Designation: E 1159 – 98

Standard Specification for Thermocouple Materials, Platinum-Rhodium Alloys, and Platinum[1]

This standard is issued under the fixed designation E 1159; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers non-insulated platinum-rhodium alloys (weight percent composition), and platinum thermoelements that meet the requirement of Specification E 230 and NIST Monograph 175[2].

1.2 This specification does not cover platinum and platinum-rhodium materials, that require a higher purity than specified in 5.1, such as used for temperature coefficient of resistance (TCR) measurements or standards type calibration. For requirements of this superior quality, it is suggested that suppliers of precious metals be contacted.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents of the issue in force on the date of material purchase form a part of this specification to the extent referenced herein.

2.2 *ASTM Standards:*

B 561 Specification for Refined Platinum[3]

B 616 Specification for Refined Rhodium[3]

E 207 Test Method of Thermal EMF Test of Single Thermoelement Materials by Comparison With a Reference Thermoelement of Similar EMF-Temperature Properties[4]

E 220 Test Method for Calibration of Thermocouples by Comparison Techniques[4]

E 230 Specification and Temperature-Electromotive Force (EMF) Tables for Standardized Thermocouples[4]

E 344 Terminology Relating to Thermometry and Hydrometry[4]

3. Terminology

3.1 *Definitions*—The definitions given in Terminology E 344 apply to terms used in this specification.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *thermocouple type*, *n*—a nominal thermoelectric class of thermoelement materials that, used as a pair, have a standardized relationship and tolerance between relative Seebeck EMF and temperature, physical characteristics, and an assigned type letter designator and color code.

3.2.1.1 *Discussion*—Letter designators and color codes are defined in the United States by ANSI/ASTM E 230. Descriptions of letter designators and color codes may also be found in ASTM MNL-12[5].

4. Ordering Information

4.1 Orders for material under this specification shall include the following:

4.1.1 ASTM designation and date of issue,

4.1.2 Thermocouple type (3.2.1.1),

4.1.3 Thermoelement diameter and tolerance (5.5),

4.1.4 Annealing requirements (5.4),

4.1.5 Quantity required (5.6, 5.7),

4.1.6 Specify standard or special tolerance on the initial value of EMF vs. temperature,

4.1.7 Calibration requirement (5.8),

4.1.8 Chemical analysis (7.2.1),

4.1.9 Certified test results (7.2.2), and

4.1.10 Statement of compliance (7.2.3).

5. Requirements

5.1 *Purity*—The purity of platinum for use in the negative thermoelement of Type R and Type S thermocouples shall be Grade 99.99, as specified in Specification B 561.

[1] This specification is under the jurisdiction of ASTM Committee E-20 on Temperature Measurement and is the direct responsibility of Subcommittee E20.04 on Thermocouples.

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[2] "Temperature-Electromotive Force Reference Functions and Tables for the Letter-Designated Thermocouple Types Based on the ITS-90," NIST Monograph 175 and Supplement 1. Available from NIST, U.S. Dept. of Commerce, Gaithersburg, MD 20899.

[3] *Annual Book of ASTM Standards*, Vol 2.04.

[4] *Annual Book of ASTM Standards*, Vol 14.03.

[5] *Manual on the Use of Thermocouples in Temperature Measurement*, ASTM MNL-12, Fourth Edition, ASTM, April 1993. (Revision of STP 470B).