



Designation: E2395 – 06 (Reapproved 2013)

# Standard Specification for Voluntary Security Performance of Window and Door Assemblies with and without Glazing Impact<sup>1</sup>

This standard is issued under the fixed designation E2395; 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 voluntary performance requirements and methods of test for the resistance to forced entry of window and door assemblies. This specification addresses the capability of window and door assemblies to frustrate opportunistic entry by unskilled and semi-skilled intruders. This specification does not address detention facilities or window and door assemblies attacked by professional, sophisticated intruders.

1.2 These requirements are limited to window and door assemblies only as manufactured, regardless of their materials or method of manufacture. They do not include requirements for secondary or storm windows and doors, doors intended for vehicular access, or skylights. This is a laboratory test, not a field test that simulates an installed condition.

1.3 This specification provides a uniform set of guidelines based upon currently available information and research. As new information and research becomes available it will be considered.

1.4 All values are stated in SI units and are to be regarded as standard. Values given in parentheses are for information only. Certain values contained in reference documents cited and quoted herein may be stated in inch-pound units and must be converted by the user.

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:<sup>2</sup>

**E631** Terminology of Building Constructions

**E1886** Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials

**E2025** Test Method for Evaluating Fenestration Components and Assemblies for Resistance to Impact Energies

**F476** Test Methods for Security of Swinging Door Assemblies (Withdrawn 2011)<sup>3</sup>

**F588** Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact

**F842** Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact

**F1233** Test Method for Security Glazing Materials And Systems

### 2.2 AAMA Standards:<sup>4</sup>

**ANSI/AAMA/WDMA 101/I.S. 2/NAFS** Voluntary Performance Specifications for Windows, Skylights, and Glass Doors

## 3. Terminology

### 3.1 Definitions:

3.1.1 General terms used in this standard specification are defined in Terminology **E631**.

3.1.2 Terms common to this standard specification and Test Methods **F476**, **F588**, **F842** and **F1233** are defined in the respective document unless defined herein.

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

3.2.1 *door slab*—a swinging door panel, blank, or leaf.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee **E06** on Performance of Buildings and is the direct responsibility of Subcommittee **E06.51** on Performance of Windows, Doors, Skylights and Curtain Walls.

Current edition approved Oct. 1, 2013. Published December 2013. Originally approved in 2005. Last previous edition approved in 2006 as E2395 – 06. DOI: 10.1520/E2395-06R13.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from American Architectural Manufacturers Association (AAMA), 1827 Walden Office Square, Suite 550, Schaumburg, Illinois 60173-4268, <http://www.aamanet.org>.

3.2.2 *interlayer*—a layer of material acting as an adhesive between plies of glazing, which adds additional performance to the finished product. For example: impact resistance, solar control, and acoustical insulation.

3.2.3 *lite*—a term for a single pane (or piece) of glass.

#### 4. Performance Requirements

4.1 Products shall be tested to the following levels as described in **Table 1**.

#### 5. Test Specimens

##### 5.1 Window and Door Assemblies:

5.1.1 One test specimen for each product design seeking qualification shall be submitted.

5.1.2 Window and door assemblies tested for conformance to this specification shall be complete specimens representative of those produced by the manufacturer or fabricator. (ANSI/AAMA/WDMA 101/I.S. 2/NAFS contains reference sizes which may prove useful in coordinating with window and door performance requirements not included in this specification.)

5.1.3 A test specimen shall be of the largest assembly size (outside to outside) for which ratings are sought.

5.1.4 A test specimen shall contain the entire panel, door slab or sash configurations, locking devices, hardware, interlocking details, meeting rail details, and glazing for which rating is sought.

5.1.5 The same test specimen shall be used for each test sequence required by this specification.

5.1.6 Windows or doors tested with more than one locking device shall not qualify windows or doors with fewer locking devices regardless of size.

##### 5.2 Glazing Materials (for 6.5):

5.2.1 One test specimen for each glazing material type to be rated.

5.2.2 Glazing material test specimens shall be representative of those produced by the fabricator or manufacturer. The glazing shall contain identical materials and be of the same type, treatment and thickness for which qualification is sought.

