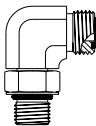
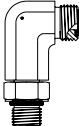
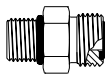
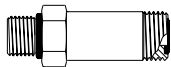
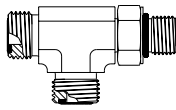
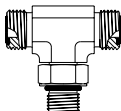
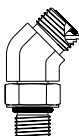
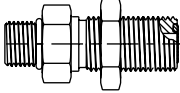
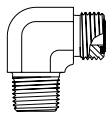
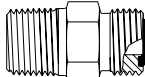

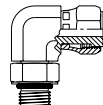
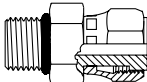
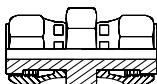
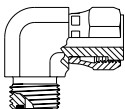
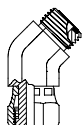
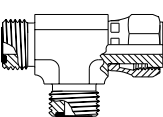
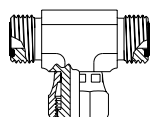
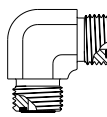
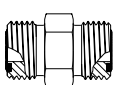
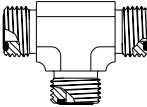
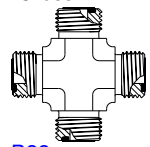
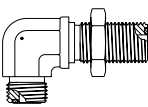
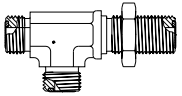
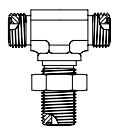
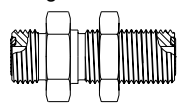
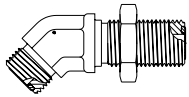
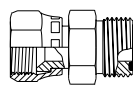
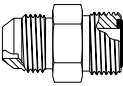
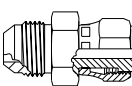
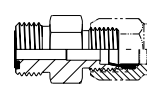
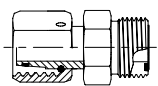
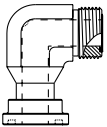
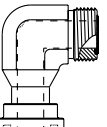
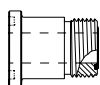
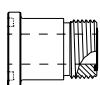
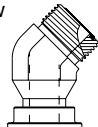


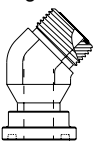
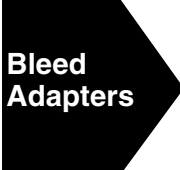
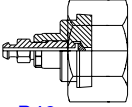
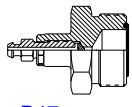



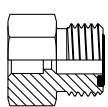
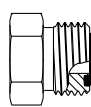




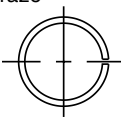

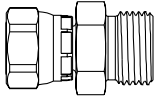




Seal-Lok™ O-Ring Face Seal Tube Fittings




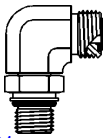
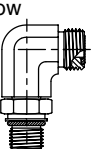
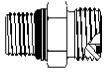
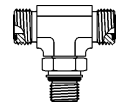
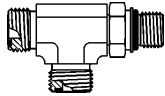



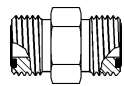
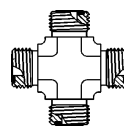
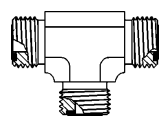

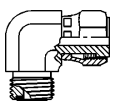
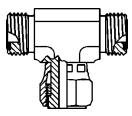
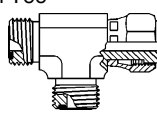

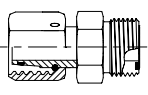

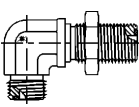
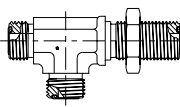
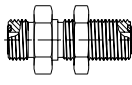
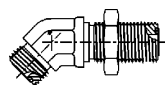
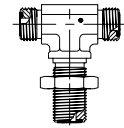
The Fitting Authority












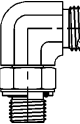
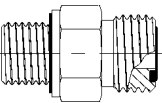
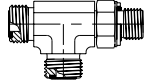
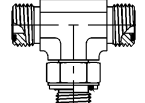

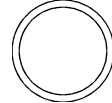



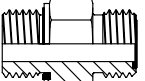
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<div>S5OLO</div> <div>Straight Thread Branch Tee</div> <div></div> <div>Page B23</div>	<div>V5OLO</div> <div>45° Straight Thread Elbow</div> <div></div> <div>Page B24</div>	<div>WF5OLO</div> <div>Straight Thread Bulkhead Connector</div> <div></div> <div>Page B35</div>	<div>Tube to Male NPTF</div>	<div>CLO</div> <div>Male Pipe Elbow</div> <div></div> <div>Page B25</div>	<div>FLO</div> <div>Male Pipe Connector</div> <div></div> <div>Page B26</div>
<div>VLO</div> <div>45° Male Pipe Elbow</div> <div></div> <div>Page B27</div>	<div>Swivel Adapters</div>	<div>AOEL6</div> <div>Straight Thread Swivel Elbow</div> <div></div> <div>Page B27</div>	<div>F65OL</div> <div>Straight Thread Swivel Connector</div> <div></div> <div>Page B28</div>	<div>HL6</div> <div>Swivel Nut Union</div> <div></div> <div>Page B28</div>	
<div>Tube to Seal-Lok Swivel</div>	<div>C6LO</div> <div>Swivel Nut Elbow</div> <div></div> <div>Page B29</div>	<div>V6LO</div> <div>45° Swivel Nut Elbow</div> <div></div> <div>Page B29</div>	<div>R6LO</div> <div>Swivel Nut Run Tee</div> <div></div> <div>Page B30</div>	<div>S6LO</div> <div>Swivel Nut Branch Tee</div> <div></div> <div>Page B30</div>	
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<div>Flange Adapters</div>	<div>LOEQ1</div> <div>Code 61 Flange Elbow</div> <div></div> <div>Page J11</div>	<div>LOEQ2</div> <div>Code 62 Flange Elbow</div> <div></div> <div>Page J11</div>	<div>LOHQ1</div> <div>Code 61 Flange Connector</div> <div></div> <div>Page J12</div>	<div>LOHQ2</div> <div>Code 62 Flange Connector</div> <div></div> <div>Page J12</div>	<div>LOVQ1</div> <div>Code 61 Flange 45° Elbow</div> <div></div> <div>Page J13</div>

LOVQ2 Code 62 Flange 45° Elbow  Page J13	Bleed Adapters 	FNLBA ORFS Tube End Cap Bleed Adapter  Page B46	PNLOBA ORFS Tube End Plug Bleed Adapter  Page B47		
Auxiliary Components 	BL Nut  Page B38	FNL Cap  Page B39	LOHB3 Braze Connector  Page B40	PNLO Plug  Page B41	TL Sleeve  Page B42
TL-Reducer Reducer Sleeve  Page B42	TPL Parflange Sleeve for Inch Tubing  Page B41	WLNL Bulkhead Locknut  Page B44	SBR Silver Braze Ring for Inch Tubing  Page B46	TRLON Tube End Reducer  Page B43	LOHL6 Tube End Expander  Page B44
Face Seal O-Ring ORFS Tube End O-Ring  Page B45	SAE O-Ring Straight Thread Port O-Ring  Page B45				

B

Metric/BSP Seal-Lok™ Tube Fittings (Shown in Section I)

Tube to ISO 6149 	C87OMLO Metric Straight Thread Elbow  Page I21	CC87OMLO Long Metric Straight Thread Elbow  Page I22	F87OMLO Metric Straight Thread Connector  Page I23	S87OMLO Metric Straight Thread Branch Tee  Page I24	R87OMLO Metric Straight Thread Run Tee  Page I24
V87OMLO Metric Straight Thread 45° Elbow  Page I25	Tube to Tube 	EMLO Union Elbow  Page I27	HMLO Union Straight  Page I27	KMLO Union Cross  Page I28	JMLO Union Tee  Page I28
Tube to Seal-Lok Swivel 	C6MLO Swivel Nut Elbow  Page I25	S6MLO Swivel Nut Branch Tee  Page I26	R6MLO Swivel Nut Run Tee  Page I26	EO Swivel Adapter 	LOHU86 EO Swivel Adapter  Page B38
Bulkhead Unions 	WEMLO Bulkhead Union Elbow  Page I29	WJMJLO Bulkhead Run Tee  Page I29	WMLO Bulkhead Union  Page I30	WNMLO 45° Bulkhead Union Elbow  Page I30	WJMLO Bulkhead Branch Tee  Page I31

Metric/BSP Seal-Lok™ Tube Fittings (cont'd.)					
Auxiliary Components 	BML Tube Nut  Page I31	MMLOHB3 Braze Connector Straight  Page I32	PNMLO Plug  Page I32	TL Braze Sleeve For Metric Tubing  Page I33	TPL Parflange Sleeve For Metric Tubing  Page I33
WLNML Bulkhead Locknut  Page I34	Face Seal O-Ring ORFS Tube End  Page I34	ISO 6149 Metric Straight Thread Port O-Ring  Page I35	SBR Silver Braze Ring for Metric Tubing  Page I36	Tube to BSPP 	C40MLO BSPP Elbow  Page I37
F42EDMLO BSPP Connector  Page I38	R40MLO BSPP Run Tee  Page I39	S40MLO BSPP Branch Tee  Page I39	V40MLO BSPP 45° Elbow  Page I40	BSPP BSPP Retaining Ring  Page I63	BSPP BSPP O-Ring  Page I63
ED EOlastic Soft Seal for BSPP & Metric Threads  Page H123	Tube to Metric DIN 3852 	F82EDMLO Male Straight Thread Connector  Page I40			

Introduction

The Seal-Lok fitting was developed by the Tube Fittings Division in the early 1980s. This product has proven to be very effective in eliminating leakage at the higher pressures found in today's hydraulic systems.

The Seal-Lok fitting is an O-ring face seal type fitting that consists of a nut, a body, an O-ring and a sleeve. As shown in Fig. B1, the tube is flanged to 90° (or the tube may be brazed instead to a braze-type sleeve). When the fitting is assembled, it compresses an O-ring in the precision machined groove in the fitting body to form a leak tight seal.

Seal-Lok fittings are suitable for any range of tube wall thickness and are also readily adaptable to pipe, inch or metric tubing and hose.

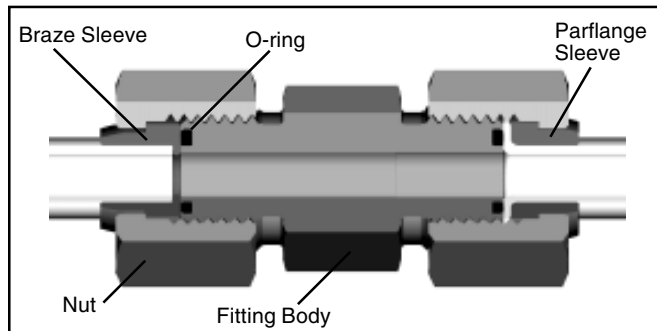


Fig. B1 — Seal-Lok Union cutaway with flanged and brazed assemblies

Design and Construction

The Seal-Lok fitting consists of four main components: a body, a sleeve, an O-ring and a nut.

The Seal-Lok Fitting Body. There are over 40 different body configurations to choose from for specific applications. The body face has a groove which contains a high durometer O-ring that is held captive during installation. In addition, the Seal-Lok fitting body shapes are forged for added strength and longer service life.

Straight products are made from cold drawn barstock. The cold drawing process ensures consistent dimensional tolerances, improved strength and better surface finish.

Seal-Lok fittings are manufactured with a captive O-ring groove (CORG) design for prevention of O-ring fall-out prior to final assembly (see Fig. B2).

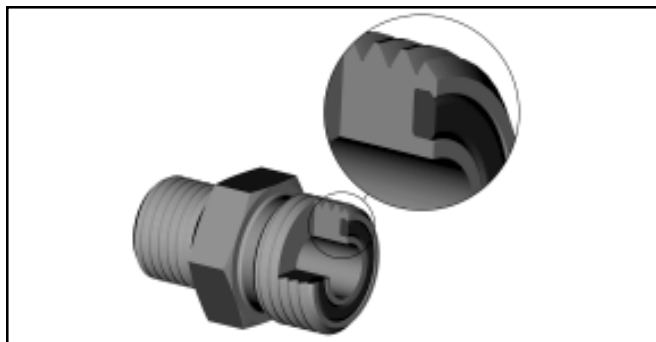


Fig. B2 — Captive O-ring Groove (CORG) Cutaway

The Seal-Lok Fitting Nut. Smaller size Seal-Lok fitting nuts are cold-formed to provide a more tightly packed grain structure, resulting in a much stronger component. Larger size nuts are machined from cold drawn barstock. Nuts which are expected to go through a brazing cycle are left unplated and are made from a higher grade material to ensure adequate strength, even after being exposed to the annealing temperatures associated with furnace brazing.

The Seal-Lok Flange Sleeve. The preferred method of making a Seal-Lok connection is by using the Parker Parflange machine (pages N25 through N27) to create the 90° flange on the tube end. A flange sleeve is used to support the flange and the tube. It also provides the contact shoulder for the nut, a back-up for the 90° tube flange and support at the tube O.D.

The Seal-Lok connection using the Parflange method can be made with either inch or metric tubing by choosing the appropriate sleeve and tooling.

With the flange sleeve, the tube to sleeve attachment is done mechanically by creating a 90° flange in front of the sleeve with the Parflange machine. This flange provides both the holding power and sealing surface (eliminating the braze joint, and hence, a potential leak path found with brazed sleeve attachment). The only seal point is between the fitting body and the tube flange face via the high durometer O-ring.

The flanging process is very fast and requires very little cleaning prior to or after flanging. Thus, the process enhances the integrity of the joint and reduces cost.

A Parflange tube assembly can be connected to a male Seal-Lok hose fitting with ease, eliminating tube brazing to make tube to hose connections.

The Seal-Lok Braze Sleeve. There are two main differences between braze and flange sleeves. The first is that the braze sleeve provides the mating surface between the tube and the fitting body. With a flange connection, the sleeve provides support for the tubing which mates with the fitting body (see Fig. B1). The second difference between braze and flange sleeves is the method of attachment to the tube. The braze sleeve, as the name implies, is attached to the tube through brazing. The braze provides holding power as well as a method to seal the joint.

Seal-Lok braze sleeves are manufactured to exacting dimensions. Tightly toleranced dimensions are required to prevent binding in the nut when torqued, provide a flat and smooth sealing surface against the O-ring, and provide the appropriate clearance for silver brazing to the tube.

The braze sleeve provides three basic functions:

- A leak free attachment to tube via silver brazing
- A flat and smooth sealing surface for the O-ring
- A flat and smooth contact shoulder for the nut to connect the tube to the fitting body.

The Seal-Lok Reducer Sleeve. Seal-Lok braze sleeves are manufactured in both even and reducing sizes. The reducing sleeves make it easy to "down size" a larger face seal fitting to a smaller tube connection.

The Seal-Lok connection can be made with either metric or inch tubing by choosing the appropriate braze sleeve.

B

The Seal-Lok Braze Connector (LOHB3). A braze connector is essentially a half of a union which can be brazed on to a tube. It effectively performs three functions:

1. Simplifies tube to hose connection using traditional female swivel hose ends and tube brazing.
2. Minimizes components when a tube union is needed.
3. Facilitates line size change (increase or decrease) and minimizes the number of joints and components.

Standard Material Specification. The standard materials used in the manufacture of Seal-Lok fittings are shown below.

Seal-Lok Fittings	Steel**		Stainless Steel**	
	ASTM	Type	ASTM	Type
Forged Bodies	A576	1214/1215	A182	316
Bar Stock Bodies	A108	12L14	A479	316
Cold Formed Nuts	A576	C1010	--	--
Machined Nuts*	A108	12L14 11L37	A479	316
Braze Sleeves & Braze Connectors	A108	12L14	A276	316L
Flange Sleeves	A108	12L14	A479	316

*All stainless steel nuts are coated to prevent galling at assembly.

**Other materials can be produced upon request.

Table B1 — Standard Material Specifications for Seal-Lok Fittings

Threads: The standard products shown in the visual index are manufactured with the applicable thread(s) from the thread forms listed below:

- SAE Straight Thread, UN/UNF Class 2A or 2B
- NPTF and NPT

Finish: Zinc with yellow chromate is used on all standard steel products. Stainless steel fittings are passivated.

Conformance Standards

Approvals

DET Norske Veritas — Approved for use in hydraulic systems up to size 38mm O.D. (1 1/2") as shown on certificate P-9538.

AGA/CGA — Stainless steel fittings approved for use in Natural Gas Vehicle per Engineering Report No. 125-AGA1-85.

American Bureau of Shipping (ABS) — Type approved for hydraulic systems and compressed air/instrument air systems per certificate No. 98-C12949-X.

Specifications

SAE Standards. Seal-Lok fittings meet or exceed all requirements of SAE J1453.

How Seal-Lok Fittings Work

The Seal-Lok fitting body face contains a high durometer O-ring that is held captive in a precision machined groove. As the nut is tightened onto the fitting body, the O-ring is compressed between the body and flat face of the tube flange or braze sleeve to form a tight, positive seal (see Fig. B1).

As the two faces come in contact, further tightening of the nut produces a sharp rise in assembly torque. A solid pull of the wrench at this point, to recommended assembly torque, completes the assembly.

The sharp torque rise gives a "solid feel" at assembly, and minimizes the possibility of over tightening.

Because the sealing surfaces are flat and perpendicular to the assembly pull, they remain virtually free of distortion during assembly, giving Seal-Lok fittings virtually unlimited remakeability. The O-ring should be inspected at each disassembly and replaced when necessary.

Tube Flanging with the Parker Parflange Machines

The Parflange machine is designed to flange tubing, specifically for use with Parker Seal-Lok (O-ring Face Seal) fittings. Parker offers the bench mount model called **Parflange 1025**, shown in Fig. B3. Also available is the more versatile, fully automatic, high speed **Parflange 1040**, whose features are discussed later in this section. All models of Parflange machines can be found on pages N25 through N27.



