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Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Exterior Profiles Used for Fencing[1]

This standard is issued under the fixed designation F 964; 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 and extrusion quality, for rigid poly (vinyl-chloride) (PVC) exterior profiles used for agricultural, commercial, and residential fencing.

NOTE 1—Agricultural fencing system recommendations for specific types of animals shall be obtained from the manufacturer.

NOTE 2—Application, installation, and maintenance of fencing systems information shall 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 The exterior profiles covered by this specification are limited to round or rectangular tubular-shaped products with exterior walls of uniform thickness.

1.4 Reference shall be made to Specification D 4726 for exterior profiles of nonuniform exterior wall thickness or of nontubular shape, or both.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are provided for information only.

1.6 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 635 Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position[2]

D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between −30°C and 30°C[2]

D 883 Terminology Relating to Plastics[2]

D 1435 Practice for Outdoor Weathering of Plastics[2]

D 1600 Terminology for Abbreviated Terms Relating to Plastics[2]

D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds[2,3]

D 1898 Practices for Sampling of Plastics[2]

D 2444 Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)[3]

D 4726 Specification for White Rigid Poly (Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors[3]

3. Terminology

3.1 General—Definitions are in accordance with Terminologies D 883 and D 1600, unless otherwise indicated.

3.2 Definitions of Terms Specific to This Standard:

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

3.2.2 *coextrusion*—profiles extruded from two or more concentric streams of PVC compounds.

3.2.2.1 *DISCUSSION*——The separate PVC streams may be compounded to provide different physical characteristics such as strength or weathering.

3.2.3 *reworked material*—a plastic from a manufacturer's facility of known, compatible composition meeting the material requirement of this specification that has been reground, pellitized, or solvated after having been previously processed by molding, extrusion, etc.

3.2.4 *single material*—profiles extruded from a single PVC compound.

3.2.4.1 *DISCUSSION*——Weathering and other physical characteristics are uniform throughout the profile.

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

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.

3.2.7 *tubular shaped product*—round or rectangular hollow profile with exterior walls of uniform thickness.

[1] This specification is under the jurisdiction of ASTM Committee F-14 on Fences and is the direct responsibility of Subcommittee F14.15 on Alternate Fencing Systems.

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[2] *Annual Book of ASTM Standards*, Vol 08.01.

[3] *Annual Book of ASTM Standards*, Vol 08.04.

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4. Significance and Use

4.1 The purpose of this specification is to establish a recognized standard of quality for rigid poly (vinyl chloride) (PVC) exterior profiles for use in assembling agricultural, commercial, and residential fencing. The term "PVC fence" refers to a complete fencing system in which the primary structural members such as posts, rails, and gates are made from rigid PVC exterior profiles. Accessory components, including bolts, screws, hinges, and latches, may be made from non-PVC material such as corrosion-resistant metal or from injection molded plastic. The information contained in this specification is intended to be helpful to producers, distributors, and users and to promote understanding between purchasers and sellers.

5. Materials and Manufacture

5.1 The rigid poly (vinyl chloride) (PVC) plastic compound used to make exterior-profile extrusions meeting the requirements of this specification are categorized by the cell class requirements in accordance with Specification D 1784.

5.2 Virgin PVC compounds used for the products meeting this specification shall meet cell Class 12333 as defined in Specification D 1784. Compounds that have higher cell classification because one or more properties are superior to those in the specified compound are acceptable.

5.3 The PVC compound, when tested in accordance with Test Method D 635, 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 sample thickness of 0.090 ± 0.009 in. (2.3 ± 0.2 mm) shall be used.

NOTE 3—The flammability testing data, conclusions, and recommendations of Test Method D 635 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.

5.4 *Reworked Material*—Clean reworked material may be used by the manufacturer's fence profile production facility, provided that the fence profiles produced in whole or in part from the reworked materials meet all the requirements of this specification.

5.5 *Recycled Materials*—No recycled materials may be used in the production of fence profiles.

5.6 *Coextruded Extrusion Requirements*—Only virgin compound shall be used in the capstock strata or exposed areas of the product, excluding cut ends of the profile lengths.

6. Workmanship

6.1 The fencing profiles shall be free from visible cracks, holes, foreign inclusions, or other defects. The fencing profiles shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

7. Physical Requirements

7.1 *Length, Height, and Width*—The nominal length, height, and width of the fencing profiles shall be as agreed upon between the purchaser and the seller. The actual length shall be within ±¼ in. (6.4 mm) of the nominal length and the actual height and width shall be within 1⁄16 in. (1.6 mm) of the nominal height and width when measured in accordance with 8.5.

7.2 *Flattening*—There shall be no evidence of splitting, cracking, or breaking when the fence profiles are tested in accordance with 8.6.

7.3 *Impact Resistance*—The PVC fence profiles shall have a minimum impact failure value of 0.75 ft × lbf/mil (40 050 J/m) of thickness of the wall when tested at 32°F (0°C) and 1.5 ft × lbf/mil (80 150 J/m) when tested at 73.4°F (23°C) when tested in accordance with the apparatus section of Test Method D 2444, using the "B'' tup and the flat plate Holder "B.'' The manufacture's published minimum wall for the product shall determine the required impact level when tested in accordance with 8.7.

7.4 *Warp*—The maximum allowable warp shall be 0.5 % of the length of the fence profile when determined in accordance with 8.8.

7.5 *Weatherability*—The fence profiles shall maintain a uniform color and be free of any visual surface or structural changes such as peeling, chipping, cracking, flaking, and pitting for a period of time consistent with the manufacturer's warranty.

7.6 *Coefficient of Linear Expansion*—The fencing 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 D 696.

NOTE 4—Expansion and contraction of the fence profile lengths must be taken in consideration in the design of the fencing system.

7.7 *Color*—The color of the fencing 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.

7.8 *Thickness of PVC Capstock*—PVC fence profiles produced by coextrusion, which contain two or more layers, shall have an outer layer (capstock) that is no less than 0.015 in. (0.38 mm) thick at any point and that does not exceed 20 % of the total wall thickness at any point.

7.9 *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 so that the layers separate at any point.

8. Test Methods

8.1 *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 his products as conforming to this specification may utilize statistically based sampling plans that are appropriate for each manufacturing process. The producer shall keep the essential records necessary to document with a high degree of assurance his claim that all the requirements of this specification have been met. Additional sampling and testing of the products, as may be agreed upon between the purchaser and the seller at the time of the execution of the sales agreement, are not precluded by this section.

8.2 *Conditioning and Test Conditions*:

8.2.1 Specimens to be tested at 73.4 ± 3.6°F (23 ± 2°C) shall be conditioned in accordance to Practice D 618 in air in