



# Standard Specification for 12 to 60 in. [300 to 1500 mm] Dual and Triple Profile-Wall Polyethylene (PE) Pipe and Fittings for Sanitary Sewer Applications<sup>1</sup>

This standard is issued under the fixed designation F2763; 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 dual and triple profile wall polyethylene pipe and fittings. The nominal inside diameters covered are 12 to 60 in. [300 to 1500 mm].

1.2 The requirements of this specification are intended to provide pipe and fittings suitable for underground use for non-pressure sanitary sewer systems. Pipe and fittings produced in accordance with this specification shall be installed in compliance with Practice [D2321](#).

1.3 This specification covers pipe and fittings with an essentially smooth interior wall and either an annular corrugation (dual wall) or an essentially smooth and exterior wall using an annular corrugated profile middle wall (triple wall) ([Fig. 1](#)).

1.4 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 The following precautionary caveat pertains only to the test method portion, Section 7, 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:<sup>2</sup>

[D578/D578M](#) Specification for Glass Fiber Strands

<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 Feb. 1, 2016. Published April 2016. Originally approved in 2011. Last previous edition approved in 2011 as F2763–11. DOI: 10.1520/F2763–16.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[A666](#) Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

[D618](#) Practice for Conditioning Plastics for Testing

[D1600](#) Terminology for Abbreviated Terms Relating to Plastics

[D2122](#) Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

[D2321](#) Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

[D2412](#) Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

[D2444](#) Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

[D3212](#) Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

[D3350](#) Specification for Polyethylene Plastics Pipe and Fittings Materials

[D4218](#) Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique

[F412](#) Terminology Relating to Plastic Piping Systems

[F477](#) Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

[F2136](#) Test Method for Notched, Constant Ligament-Stress (NCLS) Test to Determine Slow-Crack-Growth Resistance of HDPE Resins or HDPE Corrugated Pipe

### 2.2 AASHTO Standard:<sup>3</sup>

[LRFD, Section 12](#) AASHTO LRFD Bridge Design Specifications Section 12 – Buried Structures and Tunnel Liners

### 2.3 Federal Standards:<sup>4</sup>

[Fed. Std. No. 123](#) Marking for Shipment (Civil Agencies)

[MIL-STD-129](#) Marking for Shipment and Storage

<sup>3</sup> Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

<sup>4</sup> DLA Document Services Building 4/D 700 Robbins Avenue Philadelphia, PA 19111-5094 <http://quicksearch.dla.mil/>

