Designation: D5206 – 13

An American National Standard

Standard Test Method for Windload Resistance of Rigid Plastic Siding[1]

This standard is issued under the fixed designation D5206; 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 test method describes methods for testing and evaluating windload resistance of rigid plastic siding when fastened in accordance with Practice D4756.

1.2 The proper use of this test method requires a knowledge of the principles of pressure measurement.

1.3 This test method describes the apparatus and the procedures to be used to determine an average maximum sustained static test pressure, or ultimate test pressure values, or both, with static pressure applied uniformly to a specimen.

NOTE 1—There is no known ISO equivalent to this test method.

1.4 The values expressed in inch-pound units are to be regarded as the standard. The SI equivalents in parentheses are for information only.

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.* For specific precautionary statements, see Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

D3679 Specification for Rigid Poly(Vinyl Chloride) (PVC) Siding

D4756 Practice for Installation of Rigid Poly(Vinyl Chloride) (PVC) Siding and Soffit

E631 Terminology of Building Constructions

3. Terminology

3.1 *General*—Definitions are in accordance with Terminologies D883 and E631 and abbreviations are in accordance with Terminology D1600 unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *maximum sustained static test pressure*—the greatest difference in static air pressure (negative or positive) that a test specimen withstands without failure, expressed as force per square foot (or pascals).

3.2.2 *nail hem thickness*—the average thickness of the nail hem as measured between the nail slots.

3.2.3 *specimen*—the entire assembled siding panel as described in Section 8.

3.2.4 *static test pressure*—the specific difference in static air pressure (positive or negative) for which the specimen is to be tested expressed as force per square foot (or pascals).

3.2.5 *ultimate test pressure*—the difference in static air pressure (positive or negative) at which failure occurs expressed as force per square foot (or pascals).

4. Summary of Test Method

4.1 This method can be used to determine either the maximum sustained static test pressure or the ultimate pressure, or both, for the siding specimen. The procedure consists of sealing the test specimen with or against one face of a test chamber, supplying air to or exhausting air from the chamber at a rate required to maintain a specific static air pressure across the specimen for a specific time period. Pressure is applied in increments and the sample observed for failure at each stage, to determine the maximum sustained static test pressure, the ultimate test pressure, or both.

5. Significance and Use

5.1 This test method is a standard procedure for determining windload resistance of rigid plastic siding under specified uniform static pressure difference. This typically is intended to represent the effects of wind loads on exterior building surfaces. The actual loading on building surfaces is quite complex, varying with wind direction, time, height above ground, building shape, terrain, surrounding structures, and other factors.

[1] This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.24 on Plastic Building Products.

Current edition approved Jan. 1, 2013. Published January 2013. Originally approved in 1991. Last previous edition approved in 2006 as D5602 – 06a. DOI: 10.1520/D5206-13.

[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.

5.2 Design wind pressure is selected for specific geographical locations from wind velocity maps prepared by the National Weather Service or other sources. Refer to Annex A1 of Specification D3679 for additional detailed information relating to use of this test method for evaluation of rigid poly(vinyl chloride) (PVC) siding.

NOTE 2—In applying the results of this test method, note that the performance of rigid PVC siding is a function of installation, and the specimen may or may not truly represent the actual application. In service, performance will also depend on the rigidity of supporting construction, and on the resistance of other components to deterioration by various causes, to thermal expansion and contraction, etc.

6. Apparatus

6.1 The description of apparatus is general in nature; any equipment capable of performing the test procedure within the allowable tolerances is permitted.

6.2 *Major Components (See Fig. 1):*

6.2.1 *Test Chamber*—A test chamber or box with an opening, a removable mounting panel, or one open side in which or against which the specimen is installed. Either the positive test chamber configuration or the negative test chamber configuration shall be used to perform this test. (See Fig. 1.) At least one static pressure tap shall be provided to measure the chamber pressure and shall be so located that the reading is unaffected by the velocity of the air supply to or from the chamber or any other air movement. The air supply opening into the chamber shall be arranged so that the air does not impinge directly on the test specimen with any significant velocity. A means of access into the chamber to facilitate adjustments, observations, and measurements after the specimen has been installed is permitted.

NOTE 3—The test chamber or the specimen mounting frame, or both, must not deflect under the test load in such a manner that the performance of the specimen will be affected.

6.2.2 *Air System*—A controllable blower, a compressed air supply, an exhaust system, or reversible controllable blower designed to provide the required maximum air pressure difference across the specimen. The system shall provide an essentially constant air pressure difference for the required test period.

6.2.3 *Pressure Measuring Apparatus*—A device to measure the test pressure difference within a tolerance of ±2 %.

7. Safety Precautions

7.1 Take proper precautions to protect the observers in the event of any failure. At the pressures used in this test method, considerable energy and hazard are involved. In cases of failure, the hazard to personnel is less with a negative pressure configuration, as the specimen will tend to blow into the test chamber rather than out. Do not permit personnel in such chambers during tests and lockout chambers during tests.

8. Test Specimens

8.1 *Sampling*—Siding samples for test specimens shall be selected at random from production stock.

