



# Standard Specification for Ball Drop Impact Resistance of Laminated Architectural Flat Glazing<sup>1</sup>

This standard is issued under the fixed designation F3006; 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 the destructive ball drop testing of laminated flat glass products intended for use in architectural glazing applications.

1.2 This specification is intended for use as an in-plant quality control test to evaluate the impact performance of laminated flat glass when a 2.3 kg, 83 mm diameter smooth solid steel ball is dropped from a specified height.

1.3 This specification does not yield data that is a substitute for safety glazing test requirements of ANSI Z97.1 or CPSC 16 CFR 1201. Qualification under this specification provides a basis for judgment of the ability of specimens to withstand the appropriate shot-bag impact. This specification provides a mechanism to allow fabricators a less cumbersome and lower cost method for the evaluation of impact performance that may be performed on a frequent basis while reducing the amount of waste materials generated from traditional impact tests.

1.4 This specification is applicable to symmetrical and asymmetrical annealed, heat-strengthened, chemically strengthened, fully tempered laminated architectural flat glass including but not limited to: float, patterned, sheet, sand-blasted, grooved, and fritted.

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

1.6 *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. Some specific hazards statements are given in Section 4 on Hazards.*

1.7 *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.*

<https://standards.iteh.ai/catalog/standards/sist/7f204aaa-cb47-4dde-a226-0022918b8740/astm-f3006-19>

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

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

[C1036 Specification for Flat Glass](#)

[C1048 Specification for Heat-Strengthened and Fully Tempered Flat Glass](#)

[C1172 Specification for Laminated Architectural Flat Glass](#)

[E1422C1422/C1422M Specification for Chemically Strengthened Flat Glass](#)

[E631 Terminology of Building Constructions](#)

[F3007 Test Method for Ball Drop Impact Resistance of Laminated Architectural Flat Glass](#)

### 2.2 ANSI Standards:<sup>3</sup>

[Z26.1 American National Standard for Safety Glazing Materials for Glazing Motor Vehicles and Motor Vehicle Equipment Operating on Land Highways—Safety Standard](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F12 on Security Systems and Equipment and is the direct responsibility of Subcommittee F12.10 on Systems Products and Services.

Current edition approved Aug. 1, 2013 April 15, 2019. Published August 2013 April 2019. Originally approved in 2013. Last previous edition approved in 2013 as F3006 – 13. DOI: 10.1520/F3006-13.10.1520/F3006-19.

<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> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

**Z97.1 American National Standard for Safety Glazing Materials Used in Buildings—Safety Performance Specification and Methods of Test**

**2.3 Other Standards:**

**CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials**<sup>4</sup>

**GANALD-100-06 Standard Test Method for Ball Drop Impact of Laminated Architectural Flat Glass**<sup>5</sup>

**3. Terminology**

**3.1 Definitions:**

3.1.1 For definition of terms used in this specification, refer to Terminologies **C162** and **E631**.

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

3.2.1 *asymmetrical*—a term used to describe the construction of a laminate comprised of dissimilar glass types or thicknesses, or both. An example of an asymmetrical construction is: 3 mm annealed glass – 0.76 mm PVB interlayer – 6 mm annealed glass.

3.2.2 *glass/plastic laminates*—a manufactured assembly consisting of at least one layer of glass and at least one layer of plastic glazing sheet material bonded together with an interlayer.

3.2.3 *multi-ply laminates*—a laminated glazing consisting of more than two layers of glass or plastic glazing sheet material, or both, bonded together by an interlayer between each sheet of glazing.

3.2.4 *organic-coated glass*—a manufactured assembly consisting of a sheet of glass covered on one or both surfaces with either: (1) an adhesive-applied organic film or sheeting, or (2) an applied coating.

3.2.5 *symmetrical*—a term used to describe the construction of a laminate comprised of only one glass type and thickness. An example of a symmetrical construction is: 3 mm annealed glass – 0.76 mm PVB interlayer – 3 mm annealed glass.

3.2.5.1 *Discussion*—

A color difference in the glass plies does not affect symmetry.

3.2.6 *two (2)-ply glass laminates*—a manufactured assembly consisting of two sheets of glass bonded together with an interlayer to at least one other sheet of glass.

3.2.7 *two (2)-ply plastic laminates*—a manufactured assembly consisting of two sheets of plastic bonded together with an interlayer to at least one other sheet of plastic.

**4. Hazards**

4.1 **Warning:** Test impact cited in this specification is intended to result in glass fracture. Proper glass handling safety gear should be worn at all times during specimen handling, testing, evaluation, and disposal.

**5. Classification**

5.1 Products shall be classified as indicated in **Table 1**.

**6. Test Specimens**

**6.1 Number of Test Specimens:**

6.1.1 The number of specimens required for testing is dependent upon the configuration of the glazing and are indicated in **6.2** and **6.3**.

**TABLE 1 Product Classification**

Classification	Product Name	Product Description
I	2-ply glass laminates	A manufactured assembly consisting of two sheets of glass bonded together with an interlayer to at least one other sheet of glass. Note: When broken, numerous cracks appear, but glass fragments tend to adhere to the interlayer. If the nominal glass thickness is not equal on both sides, the structure is considered asymmetrical.
II	glass/plastic laminates	A manufactured assembly consisting of one layer of glass and one layer of plastic glazing sheet material bonded together with interlayer. These structures are considered asymmetrical.
III	2-ply plastic laminates	A manufactured assembly consisting of two sheets of plastic bonded together with an interlayer to at least one other sheet of plastic. If the nominal plastic thickness is not equal on both sides, the structure is considered asymmetrical.
IV	multi-ply laminates	A laminated glazing consisting of more than two layers of glass or plastic glazing sheet material, or both, bonded together by interlayers. These structures are considered asymmetrical.
V	organic-coated glass	A manufactured assembly consisting of a sheet of glass covered on one or both surfaces with either: (1) an adhesive-applied organic film or sheeting, or (2) an applied coating. When broken, numerous cracks appear, but the glass fragments tend to adhere to the applied organic material.

<sup>4</sup> Available from U.S. Consumer Product Safety Commission (CPSC), 4330 East West Hwy., Bethesda, MD 20814, <http://www.cpsc.gov>.

<sup>5</sup> Available from Glass Association of North America (GANALD), Laminating Division, 2945 SW Wanamaker Dr., Suite A, Topeka, KS 66614-5321, <http://www.glasswebsite.com>.