



Designation: F3459 – 21

Standard Specification for Rigid Poly Vinyl Chloride (PVC) Exterior Profiles Used for Sound Walls¹

This standard is issued under the fixed designation F3459; 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 for the material properties and physical properties, including dimensional tolerances, extrusion quality, and weatherability, of rigid poly (vinyl chloride) (PVC) exterior profiles used for sound walls. Methods for testing and for identifying exterior profile extrusions that comply with this specification are also provided. In addition, requirements for flexural capacity are given.

NOTE 1—Information with regard to application, assembly, and installation should be obtained from the manufacturer.

1.2 The material used in these exterior profiles is limited to rigid poly (vinyl chloride) (PVC) compounds in a single homogeneous extrusion or in a coextrusion of two or more PVC compounds in distinct layers.

1.3 *Units*—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.

1.4 *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.*

1.5 *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

[A36/A36M Specification for Carbon Structural Steel](#)

[A123/A123M Specification for Zinc \(Hot-Dip Galvanized\) Coatings on Iron and Steel Products](#)

[A153/A153M Specification for Zinc Coating \(Hot-Dip\) on Iron and Steel Hardware](#)

[A449 Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use](#)

[A500/A500M Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes](#)

[A563 Specification for Carbon and Alloy Steel Nuts](#)

[A653/A653M Specification for Steel Sheet, Zinc-Coated \(Galvanized\) or Zinc-Iron Alloy-Coated \(Galvannealed\) by the Hot-Dip Process](#)

[A780/A780M Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings](#)

[A992/A992M Specification for Structural Steel Shapes](#)

[A1011/A1011M Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength](#)

[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^{\circ}\text{C}\$ and \$30^{\circ}\text{C}\$ with a Vitreous Silica Dilatometer](#)

[D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials](#)

[D883 Terminology Relating to Plastics](#)

[D1042 Test Method for Linear Dimensional Changes of Plastics Caused by Exposure to Heat and Moisture](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)

[D2565 Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications](#)

[D4216 Specification for Rigid Poly\(Vinyl Chloride\) \(PVC\) and Related PVC and Chlorinated Poly\(Vinyl Chloride\) \(CPVC\) Building Products Compounds](#)

[D4226 Test Methods for Impact Resistance of Rigid Poly\(Vinyl Chloride\) \(PVC\) Building Products](#)

¹ This specification is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.30 on Rigid Polymer Fence Systems.

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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.

[E72 Test Methods of Conducting Strength Tests of Panels for Building Construction](#)

[E84 Test Method for Surface Burning Characteristics of Building Materials](#)

[F436/F436M Specification for Hardened Steel Washers Inch and Metric Dimensions](#)

[F1554 Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength](#)

2.2 *CSA Standard*:³

[G40.20/G40.21 Grade 350W General Requirements for Rolled or Welded Structural Quality Steel](#)

2.3 *ASCE Standard*:⁴

[ASCE/SEI 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures](#)

brackets, may be made from PVC or non-PVC materials, or both. [Fig. 1](#) shows a typical sound wall ground installation on a flange mounted caisson foundation. [Fig. 2](#) shows a typical wall section with top rail, absorptive panels, and a reflective bottom panel. The information contained in this specification is intended to be helpful to producers (manufacturers), distributors, and users and to promote understanding between purchasers and sellers.

5. Materials and Manufacture

5.1 The rigid poly vinyl chloride (PVC) compound for exterior profile extrusions meeting the requirements of this specification are categorized by the cell class requirements in accordance with Specification [D4216](#).

5.2 The PVC compounds used for the products meeting this specification shall meet a minimum cell class of 1-00233-23 for PVC profiles and 3-20233-23/4-20233-23 for PVC substrate with alternate capstock materials as defined in Specification [D4216](#). Compounds that have higher cell classification because one or more properties are superior to those in the specified compound are acceptable.

5.3 The color of the profiles shall be as agreed upon between the purchaser and the seller. The color specified shall be uniform throughout a single material extrusion or throughout the capstock layer of a coextruded profile for profiles intended to be of uniform color.

5.4 The extruded profiles shall be free from visible cracks, voids, or foreign inclusions.

5.5 The PVC extrusion, when tested in accordance with Test Method [D635](#), shall not exceed an average extent of burn of 1 in. (25 mm), with an average time of burn not to exceed 30 s. A sample of the manufactured profile thickness shall be used. In addition, it shall have a Flame Spread Index of less than 25 when tested in accordance with Test Method [E84](#).

5.6 The requirements for material and design specification apply to all panels required for the successful structural performance of the designed sound wall system. Components considered decorative and not required for the structural performance of the system may be omitted from the testing protocols of this standard.

