	-	-	-	-	-	-	1233	-	-	-	-	-	-	-	-
Lead + Copper	2-I	254	-	-	-	-	-	-	-	-	256	-	-	-	-	-
Lead aluminate ($PbO \cdot Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1003	-	-	-	-	-
Lead borate glass	4-II	-	-	-	-	-	-	-	-	-	1615	-	-	-	-	-
Lead borosilicate glass	4-II	-	-	-	-	-	-	-	-	-	1717	-	-	-	-	-
Lead-barium magnesium aluminum silicate	4-II	-	-	-	-	-	-	-	-	-	1256-1258	-	-	-	-	-
Lead boron silicate ($5\ PbO \cdot B_2O_3 \cdot SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1250	-	-	-	-	-
Lead germanium oxide ($2\ PbO \cdot GeO_2$)	4-II	-	-	-	-	-	-	-	-	-	1133	-	-	-	-	-
Lead germanium phosphate ($5\ PbO \cdot GeO_2 \cdot P_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1175	-	-	-	-	-
Lead magnesium aluminum silicate	4-II	-	-	-	-	-	-	-	-	-	1252-1254	-	-	-	-	-
Lead molybdate ($PbO_2 \cdot MoO_2$)	4-II	-	-	-	-	-	-	1113	-	-	1115	-	-	-	-	-
Lead (mon-)oxide (PbO)	4-I	-	-	-	-	-	-	234	-	-	-	-	-	-	-	-
Lead phosphates																
$PbO \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1171	-	-	-	-	-
$2\ PbO \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1171	-	-	-	-	-
$3\ PbO \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1171	-	-	-	-	-
$3\ PbO \cdot 2\ P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1171	-	-	-	-	-
$5\ PbO \cdot 2\ P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1171	-	-	-	-	-
$8\ PbO \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1171	-	-	-	-	-
Lead potassium silicate glass	4-II	-	-	-	-	-	-	-	-	1749	-	-	-	-	-	-
Lead silicates																
$PbO \cdot SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1247	-	-	-	-	-
$2\ PbO \cdot SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1247	-	-	-	-	-
$4\ PbO \cdot SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1247	-	-	-	-	-
Lead silicate glass	4-II	-	-	-	-	-	1739	-	1741	-	-	-	1743	1745	1747	-
Lead silicon phosphate ($5\ PbO \cdot SiO_2 \cdot P_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1177	-	-	-	-	-
Lead strontium silicate glass	4-II	-	-	-	-	-	-	-	-	-	1751	-	-	-	-	-
Lead sulfide (PbS)	5	-	-	-	-	-	-	-	-	-	-	-	-	688	-	-
Lead telluride (PbTe)	6-I	-	-	-	-	-	594	-	596	-	-	-	-	-	-	-
Lead telluride + Tin telluride	6-I	-	-	-	-	-	717	-	-	-	-	-	-	-	-	-
Lead (meta-) titanate ($PbO \cdot TiO_2$)	4-II	-	-	-	-	-	-	-	1433	-	1435	-	-	-	-	-
Lead tungstate ($PbO \cdot WO_3$)	4-II	-	-	-	-	-	-	1474	-	-	1476	-	-	-	-	-
Lead zirconate ($PbO \cdot ZrO_2$)	4-II	-	-	-	-	-	-	-	1510	-	-	-	-	-	-	-
Leonhardite	4-II	-	-	-	-	-	-	1233	-	-	-	-	-	-	-	-

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Libbey-Owens-Ford plate glass no. 9330	4-II	-	-	-	-	-	-	1791	-	-	-	-		-	-	-
Lime	4-I	99	99	-	-	-	101	103	105	-	107	-	-	-	-	109
Lime window glass	4-II	-	-	-	-	-	-	-	1831	-	-	-	-	-	-	-
Lithium + Sodium	2-I	-	-	-	-	-	-	-	-	258	-	-	-	-	-	-
Lithium aluminates																
$Li_2O \cdot Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	1005	-	-	-	-	-
$Li_2O \cdot 5\ Al_2O_3$	4-II	-	-	-	-	-	-	-	-	-	1005	-	-	-	-	-
Lithium aluminum borate glass	4-II	-	-	-	-	-	-	-	-	-	1617	-	-	-	-	-
Lithium aluminum fluoride (Li_3AlF_6)	5	-	-	-	-	-	-	377	-	-	-	-	-	-	-	-
Lithium aluminum silicate																
$Li_2O \cdot Al_2O_3 \cdot 3\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1275	-	-	-	-	-
$Li_2O \cdot Al_2O_3 \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1268-1270	-	-	-	-	-
$Li_2O \cdot 1.08\ Al_2O_3 \cdot 3.5\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1268	-	-	-	-	-
$Li_2O \cdot A_2O_3 \cdot 4\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1268-1270	-	-	-	-	-
$Li_2O \cdot Al_2O_3 \cdot 6\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1268-1270	-	-	-	-	-
$Li_2O \cdot Al_2O_3 \cdot 8\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1268, 1275	-	-	-	-	-
$Li_2O \cdot Al_2O_3 \cdot 10\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1275	-	-	-	-	-
Lithium aluminum silicate + + Lead bisilicate	4-II	-	-	-	-	-	-	-	-	-	1566	-	-	-	-	-
Lithium aluminum silicate + + Lead borate	4-II	-	-	-	-	-	-	-	-	-	1560	-			-	-
Lithium aluminum silicate + + Lithium aluminum germanium oxide	4-II	-	-	-	-	-	-	-	-	-	1568	-	-	-	-	-
Lithium aluminum silicate bodies, barium modified	4-II	-	-	-	-	-	-	-	-	-	1277-1281	-	-	-	-	-
Lithium aluminum silicate glass.	4-II	-	-	-	-	-	-	-	-	-	1757-1759	-	-	-	-	-
Lithium beryllium borate glass	4-II	-	-	-	-	-	-	-	-	-	1619	-	-	-	-	-
Lithium beryllium fluoride (Li_2BeF_4)	5	-	-	-	-	-	-	379	-	-	-	-	-	-	-	-
Lithium (meta-) borate ($Li_2O \cdot B_2O_3$)	4-II	-	-	-	-	1041	-	-	-	-	-	-	-	-	-	1043
Lithium borate glass	4-II	-	-	-	-	-	1607	-	-	-	-	-	-	-	-	-
Lithium borosilicate glass	4-II	-	-	-	-	-	-	-	-	-	1719	-	-	-	-	-
Lithium calcium silicate glass	4-II	-	-	-	-	-	-	-	-	-	1761	-	-	-	-	-
Lithium carbide (Li_4C_2)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium chloride (LiCl and Li_2Cl_2)	5	317	317	-	317	317	-	-	-	-	-	-	-	-	-	319
Lithium cobalt oxide ($Li_xCo_{1-x}O$)	4-II	-	-	-	-	-	1135	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Lithium cobalt nickel oxide $[Li_x(Co_yNi_{1-y})_{1-x}O]$	4-I	-	-	-	-	-	1137	-	1139	-	-	-	-	-	-	-
Lithium copper oxide ($Li_xCu_{1-x}O$)	4-II	-	-	-	-	-	1141	-	1143	-	-	-	-	-	-	-
Lithium fluoride (LiF and Li_2F_2)	5	369	369	369	369	369	-	-	371	-	-	-	-	373	-	375
Lithium fluoride + Potassium fluoride	5	-	-	-	-	-	-	409	-	-	-	-	-	-	-	-
Lithium germanium oxides																
$Li_2O \cdot GeO_2$	4-II	-	-	-	-	-	-	-	-	-	1145	-	-	-	-	-
$Li_2O \cdot 7\ GeO_2$	4-II	-	-	-	-	-	-	-	-	-	1145	-	-	-	-	-
$2\ Li_2O \cdot GeO_2$	4-II	-	-	-	-	-	-	-	-	-	1145	-	-	-	-	-
$3\ Li_2O \cdot 2\ GeO_2$	4-II	-	-	-	-	-	-	-	-	-	1145	-	-	-	-	-
$3\ Li_2O \cdot 8\ GeO_2$	4-II	-	-	-	-	-	-	-	-	-	1145	-	-	-	-	-
Lithium hydride (LiH)	5	431	431	431	431	-	-	433	435	-	437	-	-	-	-	-
Lithium lead silicate glass	4-II	-	-	-	-	-	1763		-	-	-	-	-	-	-	-
Lithium-magnesium-barium silicate glass	4-II	-	-	-	-	-	1765		-	-	-	-	-	-	-	-
Lithium magnesium borate glass	4-II	-	-	-	-	-	-	-	-		1621	-	-	-	-	-
Lithium manganese oxide ($Li_xMn_{1-x}O$)	4-II	-	-	-	-	-	1147	-	-	-	-	-	-	-	-	-
Lithium manganese selenide ($Li_xMn_{1-x}Se$)	6-I	-	-	-	-	-	337	-	339	-	-	-	-	-	-	-
Lithium nickel oxide ($Li_xNi_{1-x}O$)	6-II	-	-	-	-	-	1149	-	1151	-	-	-	-	-	-	-
Lithium nitride (Li_3N)	5	621	-	621	621	-	-	-	-	-	-	-	-	-	-	-
Lithium oxide (Li_2O)	4-I	236	236	236	236	236	-	238	-	-	-	-	-	-	-	240
Lithium potassium aluminum silicate	4-II	-	-	-	-	-	-	-	-	-	1283	-	-	-	-	-
Lithium silicates																
$Li_2O \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1260	-	-	-	-	-
$2\ Li_2O \cdot SiO_2$	4-II	-	-	-	-	-	-	-	-	-	1260	-	-	-	-	-
Lithium silicate glass	4-II	-	-	-	-	-	1753	-	-	-	1755	-	-	-	-	-
Lithium silicate - quartz body	4-II	-	-	-	-	-	-	-	-	-	1262-1264	-	-	-	-	-
Lithium sodium silicate glass	4-II	-	-	-	-	-	1767	-	-	-	-	-	-	-	-	-
Lithium titanate ($Li_2O \cdot TiO_2$)	4-II	-	-	-	-	-	-	1437	-	-	-	-	-	-	-	-
Lithium uranate ($Li_2O \cdot UO_3$)	4-II	-	1482	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium zinc ferrite ($Li_xZn_{0.8}Fe_{2.1-x}O_4$)	4-II	-	-	-	-	-	-	1101	-	-	-	-	-	-	-	-
Lockfoam	6-II	962	-	-	-	-	-	-	-	-	966	-	-	-	-	-
Lohm	2-I	-	-	-	-	-	-	-	138	-	-	-	-	-	-	-
LT-1 Metamic cermet	6-II	731	-	-	-	-	-	-	-	-	-	-	735	-	-	-
LT-1B Haynes cermet	6-II	-	-	-	-	-	-	-	-	-	739	-	747	-	-	-
LT-2 Haynes cermet	6-II	-	-	-	-	-	-	-	-	-	743	-	745	-	-	-
Lucalox	4-I	-	-	-	-	-	-	-	11	-	22	-	32	-	-	-
Lucite	6-II	1020	-	-	-	-	-	-	1024	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Lustrex L-2020	6-II	-	1076	-	-	-	-	-	-	-	-	-	-	-	-	-
Lutecium (Lu)	1	616	616	616	616	616	618	620	-	-	-	-	-	-	-	-
Lutecium borides																
LuB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LuB_6	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lutecium carbide (LuC_2)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lutecium-osmium intermetallics ($LuOs_2$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lutecium oxide (Lu_2O_3)	4-I	-	-	-	-	-	-	242	-	-	244	-	246	-	-	-
M																
Magnesia-alumina spinel	4-II	-	-	-	-	-	-	-	-	1015	-	-	-	-	-	-
Magnesium (Mg)	1	622	622	622	-	622	624	626	628	630	632	-	634	636-638	-	640
Magnesium + ΣX_i	2-II	-	-	-	-	-	1071-1075	1077	1079	-	1081	-	-	-	-	-
Magnesium + Aluminum + ΣX_i	2-II	1024	1024	1024	-	-	1026	1029	1031	1033	1035	-	-	1038-1042	-	-
Magnesium + Cerium	2-I	-	-	-	-	-	-	-	260	-	-	-	-	-	-	-
Magnesium + Cerium + ΣX_i	2-II	-	-	-	-	-	-	-	1045	-	-	-	-	-	-	-
Magnesium + Thorium	2-I	264	262	262	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium + Thorium + ΣX_i	2-II	-	1047	1047	-	-	1049-1053	1055	1057	-	1059	-	-	1061	-	-
Magnesium + Zinc	2-I	-	266	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium + Zinc + ΣX_i	2-II	-	1063	1063	-	-	-	1065	1067	-	1069	-	-	-	-	-
Magnesium L120 (British aircraft material spec.)	1	-	-	-	-	-	-	-	-	-	-	-	-	636	-	-
Magnesium alloys (special designation)																
1959	2-I	-	-	-	-	-	-	-	260	-	-	-	-	-	-	-
1960	2-I	-	-	-	-	-	-	-	260	-	-	-	-	-	-	-
1961	2-I	-	-	-	-	-	-	-	260	-	-	-	-	-	-	-
1964	2-II	-	-	-	-	-	-	-	1045	-	-	-	-	-	-	-
1992	2-II	-	-	-	-	-	-	-	1045	-	-	-	-	-	-	-
AM-100A	2-II	-	-	-	-	-	1026	-	-	-	-	-	-	-	-	-
AN-M-29	2-II	1024	-	-	-	-	-	1029	1031	1033	1035	-	-	-	-	-
AX-81-X1	2-II	-	-	-	-	-	-	-	-	-	1035	-	-	-	-	-
AZ-31	2-II	-	-	-	-	-	-	-	-	-	-	-	-	1038	-	-
AZ-31A	2-II	-	1024	1024	-	-	1026	-	-	-	1035	-	-	1040	-	-
AZ-31B	2-II	-	1024	1024	-	-	1026	1029	-	-	1035	-	-	1040-1042	-	-
AZ-63A	2-II	-	-	-	-	-	1026	-	-	-	1035	-	-	-	-	-
AZ-80	2-II	-	-	-	-	-	-	1029	-	-	-	-	-	-	-	-
AZ-81	2-II	-	-	-	-	-	-	-	-	-	1035	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Magnesium alloys (special designation) (cont.)																
AZ-91C	2-II	-	-	-	-	-	1026	-	-	-	-	-	-	-	-	-
AZ-92A	2-II	-	-	-	-	-	1026	-	-	-	1035	-	-	-	-	-
DTD 350	2-II	-	-	-	-	-	-	-	1079	-	-	-	-	-	-	-
DTD 360	2-II	-	-	-	-	-	-	-	1079	-	-	-	-	-	-	-
EK-30	2-II	-	-	-	-	-	-	-	-	-	1081	-	-	-	-	-
EK-30A	2-II	-	-	-	-	-	1071	-	-	-	-	-	-	-	-	-
EK-32A	2-II	-	-	-	-	-	-	-	-	-	1081	-	-	-	-	-
EK-33A	2-II	-	-	-	-	-	-	-	-	-	1081	-	-	-	-	-
EK-41	2-II	-	-	-	-	-	-	-	-	-	1081	-	-	-	-	-
EK-41A	2-II	-	-	-	-	-	1073	-	-	-	-	-	-	-	-	-
EZ-33A	2-II	-	-	-	-	-	1075	-	-	-	1081	-	-	-	-	-
H-807	2-II	-	-	-	-	-	-	-	1067	-	-	-	-	-	-	-
H-809	2-II	-	-	-	-	-	-	-	1031	-	-	-	-	-	-	-
H-811	II	-	-	-	-	-	-	-	1045, 1067	-	-	-	-	-	-	-
H-812	2-II	-	-	-	-	-	-	-	1045	-	-	-	-	-	-	-
H-817	2-II	-	-	-	-	-	-	-	1067	-	-	-	-	-	-	-
HK-31	2-II	-	-	-	-	-	-	-	-	-	1059	-	-	-	-	-
HK-31A	2-II	-	1047	1047	-	-	1049	1055	-	-	-	-	-	1061	-	-
HK-31XA	2-II	-	-	-	-	-	1049	-	-	-	1059	-	-	-	-	-
HM-21XA	2-II	-	1047	1047	-	-	1051	1055	-	-	-	-	-	-	-	-
HM-31XA	2-I	-	262	262	-	-	-	-	-	-	-	-	-	-	-	-
	2-II	-	-	-	-	-	-	1077	-	-	-	-	-	-	-	-
Hydronalium 71	2-II	-	-	-	-	-	1026	-	1031	-	-	-	-	-	-	-
HZ-32A	2-II	-	-	-	-	-	1053	-	-	-	-	-	-	-	-	-
HZ-32XA	2-II	-	-	-	-	-	1053	-	-	-	1059	-	-	-	-	-
Magnox B	2-II	-	-	-	-	-	-	-	1079	-	-	-	-	-	-	-
MSR	2-II	-	-	-	-	-	-	-	1079	-	-	-	-	-	-	-
RZ5	2-II	-	-	-	-	-	-	-	1067	-	-	-	-	-	-	-
TZ6	2-II	-	-	-	-	-	-	-	1067	-	-	-	-	-	-	-
Z3Z	2-II	-	-	-	-	-	-	-	1067	-	-	-	-	-	-	-
ZK-60	2-II	-	1063	1063	-	-	-	-	-	-	-	-	-	-	-	-
ZK-60A	2-II	-	-	-	-	-	-	1065	-	-	1069	-	-	-	-	-
ZREO	2-II	-	-	-	-	-	-	-	1045	-	-	-	-	-	-	-
ZT1	2-II	-	-	-	-	-	-	-	1057	-	-	-	-	-	-	-
ZTY	2-II	-	-	-	-	-	-	-	1057	-	-	-	-	-	-	-
Magnesium aluminate ($MgO \cdot Al_2O_3$)	4-II	1007	1007	-	-	-	1009	1011	1013	1015	1017	-	-	-	-	-
Magnesium aluminate + + Magnesium oxide	4-II	-	-	-	-	-	-	-	1520	-	1522	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Magnesium aluminate + Silicon (di-)oxide	4-II	-	-	-	-	-	-	-	1532	-	-	-	-	-	-	-
Magnesium aluminate + Sodium (mon-)oxide	4-II	-	-	-	-	-	-	1524	1526	1528	1530	-	-	-	-	-
Magnesium aluminate spinal	4-II	1007	1007	-	-	-	1009	1011	1013	1015	1017	-	-	-	-	-
Magnesium aluminate spinel with sodium (mon-)oxide	4-II	-	-	-	-	-	-	1524	1526	1528	1530	-	-	-	-	-
Magnesium aluminum borate glass	4-II	-	-	-	-	-	-	-	-	-	1623	-	-	-	-	-
Magnesium aluminum silicate ($2\ MgO \cdot 2\ Al_2O_3 \cdot 5\ SiO_2$)	4-II	-	-	-	-	-	1298	1300	1302	-	1304-1308	-	-	-	-	-
Magnesium aluminum silicate bodies	4-II	-	-	-	-	-	-	-	-	-	1310	-	-	-	-	-
Magnesium aluminum silicate glass	4-II	-	-	-	-	-		-	-	-	1769	-	-	-	-	-
Magnesium antimonide (Mg_3Sb_2)	6-I	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Magnesium barium cerium titanate $[(Ba_{1-x-y}Mg_xCe_y)O \cdot TiO_2]$	4-II	-	-	-	-	-	1447	-	-	-	-	-	-	-	-	-
Magnesium barium titanate	4-II	-	-	-	-	-	-	-	-		1445	-	-	-	-	
Magnesium beryllium borate glass	4-II	-	-	-	-	-	-	-	-	-	1625	-	-	-	-	-
Magnesium borides																
MgB_2	6-I	-	-	-	-	-	-	182	-	-	-	-	-	-	-	184
MgB_4	6-I	-	-	-	-	-	-	182	-	-	-	-	-	-	-	-
Magnesium-cadmium intermetallics																
MgCd	6-I	-	-	-	-	-	-	644	-	-	-	-	-	-	-	-
$M_{\ }Cd_3$	6-I	-	-	-	-	-	-	644	-	-	-	-	-	-	-	-
Mg_3Cd	6-I	-	-	-	-	-	-	644	-	-	-	-	-	-	-	-
Magnesium carbonate ($MgCO_3$)	4-II	-	-	-	-	-	-	-	-	-	-	-	-	1047	-	-
Magnesium chloride ($MgCl_2$)	5	-	321	-	-	323	-	-	-	-	-	-	-	-	-	325
Magnesium chromites																
$MgO \cdot Cr_2O_3$	4-II	-	-	-	-	-	1055	1057	-	-	1059	-	-	-	-	-
$MgO \cdot 4\ Cr_2O_3$	4-II	-	-	-	-	-	1055	-	-	-	-	-	-	-	-	-
$4\ MgO \cdot Cr_2O_3$	4-II	-	-	-	-	-	1055	-	-	-	-	-	-	-	-	-
Magnesium chromite spinal	4-II	-	-	-	-	-	-	-	-	-	1059	-	-	-	-	-
Magnesium ferrites																
$MgO \cdot Fe_2O_3$	4-II	-	-	-	-	-	1079	1081	-	-	1083	-	-	-	-	-
$MgO \cdot 2\ FeO$	4-II	-	-	-	-	-	-	-	-	-	1083	-	-	-	-	-
Magnesium fluoride (MgF_2)	5	-	381		-	383	-	-	-	-	385	-	-	-	-	387
Magnesium fluoride coating on quartz	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1425	1427	-
Magnesium germanide (Mg_2Ge)	6-I	309	309	-	-	-	311	-	-	-	-	-	-	-	-	-
Magnesium hydride (MgH_2)	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Magnesium-lead intermetallics (Mg_2Pb)	6-I	-	-	-	-	-	650	-	-	-	-	-	-	-	-	-
Magnesium lead silicate glass	4-II	-	-	-	-	-	1771	-	-		-	-	-	-	-	-
Magnesium molybdate ($MgO \cdot MoO_3$)	4-II	-	-	-	-	-	-	1117	-	-	-	-	-	-	-	-
Magnesium niobates																
$MgO \cdot Nb_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1125	-	-	-	-	-
$2\ MgO \cdot Nb_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1125	-	-	-	-	-
$3\ MgO \cdot Nb_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1125	-	-	-	-	-
$4\ MgO \cdot Nb_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1125	-	-	-	-	-
Magnesium nitride (Mg_3N_2)	5	-	-	-	-	-	-	533	-	-	-	-	-	-	-	-
Magnesium oxides																
Magnesium oxide (MgO)	4-I	248	248	-	-	-	250	252	254	257	259	263	265-267	269	-	271
M-300	4-I	-	-	-	-	-	-	-	-	-	259	-	-	-	-	-
PC-235	4-I	-	-	-	-	-	-	-	-	257	-	-	-	-	-	-
SR-2808	4-I	-	-	-	-	-	-	-	-	257	-	-	-	-	-	-
Magnesium oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	-	723	-	-	-	-	-	-
Magnesium oxide + Aluminum oxide + Beryllium oxide	4-I	-	-	-	-	-	-	-	-	-	725	-	-	-	-	-
Magnesium oxide + Aluminum oxide + Iron(ic) oxide + + Silicon (di-)oxide + Calcium oxide	4-I	-	-	-	-	-	-	-	727	-	-	-	-	-	-	
Magnesium oxide + Beryllium oxide	4-I	-	-	-	-	-	-	-	729	-	731	-	-	-	-	-
Magnesium oxide + Calcium oxide	4-I	-	-	-	-	-	-	-	-	733	735	-	-	-	-	-
Magnesium oxide + Calcium oxide + Iron(ic) oxide	4-I	-	-	-	-	-	-	-	-	737	-	-	-	-	-	-
Magnesium oxide + Chromium (sesqui-)oxide + Aluminum oxide + Iron(ic) oxide + + Silicon (di-)oxide	4-I	-	-	-	-	-	-	-	739	-	-	-	-	-	-	-
Magnesium oxide + Chromium (sesqui-)oxide + Iron(ic) oxide + Aluminum oxide + + Silicon (di-)oxide + + Iron(ous) oxide	4-I	-	-	-	-	-	-	-	741	-	-	-	-	-	-	-
Magnesium oxide + Iron(ic) oxide + Calcium oxide	4-I	-	-	-	-	-	-	-	743	-	-	-	-	-	-	-
Magnesium oxide + Magnesium aluminate	4-II	-	-	-	-	-	-	-	1536	-	-	-	-	-	-	-
Magnesium oxide + Magnesium silicate		-	-	-	-	-	-	-	1538	-	-	-	-	-	-	-
Magnesium oxide + Nickel (mon-)oxide	4-I	-	-	-	-	-	745	-	747	-	-	-	-	-	-	-
Magnesium oxide + Silicon (di-)oxide	4-I	-	-	-	-	-	-	-	749	-	751	-	-	-	-	-

