



Designation: D 4099 – 95

An American National Standard

Standard Specification for Poly(Vinyl Chloride) (PVC) Prime Windows/Sliding Glass Doors^{1,2}

This standard is issued under the fixed designation D 4099; 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 specification establishes the requirements for material properties and performance characteristics for prime windows and sliding glass doors manufactured of rigid poly(vinyl chloride) (PVC). Windows and doors included in this specification shall be complete assemblies (systems) containing all necessary hardware, anchors, and miscellaneous equipment as specified herein.

1.2 This specification includes common types of PVC window and door types presently in production. No inference is to be drawn as to the acceptability of other window and door types not listed.

1.3 Although this specification establishes performance criteria, there is no intent to imply acceptable use of PVC windows and doors in a particular building. The specifying agency shall establish all requirements for a particular application and determine suitability of the product for its anticipated use.

1.4 This specification is limited to prime windows and doors and does not include secondary windows, storm windows or storm doors.

NOTE 1—There are no ISO standards covering the primary subject matter of this specification.

1.5 This specification allows the use of recycled material, providing that all requirements of Specification D 4726^{D 4726} are met.

1.6 The values stated in inch-pound units are to be regarded as the standard.

1.7 The following precautionary caveat pertains only to the test method portion, Section 11, of this specification: *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.*

¹ This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.24 on Plastic Building Products.

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² Sections 1, 8.1.1, 8.3, 9.1.1, 11.2, 15 and Table 1 revised to clarify content, to rationalize with AAMA 101 standard, to upgrade technical requirements and accommodate recycled materials.

2. Referenced Documents

2.1 ASTM Standards:

- A 165 Specification for Electrodeposited Coatings of Cadmium on Steel³
- B 456 Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium⁴
- B 633 Specification for Electrodeposited Coatings of Zinc on Iron and Steel⁴
- C 1036 Specification for Flat Glass⁵
- C 1048 Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass⁵
- D 883 Terminology Relating to Plastics⁶
- D 1600 Terminology for Abbreviated Terms Relating to Plastics⁶
- D 1898 Practice for Sampling of Plastics⁷
- D 3656 Specification for Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Fiber Yarn⁸
- D 3892 Practice for Packaging/Packing of Plastics⁹
- D 4028 Specification for Solar Screening Woven from Vinyl-Coated Fiber Glass Yarn⁸
- D 4726 Specification for White Rigid Poly(Vinyl Chloride) (PVC) Exterior Profile Extrusions Used for Assembled Windows and Doors¹⁰
- E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen¹¹
- E 330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference¹¹
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference¹¹

³ Discontinued; see 1987 Annual Book of ASTM Standards, Vol 02.05.

⁴ Annual Book of ASTM Standards, Vol 02.05.

⁵ Annual Book of ASTM Standards, Vol 15.02.

⁶ Annual Book of ASTM Standards, Vol 08.01.

⁷ Annual Book of ASTM Standards, Vol 08.02.

⁸ Annual Book of ASTM Standards, Vol 07.02.

⁹ Annual Book of ASTM Standards, Vol 08.03.

¹⁰ Annual Book of ASTM Standards, Vol 08.04.

¹¹ Annual Book of ASTM Standards, Vol 04.07.

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)¹²

E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential¹¹

E 621 Practice for Use of Metric (SI) Units in Building Design and Construction¹¹

E 631 Terminology of Building Construction¹¹

E 774 Specification for Sealed Insulating Glass Units¹¹

E 987 Test Methods for Deglazing Force of Fenestration Products¹¹

2.2 *Consumer Product Safety Commission Standard:*
CPSC 16 CRF 1201—Safety Standard for Architectural Glazing Materials¹³

2.3 *Federal Specification:*

FS-RR-W-365 Federal Specification—Wire Fabric (Insect Screening)¹⁴

2.4 *Other Standards:*

SMA-SMT-31 Testing Procedures and Equipment Bulletin for Attachment of Screening to Frame¹⁵

ANSI Z97.1 Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings¹⁶

ANSI/SMA 1004 Specification for Aluminum Roll-Formed Tubular Shaped Screens¹⁶

3. Terminology

3.1 *General*—Definitions are in accordance with Terminologies D 883 and E 631D 883E 631 and abbreviations with Terminology D 1600D 1600 unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *bite*—the distance which the surrounding member overlaps the vision area in the window or door to be tested, as submitted for test.

