



Standard Specification for Industrial Platinum Resistance Thermometers¹

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1. Scope

1.1 This specification covers the requirements for metal-sheathed industrial platinum resistance thermometers (PRT's) suitable for direct immersion temperature measurement. It applies to PRT's with an average temperature coefficient of resistance between 0 and 100°C of 0.385 %/°C and nominal resistance at 0°C of 100 Ω or other specified value. This specification covers PRT's suitable for all or part of the temperature range –200 to 650°C. The resistance-temperature relationship and tolerances are specified as well as physical, performance, and testing requirements.

1.2 The values of temperature in this specification are based on the International Temperature Scale of 1990 (ITS-90).²

1.3 The values stated in inch-pound units or SI (metric) units may be regarded separately as standard. The values stated in each system are not exact equivalents, and each system shall be independent of the other.

1.4 *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 ASTM Standards:³

A269 Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

B167 Specification for Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, N06045, and N06696), Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617), and Nickel-Iron-

Chromium-Tungsten Alloy (UNS N06674) Seamless Pipe and Tube

E344 Terminology Relating to Thermometry and Hydrometry

E644 Test Methods for Testing Industrial Resistance Thermometers

E1652 Specification for Magnesium Oxide and Aluminum Oxide Powder and Crushable Insulators Used in the Manufacture of Base Metal Thermocouples, Metal-Sheathed Platinum Resistance Thermometers, and Noble Metal Thermocouples

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification see Terminology **E344**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *connecting wire end closure, n*—moisture barrier at the connecting wire end of the sheath.

3.2.1.1 *Discussion*—The closure is intended to provide a seal sufficient to prevent the sensor's insulation resistance from dropping below the minimum requirements.

3.2.2 *connecting wires, n*—wires that run from the element through the connecting wire end closure and external to the sheath.

3.2.3 *excitation, n*—electrical current passing through the element.

3.2.4 *g-level, n*—acceleration of an object relative to the local acceleration of gravity.

3.2.4.1 *Discussion*—For example, a g-level of 5 is equivalent to an acceleration of approximately $5 \times 9.8 \text{ m/s}^2 = 49.0 \text{ m/s}^2$.

3.2.5 *minimum immersion length, n*—depth that a thermometer should be immersed, in a uniform temperature environment, such that further immersion does not produce a change in indicated temperature greater than the specified tolerance.

3.2.6 *PRT design, n*—generic term used to differentiate between different PRT construction details, such as element and connecting wire construction, insulation methods, sealing techniques, and mounting methods (for example, spring loaded or direct mounting).

¹ This specification is under the jurisdiction of ASTM Committee E20 on Temperature Measurement and is the direct responsibility of Subcommittee E20.03 on Resistance Thermometers.

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² Preston-Thomas, H., "The International Temperature Scale of 1990 (ITS-90)," *Metrologia*, Vol 27, No. 1. 1990, pp 3–10, *ibid*, Vol 27, No. 2, 1990, p107

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.