Fig. B3 — Parflange 1025 Machine

The Parflange machines utilize an orbital cold flow forming process to produce a flat, smooth, rigidly supported 90° sealing surface on the tube end. Flanging with Parflange eliminates the need for welding or brazing of the sleeve to the tube end. Some of the many advantages of flanging with Parflange over welding or brazing are listed below.

- The Parflange process is several times faster than most welding or brazing methods. For instance, the 1025 and 1040 models produce flanges at a rate of 9 to 12 times the speed of comparable induction brazing.
- The Parflange process does not require any special pre- or post-flange cleaning of the tube and sleeve.
- Unlike brazing, the Parflange process does not require any flux, braze alloy, post braze cleaner or rust inhibitor. An environmentally safe lubricant applied to the flanging pin is the only additive associated with the Parflange.
- The Parflange process is environmentally clean and safe. It does not require open flame or any form of heating. Additionally, there is no emission of hazardous fumes, as is typical with welding and brazing.
- The Parflange process uses only a fraction of the energy needed for welding or brazing.
- The Parflange process accommodates the use of plated or unplated components (i.e. tube and sleeve). Thus, the need to electroplate assemblies after fabrication is largely eliminated.
- The Parflange process eliminates the potential leak path present at the braze or weld joint.
- The Parflange process produces a burnished sealing surface, typically much smoother than the 125 micro-inch requirement of SAE J1453.

Users of Parflange and Parker's Seal-Lok (O-ring Face Seal) fitting enjoy all the inherent sealing, reliability, time and cost saving benefits, without the many drawbacks which accompany welding or brazing.

The **Parflange 1040** machine was developed based on feedback from a wide range of customers. Some of the key features found on the 1040 are:

- Automatic lubrication for the flanging pin.
- Independent and automatic hydraulic tube clamping and releasing system.
- Programmable micro-processor control.
- Capacity for flanging heavier tube walls.
- No need for die removal in separating the flanged tube assembly from the clamping mechanism
- Optional automatic sleeve loader and bowl feeder for high production use.

These features designed into the 1040 result in time savings, lower risk of error by the operator and maintenance of the proven flange integrity provided by Parflange.

When fitted with the optional automatic sleeve loader, the **Parflange 1040** is suitable for high production use. The typical "floor-to-floor" cycle time for flanging with the loader in place is 15 seconds. The automatic sleeve loader is recommended for high volume producers, such as: commercial tube fabricators, large scale manufacturers doing in-house tube fabrication, etc.

For light to moderate tube users, the loader may not be necessary. Flanging without the loader requires manual loading of the sleeve into the die. The floor-to-floor cycle time is therefore more dependent on the speed of the operator. The flange quality is the same whether or not the loader is used. See Bulletin 4390-1040A for instructions on operating the 1040.

The **Parflange 1025** is a compact bench or cart mountable tube flanging/flaring machine. The 1025 unit is simple to operate, it has several fail proof features and is currently the lowest priced Parflange machine. This machine is especially suited for the light to medium level users involved in original equipment manufacturing, in-plant installations, in-the-field tube fabrication, on-site repairs, shipboard tube fabrication, and so forth. The 1025 has a smaller power unit than the 1040, and is therefore not capable of flanging heavy wall tubing in the larger tube outside diameters. See Bulletin 4390-1025A-USA for information on operating the Parflange 1025.

Parflange machines are presently suitable for flanging imperial size tubing of 1/4" through 2" O.D. and metric tubing having O.D. of 6mm through 38mm. The machine has the capability of flanging tubing made from carbon steel, stainless steel, aluminum, copper-nickel, nickel-copper (monel), copper and most other metallic materials. Tooling for flanging steel tubing and many of the more popular sizes of stainless steel tubing is readily available. Tooling for flanging other materials or other sizes can be developed on an "as requested" basis.

All Parflange machines are equipped to make 37° tube flare for use with Parker Triple-Lok fittings. The tube materials and tube O.D.'s for 37° flaring are similar to those recommended for flanging.

Tube End Preparation

1. Determine the extra tube cut-off length for the Parflange operation using [Table B2](#). (Refer to the "Table Notes" for practices in measuring.)
2. Cut tube squarely (within ±1 degree) using a circular toothed cut-off saw or a hacksaw with a fine tooth blade.
3. Deburr the O.D. and I.D. of the tube, but avoid exceeding a chamfer of 45° x 0.020" on the O.D.
4. Remove all loose burrs from the tube end.

B

Technical Data

Extra Tube Cut-Off Length Guide

For tube flanging, the extra tube cut-off lengths shown in [Table B2](#) are required.

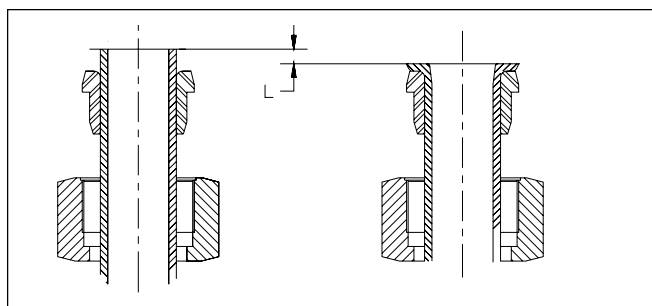
Tube O.D., Inch	Tube Wall Thickness, Inch										
	.028	.035	.049	.065	.083	.095	.109	.120	.134	.156	.188
1/4	3/16	13/64	5/32								
3/8		9/64	9/64	5/32	5/32	5/32					
1/2		5/32	9/64	9/64	9/64	9/64					
5/8			5/32	5/32	7/64	11/64	5/32	11/64			
3/4			5/32	5/32	1/8	7/64	9/64	5/32	11/64		
1				9/64	9/64	7/64	11/64	11/64	3/16		
1 1/4					5/32	7/64	7/64	1/8	5/32	11/64	11/64
1 1/2				11/64	11/64	3/16	3/16	3/16	3/16	15/64	7/32

Table B2 — Extra Tube Cut-Off Length Guide (Inch Tubing)

Table Notes:

- Fractions based on rounding off to the nearest 1/64.
- This chart is only a guide. Actual dimensions may be different from those shown because of variations in tube wall thickness, inconsistency in quality of tube cut-off, deburr, and occasional modifications to the Parflange tooling. User should verify actual extra tube cut-off length (with one or two flanges before large scale flanging).

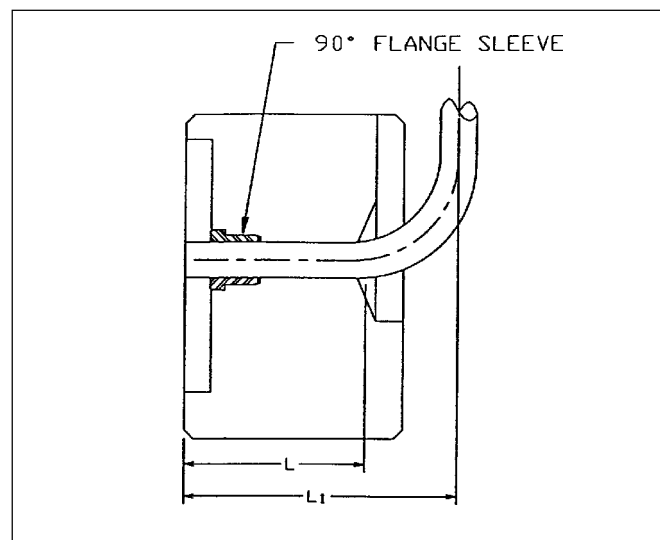
For extra tube cut-off lengths for metric tubing, refer to [Table I3](#) on page I9.



Extra Tube Cut-Off Length, L for Inch Tube 90° Flanging

Minimum Straight-Length to Start of Bend

For tube flanging, the minimum straight-length to start of bend is shown in [Table B3](#).



Minimum straight length to start of bend for 90° flanging

Tube O.D. Inch Sizes	Tube O.D. Metric Sizes	*L		**L ₁	
		(Inch)	(mm)	(Inch)	(mm)
1/4"	6	1 5/16	35	3 1/8	79
5/16"	8	1 5/16	35	3 5/32	80
3/8"	10	1 5/16	40	3 3/16	81
1/2"	12	1 3/8	40	3 1/4	82
	15	1 3/8	40	3 5/16	84
5/8"	16	1 1/2	41	3 5/16	84
	18	1 5/8	42	3 11/32	85
3/4"	20	1 3/4	50	3 3/8	86
	22	1 7/8	50	3 7/16	87
	25	1 7/8	50	3 1/2	89
1"	28	1 7/8	50	3 9/16	90
	30	1 7/8	50	3 19/32	91
1 1/4"	32	1 7/8	50	3 5/8	92
	35	2	50	3 11/16	94
1 1/2"	38	2	50	3 3/4	95

Table B3 — Minimum straight length to start of bend for 90° flanging

Table Notes:

* L is the minimum straight length to the start of tube bend.

** L₁ is the minimum centerline dimension necessary for 90° bent tube to clear the frame of the 1040 machine. In bending of the tubes, use radius blocks which will ensure that L₁ dimensions are met or exceeded.

Flanging

1. Measure the tube O.D. and wall thickness and select the matching pin and die set. Each set is color-coded designating the tube O.D. and wall thickness.
2. Flange the tube end as shown in Fig. B3, assuring that the pin and die set are in place within the Parflange machine. The Parflange sleeve must be positioned within the die prior to flanging. For tubing that is pre-bent to 90°, refer to Table B3 for the minimum straight-length dimension to start of bend.
3. Inspect the flange diameter using Table B4. The sleeve can also be used for a quick check of the flange dimension as shown in Fig. B4. If the flange is undersized or oversized, the depth of the grub screws, located on the die, can be adjusted by using a 5/16" nut driver and shims. Removing shims will increase the flange diameter — adding will decrease the flange diameter.

Inch Tube O.D. (in)	Metric Tube O.D. (mm)	Flange Diameter (in)
1/4	6	.473 / .502
3/8	10	.584 / .620
1/2	12	.709 / .745
5/8	14, 15, 16	.875 / .923
3/4	18, 20	1.048 / 1.097
1	22, 25	1.298 / 1.347
1-1/4	28, 30, 32	1.549 / 1.597
1-1/2	38	1.861 / 1.910

Table B4 — Flange Dimensions

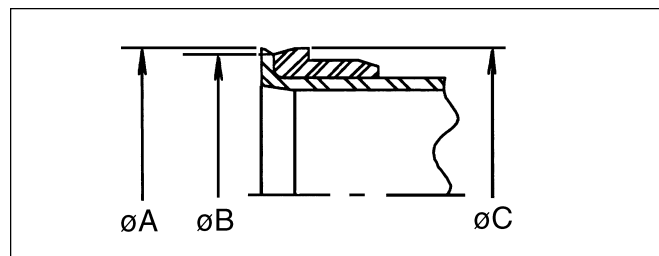


Fig. B4 — Visual Inspection: Diameter A should fall between diameters B and C

Tube Brazing

Silver brazing is the recommended joining method for attaching the braze style sleeve or braze connector to a tube. This process may be accomplished by using a torch, such as the Parker Multi-Flame Torch, shown in Fig. B5.

Caution: Silver brazing, as with any other form of brazing or welding, can be dangerous to your health. Proper precaution should be taken during brazing to avoid personal injury and/or over exposure to dangerous fumes.

Dissimilar materials: For maximum joint strength and integrity, braze carbon steel sleeves or connectors to carbon steel tube and stainless steel sleeves or connectors to stainless steel tube. **Mixing tube and sleeve materials affects the required joint clearance at brazing temperature because of their different thermal expansion rates. Therefore, it is not recommended.**

Tube End Preparation

The preparation of the tube end to be brazed is a very important step in the brazing process.

1. Ensure that the tube end is cut squarely (i.e., within ± 1 degree).
2. Deburr the O.D. and I.D. of the tube, but avoid exceeding a chamfer of $45^\circ \times 0.020"$ on the O.D.
3. Remove all oil and oxide build-up from the end of the tube for at least the length of the braze joint. Oil may be removed by using an oil-free solvent. Oxide build-up may be removed by pickling or by lightly sanding with an "aluminum-free" emery paper.

Selecting and Installing Braze Rings

With Parker's preformed silver braze rings (SBR) all that is required is to select the correct size based on the tube O.D. and to select the correct alloy composition based on the materials being joined. **SBR-SS or SBR may be used for joining carbon steel, but only SBR-SS should be used for brazing when stainless steel is involved.** SBR-SS contains nickel which retards interface corrosion typically experienced in stainless steel brazed joints when exposed to a corrosive media.

Insert the proper braze ring into the braze socket of the sleeve or braze connector that has been cleaned with solvent to remove the protective oil coating. **Remember to assemble BL nut to assembly before brazing.**

Selecting and Applying Flux

During the heating process, flux helps to prevent oxidation of the metal surfaces, dissolves residual oxides and cleans the surface to help the alloy flow. Flux, in some cases, will also serve as a temperature indicator by becoming transparent at about the same temperature that the alloy will melt. Various fluxes are available with different temperature ratings.

Parker flux is available in paste form. The Parker black flux may be used in either silver brazing stainless steel or carbon steel.

Prior to heating, flux can be applied to the braze joint by any combination of brushing, dipping or spraying. All surfaces that are required to be oxide free, such as the flat face of the sleeve, the O-ring groove and threads of the braze connector should be covered with flux. Additionally, the entire braze joint area should be covered with flux.



Fig. B5 — Multi-Flame Torch Brazing

Fixturing the Parts for Brazing

Care should be taken so the braze fixture allows the sleeve to settle and bottom on the tube completely during heating, since the Seal-Lok fitting sleeve is designed for a slip fit, this should happen easily. Short tubes can be brazed in the vertical position; on longer tubes, the joint may need to be in the horizontal position requiring a slight force to seat the sleeve on the tube.

Heating the Part

Torch Brazing: Torch brazing may be accomplished with either a single point torch, a Parker Multi-Flame Torch (see Fig. B5), or a regular welding torch that has been adjusted to give a gentle flame. A multi-point torch is strongly recommended for brazing sizes 3/4" and above because of the uniform heat produced.

Proper brazing involves heating the assembly to brazing temperature and flowing the filler metal through the joint. Heat should be applied broadly and uniformly to the tube as well as the Seal-Lok fitting. Keep in mind that thicker fitting and tubing sections take longer to heat. The entire assembly should heat to brazing temperature at about the same time. The braze alloy will always flow towards the area of higher temperature. The pre-formed braze ring has been placed inside the joint area—the last area to reach melting temperature. Therefore, when you see the braze material flow to the outside of the joint, you know the joint is complete. If the sleeve does not settle, a slight pressure will cause the sleeve to settle, completing the braze joint.

Cleaning the Brazed Joint

After stopping heat application, allow about 10 seconds for the braze alloy to solidify. Then, immerse the joint in hot water (approx. 140°F.). To make cleaning easier, add Parker Braze Cleaner to the hot water. This sudden cooling cracks the braze flux residue, making it easier to remove.

Any remaining residue can be removed by careful wire brushing, making sure not to scratch the sealing surface of the sleeve.

Braze Examination

Inspect braze for a fillet all the way around the tube at the far end (small diameter) of the sleeve.

Caution: If there are gaps in the fillet, the joint may not be sound. In this case, rebrazing is recommended. Remove the sleeve and rebraze a new one in its place.

Inspect the sealing surface. There should be no braze alloy overrun or build-up on this face.

If there is build-up, remove it with emery paper, being careful not to scratch the seal surface. If this is not possible, remove the old sleeve and rebraze a new one in its place.

Corrosion Protection After Brazing

This is an extremely important step following brazing and even more so following the use of a braze cleaner.

Braze cleaners such as Handy and Harman Post Braze Cleaner available from Parker and Bernite 45¹ which are used to facilitate the removal of residual flux after brazing, are generally corrosive. The residue left on the surface by the cleaner, especially on the I.D. of the tube, can cause rusting in carbon steel tubes rather quickly, if it is not neutralized. Therefore, it is important to neutralize the cleaner residue after cleaning with a solution such as Bernite 136² (mix 4 ounces of Bernite 136 with one gallon of water).

If the brazed parts are not to be used soon after brazing, a coating of rust inhibitors such as WD-40³ or SP-350⁴ is recommended for the braze and heat affected area.

¹ & ²) Products of Bernite Products, Inc. 84 New York, Westbury, NY 11500 (516) 338-4646.

³) A product of WD-40 Company, San Diego, CA 92220.

⁴) A product of CRC Chemicals, USA, Warminster, PA 18974 (215) 674-4300

Installation

Ensure that the correct O-ring is properly placed in the face seal O-ring groove. It is recommended that a CORG assembly tool (see Fig. B6) be used when installing the O-ring into Seal-Lok Captive O-ring Groove (CORG). Additional information on the assembly tool can be found on page N55. The steps for using the CORG assembly tool are:

1. Position the O-ring inside the CORG assembly tool against the pusher.
2. Position the tool over the Seal-Lok tube end until the end is bottomed in the tool.
3. Push the pusher of the tool until the O-ring is released into the groove.

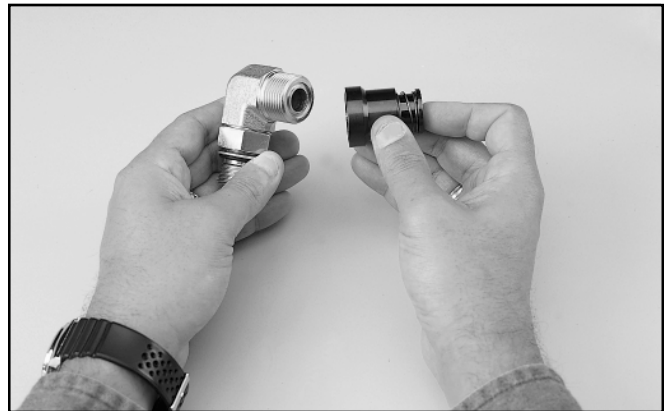


Figure B6 — O-ring Installation Using CORG Assembly Tool

After installation of the O-ring, place the tube assembly against the fitting body so that the flat face of the sleeve (or flanged tube) comes in full contact with the O-ring. Thread the nut on to the fitting body by hand and tighten it to the recommended torque from Table B5.