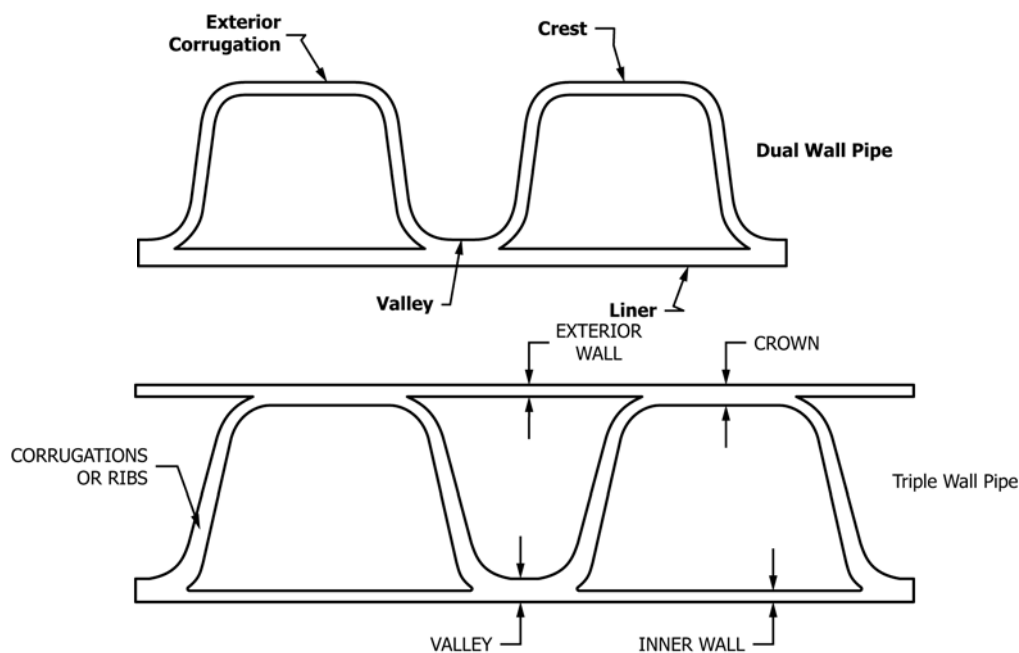


FIG. 1 Typical Dual and Triple Wall Pipe Profile

2.4 NCHRP (National Cooperative Highway Research Program) Report:<sup>4</sup>

NCHRP Report 631 Updated Test and Design Methods for Thermoplastic Drainage Pipe

### 3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F412 and abbreviations are in accordance with Terminology D1600, unless otherwise specified. The abbreviation for polyethylene is PE.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *annular corrugation*—corrugation formed in a circumferential pattern around the pipe as opposed to a helical corrugation, which is formed in a spiral pattern around the pipe.

3.2.2 *dual wall, n*—in this case, the profile pipe wall construction provides an interior liner in the waterway and includes ribs, corrugations, or other shapes, which can be either solid or hollow, that helps brace the pipe against diametrical deformation. The corrugation wall is exposed to the soil side of the pipe and is its exterior wall.

3.2.3 *triple wall, n*—in this case, the profile pipe wall construction provides an interior wall in the waterway, an exterior wall to the soil, and includes ribs, corrugations, or other shapes, which can be either solid or hollow, that helps brace the pipe against diametrical deformation. The corrugation wall is completely encapsulated by the interior and exterior walls.

### 4. Ordering Information

4.1 Orders for product made to this specification shall include the following information to adequately describe the desired product

4.1.1 This ASTM designation (F2763) and year of issue,

4.1.2 Diameters,

4.1.3 Total footage of each pipe diameter involved,

4.1.4 Pipe laying length,

4.1.5 Fitting type(s):

4.1.5.1 Size and type of fittings, including mainline and branch diameters, and

4.1.5.2 Number of fittings per diameter.

### 5. Materials and Manufacture

5.1 *Pipe and Fabricated Fittings*—The pipe and fabricated fittings shall be made of virgin PE material meeting the requirements of Specification D3350 with a minimum cell classification of 435400C, except that carbon black content shall equal to or greater than 2.0% but not exceed 3.0 % when tested in accordance with D4218. Materials that have a higher cell classification in one or more properties shall be permitted provided all other product requirements are met.

5.2 *Rework Material*—Clean rework material generated from the manufacturer's own pipe and fittings production of this product shall be permitted to be used by the same manufacturer. Rework shall be the same cell classification as new PE compound with which it is blended and the pipe produced shall meet all the requirements of this specification.

### 6. General Requirements

6.1 *Workmanship*—The pipe and fittings shall be homogeneous throughout and be as uniform as commercially practical in color, opacity, and density. 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. The ends shall be cut cleanly and squarely through valleys.

6.1.1 Visible defects, cracks, creases, splits, in pipe are not permissible.

6.2 Dimensions and Tolerance:

6.2.1 Nominal Size—The nominal size for the pipe and fittings shall be the inside diameter shown in Table 1.

NOTE 1—The outside diameters of products manufactured to this specification are not specified; therefore, compatibility between pipe and fittings made to this specification from different manufacturers must be verified.

6.2.2 Minimum Inside Diameter—The minimum inside diameter shall be as shown in Table 1, when measured in accordance with 7.3.1.

6.2.3 Length—The pipe shall be supplied in any length agreeable to both the owner and the manufacturer. Length shall not be less than 99 % of stated quantity when measured in accordance with 7.3.2.

6.2.4 Minimum Wall, Crown, Valley and Liner Thickness—The minimum thickness of the pipe wall, crown, valley and liners shall meet the requirements given in Table 1 when measured in accordance with 7.3.3.

6.3 Pipe Stiffness—Minimum pipe stiffness at 5 % deflection shall meet the requirements given in Table 1 when tested in accordance with 7.4.

NOTE 2—The 5 % deflection criterion, which was selected for testing convenience, is not a limitation with respect to in-use deflection. The engineer is responsible for establishing the acceptable deflection limit.

