

CLASS 3000 SOCKET-WELDING AND THREADED UNIONS

CLASS 3000 STEEL PIPE UNIONS TECHNICAL DATA

MSS SP-83:2006

Pressure ratings, materials, requirements and dimensional tables

PRESSURE-TEMPERATURE RATINGS

MATERIALS

SOCKET-WELDING DIMENSIONS

THREADED DIMENSIONS

INSTALLATION GUIDANCE

Technical reference prepared for product and project requirement review.

Confirm final material, dimensions, testing and documentation before ordering.

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Technical data navigation

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REFERENCE NOTE

Source dimensional values and footnotes are retained. Confirm the applicable material, grade, schedule and project specification before ordering.

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Technical data navigation

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REFERENCE NOTE

Source dimensional values and footnotes are retained. Confirm the applicable material, grade, schedule and project specification before ordering.

NOTE: UNION PARTS FROM DIFFERENT MANUFACTURERS ARE NOT FUNCTIONALLY INTERCHANGEABLE AND COMBINING PARTS FROM DIFFERENT MANUFACTURERS IS NOT RECOMMENDED.

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STANDARD PRACTICE

SP-83

**STEEL PIPE UNIONS
SOCKET WELDING AND THREADED**

1. SCOPE

1.1 This Standard Practice establishes envelope and other essential dimensionals, finish, tolerances, testing, marking, material, and minimum performance requirements for forged carbon and stainless steel pipe unions, socket welding and threaded ends.

2. PRESSURE RATINGS

2.1 These unions shall be designated as Class 3000 socket welding or threaded and shall carry ratings shown in Table 1.

3. SIZE

3.1 The size of the union is identified by the nominal pipe size.

4. DESCRIPTION

4.1 The complete union shall consist of three parts: male end, female end, and nut. Equivalent terms are tabulated in Table 2.

**TABLE 1
Pressure-Temperature Service Rating
Class 3000 Carbon and Stainless Steel
Unions Socket Welding & Threaded Ends**

SERVICE TEMP DEGREE °F	NON-SHOCK WORKING PRESSURE			
	psig			
	ASTM A 105 CARBON STEEL	ASTM A 182 F316	ASTM A 182 F304L F316L	ASTM A 182 F304
100	3000	2915	2430	2915
200	2735	2510	2050	2430
300	2655	2265	1835	2140
400	2565	2080	1670	1905
500	2425	1935	1545	1770
600	2220	1830	1460	1680
650	2180	1800	1420	1650
700	2155	1750	1390	1630
750		1710	1360	1610
800		1680	1330	1595
850		1645	1300	1575
900		1595		1555
950		1565		1515
1000		1470		1300

TABLE 2 Terminology of Parts

Preferred Term	Equivalent Terms
Male	Male seat end Tail Piece – Nut Piece - Coupling – Ball End
Female	Female seat end Thread Piece - Body - Head - Cone End
Nut	Union Coupling Nut - Swivel – Ring

4.2 The seating surfaces of the joint will be steel-to-steel, ball-to-cone design. Male and Female ends shall be machined with sockets for socket welding or threaded with internal NPT pipe threads. Male and Female ends and Nuts may be round, polygon, or modified polygon with rounded corners, at the option of the manufacturer. The length of the union ends shall be sufficient to provide a suitable wrenching surface.

5. MARKING

5.1 Each union Nut shall be permanently marked in accordance with MSS SP-25. The marking shall include (but is not limited to) the following:

- Manufacturer's name or trademark.
- Material grade identification- in accordance with the requirements of the applicable ASTM specification listed in Section 6.
Note: Multiple material marking shall be allowed as covered in ASTM material specifications listed in Section 6.1.
- Material lot or heat number for traceability.
- Service designation: 3000 or 3M (M to designate units of 1000)
- The nominal pipe size.

5.2 The Male and Female union ends shall be permanently marked with the following:

- Manufacturer's name or trademark.
- Material grade identification. (See Section 5.1b)
- Material lot or heat number for traceability.

5.3 All three parts of a union, in compliance with all requirements of this SP, shall be marked SP83.

6. MATERIAL

6.1 The three parts of a union assembly shall be manufactured from materials which have the same requirements for chemical composition, mechanical properties, and applicable heat treatment, except that F304 and F316 union nuts may be used with F304L and F316L end pieces, respectively. Material specification ASTM A 182 applies for stainless steel, grades F304/F304L/F316/F316L. Stainless steel austenitic unions are suitable for use with ASTM A312/A312M pipe.

Note: Multiple Material Marking:

Stainless Steel unions, meeting the chemical and mechanical properties for more than one class or grade, may, at the manufacturer's option, be marked with more than one class or grade designation, such as F304/304L and F316 /316L.

