



Standard Guide for Selection and Use of Wideband, Low Temperature Infrared Thermometers¹

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1. Scope

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

1.2 The devices covered by this guide are referred to as IR thermometers.

1.3 The IR thermometers covered in this guide are instruments that are intended to measure temperatures below 1000°C and measure a wide band of thermal radiation in the infrared region.

1.4 This guide covers best practice in using IR thermometers. It addresses concerns that will help the user make better measurements. It also provides graphical tables to help determine the accuracy of measurements.

1.5 Details on the design and construction of IR thermometers are not covered in this guide.

1.6 This guide does not cover medium- and high-temperature IR thermometry (above 1000°C). It does not address the use of narrowband IR thermometers.

1.7 The values of quantities stated in SI units are to be regarded as the standard. The values of quantities in parentheses are not in SI and are optional.

1.8 *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

E1256 Test Methods for Radiation Thermometers (Single Waveband Type)

E1862 Practice for Measuring and Compensating for Reflected Temperature Using Infrared Imaging Radiometers

E1897 Practice for Measuring and Compensating for Transmittance of an Attenuating Medium Using Infrared Imaging Radiometers

E1933 Practice for Measuring and Compensating for Emissivity Using Infrared Imaging Radiometers

2.2 IEC Standards:³

IEC 62492-1 TS Industrial Process Control Devices—Radiation Thermometers—Part 1: Technical Data for Radiation Thermometers

2.3 BIPM Standards:

JCGM 200:2012 International Vocabulary of Metrology—Basic and General Concepts and Associated Terms (VIM)

3. Terminology

3.1 Definitions:

3.1.1 *absolute zero, n* —a temperature of 0 K (-273.15°C).

3.1.2 *atmospheric attenuation, n* —a ratio showing how much thermal radiation in a given spectral range is absorbed or scattered in air over a given distance.

3.1.3 *atmospheric transmission, n* —a ratio showing how well thermal radiation in a given spectral range at a given distance travels through a certain distance of air.

3.1.4 *attenuating medium, n* —a semi-transparent solid, liquid or gas, such as a window, filter, external optics, or an atmosphere that reduces thermal radiation, or combinations thereof.

3.1.5 *background radiation*—see *reflected radiation*.

¹ This guide 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 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.

³ Available from International Electrotechnical Commission (IEC), 3, Rue de Varembe, CH-1211 Geneva 20, Switzerland, www.iec.ch.