6.4 Pipe Flattening—There shall be no evidence of splitting, cracking, breaking, separation of seams, separation of the outer and inner wall, or combinations thereof, when conditioned in accordance with 7.2 and tested in accordance with 7.5.

6.5 Pipe Impact Strength—There shall be no evidence of splitting, cracking, breaking, separation of seams, separation of the outer and inner wall, or combinations thereof, when tested in accordance with 7.6 and examined under normal light and the unaided eye.

6.6 Fittings and Joining Systems:—

6.6.1 Fittings shall be fabricated by the pipe manufacturer from pipe made in accordance with this standard. Fittings fabricated from dual-wall pipe shall be used with dual-wall pipe. Fittings fabricated from triple-wall pipe shall be used with triple-wall pipe. Fitting material shall comply with 5.1 and 5.2.

NOTE 3—The fittings may be fabricated from the pipe by a variety of processes including hot plate welding, spin welding or other processes.

6.6.1.1 Fittings shall be parallel-plate load tested. Fittings shall be tested in an installation orientation, shall be uniformly supported (body and outlet(s)) by the lower plate, and uniformly loaded (body and outlet(s)) by the upper plate. Fittings shall meet or exceed a vertical load equivalent to the 5% deflection stiffness in accordance with Table 1 for pipe to which the fitting is to be joined. The equivalent maximum load shall be the 5% deflection stiffness in accordance with Table 1 unit load (psi/in or kPa /mm) multiplied by the length of the fitting (run plus branch(es) as applicable) that is loaded by the upper plate. Testing shall be for equivalent load, not deflection. Acceptance criteria shall be in accordance with 6.4.

NOTE 4—Installation orientation means that the fitting testing orientation is as though it were installed in a pipeline, for example, an elbow or tee with the directional outlet(s) to the side. In accordance with an established quality program, fittings should be tested to only qualify the overall design and integrity of the unit. As unique structures, testing of every angle orientation is not necessary.

6.6.1.2 The fitting body in an installation orientation shall be impact tested in accordance with 7.6. Acceptance criteria shall be in accordance with 6.5.

6.6.2 The joining system(s) between pipe and between pipe and fittings shall be of a design that preserves pipeline slope and alignment during construction and prevents separation at the joints.

6.6.3 Pipe and fittings shall have a watertight bell/spigot joint that complies with the laboratory tests defined and described in Test Method D3212 and utilizes a gasket that

TABLE 1 Pipe Stiffness and Pipe Dimensions

Pipe Inside Diameter <sup>A</sup>		Minimum Inside Diameter <sup>B</sup>		Inside Diameter Tolerances		Minimum Pipe Stiffness at 5 % Deflection		Minimum Inner Liner Thickness		Minimum Outer Liner Thickness		Minimum Valley Thickness		Minimum Crown Thickness	
in.	[mm]	in.	[mm]	in.	[mm]	lb/in. /in.	[kPa]	in.	[mm]	in.	[mm]	in.	[mm]	in.	[mm]
12	[300]	11.90	[302]	+0.11/-0.11	+3.0/-3.0	46	[317]	0.043	[1.1]	...	...	0.048	[1.2]	0.072	[1.8]
15	[375]	14.85	[377]	+0.11/-0.11	+3.0/-3.0	46	[317]	0.052	[1.3]	...	...	0.065	[1.7]	0.103	[2.6]
18	[450]	17.93	[455]	+0.14/-0.14	+4.0/-4.0	46	[317]	0.060	[1.5]	...	...	0.072	[1.8]	0.105	[2.7]
21	[525]	20.75	[527]	+0.15/-0.15	+4.0/-4.0	46	[317]	0.062	[1.6]	...	...	0.079	[2.0]	0.116	[2.9]
24	[600]	23.90	[607]	+0.16/-0.16	+4.0/-4.0	46	[317]	0.064	[1.6]	...	...	0.086	[2.2]	0.127	[3.2]
27	[675]	26.75	[679]	+0.17/-0.17	+4.0/-4.0	46	[317]	0.073	[1.9]	...	...	0.088	[2.2]	0.130	[3.3]
30	[750]	29.79	[757]	+0.18/-0.18	+5.0/-5.0	46	[317]	0.086	[2.2]	...	...	0.093	[2.4]	0.132	[3.4]
30	[750]	29.62	[752]	+0.18/- 0.18	+4.6/-4.6	46	[317]	0.070	[1.8]	0.070	[1.8]	0.089	[2.3]	0.127	[3.2]
36	[900]	35.40	[899]	+0.21/- 0.21	+5.3/-5.3	46	[317]	0.095	[2.4]	0.095	[2.4]	0.120	[3.0]	0.182	[4.6]
42	[1050]	41.31	[1049]	+0.22/- 0.22	+5.6/-5.6	46	[317]	0.105	[2.7]	0.105	[2.7]	0.133	[3.4]	0.182	[4.6]
48	[1200]	47.31	[1201]	+0.27/- 0.27	+6.9/-6.9	46	[317]	0.105	[2.7]	0.105	[2.7]	0.139	[3.5]	0.187	[4.8]
54	[1350]	53.32	[1354]	+0.27/- 0.27	+6.9/-6.9	46	[317]	0.100	[2.8]	0.110	[2.8]	0.144	[3.7]	0.187	[4.8]
60	[1500]	59.30	[1506]	+0.31/- 0.31	+7.9/-7.9	46	[317]	0.115	[2.9]	0.115	[2.9]	0.151	[3.8]	0.231	[5.9]

