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An American National Standard

Standard Test Methods for Measuring and Compensating for Reflected Temperature Using Infrared Imaging Radiometers[1]

This standard is issued under the fixed designation E 1862; 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.

ε[1] NOTE—Editorial changes were made throughout in June 1998.

1. Scope

1.1 These test methods cover procedures for measuring and compensating for reflected temperature when measuring the surface temperature of a specimen with an infrared imaging radiometer.[2]

1.2 These test methods may involve use of equipment and materials in the presence of heated or electrically energized equipment, or both.

1.3 *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 Examinations[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *diffuse reflector*, *n*—a surface that produces a diffuse image of a reflected source.

3.1.2 *infrared thermographer*, *n*—the person using an infrared imaging radiometer.

3.1.3 *infrared reflector*, *n*—a material with a reflectance as close as possible to 1.00.

3.1.4 *reflected temperature*, *n*—the temperature of the energy incident upon and reflected from the measurement surface of a specimen.

3.1.5 *specular reflector*, *n*—a surface that produces a direct image of a reflected source.

3.2 See also Terminology E 1316.

4. Summary of Test Methods

4.1 Two test methods are given for measuring the reflected temperature of a specimen, the Reflector Method and the Direct Method.

4.2 A test method is also given for compensating for the error produced by reflected temperature using the computer built into an infrared imaging radiometer.

5. Significance and Use

5.1 The infrared energy that is reflected by a specimen can cause measurement errors for an infrared thermographer measuring its surface temperature. Two test methods are provided for measuring and compensating for this reflected temperature error source, the Reflector Method and the Direct Method.

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 *Reflector Method*:

6.1.1 This test method uses an infrared reflector with an assumed reflectance of 1.00, which is an ideal property. Errors can be minimized by using a reflector having a reflectance as close as possible to 1.00.

6.1.2 Specimens vary in that they can be diffuse or spectral reflectors, or both. Use of an infrared reflector with reflectance properties as close as possible to those of the specimen will reduce errors.

6.2 *Direct Method*:

6.2.1 The Direct Method usually does not account for the heat from the infrared thermographer's body as a source of reflected temperature. If this heat source creates a significant error, use the Reflector Method.

6.3 Reflected temperature errors produced by a point source, such as the sun or a lamp, are difficult to measure accurately. These error sources can often be avoided by moving the infrared imaging radiometer's position and angle relative to the specimen.

6.4 The measured reflected temperature of a specimen may be specific to the waveband of the infrared imaging radiometer used. Therefore, the infrared imaging radiometer's waveband should be noted with the measured value.

6.5 The significance of the error contributed by reflected

[1] These test methods are under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and are the direct responsibility of Subcommittee E07.10 on Emerging NDT Methods.

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

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