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An American National Standard

Standard Specification for Polypropylene (PP) Siding[1]

This standard is issued under the fixed designation D7254; 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 requirements and test methods for materials, impact strength, appearance, surface flame spread, and wind load resistance of siding products manufactured from polypropylene material. Methods of indicating compliance with this specification are also provided.

1.2 The use of polypropylene recycled plastic in this product shall be in accordance with the requirements in Section 4.

1.3 Siding produced to this specification shall be installed in accordance with manufacturer's installation instructions for the specific product to be installed.

NOTE 1—Information with regard to siding maintenance shall be obtained from the manufacturer.

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

1.5 The following precautionary caveat pertains to the test method portion only, Section 6 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.*

NOTE 2—There is no known ISO equivalent to this standard.

1.6 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D883 Terminology Relating to Plastics

D1435 Practice for Outdoor Weathering of Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

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

D3892 Practice for Packaging/Packing of Plastics

D4101 Specification for Polypropylene Injection and Extrusion Materials

D4226 Test Methods for Impact Resistance of Rigid Poly-(Vinyl Chloride) (PVC) Building Products

D5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics (Withdrawn 2007)[3]

D5206 Test Method for Windload Resistance of Rigid Plastic Siding

E84 Test Method for Surface Burning Characteristics of Building Materials

E631 Terminology of Building Constructions

G147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests

2.2 *ASCE Standard:*[4]

ASCE 7-10 Minimum Design Loads for Buildings and Other Structures

2.3 *International Code Council:*[5]

International Building Code

International Residential Code

2.4 *Vinyl Siding Institute, Inc.*[6]

VSI Vinyl Siding Installation Manual (2015)

2.5 *Structural Building Components Association:*[7]

ANSI/SBCA FS 100-2012 Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies

3. Terminology

3.1 Definitions are in accordance with Terminologies D883, D1600, and E631, unless otherwise specified.

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

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[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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191.

[5] Available from International Code Council (ICC), 500 New Jersey Ave., NW, 6th Floor, Washington, DC 20001, http://www.iccsafe.org.

[6] National Housing Center, 1201 15th Street NW, Suite 220, Washington, DC 20005, http://www.vinylsiding.org

[7] 6300 Enterprise Lane, Madison, WI 53719, http://www.sbcindustry.com

*A Summary of Changes section appears at the end of this standard

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *polypropylene siding*—a shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases may contain fillers and/or reinforcements, that is used to clad exterior walls of buildings.

3.2.2 *self-supporting specimen*—a specimen that remains in place by its own structural characteristics both before and during the fire test.

3.2.3 *wind load design pressure rating*—the maximum wind pressure that a polypropylene siding product is rated to withstand, based on testing under Test Method D5206.

3.2.4 *standard wind load design pressure rating*—the wind load design pressure rating for a siding product when installed 1) over a sheathing material designed and attached such that it is capable of resisting 100% of positive and negative wind pressures occurring under design conditions at the building location; and 2) with the standard fastening method specified in building codes, general installation instructions, and the siding manufacturer's instructions.

3.2.5 *alternative wind load design pressure rating*—the wind load design pressure rating for a siding product when installed over a sheathing not designed and attached such that it is capable of resisting 100 % of positive and negative wind pressures occurring under design conditions at the building location, or when the siding is not fastened in the standard way; as specified by the manufacturer

3.2.5.1 *Discussion*—The standard test conditions, configuration, and fastening method used in this Specification are specified in 6.4, while alternative sheathing and installation conditions are specified by the manufacturer and must be reflected in the product's installation instructions. Alternative ratings apply only when the specified sheathing and fastening conditions are used. See Annex A1 for information on differences between the standard wind load design pressure rating and alternative wind load design pressure ratings, and how to determine standard and alternative design pressure ratings.

3.2.6 *temperate northern climate—in weather testing*, a North American metropolitan area testing site located within 73 to 100° W longitude and 37 to 45° N latitude.

4. Materials and Manufacture

4.1 The siding shall be made principally of polypropylene compound, prepared from polypropylene homopolymer or copolymer.

4.2 Where polypropylene recycled plastic as defined in Guide D5033 is used, the siding containing the polypropylene recycled plastic shall meet all the requirements in the sections on Terminology (Section 3), on Materials and Manufacture (Section 4), and on Physical Requirements (Section 5).