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Magnesium oxide + Talc	4-II	-	-	-	-	-	-	-	1533	-	-	-	-	-	-	-
Magnesium oxide + Tin(ic) oxide	4-I	-	-	-	-	-	-	-	753	-	-	-	-	-	-	-
Magnesium oxide + Titanium (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	755	-	-	-	-	-
Magnesium oxide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	788	-	-	-	-	-
Magnesium oxide + Uranium (di-) oxide	4-I	-	-	-	-	-	-	-	757	-	-	-	-	-	-	-
Magnesium oxide + Yttrium oxide	4-I	-	-	-	-	-	-	-	-	-	759	-	-	-	-	-
Magnesium oxide + Zinc oxide	4-I	-	-	-	-	-	-	-	761	-	-	-	-	-	-	-
Magnesium silicates																
$MgO \cdot SiO_2$	4-II	1285	1285	-	-	-	1287	1289	1293	-	1295	-	-	-	-	-
$2\ MgO \cdot SiO_2$	4-II	-	-	-	-	-	-	1289	1291	-	1295	-	-	-	-	-
$3\ MgO \cdot 4\ SiO_2\ H_2O$	4-II	-	-	-	-	-	-	1288	-	-	-	-	-	-	-	-
Magnesium (ortho-) silicate + + Zinc (ortho-) silicate	4-II	-	-	-	-	-	-	-	-	-	1571	-	-	-	-	-
Magnesium silicides (Mg_2Si)	6-I	-	419	-	-	-	421	-	-	-	-	-	-	-	-	-
Magnesium silicide stannide ($Mg_2Si_xSn_{1-x}$)	6-I	-	-	-	-	-	537	-	539	-	-	-	-	-	-	-
Magnesium stannate ($MgO \cdot SnO_2$)	4-II	-	-	-	-	-	-	-	1361	-	-	-	-	-	-	-
Magnesium stannide (Mg_2Sn)	6-I	533	533	-	-	-	535	-	-	-	-	-	-	-	-	-
Magnesium titanates																
$MgO \cdot TiO_2$	4-II	-	-	-	-	-	1439	1441	-	-	1443	-	-	-	-	-
$MgO \cdot 2\ TiO_2$	4-II	-	-	-	-	-	1439	1441	-	-	1443	-	-	-	-	-
$MgO \cdot 5\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1443	-	-	-	-	-
$2\ MgO\ TiO_2$	4-II	-	-	-	-	-	1439	1441	-	-	1443	-	-	-	-	-
$2\ MgO\ 3\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1443	-	-	-	-	-
Magnesium titanate porcelain	5	1003	-	-	-	-	-	-	1017	-	-	-	-	-	-	-
Magnesium tungstate ($MgO \cdot WO_3$)	4-II	-	-	-	-	-	-	1478	-	-	-	-	-	-	-	-
Magnesium tungsten lead oxide ($2\ PbO \cdot MgO \cdot WO_3$)	4-II	-	-	-	-	-	-	-	-	-	1153	-	-	-	-	-
Magnesium vanadates																
$MgO \cdot V_2O_5$	4-II	-	-	-	-	-	-	1492	-	-	-	-		-	-	-
$2\ MgO \cdot V_2O_5$	4-II	-	-	-	-	-	-	1492	-	-	-	-	-	-	-	-
Magnesium uranate ($MgO \cdot UO_3$)	4-II	-	1482	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium zirconate ($MgO \cdot ZrO_2$)	4-II	-	-	-	-	-	-	-	-	-	1512	-	-	-	-	-
Magnetite	4-I	212	212	-	-	-	-	220	-	-	-	-	-	-	-	-
Manganese (Mn)	1	642	642	-	-	642	644	646	-	-	648	-	-	650	-	652
Manganese, electrolytic	1	-	-	-	-	-	-	646	-	-	648	-	-	-	-	-
Manganese + Aluminum	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
Manganese + Copper	2-I	-	-	-	-	-	271	273	-	-	275-277	-	-	-	-	-

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Manganese + Copper + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1083-1089	-	-	-	-	-
Manganese + Nickel	2-I	-	-	-	-	-	279	-	-	-	281	-	-	-	-	-
Manganese + Nickel + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1091-1097	-	-	-	-	-
Manganese + Titanium	2-I	283, 519	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese alloys (special designations)																
A-47	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-48	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-49	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-49.5	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-50	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-51	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-52	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-53	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-54	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-55	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-56	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-57	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-58	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-59	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
A-60	2-I	-	-	-	-	-	-	268	-	-	-	-	-	-	-	-
Manganese aluminate ($MnO \cdot Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1019	-	-	-	-	-
Manganese aluminum carbide (Mn_3AlC)	5	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-
Manganese antimonide (MnSb)	6-I	-	-	-	-	-	69	-	-	-	-	-	-	-	-	-
Manganese arsenide (Mn_7As)	6-I	-	94	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese arsenide telluride ($MnTe_{1-X}As_X$)	6-I	-	-	-	-	-	600	-	602	-	-	-	-	-	-	-
Manganese carbide (Mn_3C)	5	67	67	-	-	-	-	69	-	-	-	-	-	-	-	71
Manganese chromite ($MnO \cdot Cr_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1061	-	-	-	-	-
Manganese ferrite ($MnO \cdot Fe_2O_3$)	4-II	1085	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese nickel	2-II	-	-	-	-	-	-	-	-	-	1273	-	-	-	-	-
Manganese nitride (Mn_4N)	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese oxides																
MnO	4-I	-	-	-	-	-	-	273	-	-	281	-	-	-	-	-
MnO_2	4-I	-	-	-	-	-	-	275	-	-	281	-	-	-	-	-
Mn_2O_3	4-I	-	-	-	-	-	-	277	-	-	-	-	-	-	-	-
Mn_3O_4	4-I	-	-	-	-	-	-	-	279	-	-	-	-	-	-	-
Manganese (sesqui-)oxide + + Magnesium oxide	4-I	-	-	-	-	-	-	-	763	-	-	-	-	-	-	-

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Manganese-palladium intermetallics (MnPd)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese phosphides																
MnP	5	635	635	-	-	-	639	-	-	-	-	-	-	-	-	-
Mn_2P	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Mn_3P	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Mn_3P_2	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese selenide (MnSe)	6-I	-	-	-	-	-	-	341	-	-	-	-	-	-	-	-
Manganese silicate ($MnO \cdot SiO_2$)	4-II	-	-	-	-	-	-	1312	-	-	1314	-	-	-	-	-
Manganese silicides																
$MnSi_{0.8-0.6}$	6-I	-	-	-	-	-	-	427	-	-	-	-	-	-	-	-
MnSi	6-I	-	423	-	-	-	425	427	-	-	431	-	-	-	-	-
$MnSi_2$	6-I	-	-	-	-	-	425	427	429	-	-	-	-	-	-	-
Mn_3Si	6-I	-	423	-	-	-	-	-	-	-	-	-	-	-	-	-
Mn_5Si_3	6-I	-	423	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese telluride (MnTe)	6-I	-	-	-	-	-	-	598	-	-	-	-	-	-	-	-
Manganese zinc carbide (Mn_3ZnC)	5	-	-	-	-	-	-	75	-	-	-	-	-	-	-	-
Manganin	2-II	-	-	-	-	-	978	-	-	-	-	-	-	-	-	-
Marlex 20	6-II	-	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
Marlex 50	6-II	-	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
Massicot	4-I	-	-	-	-	-	-	234	-	-	-	-	-	-	-	-
Matte silver	1	-	-	-	-	-	-	-	-	-	-	910	-	-	-	-
Melamine formaldehyde	6-II	-	1014	-	-	-	-	-	-	-	-	-	-	-	-	-
Melamine formaldehyde, reinforced	6-II	-	-	-	-	-	-	-	-	-	1101	-	-	-	-	-
Melamine formaldehyde, alpha cellulose filled	6-II	-	-	-	-	-	-	-	-	-	1018	-	-	-	-	-
Melamine formaldehyde, mineral filled	6-II	-	-	-	-	-	1015	-	-	-	-	-	-	-	-	-
Melamine-formaldehyde resin, reinforced	6-II	-	-	-	-	-	-	-	-	1128	-	-	-	-	-	-
Melmac 592	6-II	-	-	-	-	-	1016	-	-	-	-	-	-	-	-	-
Melmac 1077	6-II	-	-	-	-	-	-	-	-	-	1018	-	-	-	-	-
Melmac 1079	6-II	-	-	-	-	-	-	-	-	-	1018	-	-	-	-	-
Melmac 1502	6-II	-	-	-	-	-	-	-	-	-	1018	-	-	-	-	-
Merwinite	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
Mercuric selenide (HgSe)	6-I	-	-	-	-	-	-	343	-	-	-	-	-	-	-	-
Metal cermets	6-II	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metco XP-1103	6-II	-	-	-	-	-	-	-	-	-	-	1309	1311	-	-	-
Metco XP-1106	6-II	-	-	-	-	-	-	-	-	-	-	1325	1327	-	-	-
Metco XP-1109	6-II	-	-	-	-	-	-	-	-	-	-	1407	1409	-	-	-
Metco XP-1110	6-II	-	-	-	-	-	-	-	-	-	-	1421	1423	-	-	-

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Mica																
Mica	5	983	-	-	-	-	985-987	-	989-991	-	993-1001	-	-	-	-	-
Biotite	5	-	-	-	-	-	-	-	-	-	997	-	-	-	-	-
Ericite	5	-	-	-	-	-	-	-	-	-	993	-	-	-	-	-
Glass bonded	5	-	-	-	-	-	987	-	-	-	-	-	-	-	-	-
Illite	5	-	-	-	-	-	-	-	-	-	993	-	-	-	-	-
Iron	5	-	-	-	-	-	-	-	-	-	997	-	-	-	-	-
Magnesium	5	-	-	-	-	-	-	-	-	-	999	-	-	-	-	-
Muscovite	5	-	-	-	-	-	985	-	-	-	1001	-	-	-	-	-
Phlogophite	5	-	-	-	-	-	-	-	-	-	999	-	-	-	-	-
Ripidolite	5	-	-	-	-	-	-	-	-	-	995	-	-	-	-	-
Synthetic	5	-	-	-	-	-	985	-	991	-	-	-	-	-	-	-
Synthetic, barium-	5	-	-	-	-	-	985	-	-	-	-		-	-	-	-
Zinn waldite	5	-	-	-	-	-	-	-	-	-	995	-	-	-	-	-
Micro-Quartz type II	6-II	-	-	-	-	-	-	1216	-	-	-	-	-	-	-	-
MIL-C-7350 type I and II	6-II	-	-	-	-	-	-	-	-	1275	-	-	-	-	-	-
MIL-C-8021 type I	6-II	-	-	-	-	-	-	-	-	1275	-	-	-	-	-	-
MIL-C-8087	6-II	-	-	-	-	-	-	954	956	-	958	-	-	-	-	-
Mineral aluminum silicates	4-II	-	-	-	-	-	1187	-	-	-	-	-	-	-	-	-
Mo-9-8 molybdenum	1	-	-	-	-	-	-	658	-	-	-	-	-	-	-	-
Molybdenite	5	690	690	-	-	-	-	-	-	-	-	-	-	692	-	-
Molybdenum (Mo)	1	654	654	-	-	654	656	658	660	663	665	667	669-675	677	-	679
Molybdenum coated with boron	6-II	-	-	-	-	-	-	-	-	-	-	-	1289	-	-	-
Molybdenum coated with carbon	6-II	-	-	-	-	-	-	-	-	-	-	1293	1295	-	-	-
Molybdenum coated with silicide	6-II	-	-	-	-	-	-	-	-	-	-	-	1467-1469	1471	-	-
Molybdenum coated with titanium (di-)oxide and aluminum	6-II	-	-	-	-	-	-	-	-	-	-	-	1395	-	-	-
Molybdenum coating on iron	6-II	-	-	-	-	-	-	-	-	-	-	1309	1311	-	-	-
Molybdenum + ΣX_i	2-II	1109	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum + Iron	2-I	285	-	-	-	-	-	287	289	-	-	-	-	-	-	-
Molybdenum + Nickel + ΣX_i	2-II	1099	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum + Niobium + ΣX_i	2-II	1101	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum + Silicon	2-I	-	-	-	-	-	-	-	-	-	-	-	291	-	-	-
Molybdenum + Titanium	2-I	-	-	-	-	-	293	295	297	299	301	-	303-307	309	-	-
Molybdenum + Titanium + ΣX_i	2-II	1103	-	-	-	-	-	1105	-	-	1107	-	-	-	-	-
Molybdenum + Tungsten	2-I	-	-	-	-	-	-	311	313	315	317	-	319	-	-	-
Molybdenum aluminides																
MoAl	6-I	-	9	-	-	-	-	-	-	-	11	-	-	-	-	-
$MoAl_2$	6-I	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-
Mo_3Al	6-I	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-

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Molybdenum beryllides																
$MoBe_2$	6-I	-	102	-	-	-	-	-	-	-	-	-	-	-	-	-
$MoBe_{12}$	6-I	102	-	-	-	-	-	104	106	-	-	-	-	-	-	-
Molybdenum borides																
MoB	6-I	-	186	-	-	-	-	188	-	-	-	-	-	-	-	192
MoB_2	6-I	-	186	186	-	-	-	188	-	-	190	-	-	-	-	-
Mo_2B	6-I	-	186	-	-	-	-	188	-	-	-	-	-	-	-	192
Mo_2B_5	6-I	-	186	-	-	-	-	-	-	-	-	-	-	-	-	-
Mo_3B_2	6-I	-	186	-	-	-	-	-	-	-	-	-	-	-	-	-
(Di-) molybdenum boride + + Molybdenum (di-) silicide	6-I	-	724	-	-	-	-	-	-	-	-	-	-	-	-	-
(Di-) molybdenum boride + + (Penta-) niobium (tri-) - silicide	6-I	-	724	-	-	-	-	-	-	-	-	-	-	-	-	-
(Di-) molybdenum boride + + Tantalum (di-) silicide	6-I	-	724	-	-	-	-	-	-	-	-	-	-	-	-	-
(Di-) molybdenum boride + + (Penta-) tantalum (tri-) - silicide	6-I	-	724	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum carbides																
MoC	5	-	-	-	-	-	-	-	-	-	87	-	-	-	-	-
Mo_2C	5	77	77	-	-	-	79	81	83	-	85	-	89	-	-	-
Molybdenum chromium silicides																
(Mo, Cr, Si)	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$(Mo, Cr)Si_2$	6-I	523	-		-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum germanide (Mo_5Ge_2)	6-I	-	313	-	-	-	-	-	-	-	-	-	-	-	-	315
Molybdenum nitride (Mo_2N)	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum oxides																
MoO_2	4-I	-	-	-	-	-	-	285	-	-	-	-	-	-	-	-
MoO_3	4-I	283	283	283	-	-	-	287	-	-	-	-	-	289	-	291
Molybdenum phosphide (MoP)	5	635	635	-	-	-	639	-	-	-	-	-	-	-	-	-
Molybdenum selenides ($MoSe_2$)	6-I	-	-	-	-	-	367	-	369	-	-	-	-	-	-	-
Molybdenum silicides																
$MoSi_2$	6-I	433	433	-	-	-	435	437	439	-	441	-	445-447	449	-	-
Mo_3Si	6-I	-	-	-	-	-	-	-	-	-	443	-	-	-	-	451
Mo_5Si_3	6-I	433	433	-	-	-	-	-	-	-	443	-	-	-	-	-
Molybdenum (di-) silicide + + Calcium aluminate	5	-	-	-	-	-	-	-	-	-	904	-	-	-	-	-
Molybdenum (di-) silicide + + Chromium (sesqui-) oxide	-	-	-	-	-	-	-	-	-	-	-	-	906	-	-	-
Molybdenum (di-) silicide + + Chromium (di-) silicide	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (di-) silicide + + Copper cermets	6-II	923	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Molybdenum (di-)silicide + + Molybdenum (tri-)oxide. . .	5	-	-	-	-	-	-	-	-	-	-	-	908-910	912	-	-
Molybdenum (di-)silicide + + Molybdenum (tri-)oxide + + Silicon (di-)oxide	5	-	-	-	-	-	-	-	-	-	-	-	914-916	918	-	-
Molybdenum (di-)silicide + + Silicon (di-)oxide	5	-	-	-	-	-	-	-	-	-	-	-	920-922	924	-	-
Molybdenum (di-)silicide + + Zirconium (di-)boride . . .	6-I	-	689, 724	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum-silicon-titanium cermet	6-II	930	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum sulfide (MoS_2). . .	5	690	690	-	-	-	-	-	-	-	-	-	-	692	-	-
Molybdenum tellurides ($MoTe_2$).	6-I	-	-	-	-	-	638	-	640	-	-	-	-	-	-	-
Molybdenum-titanium alloys coated with Chromalloy W-2 .	6-II	-	-	-	-	-	-	-	-	-	-	-	1505-1509	-	-	-
Molybdenum-titanium alloy coated with Durak-MG	6-II	-	-	-	-	-	-	-	-	-	-	-	1501-1503	-	-	-
Molybdenum-zirconium intermetallics (Mo_2Zr)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Monel	2-I	-	-	-	-	-	-	-	-	-	343	-	-	-	-	-
. . . . .	2-II	-	-	-	-	-	-	1239	1241	-	1247-1251	-	1253	-	-	-
Monel 400	2-II	-	-	-	-	-	-	1239	1241	-	1247-1249	-	1253	-	-	-
Monel 401	2-II	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
Monel 403	2-II	-	-	-	-	-	-	-	-	-	1249	-	-	-	-	-
Monel 404	2-II	-	-	-	-	-	-	-	-	-	1251	-	-	-	-	-
Monel 501	2-II	-	-	-	-	-	-	-	-	-	1245	-	-	-	-	-
Monel, H-	2-II	-	-	-	-	-	-	-	1241	-	-	-	-	-	-	-
Monel, K-	2-II	1237	-	-	-	-	-	1239	1241	1243	1245	-	-	-	-	-
Monel K-500	2-II	1237	-	-	-	-	-	1239	1241	1243	1245	-	-	-	-	-
Monel 5700, K-	2-II	-	-	-	-	-	-	-	-	-	-	-	1255	-	-	-
Monel, KR-	2-II	-	-	-	-	-	-	-	-	-	1245	-	-	-	-	-
Monel, R	2-II	-	-	-	-	-	-	-	1241	-	1247	-	-	-	-	-
Monel, R-405	2-II	-	-	-	-	-	-	-	1241	-	1247	-	-	-	-	-
Monel, S-	2-II	-	-	-	-	-	-	-	1241	-	-	-	-	-	-	-
Monel, Si-	2-II	-	-	-	-	-	-	-	1241	-	-	-	-	-	-	-
Moplen	6-II	1076	1076	-	-	-	-	1078	1080	-	1088	-	-	-	-	-
Mullite	4-II	-	-	-	-	-	-	1189	1191	1193	1197	-	1201	-	1203	-
Mullite MV-20	4-II	-	-	-	-	-	-	-	-	1193	-	-	1201	-	-	
Mullite MV-30	4-I	-	-	-	-	-	-	-	-	-	617	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Mullite + Alumina	4-II	-	-	-	-	-	-	-	1562	-	-	-	-	-	-	-
Muscovite	4-II	-	-	-	-	-	-	1573	-	-	-	-	-	-	-	-
MX-4926 carbon-phenolic laminate	6-II	-	-	-	-	-	-	1134	-	-	-	-	-	-	-	-
Mylar coated with aluminum	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1287	-	-
Mylar coated with copper	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1301	-	-
Mylar coated with gold	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1307	-	-
Mylar coated with silver	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1323	-	-
N																
NBS coating A-418 on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	1361-1363	-	-	-
NBS coating A-418 on stainless steel	6-II	-	-	-	-	-	-	-	-	-	-	-	1365-1367	-	-	-
NBS coating N-143 on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	1353-1355	-	-	-
NBS coating N-143 on stainless steel	6-II	-	-	-	-	-	-	-	-	-	-	-	1357-1359	-	-	-
Neodymia	4-I	293	293	-	-	-	-	295	-	-	297	-	-	-	-	-
Neodymium (Nd)	1	681	681	681	681	682	684	686	-	-	688	-	-	-	-	690
Neodymium + Magnesium	2-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium + Magnesium + ΣX_1	2-II	1115	1115	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium aluminide ($NdAl_2$)	6-I	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-bismuth intermetallics ($NdBi_1$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium borides																
NdB_4	6-I	296	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NdB_6	6-I	296	296	-	-	-	300	-	-	-	-	-	-	-	-	-
Neodymium-cadmium intermetallics																
$NdCd$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NdCd_2$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NdCd_3$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$NdCd_{11}$	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium carbides																
NdC_2	5	294	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Nd_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium chloride ($NdCl_3$)	5	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-cobalt intermetallics ($NdCo_5$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-copper intermetallics ($NdCu_5$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-gallium intermetallics ($NdGa_2$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Neodymium germanides ($NdGe_2$)	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium hydride (NdH_2)	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-lead intermetallics ($NdPb_3$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-mercury intermetallics (NdHg)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-nickel intermetallics ($NdNi_5$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium nitride (NdN)	5	621	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium-osmium intermetallics ($NdOs_2$)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium oxides																
NdO	4-I	293	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nd_2O_3	4-I	293	293	-	-	-	-	295	-	-	297	-	-	-	-	-
Neodymium phosphide (NdP)	5	635	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium selenides																
NdSe	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nd_2Se_3	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nd_3Se_4	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium silicide ($NdSi_2$)	6-I	523	524	-	-	-	527	-	-	-	-	-	-	-	-	-
Neodymium-silver intermetallics (NdAg)	6-I	680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neodymium sulfides																
NdS	5	694	694	-	-	-	-	-	-	-	696	-	-	-	-	-
NdS_2	5	-	694	-	-	-	-	-	-	-	-	-	-	-	-	-
Nd_2S_3	5	694	694	-	-	-	-	-	-	-	696	-	-	-	-	-
Nd_3S_4	5	694	694	-	-	-	-	-	-	-	-	-	-	-	-	-
Neoprene GN	6-II	-	-	-	-	-	-	-	-	1066	-	-	-	-	-	
Neoprene W	6-II	1051	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nepheline syenite	4-II	-	-	-	-	-	-	-	-	-	1320	-	-	-	-	-
Neptunium (Np)	1	692	692	-	-	-	-	-	-	-	-	-	-	-	-	-
Neptunium + Calcium + ΣX_i	2-II	1111	-	-	-	-	-	1113	-	-	-	-	-	-	-	-
Neptunium + Uranium	2-I	321	321	-	-	-	-	-	-	-	-	-	-	-	-	-
Neptunium bromide ($NpBr_3$)	5	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neptunium chlorides																
$NpCl_3$	5	339	-	-	-	-	-	-	-	-	-	-	-		-	-
$NpCl_4$	5	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neptonium (di-)oxide (NpO_2)	4-I	-	-	-	-	-	-	299	-	-	-	-	-	-	-	-
Nichrome	2-I	-	-	-	-	-	-	-	-	-	-	-	331		-	-
Nickel (Ni)	1	694	694	-	-	-	696	698	700	702	704	706	708-714	716-718	-	720
Nickel, carbonyl	1	-	694	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel, electrolytic	1	694	694	-	-	-	-	698	-	-	704	-	-	716	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Nickel coated with aluminum phosphate	6-II	-	-	-	-	-	-	-	-	-	-	-	1429	-	-	-
Nickel + ΣX_i	2-II	1307	-	-	-	-	1309	1311	1313	1315	-	-	-	-	-	-
Nickel + Aluminum	2-I	-	-	-	-	-	325	-	-	-	-	-	-	-	-	-
Nickel + Aluminum + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1117	-	-	-	-	-
Nickel + Chromium	2-I	-	-	-	-	-	327	329	-	-	-	-	331-333	-	-	-
Nickel + Chromium + ΣX_i	2-II	1119, 1122	1119	-	-	-	1124	1126-1132	1134-1145	1148-1150	1152-1170	-	1172-1201	1203-1215	-	-
Nickel + Cobalt	2-I	335	-	-	-	-	-	-	337	-	-	-	-	-	-	-
Nickel + Cobalt + ΣX_i	2-II	1219	1217	-	-	-	1221	-	1223	-	1225-1227	-	1229-1231	-	-	-
Nickel + Copper	2-I	-	-	-	-	-	339	341	-	-	343	-	-	-	-	-
Nickel + Copper + ΣX_i	2-II	1237	-	-	-	-	-	1239	1241	1243	1245-1251	-	1253-1255	-	-	-
Nickel + Iron	2-I	-	-	-	-	-	345	347	349	-	-	-	-	-	-	-
Nickel + Iron + ΣX_i	2-II	1257	-	-	-	-	-	1259	1261	-	1263-1267	-	1269	-	-	-
Nickel + Manganese	2-I	-	-	-	-	-	351	-	353	-	355	-	-	-	-	-
Nickel + Manganese + ΣX_i	2-II	-	-	-	-	-	-	1271	-	-	1273	-	-	-	-	-
Nickel + Molybdenum + ΣX_i	2-II	1277	1275	-	-	-	-	1279	1281	-	1283-1287	1289	1291-1295	1297	-	-
Nickel + Palladium	2-I	-	-	-	-	-	357	-	-	-	-	-	-	-	-	-
Nickel + Palladium + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1299	-	-	-	-	-
Nickel + Silicon	2-I	-	-	-	-	-	359	-	-	-	-	-	-	-	-	-
Nickel + Silicon + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1301	-	-	-	-	-
Nickel + Titanium + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1303	-	-	-	-	-
Nickel + Tungsten + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1305	-	-	-	-	-
Nickel 200	2-I	-	-	-	-	-	-	-	-	-	355	-	-	-	-	-
(also)	2-II	1307	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel 204	2-II	-	-	-	-	-	-	-	-	-	1227	-	-	-	-	-
Nickel 211	2-I	-	-	-	-	-	-	-	-	-	355	-	-	-	-	-
Nickel 270	1	-	-	-	-	-	-	-	-	-	704	-	-	-	-	-
Nickel A	1	-	-	-	-	-	-	-	700	-	-	-	-	-	-	-
(also)	2-I	-	-	-	-	-	-	-	-	-	355	-	-	-	-	-
(also)	2-II	1307	-	-	-	-	-	-	1313	-	-	-	-	-	-	-
Nickel, admiralty	2-II	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
Nickel D	2-I	-	-	-	-	-	-	-	-	-	355	-	-	-	-	-
(also)	2-II	-	-	-	-	-	-	-	1313	-	-	-	-	-	-	-
Nickel, grade A	1	694	-	-	-	-	-	-	700	-	704	706	710-712	718	-	-
(also)	2-I	-	-	-	-	-	-	-	353	-	-	-	-	-	-	-
(also)	2-II	-	-	-	-	-	-	-	1223	-	1263, 1301	-	-	-	-	-
Nickel L	1	-	-	-	-	-	-	-	700	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Nickel alloys (special designations)																
60 - 15 Cr (ASTM B83-46) . .	2-II	1257	-	-	-	-	-	1259	-	-	-	-	-	-	-	-
80 Ni - 20 Cr	2-II	-	-	-	-	-	-	1130	1144	-	-	-	-	-	-	-
90 Ni - 10 Cr	2-II	-	-	-	-	-	-	1126	-	-	-	-	-	-	-	-
AISI alloy (see AISI designations)																
Alumel	2-II	-	-	-	-	-	-	1271	-	-	-	-	-	-	-	-
Astroloy	2-II	-	-	-	-	-	-	-	-	-	-	-	1229	1231	-	-
Brazing alloys GE-62	2-II	-	-	-	-	-	-	-	-	-	1168	-	-	-	-	-
Brazing compound GEH 62-V.	2-II	-	-	-	-	-	-	1130	-	-	-	-	-	-	-	-
Chromel-P	2-I	-	-	-	-	-	-	329	-	-	-	-	-	-	-	-
Contracid	2-II	-	-	-	-	-	-	-	1261	-	-	-	-	-	-	-
D-979	2-II	-	-	-	-	-	-	-	1261	-	-	-	-	-	-	-
Duranickel 301	2-II	"	-	-	-	-	-	-	-	-	1117	-	-	-	-	-
DVL 32	2-II	1219	-	-	-	-	-	-	-	-	1225	-	-	-	-	-
DVL 321a	2-II	1219	-	-	-	-	-	-	-	-	1225	-	-	-	-	-
DVL 321i	2-II	1219	-	-	-	-	-	-	-	-	1225	-	-	-	-	-
DVL 325a	2-II	1219	-	-	-	-	-	-	-	-	1225	-	-	-	-	-
EI-435	2-II	-	-	-	-	-	-	1132	1144	1150	-	-	-	-	-	-
EI-437	2-II	-	-	-	-	-	-	-	1140	-	-	-	-	-	-	-
EI-607	2-II	-	-	-	-	-	-	-	1145	-	1158	-	-	-	-	-
EI-617	2-II	-	-	-	-	-	-	-	-	-	1170	-	-	-	-	-
GMR-235	2-II	-	-	-	-	-	-	-	-	-	1161	-	-	-	-	-
Haskins alloy 667.	2-II	-	-	-	-	-	-	-	-	-	1273	-	-	-	-	-
Haynes alloy no. R-41. . . .	2-II	-	-	-	-	-	-	-	-	-	1154	-	-	-	-	-
Haynes alloy X	2-II	-	-	-	-	-	-	-	-	-	-	-	1172	-	-	-
Hastelloys (see Hastelloy)																
HU	2-II	-	-	-	-	-	-	-	-	-	1265	-	-	-	-	-
HW	2-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
Illium alloy	2-II	-	-	-	-	-	-	-	-	-	1156	-	-	-	-	-
Illium G	2-II	-	-	-	-	-	-	-	1136	-	-	-	-	-	-	-
Illium R	2-II	-	-	-	-	-	-	-	1138	-	-	-	-	-	-	-
Inco (see Inco)																
Incoloys (see Incoloy)																
Inconels (see Inconel)																
INOR-8	2-II	-	-	-	-	-	-	-	1281	-	1285	-	1293	-	-	-
J-1500	2-II	-	-	-	-	-	-	-	1136	-	1166	-	-	-	-	-
J-1610	2-II	-	-	-	-	-	-	-	1134	-	1156	-	-	-	-	-
M-252	2-II	-	-	-	-	-	-	1130	1136	-	1166	-	1180, 1197	1209, 1215	-	-
Monels (see Monel)																