If torque wrenches are not available, an alternate method of assembly is the Flats From Wrench Resistance (F.F.W.R.) method. Wrench tighten the nut onto the fitting body until wrench resistance is reached. Tighten further to the appropriate F.F.W.R. value from Table B5.

Technical Data

Caution: The torque method of assembly is the preferred method of assembly. It reduces the risk of human error during assembly that is more prevalent in the Flats From Wrench Resistance (F.F.W.R.) method. To ensure the most accurate assembly of the Seal-Lok fitting it is strongly recommended that the torque method be utilized.

SAE Dash Size	Tube Side Thread Size	Tube Side Assembly Torque (+10% -0%)			Flats from Wrench Resistance (F.F.W.R.)	
		in.-lb.	ft.-lb.	N-m	Tube Nuts	Swivel & Hose Ends
-4	9/16-18	220	18	25	1/4 to 1/2	1/2 to 3/4
-6	11/16-16	360	30	40	1/4 to 1/2	1/2 to 3/4
-8	13/16-16	480	40	55	1/4 to 1/2	1/2 to 3/4
-10	1-14		60	80	1/4 to 1/2	1/2 to 3/4
-12	1 3/16-12		85	115	1/4 to 1/2	1/3 to 1/2
-14	15/16-12		95	130	1/4 to 1/2	1/3 to 1/2
-16	1 7/16-12		110	150	1/4 to 1/2	1/3 to 1/2
-20	1 11/16-12		140	190	1/4 to 1/2	1/3 to 1/2
-24	2-12		180	245	1/4 to 1/2	1/3 to 1/2
-32	2 1/2-12		360	490		

Table B5 — Seal-Lok Fitting Assembly Torque and F.F.W.R.

- 1) Fitting dash size designations are expressed in 1/16 of an inch increments. Thus -8 designates 1/2" size ($8/16 = 1/2$).
- 2) These torques and F.F.W.R.'s are for steel fittings, assembled dry, for full rated pressure applications.
- 3) For lower pressure applications, lower torques may be obtained by contacting the Tube Fittings Division
- 4) See [Table A36](#) for port assembly torques.

Tube Wall Thickness

Minimum/maximum tube wall thickness is based on the pressure holding capability of Seal-Lok fittings. Tubing outside the recommended range can be used. However, the pressure holding capability of the tube should be closely observed, so as not to exceed the rated pressure of the tube or fitting.

Size		Steel, Alloy Steel, St. Steel, Copper, Monel	
O.D. Inches	Dash Number	SAE O-ring Face Seal Seal-Lok	
1/4	-4	.020	.083
3/8	-6	.020	.109
1/2	-8	.028	.148
5/8	-10	.035	.134
3/4	-12	.035	.148
7/8	-14	.035	.156
1	-16	.035	.188
1 1/4	-20	.049	.220
1 1/2	-24	.049	.250
2	-32	.058	.250

Table B6 — Recommended "Min./Max" Tube Wall Thickness for Seal-Lok

Note: Brazing to attach sleeve can be used for all wall thicknesses. For flanging tool availability, [see page N28](#).

Trouble Shooting*

Problem/Probable Causes	Remedy	Problem/Probable Causes	Remedy
Leakage at face seal end: Misalignment or improper fit Damaged, pinched or missing O-ring Extruded O-ring Improper O-ring Pinched O-ring Improper tightening Brazing overflow on sealing surface Damaged fitting	Align the brazed tube end and the connecting fitting properly before tightening the tube nut. Hold the flat face of the mating fitting against the O-ring while threading on the nut and wrench tightening. Ensure that the tube bends are made to the appropriate angle(s). Use a new O-ring. Properly install it in the face seal groove. Make sure that the O-ring stays in the groove while tightening the fitting. Holding the flat face of the mating fitting against the O-ring while tightening the nut will prevent the O-ring from coming out of the groove and getting pinched or falling out. Replace the O-ring and check for the following: - proper alignment (see above) - pressure surges in excess of 133% of rated pressure of the fitting could cause the O-ring to extrude. Tighten the nut to the recommended torque. Make sure the new O-ring is of the proper hardness. Standard Seal-Lok O-rings are of 90 durometer hardness. An attempt to bleed off air by cracking the seal of Seal-Lok fittings can cause the O-ring to come out of its groove and get pinched. It can then extrude out under pressure. Use Parker bleed adapters for bleeding off air from the system. Check the joint for tightness. Retorque to the Parker recommended torque value. If it still leaks, it could be due to any one or combination of causes listed below. Take the joint apart and follow the recommendations listed. Remove the affected sleeve and re-braze a new one in its place. Do not try to file, sand or grind the braze overflow. Braze alloy tends to flow in the direction of higher temperature. This overflow can occur if the seal surface is at a higher temperature than the tail end of the sleeve when the braze ring starts melting. Therefore, when the ring starts melting, the heat source should be relocated to the small diameter of the sleeve to promote braze flow through the joint. Check and replace fittings. Because of elastomeric seal, Seal-Lok is tolerant of minor imperfections on its sealing surface; but it cannot tolerate gross scratches, nicks, dents, etc. Damaged	Leakage at braze joint: Improper joint clearance Mixing of sleeve & tube material Improper/inadequate cleaning Improper braze alloy Improper/inadequate flux Inadequate/improper braze temperature	threads can give a false sense of joint tightness because of their poor threading ability. Flux and reheat the joint, remove and replace with a sleeve of appropriate material and with recommended bore diameter for proper joint clearance. Repeat brazing in accordance with recommended procedures. Seal-Lok sleeves are designed for .003 to .008 diametrical joint clearance, for silver brazing, with high quality commercial hydraulic tubing. Do not mix sleeve and tube materials. Always use steel sleeves with steel tubing and stainless sleeves with stainless tubing. Mixing materials changes the joint clearance because of different thermal expansion characteristics of the two materials. First degrease the tube end and sleeve in suitable alkaline cleaner. Remove oxide build-up with aluminum free emery cloth, if needed. Use Parker (AWS A5.8 Class B GA-1), (Handy & Harman Easy Flo 45) for steel only and Parker SBR-SS (AWS A5.8 Class B Ag-24) (Handy & Harman Braze 505) for steel or stainless steel. SBR-SS contains a small amount of nickel to prevent interface corrosion in stainless steel when exposed to corrosive media. Apply flux liberally to the sleeve and tube end. Use AWS FB3A Parker White Flux (Handy & Harman's Handy Flux) for steel only and AWS FB3C Parker Black Flux (Handy & Harman's Type B-1) for steel or stainless steel. The key is to ensure that both the tube and sleeve reach braze temperature at about the same time. A dull red color of the tube and sleeve is a good indication of adequate braze temperature at which the braze ring should melt completely. Too little heat may not melt the braze ring completely, causing incomplete braze flow. Too much heat can cause braze alloy to boil resulting in pinhole type porosity in the joint. It can also burn the flux retarding the braze flow. A complete 360° fillet at the small end of the sleeve is a good indication of full braze flow.

Table B7 — Seal-Lok Fitting Problems and Solutions

*For trouble shooting the Parflange connection, see Bulletin 4390-1040A.

Features, Advantages & Benefits

1. Manufacture — Seal-Lok fittings conform to SAE J1453. This specification not only controls dimensions and tolerances of Seal-Lok fittings, but includes minimum performance requirements. (All shaped fittings are machined from forgings for additional strength.)

2. Sealing Capability — An elastomeric O-ring forms the primary sealing element. The O-ring is contained within a precision machined groove on the fitting body. It is compressed into the groove by the flat face of the tube flange or braze sleeve, thus assuring leak free sealing.

3. Pressure Rating — Seal-Lok fittings are the highest working pressure industrial fitting on the market, ranging from high vacuum to 9,000 psi, depending on size.

4. Vibration and Fatigue — Seal-Lok fittings have been extensively used in applications that experience severe vibration and shock with no field problems. See Bulletin 4350-B8 for complete test results.

5. Visible Inspection:

Flanged — The surface of the flange should be reasonably smooth with no deep scratches, gouges or indentations. Minor surface imperfections outside of the seal area are acceptable.

Brazed — Presence of braze alloy 360° around the back of the sleeve (tail) allows for a quick (non-destructive) check for proper braze joint attachment.

6. No Tube Entry — Tube does not enter into the body of the fitting, allowing for zero clearance, drop-in installation of components. This makes repair and maintenance very easy.

7. Assembly — A variety of sleeve attachment methods are now available. These include torch brazing, induction brazing and flanging. Seal-Lok fittings can also be used as hose adapters. Detailed assembly and inspection procedures can be found on [pages B6 through B11](#).

8. Make-Up — From the finger tight position, one short pull on the wrench gives the assembly a quick high rise to required torque. Seal-Lok fittings have a solid “make-up feel” and excellent over-torque resistance.

9. Tube Wall — The brazing of the sleeve to the outside of the tube allows Seal-Lok fittings to be used on thin to heavy wall tubing. Seal-Lok fittings can also be used with the widest range of tubing grades.

10. Reusability/Remakeability — Seal-Lok fittings can be disassembled and reassembled many times. Simply replace the O-ring on the tube end and tighten to recommended torque.

11. Temperature Range — Seal-Lok fittings are suitable for sub-zero through elevated temperature applications. Service temperature is limited by the material of the chosen O-ring.

12. Materials — Seal-Lok can be manufactured from a wide variety of materials. The most popular materials currently used are steel and stainless steel. Upon request, the Tube Fittings Division can machine Seal-Lok fittings from other materials.

13. Envelope Size — Redesign of hydraulic systems are normally unnecessary because Seal-Lok fittings are similar in size to the most popular fitting of all, the Triple-Lok 37° flared fittings. The additional 1 1/2 threads on the port end fit all standard SAE ports. Seal-Lok fittings are excellent hose adapters.

14. Available Configurations — Seal-Lok fittings are available as a standard in over forty different configurations (as shown in the visual index on [pages B2 through B4](#)). Some of these configurations are available in as many as twenty-seven different size combinations. Several of these fittings can actually reduce the total number of connections needed in a system. (Other configurations can be manufactured upon request.)

15. Available Sizes — Seal-Lok fittings are available as standard in sizes 1/4" (-4) through 2" (-32), the largest range of ORFS fittings in the industry. Only Seal-Lok offers sizes 7/8" (-14) and 2" (-32) in the industry.

16. Parflange Technology — Specifically designed to be used with Seal-Lok fittings, the Parflange machines utilize an orbital cold flow forming process to produce a smooth, rigidly supported 90° sealing surface on the tube end. The flanged tube ends meet SAE J1453 for Formed Tube Connections. This patented Parflange process eliminates the need for messy and time-consuming brazing.

17. Captive O-ring Groove — Seal-Lok fittings are manufactured with a captive O-ring groove (CORG) designed to prevent O-ring fall-out prior to final assembly. The CORG design conforms to SAE J1453.

B

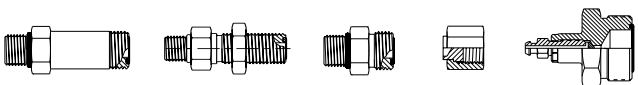

Recommended Working Pressure, PSIG

These recommended working pressures represent the capability of the subject fitting. Nevertheless, in some instances, the wall thickness or type of tubing, hose, or hose connector assembled to the fitting may dictate the maximum pressure to which the assembly should be exposed. It is strongly suggested that these fitting working pressure charts are used in conjunction with appropriate pressure charts for tubing or hose during the fitting selection process.


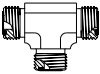


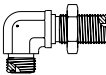
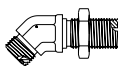
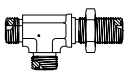
Below are the definitions of Pressure, Rated Static and Pressure, Rated Dynamic. The following values are based on a minimum design factor of 4:1 for dynamic and 3:1 for static applications.

Pressure, Rated Static – The maximum pressure that a pressure containing envelope is capable of sustaining in an application not exceeding 30,000 operating cycles in a system free of pressure surges, shocks, vibration, and temperature excursions.







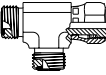
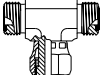
Pressure, Rated Dynamic – The maximum fluctuating pressure load that a pressure containing envelope is capable of sustaining for a minimum of one million operation cycles without failure.

				
				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	12000	15000	9200	9200
4-5	12000	15000	9200	9200
4-6	12000	15000	9200	9200
4-8	12000	15000	9200	9200
6-4	12000	15000	9200	9200
6-5	12000	15000	9200	9200
6	12000	15000	9200	9200
6-8	12000	15000	9200	9200
6-10	11000	13200	6000	6000
8-4	12000	15000	9200	9200
8-6	12000	15000	9200	9200
8	12000	15000	9200	9200
8-10	11000	13200	6000	6000
8-12	11000	13200	6000	6000
8-16	9500	11400	6000	6000
10-4	11000	13200	6000	6000
10-6	11000	13200	6000	6000
10-8	11000	13200	6000	6000
10	11000	13200	6000	6000
10-12	11000	13200	6000	6000
10-16	9500	11400	6000	6000
12-4	11000	13200	6000	6000
12-6	11000	13200	6000	6000
12-8	11000	13200	6000	6000
12-10	11000	13200	6000	6000
12	11000	13200	6000	6000
12-16	9500	11400	6000	6000
14	9500	11400	6000	6000
16-8	9500	11400	6000	6000
16-10	9500	11400	6000	6000
16-12	9500	11400	6000	6000
16	9500	11400	6000	6000
16-20	8000	9600	6000	6000
16-24	6500	7800	5000	5000
20-12	8000	9600	6000	6000
20-16	8000	9600	6000	6000
20	8000	9600	6000	6000
20-24	6500	7800	5000	5000
24-16	6500	7800	5000	5000
24-20	6500	7800	5000	5000
24	6500	7800	5000	5000
32-20	4000	4800	3000	3000
32-24	4000	4800	3000	3000
32	4000	4800	3000	3000

Recommended Working Pressure, PSIG

 ELO  JLO  KLO				
 WJLO  WELO  WNLO  WJJLO				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	12000	12000	9200	9200
6	12000	12000	9200	9200
8	12000	12000	9200	9200
10	11000	11000	6000	6000
12	11000	11000	6000	6000
14	9500	9500	6000	6000
16	9500	9500	6000	6000
20	8000	8000	5000	5000
24*	6500	6500	4000	4000
32	4000	4000	3000	3000




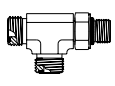
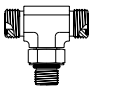

*For higher pressure applications, contact the Tube Fittings Division.




 LOHL6*  TRLON  F65OL  V6LO				
 HL6  C6LO  R6LO  S6LO				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	12000	12000	9200	9200
6	12000	12000	9200	9200
6 - 4	12000	12000	9200	9200
8	12000	12000	9200	9200
8 - 4	12000	12000	9200	9200
8 - 6	12000	12000	9200	9200
10	11000	11000	6000	6000
10 - 4	11000	11000	6000	6000
10 - 6	11000	11000	6000	6000
10 - 8	11000	11000	6000	6000
12	11000	11000	6000	6000
12 - 4	11000	11000	6000	6000
12 - 6	11000	11000	6000	6000
12 - 8	11000	11000	6000	6000
12 - 10	11000	11000	6000	6000
14	9500	9500	6000	6000
16	9500	9500	6000	6000
16 - 8	9500	9500	6000	6000
16 - 10	9500	9500	6000	6000
16 - 12	9500	9500	6000	6000
20	6500	6500	5000	5000
20 - 12	6500	6500	5000	5000
20 - 16	6500	6500	5000	5000
24	5000	5000	4000	4000
24 - 16	5000	5000	4000	4000
24 - 20	5000	5000	4000	4000
32	4000	4000	3000	3000
32 - 20	4000	4000	3000	3000
32 - 24	4000	4000	3000	3000




*For higher pressure applications, contact the Tube Fittings Division.