4.3 The polypropylene compound shall be compounded so as to provide the heat stability and weather exposure stability required for the siding market application.

5. Physical Requirements

5.1 *Color*—The color of the siding shall be within the defined color parameters for the specific color agreed upon between the purchaser and the seller.

5.2 *Impact Resistance*—Siding shall have a minimum impact strength of 35 in.-lbf when tested in accordance with 6.2.

5.3 *Weathering*—The siding shall be free of any visual surface or structural changes such as peeling, chipping, cracking, flaking, or pitting when tested in accordance with 6.3.

5.4 *Wind Load Resistance*—The siding shall withstand a minimum static test pressure and a standard wind load design pressure rating shall be determined.

5.4.1 *Minimum Test Pressure*—The siding panel(s) shall be able to withstand a minimum static test pressure of 16.2 lbf/ft^2 (776 Pa) when tested in accordance with 6.4. The average maximum sustained static pressure determined in 6.4 shall be equal to or greater than this value.

NOTE 3—The static pressure of 16.2 lbf/ft^2 (776 Pa) was established to withstand structural loading conditions that occur in wind exposures of approximately 110 mph (177 km/h) (V_{ASD}) for mean roof heights of 30 ft (9.1 m) and less in exposure category B, and corresponds to 30.0 lbf/ft^2 (1436 Pa) design pressure, to match the default wind design conditions of Table R703.3(1) in the 2015 International Residential Code.

NOTE 4—Refer to Annex A1 for an explanation as to how the negative design pressure was established, and for applications where the effective negative design pressure as specified in ASCE 7-10 is different from 30.0 lbf/ft^2 (1436 Pa) (for example, wind-zone areas greater than about 110 mph (177 km/h) (V_{ASD}) (225 km/h (V_{ULT})) or mean roof height above 30 ft (9.1 m), or exposures other than exposure category B).

5.4.1.1 The design-pressure values can be negative (suction loads) or positive. The negative values are the largest in magnitude and are the values used for this specification.

5.4.2 *Standard Wind Load Design Pressure Rating*—The standard wind load design pressure rating shall be determined from the results of testing in accordance with 6.4, using the procedures described in Annex A1, section A1.3.

NOTE 5—The standard design pressure rating is valid for applications where the siding is installed over sheathing and its fastening that are capable of independently resisting both positive and negative wind pressures occurring under design conditions at the building location. For applications over other sheathing, a different design pressure rating is applicable, and is determined in accordance with Annex A1, section A1.3. Determination of a rating other than the standard design pressure rating is not required by this section.

5.4.3 *Alternative Design Pressure Ratings*—Design pressure ratings other than the standard wind load design pressure rating, for use with different sheathing materials or using different installation or fastening, are permitted to be determined in accordance with testing under 6.4, using the procedures in Annex A1.

5.5 *Surface Flame Spread*—The siding shall exhibit a flame spread index not exceeding 200 when tested in accordance with 6.5.

6. Test Methods

6.1 *General*—The inspection and test procedures contained in this section are used to determine the conformance of products to the requirements of this specification.

NOTE 6—Each producer who represents its products as conforming to this specification typically uses statistically based sampling plans that are appropriate for each manufacturing process to verify ongoing compliance. Specifications for quality control programs are beyond the scope of this standard specification. Additional sampling and testing of the product, as agreed upon between the purchaser and the manufacturer, are not

precluded by this section.

6.2 *Impact Resistance:*

6.2.1 *Conditioning and Test Conditions*—Condition the test specimen in accordance with Specification D4101 and test under those conditions unless otherwise specified herein. Conditioning time for tests shall be at least 4 hours.

6.2.2 *Impact Test*—Test impact resistance of siding in accordance with Test Method D4226, Procedure A, impactor head configuration H.25. Increments of 4 in.-lb (for example, 0.5 in. height increments with an 8 lb falling weight) shall be used. Minimum sample dimensions shall be 1.5 by 1.5 inch. Samples shall be tested with the normally exposed surface facing up.

6.3 *Weatherability*—Expose test specimens with a plywood backing at an angle of 45° South in the northern hemisphere in accordance with Practices D1435 and G147 for two years in at least three widely different climatic areas. Test sites shall be located in a hot, dry climate, such as Phoenix, AZ; a hot, humid climate such as Miami, FL; and a temperate, northern climate such as Cleveland, OH or Louisville, KY.

