



# Standard Specification for Poly (Vinyl Chloride)(PVC) Closed Profile Gravity Pipe and Fittings Based on Controlled Inside Diameter <sup>1</sup>

This standard is issued under the fixed designation F 1803; 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 covers requirements for poly(vinyl chloride) (PVC) closed profile sewer pipe and fittings with integral bell and elastomeric seal joints or plain end pipe with couplings in sizes (18 to 60 in.) based on a controlled inside diameter.

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

1.3 The following safety hazard caveat pertains only to the test methods portion, Section 8, 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 1—Pipe and fittings produced to this specification should be installed in accordance with Practice D 2321.

## 2. Referenced Documents

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

- D 618 Practice for Conditioning Plastics for Testing
- D 1600 Terminology for Abbreviated Terms Relating to Plastics
- D 1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
- D 2152 Test Method for Adequacy of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
- D 2321 Practice for Underground Installation of Flexible Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.62 on Sewer. Current edition approved Jan. 1, 2004. Published January 2004. Originally approved in 1997. Last previous edition approved in 1997 as F 1803 – 97.

<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.

- D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- D 2444 Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
- D 2855 Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
- D 3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- F 402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- F 412 Terminology Relating to Plastic Piping Systems
- F 477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F 679 Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- 2.2 *Federal Standard:*<sup>3</sup>
  - Fed. Std. No. 123 Marking for Shipment (Civil Agencies)
- 2.3 *Military Standard:*<sup>3</sup>
  - MIL-STD-129 Marking for Shipment and Storage

## 3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F 412, and abbreviations are in accordance with Terminology D 1600, unless otherwise specified. The abbreviation for poly(vinyl chloride) is PVC.

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

3.2.1 *closed profile (CP) gravity sewer pipe, n*—a pipe product consisting of an essentially smooth waterway braced circumferentially or spirally with projections or ribs that are joined by an essentially smooth outer wall (see Fig. 1).

## 4. Significance and Use

4.1 The requirements of this specification are intended to provide pipe and fittings suitable for nonpressure drainage of sewage and surface water.

NOTE 2—Industrial waste disposal lines should be installed only with the specific approval of the governing code authority since chemicals not commonly found in drains and sewers and temperatures in excess of 140°F may be encountered.

<sup>3</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

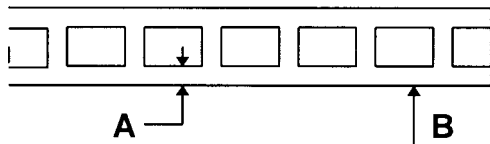


FIG. 1 Typical Closed Profile (CP) (A) Waterway minimum wall (B) Average inside diameter

5. Material

5.1 *Basic Materials*—The pipe and fittings shall be made of PVC plastic having a minimum cell classification of 12454 or 12364 as defined in Specification D 1784. Homopolymer PVC compounds must meet or exceed the requirements of the above listed minimum cell classification number.

5.2 *Rework Material*—Clean rework material generated from the manufacturer’s own pipe or fittings production may be used by the same manufacturer provided pipe or fittings produced meet all the requirements of this specification.

5.3 *Gaskets*—Elastomeric gaskets shall comply with the requirements described in Specification F 477.

5.4 *Lubricant*—The lubricant used for assembly shall be suitable for use with PVC pipe and elastomeric seals for this application and have no detrimental effect on the gasket or on the pipe.

6. Joining Systems

6.1 *Gasketed Joint*—The integral bell gasketed joint, coupling, or fitting joints shall be designed so that when assembled, the gasket (which is attached to either the bell or the spigot) will be compressed radially on the pipe spigot or in the bell to form a water-tight seal. The joints shall be designed to comply with and show no sign of leakage when tested in accordance with 7.7 when assembled with pipe for which they are intended.

6.2 *Couplings* shall form a water-tight seal when assembled with plain end pipe and show no sign of leakage when tested in accordance with 7.7 when assembled with pipe for which they are intended.