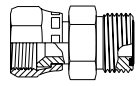
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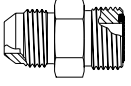
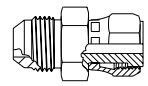
Recommended Working Pressure, PSIG

 AOEL6  C5OLO  CC5OLO  R5OLO  S5OLO  V5OLO				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	8000	8000	6000	6000
4-6	9000	9000	6000	6000
4-8	8000	8000	6000	6000
6-4	8000	8000	6000	6000
6	9000	9000	6000	6000
6-8	8000	8000	6000	6000
6-10	9000	9000	6000	6000
6-12	9000	9000	6000	6000
8-4	8000	8000	6000	6000
8-6	9000	9000	6000	6000
8	8000	8000	6000	6000
8-10	9000	9000	6000	6000
8-12	9000	9000	6000	6000
8-16	7500	7500	5500	5500
10-4	8000	8000	6000	6000
10-6	9000	9000	6000	6000
10-8	8000	8000	6000	6000
10	9000	9000	6000	6000
10-12	9000	9000	6000	6000
10-16	7500	7500	5500	5500
12-4	8000	8000	6000	6000
12-6	9000	9000	6000	6000
12-8	8000	8000	6000	6000
12-10	9000	9000	6000	6000
12	9000	9000	6000	6000
12-16	7500	7500	5500	5500
14	7500	7500	5500	5500
16-8	8000	8000	6000	6000
16-10	9000	9000	6000	6000
16-12	9000	9000	6000	6000
16	7500	7500	5500	5500
16-20	5000	5000	4000	4000
16-24	5000	5000	4000	4000
20-12	7000	7000	4000	4000
20-16	7000	7000	4000	4000
20	5000	5000	4000	4000
20-24	5000	5000	4000	4000
24-16	5500	5500	4000	4000
24-20	5000	5000	4000	4000
24	5000	5000	4000	4000
32-20	4000	4000	2500	2500
32-24	4000	4000	2500	2500
32	3500	3500	2500	2500


 LOHQ1  LOEQ1  LOVQ1				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
12	6600	6600	5000	5000
16	6600	6600	5000	5000
20	5300	5300	4000	4000
24	4500	4500	3000	3000

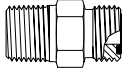
 LOHQ2  LOEQ2  LOVQ2				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
12	8000	8000	6000	6000
12-16	8000	8000	6000	6000
16	8000	8000	6000	6000
16-12	8000	8000	6000	6000
20	6600	6600	5000	5000
20-16	6600	6600	5000	5000
24	6000	6000	4500	4500

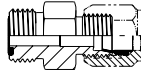
 LOHX6				
SIZE	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	7500	7500	5000	6000
6	6000	7200	4500	5400
8	5000	6000	4000	4800
10	5000	6000	4000	4800
12	4000	4800	3500	4200
16	3000	3600	2500	3000
20	3000	3600	2500	3000
24	2500	3000	2000	2400
32	2000	2400	1500	1800

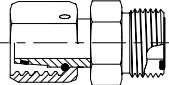
 XHLO  XHL6				
SIZE	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	10000	12000	5000	6000
6	10000	12000	5000	6000
8	8500	10200	5000	6000
10	8000	9600	5000	6000
12	7000	8400	5000	6000
16	6000	7200	4000	4800
20	5000	6000	3000	3600
24	3000	3600	2000	2400
32	2000	2400	1500	1800

Recommended Working Pressure, PSIG

 VLO CLO				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	8000	9600	6000	6000
4-4	8000	9600	6000	6000
6	10000	12000	6000	6000
6-6	10000	12000	6000	6000
6-8	10000	12000	6000	6000
8	10000	12000	6000	6000
8-8	8500	10200	6000	6000
8-12	7000	8400	4000	4000
10	8000	9600	6000	6000
10-12	7000	8400	4000	4000
12	7000	8400	4000	4000
12-8	8000	9600	6000	6000
12-16	4000	4800	3000	3000
14	4000	4800	3000	3000
16	4000	4800	3000	3000
16-12	5500	6600	4000	4000
20	3000	3600	2500	2500
24	3000	3600	2500	2500

 FLO				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
4	10000	12000	6000	6000
4-4	10000	12000	6000	6000
6	10000	12000	6000	6000
6-6	10000	12000	6000	6000
6-8	10000	12000	6000	6000
8	10000	12000	6000	6000
8-4	10000	12000	6000	6000
8-8	10000	12000	6000	6000
8-12	10000	12000	6000	6000
10	10000	12000	6000	6000
10-12	8000	9600	6000	6000
12	8000	9600	6000	6000
12-8	8000	9600	6000	6000
12-16	6000	7200	4000	4000
14	6000	7200	4000	4000
16	6000	7200	4000	4000
16-12	8000	9600	5000	5000
16-20	5000	6000	4000	4000
20	5000	6000	4000	4000
20-16	5000	6000	4000	4000
24	4000	4800	3000	3000

 BUHLO				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
6	10000	12000	6000	6000
8	8500	10200	5000	5000
10	8000	9600	5000	5000
12	7000	8400	4500	4500
16	6000	7200	4000	4000

 LOHU86				
Size	STATIC (3:1)		DYNAMIC (4:1)	
	STEEL	SS	STEEL	SS
L Series				
4 - 6L	6000		4500	
4 - 8L	6000		4500	
6 - 10L	6000		4500	
8 - 12L	6000		4500	
10 - 15L	6000		4500	
12 - 18L	6000		4500	
16 - 22L	3000		2250	
S Series				
4 - 6S	12000		9200	
4 - 8S	12000		9200	
6 - 10S	12000		9200	
8 - 12S	12000		9200	
10 - 14S	12000		9200	
10 - 16S	7700		5800	
12 - 20S	7700		5800	
16 - 25S	7700		5800	

B

How to Order**How To Order Seal-Lok Tube Fittings****Nomenclature**

Seal-Lok fitting part numbers are constructed from symbols that identify the size and style of the fitting and material used. See [pages A4 through A8](#) for complete data.

Sizes

2 through 32. (Tube sizes are determined by the number of sixteenths of an inch in the tube O.D.)

Material

Machined from steel as a standard. Seal-Lok tube fittings for special applications can be furnished in almost any material suitable for machining.

Example

Fitting needed — Seal-Lok Steel Male Connector for 1/4" O.D. Tube and 3/8" Straight Thread Port. Part number 4-6 F5OLO-S.

4-6	F*	5	O	L	O -	S
1/4" Tube O.D. (4/16") End	Male Connector	Straight Thrd Port	O-ring on Port End	Parker Seal-Lok	O-ring on Tube End	Steel
3/8" Str. Thrd Port (6/16")						

Order the same part without O-rings by eliminating the O's and simply use part number 4-6 F5L-S. Seal-Lok fittings must be ordered in its component parts. Assembled fittings are not available. To complete a flanged assembly using the above part, all of the following components are required:

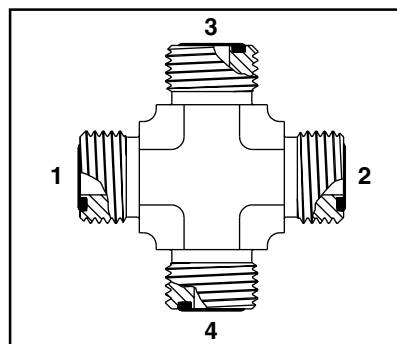
- 4 BL-S (tube nut)
- 4 TPL-S (Parflange sleeve)

To complete a brazed assembly using the part above, all of the following components are required:

- 4 BL-S (tube nut)
- 4 TL-S (braze sleeve)
- 4 SBR (silver braze ring, steel)

Crosses and Tees

For tees: First size the run (1 to 2) and then the branch (3).
For crosses: First size the run (1 to 2) and then the branch (3 to 4).

**Special Fittings**

If design or configuration is questionable, please provide a detailed sketch, drawing or sample part to the Tube Fittings Division.

Special O-rings

To order stock O-rings other than standard Buna-N (N0552), list the Parker O-ring Division compound number after the fitting material specification.

For example:

4 F5OLO-S	(N0552 O-rings supplied)
4 F5OLO-S V0894	(Fluorocarbon O-rings, e.g., Viton)
4 F5OLO-SS N0756	(Buna-N O-rings for CNG)

Straight Thread Elbow

C5OLO

ORFS Tube end / straight thread O-ring

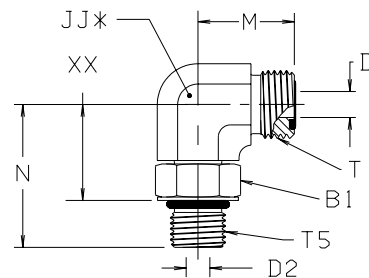
SAE 520220

Part Number Information

C5L - Body only

C5OLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

B

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN/UNF-2A	B1 HEX (inch)	D DRILL (inch)	D2 DRILL (inch)	JJ (inch)	M (inch)	N (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
											S	SS	B
4 C5OLO	1/4	9/16-18	7/16-20	5/8	0.172	0.172	9/16	0.85	1.29	0.86	•	•	
4-6 C5OLO*	1/4	9/16-18	9/16-18	3/4	0.172	0.264	9/16	0.92	1.45	0.98	•	•	
4-8 C5OLO	1/4	9/16-18	3/4-16	15/16	0.172	0.378	3/4	0.97	1.60	1.06	•	•	
6 C5OLO	3/8	11/16-16	9/16-18	3/4	0.264	0.264	3/4	0.98	1.45	0.98	•	•	
6-4 C5OLO	3/8	11/16-16	7/16-20	5/8	0.264	0.172	3/4	0.98	1.37	0.94	•	•	
6-8 C5OLO*	3/8	11/16-16	3/4-16	15/16	0.264	0.378	3/4	1.04	1.60	1.06	•	•	
6-10 C5OLO*	3/8	11/16-16	7/8-14	1 1/16	0.264	0.484	7/8	1.15	1.97	1.34	•	•	
6-12 C5OLO	3/8	11/16-16	1 1/16-12	1 3/8	0.264	0.609	1 1/16	1.28	2.17	1.44	•	•	
8 C5OLO	1/2	13/16-16	3/4-16	15/16	0.378	0.378	3/4	1.10	1.60	1.06	•	•	
8-6 C5OLO	1/2	13/16-16	9/16-18	3/4	0.378	0.264	3/4	1.10	1.44	0.97	•	•	
8-10 C5OLO*	1/2	13/16-16	7/8-14	1 1/16	0.378	0.484	7/8	1.21	1.97	1.34	•	•	
8-12 C5OLO	1/2	13/16-16	1 1/16-12	1 3/8	0.378	0.609	1 3/16	1.32	2.17	1.44	•	•	
10 C5OLO	5/8	1-14	7/8-14	1 1/16	0.484	0.484	1 1/16	1.31	1.97	1.34	•	•	
10-8 C5OLO	5/8	1-14	3/4-16	15/16	0.484	0.378	1 1/16	1.31	1.80	1.26	•	•	
10-12 C5OLO	5/8	1-14	1 1/16-12	1 3/8	0.484	0.609	1 3/16	1.41	2.17	1.44	•	•	
12 C5OLO	3/4	1 3/16-12	1 1/16-12	1 3/8	0.609	0.609	1 3/16	1.47	2.17	1.44	•	•	
12-8 C5OLO	3/4	1 3/16-12	3/4-16	15/16	0.609	0.378	1 3/16	1.47	1.84	1.30	•	•	
12-10 C5OLO	3/4	1 3/16-12	7/8-14	1 1/16	0.609	0.484	1 3/16	1.47	2.01	1.38	•	•	
12-16 C5OLO	3/4	1 3/16-12	1 5/16-12	1 5/8	0.609	0.811	1 7/16	1.62	2.35	1.62	•	•	
14 C5OLO**	7/8	1 5/16-12	1 3/16-12	1 1/2	0.709	0.689	1 5/16	1.63	2.30	1.57	•	•	
16 C5OLO	1	1 7/16-12	1 5/16-12	1 5/8	0.811	0.811	1 7/16	1.64	2.35	1.62	•	•	
16-12 C5OLO	1	1 7/16-12	1 1/16-12	1 3/8	0.811	0.609	1 7/16	1.64	2.32	1.59	•	•	
16-20 C5OLO	1	1 7/16-12	1 5/8-12	1 7/8	0.811	1.024	1 5/8	1.76	2.45	1.72	•	•	
20 C5OLO	1 1/4	1 11/16-12	1 5/8-12	1 7/8	1.024	1.024	1 5/8	1.76	2.45	1.72	•	•	
20-16 C5OLO	1 1/4	1 11/16-12	1 5/16-12	1 5/8	1.024	0.811	1 5/8	1.76	2.42	1.69	•	•	
20-24 C5OLO	1 1/4	1 11/16-12	1 7/8-12	2 1/8	1.024	1.260	1 7/8	1.92	2.59	1.86	•	•	
24 C5OLO	1 1/2	2-12	1 7/8-12	2 1/8	1.260	1.260	1 7/8	1.92	2.59	1.86	•	•	
24-20 C5OLO	1 1/2	2-12	1 5/8-12	1 7/8	1.260	1.024	1 7/8	1.92	2.59	1.86	•	•	
32 C5OLO**	2	2 1/2-12	2 1/2-12	2 3/4	1.772	1.575	2 1/2	2.76	3.07	2.34	•	•	

See page B45 for information on replacement face seal and SAE O-rings.

*JJ for these parts does not conform to SAE.

**Sizes 14 and 32 are not included in SAE J1453.

Part Data

Long Straight Thread Elbow

CC5OLO

ORFS Tube end / straight thread O-ring

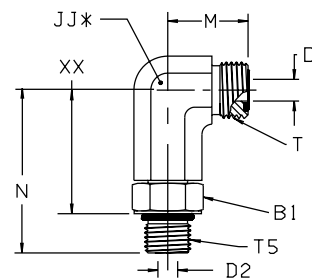
SAE 521520

Part Number Information

CC5L - Body only

CC5OLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN-UNF-2A	B1 HEX (inch)	D DRILL (inch)	D2 DRILL (inch)	JJ (inch)	M (inch)	N (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
											S	SS	B
4 CC5OLO	1/4	9/16-18	7/16-20	5/8	0.172	0.172	9/16	0.85	2.23	1.80	•		
6 CC5OLO	3/8	11/16-16	9/16-18	3/4	0.264	0.264	3/4	0.98	2.61	2.14	•		
8 CC5OLO	1/2	13/16-16	3/4-16	15/16	0.378	0.378	3/4	1.10	2.95	2.41	•		
10 CC5OLO	5/8	1-14	7/8-14	1 1/16	0.484	0.484	1 1/16	1.31	3.51	2.88	•		
12 CC5OLO	3/4	1 3/16-12	1 1/16-12	1 3/8	0.609	0.609	1 3/16	1.47	3.97	3.24	•		
16 CC5OLO	1	1 7/16-12	1 5/16-12	1 5/8	0.811	0.811	1 7/16	1.64	4.51	3.78	•		

See page B45 for information on replacement face seal and SAE O-rings.

Part Data

Straight Thread Connector

F5OLO

ORFS tube end / straight thread O-ring

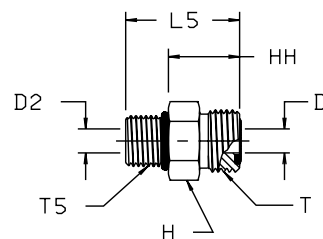
SAE 520120

Part Number Information

F5L - Body only

F5OLO - Assembled with O-rings

All dimensions are in inches

**B**

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN/UNF-2A	D** DRILL (inch)	D2** DRILL (inch)	H HEX (inch)	HH AFTER ASSY (inch)	L5 (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
4 F5OLO	1/4	9/16-18	7/16-20	0.172	0.172	5/8	0.70	1.13	•	•	
4-5 F5OLO	1/4	9/16-18	1/2-20	0.172	0.236	3/8	0.75	1.13	•		
4-6 F5OLO	1/4	9/16-18	9/16-18	0.172	0.264	3/4	0.73	1.20	•	•	
4-8 F5OLO	1/4	9/16-18	3/4-16	0.172	0.378	7/8	0.77	1.32	•		
6 F5OLO	3/8	11/16-16	9/16-18	0.264	0.264	3/4	0.78	1.25	•	•	
6-4 F5OLO	3/8	11/16-16	7/16-20	0.264	0.172	3/4	0.91	1.34	•	•	
6-5 F5OLO	3/8	11/16-16	1/2-20	0.264	0.234	3/4	0.84	1.22	•		
6-8 F5OLO	3/8	11/16-16	3/4-16	0.264	0.378	7/8	0.83	1.38	•	•	
6-10 F5OLO	3/8	11/16-16	7/8-14	0.264	0.484	1	0.90	1.53	•		
8 F5OLO	1/2	13/16-16	3/4-16	0.378	0.378	7/8	0.89	1.44	•	•	
8-6 F5OLO	1/2	13/16-16	9/16-18	0.378	0.264	7/8	1.00	1.47	•	•	
8-10 F5OLO	1/2	13/16-16	7/8-14	0.378	0.484	1	0.96	1.59	•		
8-12 F5OLO	1/2	13/16-16	1 1/16-12	0.378	0.609	1 1/4	1.02	1.75	•		
8-16 F5OLO	1/2	13/16-16	1 5/16-12	0.378	0.811	1 1/2	1.06	1.79	•		
10 F5OLO	5/8	1-14	7/8-14	0.484	0.484	1 1/16	1.07	1.70	•	•	
10-8 F5OLO	5/8	1-14	3/4-16	0.484	0.378	1 1/16	1.23	1.78	•		
10-12 F5OLO	5/8	1-14	1 1/16-12	0.484	0.609	1 1/4	1.13	1.86	•		
12 F5OLO	3/4	1 3/16-12	1 1/16-12	0.609	0.609	1 1/4	1.19	1.92	•	•	
12-8 F5OLO	3/4	1 3/16-12	3/4-16	0.609	0.378	1 1/4	1.36	1.91	•		
12-10 F5OLO	3/4	1 3/16-12	7/8-14	0.609	0.484	1 1/4	1.36	1.99	•		
12-16 F5OLO	3/4	1 3/16-12	1 5/16-12	0.609	0.811	1 1/2	1.23	1.96	•		
14 F5OLO*	7/8	1 5/16-12	1 3/16-12	0.709	0.709	1 3/8	1.18	1.91			
16 F5OLO	1	1 7/16-12	1 5/16-12	0.811	0.811	1 1/2	1.25	1.98	•	•	
16-12 F5OLO	1	1 7/16-12	1 1/16-12	0.811	0.609	1 1/2	1.41	2.14	•		
16-20 F5OLO	1	1 7/16-12	1 5/8-12	0.811	1.024	1 7/8	1.33	2.06	•		
20 F5OLO	1 1/4	1 11/16-12	1 5/8-12	1.024	1.024	1 7/8	1.33	2.06	•	•	
20-16 F5OLO	1 1/4	1 11/16-12	1 5/16-12	1.024	0.811	1 7/8	1.55	2.28	•		
20-24 F5OLO	1 1/4	1 11/16-12	1 7/8-12	1.024	1.260	2 1/8	1.40	2.13	•		
24 F5OLO	1 1/2	2-12	1 7/8-12	1.260	1.260	2 1/8	1.40	2.13	•	•	
24-20 F5OLO	1 1/2	2-12	1 5/8-12	1.260	1.024	2 1/8	1.62	2.35	•		
32 F5OLO*	2	2 1/2-12	2 1/2-12	1.772	1.575	2 3/4	1.59	2.32	•		

See page B45 for information on replacement face seal and SAE O-rings.

*Sizes 14 and 32 are not included in SAE J1453.

**SAE standard permits a manufacturer's option of a single drill through equal to the smaller of D and D2 for up to two jump sizes.

