AN AMERICAN NATIONAL STANDARD

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REFRIGERATION TUBE FITTINGS — SAE J513f

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REFRIGERATION TUBE FITTINGS—SAE J513f

SAE Standard

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GENERAL SPECIFICATIONS

Scope—This standard covers complete general and dimensional specifications for refrigeration tube fittings of the flare type specified in Figs. 1–42 and Tables 1–16. These fittings are intended for general use with flared annealed copper tubing in refrigeration applications.

Dimensions of single and double 45 deg flares on tubing to be used in conjunction with these fittings are given in Fig. 2 and Table 1 of SAE J533.

The following general specifications supplement the dimensional data contained in Tables 1–16 with respect to all unspecified detail.

Pressure Ratings and Service Limitations—Fittings covered by this standard are satisfactory for operating pressures up to 500 psi (3450 kPa) and are suitable for use in systems conducting most fluorinated hydrocarbon refrigerants. Fitting manufacturers should be consulted for recommendations.

Size Designations—Fitting sizes throughout the dimensional tables are designated by the corresponding outside diameter of the tubing for flared type or solder type tube ends and by the corresponding standard nominal pipe size for pipe thread ends.

Dimensions and Tolerances—Except for nominal sizes and thread specifications, dimensions and tolerances are given in both U. S. customary and SI units as designated. Tabulated dimensions shall apply to the finished parts, plated or otherwise processed, as specified by the purchasers. Unless otherwise specified, the maximum and minimum across flat dimensions shall be within the commercial tolerance of bar or extruded stock from which the fittings are produced. The minimum across corners dimensions of hexagons shall be 1.092 times the nominal width across flats, but shall not result in a size flat width less than 0.43 times the nominal width across flats.

Unless otherwise specified, tolerance on hole diameters designated drill in the dimensional tables shall be as tabulated below:

Drill Size Range		Tolerance			
		Plus		Minus	
in	mm	in	mm	in	mm
0.0135 thru 0.1850	0.343 thru 4.699	0.003	0.08	0.002	0.05
0.1875 thru 0.2480	4.762 thru 6.299	0.004	0.10	0.002	0.05
0.2500 thru 0.7500	6.350 thru 19.050	0.006	0.15	0.003	0.08
0.7579 thru 1.0000	19.25 thru 25.400	0.007	0.18	0.004	0.10

Tolerance on all dimensions not otherwise limited shall be ±0.010 in (0.25 mm). Fitting seats shall be concentric with the straight thread pitch diameters within 0.010 in (0.25 mm) full indicator reading (FIR). Angular tolerance on axis of ends on elbows, tees, and crosses shall be ±2.50 deg for sizes up to and including $\frac{3}{8}$ in, and ±1.50 deg for sizes larger than $\frac{3}{8}$ in.

Where so illustrated and not otherwise specified, hexagon corners shall be chamfered 30 ± 5 deg, to a diameter equal to the nominal width across flats, with a tolerance of −0.016 in (0.41 mm); or where design permits, corners may be chamfered to the diameter of the abutting surface provided the length of chamfer does not exceed that produced by the 30 deg chamfer previously described.

Passages—Where passages in straight fittings are machined from opposite ends, the offset at the meeting point shall not exceed 0.015 in (0.38 mm). The cross sectional area at the junction of passages in angle fittings shall not be less than that of the smallest passage. Where the passage is specified as a maximum or as tap drill diameter or less, the minimum shall be no less than the minimum diameter of the smallest passage in the fitting.

Wall Thickness—Unless otherwise designated, the wall thickness at any point on fittings shall not be less than the thickness established by the specified dimensions, tolerances, and eccentricities for inner and outer surfaces.

Contour—Details of contour shall be optional with the manufacturer, providing the tabulated dimensions are maintained and serviceability of the fittings is not impaired. Wrench flats on elbows and tees shall be optional. Where extruded or forged shapes are reduced to conserve material, the wall thickness, unless otherwise specified, shall not be less than the respective minimum values tabulated below:

Nominal Tube OD, in	Wall Thickness, min			
	Extruded Shapes[a]		Forged Shapes	
	in	mm	in	mm
3/16	0.04	1.0	0.060	1.52
1/4	0.04	1.0	0.075	1.90
5/16	0.05	1.3	0.075	1.90
3/8	0.05	1.3	0.085	2.16
1/2	0.06	1.5	0.090	2.29
5/8	0.08	2.0	0.100	2.54
3/4	0.08	2.0	0.100	2.54

[a]Applies to reduction in one plane of shape only.

Straight Threads—Unified Standard Class 2A external and Class 2B internal threads with minor diameters, where specified, modified to Class 3B limits shall apply to plain finish (unplated) fittings of all types. For externally threaded parts with additive finish, the maximum diameters of Class 2A may be exceeded by the amount of the allowance, that is, the basic diameters (Class 2A maximum diameters plus the allowance) shall apply after plating. For internally threaded parts with additive finish, the Class 2B diameters and modified minor diameters shall apply after plating.

The pitch diameter tolerance shall be the same as the corresponding diameter-pitch combination and class of the Unified fine thread series or for special diameter-pitch combinations shall be based on diameter, pitch, and a length of engagement of 9 times the pitch. See ANSI B1.1, Screw Threads.

For convenient reference, the data generally required to specify threads are given in Table 1. (Inasmuch as threads are normally produced and gaged with equipment made to the inch system of measurement, conversion of size designations and dimensions to SI units is considered unnecessary.)

Where external threads are produced by roll threading and the body is not undercut, the unthreaded portion of body adjacent to the shoulder may be reduced to the minimum pitch diameter.

External threads shall be chamfered to the diameter of abutting surfaces, or to the diameters specified, to produce a length of chamfered or partial thread equivalent to $\frac{3}{4}$ to $1\frac{1}{4}$ times the pitch (rounded to a three-place decimal).

Internal threads shall be countersunk 90 deg included angle to the diameters specified in the dimensional tables.

Where external threads are produced by roll threading and the body is not undercut, the unthreaded portion of body adjacent to the shoulder may be reduced to the minimum pitch diameter.

External threads shall be chamfered from the diameter of abutting surface to produce a length of chamfered or partial thread equivalent to $\frac{3}{4}$ to $1\frac{1}{4}$ times the pitch (rounded to a three-place decimal).

Internal threads shall be countersunk 90 deg included angle to the diameters specified in the dimensional tables.

Thread Eccentricity Tolerances—The various thread elements of Class 2A external and Class 2B, modified, internal threads on tube fittings shall be concentric within the limitations specified in SAE J512.

Pipe Threads—Taper pipe threads, unless there is specific authorization to the contrary, shall conform to the Dryseal American Standard Taper Pipe Thread (NPTF). Specifications for pipe threads are given in detail in SAE J476.

The length of full form external thread shall not be shorter than L_2 plus one pitch (thread), except that where thread is cut through into a relieved body or undercut on the fitting, the minimum full threaded length may be reduced by one pitch (thread).

Where external pipe threads are produced by roll threading, the diameter of the unthreaded portion of shank adjacent to shoulder may be reduced to the E_2 basic pitch diameter.

The tube fitting dimensions tabulated herein are based on length of the Dryseal American Standard Taper Pipe Thread (NPTF), it being the consensus of manufacturers and users that trouble-free assembly cannot be assured unless a full length thread is used. However, the tap drill depths and overall lengths specified in the tables for fittings with internal taper pipe threads are not consistent with the tap drill depths and overall thread lengths of the

Dryseal American Standard Taper Pipe Threads (NPTF) given in Table A2, Appendix A of SAE J476. The full length Dryseal American Standard Taper Pipe Taps specified in Table B2 of SAE J476 cannot be used, as the tap drill depths and overall lengths of the fittings have been reduced to the minimum required by bottoming taps to produce standard full thread length. The deviations described above are peculiar to these tube fittings and as special tooling is required, caution should be exercised in specifying such deviations for any other products.

Straight pipe threads, where specified, shall conform to American Standard Straight Pipe Threads for Mechanical Joints (NPSM) in ANSI B2.1, Pipe Threads.

External pipe threads shall be chamfered from the diameters tabulated in Table 2 to produce the specified length of chamfered or partial thread. Internal pipe threads shall be countersunk 90 deg included angle to the diameters tabulated in Table 2.

Material and Manufacture—Fittings shall be made from SAE CA360 brass (half-hard), CA345, or CA350 brass bar or extruded shapes or from SAE CA377 brass forgings in accordance with the manufacturer's processes. Nuts may be made from SAE CA377 brass forging, or steel as specified by the purchaser. Seal bonnets and gaskets shall be made from copper conforming to SAE CA102, CA110, or CA122. As specified by purchaser, fusible metal alloys shall be supplied for temperature ranges 158–165, 203–219, or 275–290°F (70–74, 95–104, 135–143°C).

Finish—As specified by purchaser, steel nuts shall be furnished plain, cadmium or zinc plated to a thickness of 0.0002 in (0.005 mm) minimum followed by a chromate treatment, or with a phosphate coating (oil finished). Plated or coated nuts must meet the requirements of 32 or 16 h salt spray test, respectively, in accordance with ASTM B 117.

Workmanship—Workmanship shall conform to the best commercial practice to produce high quality fittings. Fittings shall be free from all hanging burrs, loose scale, and slivers which might become dislodged in usage and all other defects which might affect their serviceability. All sealing surfaces must be smooth except that annular tool marks up to 100 μin. (2.5 μm) maximum shall be permissible.

Assembly Considerations—Use of a compatible lubricant or sealant is desirable in assembling Dryseal pipe threads on refrigeration tube fittings to minimize galling and effect a pressure-tight seal.

TABLE 1—STRAIGHT THREAD SPECIFICATION DATA, IN

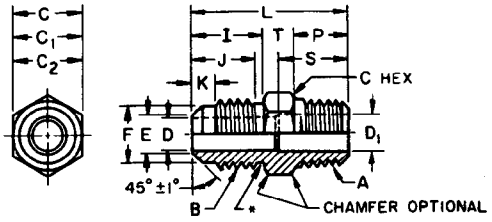
Nominal Size	Series Designation	External Thread		Internal Thread			
		Pitch Dia		Pitch Dia		Minor Dia[b]	
		Max	Min	Max	Min[a]	Max	Min
5/16–24	UNF	0.2843	0.2806	0.2902	0.2854	0.2754	0.2670
3/8 –24	UNF	0.3468	0.3430	0.3528	0.3479	0.3372	0.3300
7/16–20	UNF	0.4037	0.3995	0.4104	0.4050	0.3916	0.3830
1/2 –20	UNF	0.4462	0.4619	0.4731	0.4675	0.4537	0.4460
5/8 –18	UNF	0.5875	0.5828	0.5949	0.5889	0.5730	0.5650
3/4 –16	UNF	0.7079	0.7029	0.7159	0.7094	0.6908	0.6820
7/8 –14	UNF	0.8270	0.8216	0.8356	0.8286	0.8068	0.7980
1–1/16–14	UNS	1.0145	1.0092	1.0230	1.0161	0.9940	0.9850

[a]These values are also the basic pitch diameter.
[b]Class 3B minor diameter limits.

ϕ TABLE 2

Nominal Pipe Thread Size, in	External Thread								Internal Thread			
	Chamfer Diameter[a]				Length of Chamfered or Partial Thread				Countersink Diameter[a]			
	Max		Min		Min		Max		Min		Max	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/8	0.32	8.1	0.30	7.6	0.037	0.90	0.056	1.42	0.42	10.7	0.44	11.2
1/4	0.42	10.7	0.40	10.2	0.056	1.42	0.083	2.11	0.55	14.0	0.57	14.5
3/8	0.55	14.0	0.53	13.5	0.056	1.42	0.083	2.11	0.69	17.5	0.71	18.0
1/2	0.68	17.3	0.66	16.8	0.071	1.80	0.107	2.72	0.85	21.6	0.87	22.1
3/4	0.89	22.6	0.87	22.1	0.071	1.80	0.107	2.72	1.06	26.9	1.08	27.4

[a]Tabulated diameters conform with Appendix A, SAE J476.