NOTE 3—The outside diameters of products manufactured to this specification are not specified and therefore joint compatibility should be reviewed.

6.3 The joint shall be designed to avoid displacement of the gasket when assembled in accordance with the manufacturer’s recommendation.

6.4 The assembly of joints shall be in accordance with the manufacturer’s recommendations.

7. Requirements

7.1 *Workmanship*—The pipe and fittings shall be essentially uniform in color, opacity, density, and other properties. The inside and outside surfaces shall be semimatte or glossy in appearance and free of chalking, sticky, or tacky material. The surfaces shall be free of excess bloom; that is, slight bloom is acceptable. The pipe walls shall be free of cracks, holes, blisters, voids, foreign inclusions, or other defects that are visible to the naked eye and that may affect the wall integrity. Bloom or chalking may develop in pipe exposed to direct rays of the sun (ultraviolet radiant energy) for extended periods and consequently these requirements do not apply to pipe after extended exposure to direct rays of the sun.

7.2 *Pipe Fitting Dimensions:*

7.2.1 *Diameter*—The inside diameter of the pipe shall meet the requirements given in Table 1 when measured in accordance with 8.4.1.

7.2.2 *Wall Thickness*—The minimum wall thickness of the waterway of pipe and fittings fabricated from pipe sections shall meet the requirements given in Table 1 when measured in accordance with 8.4.2. The wall thickness of fittings fabricated from pipes meeting the requirements of Specification F 679 are also satisfactory.

7.2.3 *Bell Wall Thickness*—In the case of belled pipe and fittings fabricated from pipe sections, the thickness of the wall in the bell shall be considered satisfactory if it was formed from pipe meeting the previous requirements. For reducing fittings or those with smaller inlets, the minimum wall thickness for each inlet shall be no less than the minimum wall thickness for that size pipe.

7.2.4 *Fittings:*

7.2.4.1 *Molded Fittings*—Molded fittings conforming to the requirements of Specification F 679 may also be used with profile gravity sewer pipe provided an adapter (when required) is used to make the connection. The minimum wall thickness of the molded fittings and adapter shall coincide with the

TABLE 1 Pipe Dimensions and Stiffness

Nominal Pipe Size, in.	Minimum Inside Diameter, <sup>A</sup> in. (mm)	Tolerance on Inside Diameter, in. (mm)	Minimum Pipe Stiffness Series 46, lbf/in. <sup>2</sup> (kPa)	Waterway Minimum Wall Series 46, in. (mm)
18	17.595 (446.91)	+0.110 (+2.79)	46 (320)	0.070 (1.78)
21	20.690 (525.53)	+0.120 (+3.05)	46 (320)	0.080 (2.03)
24	23.430 (595.12)	+0.140 (+3.56)	46 (320)	0.100 (3.54)
27	26.420 (671.01)	+0.160 (+4.06)	46 (320)	0.115 (2.92)
30	29.410 (747.01)	+0.180 (+4.57)	46 (320)	0.125 (3.18)
33	32.405 (823.09)	+0.190 (+4.83)	46 (320)	0.140 (3.56)
36	35.395 (899.03)	+0.210 (+5.33)	46 (320)	0.150 (3.81)
39	38.385 (974.98)	+0.230 (+5.84)	46 (320)	0.165 (4.19)
42	41.375 (1050.93)	+0.250 (+6.35)	46 (320)	0.180 (4.57)
45	44.370 (1127.00)	+0.260 (+6.60)	46 (320)	0.195 (4.95)
48	47.360 (1202.94)	+0.280 (+7.11)	46 (320)	0.210 (5.33)
54	53.350 (1355.09)	+0.300 (+7.62)	46 (320)	0.225 (5.72)
60	59.340 (1507.24)	+0.320 (+8.128)	46 (320)	0.240 (6.10)

<sup>A</sup> In-plant quality control manufacturing. Base inside diameter calculations should include out-of-roundness as a result of shipping and handling.