



# Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings<sup>1</sup>

This standard is issued under the fixed designation F 1336; 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 and test methods for fabricated or molded poly(vinyl chloride) (PVC) gasketed sewer fittings to be used with piping manufactured to Specifications D 3034, F 679, F 789, or F 891. Fabricated fittings may be manufactured from pipe, or from a combination of pipe and injection molded parts, or from injection molded parts.

1.2 The requirements of this specification are to provide fabricated or molded PVC gasketed fittings suitable for non-pressure drainage of sewage and surface water, as well as applications involving subsurface drainage.

NOTE 1—Industrial waste lines should be installed only with the specific approval of the governing code authority when using chemicals not commonly found in drains and sewers or temperatures in excess of 140°F (60°C), or both.

1.3 Fittings produced to this specification are intended to be installed with pipe, in accordance with Practice D 2321.

1.4 The values stated in inch-pound units are to be regarded as the standard. Within the text, the SI units are given in parentheses.

1.5 The following precautionary caveat pertains to the test method portion only, Section 10, 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.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

- D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing<sup>2</sup>
- D 1600 Terminology for Abbreviated Terms Relating to Plastics<sup>2</sup>
- D 1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds<sup>2</sup>
- D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings<sup>3</sup>

- D 2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications<sup>3</sup>
- D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading<sup>3</sup>
- D 2444 Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)<sup>3</sup>
- D 2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems<sup>3</sup>
- D 2749 Symbols for Dimensions of Plastic Pipe Fittings<sup>3</sup>
- D 3034 Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings<sup>3</sup>
- D 3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals<sup>3</sup>
- D 4396 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Related Plastic Compounds for Non-Pressure Piping Products<sup>3</sup>
- F 402 Practice for Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings<sup>3</sup>
- F 412 Terminology Relating to Plastic Piping Systems<sup>3</sup>
- F 477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe<sup>3</sup>
- F 610 Practice for Estimating the Quality of Molded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings by the Heat Reversion Technique<sup>3</sup>
- F 656 Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings<sup>3</sup>
- F 679 Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings<sup>3</sup>
- F 789 Specification for Type PS-46 Poly(Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings<sup>3</sup>
- F 891 Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe with Cellular Core<sup>3</sup>
- F 913 Specification for Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe<sup>3</sup>
- 2.2 *Federal Standard:*
  - Fed. Std. No. 123 Marking for Shipment (Civil Agencies)<sup>4</sup>
- 2.3 *Military Standard:*
  - MIL-STD-129 Marking for Shipment and Storage<sup>4</sup>

## 3. Terminology

3.1 Definitions are in accordance with Terminology F 412

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 08.04.

<sup>4</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

unless otherwise specified.

3.1.1 Abbreviations are in accordance with Terminology D 1600, unless otherwise indicated. The abbreviation for poly(vinyl chloride) plastic is PVC. The abbreviation for plastic sewer main is PSM.

#### 4. Materials and Manufacture

4.1 *Basic Materials*—The pipe components for fabricated fittings shall be made from virgin or rework PVC compound. The cell classifications are indicated under the material section of the pipe standards referenced in 1.1. Molded components or fittings shall be made from virgin or rework PVC compound having a cell classification of 11432 or 12321 as prescribed in Specification D 4396 or 12454 or 13343 as prescribed in Specification D 1784. Virgin or rework compounds that have different cell classifications because one or more properties exceed the minimum requirements of those specified compounds are also acceptable.

4.2 *Rework Material*—Clean rework material generated from the manufacturer's own pipe, molded components, or fittings production may be used by the same manufacturer providing the rework material meets the requirements of 4.1 and that the pipe, molded components, or fittings produced meet all the requirements of this specification.

#### 5. Miscellaneous Requirements

##### 5.1 Gasketed Joining System:

5.1.1 The assembled joint shall display no leakage when tested in accordance with the requirements of Specification D 3212.