Long Straight Thread Connector FF5OLO

ORFS tube end / straight thread O-ring

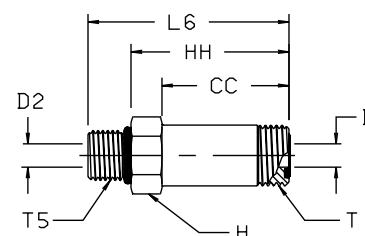
SAE 521720 (Previously 520122)

Part Number Information

FF5L - Body only

FF5OLO - Assembled with O-rings

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN/UNF-2A	CC (inch)	D DRILL (inch)	D2 DRILL (inch)	H HEX (inch)	HH AFTER ASSY (inch)	L6 (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 FF5OLO	1/4	9/16-18	7/16-20	1.33	0.172	0.172	5/8	1.64	2.07	•		
6 FF5OLO	3/8	11/16-16	9/16-18	1.45	0.264	0.264	3/4	1.80	2.27	•		
8 FF5OLO	1/2	13/16-16	3/4-16	1.74	0.378	0.378	7/8	2.13	2.68	•		
10 FF5OLO	5/8	1-14	7/8-14	2.04	0.484	0.484	1 1/16	2.50	3.13	•		
12 FF5OLO	3/4	1 3/16-12	1 1/16-12	2.05	0.609	0.609	1 5/16	3.03	3.76	•		
16 FF5OLO	1	1 7/16-12	1 5/16-12	2.85	0.811	0.811	1 5/8	3.41	4.14	•		
20 FF5OLO	1 1/4	1 11/16-12	1 5/8-12	3.39	1.024	1.024	1 7/8	4.03	4.76	•		
24 FF5OLO	1 1/2	2-12	1 7/8-12	3.82	1.26	1.260	2 1/8	4.53	5.26	•		

See page B45 for information on replacement face seal and SAE O-rings.

Straight Thread Run Tee R5OLO

ORFS tube ends / straight thread O-ring

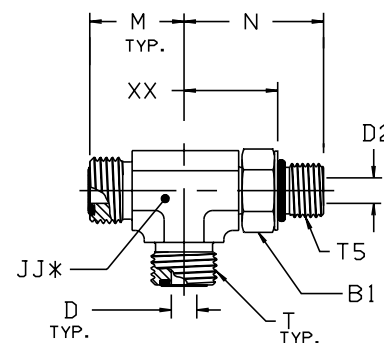
SAE 520428

Part Number Information

R5L - Body only

R5OLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN/UNF-2A	B1 HEX (inch)	D DRILL (inch)	D2 DRILL (inch)	JJ (inch)	M (inch)	N (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
											S	SS	B
4 R5OLO	1/4	9/16-18	7/16-20	5/8	0.172	0.172	9/16	0.85	1.29	0.86	•	•	
6 R5OLO	3/8	11/16-16	9/16-18	3/4	0.264	0.264	3/4	0.98	1.45	0.98	•	•	
8 R5OLO	1/2	13/16-16	3/4-16	15/16	0.378	0.378	3/4	1.10	1.60	1.06	•	•	
10 R5OLO	5/8	1-14	7/8-14	1 1/16	0.484	0.484	1 1/16	1.31	1.97	1.34	•	•	
12 R5OLO	3/4	1 3/16-12	1 1/16-12	1 3/8	0.609	0.609	1 3/16	1.47	2.17	1.44	•	•	
12-16-12 R5OLO	3/4	1 3/16-12	1 5/16-12	1 5/8	0.609	0.811	1 7/16	1.62	2.35	1.62	•		
16 R5OLO	1	1 7/16-12	1 5/16-12	1 5/8	0.811	0.811	1 7/16	1.64	2.35	1.62	•	•	
20 R5OLO	1 1/4	1 11/16-12	1 5/8-12	1 7/8	1.024	1.024	1 5/8	1.76	2.45	1.72	•		
24 R5OLO	1 1/2	2-12	1 7/8-12	2 1/8	1.260	1.260	1 7/8	1.92	2.59	1.86	•		

See page B45 for information on replacement face seal and SAE O-rings.

Part Data

Straight Thread Branch Tee

S5OLO

ORFS tube ends / straight thread O-ring

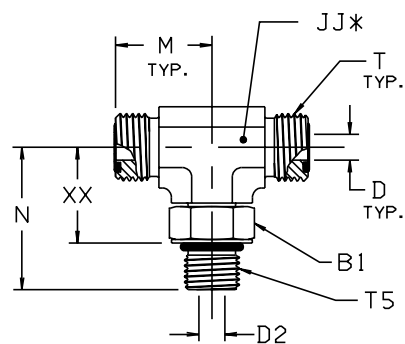
SAE 520429

Part Number Information

S5L - Body only

S5OLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN/UNF-2A	B1 HEX (inch)	D DRILL (inch)	D2 DRILL (inch)	JJ (inch)	M (inch)	N (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
											S	SS	B
4 S5OLO	1/4	9/16-18	7/16-20	5/8	0.172	0.172	9/16	0.85	1.29	0.86	•	•	
6 S5OLO	3/8	11/16-16	9/16-18	3/4	0.264	0.264	3/4	0.98	1.45	0.98	•	•	
6-6-8 S5OLO	3/8	11/16-16	3/4-16	15/16	0.264	0.378	3/4	1.04	1.60	1.06	•		
8 S5OLO	1/2	13/16-16	3/4-16	15/16	0.378	0.378	3/4	1.10	1.60	1.06	•	•	
10 S5OLO	5/8	1-14	7/8-14	1 1/16	0.484	0.484	1 1/16	1.31	1.97	1.34	•		
12 S5OLO	3/4	1 3/16-12	1 1/16-12	1 3/8	0.609	0.609	1 3/16	1.47	2.17	1.44	•	•	
12-12-16 S5OLO	3/4	1 3/16-12	1 5/16-12	1 5/8	0.709	0.811	1 7/16	1.62	2.35	1.62	•		
16 S5OLO	1	1 7/16-12	1 5/16-12	1 5/8	0.811	0.811	1 7/16	1.64	2.35	1.62	•	•	
20 S5OLO	1 1/4	1 11/16-12	1 5/8-12	1 7/8	1.024	1.024	1 5/8	1.76	2.45	1.72	•		
24 S5OLO	1 1/2	2-12	1 7/8-12	2 1/8	1.260	1.260	1 7/8	1.92	2.59	1.86	•		

See page B45 for information on replacement face seal and SAE O-rings.

Part Data

45° Straight Thread Elbow

V5OLO

ORFS tube end / straight thread O-ring

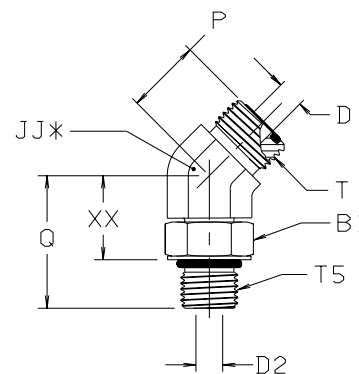
SAE 520320

Part Number Information

V5L - Body only

V5OLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS HEX FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T5 PORT THD UN/UNF-2A	B1 HEX (inch)	D DRILL (inch)	D2 DRILL (inch)	JJ (inch)	P (inch)	Q (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
											S	SS	B
4 V5OLO	1/4	9/16-18	7/16-20	5/8	0.172	0.172	9/16	0.63	1.18	0.75	•	•	
4-6 V5OLO	1/4	9/16-18	9/16-18	3/4	0.172	0.264	3/4	0.68	1.30	0.83	•		
6 V5OLO	3/8	11/16-16	9/16-18	3/4	0.264	0.264	3/4	0.74	1.30	0.83	•	•	
6-4 V5OLO	3/8	11/16-16	7/16-20	5/8	0.264	0.172	3/4	0.74	1.22	0.79	•		
6-8 V5OLO	3/8	11/16-16	3/4-16	15/16	0.264	0.378	3/4	0.74	1.43	0.89	•		
8 V5OLO	1/2	13/16-16	3/4-16	15/16	0.378	0.378	3/4	0.80	1.43	0.89	•	•	
8-6 V5OLO	1/2	13/16-16	9/16-18	3/4	0.378	0.264	3/4	0.80	1.27	0.80	•		
8-10 V5OLO	1/2	13/16-16	7/8-14	1 1/16	0.378	0.484	3/4	0.82	1.76	1.13	•		
10 V5OLO	5/8	1-14	7/8-14	1 1/16	0.484	0.484	1 1/16	0.92	1.76	1.13	•	•	
10-8 V5OLO	5/8	1-14	3/4-16	15/16	0.484	0.378	1 1/16	0.92	1.59	1.05	•		
10-12 V5OLO	5/8	1-14	1 1/16-12	1 3/8	0.484	0.609	1 3/16	0.96	1.97	1.24	•		
12 V5OLO	3/4	1 3/16-12	1 1/16-12	1 3/8	0.609	0.609	1 3/16	1.02	1.97	1.24	•	•	
12-10 V5OLO	3/4	1 3/16-12	7/8-14	1 1/16	0.609	0.484	1 3/16	1.02	1.81	1.18	•		
12-16 V5OLO	3/4	1 3/16-12	1 5/16-12	1 5/8	0.609	0.811	1 7/16	1.16	2.06	1.33	•		
14 V5OLO**	7/8	1 5/16-12	1 3/16-12	1 1/2	0.709	0.689	1 5/16	1.18	2.03	1.30			
16 V5OLO	1	1 7/16-12	1 5/16-12	1 5/8	0.811	0.811	1 7/16	1.18	2.06	1.33	•		
16-12 V5OLO	1	1 7/16-12	1 1/16-12	1 3/8	0.811	0.609	1 7/16	1.18	2.03	1.30	•		
16-20 V5OLO	1	1 7/16-12	1 5/8-12	1 7/8	0.811	1.024	1 5/8	1.26	2.11	1.38	•		
20 V5OLO	1 1/4	1 11/16-12	1 5/8-12	1 7/8	1.024	1.024	1 5/8	1.26	2.11	1.38	•		
24 V5OLO	1 1/2	2-12	1 7/8-12	2 1/8	1.260	1.260	1 7/8	1.45	2.11	1.38	•		

See page B45 for information on for replacement face seal and SAE O-rings.

** Size 14 is not included in SAE J1453.

Part Data

Male Pipe Elbow

CLO

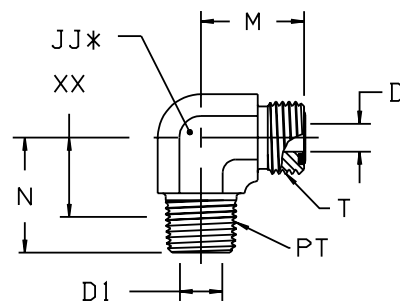
ORFS tube end / male pipe end

Part Number Information

CL - Body only

CLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	PT PORT THD NPTF	D DRILL (inch)	D1 DRILL (inch)	JJ (inch)	M (inch)	N (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 CLO	1/4	9/16-18	1/8-27	0.172	0.188	9/16	0.85	0.80	0.57	•	•	
4-4 CLO	1/4	9/16-18	1/4-18	0.172	0.281	9/16	0.85	1.12	0.78	•	•	
4-6 CLO	1/4	9/16-18	3/8-18	0.172	0.406	3/4	0.97	1.22	0.87	•	•	
6 CLO	3/8	11/16-16	1/4-18	0.264	0.281	3/4	0.98	1.09	0.75	•	•	
6-6 CLO	3/8	11/16-16	3/8-18	0.264	0.406	3/4	0.98	1.22	0.87	•	•	
6-8 CLO	3/8	11/16-16	1/2-14	0.264	0.531	7/8	1.15	1.47	1.01	•	•	
8 CLO	1/2	13/16-16	3/8-18	0.378	0.406	3/4	1.10	1.22	0.87	•	•	
8-4 CLO	1/2	13/16-16	1/4-18	0.378	0.281	3/4	1.10	1.22	0.87	•	•	
8-8 CLO	1/2	13/16-16	1/2-14	0.378	0.531	7/8	1.10	1.47	1.01	•	•	
8-12 CLO	1/2	13/16-16	3/4-14	0.378	0.719	1 1/16	1.32	1.59	1.11	•	•	
10 CLO	5/8	1-14	1/2-14	0.484	0.531	1 1/16	1.31	1.47	1.01	•	•	
10-12 CLO	5/8	1-14	3/4-14	0.484	0.719	1 3/16	1.41	1.59	1.11	•	•	
12 CLO	3/4	1 3/16-12	3/4-14	0.609	0.719	1 3/16	1.47	1.59	1.11	•	•	
12-8 CLO	3/4	1 3/16-12	1/2-14	0.609	0.531	1 3/16	1.47	1.59	1.13	•	•	
12-16 CLO	3/4	1 3/16-12	1-11 1/2	0.609	0.938	1 5/16	1.62	1.97	1.40	•	•	
14 CLO*	7/8	1 5/16-12	3/4-14	0.709	0.709	1 5/16	1.63	1.69	1.21	•	•	
16 CLO	1	1 7/16-12	1-11 1/2	0.811	0.938	1 7/16	1.64	1.97	1.40	•	•	
16-12 CLO	1	1 7/16-12	3/4-14	0.811	0.719	1 7/16	1.64	1.78	1.30	•	•	
20 CLO	1 1/4	1 11/16-12	1 1/4-11 1/2	1.024	1.250	1 5/8	1.76	2.38	1.79	•	•	
24 CLO	1 1/2	2-12	1 1/2-11 1/2	1.260	1.500	1 7/8	1.92	2.64	2.05	•	•	
24-20 CLO	1 1/2	2-12	1 1/4-11 1/2	1.260	1.250	1 7/8	1.92	2.61	2.02	•	•	

See page B45 for information on replacement face seal O-rings.

*Size 14 is not included in SAE J1453.

Part Data

Male Pipe Connector

FLO

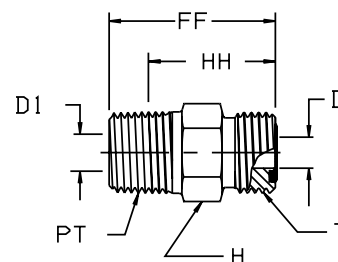
ORFS tube end / male pipe end

Part Number Information

FL - Body only

FLO - Assembled with O-rings

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	PT PORT THD NPTF	D DRILL (inch)	D1 DRILL (inch)	FF (inch)	H HEX (inch)	HH AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
4 FLO	1/4	9/16-18	1/8-27	0.172	0.188	1.07	5/8	0.83	•	•	
4-4 FLO	1/4	9/16-18	1/4-18	0.172	0.281	1.26	5/8	0.92	•	•	
4-6 FLO	1/4	9/16-18	3/8-18	0.172	0.172	1.32	3/4	0.98	•	•	
6 FLO	3/8	11/16-16	1/4-18	0.264	0.281	1.25	3/4	0.91	•	•	
6-6 FLO	3/8	11/16-16	3/8-18	0.264	0.406	1.34	3/4	0.99	•	•	
6-8 FLO	3/8	11/16-16	1/2-14	0.264	0.531	1.55	7/8	1.09	•	•	
8 FLO	1/2	13/16-16	3/8-18	0.378	0.406	1.48	7/8	1.13	•	•	
8-4 FLO	1/2	13/16-16	1/4-18	0.378	0.281	1.48	7/8	1.13	•	•	
8-8 FLO	1/2	13/16-16	1/2-14	0.378	0.531	1.64	7/8	1.18	•	•	
8-12 FLO	1/2	13/16-16	3/4-14	0.378	0.719	1.69	1 1/8	1.21	•	•	
10 FLO	5/8	1-14	1/2-14	0.484	0.531	1.82	1 1/16	1.36	•	•	
10-12 FLO	5/8	1-14	3/4-14	0.484	0.719	1.82	1 1/8	1.34	•	•	
12 FLO	3/4	1 3/16-12	3/4-14	0.609	0.719	1.93	1 1/4	1.45	•	•	
12-8 FLO	3/4	1 3/16-12	1/2-14	0.609	0.531	1.93	1 1/4	1.47	•	•	
12-16 FLO	3/4	1 3/16-12	1-11 1/2	0.609	0.938	2.13	1 3/8	1.56	•	•	
14 FLO	7/8	1 5/16-12	3/4-14	0.709	0.709	2.00	1 3/8	1.52	•	•	
16 FLO	1	1 7/16-12	1-11 1/2	0.811	0.938	2.19	1 1/2	1.62	•	•	
16-12 FLO	1	1 7/16-12	3/4-14	0.811	0.719	2.00	1 1/2	1.52	•	•	
16-20 FLO	1	1 7/16-12	1 1/16-11 1/4	0.811	1.250	2.30	1 3/4	1.71	•	•	
20 FLO	1 1/4	1 11/16-12	1 1/4-11 1/2	1.024	1.250	2.30	1 7/8	1.71	•	•	
20-16 FLO	1 1/4	1 11/16-12	1-11 1/2	0.937	0.938	2.27	1 7/8	1.70	•	•	
24 FLO	1 1/2	2-12	1 1/2-11 1/2	1.260	1.500	2.40	2 1/8	1.81	•	•	

See page B45 for information on replacement face seal O-rings.

* Manufacturing option permits a single drill through equal to the smaller of D and D1.