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Nickel alloys (special designations) (cont.)																
Ni-O-Nel	2-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
Nichrome	2-I	-	-	-	-	-	-	-	-	-	-	-	331	-	-	-
Nichrome V	2-II	-	-	-	-	-	-	1130	1144	-	-	-	-	-	-	-
Nimonics (see Nimonic)																
OKh 20N80B	2-II	-	-	-	-	-	-	1132	1136	1150	-	-	-	-	-	-
OKh 21N78T	2-II	-	-	-	-	-	-	1132	-	1150	-	-	-	-	-	-
Permanickel 300	2-II	1257	-	-	-	-	-	-	-	-	1303	-	-	-	-	-
RCA-N91	2-I	-	-	-	-	-	-	-	337	-	-	-	-	-	-	-
RCA-N97	2-I	-	-	-	-	-	-	-	337	-	-	-	-	-	-	-
Refractaloy 26	2-II	-	-	-	-	-	-	-	1223	-	-	-	-	-	-	-
Rene 41	2-II	1122	-	-	-	-	-	1130	1134	-	1156	-	1184, 1199	1211	-	-
SM-200	2-II	-	-	-	-	-	-	-	-	-	1305	-	-	-	-	-
Udimets (see Udimet)																
Unitemp Waspalloy	2-II	-	-	-	-	-	-	-	1138	-	-	-	-	-	-	-
Waspalloy	2-II	-	-	-	-	-	-	-	1136	-	1154	-	-	-	-	-
Nickel aluminate ($NiO \cdot Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1021	-	1023	-	-	-
Nickel aluminides																
NiAl	6-I	-	-	-	-	-	-	-	-	-	13	-	15-17	19	-	-
Ni_3Al	6-I	-	-	-	-	-	-	-	-	-	13	-	15-17	19	-	-
Nickel aluminides coating on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	1453-1455	1457	-	-
Nickel aluminide + Aluminum oxide	5	-	-	-	-	-	-	-	-	-	-	-	844-846	848	-	-
Nickel aluminide + Nickel (mon-) oxide	5	-	-	-	-	-	-	-	-	-	-	-	850-852	854	-	-
Nickel aluminide + Nickel (mon-) oxide + Aluminum oxide	5	-	-	-	-	-	-	-	-	-	-	-	856-858	860	-	-
Nickel borides																
Ni_2B	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni_3B	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni_3B_2	6-I	-	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel carbide (Ni_3C)	5	-	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel chrome spinel coating on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1387	-	-	-
Nickel chromite coating on niobium-zirconium alloy	6-II	-	-	-	-	-	-	-	-	-	-	-	1387	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Nickel-chromium alloy coating on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1333	1335	-	-
Nickel ferride (Ni_3Fe)	6-I	-	-	-	-	-	-	-	-	-	304	-	-	-	-	-
Nickel ferrite ($NiO \cdot Fe_2O_3$)	4-II	-	-	-	-	-	1087	1089	-	-	1091	-	-	-	-	-
Nickel ferrite spinal	4-II	-	-	-	-	-	-	1089	-	-	-	-	-	-	-	-
Nickel-lead silicate glass	4-II	-	-	-	-	-	1773	-	-	-	-	-	-	-	-	-
Nickel-manganese intermetallics (Ni_3Mn)	6-I	-	-	-	-	-	652	654	-	-	-	-	-	-	-	-
Nickel (mon-)oxide (NiO)	4-I	-	-	-	-	-	-	301	303	-	305	-	307-309	311	-	-
Nickel (mon-)oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	765	-	-	-	-	-	-	-
Nickel (mon-)oxide + Nickel aluminide	5	-	-	-	-	-	-	-	-	-	-	-	777-779	781	-	-
Nickel phosphides																
Ni_2P	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni_3P	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ni_{12}P_5$	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel selenides																
$NiSe_{1.0-2.0}$	6-I	345	-	-	-	-	-	347	-	-	-	-	-	-	-	-
Nickel silicides																
NiSi	6-I	-	453	-	-	-	-	-	-	-	-	-	-	-	-	-
$NiSi_2$	6-I	-	453	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni_2Si	6-I	-	453	-	-	-	-	-	-	-	455	-	-	-	-	-
Ni_3Si	6-I	-	453	-	-	-	-	-	-	-	455	-	-	-	-	-
Ni_3Si_2	6-I	-	453	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel-tantalum intermetallics (Ni_3Ta)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel tellurides																
NiTe	6-I	-	-	-	-	-	-	604	-	-	-	-	-	-	-	-
$NiTe_{1.1-1.5}$	6-I	-	-	-	-	-	-	604	-	-	-	-	-	-	-	-
$NiTe_2$	6-I	-	-	-	-	-	-	604	-	-	-	-	-	-	-	-
Nickel titanate ($NiO \cdot TiO_2$)	4-II	-	-	-	-	-	1452	-	-	-	-	-	-	-	-	-
Nickel zinc ferrite ($Ni_xZn_{1-x}O \cdot Fe_2O_3$)	4-II	-	-	-	-	-	-	1093	1095	-	-	-	-	-	-	-
Nickel-zirconium intermetallics																
NiZr	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni_3Zr	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni_4Zr	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Nimonic 75	2-II	-	-	-	-	-	-	-	1144	-	-	-	1182	-	-	-
Nimonic 80	2-II	-	-	-	-	-	-	-	1140		-	-	-	-	-	-
Nimonic 80/80A	2-II	-	-	-	-	-	-	-	1140	-	-	-	-	-	-	-
Nimonic 90	2-II	-	-	-	-	-	-	-	1136	-	-	-	-	-	-	-
Nimonic 95	2-II	-	-	-	-	-	-	-	1136	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Nimonic 100	2-II	1219	1217	-	-	-	-	-	1223	-	1227	-	-	-	-	-
Nimonic 105	2-II	-	-	-	-	-	-	-	1223	-	-	-	-	-	-	-
Niobium (Nb)	1	722	722	-	-	-	724	726	728	730	732	-	734-438	740	-	742
Niobium coated with aluminide	6-II	-	-	-	-	-	-	-	-	-	-	-	1435-1437	1439	-	-
Niobium coated with niobium aluminide	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1459	-	-
Niobium + ΣX_i	2-II	-	-	-	-	-	-	1361	-	-	-	-	-	-	-	-
Niobium + Iron + ΣX_i	2-II	-	-	-	-	-	-	1317	-	-	-	-	-	-	-	-
Niobium + Molybdenum + ΣX_i	2-II	1319	-	-	-	-	-	1321	1323	1325	1327	-	-	-	-	-
Niobium + Tantalum	2-I	-	361	-	-	-	363	-	365	-	-	-	-	-	-	-
Niobium + Tantalum + ΣX_i	2-II	-	-	-	-	-	-	1329	1331	1333	1335	-	-	-	-	-
Niobium + Titanium	2-I	-	-	-	-	-	367	-	-	-	-	-	-	-	-	-
Niobium + Titanium + ΣX_i	2-II	1337	-	-	-	-	-	1339	1341	1343	1345	-	1347	-	-	-
Niobium + Tungsten	2-I	-	-	-	-	-	-	-	-	-	-	-	369-371	-	-	-
Niobium + Tungsten + ΣX_i	2-II	-	-	-	-	-	-	1349	1351	1353	1355	-	-	-	-	-
Niobium + Uranium	2-I	-	-	-	-	-	-	-	373	-	375	-	-	-	-	-
Niobium + Vanadium	2-I	-	-	-	-	-	377	-	-	-	-	-	-	-	-	-
Niobium + Vanadium + ΣX_i	2-II	-	-	-	-	-	-	-	1357	-	1359	-	-	-	-	-
Niobium + Zirconium	2-I	-	-	-	-	-	379	381	383	-	385	-	387-389	-	-	-
Niobium alloys (special design.)																
5 Mo-5 V-Zr	2-II	-	-	-	-	-	-	1321	-	1325	-	-	-	-	-	-
27 Ta-12 W-0.5 Zr	2-II	-	-	-	-	-	-	1329	-	1333	-	-	-	-	-	-
10 Ti-5 Zr	2-II	-	-	-	-	-	-	1339	-	1348	-	-	-	-	-	-
10 W-1 Zr-0.1 C	2-II	-	-	-	-	-	-	1349	-	1353	-	-	-	-	-	-
10 W-5 Zr	2-II	-	-	-	-	-	-	1349	-	1353	-	-	-	-	-	-
15 W-5 Mo-1 Zr	2-II	-	-	-	-	-	-	1349	-	-	-	-	-	-	-	-
15 W-5 Mo-1 Zr-0.5 C	2-II	-	-	-	-	-	-	-	-	1353	-	-	-	-	-	-
B-66	2-II	-	-	-	-	-	-	-	-	-	1327, 1359	-	-	-	-	-
Cb-752	2-II	-	-	-	-	-	-	1349	-	-	1355	-	-	-	-	-
F-48	2-II	-	-	-	-	-	-	1349	-	-	1355	-	-	-	-	-
Ferroniobium	2-II	-	-	-	-	-	-	1317	-	-	-	-	-	-	-	-
FS-82	2-II	-	-	-	-	-	-	-	-	-	1335	-	-	-	-	-
FS-82B	2-II	-	-	-	-	-	-	1329	-	-	1335	-	-	-	-	-
FS-85	2-II	-	-	-	-	-	-	-	-	-	1335	-	-	-	-	-
MAR-M200	2-II	-	-	-	-	-	-	-	-	-	1305	-	-	-	-	-
Niobium aluminide ($NbAl_3$)	6-I	-	21	-	-	-	-	-	-	-	-	-	-	23	-	-
Niobium aluminide coating on niobium	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1459	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Niobium beryllides																
$NbBe_{11}$	6-I	-	108	-	-	-	-	-	-	-	-	-	-	-	-	-
$NbBe_{12}$	6-I	-	108	-	-	-	-	110	112	-	114	-	116	120	-	-
Nb_2Be_{17}	6-I	-	-	-	-	-	-	-	112	-	-	-	116-118	120	-	-
Niobium borides																
NbB	6-I	-	194	-	-	-	-	-	-	-	-	-	-	-	-	-
NbB_2	6-I	194	194	-	-	-	-	196	-	-	198	-	200-202	-	-	-
Nb_3B_2	6-I	-	194	-	-	-	-	-	-	-	-	-	-	-	-	-
Nb_3B_4	6-I	-	194	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium (di-)boride + Zirconium (di-)boride	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium carbide (NbC)	5	91	91	-	-	-	93	95-97	99	-	101	-	104-106	-	-	-
Niobium-chromium intermetallics ($NbCr_2$)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium-cobalt intermetallics ($NbCo_2$)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium ferride ($NbFe_2$)	6-I	-	306	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium germanides																
$NbGe_2$	6-I	323	323	-	-	-	-	-	327	-	-	-	-	-	-	-
Nb_2Ge	6-I	-	323	-	-	-	-	-	-	-	-	-	-	-	-	-
Nb_3Ge	6-I	323	323	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium germanide silicides ($NbGe_xSi_{1-x}$)	6-I	-	-	-	-	-	-	-	529	-	-	-	-	-	-	-
Niobium-manganese intermetallics ($NbMn_2$)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium nitrides																
NbN	5	535	535	-	-	-	537	-	-	-	539	-	-	-	-	-
Nb_2N	5	-	535	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium oxides																
NbO	4-I	-	-	-	-	-	-	315	-	-	-	-	-	-	-	-
NbO_2	4-I	-	-	-	-	-	-	317	-	-	-	-	-	-	-	-
Nb_2O_5	4-I	313	-	313	-	-	-	319	-	-	321	-	-	-	-	-
Niobium (pent-)oxide + + Aluminum oxide	4-I	-	767	-	-	-	-	-	-	-	769	-	-	-	-	-
Niobium (pent-)oxide + + Beryllium oxide	4-I	-	771	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium (pent-)oxide + + Magnesium oxide	4-I	-	773	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium (pent-)oxide + + Titanium (di-)oxide	4-I	-	775	-	-	-	-	-	-	-	777	-	-	-	-	-
Niobium (pent-)oxide + + Zirconium (di-)oxide	4-I	-	779	-	-	-	-	-	-	-	781	-	-	-	-	-
Niobium phosphide (NbP)	5	635	635	-	-	-	639	-	-	-	-	-	-	-	-	-
Niobium selenide ($NbSe_3$)	6-I	-	-	-	-	-	367	-	369	-	-	-	-	-	-	-

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Niobium silicides																
$NbSi_2$	6-I	-	-	-	-	-	527	-	529	-	-	-	-	-	-	-
Nb_5Si	6-I	-	457	-	-	-	-	-	-	-	-	-	-	-	-	-
Nb_5Si_3	6-I	-	457	-	-	-	-	-	-	-	459	-	-	-	-	-
(Penta-) niobium (tri-) silicide + + (Di-) molybdenum boride	6-I	-	724	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium silicide germanides																
NbSiGe	6-I	-	-	-	-	-	317	-	319	-	-	-	-	-	-	-
$NbSi_{1-x}Ge_x$	6-I	-	-	-	-	-	317	-	319	-	-	-	-	-	-	-
Niobium stannide (Nb_3Sn)	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Niobium telluride ($NbTe_2$)	6-I	-	-	-	-	-	606	-	608	-	-	-	-	-	-	-
Niobium-zirconium alloy coated with barium titanate	6-II	-	-	-	-	-	-	-	-	-	-	-	1369	-	-	-
Niobium-zirconium alloy coated with boron	6-II	-	-	-	-	-	-	-	-	-	-	-	1291	-	-	-
Niobium-zirconium alloy coated with calcium titanate	6-II	-	-	-	-	-	-	-	-	-	-	-	1371	-	-	-
Niobium-zirconium alloy coated with iron titanate	6-II	-	-	-	-	-	-	-	-	-	-	-	1385	-	-	-
Niobium-zirconium alloy coated with nickel chromite	6-II	-	-	-	-	-	-	-	-	-	-	-	1387	-	-	-
Niobium-zirconium alloys coated with silicon carbide	6-II	-	-	-	-	-	-	-	-	-	-	-	1415	-	-	-
Nodular cast iron	3	-	-	-	-	-	-	-	35-37, 437	-	41, 444	-	-	-	-	-
Nodular cast iron, ferritic base	3	-	-	-	-	-	-	-	37	-	-	-	-	-	-	-
Nodular cast iron, pearlitic base	3	-	-	-	-	-	-	-	35	-	41	-	-	-	-	-
Nycar PA-21	6-II	1051	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nylon	6-II	-	-	-	-	-	-	1047	-	-	1049	-	-	-	-	-
Nylon 1 N fabrics	6-II	-	-	-	-	-	-	-	-	1273	-	-	-	-	-	-
Nylon 6	6-II	-	-	-	-	-	-	1047	-	-	1049	-	-	-	-	-
Nylon 9	6-II	-	-	-	-	-	-	-	-	-	1049	-	-	-	-	-
Nylon 11	6-II	-	-	-	-	-	-	-	-	-	1049	-	-	-	-	-
Nylon 11 N fabric	6-II	-	-	-	-	-	-	-	-	1273	-	-	-	-	-	-
Nylon 66	6-II	-	-	-	-	-	-	-	-	-	1049	-	-	-	-	-
Nylon fabric	6-II	-	-	-	-	-	-	-	-	1273	-	-	-	-	-	-
Nylon FM-1	6-II	-	-	-	-	-	-	-	-	-	1049	-	-	-	-	-