6.3.1 Specimens shall be a minimum of 2 by 3¾ in. (51 by 95 mm).

6.3.2 Samples shall be representative of the product to be evaluated. Samples shall be taken either from commercial products or from laboratory samples. Laboratory samples shall be produced in the same manner as the commercial products to be evaluated.

NOTE 7—Production of laboratory samples in the same manner includes use of the same method of forming the product. For example, if the commercial product is extruded, the laboratory specimen shall be extruded; if the commercial product is injection molded, the laboratory specimen shall be injection molded, and so forth.

6.4 *Wind Load Resistance*—Conduct the test on wind load resistance of the finished siding in accordance with Test Method D5206. The average maximum sustained static test pressure determined from this testing is used in 5.4. For purposes of determining compliance with the minimum test pressure and standard design pressure requirements in 5.4, the test structure shall be constructed with vertical studs 16 inches on center, the siding in the test installation shall be installed over wood sheathing with a nominal thickness of 7⁄16 to ½ in., and fastened as follows:

6.4.1 *Fastener Type*—Roofing nail, smooth shank. Unless greater dimensions are specified in the manufacturer's instructions, 0.120 in. (⅛ in. nominal; 3.2 mm) shank diameter, 5⁄16 in. (7.9 mm) head diameter, length as necessary to penetrate the thickness of the sheathing plus ¼ in. (6.4 mm).

6.4.2 *Fastener Spacing*—As specified by the manufacturer's installation instructions.

6.4.3 Fasteners shall not be driven tightly against the siding. Allow approximately 1⁄32 in. (0.8 mm) clearance between the fastener head and siding surface.

NOTE 8—The installation details described 6.4 conform to the minimum requirements of the 2015 International Residential Code and polypropylene-specific provisions of the VSI Vinyl Siding Installation Manual. For installation methods that are inherently stronger than the minimum requirements (such as closer fastener spacing, longer or thicker fasteners, or greater penetration), no additional testing should be necessary, and the standard design pressure rating would apply to such installations. If the manufacturer desires a higher design pressure rating using inherently stronger installation, or for installations that are inherently less strong (such as greater fastener spacing or smaller fasteners), additional testing is needed. See 5.4.3.

6.5 *Surface Flame Spread*—Conduct the test on surface flame spread characteristics in accordance with Test Method E84. The test specimen shall either be self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface.

7. Packaging and Package Marking

7.1 The siding shall be packed in such a manner as to provide reasonable protection against damage in ordinary handling, transportation, and storage.

7.2 Provisions of Practice D3892 shall apply to this specification.

7.3 To aid identification of polypropylene siding conforming to all requirements of this specification, producers and distributors shall include a statement of compliance in conjunction with their name and address on product labels, invoices, sales literature, and the like. Use the following statement, or equivalent, when sufficient space is available: "This polypropylene siding conforms to all the requirements established in ASTM Specification D7254 developed cooperatively with the industry and published by ASTM. Full responsibility for the conformance of this product to the specification is assumed by (name and address of producer or distributor)."

7.4 Use the following abbreviated statement, or equivalent, when available space on labels is insufficient for the full statement: "Conforms to ASTM Specification D7254-XX (name and address of producer or distributor)."

7.5 The standard wind load design pressure rating determined in accordance with 5.4.2 shall be stated on the product or on the product package by one of the means in 7.5.1 or 7.5.2.

7.5.1 The package shall be marked or labeled with the standard wind load design pressure rating. The marking shall be in the format "Standard Wind Load Design Pressure Rating: ##.# psf (ASD)".

7.5.2 The standard design pressure rating shall be included on a line imprint or other marking on the front (outward-facing) surface of all siding panels. It is not required that the marking be visible after installation, provided that the marking can be revealed and read by detaching the lower edge lock of an adjacent course, without removal of any fasteners. The standard design pressure marking shall be stated at least once per panel. The marking shall be in the format "Std Design Pressure Rating: ##.# psf (ASD)".

7.5.3 At the option of the manufacturer, additional marking or labeling of the package or product with alternative wind load design pressure ratings determined in accordance with 5.4.3 for use with alternative sheathings, wall configurations or fastening methods is permitted. The marking shall use the format specified in 7.5, shall indicate the type of sheathing or wall configuration for which it is applicable, and shall refer to the manufacturer's instructions for more information and any installation requirements.