5.1.2 The joint assembly shall be in accordance with the fitting manufacturer's recommendations. The end of the pipe or fitting spigot shall not damage or dislodge the gasket during insertion. Lubricant is required on the spigot and sometimes additionally on the gasket. All surfaces of the joint that make contact with the gasket shall be smooth and free of imperfections, ridges, fractures, or cracks that could adversely affect the seal.

5.1.3 The dimensions of the elastomeric gasket seal joints shall accommodate pipes and fitting spigots having the average outside diameters and tolerances detailed in Table 1.

##### 5.2 Elastomeric Seal Components:

5.2.1 *Bells*—The dimensions shall be in accordance with the manufacturer's standard design dimensions and tolerances.

5.2.2 *Gaskets*—The elastomeric seal (gasket) shall comply with the requirements of Specifications F 477 or F 913 at the time the fittings are manufactured.

5.3 *Lubricant*—The lubricant used for field assembly shall be the type recommended by the manufacturer of the gasketed joint.

5.4 *Fabrication Joint Material*—The fabrication joint material or reinforcing overlays shall be of that type, strength, and properties suitable for the intended fabrication. It is the decision of the manufacturer as to what material will be used. The PVC primer shall meet the requirements of Specification F 656. The PVC solvent cement shall meet the requirements of Specification D 2564.

5.5 *Over-Wrapped Fittings*—Fabricated fittings that have a reinforcing overlay of fiberglass and thermosetting resin shall meet all of the requirements of this specification except for 4.1 and 4.2.

5.6 *Pipe Performance*—When pipe is used to fabricate a fitting, the pipe shall meet the requirements of the relevant ASTM standards.

5.7 *Waterway*—Fabricated fittings shall be constructed so that pipe ends do not project into the waterway of the fitting body.

#### 6. Dimensions and Permissible Variations

6.1 *Diameter*—The average outside diameter of molded fitting spigots or of spigot pipe components for fabricated fittings shall meet the requirements given in Table 1 when measured in accordance with 10.1.1.

##### 6.2 Wall Thickness:

6.2.1 *Fabricated Fittings*—Pipe wall thickness shall meet the requirements of the applicable specifications mentioned in

TABLE 1 Dimensions and Tolerances

Nominal Size in. (mm)	Outside Diameter				Minimum Wall Thickness for Molded Fittings/ Parts <sup>4</sup>					
	Average		Tolerance		SDR35		SDR26		DR23.5	
	in.	mm	in. ±	mm ±	in.	mm	in.	mm	in.	mm
4 (100)	4.215	107.06	±0.009	±0.23	0.120	3.05	0.162	4.11	0.178	4.52
5 (125)	5.640	143.26	±0.010	±0.25	0.161	4.09	0.217	5.51	0.265	6.73
6 (150)	6.275	159.39	±0.011	±0.28	0.180	4.57	0.241	6.12	-	-
8 (200)	8.400	213.36	±0.012	±0.30	0.240	6.10	0.323	8.20	-	-
10 (250)	10.500	266.70	±0.015	±0.38	0.300	7.62	0.404	10.26	-	-
12 (300)	12.500	317.50	±0.018	±0.46	0.360	9.14	0.481	12.22	-	-
15 (375)	15.300	388.62	±0.023	±0.58	0.437	11.10	0.588	14.94	-	-
18 (450)	18.700	474.98	±0.028	±0.71	0.536	13.61	0.719	18.26	-	-
21 (525)	22.047	559.99	±0.033	±0.84	0.632	16.05	0.848	21.54	-	-
24 (600)	24.803	630.00	±0.037	±0.94	0.711	18.06	0.954	24.23	-	-
27 (675)	27.953	710.01	±0.042	±1.07	0.801	20.35	1.075	27.31	-	-
30 (750)	31.496	800.00	±0.047	±1.19	-	-	0.903	22.94	-	-
33 (825)	35.433	900.00	±0.053	±1.35	-	-	1.016	25.81	-	-
36 (900)	39.370	1000.00	±0.059	±1.50	-	-	1.129	28.68	-	-
42 (1050)	44.500	1130.00	±0.060	±1.52	-	-	1.276	32.41	-	-
48 (1200)	50.800	1290.00	±0.075	±1.90	-	-	1.456	36.98	-	-

