

## Features, Braze Fittings For Tubing

The fittings described in this section provide a variety of braze on end connections for tube assembly/fabrication requirements. Fitting styles are available with male 37 degree tube and bulkhead ends, female 37 degree swivel ends, male or female NPTF pipe ends, female pipe swivels, SAE J518 four-bolt flanges and tube to tube junction blocks.

Standard braze joint designs provide a slip fit to nominal O.D. inch size tubing and are intended for silver brazing. Press fit counterbores and other special designs are available on request.

All 37 degree fitting styles are also available with the optional **Flare-O™** tube end design.

## Performance

Where applicable, fittings are designed and qualified to the requirements of SAE J514. Four bolt flange ends conform to SAE J518.

The rated working pressures for braze fittings are based on the standard pressure rating of the separable fitting end. For proper performance, the design of any hydraulic system should take into consideration the rated working pressures for each of the components of the system, including standard ratings for hose and tubing components. For brazed tube assemblies, these factors include the tubing material specifications, fabrication techniques and braze processes.

## Construction

Unless otherwise specified, fittings are machined from carbon steel and may utilize brazed construction for shaped fittings. Braze fittings are furnished unplated.

## Threads

**Straight Threads:** Internal and external straight threads conform to the Unified National Class 2A and Class 2B Series respectively, with modified minor diameters where specified. Maximum diameters of plated external threads may conform to Class 3A maximum diameters after plating.

**NPTF Threads:** Male and female pipe threads conform to the Dryseal American Standard Taper Pipe Thread (SAE J476a, NPTF) Series which will provide pressure tight joints without the use of a lubricant or sealer. Use of these fittings with non-dryseal NPT pipe or hose ends is not recommended for high-pressure applications.

**Note:** Where not functionally objectionable, use of a compatible lubricant/sealant is recommended for either NPT or NPTF threads to minimize the possibility of galling in assembly.

**NPSM Swivels:** Female threads for adapter union swivel nuts conform to the American Standard Straight Pipe Thread (NPSM) Series. These threads mate with either NPT or NPTF Series male threads to provide a mechanical connection between the adapter and mating male end. Sealing is provided by metal to metal contact between the machined 30 degree female seat on the NPT/NPTF male end and the nose of the swivel end. The NPSM swivel threads are not a sealing member.

**Caution: For proper sealing, ensure that the mating male end has been machined with the proper 30 degree female seat.**

## Assembly Information

For silver brazing and fitting assembly instructions, refer to the Technical Data Section for the appropriate fitting end. Also, refer to the Technical Data Section for recommendations regarding tubing pressure ratings, tube flares and hose/tube routing information. Please note: Tubing for single flare tube ends should be either seamless or welded and drawn, fully annealed tubing per SAE J524 or J525. For double flaring, tubing per SAE J356, J524, J525 or J526 may be used.

For proper sealing with 37 degree flared fittings, flares for tubing should conform to the requirements of SAE J533. For heavy wall tubing, the optional tube preparation and single flare configuration specified in SAE J533 is also recommended. This optional configuration provides extended sealing surface contact area versus conventional flares.

In the design and fabrication of tubing or hose runs for any hydraulic system, precautions should be taken to allow for sufficient adjustment of the hose or tubing so that proper alignment can be attained at the fitting connections. Improper fit-up or misalignment should be corrected before final connections are made. Location of fitting connections should be planned to maximize accessibility. Whenever possible, use a torque wrench to tighten connections to the recommended torque.

## Ordering Information

Size of fittings is indicated by dash number relating to sixteenths of an inch for the nominal O.D. of the tube size used. Example: 1/2 inch tube = 8/16 or (-8) size.

Order standard fittings from appropriate chart indicating required dash numbers. For example, 500-8-8 is a 90 degree braze elbow with 1/2" nominal braze counterbore and 1/2" male tube end (3/4-16 thread). Jump size 500-10-8 is a 90 degree braze elbow with 5/8" nominal braze counterbore and 1/2" male tube end (3/4-16 thread). Pictorial views for each fitting style indicate the correct numbering sequence for fitting ends.

If information is needed for jump sizes not shown, please contact customer service for engineering assistance.



Table JB1. Pressure Ratings for 37 Deg. Flared Tube Ends, Bulkheads and 37 Deg. Female Swivels

