



Standard Specification for Mechanical Cold Expansion Insert Fitting With Compression Sleeve for Cross-linked Polyethylene (PEX) Tubing¹

This standard is issued under the fixed designation F1865; 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 mechanical cold expansion insert fittings with compression sleeve suitable for use with cross-linked polyethylene PEX plastic tubing in $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and 1 in. and larger nominal diameters that meet the requirements of Specifications F876 and F877. These fittings are intended for use in 100 psi (689.5 kPa) cold and hot water distributions systems operating at temperatures up to and including 180° F (82°C). Included are the requirements for materials, workmanship, dimensions, and markings to be used on the fittings and compression sleeves

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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:²

B16/B16M Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines

B140/B140M Specification for Copper-Zinc-Lead (Red Brass or Hardware Bronze) Rod, Bar, and Shapes

B283 Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

E18 Test Methods for Rockwell Hardness of Metallic Materials

F412 Terminology Relating to Plastic Piping Systems

F876 Specification for Crosslinked Polyethylene (PEX) Tubing

F877 Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems

2.2 ASME Standards:³

B 1.20.1 Pipe Threads General Purpose (inch)

B 16.18 Cast Copper Alloy Solder Joint Pressure Fittings

B 16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

2.3 NSF International Standards:⁴

NSF 14 Plastic Piping Components and Related Materials

NSF 61 Drinking Water System Components-Health Effects

2.4 MSS Standard:⁵

SP-104 Wrought Copper Solder Joint Pressure Fittings

3. Terminology

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

4. Classification

4.1 This specification covers one class of mechanical cold expansion insert fittings with compression sleeve suitable for use with PEX tubing that meets the requirements of Specification F876 and F877.

5. Materials and Manufacture

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

¹ This specification is under the jurisdiction of Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.10 on Fittings.

Current edition approved Dec. 1, 2009. Published January 2010. Originally approved in 1998. Last previous edition approved 2009 as F1865–02a(2009). DOI: 10.1520/F1865-09.

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 Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

⁴ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, http://www.nsf.org.

⁵ Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, http://www.msshq.com.

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

5.1.1 *Machined Brass Fittings*—Machined brass fittings shall be made from material meeting the requirements of Specification B140/B140M Copper Alloy UNS C31400, Specification B16/B16M Copper Alloy UNS C38500, or Copper Alloy UNS No. C27450, or DIN 17660 – CuZn39Pb3.

5.1.2 *Forged Brass Fittings*—Forged brass fittings shall be made from material meeting the requirements of Specification B283 Copper Alloy UNS C37700, or Copper Alloy UNS No. C27450, or DIN 17660-CuZn40Pb2.

5.1.3 *Compression Sleeves*—Compression sleeves shall be made from material meeting the requirements of Specification B140/B140M Copper Alloy UNS C37700, Specification B16/B16M Copper Alloy UNS C38500, or DIN 17660-CuZn39Pb3.

6. General Requirements

6.1 The following sections of Specification F877 constitute a part of this specification:

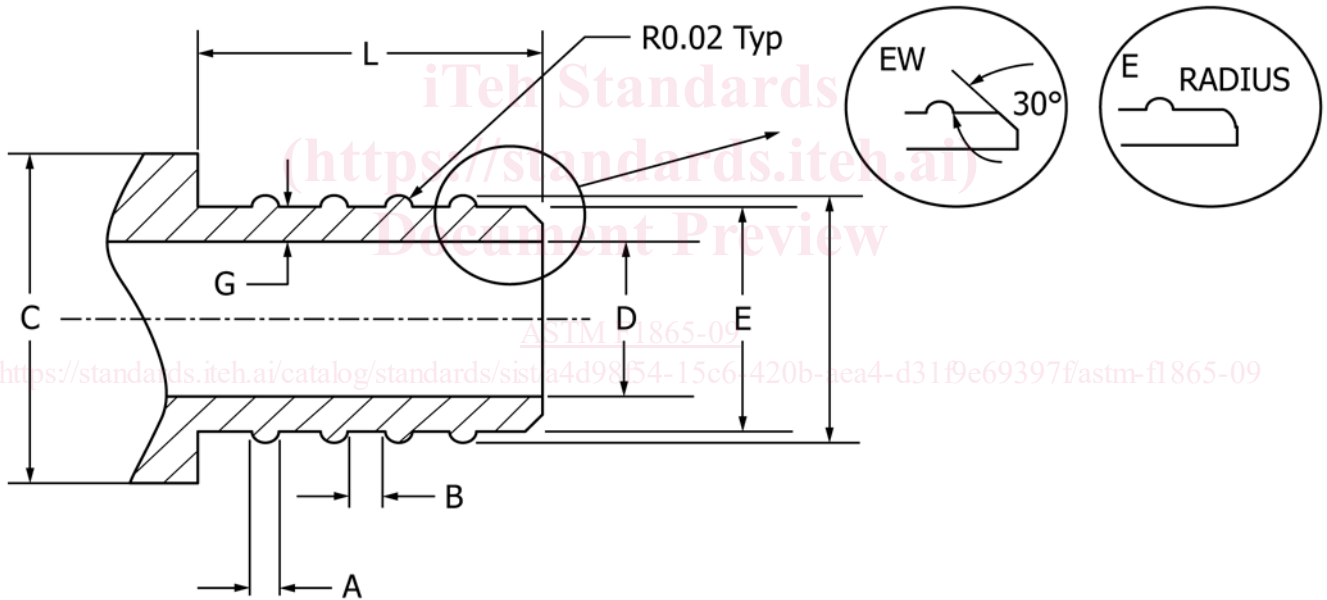
- 6.1.1 Requirements,
- 6.1.2 Test Methods, and
- 6.1.3 Retest and Rejection