** Size 14 is not included in SAE J1453.

Part Data

45 ° Male Elbow

VLO

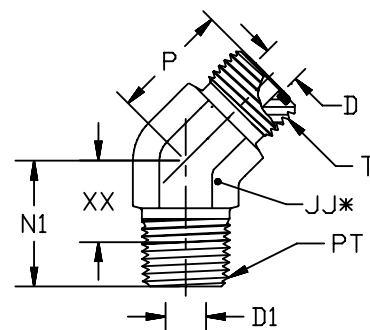
ORFS tube end / male pipe end

Part Number Information

VL – Body only

VLO – Assembled with O-rings

All dimensions are in inches



*JJ-ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	PT PORT THD NPTF	D DRILL (inch)	D1 DRILL (inch)	JJ (inch)	N1 (inch)	P (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 VLO	1/4	9/16-18	1/8-27	0.172	0.188	9/16	0.64	0.63	0.41	•		
4-4 VLO	1/4	9/16-18	1/4-18	0.172	0.281	9/16	0.86	0.68	0.52	•		
6 VLO	3/8	11/16-16	1/4-18	0.264	0.281	3/4	0.87	0.74	0.53	•		
6-6 VLO	3/8	11/16-16	3/8-18	0.264	0.406	3/4	0.87	0.74	0.52	•		
8 VLO	1/2	13/16-16	3/8-18	0.378	0.406	3/4	0.95	0.80	0.60	•		
8-8 VLO	1/2	13/16-16	1/2-14	0.378	0.531	7/8	1.17	0.86	0.71	•		
10 VLO	5/8	1-14	1/2-14	0.484	0.531	1 1/16	1.17	0.92	0.71	•		
12 VLO	3/4	1 3/16-12	3/4-14	0.609	0.719	1 5/16	1.30	1.02	0.82	•		
16 VLO	1	1 7/16-12	1-11 1/2	0.811	0.937	1 7/16	1.48	1.18	0.91	•		

See page B45 for information on replacement face seal O-rings.

Straight Thread Swivel Elbow

AOEL6

ORFS swivel / straight thread O-ring

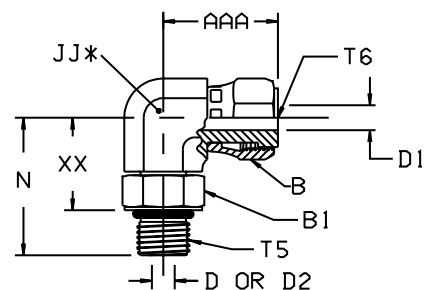
SAE 520281

Part Number Information

AEL6 - Body only

AOEL6 - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T5 PORT THD UN/UNF-2A	T6 SWIVEL UN/UNF-2B	AAA (inch)	B HEX (inch)	B1 HEX (inch)	D1 DRILL (inch)	D2 DRILL (inch)	JJ (inch)	N (inch)	XX AFTER ASSY (inch)	STANDARD MATERIAL FROM STOCK		
												S	SS	B
4 AOEL6	1/4	7/16-20	9/16-18	1.07	11/16	5/8	0.165	0.172	9/16	1.29	0.86	•		
6 AOEL6	3/8	9/16-18	11/16-16	1.17	13/16	3/4	0.264	0.264	3/4	1.45	0.98	•		
8 AOEL6	1/2	3/4-16	13/16-16	1.49	15/16	15/16	0.358	0.378	3/4	1.60	1.06	•		
10 AOEL6	5/8	7/8-14	1-14	1.65	1 1/8	1 1/16	0.453	0.484	1 1/16	1.97	1.34	•		
12 AOEL6	3/4	1 1/16-12	1 3/16-12	1.82	1 3/8	1 3/8	0.547	0.609	1 1/16	2.17	1.44	•		
16 AOEL6	1	1 5/16-12	1 7/16-12	2.10	1 5/8	1 5/8	0.783	0.811	1 5/16	2.35	1.67	•		
20 AOEL6	1 1/4	1 5/8-12	1 11/16-12	2.29	1 7/8	1 7/8	1.024	1.024	1 5/8	2.45	1.72	•		
24 AOEL6	1 1/2	1 7/8-12	2-12	2.41	2 1/4	2 1/8	1.260	1.260	1 7/8	2.59	1.86	•		

See page B45 for information on replacement SAE O-rings.

Straight Thread Swivel Connector

F65OL

ORFS swivel / Straight thread O-ring

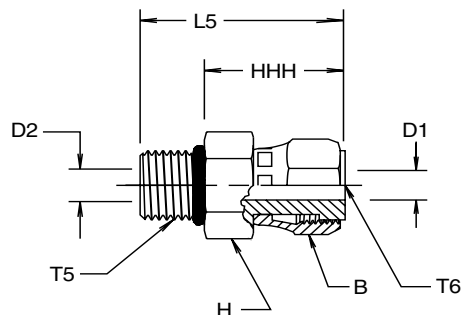
SAE 520181

Part Number Information

F65L - Body only

F65OL - Assembled with O-rings

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T5 PORT END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	B HEX (inch)	D1 DRILL (inch)	D2 DRILL (inch)	H HEX (inch)	HHH AFTER ASSY (inch)	L5 (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 F65OL	1/4	7/16-20	9/16-18	11/16	0.165	0.172	5/8	1.03	1.46	•		
6 F65OL	3/8	9/16-18	11/16-16	13/16	0.264	0.264	3/4	1.11	1.58	•		
8 F65OL	1/2	3/4-16	13/16-16	15/16	0.358	0.378	7/8	1.39	1.95	•		
10 F65OL	5/8	7/8-14	1-14	1 1/8	0.453	0.484	1 1/16	1.49	2.13	•		
12 F65OL	3/4	1 1/16-12	1 3/16-12	1 3/8	0.547	0.609	1 1/4	1.62	2.34	•		
16 F65OL	1	1 5/16-12	1 7/16-12	1 5/8	0.783	0.811	1 1/2	1.93	2.66	•		
20 F65OL	1 9/16	1 5/8-12	1 11/16-12	1 7/8	1.024	1.024	1 3/4	1.98	2.66	•		

See page B45 for information on replacement SAE O-rings.

Swivel Nut Union

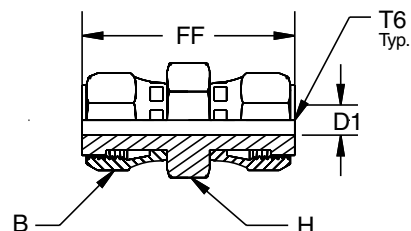
HL6

ORFS swivel / ORFS swivel

Part Number Information

HL6 – Body only

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T6 SWIVEL UN/UNF-2B	B HEX (inch)	D1 DRILL (inch)	FF (inch)	H HEX (inch)	STANDARD MATERIAL FROM STOCK		
							S	SS	B
4 HL6	1/4	9/16-18	11/16	0.165	1.59	5/8	•		
6 HL6	3/8	11/16-16	13/16	0.264	1.77	3/4	•		
8 HL6	1/2	13/16-16	15/16	0.358	2.12	7/8	•		
10 HL6	5/8	1-14	1 1/8	0.453	2.42	1 1/16	•		
12 HL6	3/4	1 3/16-12	1 3/8	0.547	2.74	1 1/4	•		

Part Data

Swivel Nut Elbow

C6LO

ORFS swivel / ORFS tube end

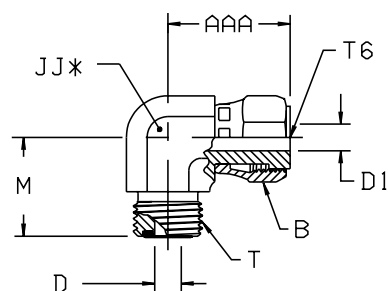
SAE 520221

Part Number Information

C6L - Body only

C6LO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

B

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	AAA (inch)	B HEX (inch)	D DRILL (inch)	D1 DRILL (inch)	JJ (inch)	M (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 C6LO	1/4	9/16-18	9/16-18	1.07	11/16	0.172	0.165	9/16	0.85	•	•	
6 C6LO	3/8	11/16-16	11/16-16	1.17	13/16	0.264	0.264	3/4	0.98	•	•	
8 C6LO	1/2	13/16-16	13/16-16	1.49	15/16	0.378	0.358	3/4	1.10	•	•	
10 C6LO	5/8	1-14	1-14	1.65	1 1/8	0.484	0.453	1 1/16	1.31	•	•	
12 C6LO	3/4	1 3/16-12	1 3/16-12	1.82	1 3/8	0.609	0.547	1 3/16	1.47	•	•	
14 C6LO*	7/8	1 5/16-12	1 5/16-12	2.07	1 1/2	0.709	0.709	1 5/16	1.63	•	•	
16 C6LO	1	1 7/16-12	1 7/16-12	2.10	1 5/8	0.811	0.783	1 7/16	1.64	•	•	
20 C6LO	1 1/4	1 11/16-12	1 11/16-12	2.29	1 7/8	1.024	1.024	1 5/8	1.76	•	•	
24 C6LO	1 1/2	2-12	2-12	2.41	2 1/4	1.260	1.260	1 7/8	1.92	•	•	

See page B45 for information on replacement face seal O-rings.

*Size 14 is not included in SAE J1453.

45° Swivel Nut Elbow

V6LO

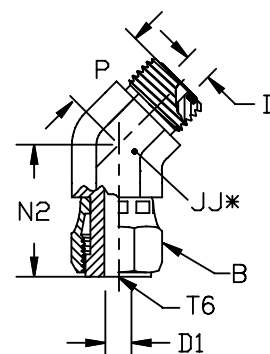
ORFS tube end (all three ends)

Part Number Information

V6L – Body only

V6LO – Assembled with O-rings

All dimensions are in inches



* JJ—ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	B HEX (inch)	D DRILL (inch)	D1 DRILL (inch)	JJ (inch)	N2 (inch)	P (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 V6LO	1/4	9/16-18	9/16-18	11/16	0.172	0.165	9/16	0.99	0.63	•	•	
6 V6LO	3/8	11/16-16	11/16-16	13/16	0.264	0.264	3/4	1.12	0.74	•	•	
8 V6LO	1/2	13/16-16	13/16-16	15/16	0.378	0.358	3/4	1.49	0.80	•	•	
10 V6LO	5/8	1-14	1-14	1 1/8	0.484	0.453	1 1/16	1.53	0.92	•	•	
12 V6LO	3/4	1 3/16-12	1 3/16-12	1 3/8	0.609	0.547	1 3/16	1.73	1.02	•	•	
16 V6LO	1	1 7/16-12	1 7/16-12	1 5/8	0.811	0.783	1 7/16	1.87	1.18	•	•	
20 V6LO	1 1/4	1 11/16-12	1 11/16-12	1 7/8	1.024	1.024	1 5/8	1.98	1.26	•	•	
24 V6LO	1 1/2	2-12	2-12	2 1/4	1.260	1.260	1 7/8	2.06	1.45	•	•	

See page B45 for information on replacement face seal O-rings.

Part Data

Swivel Nut Run Tee

R6LO

ORFS swivel / ORFS tube ends

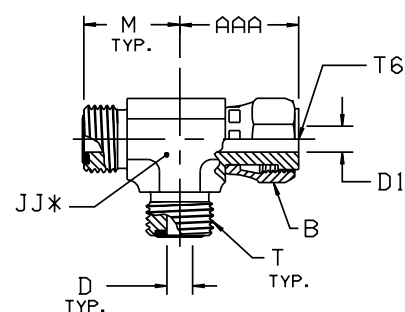
SAE 520432

Part Number Information

R6L - Body only

R6LO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	AAA (inch)	B HEX (inch)	D DRILL (inch)	D1 DRILL (inch)	JJ (inch)	M (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 R6LO	1/4	9/16-18	9/16-18	1.07	11/16	0.172	0.165	9/16	0.85	•		
6 R6LO	3/8	11/16-16	11/16-16	1.17	13/16	0.264	0.264	3/4	0.98	•		
8 R6LO	1/2	13/16-16	13/16-16	1.49	15/16	0.378	0.358	3/4	1.10	•		
10 R6LO	5/8	1-14	1-14	1.65	1 1/8	0.484	0.453	1 1/16	1.31	•		
12 R6LO	3/4	1 3/16-12	1 3/16-12	1.82	1 3/8	0.609	0.547	1 3/16	1.47	•		
14 R6LO*	7/8	1 5/16-12	1 5/16-12	2.07	1 1/2	0.709	0.709	1 5/16	1.63	•		
16 R6LO	1	1 7/16-12	1 7/16-12	2.10	1 5/8	0.811	0.783	1 7/16	1.64	•		
20 R6LO	1 1/4	1 11/16-12	1 11/16-12	2.29	1 7/8	1.024	1.024	1 5/8	1.76	•		
24 R6LO	1 1/2	2-12	2-12	2.41	2 1/4	1.260	1.260	1 7/8	1.92	•		

See page B45 for information on replacement face seal O-rings.

*Size 14 is not included in SAE J1453.

Swivel Nut Branch Tee

S6LO

ORFS swivel / ORFS tube ends

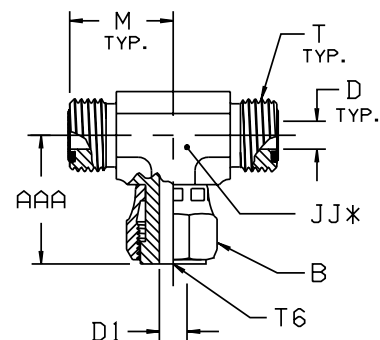
SAE 520433

Part Number Information

S6L - Body only

S6LO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	AAA (inch)	B HEX (inch)	D DRILL (inch)	D1 DRILL (inch)	JJ (inch)	M (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 S6LO	1/4	9/16-18	9/16-18	1.07	11/16	0.172	0.165	9/16	0.85	•	•	
6 S6LO	3/8	11/16-16	11/16-16	1.17	13/16	0.264	0.264	3/4	0.98	•	•	
8 S6LO	1/2	13/16-16	13/16-16	1.49	15/16	0.378	0.358	3/4	1.10	•	•	
10 S6LO	5/8	1-14	1-14	1.65	1 1/8	0.484	0.453	1 1/16	1.31	•	•	
12 S6LO	3/4	1 3/16-12	1 3/16-12	1.82	1 3/8	0.609	0.547	1 3/16	1.47	•	•	
14 S6LO*	7/8	1 5/16-12	1 5/16-12	2.07	1 1/2	0.709	0.709	1 5/16	1.63	•	•	
16 S6LO	1	1 7/16-12	1 7/16-12	2.10	1 5/8	0.811	0.783	1 7/16	1.64	•		
20 S6LO	1 1/4	1 11/16-12	1 11/16-12	2.29	1 7/8	1.024	1.024	1 5/8	1.76	•		
24 S6LO	1 1/2	2-12	2-12	2.41	2 1/4	1.260	1.260	1 7/8	1.92	•		

See page B45 for information on replacement face seal O-rings.

*Size 14 is not included in SAE J1453.

Union Elbow ELO

ORFS tube end / ORFS tube end

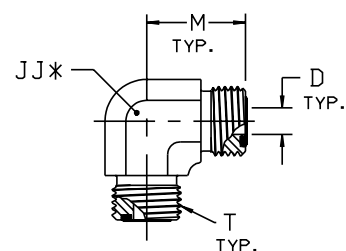
SAE 520201

Part Number Information

EL - Body only

ELO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	D DRILL (inch)	JJ (inch)	M (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4 ELO	1/4	9/16-18	0.172	9/16	0.85	•	•	
6 ELO	3/8	11/16-16	0.264	3/4	0.98	•	•	
8 ELO	1/2	13/16-16	0.378	3/4	1.10	•	•	
10 ELO	5/8	1-14	0.484	1 1/16	1.31	•	•	
12 ELO	3/4	1 3/16-12	0.609	1 3/16	1.47	•	•	
14 ELO*	7/8	1 5/16-12	0.709	1 5/16	1.63	•	•	
16 ELO	1	1 7/16-12	0.811	1 7/16	1.64	•	•	
20 ELO	1 1/4	1 11/16-12	1.024	1 5/8	1.76	•	•	
24 ELO	1 1/2	2-12	1.260	1 7/8	1.92	•	•	
32 ELO*	2	2 1/2-12	1.772	2 1/2	2.76	•	•	

See page B45 for information on replacement face seal O-rings.

*Sizes 14 and 32 are not included in SAE J1453.

Union HLO

ORFS tube end / ORFS tube end

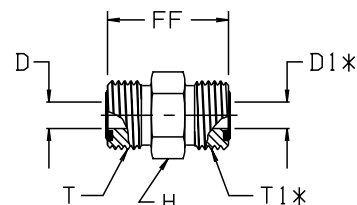
SAE 520101

Part Number Information

HL - Body only

HLO - Assembled with O-rings

All dimensions are in inches



*D1 & T1 ARE FOR JUMP SIZES ONLY.

OTHERWISE D & T ARE TYPICAL

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T1 TUBE END UN/UNF-2A	D DRILL (inch)	D1 DRILL (inch)	FF (inch)	H HEX (inch)	STANDARD MATERIAL FROM STOCK		
								S	SS	B
4 HLO	1/4	9/16-18	9/16-18	0.172	0.172	1.08	5/8	•	•	
6 HLO	3/8	11/16-16	11/16-16	0.264	0.264	1.22	3/4	•	•	
6-4 HLO	3/8 to 1/4	11/16-16	9/16-18	0.264	0.172	1.17	3/4	•	•	
8 HLO	1/2	13/16-16	13/16-16	0.378	0.378	1.39	7/8	•	•	
8-6 HLO	1/2 to 3/8	13/16-16	11/16-16	0.378	0.264	1.33	7/8	•	•	
10 HLO	5/8	1-14	1-14	0.484	0.484	1.68	1 1/16	•	•	
10-8 HLO	5/8 to 1/2	1-14	13/16-16	0.484	0.378	1.57	1 1/16	•	•	
12 HLO	3/4	1 3/16-12	1 3/16-12	0.609	0.609	1.85	1 1/4	•	•	
12-10 HLO	3/4 to 5/8	1 3/16-12	1-14	0.609	0.484	1.80	1 1/4	•	•	
14 HLO*	7/8	1 5/16-12	1 5/16-12	0.709	0.709	1.87	1 3/8	•	•	
16 HLO	1	1 7/16-12	1 7/16-12	0.811	0.811	1.94	1 1/2	•	•	
16-12 HLO	1 to 3/4	1 7/16-12	1 3/16-12	0.811	0.609	1.92	1 1/2	•	•	
20 HLO	1 1/4	1 11/16-12	1 11/16-12	1.024	1.024	2.02	1 3/4	•	•	
24 HLO	1 1/2	2-12	2-12	1.260	1.260	2.09	2 1/8	•	•	
32HLO*	2	2 1/2-12	2 1/2-12	1.772	1.772	2.87	2 3/4	•	•	

See page B45 for information on replacement face seal O-rings.

