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.

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An American National Standard

Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe[1]

This standard is issued under the fixed designation F2080; 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 cold-expansion fittings using metal compression-sleeves for use with crosslinked polyethylene (PEX) plastic pipe in ⅜-in., ½-in., ⅝-in., ¾-in., 1-in., 1¼-in., 1½-in., and 2 in. nominal diameters, meeting the requirements of Specification F876 or F3253, and for use with Polyethylene of Raised Temperature (PE-RT) pipe in ⅜, ½, ⅝, ¾, 1, 1- ¼, nominal diameters meeting the requirements of Specification F2769, whereby the pipe is cold-expanded before fitting assembly. The components covered by this specification are intended for use in residential and commercial, hot and cold, potable water distribution systems or other applications such as municipal water service lines, building supply lines, radiant panel heating systems, hydronic baseboard heating systems, snow and ice melting systems, geothermal underground pipe systems and building services pipe with continuous operation at pressures up to and including 100 psi (690 kPa), and at temperatures up to and including 180 °F (82 °C).

1.2 Included in this specification are the requirements for materials, workmanship, dimensions, and markings to be used on the fittings and compression-sleeves. Performance requirements are as referenced in Specification F877 for systems containing PEX pipe and Specification F2769 for systems containing PE-RT pipe.

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

1.4 The following precautionary caveat pertains only to the test method portion, Section 10, 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.*

1.5 *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]

A108 Specification for Steel Bar, Carbon and Alloy, Cold-Finished

A269/A269M Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A276/A276M Specification for Stainless Steel Bars and Shapes

A312/A312M Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A519 Specification for Seamless Carbon and Alloy Steel Mechanical Tubing

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

B62 Specification for Composition Bronze or Ounce Metal Castings

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

B283/B283M Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)

B371/B371M Specification for Copper-Zinc-Silicon Alloy Rod

B584 Specification for Copper Alloy Sand Castings for General Applications

B689 Specification for Electroplated Engineering Nickel Coatings

B851 Specification for Automated Controlled Shot Peening of Metallic Articles Prior to Nickel, Autocatalytic Nickel, or Chromium Plating, or as Final Finish

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

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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.

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

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D1600 Terminology for Abbreviated Terms Relating to Plastics
D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
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
F2769 Specification for Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems
F3253 Specification for Crosslinked Polyethylene (PEX) Tubing with Oxygen Barrier for Hot- and Cold-Water Hydronic Distribution Systems

2.2 *ASME Standards:*
B1.20.1 Pipe Threads General Purpose (Inch)[3]
B16.18 Cast Copper Alloy Solder Joint Pressure Fittings (Inch)[3]
B16.22 Wrought Copper Alloy Solder Joint Pressure Fittings (Inch)[3]

2.3 *NSF Standards:*
Standard No. 14 for Plastic Piping Components and Related Materials[4]
Standard No. 61 for Drinking Water System Components—Health Effects[4]

2.4 *MSS Standard:*
SP-104 Wrought Copper Solder Joint Pressure Fittings[5]

2.5 *EN Standards:*
EN 12164 Copper and Copper Alloys—Rod for Free Machining Purposes[6]
EN 12165 Copper and Copper Alloys—Wrought and Unwrought Forging Stock[6]

3. Terminology

3.1 *Definitions*—Definitions of terms used in this specification are in accordance with 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 *crosslinked polyethylene, n*—a polyethylene material which has undergone a change in molecular structure using a chemical or a physical process whereby the polymer chains are chemically linked

3.2.2 *fitting assembly, n*—comprised of a cold-expansion fitting and a metal compression-sleeve, whereby the pipe is cold-expanded before fitting insertion, and the compression-sleeve is pulled in an axial direction over the pipe.

[3] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two 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.mss-hq.org.

[6] Available from European Committee for Standardization (CEN), 36 rue de Stassart, B-1050, Brussels, Belgium, http://www.cenorm.be.

4. Classification

4.1 This specification covers one class of metal and plastic cold-expansion fittings with metal compression-sleeves suitable for use with PEX pipe that meets the requirements of Specification F876 or F3253 or PE-RT pipe that meets the requirements of Specification F2769.

5. Materials and Manufacture

5.1 *Fittings*—Cold-expansion fittings shall be made from one of the following materials:

5.1.1 *Machined Brass*—Machined brass cold-expansion fittings shall be made from material meeting the requirements of Specification B16/B16M, Copper Alloy UNS C36000, or Specification B140/B140M, Copper Alloy UNS C31400, or Specification B371/B371M, Copper Alloy UNS C69300, or Specification B283/B283M, Copper Alloy UNS C69850, or Specification B283/B283M, Copper Alloy UNS C89844, Copper Alloy UNS No. C27450 or Standard EN 12164, Copper Alloy CW614N.

5.1.2 *Machined Stainless Steel*—Machined stainless steel cold-expansion fittings shall be made from material meeting the requirements of Specification A312/A312M, stainless steel alloy 304L or 316L, or Specification A269/A269M, stainless steel alloy 304L or 316L, or Specification A276/A276M, stainless steel alloy 304L or 316L.

5.1.3 *Machined Carbon Steel*—Machined carbon steel cold-expansion fittings shall be made from material meeting the requirements of Specification A108, Carbon Steel Alloy 1020 or 1025, or Specification A519, Carbon Steel Alloy 1020, or 1025 or 1026.

5.1.4 *Forged Brass*—Forged brass cold-expansion fittings shall be made from material meeting the requirements of Specification B283/B283M, Copper Alloy UNS C37700 or UNS C89844, or Copper Alloy UNS No. C27450, or Copper Alloy UNS C69300, or Copper Alloy UNS C69850, or Standard EN 12165, Copper Alloy CW617N.

5.1.5 *Cast Copper Alloys*—Cast copper alloy cold-expansion fittings shall be made from material meeting the requirements of Specification B62 copper alloy UNS C83600, or Specification B584, copper-alloy UNS C83800, C84400 or C89844.

5.2 *Compression-Sleeves*—Metal compression-sleeves shall be made from one of the following materials:

5.2.1 *Machined Brass*—Machined brass compression-sleeves shall be made from material meeting the requirements of Specification B16/B16M copper-alloy UNS C36000, or Standard EN 12168, Copper Alloy CW614N, or Copper Alloy UNS No. C27450, or Standard EN 12165, Copper Alloy CW617N, or Specification B371/B371M, Copper Alloy UNS C69300, or Copper Alloy UNS C69850.

5.2.2 *Machined Stainless Steel*—Machined stainless steel compression-sleeves shall be made from material meeting the requirements of Specification A312/A312M, stainless steel alloy 304L or 316L, or Specification A269/A269M, stainless steel alloy 304L or 316L, or Specification A276/A276M, stainless steel alloy 304L or 316L.

5.3 *Plating*—Plating of either fitting component with nickel or chrome, or other metal is optional and must fall within the