



~~Designation: E2190-08~~ Designation: E2190 – 10

# Standard Specification for Insulating Glass Unit Performance and Evaluation<sup>1</sup>

This standard is issued under the fixed designation E2190; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers preassembled permanently sealed insulating glass units with one or two airspaces and preassembled insulating glass units with capillary tubes intentionally left open.

1.2 This specification is applicable only to sealed insulating glass units that are constructed with glass.

~~1.3 The qualification of test specimens is based on frost/dew point and on the absence of fog after the specified test durations.~~

~~1.4 Qualification under this specification is intended to provide a basis for evaluating the durability of sealed insulating glass units.~~

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

~~1.6 This specification does not cover other physical requirements such as appearance, thermophysical properties, heat and light transmission, and glass displacement.~~

1.3 This specification 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 inner lite is either glass or a suspended film.

1.4 The qualification of test specimens is based on frost/dew point and on the absence of fog after the specified test durations.

1.5 The qualification of argon gas filled test specimens is based on the qualifications in 1.3 and maintaining the specified argon gas amounts before and after testing to Test Method E2188.

1.6 Qualification under this specification is intended to provide a basis for evaluating the durability of sealed insulating glass units.

1.7 This specification is not applicable to sealed insulating glass units containing a spandrel glass coating due to test method limitations.

1.8 This specification does not cover other physical requirements such as appearance, thermophysical properties, heat and light transmission, and glass displacement.

NOTE 1—Sealed insulating glass units qualified according to this specification are not necessarily suitable for structurally glazed applications. Factors such as sealant longevity when exposed to long term ultraviolet light and the structural properties of the sealant must be reviewed for these applications. For more information on the requirements for structural sealant glazing applications, refer to Specification C1369, Guide C1249, and Test Method C1265.

~~1.7 The values stated in SI units are to be regarded as the standard. The inch-pound values given in parentheses are for information only and are not considered standard.~~

~~1.8~~

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

1.10 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:*<sup>2</sup>

C162 Terminology of Glass and Glass Products

C717 Terminology of Building Seals and Sealants

C1036 Specification for Flat Glass

C1249 Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications

<sup>1</sup> This specification 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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<sup>2</sup> 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.

- C1265 Test Method for Determining the Tensile Properties of an Insulating Glass Edge Seal for Structural Glazing Applications  
 C1369 Specification for Secondary Edge Sealants for Structurally Glazed Insulating Glass Units  
 E546 Test Method for Frost/Dew Point of Sealed Insulating Glass Units  
 E631 Terminology of Building Constructions  
 E2188 Test Method for Insulating Glass Unit Performance  
 E2189 ~~Test Method for Testing Resistance to Fogging in Insulating Glass Units~~ Test Method for Testing Resistance to Fogging in Insulating Glass Units  
 E2269 Test Method for Determining Argon Concentration in Sealed Insulating Glass Units using Gas Chromatography  
 E2649 Test Method for Determining Argon Concentration in Sealed Insulating Glass Units Using Spark Emission Spectroscopy

### 3. Terminology

#### 3.1 Definition of Terms:

3.1.1 For definitions of terms found in this Specification, refer to Terminologies C162, C717, and E631.

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *sealed insulating glass unit, n*—a preassembled unit, comprising lites of glass, which are sealed at the edges and separated by dehydrated space(s), intended for vision areas of buildings. The unit is normally used for windows, window walls, picture windows, sliding doors, patio doors, or other types of fenestration.

### 4. Performance Requirements

~~4.1 The six units that complete the weather cycle and high humidity phases of Test Method E2188 unbroken shall have the frost/dew point determined and reported.~~

~~4.2 Initial, intermediate (after the weather cycle phase) and final frost/dew points (after final high humidity test) shall be determined. For triple pane units, the frost/dew point is determined for all airspaces. The final frost/dew points shall be  $-40^{\circ}\text{C}$  or colder when measured in accordance with Test Method~~

~~4.1 To pass the specification for Test Method E2188:~~

~~4.1.1 Six units shall complete all testing unbroken. These units shall have frost/dew points determined and reported. The final frost/dew points shall be  $-40^{\circ}\text{C}$  or colder when measured in accordance with Test Method E546 or equivalent.~~

~~4.3 Final frost/dew points shall be determined after 24 h but no later than 7 days.~~

~~4.2 To pass the specification for Test Method E2189:~~

~~4.2.1 The units that complete Test Method E2189 shall have no fog visible after testing.~~

~~4.3 To pass the specification for argon filled units:~~

~~4.3.1 The average initial argon gas concentration of the specimens prior to testing to Test Method E2188 shall be a minimum of 90 %. No individual test specimen shall have an argon concentration of less than 50 %.~~

~~4.3.2 The average final argon gas concentration of the six specimens after testing to Test Method E2188 shall be a minimum of 80 %. No individual test specimen shall have an argon concentration of less than 50 %.~~

~~4.4 Fog—No fog shall be visible after testing in accordance with Test Method E2189.~~

### 5. Test Specimens

~~5.1 Specimen design and construction techniques shall be established by Test Method E2188.~~

~~5.1 Each test specimen shall measure  $355 \pm 6$  mm by  $505 \pm 6$  mm and shall be composed of two or three lites of glass.~~

~~5.2 The glass and airspace thickness(es) for qualification under this specification are 4 mm ( $\frac{5}{32}$  in.) glass with 12 mm ( $\frac{1}{2}$  in.) airspace or 5 mm ( $\frac{3}{16}$  in.) glass with 6 mm ( $\frac{1}{4}$  in.) airspace.~~

~~5.3 Glass or airspace thickness(es), or both, may be increased. (For example, using 6 mm glass with 12 mm airspace.) This may result in a more rigorous test. The glass and airspace thickness(es) for qualification under this specification shall be 4 mm glass with 12 mm airspace or 5 mm glass with 6 mm airspace.~~

~~5.3 For triple-glazed units, 4 mm glass with 6 mm airspaces shall be used.~~

~~5.4 For triple pane units, 4 mm ( $\frac{5}{32}$  in.) glass with 6 mm ( $\frac{1}{4}$  in.) airspaces are used. If the required glass constructions in 5.2 and 5.3 are not available from the submitting manufacturer, then thicker glass or wider airspaces, or both shall be allowed. (For example, using 6 mm glass with 12 mm airspace.) This may result in a more rigorous test.~~

~~5.5 All of the values in 5.2 and through 5.4 are nominal.~~

~~5.6.1 Tolerance of glass thickness shall be in accordance with Specification C1036.~~

~~5.7 Airspace tolerance(s) shall be  $\pm 0.8$  mm ( $\frac{1}{32}$  in.).~~

~~5.8 Twelve double-glazed units shall be submitted when testing to this specification.~~

~~5.9 Fourteen triple-glazed units shall be submitted when testing to this specification.~~

~~5.5.2 Airspace tolerance(s) shall be  $\pm 0.8$  mm.~~

~~5.6 If specifying internal components, then these components shall be present in the test specimens made for testing to Test Method E2189.~~

~~5.7 Twelve double-glazed test specimens shall be submitted when testing to this specification. If specifying internal components, three of these specimens shall contain those components and shall be designated for testing to Test Method E2189.~~