6.2 In addition, when a section with a title identical to that referenced in 6.1, above, appears in this specification, it contains additional requirements that supplement those appearing in F877.

6.3 *Dimensions*—Randomly selected fitting or fittings shall be used to determine dimensions. Measurements shall be made in accordance with Test Method D2122. Determine the diameters by making measurements at four points spaced approximately 45° apart around the circumference. Inspection and gauging of solder joint ends shall be in accordance with ANSI B16.18, ANSI B16.22, or MSS SP-104. Inspection and gauging of taper pipe threads shall be in accordance with ANSI/ASME G1.20.1. All fittings that will be subjected to secondary processes of mechanical marking that affect their dimensional tolerances shall be tested in their final marked configuration.

7. Dimensions

7.1 *Dimensions and Tolerances*—The dimensions and tolerances of fittings and compression sleeves shall be as shown in Fig. 1 and Fig. 2 when measured in accordance with 6.3.



Standard Size	Inches	A	B	C	D	E	F	G	EW	L
		Rib Width Typ	Gap Width Typ	Stop Dia. min	Inside Dia. min	Insert Diameter	Rib Diameter	Minimum Wall	EX Depth	
3/8 in.	0.04 + 0.01	4	0.071 ± 0.010	0.620	0.30	0.370 + 0.008	0.410 + 0.008	0.025	0.020	0.59
1/2 in.	0.04 + 0.01	4	0.071 ± 0.010	0.78	0.40	0.510 + 0.008	0.540 + 0.008	0.040	0.030	0.59
5/8 in.	0.04 + 0.01	4	0.071 ± 0.010	0.86	0.51	0.630 + 0.008	0.670 + 0.008	0.045	0.030	0.59
3/4 in.	0.04 + 0.01	5	0.102 ± 0.010	1.00	0.59	0.730 + 0.008	0.780 + 0.008	0.050	0.035	0.83
1 in.	0.04 + 0.01	5	0.126 ± 0.010	1.40	0.77	0.900 + 0.008	0.950 + 0.008	0.055	0.035	0.94
Metric Size	millimeters	A	B	C	D	E	F	G	EW	L
		Rib Width Typ	Gap Width Typ	Stop Dia. min	Inside Dia. min	Insert Diameter	Rib Diameter	Minimum Wall	EX Depth	
3/8 in. (10 mm)	(1 ± 0.25)	4	(1.8 ± 0.25)	(16)	(7.70)	(9.5 + 0.2)	(10.3 + 0.2)	(0.63)	(0.50)	(15)
1/2 in. (13 mm)	(1 ± 0.25)	4	(1.8 ± 0.25)	(20)	(10.3)	(13.0 + 0.2)	(13.8 + 0.2)	(1.0)	(0.80)	(15)
5/8 in. (16 mm)	(1 ± 0.25)	4	(1.8 ± 0.25)	(22)	(12.9)	(16.0 + 0.2)	17.0 + 0.2)	(1.14)	(0.80)	(15)
3/4 in. (19 mm)	(1 ± 0.25)	5	(2.6 ± 0.25)	(27)	(15.0)	(18.6 + 0.2)	(19.8 + 0.2)	(1.27)	(0.89)	(21)
1 in. (25 mm)	(1 ± 0.25)	5	(3.2 ± 0.25)	(34)	(19.5)	(22.9 + 0.2)	(24.0 + 0.2)	(1.40)	(0.89)	(24)

FIG. 1 Mechanical Insert Dimensions and Tolerances