



Standard Specification for Polyethylene (PE) Corrugated Pipe With a Smooth Interior and Fittings¹

This standard is issued under the fixed designation F 892; 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 includes requirements, test methods, and materials for a polyethylene (PE) corrugated pipe with a smooth interior. The pipe consists of an outer corrugated wall connected to a smooth inner wall. Joints and fittings are included in this specification.

1.2 The requirements of this specification are intended to provide pipe and fittings suitable for underground use in nonpressure applications such as sewers, conduit, and land drainage.

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

1.4 The following safety hazards caveat pertains only to the test methods portion, Section 11, 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 Testing²
- D 1600 Terminology for Abbreviated Terms Relating to Plastics²
- D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings³
- D 2321 Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe³
- D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading³
- D 2444 Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)³
- D 2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials³

¹ This specification is under the jurisdiction of ASTM Committee F-17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.26 on Olefin Based Pipe.

Current edition approved Sept. 10, 1995. Published November 1995. Originally published as F 892 – 84. Last previous edition F 892 – 94.

² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 08.04.

D 3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals³

D 3350 Specification for Polyethylene Plastic Pipe and Fittings Materials³

F 412 Terminology Relating to Plastic Piping Systems³

F 449 Practice for Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control³

F 477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe³

F 481 Practice for Installation of Thermoplastic Pipe and Corrugated Tubing in Septic Tank Leach Fields³

2.2 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)⁴

2.3 Military Standard:

MIL-STD-129 Marking for Shipment and Storage⁴

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 polyethylene is PE.

3.1.1 *crease*—a deformation that cannot be removed like a dent; generally associated with wall buckling.

3.1.2 *parting line*—a slight mark or surface irregularity in the pipe or fitting surface as a result of a mold separation at that location.

4. Classification

4.1 Pipe and fittings produced in accordance with this specification shall be classified as Type R or Type NR, based upon the compounds used in the manufacture.

4.1.1 Type R pipe or fittings shall be produced from compounds for which a hydrostatic design basis has been established in accordance with Test Method D 2837.

4.1.2 Type NR pipe or fittings may be produced from compounds for which no hydrostatic design basis exists.

4.2 Pipe and fittings classified as Type R or Type NR are intended for nonpressure applications only. Users should consult the manufacturer for information regarding the effects of other environments, such as exposure to sunlight, weathering,

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

etc., during use or storage.

5. Materials and Manufacture

5.1 *Compounds* used in the manufacture of pipe and fittings shall conform to Table 1 for Type R and Type NR classes of pipe. Compounds listed under Type R may also be used in the manufacture of Type NR pipe.

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

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

5.4 *Pipe* shall be manufactured by simultaneous extrusion of the smooth and corrugated walls with the smooth inner wall fused to the outer corrugated wall.

5.5 *Fittings* shall be molded or fabricated.

6. Joining

6.1 Gasketed joints shall meet the requirements of Specification D 3212 and be assembled to place the gasket in radial compression between the pipe spigot and either a formed bell or attached coupling. Lubricant and assembly instructions shall be in accordance with the manufacturer’s recommendations.

6.2 Joints without gaskets shall be assembled with bells or couplings manufactured in accordance with this specification.

7. Requirements

7.1 *Pipe Stiffness*—Pipe shall have the minimum pipe stiffness listed in Table 2, when tested in accordance with 11.3.

7.2 *Flattening*—There shall be no evidence of splitting, cracking, breaking, or separation of the two walls when the pipe is tested in accordance with 11.3.

7.3 *Pipe Impact Strength*—Pipe shall have the minimum pipe impact strengths in Table 3, when tested in accordance with 11.4.

7.4 *Joint Tightness*—Gasketed pipe joints shall show no leakage when tested in accordance with 11.5.

7.4.1 Testing for joint tightness is not intended to be a routine quality control test. The test is used to qualify pipe fitting joints at a specific level of performance.