5.2.3 Test specimens shall be mounted according to Section 7 of Test Method **F1233**.

5.2.4 The test specimen size shall be 600 mm (24 in.) by 600 mm (24 in.).

#### 6. Test Methods

##### 6.1 Window Assemblies Forced Entry Test:

6.1.1 Prepare the specimen as outlined in Section 9 of Test Methods **F588**.

##### 6.1.2 Hand Manipulation Test:

6.1.2.1 Lift, push, pull or otherwise manipulate by hand the sash or panel relative to the clearances within the frame, while attempting to open the sash or panel.

6.1.2.2 This test shall be conducted continuously for five minutes.

6.1.3 Perform the tests using the desired level from Section 4 of this document according to the procedure outlined in Section 10 of Test Methods **F588**.

##### 6.2 Sliding Door Assemblies Forced Entry Test:

6.2.1 Prepare the specimen as outlined in Section 9 of Test Methods **F842**.

6.2.2 Perform Hand Manipulation Test in **6.1.2**.

6.2.3 Perform the tests according to the procedure outlined in Section 10 of Test Methods **F842**.

##### 6.3 Swinging Door Assemblies Forced Entry Test:

6.3.1 Prepare and test the specimen as outlined in **Annex A1**.

##### 6.4 Assembly Glazed Area Intrusion Test:

6.4.1 Conduct a missile impact test using Test Method **E1886** with no air pressure cycling.

6.4.2 The missile shall be a 1700 ( $\pm 100$ ) g ( $3.75 \pm 0.25$  lb) two-by-four traveling at 15 m/s (50 f/s).

6.4.3 Impact the specimen twice. The exception to this second impact is if both dimensions of the glazing are less than 420 mm (17 in.), in which case there is only one impact.

6.4.3.1 The first impact shall be within a 65 mm (2.5 in.) radius circle located at the center of the glazing.

6.4.3.2 The second impact shall be within a 65 mm (2.5 in.) radius circle with the center located within 150 mm (6 in.) of a corner.

##### 6.5 Glazing Material Qualification Test:

**TABLE 1 Assembly Performance Requirements**

Product Type	Performance Level	Performance Requirements	Glazed Area Intrusion Test (Tested to 6.4)
Window Assemblies Tested to 6.1	L1	Minimum Performance Grade 10 per Annex A1 of Test Methods <b>F588</b>	No
	L2	Grade 10 per Annex A1 of Test Methods <b>F588</b>	Yes
	L3	Grade 20 per Annex A1 of Test Methods <b>F588</b>	Yes
	L4	Grade 30 per Annex A1 of Test Methods <b>F588</b>	Yes
	L5	Grade 40 per Annex A1 of Test Methods <b>F588</b>	Yes
Sliding Door Assemblies Tested to 6.2	L1	Minimum Performance Grade 10 per Annex A1 of Test Methods <b>F842</b>	No
	L2	Grade 10 per Annex A1 of Test Methods <b>F842</b>	Yes
	L3	Grade 20 per Annex A1 of Test Methods <b>F842</b>	Yes
	L4	Grade 30 per Annex A1 of Test Methods <b>F842</b>	Yes
	L5	Grade 40 per Annex A1 of Test Methods <b>F842</b>	Yes
Swinging Door Assemblies Tested to 6.3	L1	Minimum Performance Grade 10 per <b>Annex A2</b>	No
	L2	Grade 10 per <b>Annex A2</b>	Yes
	L3	Grade 20 per <b>Annex A2</b>	Yes
	L4	Grade 30 per <b>Annex A2</b>	Yes
	L5	Grade 40 per <b>Annex A2</b>	Yes

6.5.1 Perform Forced Entry Testing as outlined in Section 9.2 of Test Method **F1233** using Class I Sequence specified in Table 2.

6.5.1.1 The required ten impacts shall be entirely within a 150 mm (6 in.) radius circle having its center located 150 mm (6 in.) from an edge.

