



Designation: B1029 – 24

Standard Practice for Making Press-Connect Joints with Seamless Copper and Copper Alloy Tube and Press Fittings¹

This standard is issued under the fixed designation B1029; 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 practice covers a procedure for making permanent press-connect joints by compressing an elastomeric sealing element between seamless copper and copper alloy tube and fittings.

1.2 This procedure applies to press-connect fittings of pressurized systems such as plumbing, facility water, domestic water, vacuum, compressed air and gases, heating, ventilating and air conditioning, hydronic glycol, refrigeration, condenser and chilled water, and fire suppression sprinkler.

1.3 This procedure does not apply to the assembly of electrical or electronic systems.

1.4 Techniques for satisfactory joint preparation are referenced in ASME B31.5, ASME B31.9, and Practice B828.

1.5 Tube and fittings are manufactured within defined tolerances to accommodate small variations in dimensions associated with manufacturing practice.

1.6 A variety of elastomeric sealing element compounds are available. Select correct seal based on application and as recommended by the manufacturer.

1.7 *Units*—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.

1.8 *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.*

1.9 *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 practice is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.04 on Pipe and Tube.

Current edition approved July 1, 2024. Published July 2024. DOI: 10.1520/B1029-24.

2. Referenced Documents

2.1 ASTM Standards:²

B68/B68M Specification for Seamless Copper Tube, Bright Annealed
B75/B75M Specification for Seamless Copper Tube
B88/B88M Specification for Seamless Copper Water Tube
B280 Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
B828 Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings
B846 Terminology for Copper and Copper Alloys
B1003 Specification for Seamless Copper Tube for Linesets
F3226/F3226M Specification for Metallic Press-Connect Fittings for Piping and Tubing Systems

2.2 ASME Standards:³

B16.51 Copper and Copper Alloy Press-Connect Pressure Fittings
B31.5 Refrigeration Piping and Heat Transfer Components
B31.9 Building Services Piping

2.3 UL Standards:⁴

UL 207 Safety Refrigerant-Containing Components and Accessories, Nonelectrical
UL 213 Safety Rubber Gasketed Fittings for Fire-Protection Service

2.4 Other Standards:

FM 1920:2007 Pipe Couplings and Fittings for Above-ground Fire Protection Systems⁵
IAPMO/ANSI/CAN Z1117 Standard for Press Connections⁶

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 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 Underwriters Laboratories (UL), UL Headquarters, 333 Pfingsten Road, Northbrook, IL, 60062, <http://www.ul.com>.

⁵ Available from FM Approvals, One Technology Way, Norwood, MA 02062, <http://www.fmapprovals.com/approval-standards>.

⁶ Available from International Association of Plumbing and Mechanical Officials, 4755 E. Philadelphia St., Ontario, CA 91761, <http://www.iapmo.org>.

3. Terminology

3.1 *Definitions*—For definitions of terms related to copper and copper alloys, refer to Terminology B846.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *grip ring, n*—component of some press-connect fittings that imparts additional mechanical strength (sometimes called a bite ring).

3.2.2 *press-connection, n*—permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion-resistant grip or bite ring.

3.2.2.1 *Discussion*—The joint is made with a pressing tool and tool attachment(s) approved by the fitting manufacturer.

3.2.3 *sealing element, n*—elastomeric component of press-connect fittings that compresses between tube and fitting.

3.2.4 *tooling attachments, n*—interchangeable accessories conveying the pressing force from the tool to the fitting, such as jaws, actuators, rings, and chains.

4. Summary of Practice

4.1 Sequence of operations to make press-connect joints:

- 4.1.1 Measuring and cutting tube,
- 4.1.2 Reaming and deburring tube,
- 4.1.3 Inspection of tube-sealing surface,
- 4.1.4 Inspection of fitting,
- 4.1.5 Assembly and support,
- 4.1.6 Making press connection, and
- 4.1.7 Testing.

5. Significance and Use

5.1 The techniques described herein are used to produce leak-tight press-connect joints between copper and copper alloy tube and fittings either in shop operations or the field. Operator or mechanic's skill and knowledge is required to obtain a satisfactory joint.

5.1.1 Refer to manufacturer's recommendation for minimum installation distance from existing to new joints and distance between press-connect joints.

6. Procedure

6.1 *Measuring and Cutting:*

6.1.1 Accurately measure the length of each tube segment (Fig. 1) to ensure joint quality. Account for minimum insertion

depth in fitting as specified by manufacturer.