7.5 *Bond*—The bond between the inner and outer walls (at the corrugation valley) shall not separate, when tested in accordance with 11.6.

8. Dimensions

8.1 *Pipe Dimensions* shall meet the requirements given in Table 4, when measured in accordance with 11.7.1.

TABLE 2 Minimum Pipe Stiffness at 5 % Deflection

Pipe Size, in.	Pipe Stiffness, psi (kPa)	
4	75 (517)	120 (827)

TABLE 3 Minimum Impact Strength at 73°F (23°C)

Pipe Size, in.	Impact, ft-lb (J), Pipe Stiffness	
	75 psi	120 psi
4	45 (61.0)	50 (67.8)

8.2 *Socket Dimensions* shall meet the requirements given in Table 5, when measured in accordance with 11.7.1.

8.3 Coupling bands, when fully closed, shall meet the common socket dimensions and shall provide a band width meeting the coupling dimension, L, given in Table 5, when measured in accordance with 11.7.1.

8.4 *Fitting Dimensions*—Molded fittings shall meet the requirements given in Table 5 for Fig. 1, when measured in accordance with 11.7.1. Fabricated fittings shall meet the pipe and socket dimensional requirements of the components from which they are built.

8.5 *Laying Lengths* of pipe shall be as agreed upon between the purchaser and the manufacturer. Lengths shall be supplied with no plus variation and a maximum –1-in. (–25-mm) tolerance, when measured in accordance with 11.7.1.

8.6 *Perforations*—Perforations shall be cleanly cut and uniformly spaced along the length of the pipe. Holes shall be centered at the outside corrugation valleys in a size, shape, and pattern to suit the needs of the specifier. Unless otherwise specified, leach bed piping shall have at least two rows of holes nominally ¼ to ¾ in. in diameter at a maximum of 5-in. (125-mm) centers, when measured in accordance with 11.7.2. This pipe shall be clearly marked with a locating stripe or embossment.

9. Workmanship

9.1 The pipe and fittings shall be homogeneous throughout and free of foreign inclusions or visible defects. The pipe and fittings shall be as uniform as commercially practicable in color, opacity, density, and other physical properties. The ends shall be cut squarely and cleanly. They shall be free of internal obstructions, including defective seams. The product function shall be considered when judging external defects. Holes deliberately placed in perforated pipe are acceptable.

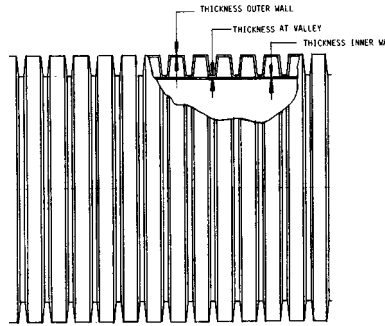
9.1.1 *Visible Defects*, such as, but not limited to cracks, creases, splits, obstructions to flow in pipe, and uncolored or “pale” pipe, are not permitted.

TABLE 1 Classification of Polyethylene Compounds

Property	Specification D 3350				
	Type R Resins			Type NR Resins	
Density (base resin)	2	3	3	3	4
Melt index	1, 2, or 3	2 or 3	2, 3, 4, 5, or 6	3, 4, or 5	2, 3, 4, 5, or 6
Flexural modulus	3 or 4	4 or 5	4 or 5	4 or 5	4 or 5
Tensile strength	3 or 4	4 or 5	4 or 5	4 or 5	4, 5, or 6
ESCR	2 or 3	2	3	3	2 ^A
HDB	3	3	3	4	0
Color and UV stabilizer code	C or E	C or E	C or E	C or E	C or E

^AUse 10 % “Igepal” C0630P instead of 100 %.

