



Standard Test Methods for Radiation Thermometers (Single Waveband Type)¹

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1. Scope

1.1 The test methods described in these test methods can be utilized to evaluate the following six basic operational parameters of a radiation thermometer (single waveband type):

	Section
Calibration Accuracy	7
Repeatability	8
Target Size	9
Response Time	10
Warm-Up Time	11
Long-Term Drift	12

1.2 *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. Terminology

2.1 Definitions:

2.1.1 *blackbody*, n —the perfect or ideal source of thermal radiant power having a spectral distribution described by the Planck equation.

2.1.1.1 *Discussion*—The term blackbody is often used to describe a furnace or other source of radiant power which approximates the ideal.

2.1.2 *center wavelength*, n —a wavelength, usually near the middle of the band of radiant power over which a radiation thermometer responds, that is used to characterize its performance.

2.1.2.1 *Discussion*—The value of the center wavelength is usually specified by the manufacturer of the instrument.

2.1.3 *radiation thermometer*, n —a radiometer calibrated to indicate the temperature of a blackbody.

2.1.4 *radiometer*, n —a device for measuring radiant power that has an output proportional to the intensity of the input power.

2.1.5 *target plane*, n —the plane, perpendicular to the line of sight of a radiation thermometer, that is in focus for that instrument.

2.2 Definitions of Terms Specific to This Standard:

2.2.1 *reference temperature source*, n —a source of thermal radiant power of known temperature or emissivity, or both, used in the testing of radiation thermometers.

2.2.2 *target size*, n —the diameter of a circle in the target plane of a radiation thermometer that is centered on its line of sight and contains 99 % of the input radiant power received by that instrument.

2.2.3 *temperature resolution*, n —the minimum simulated or actual change in target temperature that gives a usable change in output or indication, or both.

3. Significance and Use

3.1 The purpose of these test methods is to establish consensus test methods by which both manufacturers and end users may make tests to establish the validity of the readings of their radiation thermometers. The test results can also serve as standard performance criteria for instrument evaluation or selection, or both.

3.2 The goal is to provide test methods that are reliable and can be performed by a sufficiently skilled end user or manufacturer in the hope that it will result in a better understanding of the operation of radiation thermometers and also promote improved communication between the manufacturers and the end users. A user without sufficient knowledge and experience should seek assistance from the equipment makers or other expert sources, such as those found at the National Institute of Standards and Technology in Gaithersburg, Maryland.

3.3 Use these test methods with the awareness that there are other parameters, particularly spectral response limits and temperature resolution, which impact the use and characterization of radiation thermometers for which test methods have not yet been developed.

3.3.1 Temperature resolution is the minimum simulated or actual change in target temperature that results in a usable change in output or indication, or both. It is usually expressed as a temperature differential or a percent of full-scale value, or both, and usually applies to value measured. The magnitude of the temperature resolution depends upon a combination of four factors: detector noise equivalent power (NEP) or noise equivalent temperature, electronic signal processing, signal-to-noise characteristics (including amplification noise), and analog-to-digital conversion “granularity.”

3.3.2 Spectral response limits are the upper and lower limits

¹ These test methods are under the jurisdiction of ASTM Committee E20 on Temperature Measurement and are the direct responsibility of Subcommittee E20.02 on Radiation Thermometry.

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