<sup>A</sup>The triple wall profile wall pipe are only available in sizes 30 in [750 mm] to 60 in [1500 mm]. Dual wall profile pipe are available in sizes 12 in [300 mm] to 30 in [750 mm]. At 30 in [750 mm] diameter, where the dimensions for the outer liner thickness are defined, all the associated dimensions shall only pertain to the triple wall profile pipe.

<sup>B</sup>The manufacturer's stated inside diameter is the diameter plus or minus the inside diameter tolerance. In no case shall the manufacturer's minimum diameter with the tolerance be less than the minimum as shown in Table 1.

complies with the requirements of Specification **F477**. Note that special provisions must be taken in order to join field cut pipe that meets the requirements of Test Method **D3212**. Any component used in the joining material shall be resistant to effluents being carried in the pipe.

**6.6.4 Lubricant**—The lubricant used for assembly of gasketed joints shall have no detrimental effect on the gasket or on the pipe.

**6.6.5 Optional Bell Retaining Bands or External Wraps**—Bell retaining bands or external stiffening wraps shall be made of corrosive resistant materials such as fiberglass (Specification **D578/D578M**) or stainless steel (Specification **A666**). All metallic mechanical devices, including castings and bolt assemblies used to mechanically restrain the bell shall be constructed of corrosion resistant materials meeting the physical properties and chemical composition requirements of A 666, Type 302 through Type 316

**6.6.5.1** The Specification **D578/D578M** fiberglass roving chopped strand shall be an E or S type glass, free of any alkali, dirt or other impurities. The band shall consist of overlapping continuous or chopped, filament fiber strand and not a fabric.

**6.6.6** A joint proof-of-design analysis shall be conducted on the pipe joints using the method outlined in **7.8**. Each joint proof of design pressure test shall be conducted by an independent third party, which provides written certification for each analysis or test. This test is a one-time validation test for the specific pipe diameter, profile geometry, gasket and joint configuration supplied by the manufacturer.

**6.7 Pipe Flattening**—There shall be no evidence of splitting, cracking, breaking, separation of seams, separation of either the outer or inner wall, or combinations thereof, when tested in accordance with **7.5**. Additionally, at or below the deflection limit defined in **Eq 1** and **Eq 2** for dual wall and triple wall profiles, respectively, the specimen shall be considered as failing this test when the load does not increase continuously with increasing deflection.

Buckling Deflection Limit:

Dual wall:

$$\Delta = 0.012 \cdot \left( \frac{D}{0.5(D_o - D_i)} \right) \quad (1)$$

Triple Wall:

$$\Delta = 0.0144 \cdot \left( \frac{D}{0.5(D_o - D_i)} \right) \quad (2)$$

where:

$\Delta$  = minimum buckling deflection limit (in/in [mm/mm])

$D$  = mean diameter (centroid) of pipe (in [mm])

$0.5 (D_o - D_i)$  = height of the corrugation (outside diameter minus inside diameter)

NOTE 5—**Eq 1** and **Eq 2** are based on the results from NCHRP Report 631 and is defined as being derived from the standard parallel plate test equation.