*UNDERCUT TO G DIA OPTIONAL ON FLARE SIZES 1/2 AND LARGER UNLESS OTHERWISE SPECIFIED BY PURCHASER

FIG. 1—CONNECTOR
(HALF UNION)
(010102) (U1)

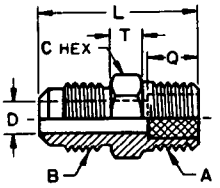


FIG. 2—FUSIBLE CONNECTOR
(HALF UNION)
(010163) (FU)

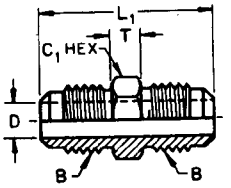


FIG. 3—UNION
(010101) (U2)

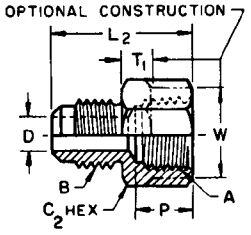


FIG. 4—INTERNAL PIPE
THREAD CONNECTOR
(HALF UNION)
(010103) (U3)

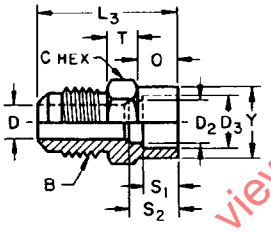


FIG. 5—SOLDER
CONNECTOR
(HALF UNION)
(010104) (US3)

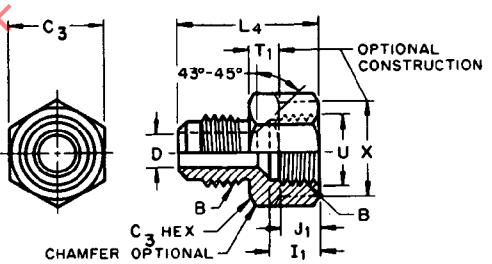


FIG. 6—INTERNAL FLARE
TO EXTERNAL
FLARE ADAPTOR
(010105) (UR3)

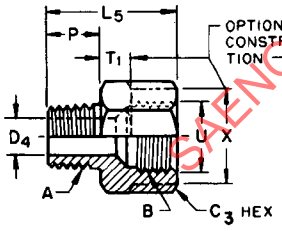


FIG. 7—INTERNAL FLARE
TO EXTERNAL
PIPE ADAPTOR
(010106) (U5)

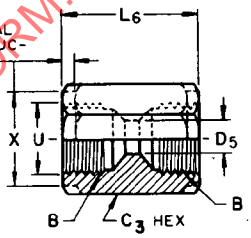


FIG. 8—INTERNAL
FLARE UNION
(010107) (U4)

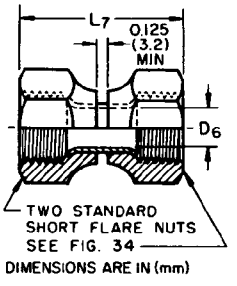


FIG. 9—INTERNAL
FLARE SWIVEL UNION
(010108) (US4)

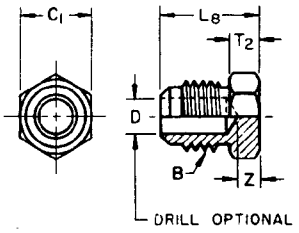


FIG. 10—PLUG
(010109) (P2)

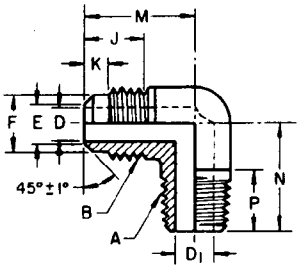


FIG. 11—90 DEG ELBOW
(010202) (E1)

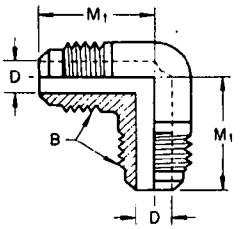
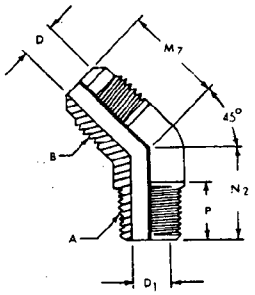
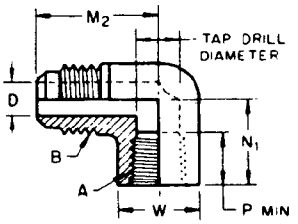


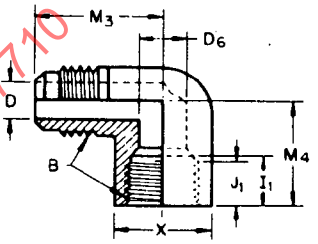
FIG. 12—90 DEG
ELBOW UNION
(010201) (E2)



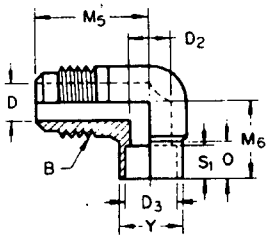
♦FIG. 13—45 DEG ELBOW
(010302) (E5)



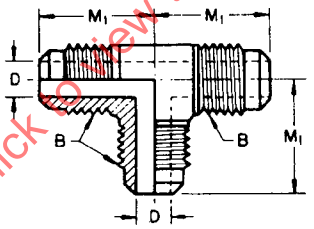
♦FIG. 14—90 DEG
INTERNAL PIPE
THREAD ELBOW
(010203) (E3)



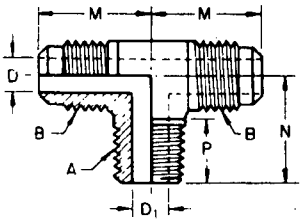
♦FIG. 15—INTERNAL FLARE
TO EXTERNAL FLARE
90 DEG ELBOW
(010205) (E4)



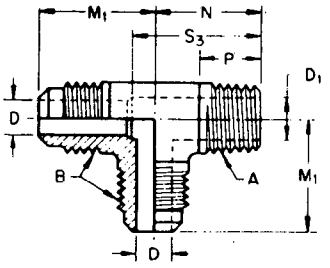
♦FIG. 16—90 DEG
SOLDER ELBOW
(010204) (ES)



♦FIG. 17—THREE
WAY TEE
(010401) (T2)



♦FIG. 18—TWO WAY TEE
(010425) (T1)



♦FIG. 19—RIGHT ANGLE
TWO WAY TEE
(010424) (T3)

NOTE: UNSPECIFIED DETAIL WITH RESPECT TO DIMENSIONS, TOLERANCES, CONTOUR, MATERIAL, WORKMANSHIP, ETC., MUST CONFORM TO GENERAL SPECIFICATIONS FOR REFRIGERATION TUBE FITTINGS. THE DIMENSIONAL DESIGNATIONS IN FIGS. 1, 6 AND 11 AND THE FIRST FIGURE IN EACH GROUP SHALL APPLY TO CORRESPONDING FEATURES OF OTHER FIGURES ON THIS PAGE UNLESS SHOWN OTHERWISE. THE ILLUSTRATIONS ON THIS PAGE APPLY TO TABLE 3. CODES SHOWN IN BRACKETS ADJACENT TO FIGURE NUMBERS REPRESENT RESPECTIVE FITTING IDENTIFICATION IN ACCORDANCE WITH SAE J846 (FIRST NUMBER) AND ANSI B70.1 (SECOND NUMBER).

TABLE 3—DIMENSIONS OF CONNECTORS, UNIONS, ADAPTORS, ELBOWS, TEES, AND CROSSES (FIGS. 1–20)

Nom Tube OD, in	A Dryseal Pipe Thread NPTF[b]	B Straight Thread Nominal Size	C Hex, in	C_1 Hex, in	C_2 Hex, in	C_3 Hex, in	D[e] Drill		D_1[e] Drill		D_2 Drill		D_3[h] Dia	
													in	mm
			Nom	Nom	Nom	Nom	in	mm	in	mm	in	mm	±0.0010	±0.025
3/16	1/8	3/8 –24	7/16	3/8	9/16	1/2	0.125	3.18	0.219	5.56	0.156	3.96	0.1915	4.864
1/4	1/8	7/16–20	7/16	7/16	9/16	5/8	0.188	4.78	0.219	5.56	0.188	4.78	0.2540	6.452
5/16	1/8	1/2 –20	1/2	1/2	9/16	1-1/16	0.219	5.56	0.219	5.56	0.250	6.35	0.3165	8.039
3/8	1/4	5/8 –18	5/8	5/8	11/16	13/16	0.281	7.14	0.312	7.92	0.312	7.92	0.3790	9.627
1/2	3/8	3/4 –16	3/4	3/4	13/16	15/16	0.406	10.31	0.406	10.31	0.438	11.13	0.5040	12.802
5/8	1/2	7/8 –14	7/8	7/8	1	1-1/16	0.500	12.70	0.562	14.27	0.547	13.89	0.6290	15.977
3/4	1/2	1-1/16–14	1-1/16	1-1/16	1-1/16	1-5/16	0.625	15.88	0.562	14.27	0.688	17.48	0.7540	19.152

Nom Tube OD, in	D_4 Drill		D_5 Drill		D_6 Tube ID		E Dia		F Dia		G[c] Dia		I		I_1	
											in	mm				
	in	mm	in	mm	in	mm	in	mm	in	mm	+0.000 −0.010	+0.00 −0.25	in	mm	in	mm
3/16	0.188	4.78	0.188	4.78	0.117	2.97	0.156	3.96	0.297	7.54	—	—	0.44	11.2	0.28	7.1
1/4	0.219	5.56	0.250	6.35	0.180	4.57	0.219	5.56	0.344	8.74	—	—	0.50	12.7	0.34	8.6
5/16	0.219	5.56	0.312	7.92	0.242	6.15	0.250	6.35	0.406	10.31	—	—	0.56	14.2	0.38	9.7
3/8	0.344	8.74	0.375	9.52	0.305	7.75	0.312	7.92	0.531	13.49	—	—	0.62	15.7	0.44	11.2
1/2	0.406	10.31	0.500	12.70	0.430	10.92	0.438	11.13	0.641	16.28	0.659	16.74	0.75	19.0	0.53	13.5
5/8	0.562	14.27	0.625	15.88	0.555	14.10	0.531	13.49	0.750	19.05	0.770	19.56	0.88	22.4	0.66	16.8
3/4	0.562	14.27	0.750	19.05	0.680	17.27	0.719	18.26	0.938	23.83	0.958	24.33	1.00	25.4	0.78	19.8

Nom Tube OD, in	J[c] Full Thread Min		J_1 Full Thread Min		K		L		L_1		L_2		L_3		L_4	
							in	mm	in	mm	in	mm	in	mm	in	mm
	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
3/16	0.38	9.7	0.22	5.6	0.12	3.0	1.00	25.4	1.06	26.9	0.97	24.6	0.94	23.9	0.94	23.9
1/4	0.41	10.4	0.27	6.9	0.16	4.1	1.06	26.9	1.19	30.2	1.03	26.2	1.00	25.4	1.06	26.9
5/16	0.47	11.9	0.30	7.6	0.19	4.8	1.16	29.5	1.34	34.0	1.06	26.9	1.09	27.7	1.12	28.4
3/8	0.54	13.7	0.34	8.6	0.22	5.6	1.44	36.6	1.50	38.1	1.31	33.3	1.19	30.2	1.31	33.3
1/2	0.66	16.8	0.44	11.2	0.25	6.4	1.62	41.0	1.81	46.0	1.50	38.1	1.44	36.6	1.56	39.6
5/8	0.76	19.3	0.55	14.0	0.28	7.1	2.00	50.8	2.12	53.8	1.81	46.0	1.75	44.4	1.81	46.0
3/4	0.90	22.9	0.67	17.0	0.28	7.1	2.19	55.6	2.44	62.0	1.91	48.5	2.06	52.3	2.06	52.3