6.1.2 Cut the tube to the measured length. Avoid deforming the tube during cutting. The cut shall be made square with the run of the tube. Failure to make a square cut may result in portions of the tube end not meeting minimum insertion depth.

6.1.3 Use tools that provide a square cut, for example, disk-type tube cutters (Fig. 2), hacksaw, abrasive wheel, band saw (Fig. 2), or any tool suited to the task. Do not use torch cutters or cutting oils.

6.2 *Reaming and Deburring:*

6.2.1 Ream the full inside diameter of cut tube ends to the full inside diameter of the tube to remove the burr created by the cutting operation.

NOTE 1—Failure to remove this rough edge by reaming is a leading cause of erosion-corrosion that occurs because of local turbulence and increased local flow velocity in the tube. A properly reamed piece of tube provides a smooth surface for better flow.

6.2.2 Remove burrs on the outside of the tube ends (Fig. 3) created by the cutting operation to ensure proper insertion of the tube into the fitting cup. Failure to remove this exterior edge may compromise the sealing element when the fitting is inserted onto the tube.

6.2.3 Use tools suitable to ream tube ends. For example, cone reamer/chamfer (Fig. 4), the reaming blade on the tube cutter, half-round or round files (Fig. 5), pen reamer (Fig. 5), or any tool suited to the task. Do not deform the soft (annealed) tube end by applying too much pressure.

6.2.4 Bring deformed soft (annealed) tube to its proper roundness and dimensions with a plug and sizing ring tool.

6.3 *Inspection of Sealing Surface:*

6.3.1 Perform a visual and tactile inspection of the outer tubing surface. If imperfections are found, proceed to 6.3.2. If no imperfections are found, proceed to 6.3.3.

6.3.2 Tube imperfections such as cuts, nicks, scratches, fouling, buildup, malformation, and contaminants such as adhesives, oils, sealants, and so forth (Figs. 6 and 7) can cause a leak path underneath a compressed sealing element. Treat permanent incise marks as imperfections. If imperfections cannot be removed, cut off damaged portion of tube or select new tube; proceed to 6.3.3.

6.3.3 Abrade the tube ends using sand cloth (Fig. 8) or nylon abrasive pads (Fig. 9) until imperfections (if any) are removed. Prepping of the tube ends should not be so aggressive

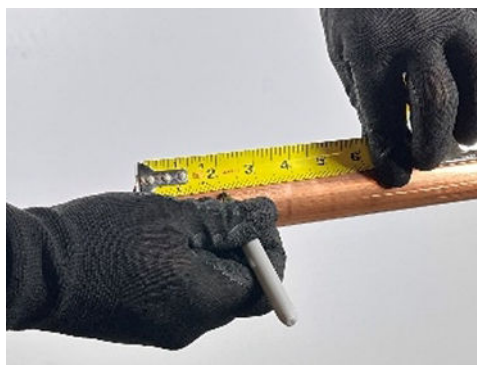


FIG. 1 Accurately Measure the Length of Each Tube Segment



FIG. 2 Disk-Type or Band Saw Tube Cutters



FIG. 3 Remove Any Burrs on the Outside of the Tube Ends



FIG. 4 Cone Reamer/Chamfer



FIG. 5 Reaming Blade on the Tube Cutter, Half-Round or Round Files (left) and Pen Reamer (right)

as to take the tubing out of round or tolerance as defined by Specifications B88/B88M or B280 as applicable. If imperfections cannot be removed, cut off the damaged portion of tube or select new tube.

6.4 *Inspection of Fitting*—Perform a visual and tactile inspection of fitting immediately before inserting onto tube (Fig. 10).

6.4.1 Verify all components of the fitting are present and installed correctly. Failure to perform this step can result in installation of fittings that do not contain critical components for performance and longevity of the system.

6.4.2 Verify the fitting and fitting sealing element is recommended by the manufacturer for the intended application.

6.4.3 Verify sealing surfaces are free of debris so as not to introduce fouling between the sealing element and surface of the tube.

6.5 *Assembly and Support:*

6.5.1 Measure and mark between minimum and full insertion depth to ensure proper insertion depth before the pressing action (Fig. 11).

6.5.2 Insert tube end into fitting cup making sure that the tube is placed at least to the minimum depth.