



Standard Specification for Crosslinked Polyethylene (PEX) Pipe for Gas Distribution Applications¹

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1. Scope*

1.1 This specification covers outside diameter controlled, metric-sized and inch-sized black or yellow crosslinked polyethylene (PEX) pipe, made in pipe dimension ratios ranging from 6 to 17, and pressure rated for gas distribution. Included are requirements and test methods for material, workmanship, dimensions, burst pressure, hydrostatic sustained pressure, stabilizer functionality, bent-pipe hydrostatic pressure, degree of crosslinking, chemical resistance, minimum operating temperature and squeeze-off. Requirements for pipe markings are also given. The pipe covered by this specification is intended for buried gas distribution and gas transmission pressure piping applications.

1.2 This specification also includes requirements for joints made between PEX pipe and polyethylene electrofusion fittings (specified in Specification F3373). Fittings to be used with PEX pipe manufactured to this specification are in Specification F2829/F2829M. Installation considerations are in X3.2.

NOTE 1—Inch-sized fittings should not be used for metric-sized pipe, and metric-sized fittings should not be used for inch-sized pipe.

1.3 The text of this specification references notes, footnotes, and appendixes, which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the specification.

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 are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.5 *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 This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.60 on Gas.

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1.6 *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

- D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents
- D618 Practice for Conditioning Plastics for Testing
- D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- D1505 Test Method for Density of Plastics by the Density-Gradient Technique
- 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
- D1600 Terminology for Abbreviated Terms Relating to Plastics (Withdrawn 2024)³
- D1603 Test Method for Carbon Black Content in Olefin Plastics
- D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
- D2290 Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe
- D2565 Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications
- D2765 Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics
- D2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
- D4218 Test Method for Determination of Carbon Black

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. 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.

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

Content in Polyethylene Compounds by the Muffle-Furnace Technique

D5596 Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics

F412 Terminology Relating to Plastic Piping Systems

F876 Specification for Crosslinked Polyethylene (PEX) Tubing

F1041 Guide for Squeeze-Off of Polyolefin Gas Pressure Pipe and Tubing

F1563 Specification for Tools to Squeeze-off Polyethylene (PE) Gas Pipe or Tubing

F1948 Specification for Metallic Mechanical Fittings for Use on Outside Diameter Controlled Thermoplastic Gas Distribution Pipe and Tubing

F2657 Test Method for Outdoor Weathering Exposure of Crosslinked Polyethylene (PEX) Tubing

F2829/F2829M Specification for Metric- and Inch-Sized Fittings for Crosslinked Polyethylene (PEX) Pipe

F2897 Specification for Tracking and Traceability Encoding System of Natural Gas Distribution Components (Pipe, Tubing, Fittings, Valves, and Appurtenances)

F3373 Specification for Polyethylene (PE) Electrofusion Fittings for Outside Diameter Controlled Crosslinked Polyethylene (PEX) Pipe

2.2 *Federal Standard*.⁴

FED-STD-123 Marking for Shipment (Civil Agencies)

2.3 *Military Standard*.⁴

MIL-STD-129 Marking for Shipment and Storage

2.4 *ISO Standards*.⁵

ISO 1167 Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method

ISO 13477 Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Small-scale steady-state test (S4 test)

ISO 14531-1 Plastics pipes and fittings — Crosslinked polyethylene (PE-X) pipe systems for the conveyance of gaseous fuels — Metric series — Specifications — Part 1: Pipes

ISO 14531-2 Plastics pipes and fittings — Crosslinked polyethylene (PE-X) pipe systems for the conveyance of gaseous fuels — Metric series — Specifications — Part 2: Fittings for heat-fusion jointing

ISO 14531-3 Plastics pipes and fittings — Crosslinked polyethylene (PE-X) pipe systems for the conveyance of gaseous fuels — Metric series — Specifications — Part 3: Fittings for mechanical jointing (including PE-X/metal transitions)

ISO 18553 Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds.

2.5 *PPI Documents*.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 Pipe

PPI TR-4 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

PEX Pipe Design Manual for Water, Oil, Gas & Industrial Applications

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 crosslinked polyethylene is PEX. Plastic pipe denotes a particular diameter schedule of plastic pipe that is outside diameter controlled.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *crosslinked polyethylene, n*—a polyethylene material that has undergone a change in molecular structure using a chemical or a physical process whereby the polymer chains are chemically linked.

3.2.2 *PEX pipe material designation code*—The PEX pipe material designation code shall consist of the abbreviation for crosslinked polyethylene (PEX) followed by four Arabic digits as shown in **Table 1**, and as defined in Terminology **F412** for PEX pipe materials.

4. Pipe Classification

4.1 *General*—This specification covers PEX pipe that is pressure rated based on HDB at 73 °F [23 °C] and 200 °F [93 °C]. Pressure ratings for temperatures between 73 °F [23 °C] and 200 °F [93 °C] are determined by temperature interpolation in accordance with PPI TR-3.

4.2 *Classification*—PEX pipes are classified by their PEX pipe material designation codes as shown in **Table 1**.

4.3 *Operating Temperature Range*—The minimum operating temperature shall be in accordance with **6.13**. The maximum temperature for continuous operation shall be based on the highest temperature HDB in accordance with **5.2** and **Table 1**. The maximum temperature for intermittent operation shall

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

TABLE 1 PEX Pipe Material Designation Codes

PEX Pipe Material Designation Code	73 °F [23 °C] HDB	200 °F [93 °C] HDB
	Psi [MPa]	Psi [MPa]
PEX 0006	1250 [8.62]	630 [4.34]
PEX 0007	1400 (9.65) ⁴	630 [4.34]
PEX 0008	1600 [11.03]	630 [4.34]
PEX 0009	1800 [12.41]	630 [4.34]

⁴The HDB category of 1400 psi has an LTHS range of 1340 to <1530 psi. The LTHS is determined in accordance with procedures of Test Method **D2837**.

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

⁵ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.