8. Keywords

8.1 plastic building products; polypropylene siding; specification

ANNEX

(Mandatory Information)

A1. WIND LOAD RESISTANCE TEST DESIGN FACTORS

A1.1 *Wind Load Criteria*:

A1.1.1 ASCE 7-10 is the basis for determining the design pressures used in this specification. Design wind loads are determined on an ASD basis in this specification.

NOTE A1.1—In previous editions of ASCE 7, wind loads were determined using wind speed maps based on a 50-year return period. In ASCE 7-10, maps based on a 700-year return period are used which, for any given location, produce a wind speed approximately 30 % greater than that of the previous maps. This larger magnitude (higher return period) wind speed, referred to as the ultimate wind speed, (V_{ULT}), is used directly (with a load factor of 1.0) to determine nominal wind loads on a Strength Design (LRFD) or "ultimate" wind load basis. When Allowable Stress Design (ASD) is used, ASCE 7-10 provides for these ultimate wind loads, determined from the ultimate wind speed map velocities, to be multiplied by a load factor of 0.6. Alternatively, the adjustment can be made directly to the wind velocity, which is the approach taken in this method (see A1.1.2). This procedure produces results consistent with past ASD wind loads.

A1.1.2 It is necessary to determine whether the wind velocity to be used is based on the maps in ASCE 7-10 or on older maps designed for direct application of ASD. Wind velocity, V, based on ASD is used in this method. Wind speeds determined using the maps in ASCE7-10, referred to as V_{ULT}, are converted to ASD wind speeds, V_{ASD}, by multiplying by the square root of 0.6. Wind speeds based on maps using an ASD basis do not require conversion (see A1.4) Thus:

$$V = V_{ASD} = V_{ULT} \times \sqrt{0.6} \qquad \text{(A1.1)}$$

The V determined in this section is used in the following calculations.

A1.1.3 The velocity pressures, q, used in this test method have been computed using the following equation:

$$q = 0.00256\, K_z K_d V^2 I \ (\text{lb/ft}^2) = 0.613\, K_z K_d V^2 I \ (\text{N/m}^2) \qquad \text{(A1.2)}$$

where:

V = wind velocity, mph (km/h). The basic wind speed corresponds to a 3-s gust speed at 33 ft (10.1 m) above ground in exposure category C, as described in ASCE 7-10. A velocity of $V = V_{ASD}$ = 110 mph (177 km/h) was used in this specification. (See Note A1.2 and Note A1.3.)

I = "importance factor" as described in editions of ASCE 7 prior to ASCE 7-10. A value of 1.0 is used. This factor is not used where the wind speed has been determined from a map in ASCE 7-10. (See Note A1.4.)

K_z = "velocity pressure coefficient" as described in ASCE 7-10. A "K_z" of 0.70 is used in the wind pressure calculations, which is the value from ASCE 7-10 for a mean roof height of 30 ft (9.1 m) above ground level and Exposure Category B.

K_d = "wind directionality factor" as described in ASCE 7-10. A "K_d" of 0.85 is used.

A1.1.4 Thus for the given velocity and factors, the velocity pressure = -18.43 lbf/ft^2 (882 Pa).

NOTE A1.2—As explained in Note A1.1, the wind velocity used in this method is converted from the V_{ULT} given by wind speed maps in ASCE 7-10 to V_{ASD} using the equation in A1.1.2. A V_{ULT} wind speed of approximately 140 mph from the maps is equivalent to a V_{ASD} of 110 mph, which is the velocity V used in this specification.

NOTE A1.3—In ASCE 7-10 the default wind speeds are given for exposure category C, and a table is provided to adjust this wind speed for other exposure categories. Since most siding is installed on buildings located in exposure category B, the velocity pressure coefficient, K_z is included in the equation to make this adjustment.

NOTE A1.4—Editions of ASCE 7 prior to ASCE 7-10 included an importance factor to represent the relative significance of the building and the consequences of its loss. Because most polypropylene siding is installed on residential and light commercial buildings, the importance factor was set at 1.0 by default. ASCE 7-10 has removed the importance factor from the velocity pressure equation, and instead provides a different wind speed map for each of the building importance categories (referred to as risk categories in ASCE 7-10). Thus the importance factor will already have been incorporated into the wind speed determined from the appropriate map, and the importance factor is not used for determining velocity pressure using wind speeds from ASCE 7-10 maps.