Material specification ASTM A 105 applies for carbon steel. Carbon steel unions are suitable for use with ASTM A 106 Grade B pipe as well as lower grades.

6.2 Carbon steel and stainless steel union parts may be forged, formed, or made from wrought bars conforming to the requirements of the melting process, chemical composition, and mechanical property requirements of ASTM A 105 for carbon steel and ASTM A 182 for stainless steel grades.

6.3 Unions may be made from materials of other wrought material by agreement between the manufacturer and the purchaser, but shall not be marked SP83.

7. TESTS

7.1 Pressure testing is not required by this standard.

8. DESIGN AND DIMENSIONS

8.1 **Socket Wall Thickness for Socket Welding Unions.** The socket wall thickness shall be no less than the corresponding values, C, shown in Table 4.

8.2 **Minimum Body Wall Thickness for Socket Welding Unions.** The minimum body wall thickness, other than socket wall, must be equal to or greater than the nominal wall thickness of Schedule 80 pipe of the same size as the union, as established by ASME B36.10M.

8.3 Minimum Wall Thickness for Threaded Unions. (Dimension C in Table 5). The minimum wall thickness at the root of the pipe thread at the wrench tight plane, must equal or exceed the nominal wall thickness for Schedule 80 pipe.

8.4 Other Dimensions. The dimensions for unions capable of meeting this standard are shown in Table 4 for socket welding unions and Table 5 for threaded unions.

8.5 Union parts from different manufacturers are not functionally interchangeable and combining parts from different manufacturers is not recommended.

9. SOCKET WELDING UNIONS

9.1 To provide assembled union uniformity this Standard Practice establishes dimensions (Table 4 Column E) for the location of the bottom of the sockets. Socket welding union ends shall be faced at right angles to the axis to provide a flat surface against which to weld and the socket shall be counterbored or otherwise machined to insure uniform depth and circularity.

9.2 When installing socket weld end unions, to minimize the possibility of cracking of the fillet welds, it is recommended that the connecting pipe be withdrawn approximately 0.06 inches away from the bottom of the union socket bore before welding (see Figure 1).

10. THREADED UNIONS

10.1 Dimensions for threaded unions are shown in Table 5. Internal pipe threads shall be NPT in accordance with ASME B1.20.1. Gaging procedures and practice shall be in accordance with Section 8 of the same standard.

11. NUT THREADS

11.1 Internal threads of the nut and external threads of the (Threadpiece) Female part shall be American National Thread form made in accordance with the formulae for special threads appearing in ASME B1.1, Unified and American Screw Threads, Class 2A External and 2B Internal Tolerances and Clearances.

11.2 At manufacturer's option, changes to the values in Column H are permitted, provided the requirements of ASME B1.1 and all requirements of this Standard Practice are met.

12. FINISH

12.1 Surfaces must be free of sharp burrs and have a workmanlike finish.

13. TOLERANCES

13.1 General. Tolerances are listed in Tables 4 and 5.

13.2 Concentricity. The socket shall be concentric with the waterway bore within a tolerance of plus or minus 0.03 in. for all sizes.

13.3 Coincidence of Axis. The maximum allowable variation in the alignment of one threaded pipe end of the assembled union to the axis of the opposite threaded pipe end shall not exceed 0.19 in. in 1 foot. Figure 2 illustrates one method that may be used to check alignment.

14. NUT TIGHTENING TORQUE

14.1 Recommended minimum nut tightening torque values are listed in Table 3.

15. CORROSION PROTECTION

15.1 Unions shall be effectively protected against corrosion. Excess oils shall be considered unacceptable as corrosion protective media. Specialty protection shall be a matter of agreement between the manufacturer and purchaser.

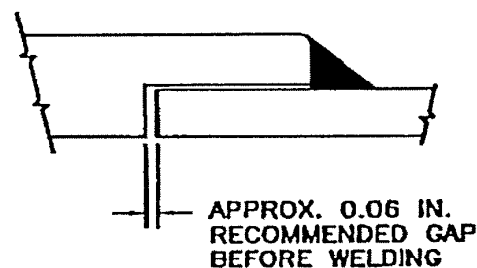
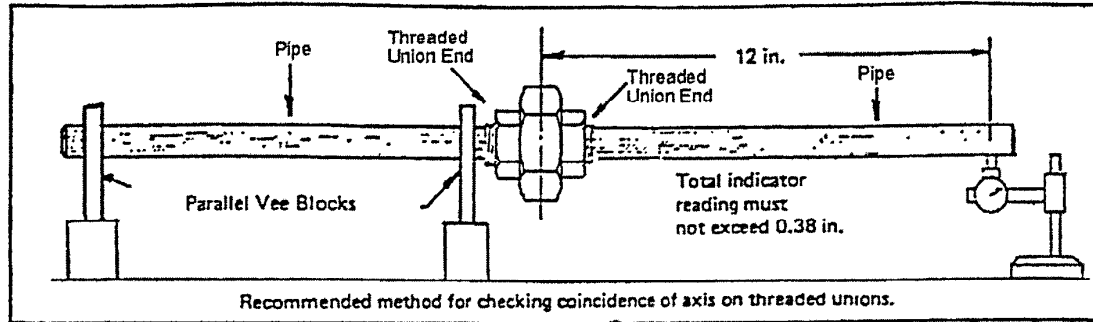


