



Standard Practice for Expanded Welded and Silver Braze Socket Joints for Pipe and Tube¹

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1. Scope

1.1 This practice describes expanded welded and silver braze socket joints for use on shipboard piping systems.

1.2 Expanded welded and silver braze socket joints are to be used to join two pipes or tubes having the same NPS (see Note 1) without using a fitting or butt weld.

1.3 Braze socket type joints are not intended for use on systems containing flammable or combustible fluids in areas where fire hazards exist or where the service temperature exceeds 425°F (205°C).

1.4 Braze joints depending solely upon a fillet weld rather than primarily upon brazing material between pipe/tube and socket, are not covered by this practice.

NOTE 1—The dimensionless designator nominal pipe size (NPS) has been substituted in this practice for such traditional terms as “nominal diameter,” “size,” and “nominal size,” and “iron pipe size.”

1.5 The values stated in inch-pound units are to be regarded as the standard.

1.6 *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:

A 312/A312M Specification for Seamless and Welded Austenitic Stainless Steel Pipe²

B 75 Specification for Seamless Copper Tube³

B 88 Specification for Seamless Copper Water Tube³

B 466 Specification for Seamless Copper-Nickel Pipe and Tube³

2.2 Military Standards:

MIL-P-1144 Pipe, Corrosion-Resistant, Stainless Steel, Seamless and Welded⁴

MIL-T-16420 Tube, Copper-Nickel Alloy, Seamless and Welded⁴

MIL-T-24107 Tube, Copper (Seamless)⁴

2.3 ASME Standard:

ASME Boiler Code⁵

2.4 Federal Standard:

Title 46 Code of Federal Regulations⁴

2.5 NAVSEA Document:

0900-LP-001-7000 Fabrication and Inspection of Braze Piping Systems⁴

3. Significance and Use

3.1 Expanded welded socket joints may be used with the following pipe and tube:

3.1.1 *Seamless Copper Tube*—2.375-in. (60-mm) outside diameter through 6.625-in. (170-mm) outside diameter.

3.1.2 *Seamless Copper-Nickel Tube*—2.375-in. (60-mm) outside diameter through 6.625-in. (170-mm) outside diameter.

3.1.3 *Seamless Copper Water Tube*—2.125-in. (55-mm) outside diameter through 4.125-in. (105-mm) outside diameter.

3.1.4 *Seamless Stainless Steel Pipe*—2 NPS through 6 NPS, Schedules 5 and 10.

3.2 Expanded silver braze socket joints may be used with the following tube:

3.2.1 *Seamless Copper Tube*—2.375-in. (60-mm) outside diameter through 6.625-in. (170-mm) outside diameter.

3.2.2 *Seamless Copper-Nickel Tube*—2.375-in. (60-mm) outside diameter through 6.625-in. (170-mm) outside diameter.

3.2.3 *Seamless Copper Water Tube*—2.125-in. (55-mm) outside diameter through 4.125-in. (105-mm) outside diameter.

3.3 Expanded welded and silver braze socket joints may be used where experience or test has demonstrated that the joint is safe and suitable for design and operating conditions, and where adequate provision is made to prevent separation of the joint.

¹ This practice is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.13 on Piping Systems.

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² *Annual Book of ASTM Standards*, Vol 01.01.

³ *Annual Book of ASTM Standards*, Vol 02.01.

⁴ Available from U.S. Government Printing Office, Washington, DC 20402.

⁵ Available from American Society of Mechanical Engineers, Headquarters, Three Park Ave., New York, NY 10016-5990.

4. Materials and Manufacture
4.1 Welded Socket Joint:

4.1.1 *Seamless Copper Tube*—Specification B 75, UNS Number C12200 and MIL-T-24107, UNS Number C12200, light drawn (see 5.3).

4.1.2 *Seamless Copper-Nickel Tube (90-10)*—Specification B 466, UNS Number C70600 and MIL-T-16420, UNS Number C70600, Class 200, annealed.

4.1.3 *Seamless Copper-Nickel Tube (70-30)*—Specification B 466, UNS Number C71500 and MIL-T-16420, UNS Number C71500, Class 200, annealed.