Nom Tube OD, in	L_5		L_6		L_7 Min		L_8		M		M_1		M_2		M_3	
	in	mm	in	mm			in	mm	in	mm	in	mm	in	mm	in	mm
	±0.03	±0.8	±0.03	±0.8	in	mm	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
3/16	0.81	20.6	0.88	22.4	1.31	33.3	0.59	15.0	0.75	19.0	0.75	19.0	0.81	20.6	—	—
1/4	0.91	23.1	1.00	25.4	1.31	33.3	0.69	17.5	0.81	20.6	0.88	22.4	0.88	22.4	0.94	23.9
5/16	0.94	23.9	1.06	26.9	1.38	35.1	0.78	19.8	0.91	23.1	0.91	23.1	0.94	23.9	—	—
3/8	1.28	32.5	1.25	31.8	1.50	38.1	0.88	22.4	1.00	25.4	1.06	26.9	1.09	27.7	1.16	29.5
1/2	1.33	35.1	1.44	36.6	1.75	44.4	1.06	26.9	1.22	31.0	1.22	31.0	1.28	32.5	1.34	34.0
5/8	1.66	42.2	1.69	42.9	2.00	50.8	1.19	30.2	1.41	35.8	1.41	35.8	1.50	38.1	—	—
3/4	1.88	47.8	2.00	50.8	2.38	60.5	1.31	33.3	1.62	41.1	1.66	42.2	1.62	41.1	—	—

Nom Tube OD, in	M_4		M_5		M_6		M_7		N		N_1		N_2		O		P		Q[d]	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm						
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm
3/16	—	—	0.72	18.3	0.59	15.0	0.62	15.7	0.75	19.0	0.44	11.2	0.52	13.2	0.31	7.9	0.38	9.7	—	—
1/4	0.78	19.8	0.81	20.6	0.62	15.7	0.67	17.0	0.78	19.8	0.47	11.9	0.64	16.3	0.31	7.9	0.38	9.7	—	—
5/16	—	—	0.91	23.1	0.66	16.8	0.78	19.8	0.78	19.8	0.47	11.9	0.64	16.3	0.31	7.9	0.38	9.7	—	—
3/8	0.97	24.6	1.03	26.2	0.72	18.3	0.89	22.6	1.06	26.9	0.69	17.5	0.86	21.8	0.31	7.9	0.56	14.2	0.69	17.5
1/2	1.12	28.4	1.22	31.0	0.84	21.3	1.06	26.9	1.12	28.4	0.75	19.0	0.95	24.1	0.38	9.7	0.56	14.2	—	—
5/8	—	—	1.41	35.8	1.03	26.2	1.23	31.2	1.38	35.1	1.00	25.4	1.17	29.7	0.50	12.7	0.75	19.0	0.94	23.9
3/4	—	—	1.62	41.1	1.25	31.8	1.41	35.8	1.50	38.1	1.06	26.9	1.20	30.5	0.62	15.7	0.75	19.0	—	—

(Table 3 continued on next page)

TABLE 3—DIMENSIONS OF CONNECTORS, UNIONS, ADAPTORS, ELBOWS, TEES, AND CROSSES (FIGS. 1–20)[a] (*continued*)

Nom Tube OD, in	S[e] Max		S_1		S_2[e] Max		S_3[e] Min		T[f] Ref		T_1[f] Min		T_2[f] Ref	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
3/16	0.48	12.2	0.31	7.9	0.41	10.4	0.85	21.6	0.18	4.6	0.21	5.3	0.15	3.8
1/4	0.48	12.2	0.31	7.9	—	—	0.92	23.4	0.18	4.6	0.24	6.1	0.18	4.6
5/16	—	—	0.31	7.9	0.42	10.7	—	—	0.21	5.3	0.24	6.1	0.21	5.3
3/8	0.69	17.5	0.31	7.9	0.44	11.2	1.24	31.5	0.24	6.1	0.30	7.6	0.24	6.1
1/2	—	—	0.38	9.7	0.54	13.7	—	—	0.30	7.6	0.37	9.4	0.30	7.6
5/8	0.94	23.9	0.50	12.7	0.69	17.5	1.67	42.4	0.37	9.4	0.43	10.9	0.30	7.6
3/4	1.22	31.0	0.62	15.7	0.84	21.3	2.02	51.3	0.43	10.9	0.49	12.4	0.30	7.6

Nom Tube OD, in	U Dia Min		U Dia Max		W[g] Dia		X[g] Dia		Y Dia Min		Z Min	
	in	mm	in	mm	in +0.00 −0.02	mm +0.00 −0.5	in +0.00 −0.02	mm +0.00 −0.5	in	mm	in	mm
3/16	0.39	9.9	0.41	10.4	0.56	14.2	0.50	12.7	0.28	7.1	0.06	1.5
1/4	0.45	11.4	0.47	11.9	0.56	14.2	0.62	15.7	0.34	8.6	0.05	1.3
5/16	0.51	13.0	0.53	13.5	0.56	14.2	0.69	17.5	0.40	10.2	0.06	1.5
3/8	0.64	16.3	0.67	17.0	0.69	17.5	0.81	20.6	0.48	12.2	0.06	1.5
1/2	0.77	19.6	0.80	20.3	0.81	20.6	0.94	23.9	0.60	15.2	0.08	2.0
5/8	0.90	22.9	0.93	23.6	1.00	25.4	1.06	26.9	0.74	18.8	0.10	2.5
3/4	1.08	27.4	1.11	28.2	1.06	26.9	1.31	33.3	0.86	21.8	0.10	2.5

[a] For reducing sizes of Unions, Internal Flare to External Flare Adaptors, and 90 Deg Elbow Unions, see Table 4; for reducing sizes of Solder Connectors and 90 Deg Solder Elbows, see Table 5; for reducing sizes of Connectors, Internal Pipe Thread Connectors, Internal Flare to External Pipe Adapters, 90 Deg Elbow, 45 Deg Elbow, and Internal Pipe Thread 90 Deg Elbow, see Table 6; for reducing sizes of Tees, see Tables 7 and 8.

[b] Dryseal American Standard Taper Pipe Thread.

[c] Where thread relief undercut is used, last thread shall be chamfered 1/2 to 1 pitch long from G diameter and dimension J may be reduced by an amount equal to 1/2 pitch.

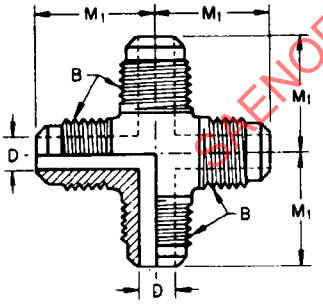
[d] Available with three types of fusible alloys as specified in general specifications.

[e] At manufacturer's option through passages in fittings shown in Figs. 1, 5, and 19 may conform with the smaller diameter specified or be counterbored to the larger diameter from the appropriate end for depths S, S_2 or S_3, respectively.

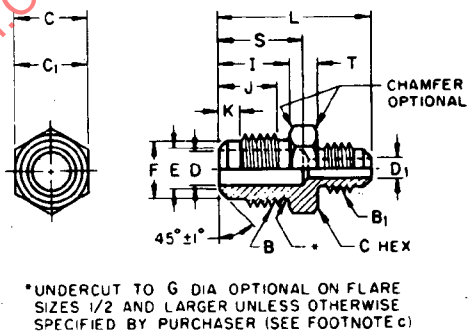
[f] Minimum design thickness, not subject to inspection.

[g] Basic dimensions shown shall apply as minimum diameter for bosses or across flats. The −0.02 in (0.5 mm) tolerance shall apply only to chamfer diameters on full hexagon versions of fittings shown in Figs. 4, 6–8.

[h] ID of solder cup shall not be out of round by more than 0.0003 in (0.08 mm).

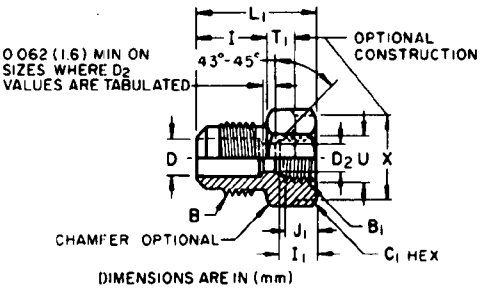


φFIG. 20—CROSS
(010501) (C1)



*UNDERCUT TO G DIA OPTIONAL ON FLARE SIZES 1/2 AND LARGER UNLESS OTHERWISE SPECIFIED BY PURCHASER (SEE FOOTNOTE c)

φFIG. 21—REDUCING UNION
(010101) (UR2)



φFIG. 22—INTERNAL FLARE TO EXTERNAL FLARE REDUCING ADAPTOR
(010105) (UR3)

NOTE: UNSPECIFIED DETAIL WITH RESPECT TO DIMENSIONS, TOLERANCES, CONTOUR, MATERIAL, WORKMANSHIP, ETC., MUST CONFORM TO GENERAL SPECIFICATIONS FOR REFRIGERATION TUBE FITTINGS. THE ILLUSTRATIONS ON THIS PAGE APPLY TO TABLE 4. CODES SHOWN IN BRACKETS ADJACENT TO FIGURE NUMBERS REPRESENT RESPECTIVE FITTING IDENTIFICATION IN ACCORDANCE WITH SAE J846 (FIRST NUMBER) AND ANSI B70.1 (SECOND NUMBER).

TABLE 4—DIMENSIONS OF REDUCING UNIONS, REDUCING ADAPTORS, AND REDUCING ELBOW UNIONS (FIGS. 21–23)[a]

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C, in	C_1, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1	
										in	mm	in	mm
		Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8
3/16	1/4	7/16	5/8	0.125	3.18	0.188	4.78	—	—	1.12	28.4	1.03	26.2
3/16	5/16	1/2	11/16	0.125	3.18	0.219	5.56	—	—	1.22	31.0	1.06	26.9
3/16	3/8	5/8	13/16	0.125	3.18	0.281	7.14	—	—	1.31	33.3	1.19	30.2
3/16	1/2	3/4	15/16	0.125	3.18	0.406	10.31	—	—	1.50	38.1	1.34	34.0
3/16	5/8	7/8	1- 1/16	0.125	3.18	0.500	12.70	—	—	1.69	42.9	1.53	38.9
3/16	3/4	1-1/16	1- 5/16	0.125	3.18	0.625	15.88	—	—	1.88	47.8	1.75	44.4

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M		M_1		S[d] Max		T[e] Ref		T_1 Min		X[f] Dia	
		in	mm	in	mm							in	mm
		±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5
3/16	1/4	0.75	19.0	0.88	22.4	0.60	15.2	0.18	4.6	0.24	6.1	0.62	15.7
3/16	5/16	0.78	19.8	0.91	23.1	0.67	17.0	0.21	5.3	0.24	6.1	0.69	17.5
3/16	3/8	0.84	21.3	1.06	26.9	0.75	19.0	0.24	6.1	0.30	7.6	0.81	20.6
3/16	1/2	0.91	23.1	1.22	31.0	0.91	23.1	0.30	7.6	0.37	9.4	0.94	23.9
3/16	5/8	0.97	24.6	1.41	35.8	1.07	27.2	0.37	9.4	0.43	10.9	1.06	26.9
3/16	3/4	1.06	26.9	1.66	42.2	1.22	31.0	0.43	10.9	0.49	12.4	1.31	33.3

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C, in	C_1, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1	
										in	mm	in	mm
		Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8
1/4	3/16	7/16	1/2	0.188	4.78	0.125	3.18	—	—	1.12	28.4	0.97	24.6
1/4	5/16	1/2	11/16	0.188	4.78	0.219	5.56	—	—	1.28	32.5	1.12	28.4
1/4	3/8	5/8	13/16	0.188	4.78	0.281	7.14	—	—	1.38	35.1	1.22	31.0
1/4	1/2	3/4	15/16	0.188	4.78	0.406	10.31	—	—	1.56	39.6	1.38	35.1
1/4	5/8	7/8	1- 1/16	0.188	4.78	0.500	12.70	—	—	1.75	44.4	1.56	39.6
1/4	3/4	1-1/16	1- 5/16	0.188	4.78	0.625	15.88	—	—	1.94	49.3	1.69	42.9

