



Designation: D3517 – 24

Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe¹

This standard is issued under the fixed designation D3517; 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 machine-made fiberglass pipe, 8 in. (200 mm) through 156 in. (4000 mm), intended for use in water conveyance systems which operate at internal gage pressures of 450 psi (3103 kPa) or less. Both glass-fiber-reinforced thermosetting-resin pipe (RTRP) and glass-fiber-reinforced polymer mortar pipe (RPMP) are fiberglass pipes. The standard is suited primarily for pipes to be installed in buried applications, although it is acceptable to be used to the extent applicable for other installations such as, but not limited to, jacking, tunnel lining and slip-lining rehabilitation of existing pipelines.

NOTE 1—For the purposes of this standard, polymer does not include natural polymers.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

NOTE 2—There is no known ISO equivalent to this standard.

1.3 The following safety hazards caveat pertains only to the test methods 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.*

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. Referenced Documents

2.1 ASTM Standards:²

- C33/C33M Specification for Concrete Aggregates
- D638 Test Method for Tensile Properties of Plastics
- D695 Test Method for Compressive Properties of Rigid Plastics
- D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- D883 Terminology Relating to Plastics
- D1600 Terminology for Abbreviated Terms Relating to Plastics (Withdrawn 2024)³
- 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
- D2584 Test Method for Ignition Loss of Cured Reinforced Resins
- D2992 Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings
- D3567 Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
- D3892 Practice for Packaging/Packing of Plastics
- D4161 Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals
- F412 Terminology Relating to Plastic Piping Systems
- F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

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.

2.2 ISO Standard:

ISO 1172 Textile Glass Reinforced Plastics—Determination of Loss on Ignition⁴

2.3 NSF Standard:

Standard No. 61 Drinking Water System Components⁵

3. Terminology

3.1 Definitions:

3.1.1 *General*—Definitions are in accordance with Terminology **D883** and Terminology **F412** and abbreviations are in accordance with Terminology **D1600**, unless otherwise indicated.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *fiberglass pipe, n*—a tubular product containing glass-fiber reinforcements embedded in or surrounded by cured thermosetting resin. The composite structure may contain aggregate, granular, or platelet fillers, thixotropic agents, pigments, or dyes. Thermoplastic or thermosetting liners or coatings may be included.

3.2.2 *flexible joint, n*—a joint that is capable of axial displacement or angular rotation, or both.

3.2.3 *liner, n*—a resin layer, with or without filler, or reinforcement, or both, forming the interior surface of the pipe.

3.2.4 *qualification test, n*—one or more tests used to prove the design of a product. Not a routine quality control test.

3.2.5 *reinforced polymer mortar pipe (RPMP), n*—a fiberglass pipe with aggregate.

3.2.6 *reinforced thermosetting resin pipe (RTRP), n*—a fiberglass pipe without aggregate.

3.2.7 *rigid joint, n*—a joint that is not capable of axial displacement or angular rotation.

3.2.8 *surface layer, n*—a resin layer, with or without filler, or reinforcements, or both, applied to the exterior surface of the pipe structural wall.

4. Classification

4.1 *General*—This specification covers fiberglass pressure pipe defined by raw materials in the structural wall (type) and liner, surface layer material (grade), operating pressure (class), and pipe stiffness. **Table 1** lists the types, liners, grades, classes, and stiffnesses that are covered.

NOTE 3—All possible combinations of types, liners, grades, classes, and stiffnesses may not be commercially available. Additional types, liners, grades, and stiffnesses may be added as they become commercially available. The purchaser should determine for himself or consult with the manufacturer for the proper class, type, liner, grade and stiffness of pipe to be used under the installation and operating conditions that will exist for the project in which the pipe is to be used.

4.2 *Designation Requirements*—The pipe materials designation code shall consist of the standard designation, ASTM D3517, followed by type, liner, and grade in Arabic numerals, class by the letter C and two or three Arabic numerals, and pipe

stiffness by a capital letter. **Table 1** presents a summary of the designation requirements. Thus, a complete material code shall consist of ASTM D3517. . . three numerals, C . . . and two or three numerals, and a capital letter.

NOTE 4—Examples of the designation are as follows: (1) ASTM D3517-1-1-3-C50-A for glass-fiber reinforced aggregate and polyester resin mortar pipe with a reinforced thermoset liner and an unreinforced polyester resin and sand surface layer, for operation at 50 psi (345 kPa), and having a minimum pipe stiffness of 9 psi (62 kPa), (2) ASTM D3517-4-2-6-C200-C for glass-fiber reinforced epoxy resin pipe with a non-reinforced thermoset liner, no surface layer, for operation at 200 psi (1380 kPa), and having a minimum pipe stiffness of 36 psi (248 kPa).

NOTE 5—Although the “Form and Style for ASTM Standards” manual requires that the type classification be roman numerals, it is recognized that companies have stencil cutting equipment for this style of type, and it is therefore acceptable to mark the product type in arabic numbers.

5. Materials and Manufacture

5.1 *General*—The thermosetting resins, glass fiber reinforcements, fillers, and other materials, when combined as a composite structure, shall produce piping products that meet the performance requirements of this specification.

5.2 *Wall Composition*—The basic structural wall composition shall consist of thermosetting resin, glass fiber reinforcement, and, if used, an aggregate filler.

5.2.1 *Resin*—A thermosetting polyester or epoxy resin, with or without filler.

5.2.2 *Reinforcement*—A commercial grade of glass fibers compatible with the resin used.

5.2.3 *Aggregate*—A siliceous sand conforming to the requirements of Specification **C33/C33M**, except that the requirements for gradation shall not apply.

NOTE 6—Fiberglass pipe intended for use in the transport of potable water should be evaluated and certified as safe for this purpose by a testing agency acceptable to the local health authority. The evaluation should be in accordance with requirements for chemical extraction, taste, and odor that are no less restrictive than those included in National Sanitation Foundation (NSF) Standard No. 61. The seal or mark of the laboratory making the evaluation should be included on the fiberglass pipe.

5.3 *Liner and Surface Layers*—Liner or surface layer, or both, when incorporated into or onto the pipe, shall meet the structural requirements of this specification.

5.4 *Joints*—The pipe shall have a joining system that shall provide for fluid tightness for the intended service condition. Both restrained or unrestrained and flexible or rigid joints are permitted depending on the specific configuration and design conditions.

5.4.1 *Unrestrained*—Pipe joints capable of withstanding internal pressure but not longitudinal tensile loads.

5.4.1.1 *Coupling or Bell-and-Spigot Gasket Joints*, with a groove either on the spigot or in the bell to retain an elastomeric gasket that shall be the sole element of the joint to provide watertightness. For typical joint details see **Fig. 1**.

5.4.1.2 *Mechanical Coupling Joint*, with elastomeric seals.

5.4.1.3 *Butt Joint*, with laminated overlay.

5.4.1.4 *Flanged Joint*, both integral and loose ring.

5.4.2 *Restrained*—Pipe joints capable of withstanding internal pressure and longitudinal tensile loads..

5.4.2.1 Joints similar to those in **5.4.1.1** with supplemental restraining elements.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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