3.2.2 *compatible with rigid poly(vinyl chloride) (PVC)*—a high degree of certainty that in service sustained physical contact will not result in discoloration, degradation, softening, cracking, or brittleness of the rigid poly(vinyl chloride) (PVC) matrix.

3.2.3 *degazing*—the disengagement of a window vision area from its surrounding member. As tested herein, it is denoted as the percentage of the as-produced window “bite.”

3.2.4 *prime window (door)*—the original window (door) to which a storm window (door) or multi-glazing is added to provide greater thermal resistance.

4. Metrication

4.1 Metrication (SI) is in accordance with Method E 380E 380, as specified for building design and construction in Practice E 621E 621.

NOTE 2—Due to traditional construction industry use of special sizes and modules, inch-pound units cannot be translated directly into SI units. Practice E 621E 621 provides preferred modules and sizes in SI units for use when metric building design and construction is required.

5. Classification

5.1 The window units will be subdivided by grades based on design pressure:

5.1.1 *Grade 15*—15 lbf/ft² (0.72 kPa) design pressure.

5.1.2 *Grade 20*—20 lbf/ft² (0.96 kPa) design pressure.

5.1.3 *Grade 25*—25 lbf/ft² (1.20 kPa) design pressure.

5.1.4 *Grade 30*—30 lbf/ft² (1.44 kPa) design pressure.

5.1.5 *Grade 35*—35 lbf/ft² (1.68 kPa) design pressure.

5.1.6 *Grade 40*—40 lbf/ft² (1.92 kPa) design pressure.

5.1.7 *Grade 45*—45 lbf/ft² (2.15 kPa) design pressure.

5.1.8 *Grade 50*—50 lbf/ft² (2.39 kPa) design pressure.

5.1.9 *Grade 55*—55 lbf/ft² (2.63 kPa) design pressure.

5.1.10 *Grade 60*—60 lbf/ft² (2.87 kPa) design pressure.

5.1.11 *Grade 65*—65 lbf/ft² (3.11 kPa) design pressure.

6. Materials and Manufacture Requirements

6.1 *Sampling*—Sampling for inspection and testing shall be carried out in accordance with Practice D 1898D 1898.

6.2 All rigid poly(vinyl chloride) (PVC) extrusions or moldings used in construction of the window or door (system assembly) shall conform to the requirements of Specification D 4726D 4726.

6.3 Wall thickness of functional segments of rigid poly(vinyl chloride) (PVC) extrusions used in construction of the window or door assembly shall be as agreed upon between the purchaser and seller with a wall thickness tolerance of ± 0.008 in. (0.2 mm) for wall thicknesses less than 0.080 in. (2.0 mm), and $\pm 10\%$ for wall thicknesses over 0.080 in. (2.0 mm).

6.4 Secondary members, such as friction shoes, filler tracks, weather-stripping, guides, etc., shall be made of a suitable material compatible with rigid PVC.

6.5 *Fasteners*—Screws, nuts, washers, bolts, rivets, and other miscellaneous devices incorporated in the product shall be of stainless steel, aluminum, or other corrosion-resistant materials compatible with rigid poly(vinyl chloride) (PVC) and of sufficient quality to perform the specific functions for which they are used. Steel may be used provided it is cadmium plated in accordance with Specification A 165A 165, type OS, zinc plated in accordance with Specification B 633B 633, SC-2, or nickel and chrome plated in accordance with Specification B 456B 456, type SC-2.

6.6 *Hardware*—Component parts that are visible shall be of stainless steel, aluminum, or other corrosion-resistant materials compatible with rigid poly(vinyl chloride) (PVC) and of sufficient quality to perform the specific functions for which they are used. Steel may be used provided it is cadmium plated in accordance with Specification A 165A 165, type OS, zinc plated in accordance with Specification B 633B 633, SC-2, or nickel and chrome plated in accordance with Specification B 456B 456, type SC-2.

6.7 *Weatherstrip*—Weatherstrip, if used, shall be made of any suitable material compatible with rigid PVC. The weatherstrip may be installed in the window or door frame, window or door sash, or both, to effectively enable the window or door

¹² Annual Book of ASTM Standards, Vol 14.02.

¹³ Available from Consumer Product Safety Commission, Washington, DC 20207.

¹⁴ Available from Standardization Documents Order Desk Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

¹⁵ Available from Screen Manufacturers Assn., 410 N. Michigan Ave., Chicago, IL 60611.

¹⁶ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.