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M		M_1		S[d] Max		T[e] Ref		T_1 Min		X[f] Dia	
		in	mm	in	mm							in	mm
		±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	±0.00 −0.02	+0.0 −0.5
1/4	3/16	0.88	22.4	0.75	19.0	0.60	15.2	0.18	4.6	0.21	5.3	0.50	12.7
1/4	5/16	0.84	21.3	0.91	23.1	0.67	17.0	0.21	5.3	0.24	6.1	0.69	17.5
1/4	3/8	0.91	23.1	1.06	26.9	0.75	19.0	0.24	6.1	0.30	7.6	0.81	20.6
1/4	1/2	0.97	24.6	1.22	31.0	0.91	23.1	0.30	7.6	0.37	9.4	0.94	23.9
1/4	5/8	1.03	26.2	1.41	35.8	1.07	27.2	0.37	9.4	0.43	10.9	1.06	26.2
1/4	3/4	1.12	28.4	1.66	42.2	1.22	31.0	0.43	10.9	0.49	12.4	1.31	33.3

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C, in	C_1, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1	
										in	mm	in	mm
		Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8
5/16	3/16	1/2	1/2	0.219	5.56	0.125	3.18	0.188	4.78	1.22	31.0	1.00	25.4
5/16	1/4	1/2	5/8	0.219	5.56	0.188	4.78	—	—	1.28	32.5	1.09	27.7
5/16	3/8	5/8	13/16	0.219	5.56	0.281	7.14	—	—	1.44	36.6	1.25	31.8
5/16	1/2	3/4	15/16	0.219	5.56	0.406	10.31	—	—	1.62	41.1	1.41	35.8
5/16	5/8	7/8	1- 1/16	0.219	5.56	0.500	12.70	—	—	1.81	46.0	1.59	40.4
5/16	3/4	1-1/16	1- 5/16	0.219	5.56	0.625	15.88	—	—	2.00	50.8	1.81	46.0

(Table continued on next page)

TABLE 4—DIMENSIONS OF REDUCING UNIONS, REDUCING ADAPTORS, AND REDUCING ELBOW UNIONS (FIGS. 21-23)[a] (CONTINUED)

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M in	M mm	M_1 in	M_1 mm	S[d] Max in	S[d] Max mm	T[c] Ref in	T[c] Ref mm	T_1 Min in	T_1 Min mm	X[f] Dia in	X[f] Dia mm
		±0.03	±0.8	±0.03	±0.8							+0.00 −0.02	+0.0 −0.5
5/16	3/16	0.91	23.1	0.78	19.8	0.67	17.0	0.21	5.3	0.21	5.3	0.50	12.7
5/16	1/4	0.91	23.1	0.84	21.3	0.67	17.0	0.21	5.3	0.24	6.1	0.62	15.7
5/16	3/8	0.97	24.6	1.06	26.9	0.75	19.0	0.24	6.1	0.30	7.6	0.81	20.6
5/16	1/2	1.03	26.2	1.22	31.0	0.91	23.1	0.30	7.6	0.37	9.4	0.94	23.9
5/16	5/8	1.09	27.7	1.41	35.8	1.07	27.2	0.37	9.4	0.43	10.9	1.06	26.9
5/16	3/4	1.19	30.2	1.66	42.2	1.22	31.0	0.43	10.9	0.49	12.4	1.31	33.3

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C_1 in	$C_{1'}$ in	D[d] Drill in	D[d] Drill mm	D_1[d] Drill in	D_1[d] Drill mm	D_2 Drill in	D_2 Drill mm	L in	L mm	L_1 in	L_1 mm
		Nom	Nom							±0.03	±0.8	±0.03	±0.8
3/8	3/16	5/8	5/8	0.281	7.14	0.125	3.18	0.188	4.78	1.31	33.3	1.03	26.2
3/8	1/4	5/8	5/8	0.281	7.14	0.188	4.78	0.250	6.35	1.38	35.1	1.12	28.4
3/8	5/16	5/8	11/16	0.281	7.14	0.219	5.56	—	—	1.44	36.6	1.19	30.2
3/8	1/2	3/4	15/16	0.281	7.14	0.406	10.31	—	—	1.69	42.9	1.44	36.6
3/8	5/8	7/8	1- 1/16	0.281	7.14	0.500	12.70	—	—	1.88	47.8	1.62	41.1
3/8	3/4	1-1/16	1- 5/16	0.281	7.14	0.625	15.89	—	—	2.06	52.3	1.84	46.7

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M in	M mm	M_1 in	M_1 mm	S[d] Max in	S[d] Max mm	T[c] Ref in	T[c] Ref mm	T_1 Min in	T_1 Min mm	X[f] Dia in	X[f] Dia mm
		±0.03	±0.8	±0.03	±0.8							+0.00 −0.02	+0.0 −0.5
3/8	3/16	1.06	26.9	0.84	21.3	0.75	19.0	0.24	6.1	0.24	6.1	0.62	15.7
3/8	1/4	1.06	26.9	0.91	23.1	0.75	19.0	0.24	6.1	0.24	6.1	0.62	15.7
3/8	5/16	1.06	26.9	0.97	24.6	0.75	19.0	0.24	6.1	0.24	6.1	0.69	17.5
3/8	1/2	1.09	27.7	1.22	31.0	0.91	23.1	0.30	7.6	0.37	9.4	0.94	23.9
3/8	5/8	1.16	29.5	1.41	35.8	1.07	27.2	0.37	9.4	0.43	10.9	1.06	26.9
3/8	3/4	1.25	31.8	1.66	42.2	1.22	31.0	0.43	10.9	0.49	12.4	1.31	33.3

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C_1 in	$C_{1'}$ in	D[d] Drill in	D[d] Drill mm	D_1[d] Drill in	D_1[d] Drill mm	D_2 Drill in	D_2 Drill mm	L in	L mm	L_1 in	L_1 mm
		Nom	Nom							±0.03	±0.8	±0.03	±0.8
1/2	3/16	3/4	3/4	0.406	10.31	0.125	3.18	0.188	4.78	1.50	38.1	1.16	29.5
1/2	1/4	3/4	3/4	0.406	10.31	0.188	4.78	0.250	6.35	1.56	39.6	1.25	31.8
1/2	5/16	3/4	3/4	0.406	10.31	0.219	5.56	0.312	7.92	1.62	41.1	1.28	32.5
1/2	3/8	3/4	13/16	0.406	10.31	0.281	7.14	0.375	9.52	1.69	42.9	1.41	35.8
1/2	5/8	7/8	1- 1/16	0.406	10.31	0.500	12.70	—	—	2.00	50.8	1.69	42.9
1/2	3/4	1-1/16	1- 5/16	0.406	10.31	0.625	15.88	—	—	2.19	55.6	1.91	48.5

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M in	M mm	M_1 in	M_1 mm	S[d] Max in	S[d] Max mm	T[e] Ref in	T[e] Ref mm	T_1 Min in	T_1 Min mm	X[f] Dia in	X[f] Dia mm
		±0.03	±0.8	±0.03	±0.8							+0.00 −0.02	+0.0 −0.5
1/2	3/16	1.22	31.0	0.91	23.1	0.91	23.1	0.30	7.6	0.30	7.6	0.75	19.0
1/2	1/4	1.22	31.0	0.97	24.6	0.91	23.1	0.30	7.6	0.30	7.6	0.75	19.0
1/2	5/16	1.22	31.0	1.03	26.2	0.91	23.1	0.30	7.6	0.30	7.6	0.75	19.0
1/2	3/8	1.22	31.0	1.09	27.7	0.91	23.1	0.30	7.6	0.30	7.6	0.81	20.6
1/2	5/8	1.28	32.5	1.41	35.8	1.07	27.2	0.37	9.4	0.43	10.9	1.06	26.9
1/2	3/4	1.38	35.1	1.66	42.2	1.22	31.0	0.43	10.9	0.49	12.4	1.31	33.3

(Table continued on next page)

TABLE 4—DIMENSIONS OF REDUCING UNIONS, REDUCING ADAPTORS, AND REDUCING ELBOW UNIONS (FIGS. 21-23)[a] (CONTINUED)

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C, in	C_1, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1	
										in	mm	in	mm
		Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8
5/8	3/16	7/8	7/8	0.500	12.70	0.125	3.18	0.188	4.78	1.69	42.9	1.25	31.8
5/8	1/4	7/8	7/8	0.500	12.70	0.188	4.78	0.250	6.35	1.75	44.4	1.31	33.3
5/8	5/16	7/8	7/8	0.500	12.70	0.219	5.56	0.312	7.92	1.81	46.0	1.38	35.1
5/8	3/8	7/8	7/8	0.500	12.70	0.281	7.14	0.375	9.52	1.88	47.8	1.47	37.3
5/8	1/2	7/8	15/16	0.500	12.70	0.406	10.31	—	—	2.00	50.8	1.62	41.1
5/8	3/4	1-1/16	1- 5/16	0.500	12.70	0.625	15.88	—	—	2.31	58.7	1.97	50.0

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M		M_1		S[d] Max		T[e] Ref		T_1 Min		X[f] Dia	
		in	mm	in	mm							in	mm
		±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5
5/8	3/16	1.41	35.8	0.97	24.6	1.07	27.2	0.37	9.4	0.37	9.4	0.88	22.4
5/8	1/4	1.41	35.8	1.03	26.2	1.07	27.2	0.37	9.4	0.37	9.4	0.88	22.4
5/8	5/16	1.41	35.8	1.09	27.7	1.07	27.2	0.37	9.4	0.37	9.4	0.88	22.4
5/8	3/8	1.41	35.8	1.16	29.5	1.07	27.2	0.37	9.4	0.37	9.4	0.88	22.4
5/8	1/2	1.41	35.8	1.28	32.5	1.07	27.2	0.37	9.4	0.37	9.4	0.94	23.9
5/8	3/4	1.50	38.1	1.66	42.2	1.22	31.0	0.43	10.9	0.49	12.4	1.31	33.3

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	C, in	C_1, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1	
										in	mm	in	mm
		Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8
3/4	3/16	1-1/16	1-1/16	0.625	15.88	0.125	3.18	0.188	4.78	1.88	47.8	1.44	36.6
3/4	1/4	1-1/16	1-1/16	0.625	15.88	0.188	4.78	0.250	6.35	1.94	49.3	1.44	36.6
3/4	5/16	1-1/16	1-1/16	0.625	15.88	0.219	5.56	0.312	7.92	2.00	50.8	1.44	36.6
3/4	3/8	1-1/16	1-1/16	0.625	15.88	0.281	7.14	0.375	9.52	2.06	52.3	1.53	38.9
3/4	1/2	1-1/16	1-1/16	0.625	15.88	0.406	10.31	0.500	12.70	2.19	55.6	1.69	42.9
3/4	5/8	1-1/16	1-1/16	0.625	15.88	0.500	12.70	—	—	2.31	58.7	1.88	47.8

B[c] Nom Tube OD in	B_1[c] Nom Tube OD in	M		M_1		S[d] Max		T[e] Ref		T_1 Min		X[f] Dia	
		in	mm	in	mm							in	mm
		±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5
3/4	3/16	1.66	42.2	1.06	26.9	1.22	31.0	0.43	10.9	0.43	10.9	1.06	26.9
3/4	1/4	1.66	42.2	1.12	28.4	1.22	31.0	0.43	10.9	0.43	10.9	1.06	26.9
3/4	5/16	1.66	42.2	1.19	30.2	1.22	31.0	0.43	10.9	0.43	10.9	1.06	26.9
3/4	3/8	1.66	42.2	1.25	31.8	1.22	31.0	0.43	10.9	0.43	10.9	1.06	26.9
3/4	1/2	1.66	42.2	1.38	35.1	1.22	31.0	0.43	10.9	0.43	10.9	1.06	26.9
3/4	5/8	1.66	42.2	1.50	38.1	1.22	31.0	0.43	10.9	0.43	10.9	1.06	26.9

[a] For flare dimensions shown on Figs. 21-23 but not covered in Table 4, see corresponding dimensions for the specified Tube OD in Table 3.