**6.8 Pipe Impact Strength**—There shall be no evidence of splitting, cracking, breaking, separation of seams, separation of the outer and inner wall, or combinations thereof, when tested in accordance with **7.6**.

**6.9 Slow Crack Growth Resistance Pipe**—For slow crack-growth resistance, the pipe shall be evaluated using the notched constant ligament stress (NCLS) test according to the procedure described in **7.7**. The average failure time of the five test specimens shall exceed 30 h with no single test specimen's failure time less than 21 h. For smaller pipe sizes where the NCLS test cannot be conducted on the pipe due to size limitations on the longitudinal coupon, the NCLS test shall be conducted on molded plaques, and the average failure time of the five test specimens shall exceed 41 h.

**6.10 Structural Design:**

**6.10.1** The manufacturer shall supply appropriate data necessary to satisfy the requirements of deflection, thrust, buckling, bending stress and long-term strain in accordance with the design criteria of the LRFD, Section 12. The design engineer shall verify that the data provided by the manufacturer satisfy the product requirements.

**6.10.2** The minimum long-term (50-year) design values for modulus of elasticity and tensile strength for the PE compounds shall be 22 000 psi (152 MPa) and 900 psi (6.2 MPa), respectively.

**6.10.3** The maximum allowable long-term (50-year) tensile strain limit for design shall be 5%.

## 7. Test Methods

**7.1 Conditioning:**—

**7.1.1 Referee Testing**—When conditioning is required for referee tests, condition the specimens in accordance with Procedure A of Practice **D618** at  $73.4 \pm 3.6^\circ\text{F}$  [ $23 \pm 2^\circ\text{C}$ ] for not less than 40 h prior to test. Conduct tests under the same conditions of temperature. The selection of the sample or samples of the pipe and fittings shall be as agreed upon between the owner and the seller. In case of no prior agreement, any sample selected by the testing laboratory shall be deemed permitted.

**7.1.2 Quality Control Testing**—Condition specimens for a minimum of 4 h prior to test in air or 1 h in water at  $73.4 \pm 3.6^\circ\text{F}$  [ $23 \pm 2^\circ\text{C}$ ] without regard to relative humidity.

**7.2 Test Conditions**—Conduct tests other than those for routine quality control purposes in the standard laboratory atmosphere of  $73.4 \pm 3.6^\circ\text{F}$  [ $23 \pm 2^\circ\text{C}$ ], in the referenced test method or in this specification.

**7.3 Dimensions:**

**7.3.1 Inside Diameter**—Measure the inside diameter in accordance with Test Method **D2122**.

**7.3.2 Length**—Measure pipe length in accordance with Test Method **D2122**. These measurements may be taken at ambient temperature.

**7.3.3 Minimum Wall, Crown, Valley and Liner Thickness**—Measure the thickness of each wall component in accordance with Test Method **D2122**. Each specimen shall be cut perpendicular to the seam line of the pipe. This circumferential cut shall be made directly through a corrugation allowing a plain view of the inner wall  $360^\circ$  around the circumference in order to obtain a minimum of eight measurements in accordance with Test Method **D2122**. Each specimen shall also be cut along the axis of the seam line to measure the longitudinal profiles for



two full corrugation periods to obtain a minimum of eight measurements for each section thickness.

**7.4 Pipe Stiffness**—Select three pipe specimens and test for pipe stiffness in accordance with Test Method **D2412**, except for the following conditions:

**7.4.1** The test specimens shall be at least 24 in. [609 mm] in length. However, the test specimen shall not be less than three full corrugations in length.

**7.4.2** Each specimen shall be cut mid-valley to mid-valley (see **Fig. 1**) while still meeting or exceeding the minimum length requirement.

**7.4.3** Determine the minimum inner wall thickness and locate the first specimen in the loading machine with the minimum inner wall thickness located at 9:00 or 3:00 when viewing the specimen from the end. The specimen shall lie flat on the plate within 0.125 in. [3 mm]. Use the first location as a reference point for rotation and testing the other specimen. Rotate the other specimen 45° and 90° from the original orientation. Test each specimen in only one position.

