Designation: E2692 – 10

Standard Test Method for Structural Performance of Thermal Barriers in Fenestration Products[1,2]

This standard is issued under the fixed designation E2692; 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 evaluates the longitudinal shear strength before and after thermal cycling for thermally broken composite thermal barriers used in framing of windows, doors, and skylights. It also evaluates the ability of a thermal barrier to maintain its longitudinal dimension after thermal cycling.

1.2 This test method is applicable to all fenestration products that are constructed with structural thermal barriers that are affixed along their length to the adjoining metal profile

1.3 This test method is meant to be applicable to many types of fenestration frame types and is not meant to be specific to any single frame construction type.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 *AAMA Standards:*[3]

AAMA 505 Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure

AAMA TIR-A8 Performance of Composite Thermal Barrier Framing Systems

3. Terminology

3.1 *Definitions:*

3.1.1 *adhesive failure, n*—when an fenestration framing member loses the bond with the thermal barrier, during the application of the load in the shear test.

3.1.2 *cohesive failure, n*—when the thermal barrier in a fenestration framing member breaks apart within the matrix of the thermal barrier itself during the application of the load in the shear test.

3.1.3 *fenestration products, n*—windows, doors, and skylights.

3.1.4 *longitudinal shear, n*—shear in a longitudinal plane, or parallel to the longitudinal axis, of the fenestration framing member.

3.1.5 *metal failure, n*—yielding of the metal prior or equal to 3mm of displacement in the thermal barrier during the application of the load in the shear test.

3.1.6 *room temperature, n*—for this test method, it shall be defined as 22 ± 3°C.

3.1.7 *thermal barrier or thermal break, n*—structure connecting inner and outer metal profiles of a fenestration framing member that consists of a thermally insulating (nonmetallic) material used for the purpose of reducing heat transfer across the assembly.

3.1.8 *thermally broken composite, n*—a fenestration framing member composed of an inner and outer metal profile connected by a thermal barrier, affixed along their long axis.

4. Summary of Test Method

4.1 This test method subjects thermally broken fenestration extrusions to shear load before and after thermal cycling.

5. Significance and Use

5.1 Thermal barriers require sufficient structural strength to carry the loads imposed on fenestration members while reducing the heat transfer through the depth of the framing members throughout their service life.

5.2 Sustained gravity, bending and tensile loads that stress the thermal barrier (that is, glazing infill weight, wind loads, and glazing gasket pressure) are not covered by this test method.

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[1] This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Performance of Windows, Doors, Skylights and Curtain Walls.

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[2] 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.

[3] Available from the American Architectural Manufacturers Association (AAMA), 1827 Walden Office Square, Suite 550, Schaumberg, IL 60173-4268, http://www.aamanet.org.

5.3 The reader is encouraged to read AAMA TIR-A8 for further information on thermal barriers and testing.

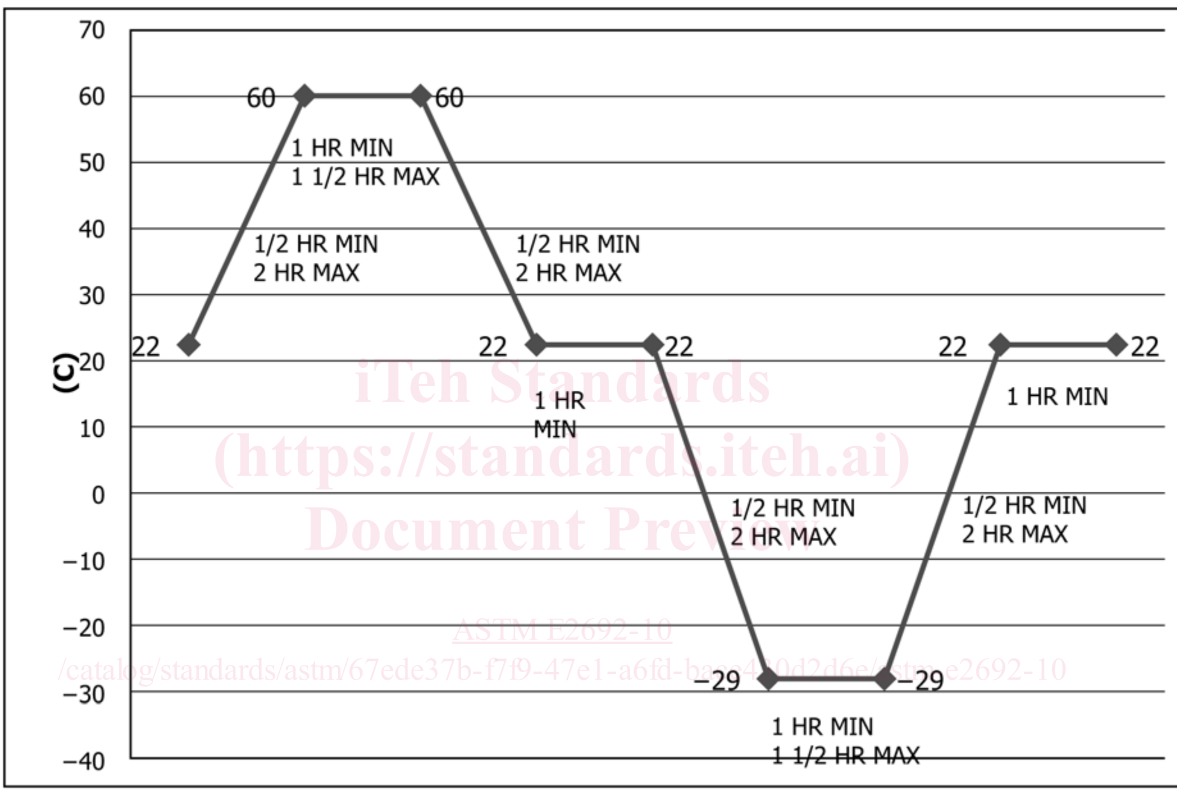
6. Apparatus

6.1 An environmental chamber shall be capable of maintaining a high temperature of 70 ± 3°C and maintaining a low temperature of –29 ± 3°C and the ability to ramp between the two temperatures at a controlled rate, within the time required on Fig. 1. The chamber shall have at least one thermocouple to monitor the interior temperature of the chamber.

6.2 A universal testing machine or similar equipment with a constant rate of crosshead movement shall be capable of exerting a measured force of up to 45 KN at a crosshead speed of 5 mm/min.

6.3 A test fixture shall be capable of holding one side of the fenestration framing member while exerting force on the opposite side of the fenestration framing member. (See Fig. 2.)

6.4 A measuring device capable of measuring 0.03 mm increments.



Raise temperature	60°C	½ h min	2 h max
Hold temperature	60°C	1 h min	1 ½ h max
Lower temperature	22°C	½ h min	2 h max
Hold temperature	22°C	1 hr min	NA
Lower temperature	–29°C	½ h min	2 h max
Hold temperature	–29°C	1 h min	1 ½ h max
Raise temperature	22°C	½ h min	2 h max
Hold temperature	22°C	1 h min	NA

FIG. 1 Thermal Cycling Schedule: One Cycle Air Temperatures