



Designation: F2764 – 11a

An American National Standard

# Standard Specification for 30 to 60 in. [750 to 1500 mm] Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications<sup>1</sup>

This standard is issued under the fixed designation F2764; 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 triple wall polypropylene pipe and fittings. The nominal inside diameters covered are 30 to 60 in. [750 to 1600 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, an essentially smooth exterior wall and an annular corrugated profile middle wall (Fig. 1).

1.4 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 statement applies only to 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>

A666 Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

D256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

D1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

D1505 Test Method for Density of Plastics by the Density-Gradient Technique

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)

D2990 Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

D3895 Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry

D4101 Specification for Polypropylene Injection and Extrusion Materials

D4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique

D4389 Specification for Finished Glass Fabrics Woven From Rovings

D6992 Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method

F412 Terminology Relating to Plastic Piping Systems

<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 May 1, 2011. Published May 2011. Originally approved in 2010. Last previous edition approved in 2011 as F2764-11. DOI:10.1520/D2764-11A.

<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.

\*A Summary of Changes section appears at the end of this standard

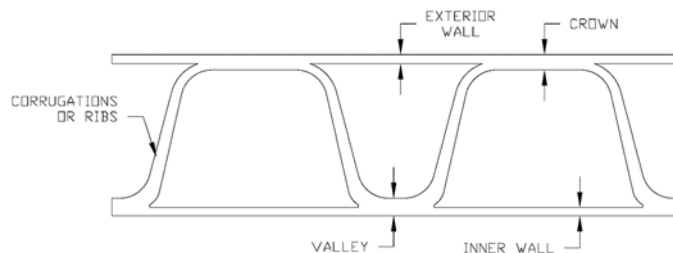


FIG. 1 Typical Triple Wall Pipe Profile

**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 Standards:<sup>3</sup>

**LRFD, Section 12** AASHTO LRFD Bridge Design Specifications Section 12 – Buried Structures and Tunnel Liners

2.3 Federal Standard:<sup>4</sup>

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

2.4 Military Standard:<sup>4</sup>

**MIL-STD-129** Marking for Shipment and Storage

### 3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *triple wall, n*—In this case, the triple 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.

### 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 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*—Polypropylene Compounds – Polypropylene compounds used in the manufacture of the triple wall pipe and fittings shall have the minimum properties as shown in **Table 1**. Polypropylene compounds shall be comprised of the base polypropylene virgin resin and all additives, colorants, UV inhibitors and stabilizers. Conditioning sampling, preparation, and testing of molded specimens shall be accordance with the requirements in Specification **D4101**. For slow crack-growth resistance of the pipe corrugation, and inner and exterior walls, PP resins shall be evaluated using the notched constant ligament stress (NCLS) test according to the procedure described in **7.7.1**. The average failure time of the five test specimens shall exceed 100 h with no single test specimen's failure time less than 71 h. Compounds shall be tested and validated on an annual basis or for any new formulations.

5.2 *Color and Ultraviolet Stabilization for Pipe and Fittings*—The pipe shall be colored or black. Black polypropylene compounds shall have between 2.0 and 3.0 percent carbon black when tested in accordance with the procedures in Test Method **D4218**. Colored polypropylene compounds shall be protected from Ultraviolet (UV) degradation with UV stabilizers.

5.3 *Rework Plastic*—Clean polypropylene rework plastic, generated from the manufacturer's own production of the product and having the same minimum physical properties, may be used by the manufacturer, provided that the pipe produced meets all the requirements of this specification.

TABLE 1 Polypropylene Compound Properties

|                                          |                    |                                            |                 |                 |
|------------------------------------------|--------------------|--------------------------------------------|-----------------|-----------------|
| Melt Flow Rate                           | <b>D1238</b>       | g/10 min                                   | 0.25 @ 230°C    | 1.50 @ 230°C    |
| Density                                  | <b>D792, D1505</b> | lb/in <sup>3</sup> (g/cm <sup>3</sup> )    | 0.0325 (0.900)  | 0.0343 (0.950)  |
| Tensile Strength at Yield                | <b>D638</b>        | psi (N/mm <sup>2</sup> )                   | 3,500 (24)      | 4,500 (31)      |
| Elongation at Yield                      | <b>D638</b>        | % (%)                                      | 5 (5)           | 25 (25)         |
| Flexural Modulus (1% secant)             | <b>D790B</b>       | psi (N/mm <sup>2</sup> )                   | 175,000 (1,200) | 275,000 (1,900) |
| IZOD Impact Strength (730°F [230°C])     | <b>D256</b>        | ft-lb/in <sup>2</sup> [kJ/m <sup>2</sup> ] | 23.8 (50)       | No Break        |
| Oxidative-Induction Time (392°F [200°C]) | <b>D3895</b>       | min                                        | 25              | 200             |

<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> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.