**7.5 Flattening**—Flatten the three test specimens from **7.4** between parallel plates until the pipe inside diameter is reduced by 40 %. The rate of loading shall be 2 in./min [50 mm/min]. The test specimens, when examined under normal light and the unaided eye, shall show no splitting, cracking, breaking or separation of the pipe walls.

**7.6 Impact Resistance**—Test pipe specimens in accordance with Test Method **D2444**, when conditioned in accordance with **7.2**, except six specimens shall be tested, or six impacts shall be made on one specimen. In the latter case, successive impacts shall be separated by  $60 \pm 10^\circ$  for impacts made on one circle, or at least 12 in. [305 mm] longitudinally for impacts made on one element. Impact points shall be at least 6 in. [150 mm] from the end of the specimen. Impact strength shall not be less than 140 ft·lbf [190 J]. Tests shall be conducted using either a 20 lb (9 kg) Tup B or 30 lb (15 kg) Tup B and a flat-plate specimen Holder B. Condition the specimens for 24 h at a temperature of  $73 \pm 3^\circ\text{F}$  ( $23 \pm 2^\circ\text{C}$ ), and conduct all tests within 60 s of removal from this atmosphere. The center of the falling tup shall strike on a corrugation crown (crest) for all impacts. All specimens must pass.

**7.6.1** Test specimens shall be cut valley-to-valley and equal in length to one-half of the nominal diameter but not less than 18-in. (457 mm).

**7.7 Slow-Crack Growth Resistance**—PE Pipe — Pipe test specimens shall be taken from the extruded pipe in the pipe liner area. Test 5 pipe specimens using the same protocol for molded bars in Test Method **F2136** test, except for the following modifications:

**7.7.1** The applied stress for the NCLS test shall be 600 psi [4138 kPa].

**7.7.2** The test specimen is taken from the extruded pipe liner if the size allows. If not, then the extruded pipe is chopped and molded into a specimen.

**7.8 Joint Proof-of-Design Pressure Test:**

**7.8.1** This proof-of-design test shall be conducted on each pipe diameter and any that differs in joint design.

**7.8.2** Prepare and test joints in accordance with **7.8.4**. Pipe shall have a watertight bell/spigot joint that complies with the laboratory tests defined and described in Test Method **D3212**.

**7.8.3** Failure of any of the specimens shall constitute failure of the test.

**7.8.4 Specimen Preparation:**

**7.8.4.1** Condition assembled test specimens a minimum of 2 h at the test temperature to be used prior to initiating the test procedure.

**7.8.4.2** Test joints shall be assembled on the appropriate size pipe in accordance with the manufacturer's joining procedure. Lubricate and assemble the joint according to the manufacturer's instructions with the associated **F477** gasket in place.

**7.8.4.3** Testing shall be conducted at standard laboratory temperature of  $73.4 + 3.6^\circ\text{F}$  ( $23 + 2^\circ\text{C}$ ) unless otherwise specified.

**7.8.4.4** Maintain assembled joint configuration for a minimum of 1000 h under ambient temperature conditions  $75 + 5^\circ\text{F}$  ( $24 + 3^\circ\text{C}$ ). Upon completion of this hold time, conduct a full **D3212** test on the assembled joint.

**NOTE 6**—For entire 1000 h hold time, joint shall remain undisturbed and fully assembled. Joint may not be disassembled and reassembled at any point prior to completion of full **D3212** testing.

**7.8.4.5** Aside from stiffeners that are part of the joint design being tested, no stiffeners may be used in the specimen.

## 8. Inspection

**8.1** Inspection of the product shall be as agreed upon between the owner and the manufacturer as part of the purchase contract. Unless otherwise specified in the contract or purchase agreement, the manufacturer is responsible for the performance of all inspection and test requirements specified herein.

**8.2 Notification**—If inspection is specified by the owner, the manufacturer shall notify the owner in advance of the date, time, and place of testing of the pipe or fittings, or both, so that the purchaser may be represented at the test.

**8.3 Access**—The inspector shall have free access to those parts of the manufacturer's plant that are involved in work performed under this specification. The manufacturer shall afford the inspector all reasonable facilities for determining whether the pipe or fittings, or both, meet the requirements of this specification.

## 9. Rejection and Rehearing

**9.1** If the results of any test(s) do not meet the requirements of this specification, the test(s) shall be conducted again in accordance with an agreement between the owner and the manufacturer. 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 this 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.

