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An American National Standard

Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing[1]

This standard is issued under the fixed designation D3261; 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 covers polyethylene (PE) butt fusion fittings for use with polyethylene pipe (IPS, DIPS, and ISO) and tubing (CTS). Included are requirements for materials, workmanship, dimensions, marking, sustained pressure, and burst pressure.

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 *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]

D1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

D1599 Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings

F1473 Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins

D1600 Terminology for Abbreviated Terms Relating to Plastics (Withdrawn 2024)[3]

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

D2513 Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings

D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

F412 Terminology Relating to Plastic Piping Systems

F2206 Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)

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 Storage[4]

2.4 *National Sanitation Foundation Standard:*

Standard No. 14 for Plastic Piping Components and Related Materials[5]

2.5 *Plastic Pipe Institute*[6]

PPI TR-3 Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe7

PPI TR-4 HDB/SDB/PDB/MRS Listed Materials, PPI Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe

2.6 *ISO Standards:*[7]

ISO 3607 Polyethylene (PE) pipes

3. Terminology

3.1 Definitions are in accordance with Terminology F412 and abbreviations are in accordance with Terminology D1600, unless otherwise specified.

3.2 *Definitions:*

3.2.1 *butt fusion fitting, n*—a fitting have one or more outlets that can be butt fusion joined to pipe, tubing, or fitting.

[1] This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.10 on Fittings.

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[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.

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

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

[5] Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, http://www.nsf.org.

[6] Available from Plastics Pipe Institute (PPI), 105 Decker Court, Suite 825, Irving, TX 75062, http://www.plasticpipe.org.

[7] Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, https://www.iso.org.

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

3.2.2 *dimension ratio (DR) for thermoplastic pipe*—the ratio of diameter to wall thickness. For this specification it is calculated by dividing the specified outside diameter by the specified wall thickness of the fitting at its area of fusion. DRs are rounded and do not calculate exactly.

4. Classification

4.1 *General*—This specification covers butt fusion fittings intended for use with polyethylene pipe and tubing.

4.1.1 Fittings covered by this specification are molded or machined from extruded or molded stock. Fittings covered by this specification may be produced by joining together one or more fittings meeting this specification using butt or saddle heat fusion joining methods. Fittings that are butt fusion joined to a length of pipe or tubing (a pup) meeting the end-use system specification are acceptable.

4.1.2 Fittings fabricated by other types of thermal welding methods, such as extrusion welding, hot-air welding, and ultrasonic welding are not included in this specification.

4.1.3 Fittings fabricated with mitered heat fusion joints are covered by Specification F2206, and are not included in this specification

4.1.4 Fittings intended for use in the distribution of natural gas or petroleum fuels shall also meet the requirements of Specification D2513.

5. Ordering Information

5.1 When ordering fittings under this specification, the following should be specified:

5.1.1 Polyethylene compound (material designation or trade name)

5.1.2 Style of fitting (tee, 90° ell, and the like)

5.1.3 Size:

5.1.3.1 Nominal diameter.

5.1.3.2 CTS, IPS, DIPS, or schedule.

5.1.3.3 Dimension ratio number or schedule number.

6. Materials

6.1 *Polyethylene Compound*—Polyethylene material compounds suitable for use in the manufacture of fittings under this specification shall meet Specification D3350 and shall meet the Specification D3350 classification and property requirements in Table 1 and shall have PPI TR-4 HDB and HDS listings at 73 °F (23 °C) and HDB listings 140 °F (60 °C) in accordance with Table 1.

6.2 *Color and Ultraviolet (UV) Stabilization*—Polyethylene material compounds shall meet Specification Table 1 code C or E. Code C material compounds shall have 2 to 3 percent carbon black. Code E material compounds shall be colored with UV stabilizer.

6.3 *Rework Material*—Clean polyethylene compound from the manufacturer's own production that met 6.1 and 6.2 as virgin material is suitable for remolding into fittings, either alone or blended with new compound of the same cell classification or material designation. Fittings containing the rework material shall meet the material and product requirements of this specification.

7. Requirements

7.1 *Dimensions and Tolerances:*

7.1.1 *Outside Diameter*—Nominal outside diameters of butt fusion fittings shall conform to the nominal iron pipe size (IPS), ductile iron pipe size (DIPS)or copper tubing size (CTS) dimensions at area of fusion. These dimensions and tolerances shall be as shown in Table 2, Table 3, Table 4 and of this specification.

7.1.2 *Inside Diameter (CTS Fittings Only)*—Inside diameters of butt fusion fittings for tubing at area of fusion shall conform to the dimensions of the tubing being joined. The dimensions and tolerances for the fittings are shown in Table 5.

7.1.3 *Wall Thickness*—The wall thicknesses of butt fusion fittings shall not be less than the minimum specified for the pipe or tubing. The wall thicknesses and tolerances at the area of fusion shall be as shown in Table 5, Table 6, Table 7, and Table 8 of this specification.

7.1.4 *Measurements*—These shall be made in accordance with the applicable sections of Test Method D2122.

7.1.5 *Design Dimensions*—Overall fitting dimensions may be as preferred from a design standpoint by the manufacturer and accepted by the purchaser consistent with 7.1.3.

7.1.6 *Special Sizes*—Where existing system conditions or special local requirements make other diameters or dimension ratios necessary, other sizes or dimension ratios, or both, shall

TABLE 1 Specification D3350 Classification of Polyethylene Fittings Materials

Physical Properties	Cell Classification and Properties for Polyethylene Pipe Materials							
	PE2606	PE2706	PE2708	PE3608	PE3708	PE3710	PE4708	PE4710
Density	2	2	2	3	3	3	4	4
Melt Index	3 or 4	3 or 4	3 or 4	4	4	4	4	4
Flexural modulus	≥4	≥4	≥4	≥4	≥4	≥4	≥4	≥5
Tensile Strength	≥3	≥3	≥3	≥4	≥4	≥4	≥4	≥4
Slow crack growth resistance (F1473)	6	7	7	6	7	7	7	7
Hydrostatic strength classification	3	3	3	4	4	4	4	4
Color and UV Stabilizer[A]	C or E	C or E	C or E	C or E	C or E	C or E	C or E	C or E
HDB at 140 °F (60 °C), PPI TR-4, psi (MPa)	[B]	[B]	[B]	[B]	[B]	[B]	[B]	[B]
HDB at 73 °F (23 °C), PPI TR-4, psi (MPa)	630 (4.34)	630 (4.34)	800 (5.52)	800 (5.52)	800 (5.52)	1000 (6.90)	800 (5.52)	1000 (6.90)

[A] See 6.2.

[B] Listing required; consult manufacturer for listed value.