Designation: C 1371 – 04

Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers[1]

This standard is issued under the fixed designation C 1371; 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 test method covers a technique for determination of the emittance of typical materials using a portable differential thermopile emissometer. The purpose of the test method is to provide a comparative means of quantifying the emittance of opaque, highly thermally conductive materials near room temperature as a parameter in evaluating temperatures, heat flows, and derived thermal resistances of materials.

1.2 This test method does not supplant Test Method C 835, which is an absolute method for determination of total hemispherical emittance, or Test Method E 408, which includes two comparative methods for determination of total normal emittance. Because of the unique construction of the portable emissometer, it can be calibrated to measure the total hemispherical emittance. This is supported by comparison of emissometer measurements with those of Test Method C 835 **(1)**.[2]

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:* [3]

C 168 Terminology Relating to Thermal Insulation

C 680 Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs

C 835 Test Method for Total Hemispherical Emittance of Surfaces up to 1400°C

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E 408 Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions*—For definitions of some terms used in this test method, refer to Terminology C 168.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *diffuse surface*—a surface that emits or reflects equal radiation intensity, or both, into all directions **(2)**.

3.2.2 *emissive power*—the rate of radiative energy emission per unit area from a surface **(2)**.

3.2.3 *emissometer*—an instrument used for measurement of emittance.

3.2.4 *Lambert's cosine law*—the mathematical relation describing the variation of emissive power from a diffuse surface as varying with the cosine of the angle measured away from the normal of the surface **(2)**.

3.2.5 *normal emittance*—the directional emittance perpendicular to the surface.

3.2.6 *radiative intensity*—radiative energy passing through an area per unit solid angle, per unit of the area projected normal to the direction of passage, and per unit time **(2)**.

3.2.7 *spectral*—having a dependence on wavelength; radiation within a narrow region of wavelength **(2)**.

3.2.8 *specular surface*—mirrorlike in reflection behavior **(2)**.

3.3 *Symbols:Symbols:*

3.3.1 For standard symbols used in this test method, see Terminology C 168. Additional symbols are listed here:

α = total absorptance, dimensionless

α_λ = spectral absorptance, dimensionless

ϵ_{hi} = total emittance of the high-emittance calibration standard, dimensionless

ϵ_{low} = total emittance of the low-emittance calibration standard, dimensionless

ϵ_{spec} = apparent total emittance of the test specimen, dimensionless

ϵ = apparent total emittance of the surface, dimensionless

[1] This test method is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.30 on Thermal Measurement.

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[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.

[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.

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