



Designation: F2905/F2905M – 25

Standard Specification for Crosslinked Polyethylene (PEX) Line Pipe For Oil and Gas Producing Applications¹

This standard is issued under the fixed designation F2905/F2905M; 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 outside diameter controlled, pressure rated, metric-sized and inch-sized black or yellow crosslinked polyethylene (PEX) pipe made in pipe dimension ratios ranging from 6 to 17. 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, and minimum operating temperature. Requirements for pipe markings are also given. The pipe covered by this specification is intended for pressure or non-pressure oil and gas producing applications, such as conveying oil, dry or wet gas, gas gathering, multiphase fluids, and non-potable oilfield water. This specification does not cover piping for gas distribution applications.

1.1.1 PEX pipe produced in accordance with this specification is permitted to be dually specified in accordance with API 15PX, which has a similar usage scope and requirements.

1.2 This specification also includes requirements for joints made between PEX pipe and polyethylene electrofusion fittings (specified in Specifications **F1055** or **F3373**). Fittings to be used with PEX pipe manufactured to this Specification are in Specification **F2829/F2829M**. Installation considerations are in **Appendix X3**.

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 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.

NOTE 1—Metric sized (SI units) pipe should only be joined with

¹ This specification is under the jurisdiction of ASTM Committee **F17** on Plastic Piping Systems and is the direct responsibility of Subcommittee **F17.68** on Energy Piping Systems.

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corresponding metric sized fittings, and inch sized pipe should only be joined with corresponding inch sized fittings. Inch sized fittings should not be used for metric sized pipe, and metric sized fittings should not be used for IPS inch sized pipe.

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.*

1.6 *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

- 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
- 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

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.

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

for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

D4218 Test Method for Determination of Carbon Black 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

F1055 Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing

F2023 Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Pipe, Tubing and Systems to Hot Chlorinated Water

F2619/F2619M Specification for High-Density Polyethylene (PE) Line Pipe

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

F3203 Test Method for Determination of Gel Content of Crosslinked Polyethylene (PEX) Pipes and Tubing

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

2.2 *Federal Standard*.³

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

2.3 *Military Standard*.³

MIL-STD-129 Marking for Shipment and Storage

2.4 *ISO Standards*.⁴

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

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 Publications*.⁵

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

PPI TR-9 Recommended Design Factors and Design Coefficients for Thermoplastic Pressure Pipe

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

2.6 *American Petroleum Institute Standard*.⁶

API 15PX Specification for Crosslinked Polyethylene (PEX) Line Pipe

2.7 *Canadian Standard*.⁷

CSA B137.19 Crosslinked polyethylene (PEX) piping systems for gas services

3. Terminology

3.1 *Definitions*—Definitions and abbreviations are in accordance with Terminology **F412**, unless otherwise specified. 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 (PEX)*, *n*—a polyethylene material that has undergone a change in molecular structure through processing whereby a majority of the polymer chains are chemically linked.

3.2.2 *multiphase fluid*, *n*—oil, gas, and water in any combination produced from one or more oil or gas wells, or recombined oil or gas well fluids that may have been separated in passing through surface facilities.

3.2.3 *oilfield water*, *n*—fresh or salt water transported by pipeline, regardless of purity or quality, from wells or surface locations for the purpose of providing water injection to underground reservoirs; or disposing of waste water from hydrocarbon or gas production, processing, or storage facilities.

3.2.4 *PEX pipe material designation code*, *n*—an abbreviated series of letters and numerals that indicate that a material is crosslinked polyethylene (PEX) and gives information about the chlorine resistance, UV resistance and long-term hydrostatic strength properties of the specific grade of PEX material it describes.

3.2.4.1 *Discussion*—See **Annex A1** for a description of the determination of PEX Material Designation Codes.

⁵ Available from Plastics Pipe Institute (PPI), 105 Decker Court, Suite 825, Irving, TX 75062, <http://www.plasticpipe.org>.

⁶ Available from American Petroleum Institute (API), 200 Massachusetts Avenue, NW Suite 1100 Washington, DC 20001-5571, <http://www.api.org>.

⁷ Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, <http://www.csagroup.org>.

³ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

⁴ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.