



Standard Practice for Determining Steady State Thermal Transmittance of Fenestration Systems¹

This standard is issued under the fixed designation E 1423; 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 standard test specimen sizes and test conditions as well as the calculation and presentation of the thermal transmittance and conductance data measured in accordance with Test Method C 1199. The standard sizes and conditions are to be used for fenestration product comparison purposes. The specifier may choose other sizes and conditions for product development or research purposes.

1.2 This practice deals with the determination of the thermal properties of a fenestration system installed vertically in the absence of solar heat gain and air leakage effects.

NOTE 1—To determine air leakage effects of fenestration systems, Test Method E 283 or E 1424 should be referenced.

1.3 This practice specifies the procedure for determining the standardized thermal transmittance of a fenestration test specimen using specified values of the room-side and weather-side surface heat transfer coefficients, h_h and h_c , respectively.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other.

1.5 *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 Materials²

C 1199 Test Method for Measuring the Steady State Thermal Transmittance of Fenestration Systems Using Hot Box Methods²

C 1363 Test Method for Thermal Performance of Building

Assemblies by Means of a Hot Box Apparatus²

E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen³

E 631 Terminology of Building Constructions³

E 783 Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors³

E 1424 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure and Temperature Differences Across the Specimen³

3. Terminology

3.1 *Definitions*—Definitions and terms are in accordance with Terminology E 631 and C 168, from which the following have been selected and modified to apply specifically to fenestration systems. See Fig. 1 and Fig. 2 for variable identification. (For further information on definitions and procedures, see Appendix X1 or Test Method C 1199.)

3.1.1 *surface heat transfer coefficient, h* (sometimes called *surface conductance* or *film coefficient*)—the time rate of heat flow from a unit area of a surface to its surroundings, induced by a unit temperature difference between the surface and the environment. Subscripts are used to differentiate between room-side (1 or r) and weather-side (2 or c) surface heat transfer coefficients (see Fig. 1 and Fig. 2).

3.1.2 *test specimen thermal transmittance U_s* (sometimes called *overall coefficient of heat transfer*)—the heat transfer in unit time through unit area of a test specimen and its boundary air films, induced by unit temperature difference between the environments on each side.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *overall thermal resistance, R_s* —the temperature difference between the environments on the two sides of a body or assembly when a unit heat flow per unit time per unit area is established through the body or assembly under steady-state conditions. It is defined as follows:

$$R_s = \frac{1}{U_s} \quad (1)$$

¹ This guide is under the jurisdiction of ASTM Committee E-6 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Component Performance of Windows, Curtain Walls, and Doors.

Current edition approved Oct. 10, 1999. Published March 2000. Originally published as E 1423 – 91. Last previous edition E 1423 – 91.

² *Annual Book of ASTM Standards*, Vol. 04.06.

³ *Annual Book of ASTM Standards*, Vol. 04.11.