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O																
OFHC copper	1	-	-	-	-	-	-	-	458	460	-	-	-	-	-	-
Opalon 300 FM	6-II	-	1076	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic fiber cloth	6-II	-	-	-	-	-	-	-	-	-	1275	-	-	-	-	-
Osmium (Os)	1	744	744	-	-	-	746	-	748	-	-	-	750	-	-	-
P																
Palatinol AH	6-II	-	-	-	-	-	-	-	1086	-	-	-	-	-	-	-
Palladium (Pd)	1	752	752	-	-	-	754	756	758	-	-	760	762-764	766	-	-
Palladium + Cobalt + ΣX_i	2-II	-	1363	-	-	-	1366-1368	-	-	-	-	-	-	-	-	-
Palladium + Copper + ΣX_i	2-II	-	1370	-	-	-	-	1372	-	-	-	-	-	-	-	-
Palladium + Gold + ΣX_i	2-II	-	1374	-	-	-	1376	-	-	-	-	-	-	-	-	-
Palladium + Nickel	2-I	-	-	-	-	-	391	-	-	-	-	-	-	-	-	-
Palladium + Nickel + ΣX_i	2-II	-	-	-	-	-	-	-	-	-	1378	-	-	-	-	-
Palladium + Uranium	2-I	-	393	-	-	-	-	-	-	-	-	-	-	-	-	-
Palladium aluminides																
PdAl	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Pd_3Al	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Palladium beryllides																
PdBe	6-I	-	158	-	-	-	-	-	-	-	-	-	-	-	-	-
$PdBe_{12}$	6-I	-	158	-	-	-	-	-	-	-	-	-	-	-	-	-
Palladium brazing alloy GE-76	2-II	-	-	-	-	-	-	-	-	-	1378	-	-	-	-	-
Palladium tellurides																
PdTe	6-I	-	-	-	-	-	-	610	-	-	-	-	-	-	-	-
$PdTe_2$	6-I	-	-	-	-	-	-	610	-	-	-	-	-	-	-	-
Panelyte, grade 942	6-II	-	-	-	-	-	-	-	-	-	1107	-	-	-	-	-
Paraplex P43	6-II	-	-	-	-	-	-	-	-	-	978	-	-	-	-	-
Penton 1215	6-II	-	1076	-	-	-	-	-	-	-	-	-	-	-	-	-
Perbunan 18	6-II	-	-	-	-	-	-	-	-	1060	-	-	-	-	-	-
Perbunan 26	6-II	-	-	-	-	-	-	-	-	1060	-	-	-	-	-	-
Perbunan 35	6-II	-	-	-	-	-	-	-	-	1060	-	-	-	-	-	-
Periclase	4-I	-	-	-	-	-	-	-	254	-	-	-	-	-	-	-
Periclase, synthetic	4-I	-	-	-	-	-	-	-	254	-	-	-	-	-	-	-
Permanickel 300	2-II	1257	-	-	-	-	-	-	-	-	1303	-	-	-	-	-
Phenacite, synthetic	4-II	-	-	-	-	-	-	-	-	-	1223	-	-	-	-	-
Phenol formaldehyde	6-II	-	-	-	-	-	-	-	-	-	986	-	-	-	-	-
Phenol formaldehyde, asbestos filled	6-II	-	-	-	-	-	-	-	-	-	988	-	-	-	-	-
Phenol formaldehyde, ceramic filled	6-II	-	-	-	-	-	-	-	-	-	990	-	-	-	-	-
Phenol formaldehyde, cord filled	6-II	-	-	-	-	-	-	-	-	-	992	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Phenol formaldehyde, cotton flock filled	6-II	-	-	-	-	-	-	-	-	-	994	-	-	-	-	-
Phenol formaldehyde, fabric filled	6-II	-	-	-	-	-	-	-	-	-	996	-	-	-	-	-
Phenol formaldehyde, stupalith A-2412	6-II	-	-	-	-	-	-	-	-	-	990	-	-	-	-	-
Phenol formaldehyde, wood flour filled	6-II	-	-	-	-	-	-	-	-	-	998	-	-	-	-	-
Phenolic, alpha cellulose paper reinforced	6-II	-	-	-	-	-	-	-	-	-	1105	-	-	-	-	-
Phenolic, cotton fabric reinforced	6-II	-	-	-	-	-	-	-	-	-	1107	-	-	-	-	-
Phenolic, LMI 304 nylon reinforced	6-II	-	-	-	-	-	1103	-	-	-	-	-	-	-	-	-
Phenolic, long glass fiber reinforced	6-II	-	-	-	-	-	1103	-	-	-	-	-	-	-	-	-
Phenolic and epoxide copolymer resin, reinforced	6-II	-	-	-	-	-	-	-	-	-	1126	-	-	-	-	-
Phenolic novolak	6-II	-	-	-	-	-	982	-	-	-	-	-	-	-	-	-
Phenolic, reinforced	6-II	-	-	-	-	-	1103	-	-	-	1105-1107	-	-	-	-	-
Phenolic resin	6-II	980	-	-	-	-	982	-	984	1082	-	-	-	-	-	-
Phenolic resin, reinforced	6-II	1130	-	-	-	-	-	1132-1146	1148-1156	1159-1170	1172-1179	-	-	-	-	-
Phenolic resin, type S	6-II	980	-	-	-	-	-	-	984	1082	-	-	-	-	-	-
Phenolites																
Phenolite	6-II	-	-	-	-	-	-	-	-	-	1101, 1176	-	-	-	-	-
NEMA C	6-II	-	-	-	-	-	-	-	-	-	1107	-	-	-	-	-
NEMA L	6-II	-	-	-	-	-	-	-	-	-	1107	-	-	-	-	-
NEMA LE	6-II	-	-	-	-	-	-	-	-	-	1107	-	-	-	-	-
NEMA X	6-II	-	-	-	-	-	-	-	-	-	1107	-	-	-	-	-
NEMA XP	6-II	-	-	-	-	-	-	-	-	-	1105	-	-	-	-	-
NEMA XXX	6-II	-	-	-	-	-	-	-	-	-	1105	-	-	-	-	-
NEMA XXXP	6-II	-	-	-	-	-	-	-	-	-	1105	-	-	-	-	-
XXXP	6-II	-	-	-	-	-	-	-	-	-	1105	-	-	-	-	-
Phenyl silane resin	6-II	-	-	-	-	-	-	1074	-	-	-	-	-	-	-	-
Phenyl silane resin, reinforced	6-II	-	-	-	-	-	-	1212	-	1220	-	-	-	-	-	-
Phenyl silane SC-1013 Monsanto	6-II	-	-	-	-	-	-	1074	-	-	-	-	-	-	-	-
Phosphate glass	4-II	1649	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus (pent-)oxide + + Zirconium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	787	-	-	-	-	-
Pittsburg no. 3235 glass	4-II	-	-	-	-	-	-	1697	-	-	-	-	1705	1709	1711-1713	-
Plate glass	4-II	1779	-	-	-	-	-	1791	1783	1793	1797	-	-	-	-	-
Plate glass no. 9330	4-II	-	-	-	-	-	-	1791	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Platinum (Pt)	1	768	768	-	-	-	770	772	774	776	778	780	782-788	790	-	-
Platinum coating on copper . . .	6-II	-	-	-	-	-	-	-	-	-	-	-	1313	-	-	-
Platinum coating on quartz . . .	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1317	1319	-
Platinum coating on stainless steel	6-II	-	-	-	-	-	-	-	-	-	-	-	1315	-	-	-
Platinum + Copper	2-I	-	-	-	-	-	395-397	-	-	-	-	-	-	-	-	-
Platinum + Iron	2-I	-	-	-	-	-	399	-	-	-	401	-	-	-	-	-
Platinum + Rhodium	2-i	-	-	-	-	-	-	-	403	-	-	-	405	407	-	-
Platinum arsenide (Pt_2As_3) . . .	6-I	-	94	-	-	-	-	-	-	-	-	-	-	-	-	-
Platinum beryllide ($PtBe_{12}$) . .	6-I	158	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Platinum stannide (Pt_3Sn) . . .	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Platinum sulfides																
PtS	5	-	-	-	-	-	-	698	-	-	-	-	-	-	-	-
PtS_2	5	-	-	-	-	-	-	698	-	-	-	-	-	-	-	-
Platinum tellurides																
PtTe	6-I	-	-	-	-	-	-	612	-	-	-	-	-	-	-	-
$PtTe_2$	6-I	-	-	-	-	-	-	612	-	-	-	-	-	-	-	-
Plexiglas 11	6-II	-	-	-	-	-	-	-	-	-	1026	-	-	-	-	-
Plexiglas AN-P-44A	6-II	1020	1020	-	-	-	-	1022	1024	-	1026	-	-	-	-	-
Plutonium (Pu)	1	794	792	-	792	-	796	799	-	-	801	-	-	-	-	-
Plutonium + Cerium + ΣX_1 . . .	2-II	-	-	-	-	-	-	1380	-	-	-	-	-	-	-	-
Plutonium + Osmium	2-I	409	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium + Thorium	2-I	411	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium beryllide ($PuBe_{13}$) . .	6-I	158	158	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium bromide ($PuBr_3$) . . .	5	3	3	3	3	3	-	-	-	-	-	-	-	-	-	5
Plutonium carbides																
PuC	5	-	-	-	-	-	110	112	-	-	114	-	-	-	-	-
Pu_2C_3	5	108	-	-	-	-	-	-	-	-	117	-	-	-	-	-
Plutonium chloride ($PuCl_3$) . . .	5	327	327	327	327	327	-	-	-	-	-	-	-	-	-	329
Plutonium ferrides																
PuFe-	6-I	306	306	-	-	-	-	-	-	-	-	-	-	-	-	-
Pu_6Fe	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium fluoride (PuF_3) . . .	5	389	389	389	389	389	-	-	-	-	-	-	-	-	-	391
Plutonium iodide (PuI_3)	5	471	471	471	471	471	-	-	-	-	-	-	-	-	-	473
Plutonium-lead intermetallics ($PuPb_3$)	6-I	-	671	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium-manganese intermetallics ($PuMn_2$)	6-I	671	671	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium-nickel intermetallics																
PuNi	6-I	-	671	-	-	-	-	-	-	-	-	-	-	-	-	-
$PuNi_2$	6-I	-	671	-	-	-	-	-	-	-	-	-	-	-	-	-
$PuNi_3$	6-I	-	671	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Plutonium nitride (PuN)	5	-	-	-	-	-	-	-	-	-	541	-	-	-	-	-
Plutonium-osmium intermetallics ($PuOs_2$)	6-I	671	671	-	-	-	-	-	-	-	-	-	-	-	-	-
Plutonium oxides																
PuO	4-I	-	-	-	-	323	-	-	-	-	-	-	-	-	-	329
PuO_2	4-I	323	323	-	-	-	-	325	-	-	327	-	-	-	-	329
Plutonium silicide ($PuSi_2$) . . .	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polonium (Po)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	803
Polybutadiene	6-II	-	-	-	-	-	-	-	-	1066	-	-	-	-	-	-
Polychlorotrifluoroethylene . .	6-II	-	-	-	-	-	-	-	1037	-	1045	-	-	-	-	-
Polyester, glass fiber reinforced	6-II	-	-	-	-	-	-	-	-	-	1109	-	-	-	-	-
Polyester, unsaturated	6-II	-	-	-	-	-	-	-	-	-	968	-	-	-	-	-
Polyester resin, reinforced . .	6-II	1180	-	-	-	-	-	1191	1195-1198	1220	1200	-	-	-	-	-
Polyethylene	6-II	1030	-	-	-	-	-	-	1037	-	1045	-	-	-	-	-
Polyethylene, halogenated . . .	6-II	1030	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
Polyethylene PE 575	6-II	-	1030	-	-	-	-	-	-	-	-	-	-	-	-	-
Polyfluorobutyl acrylate rubber.	6-II	1051	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polyisoprene	6-II	-	-	-	-	-	-	-	-	1066	-	-	-	-	-	-
Polymethyl methacrylate. . . .	6-II	-	-	-	-	-	-	-	-	-	1026	-	-	-	-	-
Polymethyl methacrylate, alumina filled	6-II	-	-	-	-	-	-	-	-	-	1028	-	-	-	-	-
Polymethyl methacrylate, boron phosphate filled	6-II	-	-	-	-	-	-	-	-	-	1028	-	-	-	-	-
Polymethyl methacrylate, calcium carbonate filled . . .	6-II	-	-	-	-	-	-	-	-	-	1028	-	-	-	-	-
Polymethyl methacrylate, silica filled	6-II	-	-	-	-	-	-	-	-	-	1028	-	-	-	-	-
Polymethyl methacrylate, zinc oxide filled	6-II	-	-	-	-	-	-	-	-	-	1028	-	-	-	-	-
Polypropylene	6-II	1076	1076	-	-	-	-	1078	1080	-	1088	-	-	-	-	-
Polystyrene	6-II	-	1076	-	-	-	-	-	1090	-	1092	-	-	-	-	-
Polystyrene, Grade 912A . . .	6-II	-	-	-	-	-	-	-	-	-	1092	-	-	-	-	-
Polystyrene foam	6-II	-	-	-	-	-	-	-	1090	-	-	-	-	-	-	-
Polytetrafluoroethylene	6-II	-	-	-	-	-	-	1035	1039	-	1045	-	-	-	-	-
Polytetrafluoroethylene laminate	6-II	-	-	-	-	-	-	1214	1218	1220	-	-	-	-	-	-
Polythene, germanium (di-)oxide filled	6-II	-	-	-	-	-	-	-	-	-	1041	-	-	-	-	-
Polythene, iron(ic) oxide filled.	6-II	-	-	-	-	-	-	-	-	-	1041	-	-	-	-	-
Polythene, scandium oxide filled	6-II	-	-	-	-	-	-	-	-	-	1041	-	-	-	-	-
Polythene PM-1	6-II	-	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
Polyurethane foam	6-II	962	-	-	-	-	-	-	964	-	966	-	-	-	-	-
Polyvinyl carbazole	6-II	-	-	-	-	-	-	970	972	-	-	-	-	-	-	-
Polyvinyl chloride	6-II	-	1076	-	-	-	-	-	1086	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Polyvinyl chloride, cellular . .	6-II	-	-	-	-	-	-	-	1086	-	-	-	-	-	-	-
Porcelain	5	1003	-	-	-	-	1005-1013	1015	1017	-	1019-1021	-	-	-	-	-
Porcelain 7A2	5	-	-	-	-	-	-	-	1017	-	-	-	-	-	-	-
Porcelain 576	5	1003	-	-	-	-	-	-	1017	-	-	-	-	-	-	-
Porcelain, aluminum oxide . . .	5	1003	-	-	-	-	-	1015	1017	-	-	-	-	-	-	-
Porcelain, cone 14	5	-	-	-	-	-	1007	-	-	-	-	-	-	-	-	-
Porcelains, electrical																
K-3 body	5	-	-	-	-	-	1005	-	-	-	-	-	-	-	-	-
K-5 body	5	-	-	-	-	-	1005	-	-	-	-	-	-	-	-	-
K-6 body	5	-	-	-	-	-	1005	-	-	-	-	-	-	-	-	-
K-7 body	5	-	-	-	-	-	1005	-	-	-	-	-	-	-	-	-
K-8 body	5	-	-	-	-	-	1005	-	-	-	-	-	-	-	-	-
K-9 body	5	-	-	-	-	-	1005	-	-	-	-	-	-	-	-	-
Li-K-1 body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Li-K-2a body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Li-K-2b body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Li-K-2c body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Li-K-2d body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Li-K-2e body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Lithium modified	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Pelalite body	5	-	-	-	-	-	1011	-	-	-	-	-	-	-	-	-
Porcelain, feldspar, dinnerware cone 12-14	5	-	-	-	-	-	1007	-	-	-	-	-	-	-	-	-
Porcelain, zircon	5	1003	-	-	-	-	1013	-	1017	-	1021	-	-	-	-	-
Potassium aluminum silicates .	4-II	-	-	-	-	-	-	-	-	-	1316-1318	-	-	-	-	-
Potassium aluminum silicate + + Iron(ic) oxide	4-II	-	-	-	-	-	-	1573	-	-	-	-	-	-	-	-
Potassium borate glass	4-II	1605	-	-	-	-	1607	-	-	-	-	-	-	-	-	-
Potassium bromide (KBr) . . .	5	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-
Potassium chloride (KCl) . . .	5	-	-	-	-	-	-	-	-	-	-	-	-	331	-	-
Potassium feldspar	4-II	-	-	-	-	-	-	-	-	-	1316-1318	-	-	-	-	-
Potassium fluoride + Lithium fluoride	5	-	-	-	-	-	-	409	-	-	-	-	-	-	-	-
Potassium mica	5	-	-	-	-	-	-	-		-	1001	-	-	-	-	-
Potassium sodium aluminum silicates	4-II	-	-	-	-	-	-	-	-	-	1320	-	-	-	-	-
Potassium uranate ($K_2O \cdot UO_3$) .	4-II	-	1482	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium lead silicate glass . .	4-II	-	-	-	-	-	1777	-	-	-	-	-	-	-	-	-
Potassium silicate glass	4-II	-	-	-	-	-	-	-	-	-	1775	-	-	-	-	-
Praseodymium (Pr)	1	805	805	805	805	-	807	809	-	-	-	-	-	-	-	811
Praseodymium + ΣX_i	2-II	-	1382	-	-	-	-	-	-	-	-	-	-	-	-	-

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Praseodymium + Magnesium . .	2-I	413	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium + Neodymium . .	2-I	-	-	-	-	-	-	-	-	-	415	-	-	-	-	-
Praseodymium + Silicon	2-I	-	-	-	-	-	-	417	-	-	-	-	-	-	-	-
Praseodymium aluminides																
PrAl	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrAl_2$	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrAl_4$	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2Al_2	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-bismuth intermetallics (PrBi)	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium borides																
PrB_4	6-I	296	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PrB_6	6-I	295-296	-	-	-	-	300	-	-	-	-	-	-	-	-	-
Praseodymium bromide ($PrBr_3$)	5	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-cadmium intermetallics																
PrCd	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCd_2$	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCd_3$	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCd_{11}$	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium carbides																
PrC_2	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium chloride ($PrCl_3$).	5	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-cobalt intermetallics																
$PrCo_2$	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCo_5$	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-copper intermetallics																
PrCu	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCu_2$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCu_4$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrCu_6$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-gallium intermetallics ($PrGa_2$)	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium germanides																
PrGe	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrGe_2$	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-gold intermetallics																
PrAu	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrAu_2$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-

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Praseodymium-gold intermetallics (cont.)																
$PrAu_3$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2Au	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium hydride (PrH_3)	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-indium intermetallics																
$PrIn_3$	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_3In	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-lead intermetallics																
PrPb	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrPb_3$	6-I	673	674	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2Pb	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-magnesium intermetallics																
PrMg	6-I	673	674	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrMg_2$	6-I	673	674	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrMg_3$	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_4Mg	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-mercury intermetallics (PrHg)	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-nickel intermetallics ($PrNi_5$)	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-osmium intermetallics ($PrOs_2$)	6-I	673	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium oxides																
$PrO_{1.70-1.83}$	4-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	335
Pr_6O_{11}	4-I	-	-	-	-	-	-	331	-	-	333	-	-	-	-	-
Praseodymium phosphide (PrP)	5	635	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium selenides																
PrSe	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2Se_3	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_3Se_4	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium silicides ($PrSi_2$)	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-silver intermetallics																
PrAg	6-I	673	673	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrAg_2$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrAg_3$	6-I	-	673	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium stannides																
$PrSn_3$	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2Sn	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_3Sn_5	6-I	-	541	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Praseodymium sulfides																
PrS	5	700	-	-	-	-	-	-	-	-	702	-	-	-	-	-
PrS_2	5	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2S_3	5	700	-	-	-	-	-	-	-	-	702	-	-	-	-	-
Pr_3S_4	5	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Praseodymium-thallium intermetallics																
PrTl	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
$PrTl_3$	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
Pr_2Tl	6-I	-	674	-	-	-	-	-	-	-	-	-	-	-	-	-
Promethium (Pm)	1	-	813	813	-	813	-	-	-	-	-	-	-	-	-	-
Protactinium (Pa)	1	815	815	-	-	-	-	-	-	-	-	-	-	-	-	-
Protactinium oxide (PaO)	4-I	337	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protoenstatite	4-II	-	-	-	-	-	-	-	-	-	1295	-	-	-	-	-
Pu-Ce-Co eutectic alloy	2-II	-	-	-	-	-	-	1380	-	-	-	-	-	-	-	-
Pyrex 774	4-II	1693	-	-	-	-	-	-	1699	1701	1703	-	1707	1709	1713	-
Pyrex 7740	4-II	-	-	-	-	-	-	1697	-	1701	-	-	1705	1709	1711-1713	-
Pyrex glasses	4-II	1693	-	-	-	-	-	1697	1699	1701	1703	-	1705-1707	1709	1711-1713	-
Pyrocerams																
Pyroceram 9606	4-II	-	-	-	-	-	-	1587	1589	1591	-	-	1593-1599	1601	1603	-
Pyroceram 9608	4-II	-	-	-	-	-	-	1587	1589	1591	-	-	1593-1599	1601	1603	-
Pyroceram 9690	4-II	-	-	-	-	-	-	-	-	1591	-	-	-	-	-	-
Pyrolytic carbon	1	83	-	-	-	-	-	-	89	-	-	-	-	-	-	-
Pyrolytic carbon EYX-4	1	-	-	-	-	-	-	-	89	-	-	-	-	-	-	-
Pyrolytic graphite	1	-	-	-	-	-	-	-	317	-	319	-	325-331	333-335	-	-
Pyrolytic graphite coating on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1297-1299	-	-	-
Pyrolytic graphite + Zirconium (pyro-) carbide	5	-		-	-	-	-	-	-	-	745	-	-	-	-	-
Q																
Quartz	4-I	353	353	-	-	-	355	357	361	365	-	-	-	379	381	-
Quartz coated with magnesium fluoride	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1425	1427	-
Quartz coated with platinum	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1317	1319	-
Quartz glass	4-II	1651	-	-	-	-	1653	1655	1657	-	-	-	-	-	-	-

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R																
Rene 41	2-II	1122	-	-	-	-	-	1130	1134	-	1156	-	1184, 1199	1211	-	-
Resimene 814 resin	6-II	-	1014	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhenium (Re)	1	817	817	-	-	817	820	822	824	-	826	-	828-832	-	-	834
Rhenium + Tungsten	2-I	-	419	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhenium arsenide (Re_3As_7)	6-I	-	-	-	-	-	96	-	-	-	-	-	-	-	-	-
Rhenium phosphide (ReP)	5	-	635	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhenium selenide ($ReSe_2$)	6-I	-	-	-	-	-	349	-	351	-	-	-	-	-	-	-
Rhenium silicides																
ReSi	6-I	-	461	-	-	-	-	-	-	-	463	-	-	-	-	465
$ReSi_2$	6-I	-	461	-	-	-	-	-	-	-	463	-	-	-	-	465
Re_3Si	6-I	-	461	-	-	-	-	-	-	-	-	-	-	-	-	465
Rhodium (Rh)	1	836	836	-	-	-	838	840	842	-	-	-	844-848	850	-	-
Rhodium germanides																
RhGe	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rh_2Ge	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rh_3Ge_4	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rh_5Ge_3	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rokide A coating on AISI 446	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1351	-	-
Rokide C coating on titanium alloy 6 Al - 4 V	6-II	-	-	-	-	-	-	-	-	-	-	-	1345-1347	-	-	-
Rubbers																
Board no. 2266, cellular	6-II	-	-	-	-	-	-	-	1056	-	-	-	-	-	-	-
Buna	6-II	1051	-	-	-	-	-	1054	1056	1066	-	-	-	-	-	-
Dielectric mix	6-II	-	-	-	-	-	-	-	1056	-	-	-	-	-	-	-
Natural	6-II	1051	-	-	-	-	-	-	1056	1058	1068	-	-	-	-	-
Perbunan	6-II	1051	-	-	-	-	-	1054	1056	1060	-	-	-	-	-	-
Silicone	6-II	-	-	-	-	-	-	-	-	1064	1068	-	-	-	-	-
Synthetic	6-II	1051	-	-	-	-	-	1054	1056	1060-1066	1068	-	-	-	-	-
Rubidium fluoride (RbF)	5	-	-	-	-	-	-	393	-	-	-	-	-	-	-	395
Ruthenium (Ru)	1	852	852	-	-	852	854	856	858	-	-	-	-	-	-	860
Ruthenium-tungsten intermetallics (Ru_2W_3)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Rutile	4-I	445	-	-	-	-	460	454	460	-	462	-	-	-	-	-

