



Designation: D8427 – 21

Standard Specification for Rigid Poly Vinyl Chloride (PVC) Exterior Profiles Used for Sheet Piling¹

This standard is issued under the fixed designation D8427; 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, of rigid poly(vinyl chloride) (PVC) exterior profiles used for heavy construction, geotechnical, commercial, and residential sheet piling. Methods for testing and for identifying exterior profile extrusions that comply with this specification are also provided.

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

1.3 The values stated in inch-pound units are to be regarded as the 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

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

¹ This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.06 on Geosynthetic Specifications.

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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.

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

3. Terminology

3.1 *Definitions*—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 streams of PVC compounds.

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 re-ground or pelletized after having been previously processed by extrusion, and so forth.

3.2.4 *single-layer profile, n*—profiles extruded from a single PVC compound (also sometimes called monoextrusion).

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

4. Ordering Information

4.1 PVC sheet piling is ordered to a particular length, often in increments of 1 ft or 2 ft. The width and profile shape needed are determined by the engineer (see Fig. 1).

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 virgin PVC compounds used for the products meeting this specification shall meet cell 1-42443-33 as defined in Specification D4216. Compounds that have a higher cell classification because one or more properties are superior to those in the specified compound are acceptable.

5.3 *Color*—The color of the profiles shall be as agreed upon between the purchaser and the seller. When no surface features

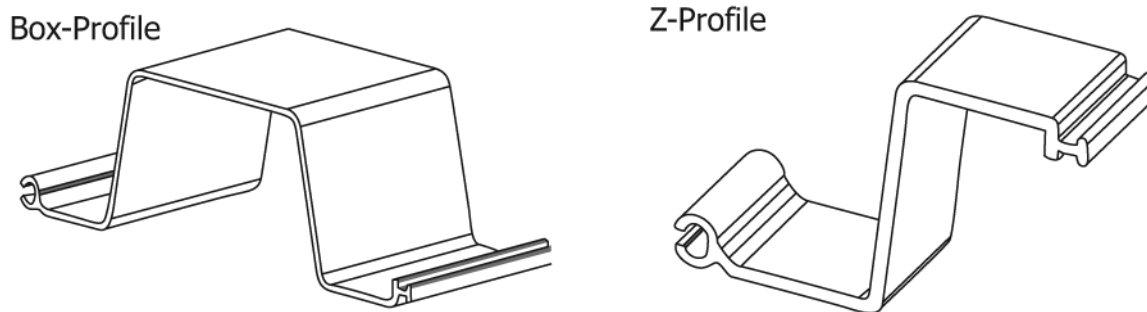


FIG. 1 Examples of Profile Shapes

are required, the color specified shall be uniform throughout a single material extrusion or throughout the capstock layer of a coextrusion.

5.4 *Reworked Material*—Clean reworked material may be used, provided that the sheet pile profiles produced in whole or in part from the reworked materials meet the requirements of this specification. Reworked material may only be included in the substrate.

6. Chemical Composition

6.1 Generally, the PVC compound formulae are proprietary, but may consist of various ratios of PVC polymers, fillers, process aids, impact modifiers, colorants, lubricants, and UV inhibitors.

7. Physical Properties

7.1 *Length, Depth, Width, and Thickness*—There are a variety of sheet pile profiles available to suit various applications. The specified length, depth, thickness, and width of the sheet pile profiles shall be as agreed upon between the purchaser and the seller and measured in accordance with Section 15.

7.1.1 The actual length shall be within ± 1 in. of the specified length.

7.1.2 The actual section depth shall be within ± 2.5 % of the specified depth.

7.1.3 The actual thickness of the webs and flanges shall be within ± 10 % of the specified thickness.

7.1.4 The actual width of the product shall be within $\pm 1/4$ in. of the specified width.

7.2 *Thickness of PVC Capstock*—PVC profiles produced by coextrusion, which contain two or more layers, shall have an outer layer (capstock) that is no less than 0.008 in. thick at any point.

7.3 *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 so that the layers separate at any point.

8. Mechanical Properties

8.1 *Tensile Strength*—A minimum of 6000 psi peak tensile strength shall be met.

8.2 *Modulus of Elasticity*—A minimum of 300 ksi modulus of elasticity shall be met.

8.3 *Impact Resistance*—A minimum of 1500 in.-lb/in. shall be met.

9. Performance Requirements(s)

9.1 *Sliding*—Sheet locks should slide together when sheets are plumb/level.

10. Dimensions, Mass, and Permissible Variations

10.1 See Section 7.

11. Workmanship, Finish, and Appearance

11.1 External surface color should be uniform, but internal color may vary. Surfaces should be free of holes, major blemishes, etc.

