



# Standard Specification for Rigid (Unplasticized) Poly(Vinyl Chloride) (PVC) Soffit<sup>1</sup>

This standard is issued under the fixed designation D4477; 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 establishes requirements and test methods for the materials, dimensions, camber, impact strength, expansion, and appearance of extruded single-wall soffit manufactured from rigid (unplasticized) PVC compound. Methods of indicating compliance with this specification are also provided.

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

1.3 Soffit produced to this specification shall be installed in accordance with Practice D4756. Reference shall also be made to the manufacturer's installation instructions for the specific product to be installed.

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

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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, health, and environmental 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.*

<sup>1</sup> 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. Referenced Documents

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

- D618 Practice for Conditioning Plastics for Testing
- D635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
- D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dilatometer
- D883 Terminology Relating to Plastics
- D1600 Terminology for Abbreviated Terms Relating to Plastics
- D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
- D2457 Test Method for Specular Gloss of Plastic Films and Solid Plastics
- D3892 Practice for Packaging/Packing of Plastics
- D4226 Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products
- D4756 Practice for Installation of Rigid Poly(Vinyl Chloride) (PVC) Siding and Soffit
- D5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics (Withdrawn 2007)<sup>3</sup>
- D5947 Test Methods for Physical Dimensions of Solid Plastics Specimens
- E631 Terminology of Building Constructions
- E1753 Practice for Use of Qualitative Chemical Spot Test Kits for Detection of Lead in Dry Paint Films

## 3. Terminology

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

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

3.2.1 *nominal*, (as related to dimensions of vinyl soffits), *adj*—the value that a manufacturer consistently uses to represent a specific property or dimension of a vinyl soffit product in

<sup>2</sup> 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.

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

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

public claims including, but not limited to, product literature, advertisements, quotations, and certificates of conformance.

3.2.2 *vinyl soffit, n*—a shaped material, made principally from rigid poly(vinyl chloride) (PVC) that is used to clad the underside of a roof overhang.

3.2.2.1 *Discussion*—Any exception to a homogeneous rigid PVC compound is present in a coextruded or laminated capstock.

#### 4. Materials and Manufacture

4.1 The soffit, shall be made of one or more layers of poly(vinyl chloride) (PVC) compound. Any layers of materials other than poly(vinyl chloride) (PVC) compound shall be kept to less than 20% by volume.

4.2 Use rigid PVC recycled plastic, as defined in Guide **D5033** if all the requirements in the sections on Terminology (Section 3), on Materials and Manufacture (Section 4), and on Physical Requirements (Section 5) are met by the soffit containing PVC recycled plastic.

4.3 The poly(vinyl chloride) soffit material, when tested in accordance with Test Method **D635**, shall not exceed an average extent of burn of 4 in. (100 mm), with an average time of burn not to exceed 10 s. A minimum sample thickness of 0.030 in. (0.8 mm) is required. (**Warning**—The flammability testing data, conclusions, and recommendations of Test Method **D635** relate solely to the measurement and description of properties for classification of the poly(vinyl chloride) soffit material in response to flame under controlled laboratory conditions and shall not be used for the description or appraisal of the fire hazard of vinyl soffit under actual fire conditions.)

4.4 The PVC compound, when extruded into soffit, shall maintain uniform color and be free of any visual surface or structural changes, such as peeling, chipping, cracking, flaking, or pitting.

4.5 PVC soffit shall not contain elemental lead (Pb) or compounds of that material other than traces incidental to raw materials or the manufacturing process. Compliance with this requirement shall be demonstrated by one of the methods in 6.12.

#### 5. Physical Requirements

5.1 *Length and Width*—The actual length shall not be less than ¼ in. (6.4 mm) of the nominal length and the actual width shall be within ±½ in. (3.2 mm) of the nominal width when measured in accordance with 6.3 and 6.4.

5.2 *Thickness*—The minimum thickness of the soffit shall be 0.030 in. (0.8 mm) when measured in accordance with 6.5.

5.3 *Camber*—A full length of soffit, typically 10 or 12 ft (3.05 or 3.66 m), will not have a camber greater than ½ in. (3.2 mm) when measured in accordance with 6.6.

5.4 *Initial Impact Resistance*—The soffit shall have a minimum impact strength of 45 in.·lbf (5.34 J) when tested in accordance with 6.7.

5.5 *Coefficient of Linear Expansion*—The soffit shall have a coefficient of linear expansion not greater than 4.5 by 10<sup>-5</sup> in./in./°F (8.1 by 10<sup>-5</sup> mm/mm/°C) when tested in accordance with 6.8.

5.6 *Gloss*—This requirement is not applicable to surface ventilated soffit. The gloss of soffit shall be uniform across the exposed face. The average of all readings for a panel determined in 6.9.1.2 shall not differ from the manufacturer's specified gloss value more than the permitted variation in **Table 1**, and each individual reading shall not vary more than 10 points from the average. Gloss shall be tested in accordance with 6.9.

**TABLE 1**

Manufacturer's Specified Gloss Value	Permitted difference from Mfg. Spec. Gloss Value
Less than or equal to 35	±8
Greater than 35	±10

5.7 Deflection of the soffit shall not exceed ±½ in. (3.2 mm) when installed flat in a horizontal position over a span of 24 in. (610 mm) without intermittent support when tested in accordance with 6.11.

5.8 *Uniformity of Color*—When tested in accordance with 6.10, the total color change, *E*, between a production specimen and the appropriate reference specimen or agreed-upon color coordinates shall not vary by more than 1.5, and the chromatic coordinates shall not change by more than ±Δa = 1.0 and ±Δb = 1.0.