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S																
SAE 1006	3	-	-	-	-	-	-	-	-	329	-	-	-	-	-	-
SAE 1010	3	310	-	-	-	-	312	316	325	329	335	-	-	-	-	-
SAE 1018	3	-	-	-	-	-	-	-	-	333	-	-	-	-	-	-
SAE 1020	3	-	-	-	-	-	-	-	-	329	-	-	345-347	-	-	-
SAE 1045	3	-	-	-	-	-	-	-	-	333	-	-	-	-	-	-
SAE 3140	3	-	-	-	-	-	-	-	-	365	-	-	-	-	-	-
SAE 4130	3	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-
SAE 4340	3	-	-	-	-	-	-	-	387	395	-	-	-	-	-	-
SAE 8630	3	-	-	-	-	-	-	-	-	-	337	-	-	-	-	-
Samaria	4-I	339	339	-	-	-	-	341	-	-	343	-	345	-	-	-
Samarium (Sm)	1	862	862	862	862	862	864	866	-	-	-	-	-	-	-	-
Samarium-bismuth intermetallics (SmBi)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium borides																
SmB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SmB_6	6-I	295	296	-	-	-	300	-	-	-	302	-	-	-	-	-
Samarium-cadmium intermetallics																
SmCd	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SmCd_2$	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SmCd_{11}$	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium carbides																
SmC_2	5	294	294	-	-	-	-	-	-	-	-	-	-	-	-	-
Sm_2C_3	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium-cobalt intermetallics																
$SmCo_2$	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SmCo_5$	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium ferrides																
$SmFe_2$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SmFe_5$	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium-gallium intermetallics ($SmGa_2$)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium germanide ($SmGe_2$)	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium hydrides																
SmH_2	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SmH_3	5	467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium-indium intermetallics ($SmIn_3$)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium-lead intermetallics ($SmPb_3$)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium-mercury intermetallics (SmHg)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Samarium-nickel intermetallics																
$SmNi_2$	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SmNi_5$	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium (sesqui-) oxide (Sm_2O_3)	4-I	339	339	-	-	-	-	341	-	-	343	-	345	-	-	-
Samarium (sesqui-) oxide + + Gadolinium oxide	4-I	-	-	-	-	-	-	-	783	-	-	-	-	-	-	-
Samarium (sesqui-) oxide + + Gadolinium oxide + + Dysprosium oxide + Yttrium oxide	4-I	785	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium phosphide (SmP)	5	635	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium selenides (SmSe)	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium silicides ($SmSi_2$)	6-I	523	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarium sulfides																
$SmS_{0.75}$	5	-	-	-	-	-	706	-	-	-	-	-	-	-	-	-
SmS	5	704	704	-	-	-	-	-	708	-	-	-	-	-	-	-
SmS_2	5	-	704	-	-	-	-	-	-	-	-	-	-	-	-	-
Sm_2S_3	5	704	704	-	-	-	-	-	-	-	-	-	-	-	-	-
Sm_3S_4	5	704	704	-	-	-	-	-	-	-	-	-	-	-	-	-
Sandwich panels, TAC-polyester skin and alkyd isocyanate foam core	6-II	-	-	-	-	-	-	1257	1259	-	-	-	-	-	-	-
Sapphire	4-I	41	41	-	-	-	43	8	45	-	47	-	-	-	-	-
Sapphire, synthetic	4-I	41	-	-	-	-	-	8	45	-	47	-	-	-	-	-
Scandia	4-I	347	347	-	-	-	-	349	-	-	351	-	-	-	-	-
Scandium (Sc)	1	868	868	868	868	868	870	872	-	-	874	-	-	-	-	876
Scandium boride (ScB_2)	6-I	204	204	-	-	-	-	-	-	-	206	-	-	-	-	-
Scandium carbide (ScC)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scandium nitride (ScN)	5	621	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scandium oxide (Sc_2O_3)	4-I	347	347	-	-	-	-	349	-	-	351	-	-	-	-	-
Scandium selenide (Sc_2Se_3)	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scandium sulfide (Sc_2S_3)	5	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scandium telluride (Sc_2Te_3)	6-I	636	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selectron 400	6-II	1020	-	-	-	-	-	-	-	-	1026	-	-	-	-	-
Selectron 5026	6-II	-	-	-	-	-	-	-	-	-	968	-	-	-	-	-
Si 142 silicon	1	-	-	-	-	-	-	-	-	890	-	-	-	-	-	-
Silastic 160	6-II	-	-	-	-	-	-	-	-	1064	1068	-	-	-	-	-
Silastic 180	6-II	-	-	-	-	-	-	-	-	1064	-	-	-	-	-	-
Silica	4-I	353	353	-	-	-	355	357	359	363	367	-	373-375	377	-	-
Silica fabric	6-II	-	-	-	-	-	-	-	-	1277	-	-	-	-	-	-
Silica glass	4-II	1651	1651	-	-	-	1653	1655	1657	1659-1661	1663	-	1665-1667	1669	1671-1673	-
Silica rock	4-I	820, 826	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Silicide coating on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	-	1467-1469	1471	-	-
Silicide coating on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1473-1475	1477	-	-
Silicide coating on titanium	6-II	-	-	-	-	-	-	-	-	-	-	-	1479-1481	1483	-	-
Silicide coating on tungsten	6-II	-	-	-	-	-	-	-	-	-	-	-	1485-1487	1489	-	-
Silicon (Si)	1	878	878	878	-	878	880-884	886	888	890	892	-	894-896	898	-	-
Silicon + ΣX_i	2-II	-	-	-	-	-	1384	1386	-	-	-	-	-	-	-	-
Silicon + Germanium	2-I	421	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon + Iron	2-I	-	-	-	-	-	-	423	425	-	427	-	-	-	-	-
Silicon alloys (special designations)																
Leboite	2-I	-	-	-	-	-	-	-	-	-	427	-	-	-	-	-
Silicon borides																
SiB_4	6-I	-	-	-	-	-	-	-	-	-	210	-	-	-	-	-
SiB_6	6-I	-	208	-	-	-	-	-	-	-	210	-	-	-	-	-
Silicon carbides																
(SiC)	5	119	119	-	-	-	121	123	125-127	-	129	-	131-135	137-139	-	-
Norton RC-4237	5	-	-	-	-	-	-	-	-	-	-	-	311	-	-	-
Silicon carbide coating on niobium-zirconium alloys	6-II	-	-	-	-	-	-	-	-	-	-	-	1415	-	-	-
Silicon carbide coating on tantalum	6-II	-	-	-	-	-	-	-	-	-	-	-	1411-1413	-	-	-
Silicon carbide + Boron carbide	5	297	-	-	-	-	-	-	-	-	299	-	-	-	-	-
Silicon carbide + Carbon	5	-	-	-	-	-	-	807	-	-	809	-	811	-	-	-
Silicon carbide + Graphite	5	-	-	-	-	-	-	813	-	-	-	-	-	-	-	-
Silicon carbide + Graphite + Silicon	5	-	-	-	-	-	-	815	817	-	-	-	-	-	-	-
Silicon carbide + Magnesium oxide + Nickel aluminide cermet	6-II	-	-	-	-	-	-	-	-	-	854	-	-	-	-	-
Silicon carbide + Silicon	5	-	-	-	-	-	-	819	-	-	-	-	821	-	-	-
Silicon carbide + Silicon cermet	6-II	-	-	-	-	-	-	-	856	-	-	-	-	-	-	-
Silicon carbide + Silicon nitride	5	-	-	-	-	-	-	-	-	-	823	-	-	-	-	-
Silicon carbide + (Tetr-) boron carbide	5	297	-	-	-	-	-	-	-	-	299	-	-	-	-	-
Silicon carbide + ΣX_i	5	-	-	-	-	-	-	-	307	-	-	-	309-311	-	-	-
Silicon carbide foam	5	-	-	-	-	-	-	-	127	-	129	-	-	-	-	-
Silicon germanide (SiGe)	6-I	-	-	-	-	-	-	405	-	-	-	-	-	-	-	-
Silicon oxides																
SiO	4-I	-	-	-	-	-	-	-	-	-	-	-	371	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Silicon oxides (cont.)																
SiO_2	4-I	353	353	-	-	-	355	357	359-361	363-365	367-369	-	373-375	377-379	381	-
Silicon (di-)oxide coating on aluminum	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1391	-	-
Silicon (di-)oxide foam	4-I	-	-	-	-	-	-	-	-	-	369	-	-	-	-	-
Silicon (mon-)oxide coating on aluminum	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1389	-	-
Silicon (di-)oxide + ΣX_1	4-I	826	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (di-)oxide + Aluminum cermet	6-II	-	-	-	-	-	-	-	-	-	790	-	-	-	-	-
Silicon (di-)oxide + Aluminum oxide + Calcium oxide	4-I	-	-	-	-	-	-	-	-	796	-	-	-	-	-	-
Silicon (di-)oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	-	789	792	-	794	-	-	-
Silicon (di-)oxide + Aluminum oxide + Iron(ic) oxide	4-I	-	-	-	-	-	-	-	798	800	802-812	-	-	-	-	-
Silicon (di-)oxide + Aluminum oxide + Iron(ic) oxide + + Magnesium oxide + Potassium (mon-)oxide	4-I	-	-	-	-	-	-	-	814	-	-	-	-	-	-	-
Silicon (di-)oxide + Calcium oxide	4-I	-	-	-	-	-	-	-	816	818	-	-	-	-	-	-
Silicon (di-)oxide + Iron(ic) oxide	4-I	820	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (di-)oxide + Molybdenum (di-)silicide	5	-	-	-	-	-	-	-	-	-	-	-	783-785	787	-	-
Silicon (di-)oxide + Titanium (di-)oxide	4-I	-	-	-	-	-	822	-	-	-	824	-	-	-	-	-
Silicon nitride (Si_3N_4)	5	543	543	-	-	-	-	545	547	-	549	-	551-553	555	-	-
Silicon nitride + Silicon carbide	5	840	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon telluride (SiTe)	6-I	614	614	-	-	-	616	-	640	-	-	-	-	-	-	-
Silicone DC-301	6-II	-	-	-	-	-	1113	-	-	-	-	-	-	-	-	-
Silicone GMGA 5003	6-II	-	-	-	-	-	1070	-	-	-	-	-	-	-	-	-
Silicone coating on Inconel	6-II	-	-	-	-	-	1495	-	-	-	-	-	-	-	-	-
Silicone, filled	6-II	-	-	-	-	-	1070	-	-	-	-	-	-	-	-	-
Silicone, reinforced	6-II	-	-	-	-	-	1113	-	-	-	-	-	-	-	-	-
Silicone foams																
Silicone foam R-7001	6-II	1084	-	-	-	-	-	-	1080	-	-	-	-	-	-	-
Silicone foam R-7002	6-II	1084	-	-	-	-	-	1072	1080	-	-	-	-	-	-	-
Silicone foam R-7091	6-II	1084	-	-	-	-	-	-	1080	-	-	-	-	-	-	-
Silicone resin	6-II	-	-	-	-	-	-	1072	-	-	-	-		-	-	-
Silicone resin, reinforced	6-II	1204	-	-	-	-	-	1206	1208, 1218	1220	1210	-	-	-	-	-
Sillimanite	4-II	-	-	-	-	-	-	1189	-	-	1195	-	1199	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Silver (Ag)	1	900	900	900	900	900	902	904	906	-	908	910	912-914	916-920	-	922
Silver coated with silver sulfide.	6-II	-	-	-	-	-	-	-	-	-	-	1433	1435	-	-	-
Silver coating on mylar	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1325	-	-
Silver lime	1	-	-	-	-	-	-	-	-	-	-	910	-	-	-	-
Silver + Aluminum	2-I	431	-	-	-	429	433	-	-	-	-	-	-	-	-	-
Silver + Cadmium	2-I	-	-	-	-	-	-	-	435	-	-	-	-	437	-	439
Silver + Copper	2-I	-	-	-	-	-	-	-	-	-	441	-	-	-	-	-
Silver + Gold	2-I	-	-	-	-	-	-	-	-	-	443	-	-	-	-	445
Silver + Lead	2-I	-	-	-	-	-	-	-	-	-	447	-	-	-	-	-
Silver + Magnesium	2-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	449
Silver + Manganese	2-I	-	-	-	-	-	451	-	-	-	-	-	-	-	-	-
Silver + Palladium	2-I	-	-	-	-	-	458	-	-	-	-	-	-	-	-	-
Silver + Platinum	2-I	-	-	-	-	-	455	-	-	-	-	-	-	-	-	-
Silver + Zinc	2-I	459	457	457	-	-	-	-	-	-	-	-	-	461	-	-
Silver antimony telluride ($AgSbTe_2$)	6-I	-	-	-	-	-	620	-	-	622	-	-	-	-	-	-
Silver antimony telluride + + Germanium telluride	6-I	-	-	-	-	-	719	-	-	-	-	-	-	-	-	-
Silver antimony telluride + + Tin telluride	6-I	-	-	-	-	-	-	-	721	-	-	-	-	-	-	-
Silver beryllide ($AgBe_2$). . . .	6-I	158	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver bromide (AgBr).	5	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-
Silver indium telluride ($AgInTe_2$)	6-I	-	-	-	-	-	624	-	640	-	-	-	-	-	-	-
Silver oxide (Ag_2O)	4-I	-	-	-	-	-	-	383	-	-	-	-	-	-	-	-
Silver plated AISI 321	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1321	-	-
Silver selenide (Ag_2Se)	6-I	-	-	-	-	-	-	353	355	-	-	-	-	-	-	-
Silver sulfide (Ag_2S).	5	-	-	-	-	-	-	710	-	-	-	-	-	-	-	-
Silver sulfide coating on silver .	6-II	-	-	-	-	-	-	-	-	-	-	1431	1433	-	-	-
Silver tellurides (Ag_2Te). . . .	6-I	-	-	-	-	-	-	618	-	-	-	-	-	-	-	-
Soda lime glass	4-II	-	-	-	-	-	-	-	-	-	-	-	1809	1811	1813-1815	-
Soda lime aluminosilicate glass.	4-II	-	-	-	-	-	1817	-	-	-	-	-	-	-	-	-
Soda-lime silicate glass	4-II	-	-	-	-	-	-	1791	1795	1793	1797	-	1799	1801	-	-
Soda lime glass LOF.	4-II	-	-	-	-	-	-	-	-	-	-	-	1809	1811	1813-1815	-
Sodium aluminum borate glass .	4-II	-	-	-	-	-	-	-	-	-	1627	-	-	-	-	-
Sodium aluminum silicates ($Na_2O \cdot Al_2O_3 \cdot 4\,SiO_2$)	4-II	-	-	-	-	-	-	1324	-	-	1326	-	-	-	-	-
Sodium barium silicate glass . .	4-II	-	-	-	-	-	-	-	-	-	1789	-	-	-	-	-
Sodium beryllium borate glass .	4-II	-	-	-	-	-	-	-	-	-	1629	-	-	-	-	-
Sodium borate glass	4-II	-	-	-	-	-	1607	-	-	-	-	-	-	-	-	-
Sodium borosilicate glass . . .	4-II	-	-	-	-	-	-	-	-	-	1721	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Sodium calcium silicate ($Na_2O \cdot CaO \cdot SiO_2$)	4-II	-	-	-	-	-	-	1328	-	-	-	-	-	-	-	-
Sodium calcium silicate glass.	4-II	-	-	-	-	-	-	1791	1795	1793	1797	-	1799	1801	-	-
Sodium ferrite ($Na_2O \cdot Fe_2O_3$)	4-II	-	-	-	-	-	-	1097	-	-	-	-	-	-	-	-
Sodium fluoride + Beryllium ferride cermet	6-II	-	-	-	-	-	-	-	911	-	-	-	-	-	-	-
Sodium fluoride + Zirconium fluoride + Uranium (tetra-) fluoride	5	-	-	-	-	-	-	411	-	-	-	-	-	-	-	-
Sodium lead silicate glass	4-II	-	-	-	-	-	1819	-	-	-	1803	-	-	-	-	-
Sodium magnesium borate glass.	4-II	-	-	-	-	-	-	-	-	-	1631	-	-	-	-	-
Sodium magnesium silicate glass	4-II	-	-	-	-	-	-	-	-	-	1805	-	-	-	-	-
Sodium magnesium copper silicate glass	4-II	-	-	-	-	-	-	-	-	-	1807	-	-	-	-	-
Sodium manganese telluride ($Na_xMn_{1-x}Te$)	6-I	-	-	-	-	-	626	-	628	-	-	-	-	-	-	-
Sodium molybdates																
$Na_2O \cdot MoO_3$	4-II	-	-	-	-	-	-	1119	-	-	-	-	-	-	-	-
$Na_2O \cdot 2\ MoO_3$	4-II	-	-	-	-	-	-	1119	-	-	-	-	-	-	-	-
Sodium (mon-)oxide (Na_2O)	4-I	-	-	-	-	-	-	385	-	-	-	-	-	-	-	-
Sodium phosphorus uranate ($2\ NaO \cdot UO_3 \cdot P_2O_5$)	4-II	-	1482	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium potassium aluminum silicates	4-II	-	-	-	-	-	-	-	-	-	1330	-	-	-	-	-
Sodium potassium borosilicate glass	4-II	-	-	-	-	-	-	-	-	-	1723	-	-	-	-	-
Sodium silicates																
$Na_2O \cdot SiO_2$	4-II	-	-	-	-	-	-	1322	-	-	-	-	-	-	-	-
$Na_2O \cdot 2\ SiO_2$	4-II	-	-	-	-	-	-	1322	-	-	-	-	-	-	-	-
Sodium silicate glass	4-II	1778	-	-	-	-	1781	-	1783	-	1785-1787	-	-	-	-	-
Sodium silicate glass no. 23	4-II	-	-	-	-	-	-	1791	-	-	-	-	-	-	-	-
Sodium strontium alumino-silicate glass	4-II	-	-	-	-	-	-	-	-	-	1821	-	-	-	-	-
Sodium tellurate ($Na_2O \cdot TeO_2$)	4-II	-	-	-	-	-	-	1366	-	-	-	-	-	-	-	-
Sodium titanates																
$Na_2O \cdot TiO_2$	4-II	-	-	-	-	-	-	1454	-	-	-	-	-	-	-	-
$Na_2O \cdot 2\ TiO_2$	4-II	-	-	-	-	-	-	1454	-	-	-	-	-	-	-	-
$Na_2O \cdot 3\ TiO_2$	4-II	-	-	-	-	-	-	1454	-	-	-	-	-	-	-	-
Sodium tungstates																
$Na_2O \cdot WO_3$	4-II	-	-	-	-	-	-	1480	-	-	-	-	-	-	-	-
$Na_2O \cdot 2\ WO_3$	4-II	-	-	-	-	-	-	1480	-	-	-	-	-	-	-	-
Sodium tungsten oxide (Na_xWO_3)	4-II	-	-	-	-	-	-	-	-	-	1155	-	-	-	-	-
Sodium uranate ($Na_2O \cdot UO_3$)	4-II	-	1482	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Sodium vanadates																
$Na_2O \cdot V_2O_5$	4-II	-	-	-	-	-	-	1494	-	-	-	-	-	-	-	-
$2\ Na_2O \cdot V_2O_5$	4-II	-	-	-	-	-	-	1494	-	-	-	-	-	-	-	-
$3\ Na_2O \cdot V_2O_5$	4-II	-	-	-	-	-	-	1494	-	-	-	-	-	-	-	-
Sodium zinc borosilicate glass	4-II	-	-	-	-	-	-	-	-	-	1725	-	-	-	-	-
Solex 2908 plate glass	4-II	1779	-	-	-	-	-	1791	1783	1793	1797	-	-	-	-	-
Solex "S" plate glass	4-II	1779	-	-	-	-	-	1791	1783	1793	1797	-	-	-	-	-
Spektralkohle artificial graphite	1	-	-	-	-	-	-	-	360	-	-	-	-	-	-	-
Spinal, magnesium aluminate	4-II	1007	1007	-	-	-	1009	1011	1013	1015	1017	-	-	-	-	-
Spinal, magnesium aluminate, with sodium (mon-)oxide	4-II	-	-	-	-	-	-	1524	1526	1528	1530	-	-	-	-	-
Spinal, magnesium chromite	4-II	-	-	-	-	-	-	-	-	-	1059	-	-	-	-	-
Spinal, nickel ferrite	4-II	-	-	-	-	-	-	1089	-	-	-	-	-	-	-	-
Spinal, zinc chromate	4-II	-	-	-	-	-	-	-	-	-	1063	-	-	-	-	-
Spodumene	4-II	-	-	-	-	-	-	-	1266	-	1270	-	-	-	-	-
Sponge zirconium	1	-	-	-	-	-	1102	-	1106	-	-	-	-	-	-	-
	2-I	-	-	-	-	-	699	-	-	-	-	-	-	-	-	-
Stafoam 604	6-II	-	-	-	-	-	-	-	964	-	-	-	-	-	-	-
Stainless steel coated with NBS coating A-418	6-II	-	-	-	-	-	-	-	-	-	-	-	1365-1367	-	-	-
Stainless steel coated with NBS coating N-143	6-II	-	-	-	-	-	-	-	-	-	-	-	1357-1359	-	-	-
Stainless steel coated with platinum	6-II	-	-	-	-	-	-	-	-	-	-	-	1315	-	-	-
Steatite	4-II	1285	-	-	-	-	1287	-	1293	-	1295	-	-	-	-	-
Steatite, ultra-	4-II	-	-	-	-	-	1287	-	-	-	-	-	-	-	-	-
Steatite 10B-2	4-II	-	-	-	-	-	-	-	1293	-	-	-	-	-	-	-
Steatite 12C-2	4-II	-	-	-	-	-	-	-	1293	-	-	-	-	-	-	-
Steatite, grade L-4, AlSiMag 196	4-II	-	-	-	-	-	1287	-	-	-	-	-	-	-	-	-
Steatite, grade L-5, Pass and Seymour E-211-M	4-II	-	-	-	-	-	1287	-	-	-	-	-	-	-	-	-
Steels (special designations)																
1 Kh18N9T	3	-	-	-	-	-	-	161	-	-	215	-	-	-	-	-
1.1 C tool steel	3	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-
4 Kh13	3	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-
12 MoV	3	-	-	-	-	-	-	-	-	-	104	-	-	-	-	-
15 KhM	3	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-
17-4 PH	3	145	-	-	-	-	-	157	170	-	199	-	-	-	-	-
17-5 MnV	3	-	-	-	-	-	-	-	-	-	116	-	-	-	-	-
17-7 PH	3	140	-	-	-	-	-	159	172	-	199, 203	231	255, 259, 270	282	-	-
17-10 P	3	-	-	-	-	-	-	-	-	-	227	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Steels (cont.)																
18-8	3	-	-	-	-	-	-	-	-	-	-	-	236, 241	-	-	-
18-8 Cr-Cu	3	-	-	-	-	-	-	-	-	-	-	-	-	138	-	-
18-20 Cr-Mn	3	-	-	-	-	-	-	-	-	-	-	-	-	348	-	-
18-21 Cr-Co	3	-	-	-	-	-	-	-	-	-	-	-	-	302	-	-
19-9 DL	3	-	-	-	-	-	-	-	-	189	211	-	-	-	-	-
19-9 DX	3	-	-	-	-	-	-	-	-	-	225	-	-	-	-	-
23 D 245	3	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-
815	3	310	-	-	-	-	-	-	-	-	340	-	-	-	-	-
A-286	3	379	-	-	-	-	-	-	391	397	401	-	409-411	413	-	-
AISI steels (see AISI designations)																
Allegheny 18-8 M	3	-	-	-	-	-	149	-	-	-	-	-	-	-	-	-
Allegheny steels	3	-	-	-	-	-	-	-	-	-	-	-	257	-	-	-
AM350	3	-	-	-	-	-	-	-	170	-	199	231	236, 259, 268	280	-	-
AM355	3	-	-	-	-	-	-	157	170	-	199	-	-	-	-	-
AMS 2713	3	-	-	-	-	-	-	-	385	-	-	-	-	-	-	-
AMS 2714	3	-	-	-	-	-	-	-	387	-	-	-	-	-	-	-
ATS	3	140	-	-	-	-	-	-	-	-	221	-	-	-	-	-
B-759	3	-	-	-	-	-	-	-	-	-	106	-	-	-	-	-
Carbon steel ASTM A105 grade II	3	-	-	-	-	-	-	-	-	-	337	-	-	-	-	-
Cor-ten	3	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-
DVL 4/V 869	3	-	-	-	-	-	-	-	-	-	403	-	-	-	-	-
DVL 30	3	140	-	-	-	-	-	-	-	-	225	-	-	-	-	-
DVL 31	3	-	-	-	-	-	-	-	-	-	403	-	-	-	-	-
DVL 46	3	140	-	-	-	-	-	-	-	-	217	-	-	-	-	-
DVL 47	3	140	-	-	-	-	-	-	-	-	217	-	-	-	-	-
DVL 48	3	-	-	-	-	-	-	-	-	-	217	-	-	-	-	-
DVL 49	3	140	-	-	-	-	-	-	-	-	217	-	-	-	-	-
DVL 50	3	140	-	-	-	-	-	-	-	-	217	-	-	-	-	-
DVL 51	3	140	-	-	-	-	-	-	-	-	227	-	-	-	-	-
DVL 52	3	140	-	-	-	-	-	-	-	-	225	-	-	-	-	-
EI-257	3	-	-	-	-	-	-	155	-	-	-	-	-	-	-	-
EI-572	3	-	-	-	-	-	-	-	178	-	215	-	-	-	-	-
EI-606	3	-	-	-	-	-	-	-	172	-	215	-	-	-	-	-
EI-783	3	-	-	-	-	-	-	-	-	-	215	-	-	-	-	-
EI-802	3	-	-	-	-	-	-	-	-	-	104	-	-	-	-	-
EI-855	3	-	-	-	-	-	-	383	394	397	-	-	-	-	-	-
EME	3	-	-	-	-	-	-	-	-	-	225	-	-	-	-	-

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Steels (cont.)																
En 8	3	-	-	-	-	-	312	-	325	-	-	-	-	-	-	-
En 19	3	-	-	-	-	-	61	-	83	-	-	-	-	-	-	-
En 31	3	-	-	-	-	-	61	-	83	-	-	-	-	-	-	-
FCM	3	311	-	-	-	-	-	-	-	-	341	-	-	-	-	-
Feni 36	3	-	-	-	-	-	-	-	-	-	369	-	-	-	-	-
G 17	3	-	-	-	-	-	-	-	391	-	-	-	-	-	-	-
GX 4881	3	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-
Haynes alloy no. 90	3	-	-	-	-	-	-	-	-	-	106	-	-	-	-	-
Haynes alloy no. 93	3	-	-	-	-	-	-	-	-	-	106	-	-	-	-	-
HF grade	3	-	141	-	-	-	-	-	-	-	195	-	-	-	-	-
H. G. T. 3 (British design.)	3	55	-	-	-	-	61	-	81	-	102	-	-	-	-	-
High speed steel M1	3	-	-	-	-	-	-	-	351	-	-	-	-	-	-	-
High speed steel M2	3	-	-	-	-	-	-	-	450	-	-	-	-	-	-	-
High speed steel M10	3	-	-	-	-	-	-	-	351	-	-	-	-	-	-	-
High speed steel T1	3	-	-	-	-	-	-	-	450	-	-	-	-	-	-	-
HNM crucible	3	-	-	-	-	-	-	161	176	-	227	-	-	-	-	-
HX 4249	3	-	-	-	-	-	-	-	-	85	-	-	-	-	-	-
Incoloys (see Incoloy)																
Invar H	3	-	-	-	-	-	-	-	-	-	369	-	-	-	-	-
Jessop no. 40	3	55	-	-	-	-	-	-	-	-	102	-	-	-	-	-
Jessop no. 46	3	55	-	-	-	-	-	-	-	-	104	-	-	-	-	-
Jessop G-18B	3	379	-	-	-	-	-	-	168	-	217	-	-	-	-	-
Jessop G-21	3	140	-	-	-	-	-	-	-	-	225	-	-	-	-	-
Jessop H-40	3	-	-	-	-	-	-	-	81	-	-	-	-	-	-	-
Jessop P.-20	3	140	-	-	-	-	-	-	176	-	221	-	-	-	-	-
Kovar	3	-	-	-	-	-	-	-	363	-	-	-	-	-	-	-
Low carbon	3	-	-	-	-	-	-	319	-	-	-	-	-	-	-	-
Macloy G	3	-	-	-	-	-	-	-	393	-	-	-	-	-	-	-
Mark 12MX	3	-	-	-	-	-	-	323	-	-	-	-	-	-	-	-
Mark 1x18N9T	3	-	-	-	-	-	-	161	-	-	215	-	-	-	-	-
Mild steel	3	311	-	-	-	-	-	316	-	-	-	-	-	-	-	-
Multimet N-155	3	140	-	-	-	-	-	-	180	191	219	120	126-128, 253, 259	-	-	-
Multimet N-155, low carbon	3	-	-	-	-	-	-	-	296	-	-	-	-	-	-	-
Multimet NR-21 (AMS-55326)	3	140	-	-	-	-	-	-	-	-	219	-	-	-	-	-
Multimet NR-21, low carbon (AMS-53762)	3	-	-	-	-	-	-	-	-	-	219	-	-	-	-	-
N-A-X AC 9115	3	-	-	-	-	-	-	-	-	-	444	-	-	-	-	-
Ni Span-C alloy 902	3	-	-	-	-	-	-	-	-	-	407	-	-	-	-	-
Okh 16N 36V3T	3	-	-	-	-	-	-	383	-	397	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Steels (cont.)																
P-193	3	379	-	-	-	-	-	-	-	-	405	-	-	-	-	-
PH 15-7 Mo	3	145	-	-	-	-	-	-	-	-	201	231	255, 259 272	284	-	-
Porous	3	461	-	-	-	-	463	-	-	-	-	-	-	-	-	-
Rex 78	3	-	-	-	-	-	-	-	389	-	-	-	-	-	-	-
Roneusil	3	-	-	-	-	-	-	-	-	-	-	-	-	349	-	-
S-590	3	-	-	-	-	-	-	-	-	191, 298, 397	221	-	-	-	-	-
SAE steels (see SAE designations)																
SAS-8	3	140	-	-	-	-	-	-	-	-	227	-	-	-	-	-
Steel 15	3	-	-	-	-	-	-	-	-	331	-	-	-	-	-	-
Steel 19	3	-	-	-	-	-	-	71	-	-	-	-	-	-	-	-
Steel 35	3	-	-	-	-	-	-	-	-	331	-	-	-	-	-	-
Steel 45	3	-	-	-	-	-	-	-	-	331	-	-	-	-	-	-
Tenelon	3	-	-	-	-	-	-	-	-	-	116	-	-	-	-	-
U-8	3	-	-	-	-	-	-	10	-	12	-	-	-	-	-	-
Unitemp 212	3	-	-	-	-	-	-	-	391	-	-	-	-	-	-	-
V-444D	3	-	-	-	-	-	-	-	-	-	223	-	-	-	-	-
Vacromin F	3	-	-	-	-	-	-	-	393	-	-	-	-	-	-	-
Vascojet 1000	3	-	-	-	-	-	-	-	81	-	-	-	132	136	-	-
Vickers F. D. P.	3	-	-	-	-	-	-	-	-	-	-	-	257	-	-	-
W	3	-	-	-	-	-	-	-	-	-	203	-	-	-	-	-
WF100D	3	140	-	-	-	-	-	-	-	-	225	-	-	-	-	-
Steel, clad	6-II	-	-	-	-	-	-	-	-	-	1267	-	-	-	-	-
Stellite no. 3	2-II	-	-	-	-	-	-	-	-	-	904	-	-	-	-	-
Stellite no. 4	2-II	-	-	-	-	-	-	-	-	-	904	-	-	-	-	-
Stellite no. 6	2-II	-	-	-	-	-	-	-	-	-	902	-	-	-	-	-
Stellite no. 6B	2-II	-	-	-	-	-	-	-	-	-	902	-	-	-	-	-
Stellite no. 6K	2-II	-	-	-	-	-	-	-	-	-	902	-	-	-	-	
Stellite no. 12	2-II	-	-	-	-	-	-	-	-	-	902	-	-	-	-	-
Stellite no. 19	2-II	-	-	-	-	-	-	-	-	-	904	-	-	-	-	-
Stellite no. 21 (AMS-5385; NR-10)	2-II	879	-	-	-	-	-	884	886	-	894	-	-	-	-	-
Stellite no. 23 (AMS-5375; NDRC-61)	2-II	879	-	-	-	-	-	-	886	-	900	-	-	-	-	-
Stellite no. 25 (L-605)	2-II	879, 882	-	-	-	-	-	-	-	890	898	-	908-914	916	-	-
Stellite no. 25 (L-605) coated with iron (Fe) oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	1381-1383	-	-	-
Stellite no. 27 (AMS-5378; NR-60)	2-II	1219	-	-	-	-	-	-	1223	-	1225	-	-	-	-	-