*Sizes 14 and 32 are not included in SAE J1453.

**Manufacturing option permits a single drill through equal to the smaller of D and D1.

Union Tee JLO

ORFS tube ends

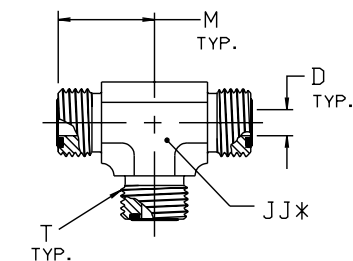
SAE 520401

Part Number Information

JL - Body only

JLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	D DRILL (inch)	JJ (inch)	M (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4 JLO	1/4	9/16-18	0.172	9/16	0.85	•	•	
6 JLO	3/8	11/16-16	0.264	3/4	0.98	•	•	
8 JLO	1/2	13/16-16	0.378	3/4	1.10	•	•	
10 JLO	5/8	1-14	0.484	1 1/16	1.31	•	•	
12 JLO	3/4	1 3/16-12	0.609	1 3/16	1.47	•	•	
14 JLO*	7/8	1 5/16-12	0.709	1 5/16	1.63			
16 JLO	1	1 7/16-12	0.811	1 7/16	1.64	•	•	
20 JLO	1 1/4	1 11/16-12	1.024	1 5/8	1.76	•	•	
24 JLO	1 1/2	2-12	1.260	1 7/8	1.92	•	•	
32 JLO*	2	2 1/2-12	1.772	2 1/2	2.76	•	•	

See page B45 for information on replacement face seal O-rings.

*Sizes 14 and 32 are not included in SAE J1453.

Union Cross KLO

ORFS tube ends

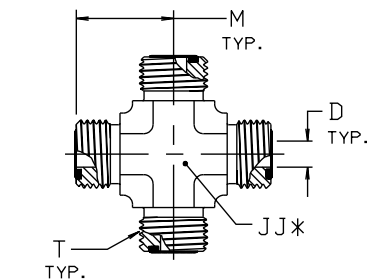
SAE 520501

Part Number Information

KL - Body only

KLO - Assembled with O-rings

All dimensions are in inches



*JJ — ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	D DRILL (inch)	JJ (inch)	M (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4 KLO	1/4	9/16-18	0.172	9/16	0.85	•		
6 KLO	3/8	11/16-16	0.264	3/4	0.98	•		
8 KLO	1/2	13/16-16	0.378	3/4	1.10	•		
10 KLO	5/8	1-14	0.484	1 1/16	1.31	•		
12 KLO	3/4	1 3/16-12	0.609	1 3/16	1.47	•		
16 KLO	1	1 7/16-12	0.811	1 7/16	1.64	•		
20 KLO	1 1/4	1 11/16-12	1.024	1 5/8	1.76	•		

See page B45 for information on replacement face seal O-rings.

Part Data

Bulkhead Union Elbow

WELO

ORFS tube end / ORFS tube end

SAE 520701

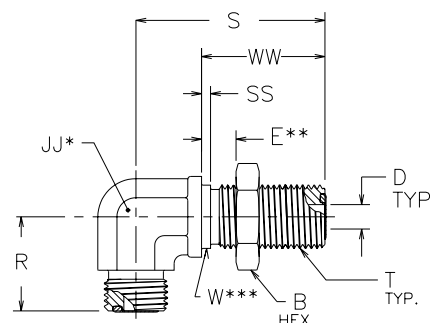
Part Number Information

WELO - Body only

WELO - Assembled with O-rings

WELO - WLNL - Assembled with O-rings and locknut

All dimensions are in inches



B

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	B HEX (inch)	D DRILL (inch)	E MAX (inch)	JJ (inch)	R (inch)	S1 (inch)	S2 (inch)	W (inch)	WW (inch)	STANDARD MATERIAL FROM STOCK		
												S	SS	B
4 WELO	1/4	9/16-18	13/16	0.172	0.53	9/16	0.89	1.85	0.06	0.56	1.24	•		
6 WELO	3/8	11/16-16	1	0.264	0.53	3/4	1.02	2.05	0.06	0.69	1.34	•		
8 WELO	1/2	13/16-16	1 1/8	0.378	0.53	3/4	1.14	2.18	0.06	0.81	1.44	•		
10 WELO	5/8	1-14	1 5/16	0.484	0.52	1 1/16	1.36	2.48	0.06	1.00	1.60	•		
12 WELO	3/4	1 3/16-12	1 1/2	0.609	0.50	1 3/16	1.52	2.65	0.06	1.19	1.64	•		
14 WELO****	7/8	1 5/16-12	1 5/8	0.709	0.51	1 7/16	1.67	2.80	0.06	1.31	1.66	•		
16 WELO	1	1 7/16-12	1 3/4	0.811	0.51	1 7/16	1.67	2.80	0.06	1.44	1.66	•		
20 WELO	1 1/4	1 11/16-12	2	1.024	0.51	1 5/8	1.79	2.97	0.06	1.69	1.66	•		
24 WELO	1 1/2	2-12	2 3/8	1.260	0.51	1 7/8	1.95	3.13	0.06	2.00	1.66	•		

See page B45 for information on replacement face seal O-rings.

* Across wrench flats.

** Maximum bulkhead thickness.

*** Bulkhead pilot diameter. Recommended clearance hole is $W + 0.015$ ".

**** Size 14 is not included in SAE J1453.

Bulkhead Run Tee

WJJLO

ORFS tube end (all three ends)

SAE 520958

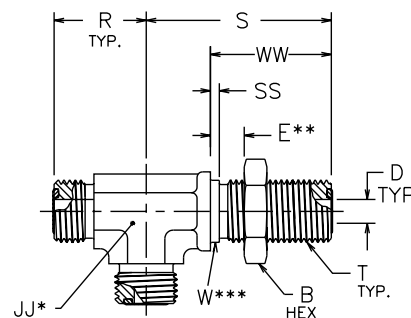
Part Number Information

WJJL - Body only

WJJLO - Assembled with O-rings

WJJLO - WLNL - Assembled with O-rings and locknut

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	B HEX (inch)	D DRILL (inch)	E MAX (inch)	JJ (inch)	R (inch)	S1 (inch)	S2 (inch)	W DIA (inch)	WW (inch)	STANDARD MATERIAL FROM STOCK		
												S	SS	B
4 WJJLO	1/4	9/16-18	13/16	0.172	0.53	9/16	0.89	1.85	0.06	0.56	1.24	•		
6 WJJLO	3/8	11/16-16	1	0.264	0.53	3/4	1.02	2.05	0.06	0.69	1.34	•		
8 WJJLO	1/2	13/16-16	1 1/8	0.378	0.53	3/4	1.14	2.18	0.06	0.81	1.44	•		
10 WJJLO	5/8	1-14	1 5/16	0.484	0.52	1 1/16	1.36	2.48	0.06	1.00	1.60	•		
12 WJJLO	3/4	1 3/16-12	1 1/2	0.609	0.50	1 3/16	1.52	2.65	0.06	1.19	1.64	•		
16 WJJLO	1	1 7/16-12	1 3/4	0.811	0.51	1 7/16	1.67	2.80	0.06	1.44	1.66	•		
20 WJJLO	1 1/4	1 11/16-12	2	1.024	0.51	1 5/8	1.79	2.97	0.06	1.69	1.66	•		
24 WJJLO	1 1/2	2-12	2 3/8	1.260	0.51	1 7/8	1.95	3.13	0.06	2.00	1.66	•		

See page B45 for information on replacement face seal O-rings.

* Across wrench flats.

** Maximum bulkhead thickness.

*** Bulkhead pilot diameter. Recommended clearance hole is $W + 0.015$ ".

Part Data

Bulkhead Branch Tee

WJLO

ORFS tube end (all three ends)

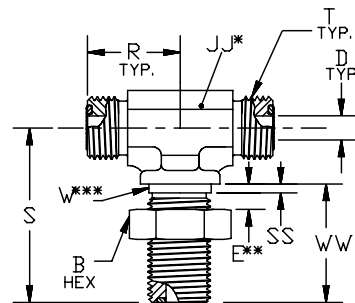
Part Number Information

WJL - Body only

WJLO - Assembled with O-rings

WJLO - WLNL - Assembled with O-rings and locknut

All dimensions are in inches



*JJ-ACROSS WRENCH FLATS

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	B HEX (inch)	D DRILL (inch)	E MAX (inch)	JJ (inch)	R (inch)	S	SS	W DIA (inch)	WW (inch)	STANDARD MATERIAL FROM STOCK		
												S	SS	B
4 WJLO	1/4	9/16-18	11/16	0.172	0.53	9/16	0.89	1.85	0.06	0.56	1.24	•		
6 WJLO	3/8	11/16-18	13/16	0.264	0.53	3/4	1.02	2.05	0.06	0.69	1.34	•		
8 WJLO	1/2	13/16-16	15/16	0.378	0.53	3/4	1.14	2.18	0.06	0.81	1.44	•		
10 WJLO	5/8	1-14	1 1/8	0.484	0.53	1 1/16	1.36	2.48	0.06	1.00	1.60	•		
12 WJLO	3/4	1 3/16-12	1 3/8	0.609	0.53	1 3/16	1.52	2.65	0.06	1.19	1.64	•		
16 WJLO	1	1 7/16-12	1 5/8	0.811	0.53	1 7/16	1.67	2.80	0.06	1.44	1.66	•		

See page B45 for information on replacement face seal O-rings.

* Across wrench flats.

** Maximum bulkhead thickness.

*** Bulkhead pilot diameter. Recommended clearance hole is $W + 0.015$ ".

Bulkhead Union

WLO

ORFS tube end / ORFS tube end

SAE 520601

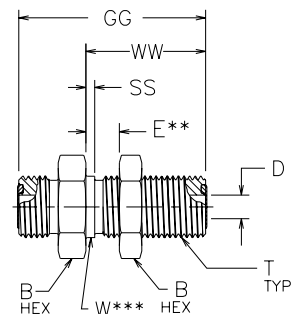
Part Number Information

WL - Body only

WLO - Assembled with O-rings

WLO - WLNL - Assembled with O-rings and locknut

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	B HEX (inch)	D DRILL (inch)	E MAX (inch)	GG (inch)	S2 (inch)	W DIA (inch)	WW (inch)	STANDARD MATERIAL FROM STOCK		
										S	SS	B
4 WLO	1/4	9/16-18	13/16	0.172	0.53	1.90	0.06	0.56	1.24	•	•	
6 WLO	3/8	11/16-16	1	0.264	0.53	2.09	0.06	0.69	1.34	•	•	
8 WLO	1/2	13/16-16	1 1/8	0.378	0.53	2.30	0.06	0.81	1.44	•	•	
10 WLO	5/8	1-14	1 5/16	0.484	0.52	2.62	0.06	1.00	1.60	•	•	
12 WLO	3/4	1 3/16-12	1 1/2	0.609	0.50	2.72	0.06	1.19	1.64	•	•	
14 WLO	7/8	1 5/16-12	1 5/8	0.709	0.51	2.76	0.06	1.31	1.66			
16 WLO	1	1 7/16-12	1 3/4	0.811	0.51	2.76	0.06	1.44	1.66	•		
20 WLO	1 1/4	1 11/16-12	2	1.024	0.51	2.76	0.06	1.69	1.66	•		
24 WLO	1 1/2	2-12	2 3/8	1.260	0.51	2.76	0.06	2.00	1.66	•		

See page B45 for information on replacement face seal O-rings.

* Size 14 is not included in SAE J1453.

** Maximum bulkhead thickness.

*** Bulkhead pilot diameter. Recommended clearance hole is $W + 0.015$ ".

45° Bulkhead Union Elbow WNLO

ORFS tube end / ORFS tube end

SAE 520801

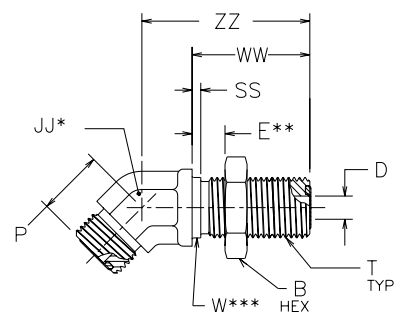
Part Number Information

WNL - Body only

WNLO - Assembled with O-rings

WNLO - WNLN - Assembled with O-rings and locknut

All dimensions are in inches



B

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	B HEX (inch)	D DRILL (inch)	E MAX (inch)	JJ (inch)	P (inch)	S2 (inch)	W DIA (inch)	WW (inch)	ZZ (inch)	STANDARD MATERIAL FROM STOCK		
												S	SS	B
4 WNLO	1/4	9/16-18	13/16	0.172	0.53	9/16	0.63	0.06	0.56	1.24	1.73	•		
6 WNLO	3/8	11/16-16	1	0.264	0.53	3/4	0.74	0.06	0.69	1.34	1.91	•		
8 WNLO	1/2	13/16-16	1 1/8	0.378	0.53	3/4	0.80	0.06	0.81	1.44	2.01	•		
10 WNLO	5/8	1-14	1 5/16	0.484	0.52	1 1/16	0.92	0.06	1.00	1.60	2.23	•		
12 WNLO	3/4	1 3/16-12	1 1/2	0.609	0.50	1 3/16	1.02	0.06	1.19	1.64	2.39	•		
16 WNLO	1	1 7/16-12	1 3/4	0.811	0.51	1 7/16	1.18	0.06	1.44	1.66	2.57	•		
20 WNLO	1 1/4	1 11/16-12	2	1.024	0.51	1 5/8	1.26	0.06	1.69	1.66	2.64	•		
24 WNLO	1 1/2	2-12	2 3/8	1.260	0.51	1 7/8	1.45	0.06	2.00	1.66	2.64	•		

See page B45 for information on replacement face seal O-rings.

* Across wrench flats.

** Maximum bulkhead thickness.

*** Bulkhead pilot diameter. Recommended clearance hole is $W + 0.015$ ".

Straight Thread Bulkhead Connector WF5OLO

ORFS Tube End / Straight Thread O-ring

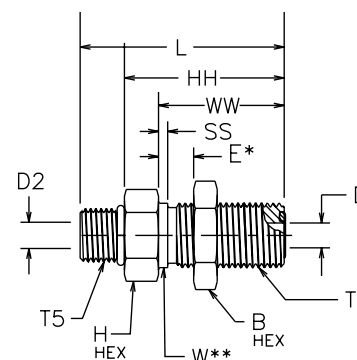
Part Number Information

WF5L - Body Only

WF5OLO - Assembled with O-rings

WF5OLO-WLNL - Assembled with O-rings and locknut

All dimensions in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T UN/UNF-2A	T5 UN/UNF-2A	B HEX (inch)	D DRILL (inch)	D2 DRILL (inch)	E MAX (inch)	H HEX (inch)	HH (inch)	L (inch)	S2 (inch)	W DIA (inch)	WW (inch)	STANDARD MATERIAL FROM STOCK		
														S	SS	B
4 WF5OLO	1/4	9/16-18	7/16-20	13/16	0.172	0.172	0.53	13/16	1.68	2.11	0.06	0.56	1.24			
4-6 WF5OLO	1/4	9/16-18	9/16-18	13/16	0.172	0.297	0.53	13/16	1.71	2.18	0.06	0.56	1.24			
6 WF5OLO	3/8	11/16-16	9/16-18	1	0.264	0.297	0.53	1	1.81	2.28	0.06	0.69	1.34			
8 WF5OLO	1/2	13/16-16	3/4-16	1 1/8	0.378	0.391	0.53	1 1/8	2.03	2.57	0.06	0.81	1.44			
10 WF5OLO	5/8	1-14	7/8-14	1 5/16	0.484	0.484	0.52	1 5/16	2.01	2.64	0.06	1.00	1.60			
12 WF5OLO	3/4	1 3/16-12	1 1/16-12	1 1/2	0.609	0.609	0.50	1 1/2	2.05	2.78	0.06	1.19	1.64			

See page B45 for information on replacement face seal and SAE O-rings.

* Maximum bulkhead thickness.

** Bulkhead pilot diameter. Recommended clearance hole is $W + 0.015$ ".

Part Data

37° Swivel Adapter

LOHX6

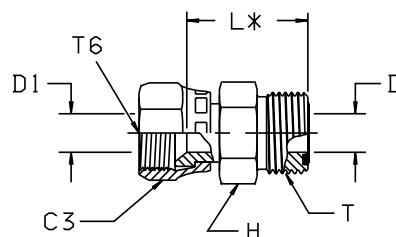
37° swivel / ORFS tube end

Part Number Information

LHX6 - Body only

LOHX6 - Assembled with O-rings

All dimensions are in inches



*L — END TO BASE OF FLARE

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	C3 HEX (inch)	D DRILL (inch)	D1 DRILL (inch)	H HEX (inch)	L (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
4 LOHX6	1/4	9/16-18	7/16-20	9/16	0.172	0.172	5/8	1.04	•		
6 LOHX6	3/8	11/16-16	9/16-18	11/16	0.264	0.264	3/4	1.14	•		
8 LOHX6	1/2	13/16-16	3/4-16	7/8	0.378	0.378	7/8	1.32	•		
10 LOHX6	5/8	1-14	7/8-14	1	0.484	0.484	1 1/16	1.52	•		
12 LOHX6	3/4	1 3/16-12	1 1/16-12	1 1/4	0.609	0.609	1 1/4	1.63	•		
16 LOHX6	1	1 7/16-12	1 5/16-12	1 1/2	0.811	0.811	1 1/2	1.79	•		

See page B45 for information on replacement face seal O-rings.