NOTE 2—The flammability testing data, conclusions, and recommendations of Test Method [D635](#) relate solely to the measurement and description of the properties of materials, products, or systems in response to heat and flame under controlled laboratory conditions and should not be used for the description or appraisal of the fire hazard of materials, products, or systems under actual fire conditions.

5.7 Post consumer recycled material may only be used in the production of sound wall PVC profiles if the profiles produced from these materials meet all of the requirements of this specification. Post consumer recycled materials may not be used in any layer of the product exposed to the sun.

5.8 Clean reworked material may be used, provided that the profiles produced in whole or in part from the reworked materials meet all of the requirements of this specification.

3. Terminology

3.1 *General*—Definitions are in accordance with Terminologies [D883](#) and [D1600](#), unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *capstock, n*—the outer layer in a coextrusion exposed to weathering.

3.2.2 *coextrusion, n*—the process of coextruding profiles from two or more concentric streams of PVC compounds.

3.2.2.1 *Discussion*—Separate PVC materials may be coextruded to form a multi-layered profile with each layer having different physical characteristics such as strength and weathering.

3.2.3 *reworked material, n*—material from the manufacturer's facility of known, compatible composition meeting the material requirement of this specification that has been reground, pelletized, or solvated after having been previously processed by molding, extrusion, and so forth.

3.2.4 *single layer profile, n*—profiles extruded from a single PVC compound; weathering and other physical characteristics are uniform throughout the profile.

3.2.5 *sound wall, n*—exterior structure designed to protect inhabitants of sensitive land use areas from sound pollution; also referred to as a sound wall, sound barrier, or acoustical barrier.

3.2.6 *substrate, n*—inner layer(s) of a coextrusion not exposed to weathering.

4. Significance and Use

4.1 The purpose of this specification is to establish a recognized standard of quality and performance for rigid poly vinyl chloride (PVC) exterior profiles for use in constructing sound walls. The term “PVC sound wall” refers to complete systems in which the horizontal members spanning between sound wall posts are made from PVC extruded profiles. Certain steel accessory materials, including support posts, are specified in [5.8](#). Other accessory components not included in this specification, such as bolts, screws, hinges, latches, caps, and

³ Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, <http://www.csagroup.org>.

⁴ Available from American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191, <http://www.asce.org>.



FIG. 1 Typical Sound Wall Ground Installation on Flange Mounted Caisson Foundation

5.9 The PVC part shall maintain uniform color and be free of any visual surface or structural changes, such as peeling, chipping, cracking, flaking, or pitting after weathering per 7.1 of this standard.

5.10 Structural steel framework and accessories to be designed to withstand the wind load pressure per ASCE 7, latest edition.

5.10.1 *Plate and Bar Materials*—Plate and bar material shall be in accordance with Specification A36/A36M or G40.20/G40.21.

5.10.2 *Rolled Sections*—Structural members (beams or posts) shall be in accordance with Specification A992/A992M or G40.20/G40.21.

5.10.3 *Hollow Structural Sections (HSS)*—HSS shall be in accordance with Specification A500/A500M or G40.20/G40.21.

5.10.4 *Sheets*—Sheet material shall be in accordance with Specification A1011/A1011M.

5.10.5 *Washers*—Washers shall be in accordance with Specification F436/F436M.

5.10.6 *Heavy Hex Nuts*—Heavy hex nuts shall be in accordance with Specification A563.

5.10.7 *Anchor Rods*—Anchor rods (anchor bolts) shall be in accordance with Specifications F1554 or A449.

5.10.8 *Galvanizing*—All galvanizing shall be done in accordance with Specifications A123/A123M and A153/A153M as appropriate.

5.10.9 *Cold Formed Sheet Steel*—All cold formed sheet steel shall be in accordance with Specification A653/A653M.

5.10.10 *Galvanizing Repair*—All galvanizing repair shall be done in accordance with Practice A780/A780M Method 2.