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Stellite no. 30 (AMS-5380; NR-12)	2-II	879	-	-	-	-	-	-	-	-	896	-	-	-	-	-
Stellite no. 31 (AMS-5382; NR-71)	2-II	879	-	-	-	-	-	-	836	-	896	-	-	-	-	-
Stellite no. 36 (L-251).	2-II	879	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stellite 98M2	2-II	-	-	-	-	-	-	-	-	-	906	-	-	-	-	-
Stellite HE1049	2-II	-	-	-	-	-	-	884	888	-	900	-	-	-	-	-
Stellite Star J-metal.	2-II	-	-	-	-	-	-	-	-	-	906	-	-	-	-	-
Strontium (Sr)	1	924	924	-	-	-	926	-	-	-	928	-	-	-	-	-
Strontium aluminates																
$SrO \cdot Al_2O_3$	4-II	1025	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$SrO \cdot 2\ Al_2O_3$	4-II	-	1025	-	-	-	-	-	-	-	1027	-	-	-	-	-
$3\ SrO \cdot Al_2O_3$	4-II	1025	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium aluminum silicate ($SrO \cdot Al_2O_3 \cdot 2\ SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1334	-	-	-	-	-
Strontium barium cerium titanate $[(Ba_{1-x-y}Sr_xCe_y)O \cdot TiO_2]$.	4-II	-	-	-	-	-	1466	-	-	-	-	-	-	-	-	-
Strontium barium cerium titanate stannate $[(Ba_{1-x}Sr_{x-y}Ce_y)O \cdot (Ti_{1-z}Sn_z)O_2]$	4-II	-	-	-	-	-	1363	-	-	-	-	-	-	-	-	-
Strontium borate glass.	4-II	-	-	-	-	-	-	-	-	-	1633	-	-	-	-	-
Strontium (hexa-)boride (SrB_6).	6-I	295	296	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium chloride ($SrCl_2$) . . .	5	-	-	-	-	-	-	333	-	-	-	-	-	-	-	-
Strontium copper silicate ($SrO \cdot CuO \cdot 4\ SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1336	-	-	-	-	-
Strontium fluoride (SrF_2). . . .	5	397	397	-	-	-	-	399	-	-	-	-	-	401	-	-
Strontium lead silicate glass . .	4-II	-	-	-	-	-	1823	-	-	-	-	-	-	-	-	-
Strontium oxide (SrO)	4-I	387	387	-	-	387	389	391	393	-	395	-	-	-	-	397
Strontium oxide + Lithium (meta-) aluminate + Aluminum oxide	4-II	-	-	-	-	-	-	-	1540	-	-	-	-	-	-	-
Strontium oxide + Lithium zirconium silicate + Aluminum oxide	4-II	-	-	-	-	-	-	-	1542	-	-	-	-	-	-	-
Strontium oxide + Lithium zirconium silicate + Zinc oxide	4-II	-	-	-	-	-	-	-	1544	-	-	-	-	-	-	-
Strontium oxide + Titanium (di-) oxide	4-I	-	828	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium oxide + Titanium (di-) oxide + Lithium zirconium silicate	4-II	-	-	-	-	-	-	-	1546	-	-	-	-	-	-	-
Strontium oxide + Zinc oxide + + Lithium zirconium silicate .	4-II	-	-	-	-	-	-	-	1548	-	-	-	-	-	-	-
Strontium silicates																
$SrO \cdot SiO_2$	4-II	1332	1332	-	-	-	-	-	-	-	-	-	-	-	-	-
$2\ SrO \cdot SiO_2$	4-II	1332	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Strontium sulfide (SrS)	5	-	-	-	-	-	-	712	-	-	-	-	-	-	-	-
Strontium titanates																
$SrO \cdot TiO_2$	4-II	1456	1456	-	-	-	1458	1460	1462	-	1464	-	-	-	-	-
$SrO \cdot 2\ TiO_2$	4-II	-	-	-	-	-	-	-	-	-	1464	-	-	-	-	-
$2\ SrO \cdot TiO_2$	4-II	-	-	-	-	-	-	1460	-	-	-	-	-	-	-	-
Strontium titanate coating on AISI 310	6-II	-	-	-	-	-	-	-	-	-	-	-	1393	-	-	-
Strontium titanate + Cobalt cermet	6-II	-	-	-	-	-	-	-	792	-	-	-	-	-	-	-
Strontium uranate ($SrO \cdot UO_3$)	4-II	-	1482	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium zirconate ($SrO \cdot ZrO_2$)	4-II	1514	-	-	-	-	-	1516	-	-	1518	-	-	-	-	-
Styrene-butadiene copolymer	6-II	-	-	-	-	-	-	1054	-	-	-	-	-	-	-	-
Styrofoam Q-103	6-II	-	-	-	-	-	-	-	1090	-	-	-	-	-	-	-
Super Dylon	6-II	1030	-		-	-	-	-	-	-	-	-	-	-	-	-
Supramica 557	5	-	-	-	-	-	987	-	-	-	-	-	-	-	-	-
Svea Iron	1	-	-	-	-	-	-	-	585	-	-	-	-	-	-	-
T																
TAC polyester	6-II	974	-	-	-	-	-	-	976	-	976	-	-	-	-	-
TAC polyester resin, reinforced	6-II	1180	-	-	-	-	-	1183	1185	1220	1187-1189	-	-	-	-	-
Talc	4-II	-	-	-	-	-	-	1289	-	-	-	-	-	-	-	-
Tan 9-4 tantalum	1	-	-	-	-	-	-	934	-	-	-	-	-	-	-	-
Tantalum (Ta)	1	930	930	-	-	930	932	934	936	938	940	942	944-950	952	-	954
Tantalum coated with aluminide	6-II	-	-	-	-	-	-	-	-	-	-	-	1441-1443	1445	-	-
Tantalum coated with cobalt oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	1373-1375	-	-	-
Tantalum coated with pyrolytic graphite	6-II	-	-	-	-	-	-	-	-	-	-	-	1297-1299	-	-	-
Tantalum coated with silicide	6-II	-	-	-	-	-	-	-	-	-	-	-	1473-1475	1477	-	-
Tantalum coated with silicon carbide	6-II	-	-	-	-	-	-	-	-	-	-	-	1411-1413	-	-	-
Tantalum coated with tantalum aluminide	6-II	-	-	-	-	-	-	-	-	-	-	-	1461-1463	1465	-	-
Tantalum + Copper + ΣX_1	2-II	1388	-	-	-	-	-	-	1390	-	1392	-	-	-	-	-
Tantalum + Niobium	2-I	-	-	-	-	-	463	-	465	-	-	-	-	-	-	-
Tantalum + Niobium + ΣX_1	2-II	-	-	-	-	-	-	1394	1396	1398	1400	-	-	-	-	-
Tantalum + Titanium	2-I	467, 549	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tantalum + Tungsten	2-I	-	-	-	-	-	-	469	471	473	475	477-479	-	-	-	-

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Tantalum + Tungsten + ΣX_i	2-II	–	1402	–	–	–	1404	1406	1408	1410	1412	–	–	–	–	–
Tantalum + Zirconium + ΣX_i	2-II	1414	–	–	–	–	–	1416	1418	–	1420	–	–	–	–	–
Tantalum alloys (special designations)																
30 Nb - 7.5 V	2-II	–	–	–	–	–	–	1394	–	1398	–	–	–	–	–	–
8 W - 2 Hf	2-II	–	1402	–	–	–	1404	1406	–	1410	–	–	–	–	–	–
Tantalum aluminide ($TaAl_3$)	6-I	–	–	–	–	–	–	–	–	–	–	–	–	25	–	–
Tantalum aluminides coating on tantalum	6-II	–	–	–	–	–	–	–	–	–	–	–	1461-1463	1465	–	–
Tantalum antimonide (TaSb)	6-I	–	–	–	–	–	71	–	73	–	–	–	–	–	–	–
Tantalum arsenide (Ta_3As_2)	6-I	–	–	–	–	–	96	–	–	–	–	–	–	–	–	–
Tantalum beryllides																
$TaBe_{12}$	6-I	–	122	–	–	–	–	124	126	–	128	–	130-132	134	–	–
Ta_2Be_{17}	6-I	–	122	–	–	–	–	124	126	–	128	–	130-132	134	–	–
Tantalum beryllide + Beryllium oxide	5	–	–	–	–	–	–	–	–	–	–	–	868-870	872	–	–
Tantalum beryllide + Beryllium oxide + Tantalum (pent-) oxide	5	–	–	–	–	–	–	–	–	–	–	–	874-876	878	–	–
Tantalum beryllide + Tantalum (pent-) oxide	5	–	–	–	–	–	–	–	–	–	–	–	880-882	884	–	–
Tantalum borides																
TaB	6-I	212	212	–	–	–	–	214	216	–	218	–	–	–	–	–
TaB_2	6-I	212	212	–	–	–	–	214	–	–	220	–	–	–	–	–
Ta_3B_2	6-I	–	212	–	–	–	–	–	–	–	–	–	–	–	–	–
Ta_3B_4	6-I	212	212	–	–	–	–	–	–	–	–	–	–	–	–	–
Tantalum carbides																
TaC	5	141	141	–	–	–	143	145	147	149	151	–	154-158	–	–	160
Ta_2C	5	–	141	–	–	–	–	–	–	–	–	–	–	–	–	–
Tantalum carbide coating on Inconel X	6-II	–	–	–	–	–	–	–	–	–	–	–	1417	1419	–	–
Tantalum carbide + Iron cermet	6-II	858	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tantalum carbide + Tungsten cermet	6-II	–	–	–	–	–	–	–	–	–	860	–	–	–	–	–
Tantalum-cobalt intermetallics ($TaCo_2$)	6-I	–	684	–	–	–	–	–	–	–	–	–	–	–	–	–
Tantalum-chromium intermetallics ($TaCr_2$)	6-I	–	684	–	–	–	–	–	–	–	–	–	–	–	–	–
Tantalum ferrides ($TaFe_2$)	6-I	–	306	–	–	–	–	–	–	–	–	–	–	–	–	–
Tantalum germanides																
TaGe	6-I	–	–	–	–	–	325	–	–	–	–	–	–	–	–	–

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Tantalum germanides (cont.)																
$TaGe_2$	6-I	-	-	-	-	-	325	-	327	-	-	-	-	-	-	-
Ta_4Ge	6-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	321
Tantalum germanide silicides																
$TaGeSi_2$	6-I	-	-	-	-	-	-	-	529	-	-	-	-	-	-	-
$TaGe_xSi_{1-x}$	6-I	-	-	-	-	-	-	-	529	-	-	-	-	-	-	-
Tantalum iron lead oxide ($4\ PbO \cdot Fe_2O_3 \cdot Ta_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1157	-	-	-	-	-
Tantalum nitrides																
TaN	5	557	557	-	-	-	559	561	563	-	565	-	567-569	-	-	-
Ta_2N	5	-	557	-	-	-	-	-	-	-	-	-	-	-	-	-
Tantalum (pent-)oxide (Ta_2O_5)	4-I	-	-	-	-	-	-	399	-	-	401	-	403-405	407	-	-
Tantalum (pent-)oxide + + Tantalum beryllide	5	-	-	-	-	-	-	-	-	-	-	-	-	789	-	-
Tantalum phosphide (TaP)	5	635	636	-	-	-	639	-	-	-	-	-	-	-	-	-
Tantalum selenides ($TaSe_2$)	6-I	-	-	-	-	-	367	-	369	-	-	-	-	-	-	-
Tantalum silicides																
Ta_5Si_3	6-I	-	467	-	-	-	-	-	-	-	-	-	-	-	-	-
$TaSi_2$	6-I	-	467	-	-	-	527	469	529	-	471	-	473-475	477	-	-
Ta_2Si	6-I	-	467	-	-	-	-	-	-	-	-	-	-	-	-	-
Ta_5Si_2	6-I	-	467	-	-	-	-	-	-	-	-	-	-	-	-	-
$Ta_{4.5}Si$	6-I	-	467	-	-	-	-	-	-	-	-	-	-	-	-	-
(Penta-)tantalum (tri-)silicide + + (Di-)molybdenum boride	6-I	-	724	-	-	-	-	-	-	-	-	-	-	-	-	-
Tantalum silicide germanides																
$TaGe_{1-x}Si_x$	6-I	-	-	-	-	-	325	-	-	-	-	-	-	-	-	-
TaGeSi	6-I	-	-	-	-	-	325	-	-	-	-	-	-	-	-	-
Tantalum tellurides																
TaTe	6-I	-	-	-	-	-	-	-	640	-	-	-	-	-	-	-
$TaTe_2$	6-I	-	-	-	-	-	630	-	640	-	-	-	-	-	-	-
$Ta_{31}Te_3$	6-I	-	-	-	-	-	630	-	-	-	-	-	-	-	-	-
Tantalum tungsten selenide ($W_{1-x}Ta_xSe_2$)	6-I	-	-	-	-	-	357	-	-	-	-	-	-	-	-	-
Teflon	6-II	1030	-	-	-	-	-	1035	1039	-	1045	-	-	-	-	-
Teflon, type TF-1	6-II	1030	-	-	-	-	-	-	-	-	1045	-	-	-	-	-
Teflon, barium titanate filled	6-II	1032	-	-	-	-	-	-	-	-	1043	-	-	-	-	-
Teflon, boron carbide filled	6-II	1032	-	-	-	-	-	-	-	-	1043	-	-	-	-	-
Teflon, calcium boride filled	6-II	1032	-	-	-	-	-	-	-	-	1043	-	-	-	-	-
Teflon, carbonyl iron grade HP filled	6-II	1032	-	-	-	-	-	-	-	-	1043	-	-	-	-	-
Teflon, J-ferrite filled	6-II	1032	-	-	-	-	-	-	-	-	1043	-	-	-	-	-
Teflon, J-mica filled	6-II	1032	-	-	-	-	-	-	-	-	1043	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Teflon laminate	6-II	–	–	–	–	–	–	1214	1218	1220	–	–	–	–	–	–
Teflon, litharge filled	6-II	1032	–	–	–	–	–	–	–	–	1043	–	–	–	–	–
Teflon, powdered iron-9 filled	6-II	1032	–	–	–	–	–	–	–	–	1043	–	–	–	–	–
Teflon, quartz no. 7900 filled	6-II	1032	–	–	–	–	–	–	–	–	1043	–	–	–	–	–
Teflon, reinforced	6-II	1097	–	–	–	–	–	–	1099	–	–	–	–	–	–	–
Teflon, titanium dioxide filled	6-II	1032	–	–	–	–	–	–	–	–	1043	–	–	–	–	–
Teflon, zero-plast type 6 filled	6-II	1032	–	–	–	–	–	–	–	–	1043	–	–	–	–	–
Television tube glass	4-II	–	–	–	–	–	–	–	–	–	–	–	1743	1745	1747	–
Tellurite	4-I	409	409	–	–	409	–	411	–	–	–	–	413	–	415	417
Tellurium (Te)	1	–	–	–	–	–	–	–	964	–	–	–	–	–	–	–
Tellurium + Chromium	2-I	–	–	–	–	–	481	483	–	–	–	–	–	–	–	–
Tellurium copper	2-I	–	–	–	–	–	–	–	–	–	152	–	–	–	–	–
Brass, tellurium-nickel	2-II	–	–	–	–	–	–	–	–	–	1002	–	–	–	–	–
Tellurium (di-)oxide (TeO_2)	4-I	409	409	–	–	409	–	411	–	–	–	–	413	–	415	417
Tellurium oxide - molybdenum oxide glass	4-II	–	–	–	–	–	–	–	–	–	1641	–	–	–	–	–
Tellurium oxide - tungsten oxide glass	4-II	–	–	–	–	–	–	–	–	–	1643	–	–	–	–	–
Tenite I 0072-MS	6-II	–	–	–	–	–	–	–	–	–	941	–	–	–	–	–
Tenite I 204-MS	6-II	–	–	–	–	–	–	–	–	–	946	–	–	–	–	–
Tenite II 205A-MS	6-II	–	–	–	–	–	–	–	–	–	946	–	–	–	–	–
Tenite G 204-H2	6-II	–	–	–	–	–	–	–	–	–	946	–	–	–	–	–
Tenite Q 264-H2	6-II	–	–	–	–	–	–	–	–	–	946	–	–	–	–	–
Tenite S 264-MS	6-II	–	–	–	–	–	–	–	–	–	946	–	–	–	–	–
Terbium (Tb)	1	956	956	956	956	956	958	960	–	–	962	–	–	–	–	–
Terbium borides																
TbB_4	6-II	295	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TbB_6	6-I	295	–	–	–	–	300	–	–	–	–	–	–	–	–	–
Terbium carbides																
TbC_2	5	294	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tb_2C_3	5	294	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Terbium-cobalt intermetallics ($TbCo_5$)	6-I	681	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Terbium-gallium intermetallics ($TbGa_2$)	6-I	681	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Terbium hydride (TbH_2)	5	467	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Terbium oxide ($TbO_{1.81}$)	4-I	–	–	–	–	–	–	–	–	–	–	–	–	–	–	419
Thorianite	4-I	421	421	–	–	422	425	428	430	–	432	–	435	–	–	437
Thorite	4-II	–	–	–	–	–	–	–	–	–	1338	–	–	–	–	–
Thorium (Th)	1	966	966	967	–	–	971	973	975	977	979	–	981	–	–	983
Thorium + Plutonium	2-I	411, 485	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Thorium + Titanium	2-I	–	–	–	–	–	–	–	–	–	487	–	–	–	–	–
Thorium + Uranium	2-I	–	–	–	–	–	489	–	–	–	–	–	–	–	–	–

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Thorium + Uranium + ΣX_i	2-II	-	1422	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium + Zirconium	2-I	-	-	-	-	-	-	-	-	-	491	-	-	-	-	-
Thorium + Zirconium + ΣX_i	2-II	-	1424	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium aluminate ($2\ ThO_2 \cdot 3\ Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1029	-	-	-	-	-
Thorium antimonides																
ThSb	6-I	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ThSb_2$	6-I	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Th_3Sb_4	6-I	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium borides																
ThB_4	6-I	222	222	-	-	-	224	226	228	-	230	-	232	-	-	-
ThB_6	6-I	-	222	-	-	-	224	-	-	-	-	-	-	-	-	-
Thorium carbides																
ThC	5	-	162	-	-	-	-	-	168	-	-	-	172	-	-	-
ThC_2	5	162	162	-	-	-	164	166	168	-	170	-	172	-	-	-
Thorium carbide + Uranium (di-) carbide	5	-	-	-	-	-	-	-	-	-	301	-	-	-	-	-
Thorium chloride ($ThCl_4$)	5	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium fluoride (ThF_4)	5	403	403	403	403	403	-	-	-	-	-	-	-	-	-	405
Thorium hydrides																
ThH_2	5	439	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ThH_3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	441
Thorium-manganese intermetallics																
$ThMn_{12}$	6-I	683	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Th_6Mn_{23}	6-I	683	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium nitrides																
ThN	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Th_3N_4	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium (di-) oxide (ThO_2)	4-I	421	421	-	-	422	425	428	430	-	432	-	436	-	-	437
Thorium (di-) oxide, molybdenum fibers reinforced	6-II	-	-	-	-	-	-	-	1265	-	-	-	-	-	-	-
Thorium (di-) oxide + Aluminum oxide	4-I	-	830	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium (di-) oxide + Aluminum oxide + Beryllium oxide	4-I	-	832	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium (di-) oxide + Graphite	5	-	-	-	-	-	-	-	739	-	-	-	-	-	-	-
Thorium (di-) oxide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	794
Thorium (di-) oxide + Uranium (di-) oxide	4-I	-	-	-	-	-	834	-	-	-	-	-	-	-	-	-
Thorium (di-) oxide + Uranium (di-) oxide + Yttrium oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	836
Thorium (di-) oxide + Zirconium (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	838	-	-	-	-	-

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Thorium (ortho-) silicate ($ThO_2 \cdot SiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1338	-	-	-	-	-
Thorium silicides																
ThSi	6-I	-	524	-	-	-	-	-	-	-	-	-	-	-	-	-
$ThSi_2$	6-I	-	523-524	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium sulfides																
ThS	5	714	714	-	-	-	-	-	-	-	718	-	-	-	-	-
ThS_2	5	714	714	-	-	-	-	716	-	-	-	-	-	-	-	-
Th_2S_3	5	-	714	-	-	-	-	-	-	-	-	-	-	-	-	-
Th_6S_7	5	714	714	-	-	-	-	-	-	-	-	-	-	-	-	-
Th_7S_{12}	5	-	714	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium uranium beryllide [$(Th_9U)Be_{13}$]	6-I	-	-	-	-	-	-	-	-	-	136	-	-	-	-	-
Thorium uranium boride [$(Th_9U)B_4$]	6-I	-	-	-	-	-	-	-	-	-	234	-	-	-	-	-
Thorium uranium carbides																
$(Th_9U)C$	5	-	-	-	-	-	-	-	-	-	174	-	-	-	-	-
$(Th_9U)C_2$	5	-	-	-	-	-	-	-	-	-	174	-	-	-	-	-
Thulia	4-I	-	-	-	-	-	-	-	-	-	439	-	-	-	-	-
Thulium (Tm)	1	985	985	985	985	985	987	989	-	-	-	-	-	-	-	991
Thulium (hexa-) boride (TmB_6)	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thulium carbide (TmC_2)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thulium oxide (Tm_2O_3)	4-I	-	-	-	-	-	-	-	-	-	439	-	-	-	-	-
Tin + Magnesium	2-I	-	-	-	-	-	493	-	-	-	-	-	-	-	-	-
Tin(ic) aluminate ($2SnO_2 \cdot 3Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1031	-	-	-	-	-
Tin(ic) oxide (SnO_2)	4-I	-	-	-	-	-	-	-	441	-	443	-	-	-	-	-
Tin(ic) oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	840	-	-	-	-	-	-	-
Tin(ic) oxide + Magnesium oxide + Zinc oxide	4-I	-	-	-	-	-	-	-	842	-	-	-	-	-	-	-
Tin(ic) oxide + Vanadium (pent-) oxide	4-I	-	-	-	-	-	-	-	-	-	844	-	-	-	-	-
Tin(ic) oxide + Zinc oxide	4-I	-	-	-	-	-	-	-	846	-	-	-	-	-	-	-
Tin(ic) oxide + Zinc oxide + + Magnesium oxide	4-I	-	-	-	-	-	-	-	848	-	-	-	-	-	-	-
Tin(ous) (ortho-) phosphate ($3\,SnO \cdot P_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1179	-	-	-	-	-
Tin sulfide (SnS)	5	-	-	-	-	-	-	-	-	-	-	-	-	720	-	-
Tin telluride (SnTe)	6-I	-	-	-	-	-	632	-	-	-	-	-	-	-	-	-
Tin telluride + Silver antimony telluride	6-I	-	-	-	-	-	-	-	721	-	-	-	-	-	-	-
Tin-zirconium intermetallics																
$SnZr_2$	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Sn_3Zr_5	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-

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Titanium (Ti)	1	993	993	-	-	993	996	999	1001	1003	1005	-	1007-1013	1015	-	1017
Titanium coated with aluminide .	6-II	-	-	-	-	-	-	-	-	-	-	-	1447-1449	1451	-	-
Titanium coated with aluminized-silicone paint	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1497	-	-
Titanium coated with gold . . .	6-II	-	-	-	-	-	-	-	-	-	-	-	1303	1305	-	-
Titanium coated with silicides .	6-II	-	-	-	-	-	-	-	-	-	-	-	1479-1481	1483	-	-
Titanium A-55	1	-	-	-	-	-	996	-	-	-	1005	-	-	-	-	-
Titanium A-70	1	-	-	-	-	-	-	-	-	-	1005	-	-	-	-	-
Titanium Ti-75A	1	-	-	-	-	-	996	999	1001	-	1005	-	1007-1009	1015	-	-
Titanium Ti-75A (AMS 4901) coated with Dow-Corning XP-310	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1487	-	-
Titanium RC-55	1	-	-	-	-	-	996	-	-	-	-	-	-	-	-	-
Titanium VT-1	1	-	-	-	-	-	-	-	-	1003	-	-	-	-	-	-
Titanium + ΣX_i	2-II	1502	-	-	-	-	1504	1506	-	-	1508	-	-	-	-	-
Titanium + Aluminum	2-I	-	-	-	-	-	495-501	-	503	505	-	-	-	-	-	-
Titanium + Aluminum + ΣX_i . .	2-II	-	-	-	-	-	1426-1432	1434	1436-1442	1444-1446	1448-1454	-	1456-1459	1461	-	-
Titanium + Chromium	2-I	-	-	-	-	-	-	-	-	-	507	-	-	-	-	-
Titanium + Chromium + ΣX_i . .	2-II	-	-	-	-	-	-	1464	1466	-	1468	-	-	-	-	-
Titanium + Copper	2-I	-	-	-	-	-	509	-	-	-	511	-	-	-	-	-
Titanium + Germanium	2-I	-	-	-	-	-	513	-	-	-	515	-	-	-	-	-
Titanium + Iron	2-I	-	-	-	-	-	-	-	-	-	517	-	-	-	-	-
Titanium + Iron + ΣX_i	2-II	1470	-	-	-	-	1472	-	1474	-	1476	-	-	-	-	-
Titanium + Manganese	2-I	519	-	-	-	-	521	523	525	527	529	-	531-535	537	-	-
Titanium + Manganese + ΣX_i . .	2-II	-	-	-	-	-	1478	-	-	-	1480	-	-	-	-	-
Titanium + Molybdenum	2-I	-	-	-	-	-	-	-	-	-	539	-	-	-	-	-
Titanium + Molybdenum + ΣX_i .	2-II	-	-	-	-	-	1482	-	-	-	-	-	-	-	-	-
Titanium + Nickel	2-I	-	-	-	-	-	-	-	-	-	541	-	-	-	-	-
Titanium + Niobium	2-I	-	-	-	-	-	543	-	-	-	545	-	-	-	-	-
Titanium + Silicon	2-I	-	-	-	-	-	-	-	-	-	547	-	-	-	-	-
Titanium + Tantalum	2-I	549	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium + Tin	2-I	-	-	-	-	-	551	-	553	-	-	-	-	-	-	-
Titanium + Tin + ΣX_i	2-II	-	-	-	-	-	1484	-	1486	-	-	-	-	-	-	-
Titanium + Tungsten.	2-I	555	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium + Vanadium	2-I	557	-	-	-	-	-	-	-	-	559	-	-	-	-	-
Titanium + Vanadium + ΣX_i. . .	2-II	1488	-	-	-	-	-	1490	1492	-	1494	-	-	1496	-	-
Titanium + Zirconium	2-I	-	-	-	-	-	561	-	-	-	563	-	-	-	-	-
Titanium + Zirconium + ΣX_i . .	2-II	-	-	-	-	-	1498	-	1500	-	-	-	-	-	-	-

