Designation: C 1199 – 00

Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods[1]

This standard is issued under the fixed designation C 1199; 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 requirements and guidelines and specifies calibration procedures required for the measurement of the steady-state thermal transmittance of fenestration systems installed vertically in the test chamber. This test method specifies the necessary measurements to be made using measurement systems conforming to either Test Methods C 236, C 976, or C 1363 for determination of fenestration system thermal transmittance.

NOTE 1—This test method allows the testing of projecting fenestration products (that is, garden windows, skylights, and roof windows) installed vertically in a surround panel. Current research on skylights, roof windows, and projecting products hopefully will provide additional information that can be added to the next version of this test method so that skylight and roof windows can be tested horizontally or at some angle typical of a sloping roof.

1.2 This test method refers to the thermal transmittance, U, and the corresponding thermal resistance, R, of a fenestration system installed vertically in the absence of solar and air leakage effects.

NOTE 2—The methods described in this document may also be adapted for use in determining the thermal transmittance of sections of building wall, and roof and floor assemblies containing thermal anomalies, which are smaller than the hot box metering area.

1.3 This test method describes how to determine a fenestration product's (also called test specimen) thermal transmittance, U_S, at well-defined environmental conditions. The thermal transmittance, which is sometimes called the air-to-air U-factor, is also a reported test result from Test Methods C 236, C 976, and C 1363. If only the thermal transmittance is reported using this test method, the test report must also include a detailed description of the environmental conditions in the thermal chamber during the test as outlined in 10.3.

1.4 For rating purposes, this test method also describes how to calculate a standardized thermal transmittance, U_{ST}, which can be used to compare test results from laboratories with different weather side wind directions and thermal chamber configurations, and can also be used to directly compare to calculated results from current computer programs for determining the thermal transmittance of fenestration products. Although this test method specifies two methods of calculating the standardized thermal transmittance, only the standardized thermal transmittance result from one method is reported for each test. One standardized thermal transmittance calculation procedure is the Calibration Transfer Standard (CTS) method and another is the area weighting (AW) method (see 4.3 and Section 8 for further descriptions of these two methods). The area weighting method requires that the surface temperatures on both sides of the test specimen be directly measured as specified in Practice E 1423 in order to determine the surface heat transfer coefficients on the fenestration product during the test. The CTS method does not use the measured surface temperatures on the test specimen and instead utilizes the calculation of equivalent surface temperatures from calibration data to determine the test specimen surface heat transfer coefficients. The area weighting (AW) method shall be used whenever the thermal transmittance, U_S, is greater than 3.4 W/(m^2•K) {0.6 Btu/(hr•Ft ^{2}•°F)}, or when the ratio of test specimen projected surface area to wetted (that is, total heat transfer or developed) surface area on either side of the test specimen is less than 0.80. Otherwise the CTS method shall be used to standardize the thermal transmittance results.

1.5 A discussion of the terminology and underlying assumptions for measuring the thermal transmittance are included.

1.6 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

1.7 *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:*

C 168 Terminology Relating to Thermal Insulating Materials[2]

[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] *Annual Book of ASTM Standards*, Vol 04.06.

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