[b] In these sizes the reducing unions and reducing elbows are the reverses of sizes already specified in Table.

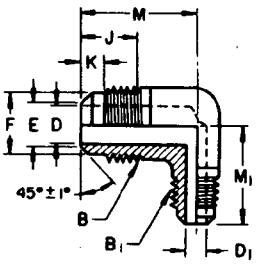
[c] Where thread relief undercut is used last thread shall be chamfered 1/2 to 1 pitch long from G diameter and dimension J may be reduced by an amount equal to 1/2 pitch.

[d] At manufacturer's option through passages in fittings shown in Fig. 21 may conform with the smaller diameter specified or be counterbored to the larger diameter from the appropriate end for depth S.

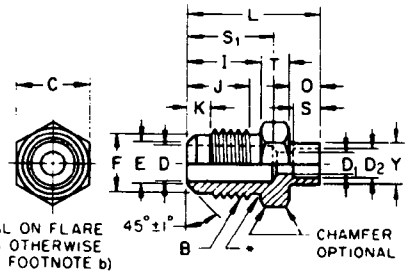
[e] Minimum design thickness, not subject to inspection.

[f] Basic dimensions shown shall apply as minimum for bosses. The −0.02 in (0.51 mm) tolerance shall apply only to chamfer diameter on full hexagon version of fittings in Fig. 22.

φ FIG. 23—90 DEG REDUCING ELBOW UNION (010201) (ER2)



φ FIG. 24—FLARE TO SOLDER REDUCING CONNECTOR (HALF UNION) (010104) (US3)



*UNDERCUT TO G DIA OPTIONAL ON FLARE SIZES 1/2 AND LARGER UNLESS OTHERWISE SPECIFIED BY PURCHASER (SEE FOOTNOTE b)

NOTE: UNSPECIFIED DETAIL WITH RESPECT TO DIMENSIONS, TOLERANCES, CONTOUR, MATERIAL, WORKMANSHIP, ETC., MUST CONFORM TO GENERAL SPECIFICATIONS FOR REFRIGERATION TUBE FITTINGS. THE ILLUSTRATIONS ON THIS PAGE APPLY TO TABLE 4. CODES SHOWN IN BRACKETS ADJACENT TO FIGURE NUMBERS REPRESENT RESPECTIVE FITTING IDENTIFICATION IN ACCORDANCE WITH SAE J846 (FIRST NUMBER) AND ANSI B70.1 (SECOND NUMBER).

TABLE 5—DIMENSIONS OF REDUCING SOLDER CONNECTORS AND REDUCING SOLDER ELBOWS (FIGS. 24 AND 25)[a]

B Nom Tube OD, in	Solder Tube OD, in	C Hex, in	D[c] Drill		D_1[c] Drill		D_2[e] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
3/16	1/8	3/8	0.125	3.18	0.094	2.39	0.1290	3.277	0.91	23.1	0.72	18.3
3/16	1/4	7/16	0.125	3.18	0.188	4.78	0.2540	6.452	0.94	23.9	0.72	18.3
3/16	5/16	7/16	0.125	3.18	0.250	6.35	0.3165	8.039	0.94	23.9	0.75	19.0
3/16	3/8	1/2	0.125	3.18	0.312	7.92	0.3790	9.627	0.94	23.9	0.78	19.8
3/16	1/2	5/8	0.125	3.18	0.438	11.13	0.5040	12.802	1.03	26.2	0.84	21.3
3/16	5/8	3/4	0.125	3.18	0.547	13.89	0.6290	15.977	1.19	30.2	0.91	23.1
3/16	3/4	7/8	0.125	3.18	0.688	17.48	0.7540	19.152	1.38	35.1	0.97	24.6
3/16	7/8	1	0.125	3.18	0.781	19.84	0.8790	22.327	1.56	39.6	1.06	26.9

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
3/16	1/8	0.59	15.0	0.31	7.9	0.31	7.9	0.52	13.2	0.15	3.8	0.22	5.6
3/16	1/4	0.59	15.0	0.31	7.9	0.31	7.9	0.41	10.4	0.18	4.6	0.34	8.6
3/16	5/16	0.62	15.7	0.31	7.9	0.31	7.9	0.41	10.4	0.18	4.6	0.40	10.2
3/16	3/8	0.66	16.8	0.31	7.9	0.31	7.9	0.41	10.4	0.18	4.6	0.48	12.2
3/16	1/2	0.78	19.8	0.38	9.7	0.38	9.7	0.49	12.4	0.21	5.3	0.60	15.2
3/16	5/8	0.97	24.6	0.50	12.7	0.50	12.7	0.63	16.0	0.24	6.1	0.74	18.8
3/16	3/4	1.16	29.5	0.62	15.7	0.62	15.7	0.78	19.8	0.30	7.6	0.86	21.8
3/16	7/8	1.38	35.1	0.75	19.0	0.75	19.0	0.94	23.9	0.37	9.4	0.98	24.9

B Nom Tube OD, in	Solder Tube OD, in	C Hex,	D[c] Drill		D_1[c] Drill		D_2[e] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
1/4	1/8	7/16	0.188	4.78	0.094	2.39	0.1290	3.277	1.00	25.4	0.81	20.6
1/4	3/16	7/16	0.188	4.78	0.188	4.78	0.1915	4.864	1.00	25.4	0.81	20.6
1/4	5/16	7/16	0.188	4.78	0.250	6.35	0.3165	8.039	1.00	25.4	0.81	20.6
1/4	3/8	1/2	0.188	4.78	0.312	7.92	0.3790	9.627	1.00	25.4	0.84	21.3
1/4	1/2	5/8	0.188	4.78	0.438	11.13	0.5040	12.802	1.09	27.7	0.91	23.1
1/4	5/8	3/4	0.188	4.78	0.547	13.89	0.6290	15.977	1.25	31.8	0.97	24.6
1/4	3/4	7/8	0.188	4.78	0.688	17.48	0.7540	19.152	1.44	36.6	1.03	26.2
1/4	7/8	1	0.188	4.78	0.781	19.84	0.8790	22.327	1.62	41.1	1.12	28.4

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
1/4	1/8	0.62	15.7	0.31	7.9	0.31	7.9	0.60	15.2	0.18	4.6	0.22	5.6
1/4	3/16	0.62	15.7	0.31	7.9	0.31	7.9	0.60	15.2	0.18	4.6	0.28	7.1
1/4	5/16	0.62	15.7	0.31	7.9	0.31	7.9	0.41	10.4	0.18	4.6	0.40	10.2
1/4	3/8	0.66	16.8	0.31	7.9	0.31	7.9	0.41	10.4	0.18	4.6	0.48	12.2
1/4	1/2	0.78	19.8	0.38	9.7	0.38	9.7	0.49	12.4	0.21	5.3	0.60	15.2
1/4	5/8	0.97	24.6	0.50	12.7	0.50	12.7	0.63	16.0	0.24	6.1	0.74	18.8
1/4	3/4	1.16	29.5	0.62	15.7	0.62	15.7	0.78	19.8	0.30	7.6	0.86	21.8
1/4	7/8	1.38	35.1	0.75	19.0	0.75	19.0	0.94	23.9	0.37	9.4	0.98	24.9

B Nom Tube OD, in	Solder Tube OD, in	C Hex, in	D[c] Drill		D_1[c] Drill		D_2[e] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
5/16	1/8	1/2	0.219	5.56	0.094	2.39	0.1290	3.277	1.09	27.7	0.91	23.1
5/16	3/16	1/2	0.219	5.56	0.156	3.96	0.1915	4.864	1.09	27.7	0.91	23.1
5/16	1/4	1/2	0.219	5.56	0.188	4.78	0.2540	6.452	1.09	27.7	0.91	23.1
5/16	3/8	1/2	0.219	5.56	0.312	7.92	0.3790	9.627	1.09	27.7	0.91	23.1
5/16	1/2	5/8	0.219	5.56	0.438	11.13	0.5040	12.802	1.16	29.5	0.97	24.6
5/16	5/8	3/4	0.219	5.56	0.547	13.89	0.6290	15.977	1.31	33.3	1.03	26.2
5/16	3/4	7/8	0.219	5.56	0.688	17.48	0.7540	19.152	1.50	38.1	1.09	27.7
5/16	7/8	1	0.219	5.56	0.781	19.84	0.8790	22.327	1.69	42.9	1.19	30.2

(Table 5 continued on next page)

TABLE 5—DIMENSIONS OF REDUCING SOLDER CONNECTORS AND REDUCING SOLDER ELBOWS (FIGS. 24 AND 25)[a] (CONTINUED)

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
5/16	1/8	0.66	16.8	0.31	7.9	0.31	7.9	0.67	17.0	0.21	5.3	0.22	5.6
5/16	3/16	0.66	16.8	0.31	7.9	0.31	7.9	0.67	17.0	0.21	5.3	0.28	7.1
5/16	1/4	0.66	16.8	0.31	7.9	0.31	7.9	0.67	17.0	0.21	5.3	0.34	8.6
5/16	3/8	0.66	16.8	0.31	7.9	0.31	7.9	0.42	10.7	0.21	5.3	0.48	12.2
5/16	1/2	0.78	19.8	0.38	9.7	0.38	9.7	0.49	12.4	0.21	5.3	0.60	15.2
5/16	5/8	0.97	24.6	0.50	12.7	0.50	12.7	0.63	16.0	0.24	6.1	0.74	18.8
5/16	3/4	1.16	29.5	0.62	15.7	0.62	15.7	0.78	19.8	0.30	7.6	0.86	21.8
5/16	7/8	1.38	35.1	0.75	19.0	0.75	19.0	0.94	23.9	0.37	9.4	0.98	24.9

B Nom Tube OD, in	Solder Tube OD, in	C Hex, in	D[c] Drill		D_1[c] Drill		D_2[e] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
3/8	1/8	5/8	0.281	7.14	0.094	2.39	0.1290	3.277	1.19	30.2	1.03	26.2
3/8	3/16	5/8	0.281	7.14	0.156	3.96	0.1915	4.864	1.19	30.2	1.03	26.2
3/8	1/4	5/8	0.281	7.14	0.188	4.78	0.2540	6.452	1.19	30.2	1.03	26.2
3/8	5/16	5/8	0.281	7.14	0.250	6.35	0.3165	8.039	1.19	30.2	1.03	26.2
3/8	1/2	5/8	0.281	7.14	0.438	11.13	0.5040	12.802	1.25	31.8	1.03	26.2
3/8	5/8	3/4	0.281	7.14	0.547	13.89	0.6290	15.977	1.38	35.1	1.09	27.7
3/8	3/4	7/8	0.281	7.14	0.688	17.48	0.7540	19.152	1.56	39.6	1.16	29.5
3/8	7/8	1	0.281	7.14	0.781	19.84	0.8790	22.327	1.75	44.4	1.25	31.8

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
3/8	1/8	0.72	18.3	0.31	7.9	0.31	7.9	0.75	19.0	0.24	6.1	0.22	5.6
3/8	3/16	0.72	18.3	0.31	7.9	0.31	7.9	0.75	19.0	0.24	6.1	0.28	7.1
3/8	1/4	0.72	18.3	0.31	7.9	0.31	7.9	0.75	19.0	0.24	6.1	0.34	8.6
3/8	5/16	0.72	18.3	0.31	7.9	0.31	7.9	0.75	19.0	0.24	6.1	0.40	10.2
3/8	1/2	0.78	19.8	0.38	9.7	0.38	9.7	0.51	13.0	0.24	6.1	0.60	15.2
3/8	5/8	0.97	24.6	0.50	12.7	0.50	12.7	0.63	16.0	0.24	6.1	0.74	18.8
3/8	3/4	1.16	29.5	0.62	15.7	0.62	15.7	0.78	19.8	0.30	7.6	0.86	21.8
3/8	7/8	1.25	31.8	0.75	19.0	0.75	19.0	0.94	23.9	0.37	9.4	0.98	24.9

