



Designation: F 1380 – 95a (Reapproved 2002)^{ε1}

An American National Standard

Standard Specification for Metal Insert Fittings for Polybutylene (PB) Tubing¹

This standard is issued under the fixed designation F 1380; 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.

ε¹ NOTE—Supplementary Requirement section was editorially revised in December 2002.

1. Scope

1.1 This specification covers metal insert fittings for polybutylene (PB) plastic tubing. These fittings are intended for use in 100 psi (6.9 MPa) cold- and hot-water distribution systems operating at temperatures up to and including 180°F (82°C). Included are the requirements for materials, workmanship, burst pressure, sustained pressure, temperature cycling tests, and markings to be used on the fittings.

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

1.3 The following precautionary 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- B 16 Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines²
- B 62 Specification for Composition Bronze or Ounce Metal Castings²
- B 75 Specification for Seamless Copper Tube²
- B 88 Specification for Seamless Copper Water Tube²
- B 140 Specification for Copper-Zinc-Lead (Leaded Red Brass or Hardware Bronze) Rod, Bar, and Shapes²
- B 283 Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)²
- B 584 Specification for Copper Alloy Sand Castings for General Applications²

¹ This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.61 on Water. Current edition approved Sept. 10, 1995. Published November 1995. Originally published as F 1380 – 92. Last previous edition F 1380 – 95a.

² Annual Book of ASTM Standards, Vol 02.01.

D 618 Practice for Conditioning Plastics for Testing³

D 883 Terminology Relating to Plastics³

D 1598 Test Method for Time-To-Failure of Plastic Pipe Under Constant Internal Pressure⁴

D 1599 Test Method for Resistance to Short-Time, Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings⁴

D 1600 Terminology for Abbreviated Terms Relating to Plastics³

D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings⁴

D 3309 Specification for Polybutylene (PB) Plastic Hot-Water Distribution Systems⁴

F 412 Terminology Relating to Plastic Piping Systems⁴

2.2 American National Standards Institute Standard:

B1.20.1 Pipe Threads General Purpose (Inch)⁵

B16.18 Cast Copper Alloy Solder Joint Pressure Fittings⁵

B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings⁵

2.3 Manufacturers Standardization Society Standard:

SP-104 Wrought Copper LW Solder Joint Pressure Fittings⁶

2.4 National Sanitation Foundation Standards:

Standard No. 14 for Plastic Piping Components and Related Materials⁷

Standard No. 61 for Drinking Water Systems Components—Health Effects⁷

3. Terminology

3.1 Definitions are in accordance with Terminologies D 883 and F 412 and abbreviations are in accordance with Terminology D 1600, unless otherwise indicated.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vol 08.04.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁶ Available from Manufacturers Standardization Society of the Valves and Fittings Industry, 1815 N. Fort Myer Dr., Arlington, VA 22209.

⁷ Available from the National Sanitation Foundation, PO Box 1468, Ann Arbor, MI 48106.

4. Classification

4.1 This specification covers one class of fittings suitable for use with PB tubing that meets the requirements of applicable ASTM specifications. At the present time this is Specification D 3309.

5. Materials and Manufacture

5.1 *Fittings*—The fittings shall be made from one of the following metals (Note 1):

5.1.1 *Wrought Copper Fittings*—Wrought copper fittings shall be made from material meeting the requirements of Specification B 75 for one of the following coppers: Copper Alloy UNS C10200, C10300, C10800, C12000, or C12200.

5.1.2 *Cast Copper Alloy Fittings*—Cast copper alloy fittings shall be made from material meeting the requirements of Specification B 584, Copper Alloy UNS C84400. When fittings are assembled with copper insert fittings, the insert fittings shall comply with 5.1.1.

5.1.3 *Cast Copper Alloy Valves*—Cast copper alloy valves shall be made from material meeting the requirements of Specification B 62 Copper Alloy UNS C83600 or Specification B 584 Copper Alloy UNS C83800 or C84400. When valves are assembled with copper insert fittings, the fittings shall comply with 5.1.1.