<sup>4</sup>Special Conditions for Wall Thickness Deviations, Molded Fittings or Components—The wall thickness is a minimum value except that a 10 % variation resulting from a core shift is allowable; however, the average of the two opposite wall thickness shall equal or exceed the value shown in the table.

the scope of this specification when measured in accordance with Test Method D 2122 and 10.1.2, and shall have a minimum pipe stiffness of 46 psi. In the case of fittings fabricated from pipe sections, the thickness of the wall in the bell and the branch area shall be considered satisfactory if it was formed from pipe meeting those requirements.

6.2.2 *Molded Fittings or Components*—The wall thickness of the waterway and socket or bell of molded fittings or components shall be no less than the respective minimum thickness indicated in Table 1. For reducing fittings or those with smaller inlets, the minimum wall thickness of each inlet shall be no less than the minimum wall thickness indicated in Table 1 for that nominal pipe size. The thickness shall be determined in accordance with Method D 2122 and 10.1.2

NOTE 2—Refer to Fig. 1, Fig. 2, and Appendix X1 for geometric configurations as illustrations of some of the fittings being produced. Consult the individual manufacturer for laying lengths.

6.3 *Socket Length*—The minimum distance from the center of the gasket to the bottom of the socket and the maximum distance from the center of the gasket to the outermost edge of fitting socket (see Fig. 3) shall comply with the dimensions given in Table 2 when measured in accordance with Test Method D 2122 and 10.1.3.

6.4 *Spigot Length*—The minimum distance from the spigot end to the area where spigot diameter changes due to a socket, branch, or change in angle shall comply with the dimensions given in Table 2 when measured in accordance with 10.1.4.

7. Mechanical Properties

7.1 *Impact Strength*—The impact strength of tees, wyes, couplings, bends, increasers/reducers, and saddles shall be no less than the values given in Table 3, when tested in accordance with 10.2.

NOTE 3—This test is intended only for use as a quality control test; not for use as a simulated service test.

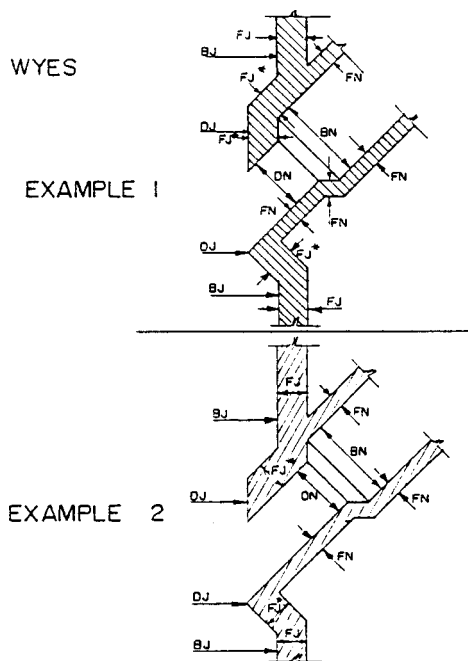
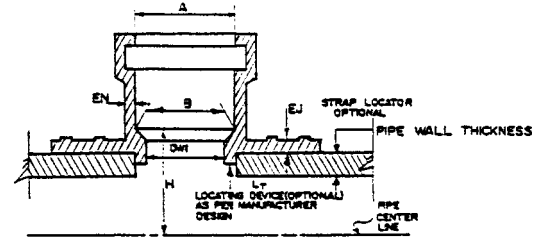
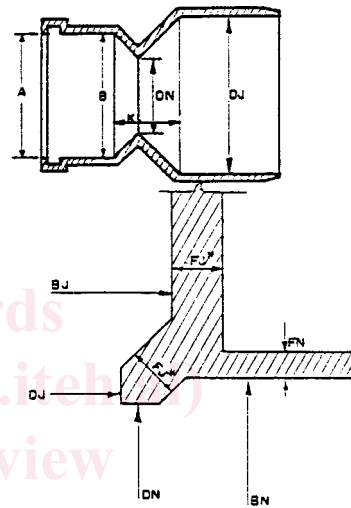