Figure 1 - Welding Gap

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Illustrative Only
FIGURE 2

TABLE 3
Minimum Recommended
Nut Tightening Torque

Nominal Pipe Size	Foot Pounds (Minimum)
1/8	85
1/4	85
3/8	100
1/2	100
3/4	120
1	120
1-1/4	130
1-1/2	130
2	130
2-1/2	150
3	150

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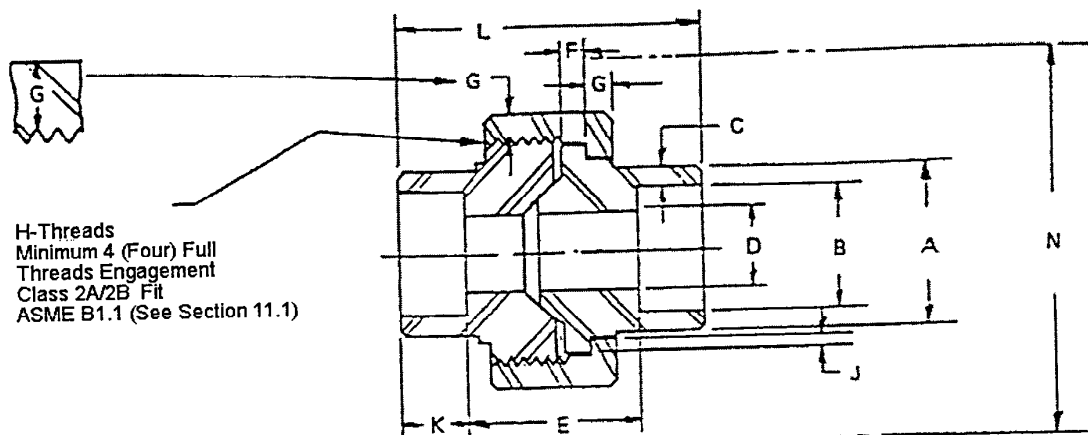


**TABLE 4 - Class 3000 Carbon and Stainless Steel
Pipe Unions - Socket Welding Ends**

Nom. Pipe Size	Pipe End Min.	Socket Bore Dia.	Socket Wall Min.	Water Way Bore ^(a)	Laying Length	Male Flange Min.	Nut Min.	Threads Per Inch	Bearing Min.	Depth Of Socket Min.	Length Assem. Nominal	Clear Assem. Nut
	A	B	C	D	E	F	G	H	J	K	L	N
1/8	0.86	0.440 0.420	0.125	0.299 0.239	0.88 0.75	0.125	0.125	16	0.049	0.38	1.63	2.0
1/4	0.86	0.575 0.555	0.130	0.394 0.334	0.88 0.75	0.125	0.125	16	0.049	0.38	1.63	2.0
3/8	1.02	0.710 0.690	0.138	0.523 0.463	1.06 0.81	0.135	0.135	14	0.054	0.38	1.81	2.2
1/2	1.23	0.875 0.855	0.161	0.652 0.592	1.06 0.81	0.145	0.145	14	0.059	0.38	1.93	2.3
3/4	1.46	1.085 1.065	0.168	0.854 0.794	1.25 1.00	0.160	0.160	11	0.066	0.50	2.24	2.6
1	1.79	1.350 1.330	0.196	1.079 1.019	1.35 1.03	0.180	0.175	11	0.073	0.50	2.44	3.1
1-1/4	2.16	1.695 1.675	0.208	1.410 1.350	1.60 1.28	0.210	0.205	10	0.084	0.50	2.80	3.7
1-1/2	2.42	1.935 1.915	0.218	1.640 1.580	1.66 1.34	0.230	0.220	10	0.091	0.50	3.01	4.4
2	2.96	2.426 2.406	0.238	2.097 2.037	1.79 1.47	0.260	0.250	10	0.106	0.62	3.39	5.2
2-1/2	3.61	2.931 2.906	0.302	2.529 2.409	2.43 2.05	0.295	0.280	8	0.121	0.62	4.03	5.9
3	4.30	3.560 3.535	0.327	3.128 3.008	2.51 2.11	0.325	0.315	8	0.139	0.62	4.29	6.9

NOTE: (a) The contact diameter of the male/female tailpiece is affected by the waterway bore (Col. D). The manufacturer shall consider the relationships between the contact point and waterway diameter in his design.