## 10. Certification

10.1 When specified in the purchase order or contract, a manufacturer's or independent laboratory's certification shall be furnished to the owner that the products shipped, as identified by the lot description of 11.1 and 11.2, were manufactured, sampled, tested, and inspected at the time of manufacture in accordance with this specification and have been found to meet the requirements. When specified in the purchase order or contract, a report of the test results shall be furnished. Where requested, certified actual inside diameter, extrusion line and shift the pipe was produced shall be provided.

## 11. Markings

11.1 *Pipe*—Each length of pipe in compliance with this specification shall be clearly marked with the following information: this designation ASTM F2763, the nominal size, the legend PE, the manufacturer's name, trade name or trademark, plant location, and date of manufacture. The marking shall be applied at the time of manufacture to the pipe. It shall be placed, at least, at each end of each length of pipe or spaced at intervals of not more than 10 ft [3.0 m].

11.2 *Fittings*—Each fitting in compliance with this specification shall be clearly marked with the following information:

this designation ASTM F2763, the nominal size, the legend PE, the manufacturer's name, trade name or trademark, plant location, and date of manufacture.

NOTE 7—Due to the unique profiles and joint dimensions that are provided by manufacturers, special attention should be paid to joining only pipe and fittings produced by either the same manufacturer or production equipment with the same dimensions. The markings on the pipe and fittings should be used for making this assessment.

## 12. Packaging

12.1 All pipe and couplings and fittings shall, unless otherwise specified, be packaged for standard commercial shipment.

## 13. Quality Assurance

13.1 When the product is marked with this designation (ASTM F2763), the manufacturer affirms that the product was manufactured, inspected, sampled, and tested in accordance with this specification and has been found to meet the requirements of this specification.

## 14. Keywords

14.1 fittings; interior liner; PE; pipe; polyethylene; profile wall; sanitary sewer

## SUPPLEMENTARY REQUIREMENTS

These requirements apply only to federal/military procurement, not domestic sales or transfers.

### S1. *Responsibility for Inspection*

S1.1 Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all inspection and test requirements specified herein. The manufacturer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless the owner disapproves. The owner shall have the right to perform any of the inspections and tests set forth in this specification, where such inspections are deemed necessary to ensure that material conforms to prescribed requirements.

NOTE S1—In U.S. federal contracts, the contractor is responsible for inspection.

### S2. *Packaging and Marking for U.S. Government Procurement*

S2.1 *Packaging* —Unless otherwise specified in the contract, the materials shall be packaged in accordance with the manufacturer's standard practice in a manner ensuring arrival at destination in satisfactory condition and which will be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification rules or National Motor Freight Classification rules.

*Marking*— Marking for shipment shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

NOTE S2—The inclusion of U.S. government procurement requirements shall not be construed as an indication that the U.S. government uses or endorses the products described in this document.

**APPENDIXES**
**(Nonmandatory Information)**
**X1. AUTHORITIES**

X1.1 Since this product has a wide variety of uses in sanitary sewer systems, approval for its use rests with various agencies. The installer should contact the relevant authority to obtain local installation guidelines.

X1.2 The pipe manufacturer(s) should be able to provide proof of product acceptance by specific agencies, when appropriate.

**X2. MANHOLE CONNECTIONS**

X2.1 Watertight connections to manholes require the exact outside dimensions of the pipe to properly size both the manhole opening as well as the resilient gasket connection between the manhole and pipe.

X2.2 The following table provides nominal outside dimensions for preliminary sizing of both the manhole as well as the associated resilient connection. The values in this table should not be used for design as these are only estimated dimensions. Actual pipe outside dimensions vary per manufacturer and this material should be requested from the supplier prior to finalization of any sanitary sewer design or sizing.

Pipe Inside Diameter		Nominal Pipe Outside Diameter	
in.	[mm]	in.	[mm]
12	[300]	14	[356]
15	[375]	17	[432]
18	[450]	21	[533]
21	[530]	24	[610]
24	[600]	28	[711]
27	[675]	31	[787]
30	[750]	35	[889]
36	[900]	42	[1067]
42	[1050]	47	[1194]
48	[1200]	53	[1346]
54	[1350]	60	[1524]
60	[1500]	66	[1676]

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; http://www.copyright.com/*