A1.1.5 ASCE 7-10 recommends various internal and external pressure coefficients, which include gust response factors. These coefficients vary with the effective area of the cladding component, the location of the cladding component relative to building corners, and the configuration of the building (open versus enclosed). The internal and external pressure coefficients are taken from Table 26.11-1 and Figure 30.4-1 of ASCE 7-10. The effective area is taken as 10 ft^2 (the area of one piece of siding), an enclosed building is assumed, and factors for the building corners are used.

A1.1.5.1 The pressure coefficients are as follows:

Internal Pressure Coefficient = ± 0.18
External Pressure Coefficient = +1.00 and –1.40

A1.1.5.2 The design pressure is calculated by multiplying the velocity pressures by the algebraic sum of the internal and external pressure coefficients.

A1.2 *Design Pressure*:

Positive Design Pressure = (18.43)(1.00 + 0.18) = 21.74 psf
Negative Design Pressure = (18.43)(–1.40 – 0.18) = -29.12 psf

NOTE A1.5—Because the wind velocity has already been adjusted from an ultimate basis to an ASD basis at the beginning of these calculations, the design pressure determined in this step is an ASD load. This correlates to the design pressure requirements stated in tables in the 2015 International Residential Code and other codes which have also been adjusted to an ASD basis. However, the required design pressures in some other codes and design standards have not been adjusted to an ASD basis. Where required design pressures are based on ultimate wind loads determined from ASCE 7-10 wind speeds, those loads must be multiplied by 0.60 to match the design pressure determined from this equation.

A1.2.1 The negative values (suction loads) are the largest in magnitude and are the design values used in this specification. Based on research conducted by Architectural Testing, Inc. for the Vinyl Siding Institute,[8] a certain amount of pressure equalization occurs through residential siding products installed with sheathing under high dynamic pressures. In light of this pressure equalization, the design pressure in the ASCE 7-10 wind load standards is reduced by a factor of 0.36.

A1.2.2 Therefore, the required test pressures are calculated as follows:

$$P_t = D_P \times PEF \times 1.5 \quad \text{(A1.3)}$$

where:

P_t = test pressure, lbf/ft^2 (Pa),
D_P = design pressure, lbf/ft^2 (Pa),
PEF = pressure equalization factor, 0.36, and
1.5 = safety factor.

A1.2.2.1 If documentation in support of the use of compensation for pressure equalization other than 0.36 is provided, use the calculation in A1.2.2, substituting the appropriate pressure equalization factor.

A1.2.3 Using the above equations in a 110 mph (177 km/h) (V_{ASD}) wind zone area specifying a design pressure of -29.12 lbf/ft^2 (1394 Pa) for a building 30 ft (9.1 m) in height or less, the required minimum siding uniform load test pressure is 15.73 lbf/ft^2 (753 Pa).

A1.2.3.1 For compliance with section 5.4, the referenced design pressure has been rounded to –30.0 lbf/ft^2 (1436 Pa) to match the standard design conditions specified by the 2015 International Residential Code. When tested under Test Method D5206, the siding must attain an average maximum sustained static test pressure equal to or greater than the corresponding minimum test pressure of 16.2 lb/ft^2 (776 Pa).

A1.2.4 For applications where the effective design pressure is greater than -30.0 lbf/ft^2 (1436 Pa) (for example, wind zone areas greater than 110 mph (177 km/h), mean roof height over 30 ft (9.1 m), or exposure conditions other than Exposure B), refer to ASCE 7-10 for the effective design pressure. To be shown to be suitable for the application, when tested under Test Method D5206 the siding must attain an average maximum sustained static test pressure equal to or greater than the minimum test pressure determined by the formula in A1.2.2, using the design pressure, D_P, determined for the application using the procedure in A1.1.2 through A1.2.

A1.2.5 These loading conditions apply only to siding installed without an air space, directly over sheathing of a type and fastening method that is capable of independently resisting both positive and negative wind design pressures at the building location. Examples of such sheathing include oriented strand board (OSB) and plywood fastened to resist the design wind pressures. For applications where the siding is installed over open studding, without sheathing, rapid pressure equalization does not occur. In these applications, the load the siding will see is equal to the total design pressure, and pressure equalization factor (PEF) is set to 1.0. The static test pressure required for products used under these conditions is as follows:

$$P_t = D_P \times PEF \times 1.5 \quad \text{(A1.4)}$$

where:

P_t = static test pressure, lbf/ft^2 (Pa),
D_P = design pressure, lbf/ft^2 (Pa),
PEF = pressure equalization factor, 1.0, and
1.5 = safety factor.

