



Designation: E 644 – 02

Standard Test Methods for Testing Industrial Resistance Thermometers¹

This standard is issued under the fixed designation E 644; 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 These test methods describe the principles, apparatus, and procedures for calibration and testing of industrial resistance thermometers.

1.2 These test methods cover the tests for insulation resistance, calibration, immersion error, pressure effects, thermal response time, vibration effect, mechanical shock, self-heating effect, stability, thermoelectric effect, humidity, thermal hysteresis and thermal shock.

1.3 These test methods are not necessarily intended for, recommended to be performed on, or appropriate for every type of thermometer. The expected repeatability and reproducibility of the results are tabulated in Appendix X4.

1.4 These test methods, when specified in a procurement document, shall govern the method of testing the resistance thermometer.

1.5 Thermometer performance specifications, acceptance limits, and sampling methods are not covered in these test methods; they should be specified separately in the procurement document.

1.6 *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.* Specific precautionary statements are given in 6.3.2, 6.3.5, and 8.1.

2. Referenced Documents

2.1 ASTM Standards:

E 77 Test Method for the Inspection and Verification of Thermometers²

E 230 Temperature-Electromotive Force (EMF) Tables for Standardized Thermocouples²

E 344 Terminology Relating to Thermometry and Hydrometry²

E 563 Practice for Preparation and Use of Freezing Point Reference Baths³

E 1137 Specification Industrial Platinum Resistance Thermometers²

E 1502 Guide for Use of Freezing-Point Cells for Reference Temperatures²

E 1750 Guide for Use of Water Triple Point Cells²

E 1751 Guide to Temperature Electromotive Force (EMF) Tables for Non-Letter Designated Thermocouple Combinations²

2.2 Military Standard:

MIL-STD-202 Test Methods for Electronic and Electrical Component Parts⁴

3. Terminology

3.1 Definitions:

3.1.1 The definitions given in Terminology E 344 shall apply to these test methods.

4. Significance and Use

4.1 These test methods provide uniform methods for testing industrial resistance thermometers so that a given tester may expect to obtain the same value of a test result from making successive measurements on the same test article within the limits of repeatability given in Appendix X4. Independent testers may also expect to obtain the same result from the testing of the same article within the limits of reproducibility given in Appendix X4.

4.2 These tests may be used to qualify platinum resistance thermometers for use in specific applications to meet a particular specification such as Specification E 1137, or to evaluate relative merits of equivalent test articles supplied by one or more manufacturers, or to determine the limits of the application of a particular design of thermometer.

4.3 The expected repeatability and reproducibility of selected test methods are included in Appendix X4.

4.4 Some non-destructive tests described in these test methods may be applied to thermometers that can be subsequently

¹ These test methods are under the jurisdiction of ASTM Committee E20 on Temperature Measurement and are the direct responsibility of Subcommittee E20.03 on Resistance Thermometers.

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² *Annual Book of ASTM Standards*, Vol 14.03.

³ Discontinued; see 1996 *Annual Book of ASTM Standards*, Vol 14.03.

⁴ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20234.