



Standard Test Method for Calibration and Accuracy Verification of Wideband Infrared Thermometers¹

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1. Scope

1.1 This test method covers electronic instruments intended for measurement of temperature by detecting the intensity of thermal radiation exchanged between the subject of measurement and the sensor.

1.2 The devices covered by this test method are referred to as infrared thermometers in this document.

1.3 The infrared thermometers covered in this test method are instruments that are intended to measure temperatures below 1000°C, measure thermal radiation over a wide bandwidth in the infrared region, and are direct-reading in temperature.

1.4 This guide covers best practice in calibrating infrared thermometers. It addresses concerns that will help the user perform more accurate calibrations. It also provides a structure for calculation of uncertainties and reporting of calibration results to include uncertainty.

1.5 Details on the design and construction of infrared thermometers are not covered in this test method.

1.6 This test method does not cover infrared thermometry above 1000°C. It does not address the use of narrowband infrared thermometers or infrared thermometers that do not indicate temperature directly.

1.7 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.8 *The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.*

¹ This practice is under the jurisdiction of ASTM Committee E20 on Temperature Measurement and is the direct responsibility of Subcommittee E20.02 on Radiation Thermometry.

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2. Referenced Documents

2.1 *ASTM Standards*:²

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

E1256 [Test Methods for Radiation Thermometers \(Single Waveband Type\)](#)

E2758 [Guide for Selection and Use of Wideband, Low Temperature Infrared Thermometers](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *cavity bottom, n*—the portion of the cavity radiation source forming the end of the cavity.

3.1.1.1 *Discussion*—The cavity bottom is the primary area where an infrared thermometer being calibrated measures radiation.

3.1.2 *cavity radiation source, n*—a concave shaped geometry approximating a perfect blackbody of controlled temperature and defined emissivity used for calibration of radiation thermometers.

3.1.2.1 *Discussion*—A cavity radiation source is a subset of thermal radiation sources.

3.1.2.2 *Discussion*—To be a cavity radiation source of practical value for calibration, at least 90 % of the field-of-view of a radiation thermometer is expected to be incident on the cavity bottom. In addition, the ratio of the length of the cavity versus the cavity diameter is expected to be greater than or equal to 5:1.

3.1.3 *cavity walls, n*—the inside surfaces of the concave shape forming a cavity radiation source.

3.1.4 *customer, n*—the individual or institution to whom the calibration or accuracy verification is being provided.

3.1.5 *distance-to-size ratio (D:S), n*—see *field-of-view*.

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.