NOTE A1.6—Building codes and siding installation instructions require polypropylene siding to be installed over sheathing, so calculation of minimum test pressure for siding installed without sheathing is essentially moot. However, the calculation has been retained for completeness and comparison with other installation conditions.

A1.2.6 Because polypropylene siding is normally attached to nailable sheathing rather than building framing, it is typically used over sheathing such as plywood or OSB that is capable of independently resisting both positive and negative wind pressures occurring under design conditions at the building location, In any case where polypropylene siding is installed over sheathing that does not have that capability, a greater percentage of the total wind pressure is transferred to the siding and its fasteners. This has the effect of partially or completely countering the effect of the pressure equalization factor. In these cases a value between 0.36 and 1.0 is used for the pressure equalization factor (PEF).

A1.2.6.1 In addition, in cases where failure of the siding would result in failure of the exterior wall covering assembly (that is, siding and sheathing) a safety factor of greater than 1.5 is indicated.

A1.2.6.2 If the adjusted PEF for a given combination of siding and sheathing is known, and an appropriate safety factor is used, a minimum test pressure can be determined using the equation in A1.2.1. However, it is normally more appropriate to make an adjustment for alternative sheathings when determining the design pressure rating, as discussed in A1.4.

NOTE A1.7—Where the sheathing is not capable of independently resisting both positive and negative wind pressures occurring under design conditions at the building location, the layer of siding over the sheathing, and its fastening through the sheathing, act to reinforce the sheathing such that the whole wall covering (siding-sheathing) assembly is capable of resisting such wind pressures. Because siding is tested by itself (not as part of a siding-sheathing assembly) in Test Method D5206, the adjustment of test pressure (before the test) or of the design pressure (after the test) ensures that the wind load resistance of the assembly as a whole is reflected in the rating of the siding.

NOTE A1.8—In some high wind hazard regions, such as south Florida, the exterior wall covering assembly may also be required to meet wind-borne debris impact resistance criteria which would affect the choice of sheathing material to be used together with siding. Such considerations are beyond the scope of this standard.

[8] Vinyl Siding Pressure Equalization Factor, Architectural Testing, Inc., Report No. 01-40776.01, September, 2002.

A1.3 *Wind Design Pressure Rating (Maximum Allowable Pressure):*

A1.3.1 A design pressure rating is the maximum wind pressure that a particular polypropylene siding product is rated to be able to withstand. It is used in building design and building codes to determine the acceptability of a siding product for use under the design wind conditions for a specific application. To be acceptable, a siding's design pressure rating must be equal to or greater than the design pressure for the specific building at the specific location. The design pressure rating is determined from the average maximum sustained static test pressure for a siding product produced by testing under Test Method D5206, the pressure equalization factor, and a safety factor.

A1.3.2 *Standard Design Pressure Rating*—The standard design pressure rating is used for applications where the siding is installed over a sheathing type and fastening method that is capable of independently resisting both positive and negative wind pressures occurring under design conditions at the building location.

A1.3.2.1 The standard design pressure rating assumes that the siding is fastened to the building in the standard manner, with the minimum fastener type, size, spacing, and penetration depth prescribed in Chapter 7 of the International Residential Code and polypropylene-specific sections of the VSI Vinyl Siding Installation Manual. The installation of the siding for testing under Test Method D5206 must be consistent with these minimum fastening requirements. However, this does not prevent additional testing, using different fastening, to support design pressure ratings for other applications, such as special high wind installations.

A1.3.2.2 The pressure equalization factor and safety factor are the same as those used to determine the test pressure in A1.2.1, using the following equation:

$$D_{Rstd} = \frac{P_m}{(PEF \times SF)} \quad \text{(A1.5)}$$

where:

D_{Rstd} = standard design pressure rating, lbf/ft^2 (Pa),
P_m = average maximum sustained static test pressure, lbf/ft^2 (Pa),
PEF = pressure equalization factor, 0.36, and
SF = safety factor, 1.5.

A1.3.3 *Alternative Design Pressure Ratings*—Design pressure ratings for applications other than the standard conditions described above can be developed. Common circumstances where this is done include the use of alternative fastening methods in order to achieve a higher design pressure rating, and cases where the sheathing is not capable of independently resisting wind pressures under design conditions, which necessitates a reduction in the siding's design pressure rating.