12. Sampling

12.1 *Sample Selection*—Samples should be selected from approximately the center of each position across of the sheet pile. For the box-shape profile, there are five positions: male flange, male web, center flange, female web, and female flange. For the Z-shape profile, there are three positions: male flange, center web, and female flange. See Fig. 2.

12.2 *Sample Length and Width*—The samples must be wide enough and long enough to machine tensile testing dog bones. Additionally, samples should be long enough and wide enough to get 20 impact locations for drop dart (style “A” dart should be used).

13. Number of Tests and Retests

13.1 A minimum of two tests should be completed to establish an average and variation statistic.

13.2 If most of any tests fail, retest with specimen as close in time as possible. If most of these tests fail, testing backward through production shall be conducted until the balance of the production run passes.

14. Specimen Preparation

14.1 Specimens to be tested at 73.4 ± 3.6 °F and shall be conditioned in accordance with Practice D618 for no less than 1 h.

15. Test Methods

15.1 *General*—Each manufacturer who represents their products as conforming to this specification may utilize statistically based sampling plans that are appropriate for each

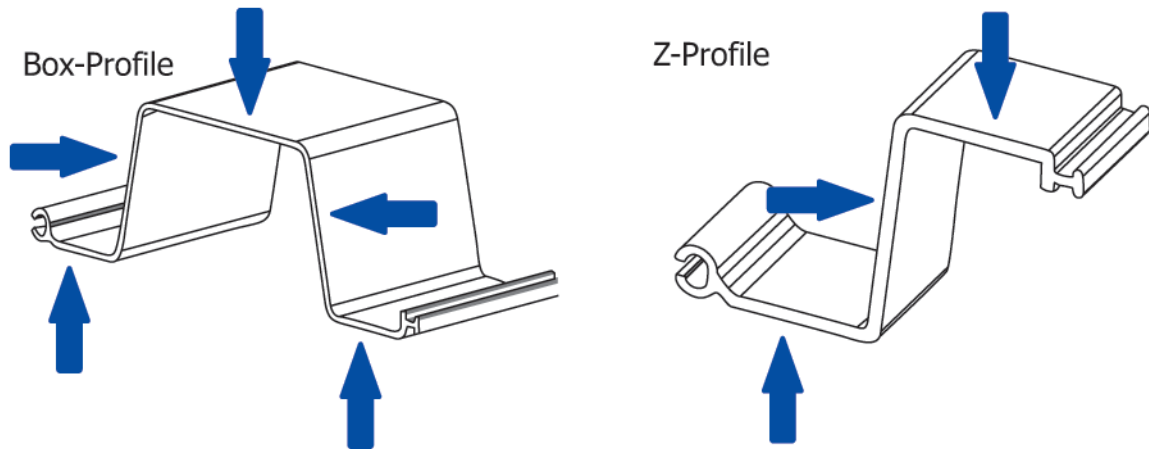


FIG. 2 Sampling Positions

manufacturing process. The producer shall keep the essential records necessary to document with a high degree of assurance their claim that all the requirements of this specification have been met.

15.2 *Thickness (Overall)*—Overall thickness should be measured with vernier or dial calipers.

15.3 *Thickness (Capstock)*—Capstock thickness should be measured with a magnifying loupe containing a graticule.

15.4 *Width*—Width can be measured with a tape rule while the profile is laying on a flat surface.

15.5 *Depth of Section*—Section depth can be measured with a tape rule while the profile is laying on a flat surface.

15.6 *Length*—Sheet length shall be measured with a tape rule while the profile is laying on a flat surface.

15.7 *Tensile Properties*—Tensile and modulus of elasticity shall be measured using Test Method D638.

15.8 *Impact Strength*—Drop dart impact strength can be measured using Test Methods D4226 (dart “A”).

16. Inspection

16.1 Inspection of the material shall be agreed upon between the purchaser and supplier as part of the purchase order or contract.

17. Rejection and Rehearing

17.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported

to the producer promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim of rehearing.

18. Certification

18.1 Fifty-year manufacturer’s limited warranty.

18.2 Material certification from the capstock manufacturer.

19. Product Marking

19.1 The product may be marked as individual units or as bundles with stickers or direct markings stating at least the product name/code and the manufacture date.

20. Packaging and Package Marking

20.1 Products should be packaged in bundles secured with bands of dunnage and strapping. Enough bands should be included to prevent deflection or deformation in storage or transport.

20.2 Bundles should be identified with at least two labels stating at least the product name/code, the manufacture date, and order number.

21. Supplementary Requirement(s)

21.1 A maximum allowable design stress of 3200 psi shall be used in stating the allowable moment.

22. Keywords

22.1 capstock; coextrusion; exterior profile; poly(vinyl chloride); PVC; PVC sheet pile; vinyl sheet piling