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Titanium alloys (special designations)																
2.5 Al - 16 V	2-II	-	-	-	-	-	-	1490	-	-	-	-	-	-	-	-
3 Al - 2.5 V	2-II	-	-	-	-	-	-	-	-	-	1454	-	-	-	-	-
4 Al - 3 Mo	2-II	-	-	-	-	-	-	-	-	-	1452	-	-	-	-	-
4 Al - 3 Mo - 1 V	2-II	-	-	-	-	-	-	1434	-	-	-	-	-	-	-	-
4 Al - 4 Mn	2-II	-	-	-	-	-	-	-	-	-	1450, 1481	-	-	-	-	-
6 Al - 4 V	2-II	-	-	-	-	-	1428	1434	1440	1444	1454	-	1456-1459	-	-	-
7 Al - 4 Mo	2-II	-	-	-	-	-	-	-	-	-	1452	-	-	-	-	-
7 Al - 2 Nb - 1 Ta	2-II	-	-	-	-	-	-	-	-	-	1448	-	-	-	-	-
13 V - 11 Cr - 3 Al	2-II	-	-	-	-	-	-	1490	-	-	-	-	-	-	-	-
48-OT-3	2-I	-	-	-	-	-	-	-	-	505	-	-	-	-	-	-
A-110 AT	2-II	-	-	-	-	-	1432	-	1438	-	1448	-	1456-1459	1461	-	-
B120VCA (crucible heat no. R6759 sheet no. 9MB3)	2-II	-	-	-	-	-	-	-	1492	-	1494	-	-	1496	-	-
BT-5	2-I	-	-	-	-	-	-	-	-	505	-	-	-	-	-	-
C-110M	2-I	-	-	-	-	-	521	523	525	527	529	-	533-535	537	-	-
C-120AV	2-II	-	-	-	-	-	-	-	-	-	1454	-	-	-	-	-
C-130AM	2-II	-	-	-	-	-	1426, 1478	-	1442	-	-	-	-	-	-	-
Cr - Mo	2-II	-	-	-	-	-	-	-	1466	-	-	-	-	-	-	-
Heat no. 32167 and sheet no. 1777A-1	2-II	-	-	-	-	-	-	-	-	-	1454	-	-	-	-	-
Heat no. R6736 sheet no. B-32	2-II	-	-	-	-	-	-	-	1436	-	1452	-	-	-	-	-
Heat no. 23345 sheet no. 1149-3	2-II	-	-	-	-	-	-	-	1492	-	1494	-	-	-	-	-
Hylite 20	2-II	-	-	-	-	-	1432	-	1438	-	-	-	-	-	-	-
Hylite 30	2-II	-	-	-	-	-	1426, 1478	-	1442	-	-	-	-	-	-	-
Hylite 40	2-II	-	-	-	-	-	1426, 1478	-	1442	-	-	-	-	-	-	-
Hylite 50	2-II	-	-	-	-	-	1432, 1482	-	1436	-	-	-	-	-	-	-
Hylite 55	2-II	-	-	-	-	-	1484	-	1486	-	-	-	-	-	-	-
Hylite 60	2-II	-	-	-	-	-	1484	-	1486	-	-	-	-	-	-	-
MST-3Mn	2-II	-	-	-	-	-	-	-	-	-	1481	-	-	-	-	-
RC-130A	2-I	-	-	-	-	-	521	523	525	527	529	-	533-535	537	-	-
RC-130B	2-II	-	-	-	-	-	1426, 1478	-	-	-	1450	-	-	-	-	-
RMI-8Mn	2-II	-	-	-	-	-	-	-	-	-	1481	-	-	-	-	-
RMI-30	2-I	-	-	-	-	-	-	-	-	-	517	-	-	-	-	-
RMI-40	2-I	-	-	-	-	-	-	-	-	-	517	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Titanium alloys (special designations) (cont.)																
RMI-55	2-I	–	–	–	–	–	–	–	–	–	517	–	–	–	–	–
RMI-70	2-I	–	–	–	–	–	–	–	–	–	517	–	–	–	–	–
RS-120	2-I	–	–	–	–	–	–	–	–	–	–	–	531	–	–	–
Ti-140A	2-II	–	–	–	–	–	1472	–	1474	–	–	–	–	–	–	–
Ti-150A	2-II	–	–	–	–	–	–	–	1466	–	–	–	–	–	–	–
Ti-155A	2-II	–	–	–	–	–	1432	–	1442	–	–	–	–	–	–	–
Titanium alloy 8 Al-4 V coated with Rokide C	6-II	–	–	–	–	–	–	–	–	–	–	–	1345-1347	–	–	–
Titanium aluminide (TiAl)	6-I	27	27	–	–	–	–	–	–	–	–	–	29-31	33	–	–
Titanium aluminide + Aluminum oxide	5	–	–	–	–	–	–	–	–	–	–	–	862-864	866	–	–
Titanium beryllides																
TiBe	6-I	138	–	–	–	–	–	–	–	–	–	–	–	–	–	–
$TiBe_2$	6-I	138	–	–	–	–	–	–	–	–	–	–	–	–	–	–
$TiBe_{12}$	6-I	–	–	–	–	–	–	140	142	–	–	–	–	–	–	–
Titanium borides																
TiB	6-I	236	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TiB_2	6-I	236	236	–	–	–	238	240	242	–	244	–	246-248	–	–	–
Ti_2B	6-I	–	230	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium (di-)boride + + Aluminum boride	6-I	723	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium (di-)boride + + Boracic acid	5	–	–	–	–	–	–	–	–	–	–	–	886-888	890	–	–
Titanium (di-)boride + + Chromium (di-)boride	6-I	723	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium (di-)boride + + (Penta-)niobium (tri-)-silicide	6-I	–	724	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium (di-)boride + + Tantalum (di-)silicide	6-I	–	724	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium (di-)boride + + Titanium (di-)oxide	5	–	–	–	–	–	–	–	–	–	–	–	892-894	896	–	–
Titanium (di-)boride + + Titanium (di-)oxide + + Boracic acid	5	–	–	–	–	–	–	–	–	–	–	–	898-900	902	–	–
Titanium (di-)boride + + Titanium nitride	5	–	–	–	–	–	–	–	–	–	801	–	–	–	–	–
Titanium (di-)boride + + Vanadium (di-)boride	6-I	723	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Titanium carbide (TiC)	5	176	176	–	–	–	178	180	182	185	187	–	189-193	–	–	–

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Titanium carbide + Cobalt cermet	6-II	862	-	-	-	-	-	-	911	-	864	-	-	-	-	-
Titanium carbide + Molybdenum + + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	866	-	-	-	-	-
Titanium carbide + Nickel cermet	6-II	868	-	-	-	-	-	871	873	-	875-877	-	-	-	-	-
Titanium carbide + Niobium carbide + Nickel cermet	6-II	-	-	-	-	-	-	-	911	-	-	-	-	-	-	-
Titanium carbide + Tungsten cermet	6-II	-	-	-	-	-	-	-	-	-	879	-	-	-	-	-
Titanium-chromium intermetallics ($TiCr_2$)	6-I	-	-		-	-	-	-	-	-	-	-	656-658	660	-	-
Titanium-chromium intermetallics + Chromium (sesqui-)oxide	5	-	-	-	-	-	-	-	-	-	926	-	928-930	932	-	-
Titanium-chromium intermetallics + Chromium (sesqui-)oxide + Titanium (di-)oxide	5	-	-	-	-	-	-	-	-	-	-	-	934-936	938	-	-
Titanium-chromium intermetallics + Titanium (di-)oxide	5	-	-	-	-	-	-	-	-	-	-	-	940-942	944	-	-
Titanium ferrides																
TiFe	6-I	-	306	-	-	-	-	-	-	-	-	-	-	-	-	-
$TiFe_2$	6-I	-	306	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium-gold intermetallics																
TiAu	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
$TiAu_2$	6-I	-	684	-		-	-	-	-	-	-	-	-	-	-	-
Ti_3Au	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium hydride (TiH)	5	-	-	-	-	-	443	445	-	-	-	-	-	-	-	-
Titanium iodide (TiI_2)	5	-	-	-	-	-	-	-	-	-	475	-	-	-	-	-
Titanium nitride (TiN)	5	571	571	-	-	-	573	575	577	579	581	-	584	-	-	-
Titanium nitride + Chromium + + Titanium cermet	6-II	-	-	-	-	-	-	-	-	-	909	-	-	-	-	-
Titanium nitride + Titanium (di-)boride	5	-	-	-	-	-	-	-	-	-	842	-	-	-	-	-
Titanium oxides																
TiO	4-I	-	-	-	-	446	-	452	-	-	462	-	-	-	-	479
TiO_2	4-I	445	445	-	-	446	450	454	460	-	462	465	467-471	473-475	.77	479
Ti_2O_3	4-I	-	-	-	-	-	-	456	-	-	-	-	-	-	-	-
Ti_3O_5	4-I	-	-	-	-	-	-	458	-	-	-	-	-	-	-	479
Titanium (mon-)oxide + + Chromium-titanium alloys cermet	6-II	-	-	-	-	-	-	-	-	-	796	-	-	-	-	-

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Titanium (di-) oxide and aluminum oxide coating on molybdenum	6-II	-	-	-	-	-	-	-	-	-	-	-	1395	-	-	-
Titanium (di-) oxide + Antimony (tri-) oxide	4-I	-	-	-	-	-	-	-	-	-	850	-	-	-	-	-
Titanium (di-) oxide + Beryllium oxide + Calcium titanium silicate + Magnesium oxide	4-II	-	-	-	-	-	-	-	-	-	1550	-	-	-	-	-
Titanium (di-) oxide + Lithium carbonate	4-II	-	-	-	-	-	-	-	-	-	1552	-	-	-	-	-
Titanium (di-) oxide + Manganese (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	852	-	-	-	-	-
Titanium (di-) oxide + Niobium (pent-) oxide	4-I	-	854	-	-	-	-	-	-	-	856	-	-	-	-	-
Titanium (di-) oxide + Silicon (di-) oxide	4-I	-	-	-	-	-	858	-	-	-	860	-	-	-	-	-
Titanium (di-) oxide + Strontium oxide	4-I	-	862	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (di-) oxide + Tin(ic) oxide	4-I	-	-	-	-	-	-	-	-	-	864	-	-	-	-	-
Titanium (di-) oxide + Titanium (di-) boride	5	-	-	-	-	-	-	-	-	-	-	-	791-793	795	-	-
Titanium (di-) oxide + Tungsten (tri-) oxide	4-I	-	-	-	-	-	-	-	-	-	866	-	-	-	-	-
Titanium (di-) oxide + Vanadium (pent-) oxide	4-I	-	-	-	-	-	-	-	-	-	868-870	-	-	-	-	-
Titanium (di-) oxide + Zirconium (di-) oxide	4-I	-	-	-	-	-	-	-	-	-	872	-	-	-	-	-
Titanium phosphates																
$TiO_2 \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1181	-	-	-	-	-
$5\ TiO_2 \cdot 2\ P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1181	-	-	-	-	-
Titanium phosphide (TiP)	5	635	636	-	-	-	639	-	-	-	-	-	-	-	-	-
Titanium silicides																
TiSi	6-I	-	479	-	-	-	-	481	-	-	483	-	-	-	-	-
$TiSi_2$	6-I	479	479	-	-	-	-	481	-	-	483	-	485-487	489	-	-
Ti_5Si_3	6-I	-	479	-	-	-	-	481	-	-	483	-	-	489	-	-
Titanium (di-) silicide + + (Penta-) titanium (tri-) - silicide	6-I	-	-	-	-	-	-	-	-	-	-	-	693-695	697	-	-
(Penta-) titanium (tri-) silicide + + Titanium (di-) silicide	6-I	-	-	-	-	-	-	-	-	-	-	-	699-701	703	-	-
Titanium tungsten (di-) carbide + + Cobalt cermet	6-II	-	-	-	-	-	-	-	-	-	881	-	-	-	-	-
Titanium tungsten (di-) carbide + + Tantalum cermet	6-II	-	-	-	-	-	-	-	-	-	883	-	-	-	-	-

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Titanox TG	4-I	-	-	-	-	-	-	-	-	-	462	-	-	-	-	-
Transite	6-II	-	-	-	-	-	-	1216	-	-	-	-	-	-	-	-
Tremolite	4-II	-	-	-	-	-	-	1239	-	-	-	-	-	-	-	-
Trolitul Luv-M150	6-II	-	-	-	-	-	-	970	972	1082	-	-	-	-	-	-
Tungsten (W)	1	1019	1019	-	-	-	1021	1023	1025	1027	1029	-	1031-1038	1040-1042	-	1044
Tungsten, lamp grade	1	-	-	-	-	-	-	-	-	-	-	-	1038	-	-	-
Tungsten coated with hafnium (di-)oxide	6-II	-	-	-	-	-	-	-	-	-	-	-	1377-1379	-	-	-
Tungsten coated with silicide	6-II	-	-	-	-	-	-	-	-	-	-	-	1485-1487	1489	-	-
Tungsten coating on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1329	1331	-	-
Tungsten coating on iron	6-II	-	-	-	-	-	-	-	-	-	-	1325	1327	-	-	-
Tungsten + ΣX_i	2-II	1516	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten + Cobalt	2-I	-	-	-	-	-	-	-	-	-	565	-	-	-	-	-
Tungsten + Copper	2-I	-	-	-	-	-	-	-	-	-	567	-	-	-	-	-
Tungsten + Molybdenum	2-I	-	-	-	-	-	-	-	-	-	-	-	569-573	-	-	-
Tungsten + Nickel + ΣX_i	2-II	1510	-	-	-	-	-	-	1512	-	1514	-	-	-	-	-
Tungsten + Niobium	2-I	-	575	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten + Rhenium	2-I	-	-	-	-	-	577	-	-	-	-	-	-	-	-	-
Tungsten alloys (special design.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B50YA12B	2-II	-	-	-	-	-	-	-	-	-	1514	-	-	-	-	-
Heavy alloy	2-II	-	-	-	-	-	-	-	-	-	1514	-	-	-	-	-
Mallory 1000	2-II	-	-	-	-	-	-	-	-	-	1514	-	-	-	-	-
Tungsten aluminide (WAl)	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten arsenide (W_3As_7)	6-I	-	-	-	-	-	96	-	-	-	-	-	-	-	-	-
Tungsten borides																
WB	6-I	-	250	-	-	-	252	254	258	260	262	-	264	-	-	-
WB_2	6-I	-	250	-	-	-	-	-	-	-	-	-	-	-	-	-
W_2B	6-I	-	250	-	-	-	-	256	-	-	-	-	-	-	-	-
W_2B_5	6-I	-	250	-	-	-	-	256	-	-	-	-	-	-	-	-
Tungsten carbides																
WC	5	195	195	-	-	-	197	199	201	-	203	-	205-209	-	-	215
W_2C	5	-	195	-	-	-	-	-	-	-	203		211-213	-	-	-
Tungsten carbide coating on iron	6-II	-	-	-	-	-	-	-	-	-	-	1421	1423	-	-	-
Tungsten carbide + Chromium-cobalt alloys cermet	6-II	-	-	-	-	-	-	-	-	-	895	-	-	-	-	-
Tungsten carbide + Cobalt cermet	6-II	-	-	-	-	-	-	-	889	-	897-905	-	-	-	-	-

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Tungsten carbide + Nickel cermet	6-II	-	-	-	-	-	-	-	-	-	907	-	-	-	-	-
Tungsten-cobalt alloy c ting on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1341	1343	-	-
Tungsten-cobalt intermetallics (WCo_2)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten iron lead oxide ($3\ PbO \cdot Fe_2O_3 \cdot WO_3$)	4-II	-	-	-	-	-	-	-	-	-	1159	-	-	-	-	-
Tungsten nitride (WN)	5	-	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten oxides																
WO_2	4-I	-	-	-	-	-	-	-	-	-	485	-	-	-	-	-
WO_3	4-I	-	-	-	-	-	-	481	483	-	485	-		-	-	-
$W_{18}O_{49}$	4-I	-	-	-	-	-	-	-	-	-	485	-	-	-	-	-
$W_{20}O_{58}$	4-I	-	-	-	-	-	-	-	-	-	485	-	-	-	-	-
Tungsten (tri-)oxide + Zinc oxide	4-I	-	-	-	-	-	-	-	874	-	-	-	-	-	-	-
Tungsten phosphide (WP)	5	635	636	-	-	-	639	-	-	-	-	-	-	-	-	-
Tungsten selenide (WSe_2)	6-I	-	-	-	-	-	359	-	361	-	-	-	-	-	-	-
Tungsten selenide tellurides ($WSe_{2-x}Te_x$)	6-I	-	-	-	-	-	634	-	-	-	-	-	-	-	-	-
Tungsten silicides																
WSi	6-I	-	491	-	-	-	-	-	-	-	-	-	-	-	-	-
WSi_2	6-I	-	491	-	-	-	-	493	495	-	497	-	-	499	-	-
W_5Si_2	6-I	-	491	-	-	-	-	-	-	-	-	-	-	-	-	-
W_5Si_3	6-I	-	491	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten tellurides (WTe_2)	6-I	-	-	-	-	-	638	-	640	-	-	-	-	-	-	-
Tungsten-zirconium intermetallics (W_2Zr)	6-I	-	684	-	-	-	-	-	-	-	-	-	-	-	-	-
U																
Udimet 500	2-II	-	-	-	-	-	-	-	1134	-	-	-	1201, 1233	1213, 1235	-	-
Udimet 600	2-II	-	-	-	-	-		-	1134	-	-	-	-	-	-	-
Uranium (U)	1	1046	1046	-	-	-	1049	1051	1053	1056	1058	-	1061-1063	-	-	-
Uranium + ΣX_i	2-II	-	-	1544	1544	1544	-	-	-	-	-	-	-	-	-	1546
Uranium + Chromium	2-I	579	579	-	-	-	581	583	585	-	587	-	-	-	-	-
Uranium + Iron	2-I	589	-	-	-	-	-	-	-	-	591	-	-	-	-	-
Uranium + Magnesium	2-I	-	-	-	-	-	-	-	593	-	595	-	-	-	-	-
Uranium + Molybdenum	2-I	599	597	-	-	-	601	603	605	-	607-613	-	-	-	-	-
Uranium + Molybdenum + ΣX_i	2-II	-	1518	-	-	-	-	-	1520	-	1522-1526	-	-	-	-	-
Uranium + Niobium	2-I	-	617	-	-	-	-	-	619	-	-	-	621-623	-	-	-
Uranium + Plutonium + ΣX_i	2-II	-	1528	-	-	-	-	-	-	-	1530	-	-	-	-	-

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Uranium + Thorium + ΣX_i	2-II	-	1532	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium + Zirconium	2-I	625	-	-	-	-	627	-	629	-	631-641	-	-	-	-	-
Uranium + Zirconium + ΣX_i	2-II	-	1534	-	-	-	1536	-	1538	-	-	-	1540-1542	-	-	-
Uranium alloys (special design.)																
Fissium alloy	2-II	-	1518	-	-	-	-	-	1520	-	-	-	-	-	-	-
U-3% FS	2-II	-	-	-	-	-	-	-	1520	-	-	-	-	-	-	-
U-5% FS	2-II	-	-	-	-	-	-	-	1520	-	-	-	-	-	-	-
U-5% FS - 2.25 Zr	2-II	-	-	-	-	-	-	-	1538	-	-	-	-	-	-	-
U-8% FS	2-II	-	-	-	-	-	-	-	1520	-	-	-	-	-	-	-
U-10% FS	2-II	-	-	-	-	-	-	-	1520	-	-	-	-	-	-	-
Uranium aluminides																
UAl_2	6-I	35	35	-	-	-	-	-	-	-	37	-	-	-	-	-
UAl_3	6-I	35	35	-	-	-	-	-	-	-	-	-	-	-	-	-
UAl_4	6-I	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium beryllide (UBe_{13})	6-I	144	-	-	-	-	-	-	146		-	-	-	-	-	-
Uranium-bismuth intermetallics																
UBi	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
UBi_2	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
U_3Bi_4	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
U_4Bi_5	6-I	676	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium borides																
UB_2	6-I	-	266	-	-	-	-	-	-	-	268	-	-	-	-	-
UB_4	6-I	266	266	-	-	-	-	-	-	-	-	-	-	-	-	-
UB_{12}	6-I	-	266	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium bromide (UBr_3)	5	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium carbides																
UC	5	217	217	-	-	-	219	223	231	235	237	-	243, 245	-	-	-
UC_2	5	-	217	-	-	-	22'	225-227	233	-	239	-	243-245	-	-	-
U_2C_3	5	217	217	-	-	-	-	229	-	-	241	-	-	-	-	-
Uranium (mono-) carbide + + Molybdenum cermet	6-II	-	-	-	-	-	-	-	-	-	891	-	-	-	-	-
Uranium (mono-) carbide + + Uranium cermet	6-II	-	-	-	-	-	-	-	-	-	893	-	-	-	-	-
Uranium (di-) carbide + Graphite	5	-	-	-	-	-	-	-	743	-	-	-	-	-	-	-
Uranium chlorides																
UCl_3	5	335	-	-	-	-	-	337	-	-	-	-	-	-	-	-
UCl_4	5	335	-	-	-	-	-	337	-	-	-	-	-	-	-	-
Uranium-cobalt intermetallics																
UCo	6-I	676	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U_6Co	6-I	676	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Uranium ferrides																
UFe_2	6-I	306	306	-	-	-	-	-	-	-	-	-	-	-	-	-
U_6Fe	6-I	306	306	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium fluorides																
UF_3	5	-	407	-	-	-	-	-	-	-	-	-	-	-	-	-
UF_4	5	407	407	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium hydride (UH_3)	5	447	-	-	-	-	-	449	-	-	-	-	-	-	-	-
Uranium iodides																
UI_3	5	-	477	-	-	-	-	-	-	-	-	-	-	-	-	-
UI_4	5	-	477	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium-lead intermetallics																
UPb	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
UPb_3	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium-manganese intermetallics																
UMn_2	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
U_6Mn	6-I	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium-nickel intermetallics (U_6Ni)	6-I	676	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium nitrides																
UN	5	586	586	-	-	-	-	-	588	590	592	-	-	-	-	-
$UN_{1.56-1.65}$	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	594
UN_2	5	586	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U_2N_3	5	586	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium oxides																
UO_2	4-I	488	489	-	-	-	493	495	503-511	515	517	-	520	-	-	522
$UO_{2.03-2.18}$	4-I	-	-	-	-	-	-	-	508	-	517	-	-	-	-	
UO_3	4-I	488	489	-	-	-	-	497	-	-	-	-	-	-	-	-
U_2O_3	4-I	-	-	-	-	-	493	-	-	-	-	-	-	-	-	-
U_2O_5	4-I	488	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U_3O_8	4-I	488	489	-	-	-	-	499	513	-	-	-	-	-	-	-
U_4O_9	4-I	-	-	-	-	-	-	501	-	-	-	-	-	-	-	-
Uranium (di-)oxide powder	4-I	-	-	-	-	-	-	-	511	-	-	-	520	-	-	-
Uranium (di-)oxide + Beryllium oxide	4-I	-	-	-	-	-	-	-	876	-	878	-	-	-	-	-
Uranium (di-)oxide + Chromium cermet	6-II	-	-	-	-	-	798	-	800	-	802	-	-	-	-	-
Uranium (di-)oxide + + Dysprosium oxide	4-I	-	-	-	-	-	-	-	-	-	880	-	-	-	-	-
Uranium (di-)oxide + Graphite	5	-	-	-	-	-	-	-	741	-	-	-	-	-	-	-
Uranium (di-)oxide + + Magnesium oxide	4-I	-	-	-	-	-	-	-	-	-	882	-	-	-	-	-
Uranium (di-)oxide + + Molybdenum cermet	6-II	-	-	-	-	-	804	-	806	-	808	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Uranium (di-)oxide + Niobium cermet	6-II	-	-	-	-	-	810	-	812	-	-	-	-	-	-	-
Uranium (di-)oxide + Stainless steel cermet	6-II	-	-	-	-	-	814	-	816	-	818	-	-	-	-	-
Uranium (di-)oxide + Thorium (di-)oxide	4-I	-	-	-	-	-	884	-	-	-	-	-	-	-	-	-
Uranium (di-)oxide + Thorium (di-)oxide + Yttrium oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	886
Uranium (di-)oxide + Yttrium oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888
Uranium (di-)oxide + + Zirconium cermet	6-II	820	-	-	-	-	-	-	822	-	824	-	-	-	-	-
Uranium (di-)oxide + + Zirconium (di-)oxide	4-I	-	890	-	-	-	-	-	-	-	892	-	-	-	-	-
Uranium phosphate ($UO_2 \cdot P_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1183	-	-	-	-	-
Uranium plutonium carbide ($U_{1-x}Pu_xC$)	5	-	-	-	-	-	247	-	-	-	-	-	-	-	-	-
Uranium silicides																
USi	6-I	501	501	-	-	-	-	-	-	-	509	-	-	-	-	-
USi_2	6-I	501	501	-	-	-	-	505	-	-	509	-	-	-	-	-
USi_3	6-I	501	501	-	-	-	503	505	-	-	509	-	-	-	-	-
U_3Si	6-I	501	501	-	-	-	503	505	507	-	509	-	-	-	-	-
U_3Si_2	6-I	501	501	-	-	-	-	-	-	-	509	-	-	-	-	-
Uranium stannide (USn_3)	6-I	541	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium sulfides																
US	5	722	722	-	-	-	-	-	-	-	724	-	-	-	-	-
US_2	5	722	722	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium thorium oxide ($Th_{1-x}U_xO_2$)	4-II	-	-	-	-	-	-	-	1161	-	-	-	-	-	-	-
Uranium-titanium intermetallics (U_2Ti)	6-I	-	676	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium zirconium carbide ($U_{1-x}Zr_xC$)	5	-	-	-	-	-	-	-	-	-	-	-	249	-	-	-
Uranium zirconium hydride ($U_{1-x}Zr_xH$)	5	-	-	-	-	-	-	-	-	-	451	-	-	-	-	-
Uranyl oxide	4-I	488	489	-	-	-	-	497	-	-	-	-	-	-	-	-
Urea formaldehyde, alpha cellulose filled	6-II	-	-	-	-	-	-	-	-	-	1002	-	-	-	-	-
V																
Vanadate glass	4-II	-	-	-	-	-	1645	-	-	-	1647	-	-	-	-	-
Vanadium (V)	1	1065	1065	-	-	1065	1067	1069	1071	-	1073	-	1075	1077	-	1079
Vanadium + ΣX_i	2-I	-	-	-	-	-	643	-	-	-		-	-	-	-	-
Vanadium + Aluminum	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Antimony	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Chromium	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-