A1.3.3.1 *Alternative Fastening*—Where an alternative fastening method is specified by the manufacturer, the siding is permitted to be tested under Test Method D5206 using the specified fastening. The resulting average maximum sustained static test pressure is used in the above equation to determine the alternative design pressure rating. In order for this alternative rating to be realized, the siding must be installed using the alternative method, and the rating must be clearly tied to installation requirements in manufacturer's literature and instructions.

A1.3.3.2 *Alternative Sheathing*—An adjusted design pressure rating for use of the siding over sheathings not capable of independently resisting both positive and negative wind pressures occurring under design conditions at the building location, as discussed in A1.2.6, can be calculated using the above equation if the appropriate PEF and safety factor are specified.

A1.3.3.3 Alternative PEF and safety factor values have been documented (see 2009 and 2012 International Residential Code, section R703.11.2) for one type of sheathing, foam plastic insulating sheathing complying with ANSI/SBCA FS 100. Two wall assembly cases are considered: 1) where the interior surface of the wall is covered with gypsum wall board or equivalent; and 2) where the interior surface of the wall is not covered with gypsum wall board or equivalent. In both cases the siding is installed directly over foam sheathing, which is then attached directly to framing, without intervening sheathing. The PEF and safety factor for each case are as follows:

Case	PEF	Safety Factor
Case 1	0.7	2.0
Case 2	1.0	2.0

NOTE A1.9— Polypropylene siding is normally attached directly to nailable sheathing, so adjustment of PEF and safety factors for attachment to foam plastic sheathing alone would not normally be relevant, but is included for completeness. For attachment of polypropylene siding over foam plastic sheathing that is layered with a nailable sheathing, see A1.3.3.4.

A1.3.3.4 Adjustment of the standard design pressure rating is not necessary when foam plastic insulating sheathing is installed directly over sheathing that is capable of independently resisting both positive and negative wind pressures occurring under design conditions at the building location, or where the sheathing is fastened in a way that allows it to independently resist the design wind pressure. For such cases the standard design pressure rating is applied.

A1.4 *Design Wind Speeds*:

A1.4.1 The wind velocity maps in ASCE 7-10 provide one source of design wind speeds for particular geographic regions. The velocities on these maps are stated in terms of "ultimate", 700-year return interval speeds. To be used in the procedure in this Annex, those velocities need to be converted to the ASD equivalent in accordance with A1.1.2, and the resulting velocity, V, used in the equation in A1.1.3. The 2012 and 2015 International Building Code and 2015 International Residential Code also contain maps based on ultimate wind speeds.

A1.4.2 Other maps are available that do not require conversion of wind velocities. Examples include the wind map in the 2012 International Residential Code, on which the velocities have already been converted from those on the ASCE 7-10 maps. Maps from previous editions of ASCE 7 used ASD velocities and do not require conversion. However, only editions since 1995 used the 3-second gust basis that is used in this annex. The 1998, 2002, and 2005 editions of ASCE 7

continued the use of 3-sec gust wind basis, but with improved hazard modeling of hurricane wind speeds first made in the 1998 edition. These previous editions also do not have the benefit of further improved hurricane hazard modeling that was incorporated into the maps used in ASCE 7-10.

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue (D7254 - 15) that may impact the use of this standard. (June 1, 2017)

(1) Section 2 was revised to update the reference to ASCE 7 and to add references referred to elsewhere in the standard.
(2) Section 2 was revised to add references to building codes and to the VSI Vinyl Siding Installation Manual.
(3) Section 3 was revised to add definitions of design wind load pressure rating, standard wind load design pressure rating, and alternative wind load design pressure rating.
(4) Subsection 5.4 was revised to clarify current requirements and put non-mandatory information in Notes, and to provide for the determination of standard and alternative wind load design pressure ratings.
(5) Subsection 6.4 was revised to provide the standard test conditions for determining compliance with the minimum test pressure and standard wind load design pressure rating.
(6) Additional provisions were added to Section 7 specifying marking of the standard design pressure and alternative design pressures.
(7) Annex A1 was revised to reflect recent changes in ASCE 7 and to improve clarity.
(8)) Section A1.2 was revised to add provisions for adjusting the minimum required test pressure for applications of siding over certain alternative sheathing types.
(9) Section A1.3 was added to describe the procedures for determining design pressure ratings.