



Designation: E2189 – 19

Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units¹

This standard is issued under the fixed designation E2189; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This test method covers procedures for testing the resistance to fogging of pre-assembled permanently sealed insulating glass units or insulating glass units with capillary tubes intentionally left open or closed.

1.2 This test method is applicable only to insulating glass units that are constructed with glass or suspended film.

1.3 This test method is applicable to both double-glazed and triple-glazed insulating glass units; for triple-glazed insulating glass units where both of the outer lites are glass and the inner lite is either glass or a suspended film.

1.4 The unit construction used in this test method contains construction details that are essential components of the test. Different types of glass, different glass thicknesses, and different cavity sizes may affect the test results.

1.5 This test method is not applicable to insulating glass units containing a spandrel glass coating due to testing limitations.

1.6 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.22 on Durability Performance of Building Constructions.

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2. Referenced Documents

2.1 *ASTM Standards:*²

[C162 Terminology of Glass and Glass Products](#)

[C717 Terminology of Building Seals and Sealants](#)

[E631 Terminology of Building Constructions](#)

[E2188 Test Method for Insulating Glass Unit Performance](#)

[E2190 Specification for Insulating Glass Unit Performance and Evaluation](#)

3. Terminology

3.1 *Definition of Terms:*

3.1.1 For definitions of terms found in the standard, refer to Terminology [C717](#), Terminology [C162](#) and Terminology [E631](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cavity, n*—the space within an insulating glass unit created by the sealing system where water vapor is controlled to prevent the formation of condensation. Cavities may be air-filled or inert gas-filled.

3.2.2 *fog, n*—visible deposits present after testing in accordance with Section 8 that were not present prior to testing. Fog does not include defects in a glass coating or the glass substrate when examined prior to testing.

3.2.3 *internal components, n*—the components of an insulating glass unit that typically do not contribute to water vapor control of the cavity. Internal components may be decorative, such as false muntins, decorative glass, caming, and other decorative materials. Internal components may also be functional, such as blinds or shades.

3.2.4 *sealing system, n*—the components of an insulating glass unit that together function to create the cavity and control cavity water vapor content. Sealing system components typically include a spacer, a desiccant, and sealant(s).

4. Significance and Use

4.1 This test method is intended to provide a means for testing the resistance to fogging in insulating glass units.

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.

4.2 This test method is also intended to provide a means for testing the resistance to fogging caused by the volatility of components within the unit, including the sealing system components and internal components.

5. Test Specimens

5.1 Each test specimen shall be manufactured in accordance with Test Method E2188, Section 5.

5.2 For test specimens containing muntin bars, the specimens shall be fabricated with one vertical and one horizontal muntin bar dividing the specimens into four areas as shown in Fig. 1.

5.3 Test specimens containing other types of internal components shall contain the internal component design to be qualified. If the internal component design cannot fit in the designated specimen size, specimens shall be fabricated containing representative quantities of each component of the design to be qualified.

5.4 Viewing of the fog shall not be compromised by any internal component.

5.5 For double-glazed units, at least three specimens of identical component materials and construction shall be submitted.

5.6 For triple-glazed units, at least five specimens of identical component materials and construction shall be submitted. For these units, the manufacturer shall specify the exterior surface.

NOTE 1—Certain reflective coatings may interfere with the ability to view fog.

5.7 During all stages of storage and handling, the units shall be held in a vertical position with equal support to all panes and no compression loading.