TABLE 4 Pipe Dimensions



Pipe Size, in. (mm)	Outside Diameter Maximum	Inside Diameter, min	Minimum Wall Thickness					
			75 psi Pipe Stiffness			120 psi Pipe Stiffness		
			Inner Wall	Outer Wall	At Valley	Inner Wall	Outer Wall	At Valley
4 (101.6)	4.755 (120.64)	3.920 (99.6)	0.0225 (0.57)	0.0152 (0.39)	0.0225 (0.57)	0.0300 (0.76)	0.0200 (0.51)	0.0300 (0.76)

TABLE 5 Fitting Dimensions

Nominal Pipe Size, in. (mm)	Common Socket Dimensions					Coupling Dimensions				Adapter Dimensions					
	A		B		T	L	L1	LL	C		D		LL1	L2	L3
	Average	Tolerance	Average	Tolerance	min	min	min	min	Average	Tolerance	Average	Tolerance	min		
4 (101.6)	4.762 (121)	±0.015 (±0.38)	4.740 (120.4)	±0.015 (±0.38)	0.110 (2.8)	6 (152)	2 ¹⁵ / ₁₆ (75)	1/8 (3)	4.376 (111.2)	±0.015 (±0.38)	4.324 (109.8)	±0.015 (±0.38)	0.110 (2.8)	6 ⁵ / ₁₆ (161)	3 ³ / ₁₆ (81)

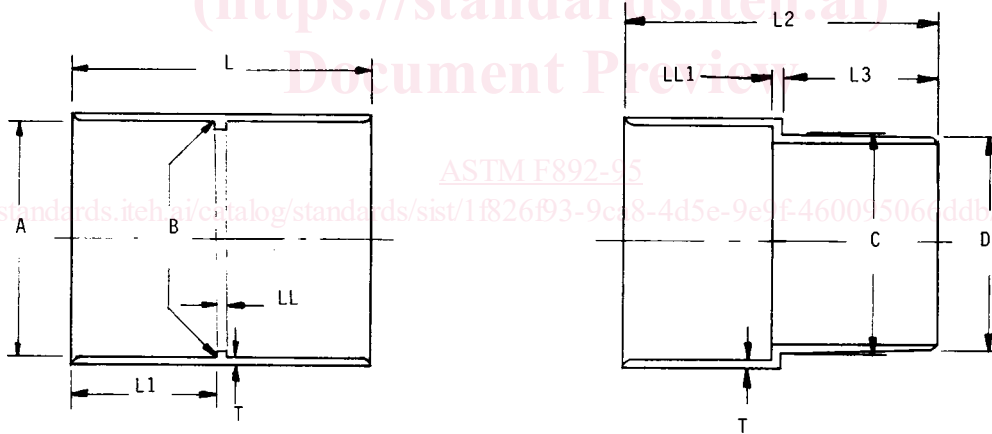


FIG. 1 Fittings

10. Sampling and Retest

10.1 *Sampling*—The selection of the sample or samples shall be as agreed upon between the purchaser and the seller.

10.2 If the results of any test(s) do not meet the requirements of this specification, the test(s) may be conducted again in accordance with an agreement between the purchaser and the seller. There shall be no agreement to lower the minimum requirement of the specification by such means as omitting tests that are a part of the specification, substituting or modifying a test method, or by changing the specification limits. In retesting, the product requirements of this specification shall be met, and the test methods designated in the specification shall be followed. If, upon retest, failure occurs, the quantity of product represented by the test(s) does not meet the requirements of this specification.

NOTE 1—Sampling and any retest are normally conducted at the time of manufacture to assure the required quality for the intended use.

11. Test Methods

11.1 *Conditioning*—Condition the specimen prior to test at 73.4 ± 3.6°F (23 ± 2°C) for not less than 40 h in accordance with Procedure A in Practice D 618, for those tests where conditioning is required and in all cases of disagreement.

11.2 *Test Conditions*—Conduct the test in the laboratory temperature of 73.4 ± 3.6°F (23 ± 2°C), unless otherwise specified.

11.3 *Pipe Stiffness and Flattening:*

11.3.1 *Pipe Stiffness*—Determine the pipe stiffness at 5 % deflection using Test Method D 2412.

NOTE 2—The 5 % deflection criteria that was arbitrarily selected for