



Designation: D5677 – 17 (Reapproved 2023)

Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Pipe Fittings, Adhesive Bonded Joint Type, for Aviation Jet Turbine Fuel Lines¹

This standard is issued under the fixed designation D5677; 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 a reinforced plastic pipe and fittings system made from epoxy resin and glass-fiber reinforcement, together with adhesive for joint assembly, intended for service up to 150°F (65.6°C) and 150-psig (1034-kPa) operating pressure and surges up to 275 psig (1896 kPa) in aviation jet turbine fuel lines installed below ground.

1.2 The dimensionless designator NPS has been substituted in this specification for such traditional terms as *nominal diameter*, *size*, and *nominal size*.

1.3 The values stated in inch-pound units are to be regarded as standard. The values in parentheses are for information only.

1.4 The following safety hazards caveat pertains only to the test method portion, Section 9, 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.

1.5 *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

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.

Current edition approved Oct. 1, 2023. Published October 2023. Originally approved in 1995. Last previous edition approved in 2017 as D5677 – 17. DOI: 10.1520/D5677-17R23.

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.

D381 Test Method for Gum Content in Fuels by Jet Evaporation

D883 Terminology Relating to Plastics

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

D1600 Terminology for Abbreviated Terms Relating to Plastics

D1655 Specification for Aviation Turbine Fuels

D2310 Classification for Machine-Made “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe (Withdrawn 2017)³

D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

D3241 Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels

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

D3951 Practice for Commercial Packaging

D5685 Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe Fittings

F412 Terminology Relating to Plastic Piping Systems

F1173 Specification for Thermosetting Resin Fiberglass Pipe Systems to Be Used for Marine Applications

2.2 Military Specification:

MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4, JP-5 and JP-5/JP-8 ST⁴

2.3 ANSI Standard:

B16.5 Steel Pipe Flanges and Flanged Fittings⁵

3. Terminology

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

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

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *conductive*—a pipe or fitting that meets the requirements for conductivity listed in Section 6 of Specification **F1173**.

3.3 Abbreviations:

3.3.1 *RTRP, n*—reinforced thermosetting resin pipe.

4. Classification

4.1 General:

4.1.1 Pipe meeting this specification is classified by type, grade, and class similar to Classification **D2310**.

4.1.2 Fittings meeting this specification are also classified by type (method of manufacture) and grades (generic type of resin).

4.2 Pipe:

4.2.1 Type I Filament-Wound Pipe Nonconductive

4.2.2 Type Ia Filament-Wound Pipe Conductive

4.2.3 Type II Centrifugally Cast Pipe

4.3 Fittings:

4.3.1 Type I Filament-Wound Fittings Nonconductive

4.3.2 Type Ia Filament Wound Fittings Conductive

4.3.3 Type II Molded Fittings Nonconductive

4.4 Grade:

4.4.1 Grade 1 Glass-Fiber-Reinforced Epoxy Resin (Pipe and Fittings)

4.5 Classes (Pipe Only):

4.5.1 Class A No Liner

4.5.2 Class C Epoxy Resin Liner Nonreinforced

4.5.3 Class F Epoxy Resin Liner Reinforced

5. Materials and Manufacture

5.1 *General*—The fiberglass pipe shall be round and straight, and the pipe and fittings shall be of uniform density, resin content, and surface finish. All pipe ends shall be cut at right angles to the axis of the pipe and any sharp edges removed. The bore of the pipe and fittings shall have a smooth, uniform surface with no exposed fibers and is permitted to

contain a liner. The liner, if used, shall be composed of an epoxy resin formulation and is permitted to contain a reinforcement.

5.2 *Material*—The pipe and fittings shall be made from epoxy resins and glass-fiber reinforcement of commercial first quality. Fillers, colorants, and other materials are permitted to be added, provided the pipe and fittings meet all the requirements of this specification. Epoxy pipe shall be joined only with epoxy fittings.

5.3 *Adhesive*—Adhesive for joint assembly shall be a material suitable for providing a seal between the pipe and fittings in continuous service up to 150°F (65°C) and 150 psig (1034 kPa) with surges to 275 psig (1896 kPa). The adhesive shall be supplied as a kit which includes containers of all components in the amounts needed for each adhesive mixture. Instructions for use shall be marked on each container or listed on an instruction sheet included in each adhesive kit. When specified in the contract or purchase order, adhesive kits shall be furnished in a sufficient quantity for the particular procurement of pipe and fittings.

6. Dimensions

6.1 *Pipe*—The pipe shall be 1, 1.5, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24-in. (25, 40, 50, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 550, and 600-mm) nominal sizes as specified and shall have the dimensions and tolerances shown in **Table 1** unless otherwise agreed upon by the purchaser and seller.

6.1.1 *Length*—Unless other lengths are specified on the purchase order, the length of the pipe shall be 20 ft (6.1 m), 30 ft (9.2 m), or 40 ft (12.2 m) with a plus tolerance of 2 ft (0.6 m) and a minus tolerance of 5 ft (1.5 m).

6.1.2 *Wall Thickness*—The minimum wall thickness of the pipe shall be not less than 87.5 % of the average wall thickness of the pipe as measured in Section 8 and tested in Section 9.

6.1.3 *Fittings*—Fittings shall be 1, 1.5, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24-in. (25, 40, 50, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, and 600-mm) nominal sizes,

TABLE 1 Dimensions of Pipe

NOTE 1—Nominal pipe diameters of 14 in. (350 mm), 16 in. (400 mm), 18 in. (450 mm), 20 in. (500 mm), 22 in. (550 mm), and 24 (600 mm) are available and approved with outside diameters or inside diameters as specified in **Table 1**.

Nominal Pipe Diameter		Outside Diameter		Tolerance, Type I and Type Ia		Tolerance, Type II	
in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
1	(25)	1.315	(33.40)	+0.060 –0.016	(+1.52 –0.41)	±0.009	(±0.229)
1.5	(40)	1.900	(48.26)	+0.060 –0.018	(+1.52 –0.46)	±0.009	(±0.229)
2	(50)	2.375	(60.32)	+0.060 –0.018	(+1.52 –0.46)	±0.012	(±0.30)
3	(75)	3.500	(88.90)	±0.060 –0.018	(+1.52 –0.46)	±0.012	(±0.30)
4	(100)	4.500	(114.30)	±0.060 –0.018	(+1.52 –0.46)	±0.015	(±0.38)
5	(125)	5.563	(141.30)	±0.060 –0.028	(+1.68 –0.71)	±0.025	(±0.64)
6	(150)	6.625	(168.28)	±0.066 –0.028	(+1.68 –0.71)	±0.025	(±0.64)
8	(200)	8.625	(219.08)	±0.086 –0.040	(+2.28 –1.02)	±0.025	(±0.64)
10	(250)	10.750	(273.05)	±0.108 –0.048	(+2.74 –1.22)	±0.025	(±0.64)
12	(300)	12.750	(323.05)	±0.128 –0.056	(+3.25 –1.42)	±0.025	(±0.64)
14	(350)	14.000	(355.60)	±0.145 –0.064	(+3.68 –1.63)	±0.035	(±0.89)
16	(400)	16.000	(406.40)	±0.165 –0.074	(+4.19 –1.88)	±0.035	(±0.89)
18	(450)	18.000	(457.20)	±0.250	±6.35		
20	(500)	20.000	(508.00)	±0.250	±6.35		
22	(550)	22.000	(558.80)	±0.250	±6.35		
24	(600)	24.000	(609.60)	±0.250	±6.35		