FIG. 1 Product Design Examples

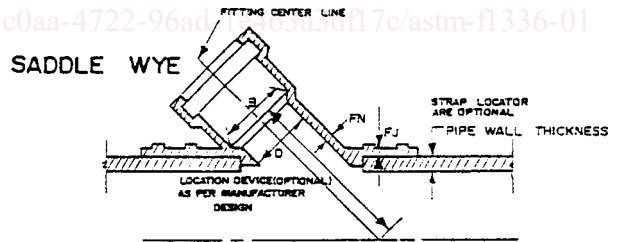
SADDLE TEE



REDUCER COUPLING



TEE



NOTE 1—The asterisk (\*) in the examples indicates that the region beyond the intersection of the branch and the main body is considered a transition area and may vary based on individual manufacturers design.

NOTE 2—Dimensions are identified according to Symbols D 2749. Consult the manufacturer for their actual values.

FIG. 2 Product Design Examples (continued)

7.2 *Pipe Stop Load Support*—Tee, tee-wye, or saddle tee shall support the load indicated in Table 4, when tested in accordance with 10.3.

NOTE 4—This test is intended only for use as a quality control test; not for use as a simulated service test.

7.3 *Internal Stress*—Molded components or fittings shall be tested in accordance with 10.4.

7.4 *Branch Bending*—The wye or tee branch of a fabricated fitting shall be subject to a load in accordance with 10.5.

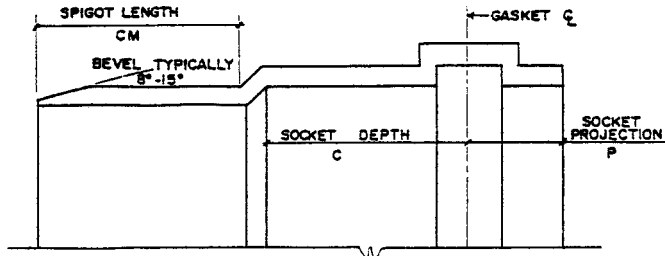


FIG. 3 Socket/Spigot Descriptions

TABLE 2 Socket and Spigot Dimensions<sup>A</sup>

Nominal Size, in. (mm)	Socket		Spigot
	Depth, "C" min, in. (mm)	Projection, "P" max, in. (mm)	Length, "cm" min, in. (mm)
4 (100)	1.50 (38.1)	1.00 (25.4)	2.25 (57.1)
5 (125)	1.97 (50)	1.50 (38.1)	3.00 (76.2)
6 (150)	2.15 (54.6)	2.00 (50.8)	3.50 (88.9)
8 (200)	2.50 (63.5)	2.50 (63.5)	4.10 (104.1)
10 (250)	2.92 (74.2)	3.00 (76.2)	5.00 (127)
12 (300)	3.10 (78.7)	3.50 (88.9)	6.00 (152.4)
15 (375)	3.20 (81.3)	4.00 (101.6)	7.50 (190.5)
18 (450)	4.10 (104.1)	4.50 (114.3)	8.60 (218.4)
21 (525)	4.61 (117.1)	5.00 (127)	9.60 (244)
24 (600)	5.12 (130)	5.50 (139.7)	10.62 (269.7)
27 (675)	5.63 (143)	6.00 (152.4)	11.60 (294.6)
30 (750)	10.00 (254)	5.75 (146.1)	14.49 (368.0)
33 (825)	11.00 (279.4)	5.75 (146.1)	14.85 (377.2)
36 (900)	11.00 (279.4)	5.75 (146.1)	15.47 (392.9)
42 (1050)	12.00 (304.8)	5.75 (146.1)	16.50 (419.1)
48 (1200)	12.00 (304.8)	6.50 (165.1)	17.48 (444.0)

<sup>A</sup>Refer to Fig. 3 as to location.