B Nom Tube OD, in	Solder Tube OD, in	C Hex, in	D[c] Drill		D_1[c] Drill		D_2[e] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
1/2	1/8	3/4	0.406	10.31	0.094	2.39	0.1290	3.277	1.38	35.1	1.22	31.0
1/2	3/16	3/4	0.406	10.31	0.156	3.96	0.1915	4.864	1.38	35.1	1.22	31.0
1/2	1/4	3/4	0.406	10.31	0.188	4.78	0.2540	6.452	1.38	35.1	1.22	31.0
1/2	5/16	3/4	0.406	10.31	0.250	6.35	0.3165	8.039	1.38	35.1	1.22	31.0
1/2	3/8	3/4	0.406	10.31	0.312	7.92	0.3790	9.627	1.38	35.1	1.22	31.0
1/2	5/8	3/4	0.406	10.31	0.547	13.89	0.6290	15.977	1.56	39.6	1.22	31.0
1/2	3/4	7/8	0.406	10.31	0.688	17.48	0.7540	19.152	1.69	42.9	1.28	32.5
1/2	7/8	1	0.406	10.31	0.781	19.84	0.8790	22.327	1.88	47.8	1.38	35.1

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
1/2	1/8	0.78	19.8	0.31	7.9	0.31	7.9	0.91	23.1	0.30	7.6	0.22	5.6
1/2	3/16	0.78	19.8	0.31	7.9	0.31	7.9	0.91	23.1	0.30	7.6	0.28	7.1
1/2	1/4	0.78	19.8	0.31	7.9	0.31	7.9	0.91	23.1	0.30	7.6	0.34	8.6
1/2	5/16	0.78	19.8	0.31	7.9	0.31	7.9	0.91	23.1	0.30	7.6	0.40	10.2
1/2	3/8	0.78	19.8	0.31	7.9	0.31	7.9	0.91	23.1	0.30	7.6	0.48	12.2
1/2	5/8	0.97	24.6	0.50	12.7	0.50	12.7	0.66	16.8	0.30	7.6	0.74	18.8
1/2	3/4	1.16	29.5	0.62	15.7	0.62	15.7	0.78	19.8	0.30	7.6	0.86	21.8
1/2	7/8	1.38	35.1	0.75	19.0	0.75	19.0	0.94	23.9	0.37	9.4	0.98	24.9

(Table 5 continued on next page)

TABLE 5—DIMENSIONS OF REDUCING SOLDER CONNECTORS AND REDUCING SOLDER ELBOWS (FIGS. 24 AND 25)[a] (CONTINUED)

B Nom Tube OD, in	Solder Tube OD, in	C Hex, in	D[b] Drill		D_1[c] Drill		D_2[c] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
5/8	1/8	7/8	0.500	12.70	0.094	2.39	0.1290	3.277	1.56	39.6	1.41	35.8
5/8	3/16	7/8	0.500	12.70	0.156	3.96	0.1915	4.864	1.56	39.6	1.41	35.8
5/8	1/4	7/8	0.500	12.70	0.188	4.78	0.2540	6.452	1.56	39.6	1.41	35.8
5/8	5/16	7/8	0.500	12.70	0.250	6.35	0.3165	8.039	1.56	39.6	1.41	35.8
5/8	3/8	7/8	0.500	12.70	0.312	7.92	0.3790	9.627	1.56	39.6	1.41	35.8
5/8	1/2	7/8	0.500	12.70	0.438	11.13	0.5040	12.802	1.62	41.1	1.41	35.8
5/8	3/4	7/8	0.500	12.70	0.688	17.48	0.7540	19.152	1.88	47.8	1.41	35.8
5/8	7/8	1	0.500	12.70	0.781	19.84	0.8790	22.327	2.00	50.8	1.50	38.1

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
5/8	1/8	0.84	21.3	0.31	7.9	0.31	7.9	1.07	27.2	0.37	9.4	0.22	5.6
5/8	3/16	0.84	21.3	0.31	7.9	0.31	7.9	1.07	27.2	0.37	9.4	0.28	7.1
5/8	1/4	0.84	21.3	0.31	7.9	0.31	7.9	1.07	27.2	0.37	9.4	0.34	8.6
5/8	5/16	0.84	21.3	0.31	7.9	0.31	7.9	1.07	27.2	0.37	9.4	0.40	10.2
5/8	3/8	0.84	21.3	0.31	7.9	0.31	7.9	1.07	27.2	0.37	9.4	0.48	12.2
5/8	1/2	0.91	23.1	0.38	9.7	0.38	9.7	1.07	27.2	0.37	9.4	0.60	15.2
5/8	3/4	1.16	29.5	0.62	15.7	0.62	15.7	0.81	20.6	0.37	9.4	0.86	21.8
5/8	7/8	1.38	35.1	0.75	19.0	0.75	19.0	0.94	23.9	0.37	9.4	0.98	24.9

B Nom Tube OD, in	Solder Tube OD, in	C Hex, in	D[b] Drill		D_1[c] Drill		D_2[c] Dia		L		M	
							in	mm	in	mm	in	mm
		Nom	in	mm	in	mm	±0.0010	±0.025	±0.03	±0.8	±0.03	±0.8
3/4	1/8	1-1/16	0.625	15.88	0.094	—	0.1290	3.277	1.75	44.4	1.62	41.1
3/4	3/16	1-1/16	0.625	15.88	0.156	—	0.1915	4.864	1.75	44.4	1.62	41.1
3/4	1/4	1-1/16	0.625	15.88	0.188	—	0.2540	6.452	1.75	44.4	1.62	41.1
3/4	5/16	1-1/16	0.625	15.88	0.250	—	0.3165	8.039	1.75	44.4	1.62	41.1
3/4	3/8	1-1/16	0.625	15.88	0.312	—	0.3790	9.627	1.75	44.4	1.62	41.1
3/4	1/2	1-1/16	0.625	15.88	0.438	—	0.5040	12.802	1.81	46.0	1.62	41.1
3/4	5/8	1-1/16	0.625	15.88	0.547	—	0.6290	15.977	1.94	49.3	1.62	41.1
3/4	3/4	1-1/16	0.625	15.88	0.781	—	0.8790	22.327	2.19	55.6	1.62	41.1

B Nom Tube OD, in	Solder Tube OD, in	M_1		O		S		S_1[c] Max		T[d] Ref		Y Dia Min	
		in	mm										
		±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm
3/4	1/8	0.94	23.9	0.31	7.9	0.31	7.9	1.22	31.0	0.43	10.9	0.22	5.6
3/4	3/16	0.94	23.9	0.31	7.9	0.31	7.9	1.22	31.0	0.43	10.9	0.28	7.1
3/4	1/4	0.94	23.9	0.31	7.9	0.31	7.9	1.22	31.0	0.43	10.9	0.34	8.6
3/4	5/16	0.94	23.9	0.31	7.9	0.31	7.9	1.22	31.0	0.43	10.9	0.40	10.2
3/4	3/8	0.94	23.9	0.31	7.9	0.31	7.9	1.22	31.0	0.43	10.9	0.48	12.2
3/4	1/2	1.00	25.4	0.38	9.7	0.38	9.7	1.22	31.0	0.43	10.9	0.60	15.2
3/4	5/8	1.12	28.4	0.50	12.7	0.50	12.7	1.22	31.0	0.43	10.9	0.74	18.8
3/4	7/8	1.38	35.1	0.75	19.0	0.75	19.0	0.97	24.6	0.43	10.9	0.98	24.9

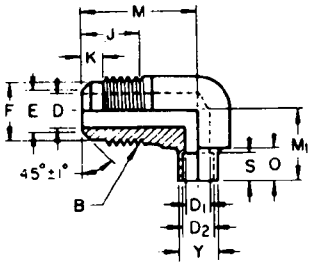
[a] For flare dimensions shown on Figs. 24 and 25 but not covered in Table 5, see corresponding dimensions for the specified Tube OD in Table 3.

[b] Where thread relief undercut is used, last thread shall be chambered 1/2 to 1 pitch long from G diameter and dimension J may be reduced by an amount equal to 1/2 pitch.

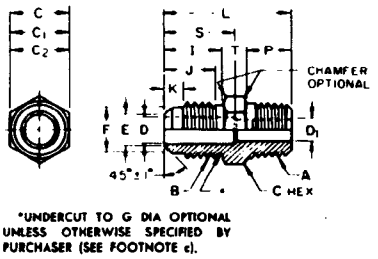
[c] At manufacturer's option through passages in fittings shown in Fig. 24 may conform with the smaller diameter specified or be counterbored to the larger diameter from appropriate end for depth S.

[d] Minimum design thickness, not subject to inspection.

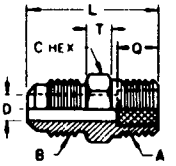
[e] ID of solder cup shall not be out of round by more than 0.003 in (0.08 mm).



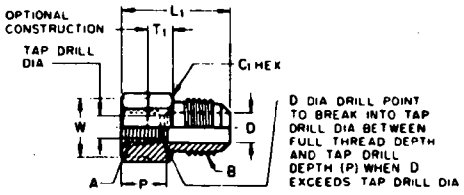
◊FIG. 25—FLARE TO SOLDER 90 DEG REDUCING ELBOW (010204) (ES)



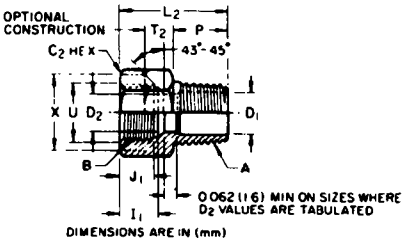
◊FIG. 26—REDUCING CONNECTOR (HALF UNION) (010102) (U1)



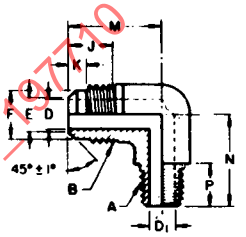
◊FIG. 27—FUSIBLE REDUCING CONNECTOR (HALF UNION) (010163) (FU)



◊FIG. 28—INTERNAL THREAD REDUCING CONNECTOR (HALF UNION) (010103) (U3)



◊FIG. 29—INTERNAL FLARE TO EXTERNAL PIPE REDUCING ADAPTOR (010106) (U5)



◊FIG. 30—90 DEG REDUCING ELBOW (010202) (E1)

NOTE: UNSPECIFIED DETAIL WITH RESPECT TO DIMENSIONS, TOLERANCES, CONTOUR, MATERIAL, WORKMANSHIP, ETC., MUST CONFORM TO GENERAL SPECIFICATIONS FOR REFRIGERATION TUBE FITTINGS. THE DIMENSIONAL DESIGNATIONS IN FIGS. 1 AND 30 SHALL APPLY TO CORRESPONDING FEATURES OF OTHER FIGURES ON THIS PAGE UNLESS SHOWN OTHERWISE. THE ILLUSTRATIONS ON THIS PAGE APPLY TO TABLE 6. CODES SHOWN IN BRACKETS ADJACENT TO FIGURE NUMBERS REPRESENT RESPECTIVE FITTING IDENTIFICATION IN ACCORDANCE WITH SAE J846 (FIRST NUMBER) AND ANSI B70.1 (SECOND NUMBER).