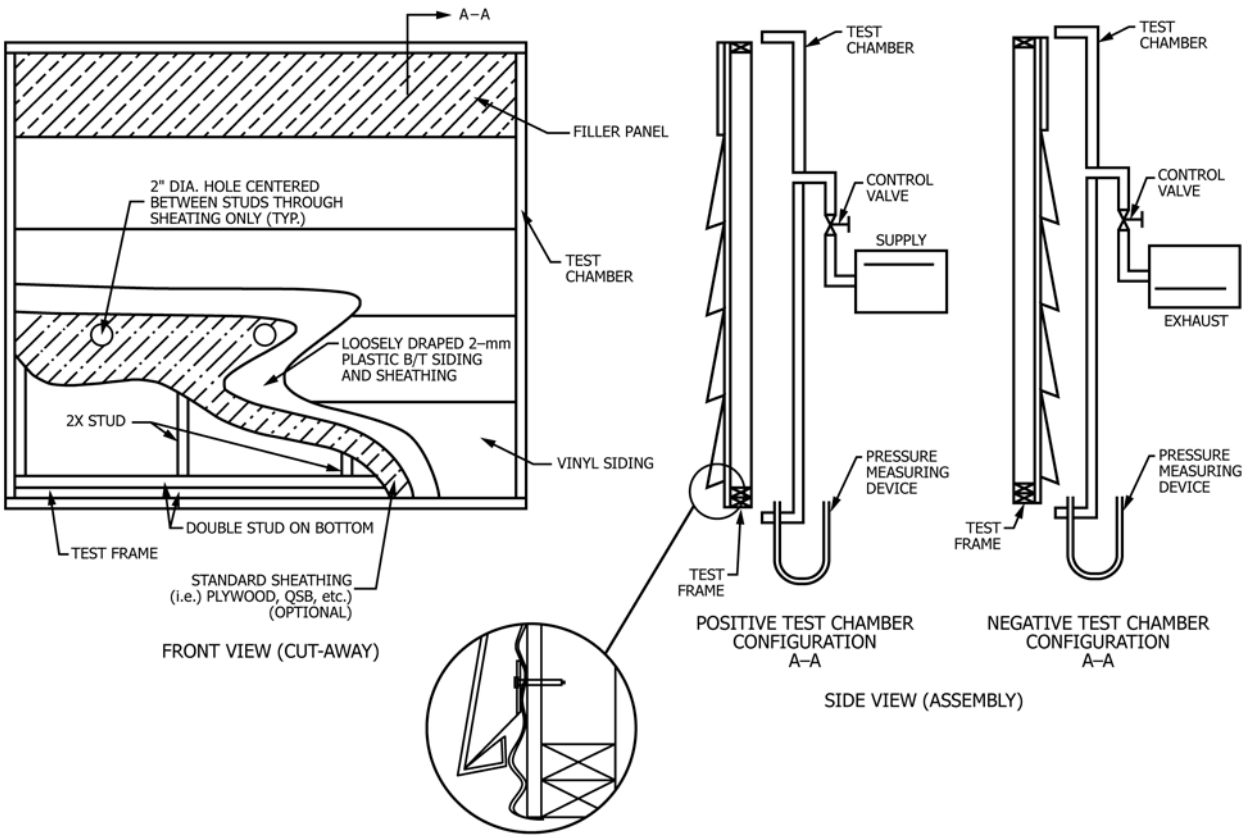

FIG. 1 Test Chamber

8.2 Prepare a test specimen frame to simulate construction methods that will be expected in the field. The frame shall be sized to accommodate a minimum of three stud spaces wide and a minimum of four siding panels high. Measure the nail hem thickness at a minimum of 5 locations along the nail hem prior to mounting the panel.

8.2.1 Stud spacing shall have either 16 or 24-in. (406 or 609 mm) centers in accordance with the manufacturer's fastening instructions.

8.2.2 The overall height of the test specimen frame shall be adjusted for siding panels of varying height to keep the distance between the frame and the siding at the top and bottom to a minimum and yet provide clearance between siding and frame. (See Fig. 1.)

8.3 Apply 2-mil (0.0508 mm) maximum thickness plastic film between the siding and the studs or sheathing and seal it to the perimeter of the test frame. If sheathing is applied to the exterior of the studs, 2-in. (50.8 mm) minimum diameter holes centered horizontally and vertically between studs shall be cut through the sheathing to allow pressure application to the plastic film.

8.3.1 Film application must permit full pressure load transfer to the siding test specimen and must not prevent movement or failure of the specimen. Apply film loosely with extra folds of material at each corner and at all offsets and recesses. When load is applied, there shall be no fillet caused by tightness of the plastic film.

8.4 Apply a starter strip and at least four siding panels to the test specimen frame as specified in the section on application of horizontal siding in Practice D4756 (9.1).

8.5 In cases where siding is not designed or configured for use as horizontal panels, the test structure shall be modified to provide a test exposure similar to that described in 8.2 and 8.4, with the siding installed in accordance with the manufacturers instructions.