5.8 Damaged units shall not be tested.

6. Apparatus

6.1 *Volatile Fog Test Apparatus:*

6.1.1 The dimensions and components are found in Fig. 2. The construction of the apparatus shall be capable of maintaining $50 \pm 3 \text{ }^\circ\text{C}$ ($122 \pm 5 \text{ }^\circ\text{F}$). In order to maintain this temperature, at least one circulating fan shall be mounted in the

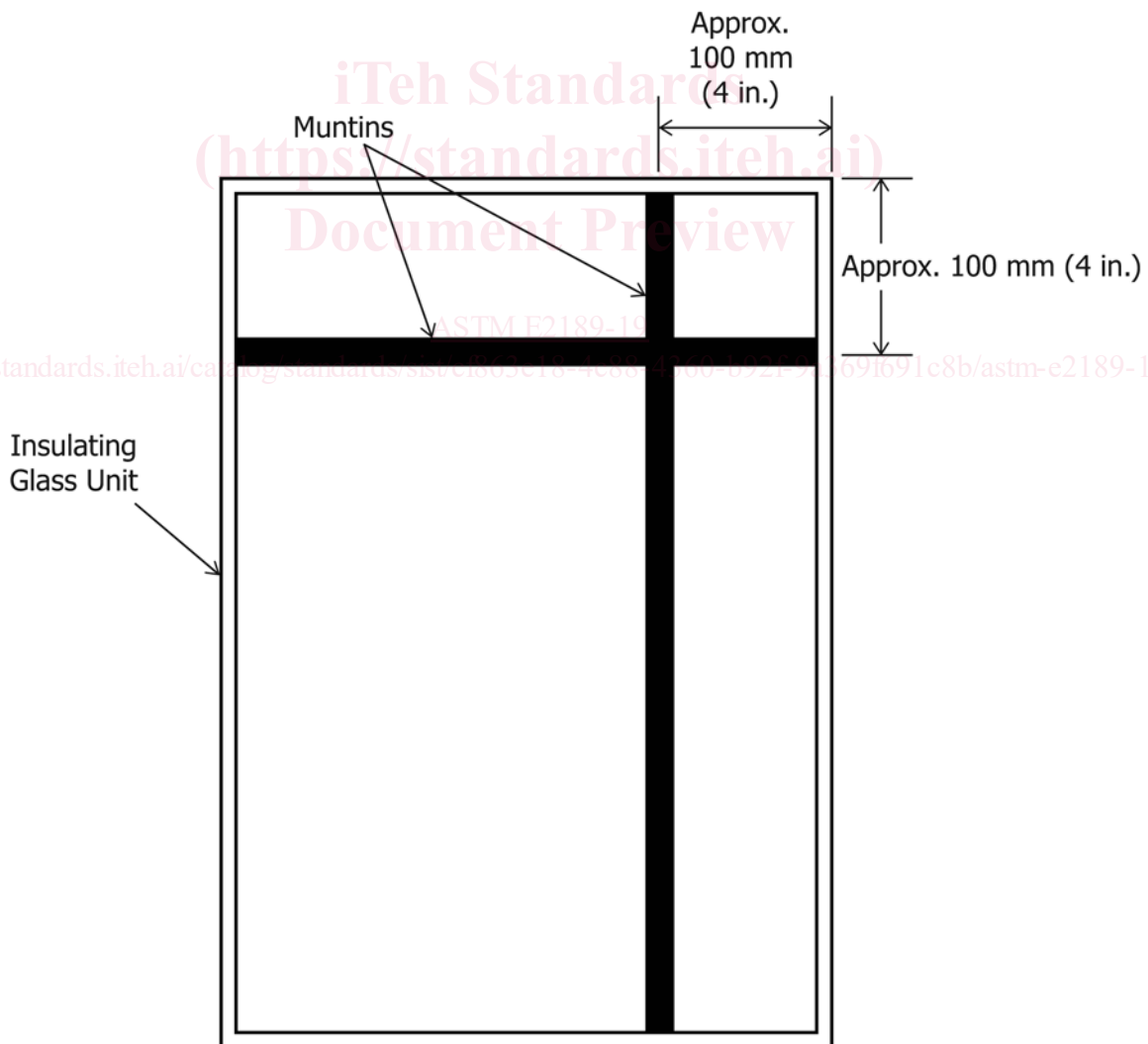


FIG. 1 Schematic Drawing of Insulating Glass Unit with Muntin Bars