TABLE 3 Impact Strength

Fitting Size, in. (mm)	Impact Strength	
	ft-lbf	J
4 (100)	50	68
5 (125)	60	81
6 (150)	75	101
8 (200)	75	101
10 (250)	90	122
12 (300)	90	122
15 (375)	120	162
18 (450)	120	162
21 (525)	150	203
24 (600)	150	203
27 (675)	180	243
30 (750)	180	243
33 (825)	210	285
36 (900)	210	285
42 (1050)	240	325
48 (1200)	240	325

NOTE 5—This is intended only for use as a quality control test; not for use as a simulated service test.

8. Workmanship, Finish, and Appearance

8.1 The fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The fittings shall be as uniform as commercially practical in color, opacity, density, and other physical properties.

9. Sampling and Conditioning

9.1 Sampling—The selection of fitting samples shall be as

TABLE 4 Pipe Stop Support

Branch Nominal Diameter, in. (mm)	Load	
	lb	kg
4 (100)	1320	599
5 (125)	1770	803
6 (150)	1970	894
8 (200)	2630	1193
10 (250)	3290	1492
12 (300)	3920	1778
15 (375)	4800	2177
18 (450)	5000	2268
21 (525)	5000	2268
24 (600)	5000	2268
27 (675)	5000	2268
30 (750)	5000	2268
33 (825)	5000	2268
36 (900)	5000	2268
42 (1050)	5000	2268
48 (1200)	5000	2268

agreed upon between the purchaser and the seller. In case of no prior agreement, samples selected by the testing laboratory shall be deemed adequate.

9.2 Conditioning:

9.2.1 Referee Testing—The specimen shall be conditioned in accordance with Procedure A of Practice D 618 at 73.4 ± 3.6°F (23 ± 2°C) and 50 ± 5 % relative humidity for not less than 40 h prior to test. Tests shall be conducted at the same conditions of temperature and humidity, unless otherwise specified.

9.2.2 Quality Control Tests—For quality control tests, the specimens shall be conditioned for a minimum of 4 h in air or 1 h in water at 73.4 ± 3.6°F (23 ± 2°C). The specimen shall be tested at 73.4 ± 3.6°F (23 ± 2°C) without regard to relative humidity.

10. Test Methods

10.1 Dimensions and Tolerances:

10.1.1 Diameter—The average outside diameter of a pipe or spigot component shall be measured in accordance with Test Method D 2122. A measurement device accurate to 0.001 in. (0.02 mm) shall be used.

10.1.2 Wall Thickness—Wall thickness shall be measured in accordance with Test Method D 2122. A measurement device accurate to 0.001 in. (0.02 mm) shall be used.

10.1.3 Socket Length—Socket length shall be measured in accordance with Test Method D 2122. A steel rule, with at least 0.031-in. or 1-mm graduations shall be used. Refer to Fig. 3 for measuring locations.

10.1.4 Spigot Length—Spigot lengths shall be measured using a steel rule with at least 0.031-in. or 1-mm graduations. Refer to Fig. 3 for measuring locations.

10.2 Impact Strength—Determine in accordance with Test Method D 2444, using a 20-lb (9.1-kg) Tup A for sizes 18 in. and smaller; 30-lb (13.6-kg) Tup A for sizes above 18 in. Flat Plate Holder B shall be used. Test six specimens at the impact levels shown in Table 3. Support with shim(s) one of the largest hub(s) under the bell and hit mid point between gasket groove and bottom of bell. Test conditions shall be in accordance with 9.2.1 or 9.2.2. Five of the six specimens shall pass. If two or more fail, test another six specimens. Nine passes out of twelve