#### 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. Each producer who represents its products as conforming to this specification shall be permitted to use statistically based sampling plans that are appropriate for each manufacturing process, but shall keep the essential records necessary to document, with a high degree of assurance, his claim that all of the requirements of this specification have been met.

6.2 *Conditioning and Test Conditions*—Condition the test specimen in accordance with Procedure A of Practice **D618** and test under those conditions, unless otherwise specified herein.

6.3 *Length*—Lay the specimen on a flat surface and measure with a steel tape. Measure the length of a soffit panel to the nearest ⅓ in. (1.6 mm) at the center, the butt edge, and the bottom of the top lock. The average of the three measurements is the actual length.

6.4 *Width*—Interlock two long specimens, each at least 26 in. (660 mm) long in the normal mode for installation. Lay the two specimens on a flat surface. Measure to the nearest ⅓ in. (1.6 mm), the distance between the lowest butt edge of the top specimen and the lowest butt edge of the bottom specimen. Commencing approximately 1 in. (25 mm) from one end of the specimens, make 5 measurements at 6 in. (152 mm) intervals, making sure that the measurement is made perpendicular to the butt edge. Average the measurements. The average constitutes the exposed width of soffit.

6.5 *Thickness*—Make a minimum of five equally spaced measurements across the width of the soffit specimen perpendicular to the exposed surface with a micrometer similar to that described in Test Method [D5947](#), Method A or B, with the exception that the vernier reading shall be to 0.001 in. (0.0254 mm). Average the measurements. The average constitutes the thickness of the soffit.

6.6 *Camber*—Place a full length of soffit (typically 10 or 12 ft (3.05 or 3.66 m), on a flat surface alongside a straightedge at least as long as the soffit specimen. Measure the maximum space between the edge of the soffit specimen and the straight-edge for each edge to the nearest  $\frac{1}{16}$  in. (1.6 mm).

6.7 *Impact Resistance*—Test impact resistance of soffit in accordance with Test Methods [D4226](#), Procedure A impactor head configuration H.25. 4 in-lb increments (0.5 in height increments with 8 lb falling weight) shall be used. Minimum sample dimensions shall be 1.5 in. by 1.5 in. Samples shall be tested with the normally exposed surface facing up. Conditioning time for quality control test shall be at least 1 hr.

6.8 *Coefficient of Linear Expansion*—Conduct this test in accordance with Test Method [D696](#).

6.9 *Gloss*—Measure gloss using a 75° geometry glossmeter that meets the requirements of the Apparatus section of Test Method [D2457](#).

#### 6.9.1 *Procedure:*

6.9.1.1 Measure gloss on one piece of soffit on at least three widely separated points across the width of the exposed surface. At least one reading shall be taken on each exposed, flat surface of the panel at least 3 in. wide. If a flat area on the exposed surface cannot be found due to the style or depth of embossing of the panel being tested, then a non-exposed area of the panel shall be chosen in its place. Such locations shall be representative of the gloss of the area that will be exposed after installation.

6.9.1.2 Each reading shall be within the limits specified in [5.6](#). The average of all readings shall be used to represent the gloss of the sample.

6.9.1.3 This test method is not applicable to surface ventilated soffit.

6.10 *Color Uniformity*—Calculate the difference between the  $L_H$ ,  $a_H$ ,  $b_H$  color coordinates for a production specimen to those of either the appropriate reference specimen or the agreed-upon color coordinates for that specific color product in accordance with Test Method [D2244](#). Calculate the total difference,  $E$ , between the production specimen and the reference specimen in accordance with Test Method [D2244](#).

#### 6.11 *Deflection:*

6.11.1 *Specimen Preparation*—Three pieces of soffit, 30 in. (762 mm) long, are prepared and conditioned at room temperature for 24 h.

6.11.2 *Apparatus*—Two parallel supporting beams,  $\frac{1}{2}$  in. (12.7 mm) wide at the same level of elevation and 24 in. (610

mm) apart, are set up with the provision of measuring height distance at the center of the beams.

6.11.3 *Procedure*—Interlock the three pieces of soffit panel with ends being in line. Position the soffit unit across the support beams so that the ends of the unit are equidistant from the outside edges of the beams. The panel center area is compared in height distance to the height of the support beams and any deviation is recorded.

#### 6.12 *Lead Content:*

6.12.1 Testing for lead content shall be conducted on extruded soffit using a rhodizinate-type lead swab test kit conforming to Practice [E1753](#). Testing shall be performed in accordance with the test kit manufacturer's instructions. The soffit shall be deemed to comply with [4.5](#) if the test shows a negative or not-detected result; that is, the test does not indicate the presence of lead. The test shall be conducted separately on the substrate and on any cap or film material.

6.12.2 As an alternative to the method in [6.12.1](#), and as a means of resolving any ambiguous results from that method, an analytical method capable of detecting lead at least as low as 0.02 percent by sample weight shall be employed. Under this alternative, neither the substrate nor any cap or film shall contain a concentration of lead in excess of 0.02 percent by weight.

## 7. Product Marking

7.1 To aid identification of products 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. The following statement is suggested when sufficient space is available: "This product conforms to all the requirements established in ASTM Specification D4477, developed cooperatively with the industry and published by the ASTM. Full responsibility for the conformance of this product to the specification is assumed by (name and address of producer or distributor)."

7.2 The following abbreviated statement is suggested when available space on labels is insufficient for the full statement: "Conforms to ASTM D4477, (name and address of producer or distributor)."

## 8. Packing, Packaging, and Package Marking

8.1 The soffit shall be packaged in such a manner as to provide reasonable protection against damage in ordinary handling, transportation, and storage.

8.2 The provisions of Practice [D3892](#) shall apply to this specification.

## 9. Keywords

9.1 plastic building products; plastic weatherability; recycled plastics; rigid PVC soffit; weatherability color-hold guidelines