



Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe¹

This standard is issued under the fixed designation F894; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This specification covers requirements and test methods for materials, dimensions, workmanship, ring stiffness, flattening, joint systems, and a form of marking for large diameter, 10 in. to 138 in. (250 mm to 3510 mm), inside diameter based polyethylene (PE) pipe of profile wall construction and with bell and spigot, heat fusion, extrusion welded or electrofusion joints for use in gravity flow applications, such as for sewers and drains.

NOTE 1—Pipe produced to this specification should be installed in accordance with Practice D2321 and with the manufacturer's recommendations.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The following safety hazards caveat pertains only to the test method 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D618 Practice for Conditioning Plastics for Testing

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

Current edition approved Feb. 15, 2024. Published March 2024. Originally approved in 1985. Last previous edition approved in 2019 as F894 –19. DOI: 10.1520/F0894-24.

² 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.

D1600 Terminology for Abbreviated Terms Relating to Plastics (Withdrawn 2024)³

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

D2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

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

D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

F412 Terminology Relating to Plastic Piping Systems

F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

F585 Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers

F1290 Practice for Electrofusion Joining Polyolefin Pipe and Fittings

F2620 Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

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 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 *closed profile (CP)*—a profile wall pipe wall construction that presents an essentially smooth internal and external

³ The last approved version of this historical standard is referenced on www.astm.org.

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

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

surface that is formed by a solid core wall pipe with thermoplastic pipe reinforcement, or by the spiral winding of a structural thermoplastic profile.

3.2.2 *extrusion welding*—a joining technique that is accomplished by extruding a molten polyethylene bead between two prepared surface ends.

3.2.3 *gravity flow, n*—for the purposes of the specification, gravity flow means a piping system flowing less than full, except during storms or high flow conditions when the system may become surcharged in which case, the system is subject to temporary internal hydrostatic pressure that is limited to joint capabilities. See Section 7.

3.2.4 *open profile (OP)*—a profile wall pipe wall construction that presents an essentially smooth internal surface with a ribbed or corrugated external surface. The wall of the pipe is reinforced with round or rectangular profiles.

3.2.5 *profile wall*—a pipe wall construction that presents an essentially smooth surface in the waterway but includes other shapes, which can be either solid or hollow, that help brace the pipe against diametrical deformation (see Fig. 1).

3.2.6 *ring stiffness constant (RSC)*—the value obtained by dividing the parallel plate load in pounds per foot of pipe length, by the resulting deflection, in percent, at 3 % deflection. The ring stiffness constant (RSC) that is used in this specification to classify pipe is a measure of the pipe's deformation resistance to diametrical point loading, such as is experienced during handling and installation. A pipe should resist these loads sufficiently well to allow its installation to prescribed deflection limits.

4. Classifications and Uses

4.1 *Uses*—The requirements of this specification are intended to provide pipe suitable for underground or overground gravity flow drainage of sewage, surface water, and industrial waste.

NOTE 2—Industrial waste disposal lines should be installed only upon the specific approval of the governing code, or other authority, and after determining the suitability of the product under the anticipated environment, temperature, and other end-use conditions. Users should

consult the manufacturer for the required product information.

4.2 *Classifications*—This specification covers PE profile wall pipe products made in six standard ring stiffness constant (RSC) classifications, namely 40, 63, 100, and 160, 250 and 400. These are referred to as RSC 40, RSC 63, RSC 100, RSC 160, RSC 250 and RSC 400.

NOTE 3—Other RSC classifications may be supplied, as agreed upon between the purchaser and the manufacturer, provided that such product complies in every other respect with the applicable dimensional tolerances and testing requirements of this specification.

4.3 *Pipe Ends and Joining Systems*: Joints intended for sewer applications shall be watertight. They shall meet the requirements of Test Method D3212. Joints intended for drainage applications shall be sand/silt tight.

4.3.1 *Bell and Spigot, Gasketed Type*—The bell and spigot are formed on the pipe or welded to the pipe. Seal is made by a gasket compressed between the spigot and billed ends of the pipe (see Fig. 2).

4.3.2 *Bell and Spigot, Extrusion Weld Type*—The bell and spigot are formed on the pipe or welded to the pipe. Seal is made by extrusion welding (3.2.2) of the bell and spigot pipe ends (see Fig. 3).

4.3.3 *Heat Fusion*—Heat fusion joints are in accordance with Practice F2620. Seal is made by joining molten pipe ends under controlled temperature and pressure (see Fig. 4).

4.3.4 *Plain End Extrusion Weld*—Seal is effected by extrusion welding prepared plain ends of the pipe (see Fig. 5).

4.3.5 *Spiral Wound Plain End*—Seal is made by extrusion welding on the ID side, or the OD side, or both, of the prepared plain ends at the termination of the spiral winding. (see Fig. 6).

4.3.6 *Electrofusion Bell & Spigot*—The seal is made by electrofusion joining through an integral electrofusion device built into the spigot end of the pipe. The spigot is inserted into the socket (or bell) and current applied to the contacts.

4.3.7 *Electrofusion Coupling*—The seal is made by electrofusion joining through a separate electrofusion coupling or fitting. The electrofusion fitting may be an enlarged OD coupler, a reduced ID coupler, or an equal OD/ID internal coupler.

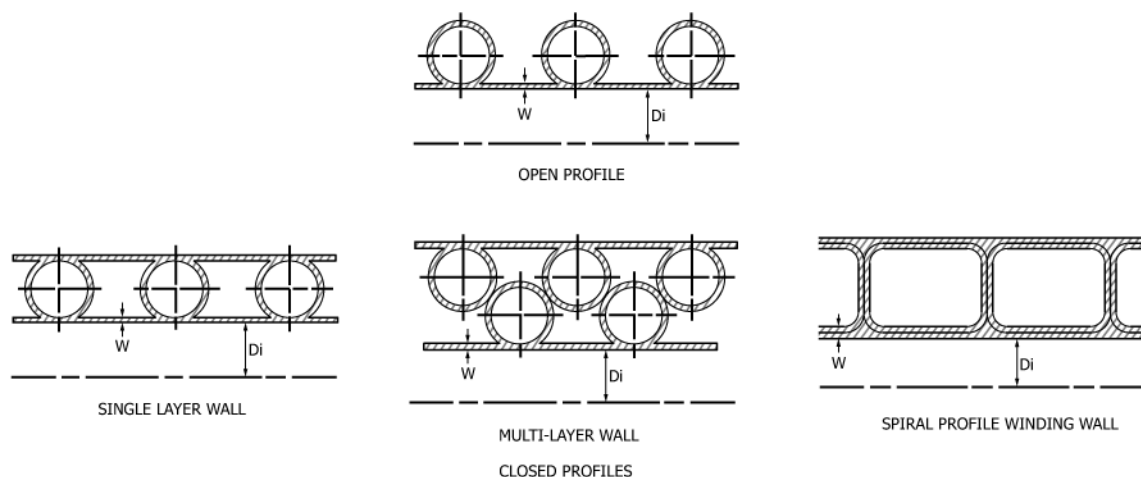


FIG. 1 Typical Construction of Profile Wall PE Pipe