



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

This standard is issued under the fixed designation E 1897; 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 These test methods cover 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 the standard.

1.3 *These test methods 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 1316 Terminology for Nondestructive Examinations³

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 and/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.

¹ These test methods are under the jurisdiction of ASTM Committee E-07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.10 on Emerging NDT Methods.

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² These test methods are adapted from the *Guideline of Measuring and Compensating for Reflected Temperature, Emittance and Transmittance* developed by Infrasppection Institute, 1971 Shelburne Road, Shelburne, VT 05482, 1993.

³ *Annual Book of ASTM Standards*, Vol 03.03.

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 E 1316.

4. Summary of Test Method

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.

5.1.1 A test method is given for measuring the transmittance of an attenuating medium.

5.1.2 A test method is given for compensating for errors when measuring the temperature of a specimen having a known emissivity through an attenuating medium with a known transmittance.

5.1.3 A test method is given for measuring and compensating for transmittance and emissivity errors when the specimen temperature is known.

5.2 These test methods can be used in the field or laboratory using commonly available materials.

5.3 These test methods can be used with any infrared radiometers that have the required computer capabilities.

6. Interferences

6.1 *Test Method for Measuring the Transmittance of an Attenuating Medium:*

6.1.1 This test method requires a blackbody simulator with an emissivity of 0.95 or greater that is at least 20°C warmer