TABLE 6—DIMENSIONS OF REDUCING CONNECTORS, REDUCING ADAPTORS, AND REDUCING ELBOWS (FIGS. 26-32)[a]

B Nom Tube OD, in	A Dryseal Pipe Thread NPTF[b]	C Hex, in	C_1 Hex, in	C_2 Hex, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1		L_2		M		M_1		M_2	
											in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
		Nom	Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
3/16	1/4	9/16	11/16	9/16	0.125	3.18	0.312	7.92	0.188	4.78	1.19	30.2	1.19	30.2	0.94	23.9	0.81	20.6	0.91	23.1	0.71	18.0
3/16	3/8	11/16	13/16	11/16	0.125	3.18	0.406	10.31	0.188	4.78	1.25	31.8	1.22	31.0	0.84	21.3	0.88	22.4	0.97	24.6	0.75	19.0
3/16	1/2	7/8	1	7/8	0.125	3.18	0.562	14.27	0.188	4.78	1.50	38.1	1.44	36.6	1.06	26.9	0.97	24.6	1.06	26.9	0.80	20.3
3/16	3/4	1- 1/16	1- 1/4	1- 1/16	0.125	3.18	0.750	19.05	0.188	4.78	1.62	41.1	1.50	38.1	1.19	30.2	1.06	26.9	1.22	31.0	0.84	21.3

B Nom Tube OD, in	N		N_1		N_2		P		Q[e]		S^d Max		T^f Ref		T_1 Min		T_2 Min		W[g]		X[g]	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
3/16	0.97	24.6	0.62	15.8	0.86	21.8	0.56	14.2	—	—	0.66	16.8	0.18	4.6	0.24	6.1	0.21	5.3	0.69	17.5	0.56	14.2
3/16	1.00	25.4	0.62	15.8	0.95	24.1	0.56	14.2	—	—	0.69	17.5	0.24	6.1	0.30	7.6	0.24	6.1	0.81	20.6	0.69	17.5
3/16	1.28	32.5	0.81	20.6	1.17	29.7	0.75	19.0	—	—	0.91	23.1	0.30	7.6	0.37	9.4	0.30	7.6	1.00	25.4	0.88	22.4
3/16	1.38	35.1	0.81	20.6	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.43	10.9	1.25	31.8	1.06	26.9

B Nom Tube OD, in	A Dryseal Pipe Thread NPTF	C Hex, in	C_1 Hex, in	C_2 Hex, in	D[d] Drill		D_1[d] Drill		D_2 Drill		L		L_1		L_2		M		M_1		M_2	
											in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
		Nom	Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
1/4	1/4	9/16	11/16	5/8	0.188	4.78	0.312	7.92	0.250	6.35	1.25	31.8	1.25	31.8	1.03	26.2	0.91	23.1	0.97	24.6	0.75	19.0
1/4	3/8	11/16	13/16	11/16	0.188	4.78	0.406	10.31	0.250	6.35	1.31	33.3	1.28	32.5	0.94	23.9	0.94	23.9	1.03	26.2	0.79	20.1
1/4	1/2	7/8	1	7/8	0.188	4.78	0.562	14.27	0.250	6.35	1.56	39.6	1.50	38.1	1.06	26.9	1.03	26.2	1.12	28.4	0.85	21.6
1/4	3/4	1- 1/16	1- 1/4	1- 1/16	0.188	4.78	0.750	19.05	0.250	6.35	1.69	42.9	1.56	39.6	1.19	30.2	1.12	28.4	1.28	32.5	0.89	22.6

(Table 6 continued on next page)

TABLE 6—DIMENSIONS OF REDUCING CONNECTORS, REDUCING ADAPTORS, AND REDUCING ELBOWS (FIGS. 26–32)[a] (CONTINUED)

B Nom Tube OD, in	N in	N mm	N_1 in	N_1 mm	N_2 in	N_2 mm	P in	P mm	Q[c] in	Q mm	S[d] Max in	S mm	T[f] Ref in	T mm	T_1 Min in	T_1 mm	T_2 Min in	T_2 mm	W[g] in	W mm	X[g] in	X mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8													+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
1/4	0.94	23.9	0.66	16.8	0.86	21.8	0.56	14.2	0.66	16.8	0.66	16.8	0.18	4.6	0.24	6.1	0.24	6.1	0.69	17.5	0.62	15.7
1/4	1.03	26.2	0.66	16.8	0.95	24.1	0.56	14.2	0.69	17.5	0.69	17.5	0.24	6.1	0.30	7.6	0.24	6.1	0.81	20.6	0.69	17.5
1/4	1.28	32.5	0.84	21.3	1.17	29.7	0.75	19.0	—	—	0.91	23.1	0.30	7.6	0.37	9.4	0.30	7.6	1.00	25.4	0.88	22.4
1/4	1.38	35.1	0.84	21.3	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.43	10.9	1.25	31.8	1.06	26.9

B Nom Tube OD, in	A Dryseal Pipe Thread NPTF	C Hex, in Nom	C_1 Hex, in Nom	C_2 Hex, in Nom	D[d] Drill in	D mm	D_1[d] Drill in	D_1 mm	D_2 Drill in	D_2 mm	L in	L mm	L_1 in	L_1 mm	L_2 in	L_2 mm	M in	M mm	M_1 in	M_1 mm	M_2 in	M_2 mm
											±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
5/16	1/4	9/16	11/16	11/16	0.219	5.56	0.312	7.92	0.312	7.92	1.34	34.0	1.28	32.5	1.09	27.7	0.97	24.6	1.03	26.2	0.81	20.6
5/16	3/8	11/16	13/16	11/16	0.219	5.56	0.406	10.31	0.312	7.92	1.38	35.1	1.31	33.3	1.00	25.4	1.00	25.4	1.09	27.7	0.85	21.6
5/16	1/2	7/8	1	7/8	0.219	5.56	0.562	14.27	0.312	7.92	1.62	41.1	1.53	38.9	1.12	28.4	1.09	27.7	1.19	30.2	0.91	23.1
5/16	3/4	1- 1/16	1- 1/4	1- 1/16	0.219	5.56	0.750	19.05	0.312	7.92	1.75	44.4	1.52	40.4	1.19	30.2	1.19	30.2	1.34	34.0	0.95	24.1

B Nom Tube OD, in	N in	N mm	N_1 in	N_1 mm	N_2 in	N_2 mm	P in	P mm	Q[e] in	Q mm	S[d] Max in	S mm	T[f] Ref in	T mm	T_1 Min in	T_1 mm	T_2 Min in	T_2 mm	W[g] in	W mm	X[g] in	X mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8													+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
5/16	0.94	23.9	0.66	16.8	0.86	21.8	0.56	14.2	—	—	0.67	17.0	0.21	5.3	0.24	6.1	0.24	6.1	0.69	17.5	0.69	17.5
5/16	1.03	26.2	0.66	16.8	0.95	24.1	0.56	14.2	—	—	0.69	17.5	0.24	6.1	0.30	7.6	0.24	6.1	0.81	20.6	0.69	17.5
5/16	1.28	32.5	0.84	21.3	1.17	29.7	0.75	19.0	—	—	0.91	23.1	0.30	7.6	0.37	9.4	0.30	7.6	1.00	25.4	0.88	22.4
5/16	1.38	35.1	0.84	21.3	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.43	10.9	1.25	31.8	1.06	26.9

B Nom Tube OD, in	A Dryseal Pipe Thread NPTF	C Hex, in Nom	C_1 Hex, in Nom	C_2 Hex, in Nom	D[d] Drill in	D mm	D_1[d] Drill in	D_1 mm	D_2 Drill in	D_2 mm	L in	L mm	L_1 in	L_1 mm	L_2 in	L_2 mm	M in	M mm	M_1 in	M_1 mm	M_2 in	M_2 mm
											±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
3/8	1/8	5/8	5/8	13/16	0.281	7.14	0.219	5.56	—	—	1.25	31.8	1.12	28.4	1.09	27.7	1.03	26.2	1.06	26.9	0.89	22.6
3/8	3/8	11/16	13/16	13/16	0.281	7.14	0.406	10.31	0.375	9.52	1.44	36.6	1.38	35.1	1.12	28.4	1.06	26.9	1.16	29.5	0.93	23.6
3/8	1/2	7/8	1	7/8	0.281	7.14	0.562	14.27	0.375	9.52	1.69	42.9	1.62	41.1	1.25	31.8	1.16	29.5	1.25	31.8	0.99	25.1
3/8	3/4	1- 1/16	1- 1/4	1- 1/16	0.281	7.14	0.750	19.05	0.375	9.52	1.81	46.0	1.66	42.2	1.19	30.2	1.25	31.8	1.41	35.8	1.03	26.2

B Nom Tube OD, in	N in	N mm	N_1 in	N_1 mm	N_2 in	N_2 mm	P in	P mm	Q[e] in	Q mm	S[d] Max in	S mm	T[f] Ref in	T mm	T_1 Min in	T_1 mm	T_2 Min in	T_2 mm	W[g] in	W mm	X[g] in	X mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8													+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
3/8	0.91	23.1	0.50	12.7	0.67	17.0	0.38	9.7	—	—	0.75	19.0	0.24	6.1	0.24	6.1	0.30	7.6	0.62	15.7	0.81	20.6
3/8	1.09	27.7	0.69	17.5	0.95	24.1	0.56	14.2	0.69	17.5	0.69	17.5	0.24	6.1	0.30	7.6	0.30	7.6	0.81	20.6	0.81	20.6
3/8	1.28	32.5	0.88	22.4	1.17	29.7	0.75	19.0	—	—	0.91	23.1	0.30	7.6	0.37	9.4	0.30	7.6	1.00	25.4	0.88	22.4
3/8	1.38	35.1	0.88	22.4	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.43	10.9	1.25	31.8	1.06	26.9

B Nom Tube OD, in	A Dryseal Pipe Thread NPTF	C Hex, in Nom	C_1 Hex, in Nom	C_2 Hex, in Nom	D[d] Drill in	D mm	D_1[d] Drill in	D_1 mm	D_2 Drill in	D_2 mm	L in	L mm	L_1 in	L_1 mm	L_2 in	L_2 mm	M in	M mm	M_1 in	M_1 mm	M_2 in	M_2 mm
											±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
1/2	1/8	3/4	3/4	15/16	0.406	10.31	0.219	5.56	—	—	1.44	36.6	1.19	30.2	1.25	31.8	1.22	31.0	1.22	31.0	1.06	26.9
1/2	1/4	3/4	3/4	15/16	0.406	10.31	0.312	7.92	—	—	1.62	41.1	1.41	35.8	1.34	34.0	1.22	31.0	1.22	31.0	1.06	26.9
1/2	1/2	7/8	1	15/16	0.406	10.31	0.562	14.27	0.500	12.70	1.81	46.0	1.75	44.4	1.47	37.3	1.28	32.5	1.38	35.1	1.12	28.4
1/2	3/4	1- 1/16	1- 1/4	1- 1/16	0.406	10.31	0.750	19.05	0.500	12.70	1.94	49.3	1.81	46.0	1.38	35.1	1.38	35.1	1.53	38.9	1.16	29.5

(Table 6 continued on next page)

TABLE 6—DIMENSIONS OF REDUCING CONNECTORS, REDUCING ADAPTORS, AND REDUCING ELBOWS (FIGS. 26–32)[a] (CONTINUED)

B Nom Tube OD in	N in	N mm	N_1 in	N_1 mm	N_2 in	N_2 mm	P		Q^e		S^d Max		T^f Ref		T_1 Min		T_2 Min		W^g		X^g	
																			in	mm	in	mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
1/2	1.00	25.4	0.56	14.2	0.76	19.3	0.38	9.7	—	—	0.91	23.1	0.30	7.6	0.30	7.6	0.37	9.4	0.75	19.0	0.94	23.9
1/2	1.19	30.2	0.75	19.0	0.95	24.1	0.56	14.2	—	—	0.91	23.1	0.30	7.6	0.30	7.6	0.37	9.4	0.75	19.0	0.94	23.9
1/2	1.38	35.1	0.94	23.9	1.17	29.7	0.75	19.0	—	—	0.91	23.1	0.30	7.6	0.37	9.4	0.37	9.4	1.00	25.4	0.94	23.9
1/2	1.38	35.1	0.94	23.9	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.43	10.9	1.25	31.8	1.06	26.9

