



Designation: E1897 – 14 (Reapproved 2022)

Standard Practice for Measuring and Compensating for Transmittance of an Attenuating Medium Using Infrared Imaging Radiometers¹

This standard is issued under the fixed designation E1897; 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 This practice covers procedures for measuring and compensating for transmittance when using an infrared imaging radiometer to measure the temperature of a specimen through an attenuating medium, such as a window, filter, or atmosphere.²

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *These procedures may involve use of equipment and materials in the presence of heated or electrically-energized equipment, or both.*

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*³

E1316 Terminology for Nondestructive Examinations

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.10 on Specialized NDT Methods.

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² This practice was originally adapted in 1997, by agreement, from the *Guideline for Measuring and Compensating for Reflected Temperature, Emittance and Transmittance* developed by Infraspection Institute, 425 Ellis Street, Burlington, NJ 08016.

³ 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. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *attenuating medium*—a semi-transparent solid, liquid, or gas, such as a window, filter, external optics or an atmosphere that attenuates radiation.

3.1.2 *blackbody simulator*—a device with an emissivity close to 1.00 that can be heated or cooled to a stable temperature.

3.1.3 *filter*—a semi-transparent material that attenuates certain wavelengths of radiation.

3.1.4 *infrared thermographer*—the person using an infrared imaging radiometer.

3.1.5 *reflected temperature*—the temperature of the energy incident upon and reflected by the measurement surface of the specimen.

3.1.6 *window*—a semi-transparent material that separates conditioned and unconditioned atmospheres and attenuates certain wavelengths of radiation.

3.2 See also Terminology E1316.

4. Summary of Practice

4.1 Using the computer built into an infrared imaging radiometer, a method is given for measuring the transmittance of an attenuating medium.

4.2 Using the computer built into an infrared imaging radiometer, a method is given for compensating for errors when measuring the temperature of a specimen through an attenuating medium when the emissivity of the specimen and the transmittance of the attenuating medium are known.

4.3 Using the computer built into an infrared imaging radiometer, a method is given for measuring and compensating for unknown transmittance and emissivity errors when the specimen temperature is known.

5. Significance and Use

5.1 The transmittance of an attenuating medium can cause errors for an infrared thermographer using an infrared imaging radiometer to measure the temperature of a specimen through the medium. Three test methods are given for measuring and compensating for this error source.