



Designation: D2517 – 18 (Reapproved 2023)

Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings¹

This standard is issued under the fixed designation D2517; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers requirements and methods of test for materials, dimensions and tolerances, hydrostatic-burst strength, chemical resistance, and longitudinal tensile properties, for reinforced epoxy resin pipe and fittings for use in gas mains and services for direct burial and insertion applications. The pipe and fittings covered by this specification are intended for use in the distribution of natural gas, petroleum fuels (propane–air and propane–butane vapor mixtures), manufactured and mixed gases where resistance to gas permeation, toughness, resistance to corrosion, aging, and deterioration from water, gas, and gas additives are required. Methods of marking are also given. Design considerations are discussed in [Appendix X1](#).

1.2 The values in SI units are to be regarded as the 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.*

NOTE 1—There is no known ISO equivalent to this standard.

1.4 A recommended inplant quality control program is given in [Appendix X2](#).

1.5 *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

[D396 Specification for Fuel Oils](#)

[D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents](#)

[D618 Practice for Conditioning Plastics for Testing](#)

[D883 Terminology Relating to Plastics](#)

[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](#)

[D1898 Practice for Sampling of Plastics \(Withdrawn 1998\)](#)³

[D2105 Test Method for Longitudinal Tensile Properties of “Fiberglass” \(Glass-Fiber-Reinforced Thermosetting-Resin\) Pipe and Tube](#)

[D2143 Test Method for Cyclic Pressure Strength of Reinforced, Thermosetting Plastic Pipe](#)

[D2290 Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe](#)

[D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading](#)

[D2924 Test Method for External Pressure Resistance of “Fiberglass” \(Glass-Fiber-Reinforced Thermosetting-Resin\) Pipe](#)

[D2992 Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” \(Glass-Fiber-Reinforced Thermosetting-Resin\) Pipe and Fittings](#)

[D2996 Specification for Filament-Wound “Fiberglass” \(Glass-Fiber-Reinforced Thermosetting-Resin\) Pipe](#)

[D3567 Practice for Determining Dimensions of “Fiberglass” \(Glass-Fiber-Reinforced Thermosetting Resin\) Pipe and Fittings](#)

[D3839 Guide for Underground Installation of “Fiberglass”](#)

¹ This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.23 on Reinforced Thermosetting Resin Piping Systems and Chemical Equipment.

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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.

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

(Glass-Fiber Reinforced Thermosetting-Resin) Pipe
D3892 Practice for Packaging/Packing of Plastics
D5685 Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe Fittings
F412 Terminology Relating to Plastic Piping Systems

3. Terminology

3.1 Definitions:

3.1.1 *General*—Definitions are in accordance with Terminology D883 or F412. Abbreviations are in accordance with Terminology D1600, unless otherwise indicated. The abbreviation for fiberglass pipe is RTRP and the abbreviation for fiberglass fittings is RTRF.

3.1.2 The gas industry technology used in this specification is in accordance with definitions given in The Department of Transportation of Natural and Other Gas by Pipeline Minimum Safety Standards.

3.1.3 *Standards Reinforced Thermosetting Resin Pipe Materials Designation Code*—The pipe material designation code shall consist of the abbreviation RTRP followed by type and grade in arabic numerals, class by a capital letter and the long term steady pressure strength by a second capital letter. The fittings material designation shall consist of the abbreviation RTRF followed by type (method of manufacture), grade (general type of resin), class (configuration of joining system), and pressure rating.

4. Classification

4.1 *Pipe*—The pipe covered in this specification is made by the filament winding process and is described in Specification D2996. Requirements of this pipe are based on short-term tests defined in this specification.

4.2 *Fittings*—This specification covers a) reinforced epoxy resin fittings described in specification D5685 and made of the type of materials covered in Section 5, and b) metal fittings which have been designed and tested in accordance with the provisions of The Department of Transportation Title 49 of The Code of Federal Regulations Part 192 – Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards, which are capable of being joined to the pipe and will provide a suitable gas distribution system.

5. Materials

5.1 The resins and reinforcements used to make pipe shall be as specified in 5.1.1.

5.1.1 This specification covers glass fiber reinforced epoxy resin pipe and fittings as defined in Specification D2996 as RTRP Type 1; Grade 1; Classes A, C, F, and H; and Hydrostatic

Design Basis U, W, X, Y, and Z —Example: RTRP 11 HZ and fittings as defined in specification D5685-RTRF Types 1, 2, 3, 4, and 5; Grade 1; Class A, C, F, and H; Category 1, 2, 3, 4, and 5; and Pressure Rating Category D, E, F, G, H, I, and J—Example: RTRF 21A2D.

NOTE 2—The particular reinforced thermosetting resin included initially in this specification for gas pressure piping was selected on the basis of engineering test studies made by Battelle Memorial Institute, experimental use in field installations, and technical data supplied by the manufacturers of the plastics materials used to make the pipe and fittings. It is the intent of ASTM Committee D-20 on Plastics to consider for inclusion other resins and reinforcements in this specification when evidence is presented to show that they are suitable for gas service. Minimum requirements are an ASTM pipe specification and long-term strength determined in accordance with Test Method D2992, Procedure B, in addition to the requirements of this specification.

6. Requirements

6.1 *Workmanship*—The pipe and fittings shall be free of visible cracks, holes, foreign inclusions, blisters, and other injurious defects. The pipe and fittings shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

6.2 Pipe Dimensions and Tolerances:

6.2.1 *Diameters*—The outside diameter of the pipe shall be in accordance with Table 1 when measured in accordance with 8.4.1.

6.2.2 *Wall Thickness*—The wall thickness of the pipe shall meet the requirements given in Table 1 when measured in accordance with 8.4.1.

6.2.3 *Lengths*—The pipe shall be in lengths as specified on the purchase order when measured in accordance with 8.4.1.

NOTE 3—Either threaded adaptors or bonded joints are acceptable. Joints of up to 5 % of the shipment are acceptable to meet the length requirements. No section less than 1.5 m (5 ft) long can be used to make a joint and only one jointer can be used in a length.

6.3 *Fittings Dimensions and Tolerances*— The fittings dimensions shall enable the pipe and fittings to be joined and shall be measured in accordance with 8.4.2.

NOTE 4—Subcommittee D20.23 is working towards development of dimensional requirements for fittings; however, it will be some time before the requirements are available. Therefore, the method of measuring is provided only to have a standard method of measuring fittings dimensions for inspection purposes.

6.4 *Short-Term Rupture Strength (Burst Pressure)*—The minimum hoop stress at burst for pipe covered by this specification shall be as listed in Table 2 when tested in accordance with 8.5. The minimum burst requirements for fittings covered by this specification shall be 4.82 MPa (700

TABLE 1 Pipe Dimensions, mm (in.)

Nominal	Outside Diameter	Tolerance	Minimum Wall Thickness
2	60.325 (2.375)	+1.524, −0.457 (+0.060, −0.018)	1.524 (0.060)
3	88.900 (3.500)	+1.524, −0.457 (+0.060, −0.018)	1.524 (0.060)
4	114.300 (4.500)	+1.524, −0.457 (+0.060, −0.018)	1.780 (0.070)
6	168.275 (6.625)	+1.678, −0.711 (+0.066, −0.028)	2.540 (0.100)
8	219.075 (8.625)	+2.184, −1.016 (+0.086, −0.040)	3.227 (0.125)
10	273.050 (10.750)	+2.743, −1.219 (+0.108, −0.048)	3.830 (0.150)
12	323.850 (12.750)	+3.251, −1.422 (+0.128, −0.056)	4.215 (0.175)