8.6 Prepare six identical test specimens under uniform preparation conditions by experienced personnel so as to provide adequate specimens for retests or determination of ultimate test pressure (when required) in addition to static test pressure.

9. Procedure

9.1 Position a test specimen frame vertically or horizontally over the opening in the test chamber (box) so as to subject the entire test specimen to the pressure load. The orientation of the siding face will depend upon whether a positive or negative chamber configuration is used. The test configuration shall create a load on the siding in the direction that would tend to pull the siding off the wall.

9.2 Install a filler panel in the test chamber of box opening not covered by the specimen frame.

9.3 Seal all seams in the equipment and test chamber which could permit pressure leakage during the test.

9.4 Failure of siding specimen has occurred when any of the following criteria are present:

9.4.1 Siding nail tab is torn or disengaged from fastener.

9.4.2 Permanent buckling of siding.

9.4.3 Fastener withdrawal from frame.

9.4.4 Permanent disengagement of locks.

9.5 *Procedure*—This procedure determines the maximum sustained static test pressure, the ultimate test pressure for failure, or both, for the siding.

9.5.1 Check the specimen for proper adjustment and lockout the chamber if human entry is possible.

9.5.2 Apply a preload of 5 lbf/ft^2 (239.4 Pa) to the test specimen and hold for 30 s. Release pressure difference across the specimen, and allow a 1-min recovery period.

9.5.3 Apply a pressure difference across the specimen in increments of 5 lbf/ft^2 (239.4 Pa), holding for 30 s before increasing the next 5 lbf/ft^2 (239.4 Pa). Continue test until failure occurs. Record the pressure at failure, which is the ultimate pressure, as well as the mode of failure. Record the highest pressure that was sustained for 30 s without failure, which is the maximum sustained static test pressure.

9.5.4 Test two additional specimens for failure pressure difference as detailed in 9.5.1 to 9.5.3. For each sample, record the pressure at failure, which is the ultimate test pressure, and the failure mode. Record the highest pressure that was sustained for 30 s without failure, which is the maximum sustained static test pressure.

9.5.5 Average the pressure at failure for each of the three specimens and report this value as the average ultimate test pressure of the siding product. Average the highest pressure that was sustained for 30 s without failure for each of the three specimens and report this value as the average maximum sustained static test pressure.

9.5.6 For the test results to be considered valid, the ultimate test pressure and the maximum sustained static test pressure for each of the three specimens must fall within the following required range:

(1) For average test pressure less than 33.33 lbf/ft^2, the result for each of the three specimens is not greater than 5 psf above or below the average of the three specimens.

(2) For average test pressure greater than or equal to 33.33 lbf/ft^2 (1596 Pa), the result for each of the three specimens is not greater than 15 percent above or below the average of the three pressures.

9.5.6.1 If the result for any of the three specimens falls outside the required range, a test with a fourth specimen is to be conducted. The average of all four tests is reported.

10. Report

10.1 Report the following information:

10.1.1 Date of the test and the report.

10.1.2 Identification of the siding (manufacturer, trademark, or code, lot number, source of supply, dimensions, model type, material) and other related information.

10.1.3 Specific details of test parameters including siding nominal and measured thickness, siding style, fasteners used, number of siding spans used, stud spacing, nail slot edge distance, average nail hem thickness, type and thickness of sheathing material, and other pertinent information. If a double nail hem is used, the thickness of both nail hem walls shall be

reported. Any deviation from the test procedure in Sections 8 and 9 shall be reported.

10.1.4 Detailed drawings of the test specimen, showing dimensioned section profiles and any other pertinent details. Any deviation from the drawings or any modifications made to the specimen to obtain the reported values shall be noted on the drawing and in the report.

10.1.5 Any deviation from the manufacturer's installation instructions or any modifications made to the test specimen to obtain the reported values shall be noted on the installation instructions and the test report.

10.1.6 A record of visual observations made during the application of pressure and during the examination for failure criteria.

10.1.7 A tabulation of test pressure difference applied to each specimen, specimen orientation, duration of pressure application, and failure mode for each test performed.

10.1.8 As appropriate, the ultimate test pressure, the average maximum sustained static test pressure, or both.

10.1.9 A statement that the tests were conducted in accordance with this test method, or a full description of any deviations from this test method.

10.1.10 Author of the report.

10.1.11 Testing agency which conducted the tests and requester of tests, including addresses.

10.1.12 Ambient conditions including temperature, before and during tests.

10.1.13 Signatures of persons responsible for supervision of the tests and a list of official observers.

10.1.14 Append to the report any data not required herein, but useful to a better understanding of the test results, conclusions, or recommendations.

11. Precision and Bias

11.1 *Precision*—Due to the subjective nature of the tests (pass/fail mode), the many variable styles of siding under test, the variable installation practice depending on the manufacturer's instructions, the variable sheathing or stud backing to which the siding is installed, and the variable modes of failure, the precision of this test method has not been measured.

11.2 *Bias*—It is not possible to measure bias in this test method since there is no reference value.

12. Keywords

12.1 PVC siding; plastic siding; siding failure modes; test methods; windload resistance