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Vanadium + Copper	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Iron	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Manganese	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Nickel	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Palladium	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Silicon	2-I	-	-	-	-	-	-	-	-	-	645	-	-	-	-	-
Vanadium + Silicon + ΣX_i	2-II	-	-	-	-	-	-	-	1548	-	-	-	-	-	-	-
Vanadium + Tin	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium + Titanium	2-I	647	-	-	-	-	643	-	649	-	651	-	-	-	-	-
Vanadium + Titanium + ΣX_i	2-II	-	-	-	-	-	-	-	1550	-	-	-	-	-	-	-
Vanadium + Zirconium	2-I	-	-	-	-	-	643	-	-	-	-	-	-	-	-	-
Vanadium aluminide (V_5Al_3)	6-I	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium beryllide (VBe_{13})	6-I	-	158	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium borides																
VB	6-I	-	270	-	-	-	-	-	-	-	-	-	-	-	-	-
VB_2	6-I	270	270	-	-	-	-	-	-	-	272	-	-	-	-	-
V_3B_2	6-I	-	270	-	-	-	-	-	-	-	-	-	-	-	-	-
V_3B_4	6-I	-	270	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (di-)boride + + Chromium (di-)boride	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (di-)boride + + Titanium (di-)boride	6-I	723	-	-	-	-		-	-	-	-	-	-	-	-	-
Vanadium carbides																
VC	5	251	251	-	-	-	253	255	257	-	259	-	261	-	-	-
V_2C	5	-	251	-	-	-	-	-	-	-	259	-	-	-	-	-
Vanadium germanium lead oxide (5 PbO $GeO_2 \cdot V_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1163	-	-	-	-	-
Vanadium hydride (VH)	5	-	-	-	-	-	-	453	-	-	-	-	-	-	-	-
Vanadium-manganese intermetallics (VMn_2)	6-I	-	685	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium nitride (VN)	5	595	596	-	-	-	-	598	-	-	600	-	-	-	-	-
Vanadium oxides																
VO	4-I	-	-	-	-	524	-	528	-	-	-	-	-	-	-	536
V_2O_3	4-I	-	-	-	-	-	526	530	-	-	-	-	-	-	-	-
V_2O_4	4-I	-	-	-	-	-	-	532	-	-	-	-	-	-	-	-
V_2O_5	4-I	524	524	-	-	-	526	534	-	-	-	-	-	-	-	-
Vanadium (pent-)oxide + + Titanium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	884	-	-	-	-	-
Vanadium phosphide (VP)	5	635	636	-	-	-	639	-	-	-	-	-	-	-	-	-
Vanadium silicides																
VSi	6-I	-	511	-	-	-	-	-	-	-	-		-	-	-	-
VSi_2	6-I	-	-	-	-	-	-	513	-	-	515	-	-	-	-	-
V_3Si	6-I	-	511	-	-	-	-	513	-	-	515	-	-	-	-	-
V_5Si_3	6-I	-	511	-	-	-	-	513	-	-	515	-	-	-	-	-

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Vanadium silicon lead oxide ($5\ PbO \cdot SiO_2 \cdot V_2O_5$)	4-II	-	-	-	-	-	-	-	-	-	1165	-	-	-	-	-
Vanadium-zirconium intermetallics (V_2Zr)	6-I	-	685	-	-	-	-	-	-	-	-	-	-	-	-	-
Vermiculite, expanded	4-I	-		-	-	-	-	-	814	-		-	-	-	-	-
Vinylite VMCH	6-II	-	-	-	-	-	-	-	-	-	950	-	-	-	-	-
Vinylite VYDR	6-II	-	-	-	-	-	-	-	-	-	950	-	-	-	-	-
Vitreous bonded aluminum titanate	5	-	-	-	-	-	949-953	-	-	-	955-977	-	-	-	-	-
Vulcollan	6-II	1051	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vycor no. 790	4-II	-	1651	-	-	-	1653	-	-	-	1663	-	-	-	-	-
Vycor 7900	4-II	-	-	-	-	-	-	1655	-	1661	-	-	1665	1669	1671-1673	-
Vycor glasses	4-II	1651	1651	-	-	-	1653	1655	1657, 1699	1659-1661	1663	-	1665-1667	1669	1671-1673	-
W																
Willemite	4-II	-	-	-	-	-	-	1340	-	-	-	-	-	-	-	-
Wollastonite	4-II	-	-	-	-	-	-	1229	-	-	-	-	-	-	-	-
Wustite	4-I	-	-	-	-	-	-	-	-	-	222	-	-	-	-	-
Y																
Ytterbia	4-I	538	-	-	-	-	-	540	-	-	542	-	-	-	544	-
Ytterbium (Yb)	1	1081	1081	1081	1081	1081	1083	1085	-	-	-	-	-	-	-	-
Ytterbium + Calcium	2-I	-	-	-	-	-	-	-	-	-	653	-	-	-	-	-
Ytterbium borides																
YbB_4	6-I	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YbB_6	6-I	295	-	-	-	-	300	-	-	-	-	-	-	-	-	-
Ytterbium carbide (YbC_2)	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ytterbium oxide (Yb_2O_3)	4-I	538	-	-	-	-	-	540	-	-	542	-	-	-	544	-
Ytterbium selenide (YbSe)	6-I	365	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ytterbium sulfide (Yb_2S_3)	5	732	-	-	-		-	-	-	-	-	-	-	-	-	-
Yttria	4-I	546	-	-	-	-	-	548	550	-	552	-	555-559	-	561	-
Yttrium (Y)	1	1087	1087	1087	1087	1087	1089	1091	1093	-	-	-	1095	-	-	1097
Yttrium + ΣX_i	2-II	-	-	-	-	-	-	1554	-	1556	-	-	-	-	-	-
Yttrium + Tantalum	2-I	-	-	-	-	-	-	655	-	-	-	-	-	-	-	-
Yttrium + Terbium	2-I	-	-	-	-	-	657	-	-	-	-	-	-	-	-	-
Yttrium + Terbium + ΣX_i	2-II	1552	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium borides																
YB_2	6-I	295	297	-	-	-	-	-	-	-	-	-	-	-	-	-
YB_4	6-I	295	297	-	-	-	-	-	-	-	-		-	-	-	-

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Yttrium borides (cont.)																
YB_6	6-I	295	297	-	-	-	300	-	-	-	-	-	-	-	-	-
Yttrium carbides																
YC	5	-	295	-	-	-	-	-	-	-	-	-	-	-	-	-
YC_2	5	294	295	-	-	-	-	-	-	-	-	-	-	-	-	-
Y_2C_3	5	-	295	-	-	-	-	-	-	-	-	-	-	-	-	-
Y_3C	5	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium-cobalt intermetallics																
YCo_2	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YCo_5	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium-copper intermetallics (YCu_5)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium ferride (YFe_5)	6-I	306	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium fluoride (YF_3)	5	407	407	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium-gallium intermetallics (YGa_2)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium germanides (Y_5Ge_3)	6-I	323	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium hydrides																
YH_2	5	455	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YH_3	5	455	-	-	-	-	-	457	-	-	-	-	-	-	-	-
Yttrium-manganese intermetallics																
YMn_2	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YMn_5	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium-nickel intermetallics (YNi_5)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium nitride (YN)	5	621	621	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium-osmium intermetallics (YOs_2)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium oxide (Y_2O_3)	4-I	546	-	-	-	-	-	548	550	-	552	-	555-559	-	561	-
Yttrium oxide + Chromium (sesqui-)oxide	4-I	-	-	-	-	-	-	-	-	-	-	-	896	-	-	-
Yttrium oxide + Uranium (di-)oxide	4-I	-	-	-	-	-	-	-	898	-	-	-	-	-	-	-
Yttrium-rhodium intermetallics (YRh)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium silicides																
YSi	6-I	523	524	-	-	-	-	-	-	-	-	-	-	-	-	-
YSi_2	6-I	523	524	-	-	-	-	-	-	-	-	-	-	-	-	-
Y_5Si_5	6-I	-	524	-	-	-	-	-	-	-	-	-	-	-	-	-
Y_5Si_3	6-I	523	524	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium-silver intermetallics (YAg)	6-I	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Name	Volume	Density	Melting Point	Heat of Fusion	Heat of Vaporization	Heat of Sublimation	Electrical Resistivity	Specific Heat	Thermal Conductivity	Thermal Diffusivity	Thermal Linear Expansion	Thermal Absorptance	Thermal Emittance	Thermal Reflectance	Thermal Transmittance	Vapor Pressure
Yttrium sulfides																
YS	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
YS_2	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Y_2S_3	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Y_3S_7	5	732	732	-	-	-	-	-	-	-	-	-	-	-	-	-
Yttrium tellurides (Y_2Te_3)	6-I	-	-	-	-	-	638	-	-	-	-	-	-	-	-	-
Z																
Zinc + Copper	2-I	-	-	-	-	-	659	-	-	-	-	-	-	-	-	-
Zinc + Silver	2-I	-	661	661	-	-	-	-	-	-	-	-	-	-	-	-
Zinc + Zirconium	2-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	663
Zinc aluminate ($ZnO \cdot Al_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1033	-	-	-	-	-
Zinc antimonide (ZnSb)	6-I	-	-	-	-	-	75	-	77	-	-	-	-	-	-	79
Zinc chromate ($ZnO\ Cr_2O_3$)	4-II	-	-	-	-	-	-	-	-	-	1063	-	-	-	-	-
Zinc chromate spinal	4-II	-	-	-	-	-	-	-	-	-	1063	-	-	-	-	-
Zinc ferrite ($ZnO \cdot Fe_2O_3$)	4-II	-	-	-	-	-	1099	1101	1103	-	1105	-	-	-	-	-
Zinc fluoride (ZnF_2)	5	407	407	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc germanide oxide ($2\ ZnO\ GeO_2$)	4-II	-	-	-	-	-	-	-	-	-	1167	-	-	-	-	-
Zinc germanium oxide + + Magnesium germanium oxide	4-II	-	-	-	-	-	-	-	-	-	1556	-	-	-	-	-
Zinc germanium oxide + Zinc (ortho-) silicate	4-II	-	-	-	-	-	-	-	-	-	1558	-	-	-	-	-
Zinc lead silicate glass	4-II	-	-	-	-	-	1825	-	-	-	-	-	-	-	-	-
Zinc magnesium aluminum borosilicate glass	4-II	-	-	-		-	-	-	-	-	1727	-	-	-	-	-
Zinc oxide (ZnO)	4-I	-	-	-	-	-	563	-	565	-	567	-	565		-	-
Zinc oxide + Magnesium oxide	4-I	-	-	-	-	-	-	-	900	-	-	-	-		-	
Zinc oxide + Strontium oxide + + Lithium zirconium silicate	4-II	-	-	-	-	-	-	-	1554	-	-		-	-	-	
Zinc oxide + Tin(ic) oxide	4-I	-	-	-	-	-	-	-	902	-	-	-	-	-	-	-
Zinc oxide + Tin(ic) oxide + + Magnesium oxide	4-I	-	-	-	-	-	-	-	904	-	-	-	-	-	-	
Zinc selenide (ZnSe)	6-I	-	-	-	-	-	-	-	-	-	363	-	-	-	-	-
Zinc (ortho-) silicate ($2\ ZnO\ SiO_2$)	4-II	-	-	-	-	-	-	1340	-	-	1342	-	-	-	-	-
Zinc (ortho-) silicate + + Magnesium (ortho-) silicate	4-II	-	-	-	-	-	-	-	-	-	1575	-	-	-	-	
Zinc sulfide (ZnS)	5	-	-	-	-	-	726	-	-	-	-	-	-	728-730	-	-
Zinc (ortho-) titanate ($2\ ZnO \cdot TiO_2$)	4-II	-	-	-	-	-	-	1468	-	-	-	-	-	-	-	-
Zircaloy 2	2-I	-	-	-	-	-	699	702	704	-	-	-	709-714	-	-	-
Zircaloy 2, low nickel	2-I	-	-	-	-	-	-	702	-	-	-	-	-	-	-	-

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Zircaloy 4	2-I	-	-	-	-	-	-	702	-	-	-	-	-	-	-	-
Zircon	4-II	1344	-	-	-	-	1346	1348	-	-	-	-	-	-	-	-
Zircon 475	4-II	1344	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zircon CZ-5, Taylor	4-II	-	-	-	-	-	-	1348	1350	-	1352	-	-	-	-	-
Zircon Beryl	4-II	-	-	-	-	-	-	-	-	-	1577	-	-	-	-	-
Zirconia	4-I	571	571	-	-	571	574	576	578	580	582-587	-	589-593	595	-	597
Zirconium (Zr)	1	1099	1099	-	-	1099	1102	1104	1106	1109	1111	-	1113-1117	-	-	1119
Zirconium no. 715	1	-	-	-	-	-	-	-	1106	-	-	-	-	-	-	-
Zirconium + ΣX_i	2-II	1580	-	-	-	-	1582	-	1584	-	1586	-	-	-	-	-
Zirconium + Aluminum	2-I	-	-	-	-	-	665	-	667	-	-	-	-	-	-	-
Zirconium + Aluminum + ΣX_i	2-II	1558	-	-	-	-	1560	-	1562	-	-	-	-	-	-	-
Zirconium + Boron	2-I	669	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium + Hafnium	2-I	671	-	-	-	671	673	675	-	-	677	-	-	-	-	-
Zirconium + Hafnium + ΣX_i	2-II	-	-	-	-	-	-	1566	-	-	-	-	-	-	-	-
Zirconium + Indium	2-I	-	-	-	-	-	-	679	-	-	-	-	-	-	-	-
Zirconium + Iron + ΣX_i	2-II	-	-	-	-	-	-	1568	-	-	-	-	-	-	-	-
Zirconium + Molybdenum	2-I	-	-	-	-	-	681	-	683	-	-	-	-	-	-	-
Zirconium + Niobium	2-I	-	-	-	-	-	685	687	689	-	-	-	-	-	-	-
Zirconium + Silver	2-I	-	-	-	-	-	-	691	-	-	-	-	-	-	-	-
Zirconium + Tantalum + ΣX_i	2-II	-	-	-	-	-	1570	-	-	-	-	-	-	-	-	-
Zirconium + Thorium	2-I	-	-	-	-	-	-	-	-	-	693-695	-	-	-	-	-
Zirconium + Tin	2-I	697	-	-	-	-	699	702	704	-	707	-	709-714	-	-	-
Zirconium + Tin + ΣX_i	2-II	-	-	-	-	-	1572	-	-	-	-	-	-	-	-	-
Zirconium + Titanium	2-I	-	-	-	-	-	-	715	-	-	-	-	-	-	-	-
Zirconium + Uranium	2-I	717	-	-	-	-	719	721	723	-	725	-	-	-	-	-
Zirconium + Uranium + ΣX_i	2-II	-	-	-	-	-	-	1574	-	-	-	-	1576-1578	-	-	-
Zirconium alloys (special designations)																
3ZI	2-II	1558	-	-	-	-	1560	-	1562	1564	-	-	-	-	-	-
Zircaloys (see Zircaloy)																
Zirconium aluminides																
$ZrAl_2$	6-I	-	39	-	-	-	-	-	-	-	41	-	-	-	-	-
$ZrAl_3$	6-I	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_2Al_3	6-I	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_3Al_2	6-I	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_3Al_4	6-I	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium beryllides																
$ZrBe_6$	6-I	-	148	-	-	-	-	-	-	-	-	-	-	-	-	-
$ZrBe_9$	6-I	-	148	-	-	-	-	-	-	-	-	-	-	-	-	-

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Zirconium beryllides (cont.)																
$ZrBe_{13}$	6-I	-	148	-	-	-	-	150	152	-	154	-	-	156	-	-
$ZrBe_{16}$	6-I	-	148	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_2Be_{17}	6-I	-	-	-	-	-	-	-	-	-	-	-	-	156	-	-
Zirconium borides																
ZrB	6-I	-	-	-	-	-	-	-	281	-	-	-	-	-	-	-
ZrB_2	6-I	274	274	-	274	-	277	279	-	-	283	-	286-288	291	-	293
ZrB_{12}	6-I	274	274	-	-	-	277	-	281	-	-	-	-	-	-	-
Zirconium (di-)boride cermet	6-II	842	-	-	-	-	844	846	848	-	850	-	-	-	-	-
Zirconium (di-)boride + + Molybdenum (di-)boride	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium (di-)boride + + Molybdenum (di-)silicide	6-I	-	689	-	-	-	-	-	-	-	691	-	-	-	-	-
Zirconium (di-)boride + + Niobium (di-)boride	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium (di-)boride + + Tantalum (di-)boride	6-I	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium carbide (ZrC)	5	263	263	-	-	-	265	267	269	271	273	-	277-283	-	-	285
Zirconium (pyro-)carbide	5	-	-	-	-	-	-	-	-	-	273	-	-	-	-	-
Zirconium carbide + Graphite	5	-	-	-	-	-	-	-	-	-	825	-	-	-	-	-
Zirconium-cobalt intermetallics ($ZrCo_2$)	6-I	-	685	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium ferride ($ZrFe_2$)	6-I	-	306	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium fluoride (ZrF_4)	5	407	407	-	-	407	-	-	-	-	-	-	-	-	-	-
Zirconium fluoride + Lithium fluoride	5	-	413	-	-	-	-	-	-	-	-	-	-	-	-	415
Zirconium fluoride + Rubidium fluoride	5	-	417	-	-	-	-	-	-	-	-	-	-	-	-	419
Zirconium fluoride + Sodium fluoride	5	-	421	-	-	-	-	-	-	-	-	-	-	-	-	423
Zirconium germanides																
ZrGe	6-I	-	323	-	-	-	-	-	-	-	-	-	-	-	-	-
$ZrGe_2$	6-I	-	323	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_5Ge	6-I	-	323	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_5Ge_3	6-I	-	323	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium hydride (ZrH_2)	5	459	-	-	-	-	-	461	463	-	465	-	-	-	-	-
Zirconium nitride (ZrN)	5	602	602	-	-	-	-	604	606	608	610	-	613-615	-	-	617-619
Zirconium (di-)oxide (ZrO_2)	4-I	571	571	-	-	571	574	576	578	580	582-587	-	589-593	595	-	597
Zirconium (di-)oxide foam	4-I	-	-	-	-	-	-	-	-	-	587	-	-	-	-	-
Zirconium (di-)oxide mix 148	4-I	-	-	-	-	-	-	-	916	-	-	-	-	-	-	-
Zirconium (di-)oxide mix 187	4-I	-	-	-	-	-	-	-	916	-	-	-	-	-	-	-

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Zirconium (di-)oxide Norton mix 302	4-I	-	-	-	-	-	-	-	-	580	-	-	-	-	-	-
Zirconium (di-)oxide ZP-58	5	-	-	-	-	-	-	799	-	-	-	-	-	-	-	-
Zirconium (di-)oxide ZP-74	5	-	-	-	-	-	-	799	-	-	-	-	-	-	-	-
Zirconium (di-)oxide coating on Inconel	6-II	-	-	-	-	-	-	-	-	-	-	-	-	1397	-	-
Zirconium (di-)oxide coating on Inconel X	6-II	-	-	-	-	-	-	-	-	-	-	-	1399	1401	-	-
Zirconium (di-)oxide + ΣX_i	5	-	-	-	-	-	-	799	-	-	-	-	-	-	-	-
Zirconium (di-)oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	-	906	908	-	-	-	-	-
Zirconium (di-)oxide + + Beryllium oxide + Aluminum oxide	4-I	-	-	-	-	-	-	-	-	-	910	-		-	-	-
Zirconium (di-)oxide + Calcium oxide	4-I	-	-	-	-	-	912	914	916	918	920	-	923	-	-	-
Zirconium (di-)oxide + Calcium oxide + Cerium (di-)oxide	4-I	-	-	-	-	-	-	-	925	-	-	-	-	-	-	-
Zirconium (di-)oxide + Calcium oxide + Silicon (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	927	-	-	-	-	-
Zirconium (di-)oxide + Cerium (di-)oxide	4-I	-	-	-	-	-	-	-	-	929	931	-	-	-	-	-
Zirconium (di-)oxide + + Dysprosium oxide	4-I	-	-	-	-	-	-	-	-	-	934	-	-	-	-	-
Zirconium (di-)oxide + Hafnium + + Magnesium	5	-	-	-	-	-	-	797	-	-	-	-	-	-	-	-
Zirconium (di-)oxide + Hafnium (di-)oxide	4-I	-	936	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium (di-)oxide + + Magnesium oxide	4-I	-	-	-	-	-	938	-	940	942	944	-	-	-	-	-
Zirconium (di-)oxide + + Magnesium oxide + Beryllium oxide	4-I	-	947	-	-	-	-	-	-		-	-	-	-	-	-
Zirconium (di-)oxide + Niobium (pent-)oxide	4-I	-	949	-	-	-	-	-	-	-	951	-	-	-	-	-
Zirconium (di-)oxide + + Phosphorus (pent-)oxide	4-I	-	-	-	-	-	-	-	-	-	953	-	-	-	-	-
Zirconium (di-)oxide + Silicon (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	955	-	-	-	-	-
Zirconium (di-)oxide + Thorium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	958	-	-	-	-	-
Zirconium (di-)oxide + Titanium cermet	6-II	-	-	-	-	-	-	826	828	830	832	-	-	-	-	-
Zirconium (di-)oxide + Titanium (di-)oxide	4-I	-	-	-	-	-	-	-	-	-	960	-	-	-	-	-
Zirconium (di-)oxide + Uranium (di-)oxide	4-I	962	964	-	-	-	-	-	-	-	966	-	-	-	-	-
Zirconium (di-)oxide + Yttrium oxide	4-I	-	-	-	-	-	-	-	9	-	970	-	-	-	-	-
Zirconium (di-)oxide + Yttrium oxide + Cerium (di-)oxide	4-I	-	-	-	-	-	-	-	972	-	-	-	-	-	-	-

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Zirconium (di-)oxide + Yttrium oxide + Zirconium cermet	6-II	-	-	-	-	-	-	-	834	-	-	-	-	-	-	-
Zirconium (di-)oxide + + Zirconium cermet	6-II	-	-	-	-	-	-	-	-	836	838	-	-	-	-	840
Zirconium (di-)oxide ZT-15-M cermet	6-II	-	-	-	-	-	-	826	-	830	-	-	-	-	-	-
Zirconium phosphates																
$ZrO_2 \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1185	-	-	-	-	-
$2\ ZrO_2 \cdot P_2O_5$	4-II	-	-	-	-	-	-	-	-	-	1185	-	-	-	-	-
Zirconium (ortho-)silicate ($ZrO_2 \cdot SiO_2$)	4-II	1344	1344	-	-	-	1346	1348	1350	-	1352	-	-	-	-	-
Zirconium (ortho-)silicate + + Beryllium aluminum silicate	4-II	-	-	-	-	-	-	-	-	-	1577	-	-		-	-
Zirconium silicides																
ZrSi	6-I	517	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ZrSi_2$	6-I	517	517	-	-	-	-	-	-	-	519	-	-	521	-	-
Zr_2Si	6-I	517	-	-	-	-	-	-	-	-		-	-	-	-	-
Zr_3Si_2	6-I	517	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_4Si	6-I	517	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_4Si_3	6-I	517	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_5Si_3	6-I	517	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zr_5Si_4	6-I	517	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium tantalum carbide ($Ta_XZr_YC_Z$)	5	-	-	-	-	-	-	-	-	-	287	-	290	-	-	-
Zirconium titanate ($ZrO_2 \cdot TiO_2$)	4-II	-	-	-	-	-	-	-	-	-	1470	-	-	-	-	-
Zirconium uranium carbide ($Zr_XU_{1-X}C$)	5	-	-	-	-	-	292	-	-	-	-	-	-	-	-	-
Zirconium-vanadium intermetallics (ZrV_2)	6-I	-	685	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirox, grade A	4-I	-	-	-	-	-	-	-	-	-	582	-	-	-	-	-
ZT-15-M zirconium (di-)oxide cermet	6-II	-	-	-	-	-	-	826	-	830	-	-	-	-	-	-