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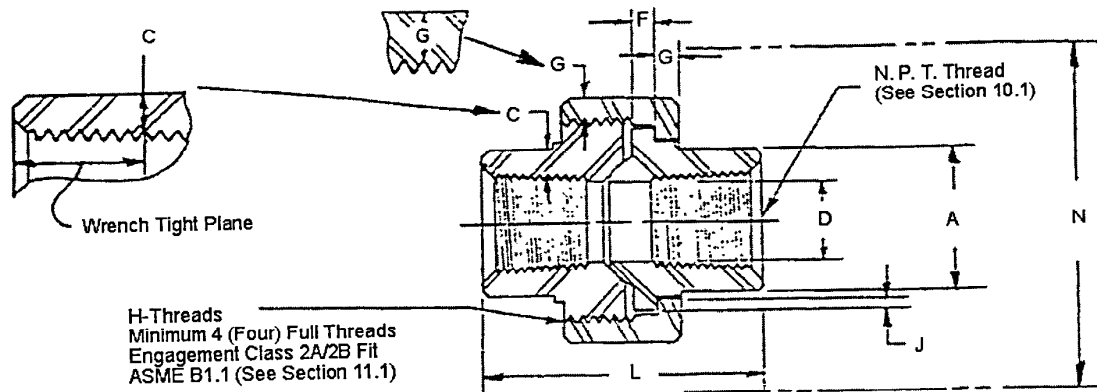


TABLE 5 - Class 3000 Carbon and Stainless Steel Pipe Unions - Threaded Ends

Nom. Pipe Size	Pipe End Min. A	Wall Min. C	Water Way Bore ^(a) D	Male Flange Min. F	Nut Min. G	Threads Per Inch H	Bearing Min. J	Length Assem. Nominal L	Clear Assem. Nut N
1/8	0.58	0.095	0.332 0.253	0.125	0.125	16	0.049	1.63	2.0
1/4	0.75	0.119	0.438 0.372	0.125	0.125	16	0.049	1.63	2.0
3/8	0.90	0.126	0.562 0.532	0.135	0.135	14	0.054	1.81	2.2
1/2	1.09	0.147	0.703 0.672	0.145	0.145	14	0.059	1.93	2.3
3/4	1.32	0.154	0.906 0.842	0.160	0.160	11	0.066	2.24	2.6
1	1.63	0.179	1.141 1.092	0.180	0.175	11	0.073	2.44	3.1
1-1/4	1.99	0.191	1.484 1.392	0.210	0.205	10	0.084	2.80	3.7
1-1/2	2.25	0.200	1.714 1.622	0.230	0.220	10	0.091	3.01	4.4
2	2.76	0.218	2.188 2.052	0.260	0.250	10	0.106	3.39	5.2
2-1/2	3.36	0.276	2.609 2.532	0.295	0.280	8	0.121	4.03	5.9
3	4.03	0.300	3.250 3.042	0.325	0.315	8	0.139	4.29	6.9

NOTE: (a) The contact diameter of the male/female tailpiece is affected by the waterway bore (Col. D). The manufacturer shall consider the relationships between the contact point and waterway diameter in his design.

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ANNEX A

Referenced Standards and Applicable Dates

This Annex is an integral part of this Standard Practice and is placed after the main text for convenience.

Standard Name or Description.

ASME

B1.1-2003	Unified Inch Screw Threads
B1.20.1-1983 (R01)	Pipe Threads, General Purpose, Inch
B36.10M-2004	Welded and Seamless Wrought Steel Pipe

ASTM

A 105/A 105M-2005	Carbon Steel Forgings for Piping Applications
A 106/A 106M -04b-004b	Seamless Carbon Steel Pipe for High Temperature Service
A 234/A 234M-2005a	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
A 182/A 182M-2005	Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
A 403/A 403M-2004	Wrought Austenitic Stainless Steel Pipe Fittings
A 312/A 312M-2005	Seamless, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipe

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SP-25-1998	Standard Marking System for Valves, Fittings, Flanges and Unions
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Publications of the following organizations appear in the above list:

ASME	ASME International 3 Park Ave., New York, NY 10016-5990
ASTM	ASTM International 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Street, N.E., Vienna, VA 22180

Send your requirement

Send a drawing, product list, size, material grade, standard, schedule or wall thickness, testing and project document requirements.

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RESPONSE AND DOCUMENT COORDINATION

Initial enquiries are answered within 24 hours, including weekends, by email or WhatsApp. Drawing review, material/standard matching and project document requirements can be discussed and organized with the buyer. Third-party inspection can be buyer-nominated or coordinated on request.

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