4.1.4 *Seamless Copper Water Tube*—Specification B 88, Type K, UNS Number C71500, drawn (see 5.3).

4.1.5 *Seamless Stainless Steel Pipe*—Specification A 312/A 312M, UNS Number S30400 and S31600. MIL-P-1144, UNS Number S30400 and S31600, Schedules 5 and 10.

4.2 Silver-Brazed Socket Joint:

4.2.1 *Seamless Copper Tube*—Specification B 75, UNS Number C12200 and MIL-T-24107, UNS Number C12200, light drawn (see 5.3).

4.2.2 *Seamless Copper-Nickel Tube (90-10)*—Specification B 466, UNS Number C70600 and MIL-T-16420, UNS Number C70600, Class 200, annealed.

4.2.3 *Seamless Copper-Nickel Tube (70-30)*—Specification B 466, UNS Number C71500 and MIL-T-16420, UNS Number C71500, Class 200, annealed.

TABLE 1 Expanded Welded Socket Joint

NOTE 1—1 in. = 25.4 mm. °F = (°C × 9/5) + 32.

Material	System Size		Wall Thickness		Maximum Design Pressure and Temperature	
	Size (NPS)	Tube Outside Diameter, in.	T Minimum as Procured, in.	T ₁ Minimum After Expansion, in.	Commercial System Class II ^A	MIL-Specification System, Class P2
Seamless light drawn copper tube, Specification B 75, UNS Number C12200 and MIL-T-24107, Alloy 122.	2	2.375	0.065	0.061	200 psi at 406°F	200 psi at 425°F
	2½	2.875	0.065	0.062		
	3	3.500	0.065	0.062		
	4	4.500	0.065	0.063		
	5	5.563	0.068	0.066		
	6	6.625	0.081	0.079		
Seamless annealed copper-nickel tubing (90-10), Specification B 466, UNS Number C70600 and MIL-T-16420, Alloy 706, Class 200.	2	2.375	0.083	0.077	200 psi at 450°F	200 psi at 450°F
	2½	2.875	0.083	0.078		
	3	3.500	0.095	0.089		
	4	4.500	0.109	0.103		
	5	5.563	0.125	0.119		
	6	6.625	0.134	0.128		
Seamless annealed copper-nickel tubing (70-30), Specification B 466, UNS Number C71500 and MIL-T-16420, Alloy 715, Class 200.	2	2.375	0.083	0.077	200 psi at 450°F	200 psi at 450°F
	2½	2.875	0.083	0.078		
	3	3.500	0.095	0.089		
	4	4.500	0.109	0.103		
	5	5.563	0.125	0.119		
	6	6.625	0.134	0.128		
Seamless drawn copper water tube, Specification B 88, Type K, UNS Number C12200.	2	2.125	0.083	0.076	200 psi at 406°F	...
	2½	2.625	0.095	0.088		
	3	3.125	0.109	0.101		
	...	3.625	0.120	0.112		
	4	4.125	0.134	0.125		
		
Seamless stainless steel pipe, Specification A 312/A 312M, UNS Number S30400 and S31600, MIL-P-1144, Alloy 304 and 316, Schedule 5.	1	300 psi at 650°F	300 psi at 650°F
	1¼	...	...	...
	1½	...	...	...
	1¾	...	...	...
	2	2.375	0.065	0.061		
	2½	2.875	0.083	0.078		
	3	3.500	0.083	0.079		
	4	4.500	0.083	0.080		
	5	5.563	0.109	0.104		
	6	6.625	0.109	0.105		
		
Seamless stainless steel pipe, Specification A 312/A 312M, UNS Number S30400 and S31600, MIL-P-1144, Alloy 304 and 316, Schedule 10.	1	300 psi at 650°F	300 psi at 650°F
	1¼	...	...	...
	1½	...	...	...
	1¾	...	...	...
	2	2.375	0.109	0.099		
	2½	2.875	0.120	0.110		
	3	3.500	0.120	0.111		
	4	4.500	0.120	0.113		
5	5.563	0.134	0.127			
6	6.625	0.134	0.128			