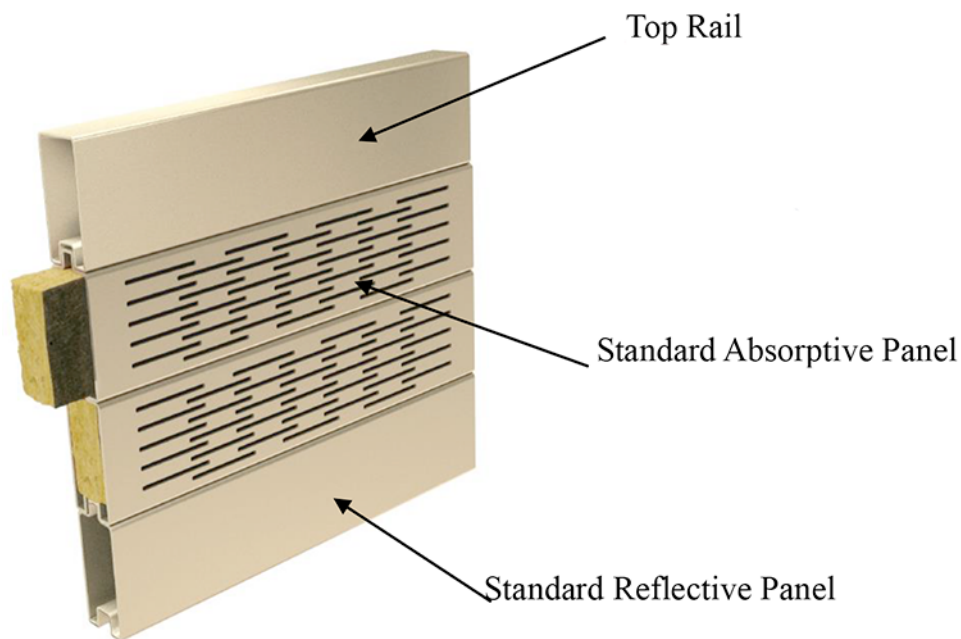


FIG. 2 Typical Sound Wall Section with Top Rail and Panels

TABLE 1 Allowable Horizontal and Vertical Bow for Common Length Extrusions as Measured per 8.7

Profile Length	Allowable Bow per Piece
72 in.	0.141 in.
96 in.	0.250 in.
144 in.	0.563 in.
192 in.	1.000 in.
240 in.	1.563 in.

6. Physical Requirements

6.1 *Length, Height, and Width*—The specified length, height, and width of the PVC sound wall profiles shall be as agreed upon between the purchaser and the seller, or by established internal process control standards. The actual panel length shall be within 0.25 in. (6.4 mm) for specified lengths less than 10 ft (3.0 m) and shall be within 0.25 in. (6.4 mm) per 10 ft (3.0 m) of the specified length for lengths greater than 10 ft (3.0 m). The actual height and width shall be within 0.0625 in. (1.6 mm) of the specified height and width when measured in accordance with 8.4 and 8.5. All panel lengths shall be measured at 73.4 °F ± 3.6 °F (23 °C ± 2 °C).

6.2 *Wall Thickness*—The average minimum wall thickness of the PVC standard sound wall profile shall be 0.180 in. (4.6 mm) when measured at three points along the sections of the face of the profile in the vertical orientation when in service. At no point shall the wall thickness be less than 0.160 in. (4.1 mm).

6.3 *Weight Tolerance*—Profile extrusion weight shall not be more than 5 % below the specified profile weight indicated in the manufacturer’s specifications.

6.4 *Impact Resistance*—Standard profiles are to be tested in accordance with Test Method D4226, Procedure “B,” using impactor C.125. Flat sections of the profile extrusion shall have a minimum impact failure of 1.5 in. lb/mil (6675 J/m) when tested at 73.4 °F ± 3.6 °F (23 °C ± 2 °C). Standard profiles are to be tested in accordance with Test Method D4226, Procedure “B,” using impactor H.25. Flat sections of the profile extrusion shall have a minimum impact failure of 0.25 in.lb/mil (1113 J/m) when tested at -40 °F ± 3.6 °F (-40 °C ± 2 °C).

6.5 *Horizontal and Vertical Bow*—The maximum allowable horizontal and vertical bow shall not exceed that given in Table 1, calculated by the following equation:

$$B = 4608.125 - [(4608.125)^2 - (L/2)^2]^{1/2} \quad (1)$$

where:

- B* = horizontal or vertical bow,
- r* = radius of bow circle, and
- L* = length of extruded profile.

6.6 *Dimensional Stability*—The dimensional stability of the profile extrusions shall be determined in accordance with 8.8. Extrusions shall have a maximum average shrinkage of 2.4 % for all sides measured, with no single value exceeding 3 %.

6.7 *Coefficient of Linear Expansion*—The profiles shall have a coefficient of linear expansion not greater than 4.4 × 10⁻⁵ in./in. · °F (7.9 × 10⁻⁵ mm/mm · °C) when tested in accordance with Test Method D696.

NOTE 3—Expansion and contraction of the sound wall profile lengths must be taken in consideration in the design of the sound wall system.

6.8 *Thickness of PVC Capstock*—PVC extruded profiles produced by coextrusion, which contain two or more layers, shall have an outer layer (capstock) that is no less than 0.010 in. (0.25 mm) thick at any point on all surfaces exposed to UV rays upon completed installation.

6.9 *Bond*—For PVC profiles produced by coextrusion, the bond between the layers shall be strong and uniform. It shall not be possible to separate any two layers with a probe or point of a knife blade.