## 7. Pass/Fail Criteria

The following two sets of pass/fail criteria shall apply for this specification:

7.1 *Window Assemblies, Sliding Door Assemblies, or Swinging Door Assemblies:*

7.1.1 Any opening that is sufficient to freely pass a 75 mm (3 in.) diameter sphere with a horizontal force of 18 N (4 lb) or less constitutes a failure. These criteria will apply when the free passage of the shape is made through a hole in any portion of the test specimen.

7.2 *Glazing Materials:*

7.2.1 Failure is defined in Section 9.2.4.2 (Body Passage) of Test Method **F1233**.

## 8. Product Qualification

8.1 Products shall be qualified as passing and shall be rated when the following conditions have been met:

8.1.1 Test specimens shall be tested following the appropriate test method (Window Assemblies, Sliding Door Assemblies, or Swinging Door Assemblies) in this specification and comply with the pass/fail criteria established in 7.1.

8.1.2 Glazing materials used in products shall be tested following the Glazing Materials Test and comply with the pass/fail criteria established in 7.2.

8.2 Substitutions shall be according to the following criteria.

8.2.1 Successful tests of a window or door assembly shall qualify other assemblies with thicker or equal glazing and thicker or equal identical interlayer material of the same glass type and treatment, provided the glazing detail is unchanged.

8.2.2 Products which have been tested and rated by this specification shall qualify identical assemblies that are smaller, provided the smaller assembly's dimensions shall not exceed dimensions of the test specimen's width or height.

8.2.3 Glazing materials which contain tinting or reflective coatings are considered equivalent to the same thickness as clear materials (or vice-versa), provided the tinting or coatings are integral to the monolithic glass and are not applied films. Heat-treated glazing shall not qualify annealed glazing material.

8.2.4 Successful tests of a window or door assembly that contains single lite glazing (monolithic or laminated) shall qualify multiple lite glazing (insulating) units provided the requirements of 8.2.1 and 8.2.2 are satisfied.

8.2.5 Successful tests of a window or door assembly that contains construction to improve thermal efficiency of the

frame or sash, shall qualify other assemblies that do not contain construction to improve thermal efficiency provided the same extrusions are used and the requirements of 8.2.1 and 8.2.2 are satisfied.

8.2.6 When composite window or door assemblies, which include combinations of two or more window or door styles, are evaluated for conformance with this specification, each separate style type of the composite window unit shall be tested as though it were an individual window or door.

8.2.6.1 Manufactured assemblies successfully tested can be combined provided the structural supports and connections between assemblies have been designed for the required loads.

8.2.7 Substitution of glazing material components or manufacturers (such as sealant, laminated glass interlayer, or plastics) is not permitted.

## 9. Compliance Statement

9.1 Report the following information:

9.1.1 *Window Assemblies,*

9.1.1.1 Detailed description of the required test specimen(s) and report test results using the requirements of the Report section of Test Methods **F588**.

9.1.1.2 Detailed description of glazing materials including glass type, glass treatment, glass thickness, and component manufacturers and report indicating test results in accordance with the test requirements of 6.4 and 6.5.

9.1.1.3 State the grade level that was successfully achieved.

9.1.2 *Sliding Door Assemblies:*

9.1.2.1 Detailed description of the required test specimen(s) and report test results using the requirements of the Report section of Test Methods **F842**.

9.1.2.2 Detailed description of glazing materials including glass type, glass treatment, glass thickness and component manufacturers and report indicating test results in accordance with the test requirements of 6.4 and 6.5.

9.1.2.3 State the grade level that was successfully achieved.

9.1.3 *Swinging Door Assemblies:*

9.1.3.1 Detailed description of the required test specimen(s) and report test results using the requirements of Section 11 of Test Methods **F842**.

9.1.3.2 Detailed description of glazing materials including glass type, glass treatment, glass thickness and component manufacturers and report indicating test results in accordance with the test requirements of 6.4 and 6.5.

9.1.3.3 State the grade level that was successfully achieved.

## 10. Keywords

10.1 forced entry; glass; glazing; impact; security; security doors; security windows; sliding door assemblies; sliding doors; sliding glass door assemblies; sliding glass doors; swing doors; swinging door assemblies; swinging doors; window assemblies; windows