Nominal Tube Size		Thread Size	Working Pressures			
Nom SAE Dash Size	Nom Inch Tube O.D.	SAE J514 Flared Tube Ends, Unions, Bulkheads and Swivels (Notes 1&2)	37 Deg. Flared Tube Ends, Unions and Bulkheads		37 Deg. Female Swivels	
			MPa	psi	MPa	psi
-2	1/8	5/16-24 UNF	34.5	5,000	34.5	5,000
-3	3/16	3/8-24 UNF	34.5	5,000	34.5	5,000
-4	1/4	7/16-20 UNF	34.5	5,000	31	4,500
-5	5/16	1/2-20 UNF	34.5	5,000	27.5	4,000
-6	3/8	9/16-18 UNF	34.5	5,000	27.5	4,000
-8	1/2	3/4-16 UNF	31	4,500	27.5	4,000
-10	5/8	7/8-14 UNF	24	3,500	21	3,000
-12	3/4	1-1/16-12 UN	24	3,500	21	3,000
-14	7/8	1-3/16-12 UN	21	3,000	17	2,500
-16	1	1-5/16-12 UN	21	3,000	17	2,500
-20	1 1/4	1-5/8-12 UN	17	2,500	14	2,000
-24	1 1/2	1-7/8-12 UN	14	2,000	10.5	1,500
-32	2	2-1/2-12 UN	10.5	1,500	8	1,125

1) Threads per SAE J475 Class 2A ext. Class 2B int. (Ref. ISO-263/ISO-R725)

2) Unified class 2B threads apply to swivel nuts and with minor diameter modified to class 3B limits for locknuts

Table JB2. Pressure Ratings for Fittings With NPTF Pipe Threads and NPSM Female Swivels

Nominal Pipe Size		Thread Size		Working Pressures			
Nom SAE Dash Size	Nom Inch Pipe O.D.	Dryseal Pipe Thread (NPTF <sup>1</sup> ) Male and Female	Straight Pipe Thread (NPSM <sup>2</sup> ) Female Swivels	Fittings With NPTF Pipe Threads		NPSM Female Swivels	
				MPa	psi	MPa	psi
-2	1/8	1/8-27	1/8-27	34.5	5,000	34.5	5,000
-4	1/4	1/4-18	1/4-18	27.5	4,000	34.5	5,000
-6	3/8	3/8-18	3/8-18	21	3,000	27.6	4,000
-8	1/2	1/2-14	1/2-14	21	3,000	24.1	3,500
-12	3/4	3/4-14	3/4-14	17	2,500	15.5	2,250
-16	1	1-11-1/2	1-11-1/2	14	2,000	13.8	2,000
-20	1 1/4	1-1/4-11-1/2	1-1/4-11-1/2	8	1,150	11.2	1,625
-24	1 1/2	1-1/2-11-1/2	1-1/2-11-1/2	7	1,000	8.6	1,250
-32	2	2-11-1/2	2-11-1/2	7	1,000	7.8	1,125

1) Dryseal American Standard Taper Pipe Thread

2) American Standard Straight Pipe Thread for Mechanical Joints

Table JB3. Pressure Ratings for Code 61 Four-Bolt Split Flange Ends

Nominal Flange Size		Bolt Dimensions			Working Pressures @ Recommended Torque (Note: See Below)			
Nom SAE Dash Size	Nom Inch Pipe O.D.	Thread	Length		Maximum Recommended Working Pressure		Recommended Torque Range	
			mm	inch	MPa	psi	Nm	lb-in
-8	1/2	5/16-18	32	1-1/4	34.5	5,000	20-25	175-225
-12	3/4	3/8-16	32	1-1/4	34.5	5,000	28-40	250-350
-16	1	3/8-16	32	1-1/4	34.5	5,000	37-48	325-425
-20	1 1/4	7/16-14	38	1-1/2	27.6	4,000	48-62	425-550
-24	1 1/2	1/2-13	38	1-1/2	20.7	3,000	62-79	550-700
-32	2	1/2-13	38	1-1/2	20.7	3,000	73-90	650-800



Table JB4. Pressure Ratings for Code 62 Four-Bolt Split Flange Ends								
Nominal Flange Size		Bolt Dimensions			Working Pressures @ Recommended Torque (Note: See Below)			
Nom SAE Dash Size	Nom Inch Pipe O.D.	Thread	Length		Maximum Recommended Working Pressure		Recommended Torque Range	
			mm	inch	MPa	psi	Nm	lb-in
-8	1/2	5/16-18	32	1-1/4	41.4	6,000	20-25	175-225
-12	3/4	3/8-16	38	1-1/2	41.4	6,000	34-45	300-400
-16	1	7/16-14	44	1-3/4	41.4	6,000	56-68	500-600
-20	1 1/4	1/2-13	44	1-3/4	41.4	6,000	85-102	750-900
-24	1 1/2	5/8-11	57	2-1/4	41.4	6,000	158-181	1400-1600
-32	2	3/4-10	70	2-3/4	41.4	6,000	271-294	2400-2600

**Note:** SAE J518, Code 61 and Code 62 Four-Bolt Split Flange connections are non-threaded port ends which utilize O-rings for sealing. They are assembled to ports with split flange clamp halves and clamping pressure is provided by bolts or socket head cap screws of SAE Grade 5 material or better as specified in SAE J429.

Rated design factor for these connections is dependent on the selected grade for the clamp bolts. Flanged head ends are incorporated into fittings having suitable means for attachment to tubes, pipes or hoses to provide connection ends.