5.1.4 *Machined Brass Fittings*—Machined brass fittings shall be made from material meeting the requirements of Specification B 140 Copper Alloy UNS C31400 or Specification B 16 Copper Alloy UNS C36000.

5.1.5 *Forged Brass Fittings*—Forged brass fittings shall be made from material meeting the requirements of Specification B 283 Copper Alloy UNS C37700.

5.2 *Crimp Rings*—Crimp rings shall be made from Copper Alloy UNS C10200, C12000, or C12200. The crimp rings shall

have a minimum allowable hardness of 35 and a maximum allowable hardness of 45 measured on the Rockwell 15T scale.

6. Performance Requirements

6.1 *Hydrostatic Burst*—Fittings with the dimensions and tolerances noted in Table 1 (see Fig. 1 and Fig. 2) and tubing manufactured in accordance with Specification D 3309 will be tested as an assembly and shall meet the minimum hydrostatic burst requirements shown in Table 2 when tested in accordance with 9.5.

6.2 *Hydrostatic Sustained Pressure Strength*—Tubing and fittings (tested as assemblies) shall meet the hydrostatic sustained pressure strength requirements shown in Table 3 when tested in accordance with 9.6.

6.3 *Thermocycling*—Fittings and tubing assembled using the manufacturer's recommended procedure shall not leak or separate when thermocycled 10 000 times between the temperatures of 60°F (16°C) and 180°F (82°C) when tested in accordance with 9.7.

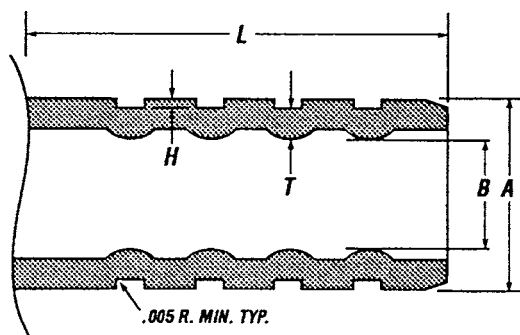
6.4 *Excessive Temperature and Pressure Capability*—In the event of a heating system malfunction, polybutylene tubing and fitting assemblies shall have adequate strength to accommodate short-term conditions, 48 h, of 210°F (99°C) and 150 psi (1.04 MPa) until repairs are made. Tubing and fittings (tested as assemblies) shall meet sustained pressure requirements shown in Table 4 when tested in accordance with 9.8.

7. Dimensions and Permissible Variations

7.1 *Dimensions and Tolerances*—The dimensions and tolerances shall be as shown in Table 1 and Table 5 when measured in accordance with 9.4.

7.1.1 *Alignment*—Alignment of all openings of fittings shall be within 1/16 in./ft (5 mm/m).

TABLE 1 Dimensions and Tolerances



Size	A Outside Diameter	Tolerance	B Minimum Inside Diameter Under Barb	T Minimum Wall Thickness ^A	L Minimum Insert Length ^B	Minimum Ribs	H Minimum Ribbed Height	Maximum Flash and Mismatch, Total on Crest Diameter ^{C,D}
3/8	0.375	±0.005	0.232	0.022	0.6	3	0.008	0.005
1/2	0.500	±0.005	0.355	0.026	0.6	3	0.008	0.005
3/4	0.715	±0.005	0.535	0.029	0.6	3	0.008	0.005
1	0.904	±0.004	0.771	0.032	0.7	4	0.012	0.005

^AApplies to entire fitting, not just insert area.

^BFitting shall be designed with sufficient overall dimensions to allow proper use of a crimp tool without interference with previously completed crimps on the same fitting.

^CThe maximum flash and mismatch at the root diameter between the ribs shall not exceed 30 % of the rib height.

^DThe total flash and mismatch is assumed to be the difference between the dimensions x and y (see Fig. 1). These dimensions shall be measured with appropriate calipers or micrometers. See Fig. 2 for a graphic definition of flash and mismatch created by imperfection in die half interfaces.