B Nom Tube OD in	A Dryseal Pipe Thread NPTF	C Hex, in	C_1 Hex, in	C_2 Hex, in	D^d Drill		$D_1{}^d$ Drill		D_2 Drill		L		L_1		L_2		M		M_1		M_2	
											in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
		Nom	Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
5/8	1/8	7/8	7/8	1-1/16	0.500	12.70	0.219	5.56	—	—	1.62	41.1	1.28	32.5	1.41	35.8	1.41	35.8	1.41	35.8	1.23	31.2
5/8	1/4	7/8	7/8	1-1/16	0.500	12.70	0.312	7.92	—	—	1.81	46.0	1.50	38.1	1.53	38.9	1.41	35.8	1.41	35.8	1.23	31.2
5/8	3/8	7/8	7/8	1-1/16	0.500	12.70	0.406	10.31	—	—	1.81	46.0	1.59	40.4	1.56	39.6	1.41	35.8	1.41	35.8	1.23	31.2
5/8	3/4	1-1/16	1-1/4	1-1/16	0.500	12.70	0.750	19.05	0.625	15.88	2.06	52.3	1.91	48.5	1.66	42.2	1.44	36.6	1.66	42.2	1.27	32.3

B Nom Tube OD in	N in	N mm	N_1 in	N_1 mm	N_2 in	N_2 mm	P		Q^e		S^d Max		T^f Ref		T_1 Min		T_2 Min		W^g		X^g	
																			in	mm	in	mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
5/8	1.06	26.9	0.62	15.7	0.79	20.1	0.38	9.7	—	—	1.07	27.2	0.37	9.4	0.37	9.4	0.43	10.9	0.88	22.4	1.06	26.9
5/8	1.25	31.8	0.81	20.6	0.98	24.9	0.56	14.2	—	—	1.07	27.2	0.37	9.4	0.37	9.4	0.43	10.9	0.88	22.4	1.06	26.9
5/8	1.25	31.8	0.81	20.6	0.98	24.9	0.56	14.2	—	—	1.07	27.2	0.37	9.4	0.37	9.4	0.43	10.9	0.88	22.4	1.06	26.9
5/8	1.50	38.1	1.00	25.4	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.43	10.9	1.25	31.8	1.06	26.9

B Nom Tube OD in	A Dryseal Pipe Thread NPTF	C Hex, in	C_1 Hex, in	C_2 Hex, in	D^d Drill		$D_1{}^d$ Drill		D_2 Drill		L		L_1		L_2		M		M_1		M_2	
											in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
		Nom	Nom	Nom	in	mm	in	mm	in	mm	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8
3/4	1/8	1-1/16	1-1/16	1-5/16	0.625	15.88	0.219	5.56	—	—	1.81	46.0	1.38	35.1	1.62	41.1	1.62	41.1	1.59	40.4	1.41	35.8
3/4	1/4	1-1/16	1-1/16	1-5/16	0.625	15.88	0.312	7.92	—	—	2.00	50.8	1.56	39.6	1.75	44.4	1.62	41.1	1.59	40.4	1.41	35.8
3/4	3/8	1-1/16	1-1/16	1-5/16	0.625	15.88	0.406	10.31	—	—	2.00	50.8	1.66	42.2	1.78	45.2	1.62	41.1	1.59	40.4	1.41	35.8
3/4	3/4	1-1/16	1-1/4	1-5/16	0.625	15.88	0.750	19.05	—	—	2.19	55.6	1.97	50.0	1.78	45.2	1.59	40.4	1.78	45.2	1.41	35.8

B Nom Tube OD in	N in	N mm	N_1 in	N_1 mm	N_2 in	N_2 mm	P		Q^e		S^d Max		T^f Ref		T_1 Min		T_2 Min		W^g		X^g	
																			in	mm	in	mm
	±0.03	±0.8	±0.03	±0.8	±0.03	±0.8	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	+0.00 −0.02	+0.0 −0.5	+0.00 −0.02	+0.0 −0.5
3/4	1.22	31.0	0.69	17.5	0.82	20.8	0.38	9.7	—	—	1.22	31.0	0.43	10.9	0.43	10.9	0.49	12.4	1.06	26.9	1.31	33.3
3/4	1.41	35.8	0.88	22.4	1.01	25.7	0.56	14.2	—	—	1.22	31.0	0.43	10.9	0.43	10.9	0.49	12.4	1.06	26.9	1.31	33.3
3/4	1.41	35.8	0.88	22.4	1.01	25.7	0.56	14.2	—	—	1.22	31.0	0.43	10.9	0.43	10.9	0.49	12.4	1.06	26.9	1.31	33.3
3/4	1.62	41.1	1.06	26.9	1.20	30.5	0.75	19.0	—	—	0.97	24.6	0.43	10.9	0.49	12.4	0.49	12.4	1.25	31.8	1.31	33.3

[a] For flare dimensions shown on Figs. 26–32 but not given in Table 6, see corresponding dimensions for the specified Tube OD in Table 3.

[b] Dryseal American Standard Taper Pipe Thread.

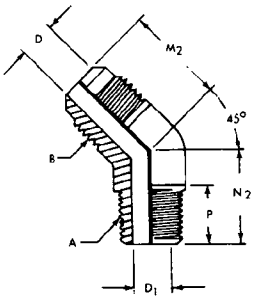
[c] Where thread relief undercut is used, last thread shall be chamfered 1/2 to 1 pitch long from G diameter and dimension J may be reduced by an amount equal to 1/2 pitch.

[d] At manufacturer's option, through passages in fittings shown in Fig. 26 may conform with the smaller diameter specified or be counterbored to the larger diameter from the appropriate end for depth S.

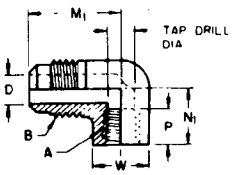
[e] Available with three types of fusible alloys as specified in General Specifications.

[f] Minimum design thickness, not subject to inspection.

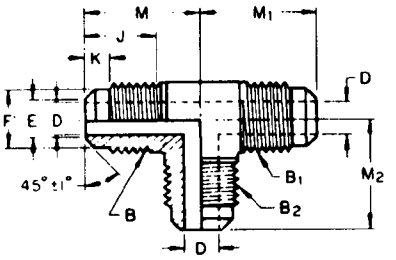
[g] Basic dimensions shown shall apply as minimum for bosses. The −0.02 in (0.51 mm) tolerance shall apply only to chamfer diameters on full hexagon versions of fittings shown in Figs. 28 and 29.



♦FIG. 31—45 DEG REDUCING ELBOW
(010302) (E5)



♦FIG. 32—90 DEG INTERNAL PIPE THREAD REDUCING ELBOW
(010203) (E3)



♦FIG. 33—THREE-WAY REDUCING TEE
(010401) (TR2)

NOTE: UNSPECIFIED DETAIL WITH RESPECT TO DIMENSIONS, TOLERANCES, CONTOUR, MATERIAL, WORKMANSHIP, ETC., MUST CONFORM TO GENERAL SPECIFICATIONS FOR REFRIGERATION TUBE FITTINGS. THE ILLUSTRATIONS ON THIS PAGE APPLY TO TABLES 7–10. CODES SHOWN IN BRACKETS ADJACENT TO FIGURE NUMBERS REPRESENT RESPECTIVE FITTING IDENTIFICATION IN ACCORDANCE WITH SAE J846 (FIRST NUMBER) AND ANSI B70.1 (SECOND NUMBER).

♦ TABLE 7—END TO CENTER DIMENSIONS OF FLARE TO FLARE ENDS ON REDUCING TEES[a]

B and B_1 Tube OD, of Run, in	End to Center ±0.03 in ±0.8 mm	B_2, Nominal Flare Sizes of Branch, in													
		3/16		1/4		5/16		3/8		1/2		5/8		3/4	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
3/16	M or M_1	0.75	19.0	0.75	19.0	0.78	19.8	0.84	21.3	0.91	23.1	0.97	24.6	1.06	26.9
	M_2	0.75	19.0	0.88	22.4	0.91	23.1	1.06	26.9	1.22	31.0	1.41	35.8	1.66	42.2
1/4	M or M_1	0.88	22.4	0.88	22.4	0.84	21.3	0.91	23.1	0.97	24.6	1.03	26.2	1.12	28.4
	M_2	0.75	19.0	0.88	22.4	0.91	23.1	1.06	26.9	1.22	31.0	1.41	35.8	1.66	42.2
5/16	M or M_2	0.91	23.1	0.91	23.1	0.91	23.1	0.97	24.6	1.03	26.2	1.09	27.7	1.19	30.2
	M_2	0.78	19.8	0.84	21.3	0.91	23.1	1.06	26.9	1.22	31.0	1.41	35.8	1.66	42.2
3/8	M or M_1	1.06	26.9	1.06	26.9	1.06	26.9	1.06	26.9	1.09	27.7	1.16	29.5	1.25	31.8
	M_2	0.84	21.3	0.91	23.1	0.97	24.6	1.06	26.9	1.22	31.0	1.41	35.8	1.66	42.2
1/2	M or M_1	1.22	31.0	1.22	31.0	1.22	31.0	1.22	31.0	1.22	31.0	1.28	32.5	1.38	35.1
	M_2	0.91	23.1	0.97	24.6	1.03	26.2	1.09	27.7	1.22	31.0	1.41	35.8	1.66	42.2
5/8	M or M_1	1.41	35.8	1.41	35.8	1.41	35.8	1.41	35.8	1.41	35.8	1.41	35.8	1.50	38.1
	M_2	0.97	24.6	1.03	26.2	1.09	27.7	1.16	29.5	1.28	32.5	1.41	35.8	1.66	42.2
3/4	M or M_1	1.66	42.2	1.66	42.2	1.66	42.2	1.66	42.2	1.66	42.2	1.66	42.2	1.66	42.2
	M_2	1.06	26.9	1.12	28.4	1.19	30.2	1.25	31.8	1.38	35.1	1.50	38.1	1.66	42.2

[a] For flare and pipe thread dimensions shown on Figs. 33–35, see corresponding dimensions for specified Tube OD and specified pipe thread size in Table 3. For passage diameters, see Tables 9 and 10.

♦ TABLE 8—END TO CENTER DIMENSIONS OF FLARE TO PIPE ENDS ON REDUCING TEES[a]

B, B_1 or B_2 Tube OD, in	End to Center ±0.03 in ±0.8 mm	A_1 Dryseal Taper Thread, NPTF[b], in									
		1/8		1/4		3/8		1/2		3/4	
		in	mm	in	mm	in	mm	in	mm	in	mm
3/16	M_3	0.75	19.0	0.81	20.6	0.88	22.4	0.97	24.6	1.06	26.9
	N	0.75	19.0	0.97	24.6	1.00	25.4	1.28	32.5	1.38	35.1
1/4	M_3	0.81	20.6	0.91	23.1	0.94	23.9	1.03	26.2	1.12	28.4
	N	0.78	19.8	0.94	23.9	1.03	26.2	1.23	32.5	1.38	35.1
5/16	M_3	0.91	23.1	0.97	24.6	1.00	25.4	1.09	27.7	1.19	30.2
	N	0.78	19.8	0.94	23.9	1.03	26.2	1.28	32.5	1.38	35.1
3/8	M_3	1.03	26.2	1.00	25.4	1.06	26.9	1.16	29.5	1.25	31.8
	N	0.91	23.1	1.06	26.9	1.09	27.7	1.28	32.5	1.38	35.1
1/2	M_3	1.22	31.0	1.22	31.0	1.22	31.0	1.28	32.5	1.38	35.1
	N	1.00	25.4	1.19	30.2	1.12	28.4	1.38	35.1	1.38	35.1
5/8	M_3	1.41	35.8	1.41	35.8	1.41	35.8	1.41	35.8	1.44	36.6
	N	1.06	26.9	1.25	31.8	1.25	31.8	1.38	35.1	1.50	38.1
3/4	M_3	1.62	41.1	1.62	41.1	1.62	41.1	1.62	41.1	1.59	40.4
	N	1.22	31.0	1.41	35.8	1.41	35.8	1.50	38.1	1.62	41.1

[a] For flare and pipe thread dimensions shown on Figs. 33–35, see corresponding dimensions for specified Tube OD and specified pipe thread size in Table 3. For passage diameters, see Tables 9 and 10.

[b] Dryseal American Standard Taper Pipe Thread.