



Standard Guide for Accuracy Verification of Industrial Platinum Resistance Thermometers¹

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1. Scope

1.1 This guide describes the techniques and apparatus required for the accuracy verification of industrial platinum resistance thermometers constructed in accordance with Specification [E1137/E1137M](#) and the evaluation of calibration uncertainties. The procedures described apply over the range of -200°C to 650°C .

1.2 This guide does not intend to describe procedures necessary for the calibration of platinum resistance thermometers used as calibration standards or Standard Platinum Resistance Thermometers. Consequently, calibration of these types of instruments is outside the scope of this guide.

1.3 Industrial platinum resistance thermometers are available in many styles and configurations. This guide does not purport to determine the suitability of any particular design, style, or configuration for calibration over a desired temperature range.

1.4 The evaluation of uncertainties is based upon current international practices as described in ISO/TAG 4/WG 3 “Guide to the Evaluation of Uncertainty in Measurement” and ANSI/NCSL Z540-2-1997 “U.S. Guide to the Expression of Uncertainty in Measurement.”

1.5 *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:²

[E344](#) Terminology Relating to Thermometry and Hydrometry

¹ This guide 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 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.

[E563](#) Practice for Preparation and Use of an Ice-Point Bath as a Reference Temperature

[E644](#) Test Methods for Testing Industrial Resistance Thermometers

[E1137/E1137M](#) Specification for Industrial Platinum Resistance Thermometers

[E1502](#) Guide for Use of Fixed-Point Cells for Reference Temperatures

[E1750](#) Guide for Use of Water Triple Point Cells

2.2 *ANSI Publication:*

[ANSI/NCSL Z540-2-1997](#) U.S. Guide to the Expression of Uncertainty in Measurement³

2.3 *Other Publication:*

[ISO/TAG 4/WG 3](#) Guide to the Evaluation of Uncertainty in Measurement

3. Terminology

3.1 *Definitions*—The definitions given in Terminology [E344](#) shall be considered as applying to the terms used in this guide.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *annealing, v*—a heat treating process intended to stabilize resistance thermometers prior to calibration and use.

3.2.2 *check standard, n*—a thermometer similar in design to the unit under test, but of superior stability, which is included in the calibration process for the purpose of quantifying the process variability.

3.2.3 *coverage factor, n*—numerical factor used as a multiplier of the combined standard uncertainty in order to obtain an expanded uncertainty.

3.2.4 *dielectric absorption, n*—an effect in an insulator caused by the polarization of positive and negative charges within the insulator which manifests itself as an in-phase current when the voltage is removed and the charges recombine.

3.2.5 *expanded uncertainty, U, n*—quantity defining an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.