37° Male Adapter

XHLO

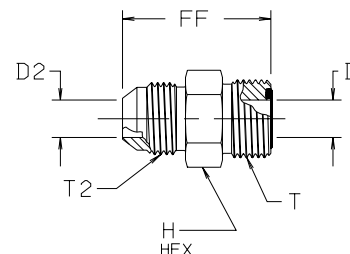
37° tube end / ORFS tube end

Part Number Information

XHL - Body only

XHLO - Assembled with O-rings

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T2 TUBE END UN/UNF-2A	D DRILL (inch)	D2 DRILL (inch)	FF (inch)	H HEX (inch)	STANDARD MATERIAL FROM STOCK		
								S	SS	B
4 XHLO	1/4	9/16-18	7/16-20	0.172	0.172	1.25	5/8	•		
6 XHLO	3/8	11/16-16	9/16-18	0.264	0.264	1.34	3/4	•		
8 XHLO	1/2	13/16-16	3/4-16	0.378	0.378	1.55	7/8	•		
10 XHLO	5/8	1-14	7/8-14	0.484	0.484	1.83	1 1/16	•		
12 XHLO	3/4	1 3/16-12	1 1/16-12	0.609	0.609	2.05	1 1/4	•		
16 XHLO	1	1 7/16-12	1 5/16-12	0.811	0.811	2.16	1 1/2	•		
20 XHLO	1 1/4	1 11/16-12	1 5/8-12	1.024	1.024	2.29	1 3/4	•		
24 XHLO	1 1/2	2-12	1 7/8-12	1.260	1.260	2.48	2 1/8	•		

See page B45 for information on replacement face seal O-rings.

Part Data

37° Male Swivel Adapter

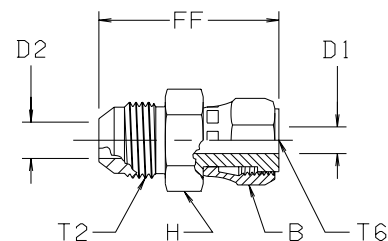
XHL6

ORFS swivel / 37° tube end

Part Number Information

XHL6 - Body only

All dimensions are in inches

**B**

TUBE FITTING PART #	TUBE O.D. (inch)	T2 TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	B HEX (inch)	D1 DRILL (inch)	D2 (inch)	FF (inch)	H HEX (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
4 XHL6	1/4	7/16-20	9/16-18	11/16	0.165	0.165	1.50	5/8	•		
6 XHL6	3/8	9/16-18	11/16-16	13/16	0.264	0.264	1.61	3/4	•		
8 XHL6	1/2	3/4-16	13/16-16	15/16	0.358	0.358	1.90	7/8	•		
10 XHL6	5/8	7/8-14	1-14	1 1/8	0.453	0.453	2.20	1 1/16	•		
12 XHL6	3/4	1 1/16-12	1 3/16-12	1 3/8	0.547	0.547	2.50	1 1/4	•		
16 XHL6	1	1 5/16-12	1 7/16-12	1 5/8	0.783	0.783	2.66	1 1/2	•		
20 XHL6	1 1/4	1 5/8-12	1 11/16-12	1 7/8	1.024	1.024	2.80	1 11/16	•		

Ferulok Male Adapter

BUHLO

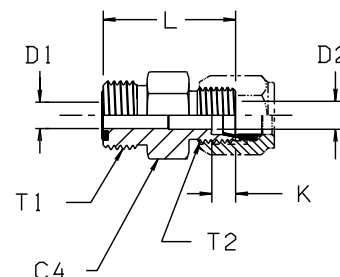
ORFS tube end / Flareless tube end

Part Number Information

UHL - Body only

BUHLO - Assembled with flareless nut & sleeve and ORFS O-Ring

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T1 TUBE UN/UNF-2A	T2 TUBE UN/UNF-2A	C4 HEX (inch)	D1* DRILL (inch)	D2* DRILL (inch)	K (inch)	L (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
6 BUHLO	3/8	11/16-16	9/16-18	3/4	0.264	0.281	0.26	1.25	•		
8 BUHLO	1/2	13/16-16	3/4-16	7/8	0.378	0.422	0.31	1.45	•		
10 BUHLO	5/8	1-14	7/8-14	1 1/16	0.484	0.500	0.36	1.70	•		
12 BUHLO	3/4	1 3/16-12	1 1/16-12	1 1/4	0.609	0.656	0.36	1.88	•		
16 BUHLO	1	1 7/16-12	1 5/16-12	1 1/2	0.811	0.875	0.42	1.94	•		

See page B45 for information on replacement face seal rings.

* Manufacturing option permits a single drill through equal to the smaller of D1 and D2.

Part Data

EO Swivel Adapter

LOHU86

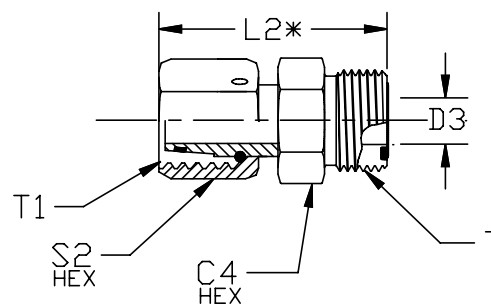
EO swivel / ORFS tube end

Part Number Information

LHU86 – Body Only

LOHU86 – Assembled with O-rings

All dimensions are in inches except T1 and S2, which are in millimeters



TUBE FITTING PART #	TUBE O.D. (inch)	EO SWIVEL SIZE	T TUBE END UN/UNF-2A	T1 THREAD	C4 HEX (inch)	D3 DRILL	L2 (inch)	S2 (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
4-6L LOHU86	1/4	6L	9/16-18	12 X 1.5	5/8	0.102	1.32	14	•		
4-8L LOHU86	1/4	8L	9/16-18	14 X 1.5	5/8	0.161	1.32	17	•		
6-10L LOHU86	3/8	10L	11/16-16	16 X 1.5	3/4	0.240	1.44	19	•		
8-12L LOHU86	1/2	12L	13/16-16	18 X 1.5	7/8	0.323	1.53	22	•		
10-15L LOHU86	5/8	15L	1-14	22 X 1.5	1 1/16	0.402	1.82	27	•		
12-18L LOHU86	3/4	18L	1 3/16-12	26 X 1.5	1 1/4	0.520	1.89	32	•		
16-22L LOHU86	1	22L	1 7/16-12	30 X 2	1 1/2	0.677	2.08	36	•		
4-6S LOHU86	1/4	6S	9/16-18	14 X 1.5	5/8	0.102	1.32	17	•		
4-8S LOHU86	1/4	8S	9/16-18	16 X 1.5	5/8	0.161	1.34	19	•		
6-10S LOHU86	3/8	10S	11/16-16	18 X 1.5	3/4	0.204	1.44	22	•		
8-12S LOHU86	1/2	12S	13/16-16	20 X 1.5	7/8	0.323	1.59	24	•		
10-14S LOHU86	5/8	14S	1-14	22 X 1.5	1 1/16	0.362	1.84	27	•		
10-16S LOHU86	5/8	16S	1-14	24 X 1.5	1 1/16	0.441	1.84	30	•		
12-20S LOHU86	3/4	20S	1 3/16-12	30 X 2	1 1/4	0.556	2.05	36	•		
16-25S LOHU86	1	25S	1 7/16-12	36 X 2	1 1/2	0.717	2.15	46	•		

See page B45 for information on replacement face seal O-rings.

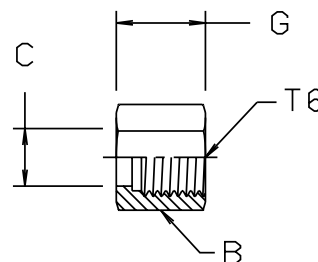
Nut

BL

ORFS tube nut**

SAE 520110

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T6 UNF/UNF-2B	B HEX (inch)	C (inch)	G (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4 BL	1/4	9/16-18	11/16	0.41	0.58	•	•	
6 BL	3/8	11/16-16	13/16	0.53	0.67	•	•	
8 BL	1/2	13/16-16	15/16	0.65	0.83	•	•	
10 BL	5/8	1-14	1 1/8	0.83	0.93	•	•	
12 BL	3/4	1 3/16-12	1 3/8	0.95	1.02	•	•	
12-14 BL	7/8	1 3/16-12	1 3/8	0.99	1.22	•		
14 BL*	7/8	1 5/16-12	1 1/2	1.08	1.04			
16 BL	1	1 7/16-12	1 5/8	1.14	1.10	•	•	
20 BL	1 1/4	1 11/16-12	1 7/8	1.42	1.10	•	•	
24 BL	1 1/2	2-12	2 1/4	1.73	1.10	•	•	
32 BL*	2	2 1/2-2	2 7/8	2.22	1.30	•		

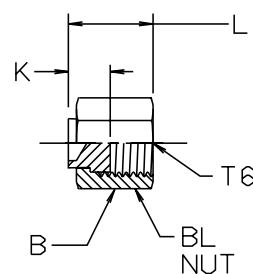
*Sizes 14 and 32 are not included in SAE J1453.

**These tube nuts should not be exposed to annealing temperatures, such as furnace brazing. Contact the Tube Fittings Division for information on special nuts.

Cap FNL

ORFS tube end cap
SAE 520112

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T6 SWIVEL UN/UNF-2B	B HEX (inch)	K (inch)	L (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4 FNL	1/4	9/16-18	11/16	0.34	0.65	•	•	
6 FNL	3/8	11/16-16	13/16	0.37	0.74	•	•	
8 FNL	1/2	13/16-16	15/16	0.47	0.90	•	•	
10 FNL	5/8	1-14	1 1/8	0.47	1.00	•	•	
12 FNL	3/4	1 3/16-12	1 3/8	0.53	1.10	•	•	
14 FNL*	7/8	1 5/16-12	1 1/2	0.61	1.14			
16 FNL	1	1 7/16-12	1 5/8	0.59	1.16	•	•	
20 FNL	1 1/4	1 11/16-12	1 7/8	0.59	1.16	•	•	
24 FNL	1 1/2	2-12	2 1/4	0.59	1.16	•	•	
32 FNL*	2	2 1/2-12	2 7/8	0.80	1.47	•		

*Sizes 14 and 32 are not included in SAE J1453.

Part Data

Braze Connector

LOHB3

ORFS tube end / silver braze socket*

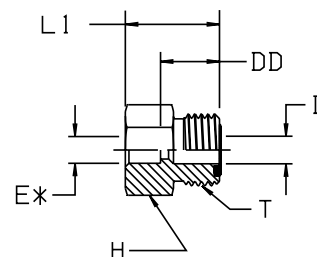
SAE 520104

Part Number Information

LHB3 - Body only

LOHB3 - Assembled with O-rings

All dimensions are in inches



TUBE FITTING PART #	ORFS TUBE O.D. (inch)	SOCKET BRAZE TUBE O.D. (inch)	T TUBE END UN/UNF-2A	D DRILL (inch)	DD (inch)	E DIA (inch)	H HEX (inch)	L1 (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
4 LOHB3	1/4	1/4	9/16-18	0.172	0.52	0.26	5/8	0.86	•		
4-6 LOHB3	1/4	3/8	9/16-18	0.172	0.52	0.38	5/8	0.86	•		
6 LOHB3	3/8	3/8	11/16-16	0.264	0.56	0.38	3/4	0.90	•		
6-4 LOHB3	3/8	1/4	11/16-16	0.264	0.56	0.26	3/4	0.90	•		
6-8 LOHB3	3/8	1/2	11/16-16	0.264	0.56	0.51	3/4	0.90	•		
8 LOHB3	1/2	1/2	13/16-16	0.378	0.63	0.51	7/8	0.97	•		
8-4 LOHB3	1/2	1/4	13/16-16	0.378	0.64	0.26	7/8	0.97	•		
8-6 LOHB3	1/2	3/8	13/16-16	0.378	0.63	0.38	7/8	0.97	•		
8-10 LOHB3	1/2	5/8	13/16-16	0.378	0.63	0.63	7/8	0.97	•		
8-12 LOHB3	1/2	3/4	13/16-16	0.378	0.67	0.76	1 1/16	1.16	•		
10 LOHB3	5/8	5/8	1-14	0.484	0.73	0.63	1 1/16	1.07	•		
10-6 LOHB3	5/8	3/8	1-14	0.484	0.73	0.38	1 1/16	1.07	•		
10-8 LOHB3	5/8	1/2	1-14	0.484	0.73	0.51	1 1/16	1.07	•		
10-12 LOHB3	5/8	3/4	1-14	0.484	0.74	0.76	1 1/16	1.23	•		
12 LOHB3	3/4	3/4	1 3/16-12	0.609	0.83	0.76	1 1/4	1.32	•		
12-8 LOHB3	3/4	1/2	1 3/16-12	0.609	0.83	0.51	1 1/4	1.16	•		
12-10 LOHB3	3/4	5/8	1 3/16-12	0.609	0.83	0.63	1 1/4	1.16	•		
12-16 LOHB3	3/4	1	1 3/16-12	0.609	0.83	1.01	1 1/2	1.38	•		
14 LOHB3	7/8	7/8	1 5/16-12	0.709	0.97	0.88	1 3/8	1.52			
16 LOHB3	1	1	1 7/16-12	0.811	0.97	1.01	1 1/2	1.52	•		
16-8 LOHB3	1	1/2	1 7/16-12	0.811	0.97	0.51	1 1/2	1.30	•		
16-12 LOHB3	1	3/4	1 7/16-12	0.811	0.97	0.76	1 1/2	1.46	•		
16-20 LOHB3	1	1 1/4	1 7/16-12	0.811	0.97	1.26	1 3/4	1.52	•		
20 LOHB3	1 1/4	1 1/4	1 11/16-12	1.024	0.97	1.26	1 3/4	1.52	•		
20-16 LOHB3	1 1/4	1	1 11/16-12	1.024	0.97	1.01	1 3/4	1.52	•		
20-24 LOHB3	1 1/4	1 1/2	1 11/16-12	1.024	0.97	1.51	2 1/8	1.52	•		
24 LOHB3	1 1/2	1 1/2	2-11 1/2	1.260	0.97	1.51	2 1/8	1.52	•		
24-20 LOHB3	1 1/2	1 1/4	2-11 1/2	1.260	0.97	1.26	2 1/8	1.52	•		

See page B45 for information on replacement face seal O-rings.

Unplated part, oil dipped for corrosion protection.

*Size 14 is not included in SAE J1453.

E* is for silver brazing. Standard steel parts are not recommended for welding.

NOTE: If ordered with O-ring assembled, the O-ring must be removed prior to brazing operation.

Plug PNLO

ORFS tube end plug

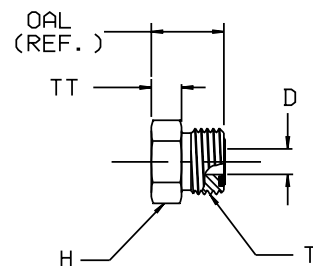
SAE 520109

Part Number Information

PNL - Body only

PNLO - Assembled with O-ring

All dimensions are in inches



B

TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	D DRILL (inch)	H HEX (inch)	OAL (REF) (inch)	TT (inch)	STANDARD MATERIAL FROM STOCK		
							S	SS	B
4 PNLO	1/4	9/16-18	0.172	5/8	0.66	0.20	•		
6 PNLO	3/8	11/16-16	0.264	3/4	0.76	0.32	•		
8 PNLO	1/2	13/16-16	0.378	7/8	0.86	0.35	•		
10 PNLO	5/8	1-14	0.484	1 1/16	1.02	0.41	•		
12 PNLO	3/4	1 3/16-12	0.609	1 1/4	1.08	0.41	•		
14 PNLO*	7/8	1 5/16-12	0.709	1 3/8	1.18	0.049			
16 PNLO	1	1 7/16-12	0.811	1 1/2	1.10	0.41	•		
20 PNLO	1 1/4	1 11/16-12	1.024	1 3/4	1.10	0.41	•		
24 PNLO	1 1/2	2-12	1.260	2 1/8	1.10	0.41	•		
32 PNLO*	2	2 1/2-12	1.772	2 3/4	1.37	0.50	•		

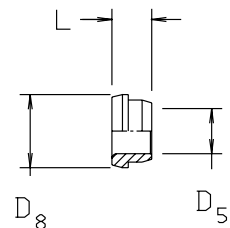
See page B45 for information on replacement face seal O-rings.

*Sizes 14 and 32 are not included in SAE J1453.

Parflange Sleeve for Inch Tubing TPL

ORFS Mechanically Attachable Sleeve

All dimensions are in inches

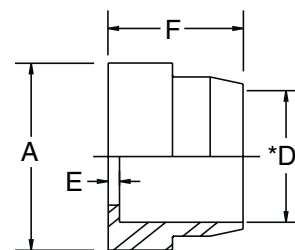


TUBE FITTING PART #	D5 TUBE O.D. (inch)	D8 DIA (inch)	L (inch)	STANDARD MATERIAL FROM STOCK		
				S	SS	B
4 TPL	1/4	0.50	0.30	•	•	
6 TPL	3/8	0.62	0.34	•	•	
8 TPL	1/2	0.74	0.42	•	•	
10 TPL	5/8	0.92	0.42	•	•	
12 TPL	3/4	1.09	0.47	•	•	
16 TPL	1	1.34	0.53	•	•	
20 TPL	1 1/4	1.59	0.52	•	•	
24 TPL	1 1/2	1.91	0.49	•	•	
32 TPL	2	2.39	0.54	•	•	

Sleeve TL

ORFS silver braze sleeve*
SAE 520115

All dimensions are in inches



*D IS FOR SILVER BRAZING

TUBE FITTING PART #	TUBE O.D. (inch)	A DIA (inch)	*D (inch)	E (inch)	F (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4 TL	1/4	0.50	0.26	0.04	0.37	•	•	
6 TL	3/8	0.62	0.38	0.04	0.37	•	•	
8 TL	1/2	0.75	0.51	0.04	0.37	•	•	
10 TL	5/8	0.92	0.63	0.06	0.41	•	•	
12 TL	3/4	1.10	0.76	0.06	0.55	•	•	
14 TL**	7/8	1.22	0.88	0.06	0.55			
16 TL	1	1.35	1.01	0.06	0.61	•	•	
20 TL	1 1/4	1.60	1.26	0.06	0.61	•	•	
24 TL	1 1/2	1.91	1.51	0.06	0.61	•	•	
32 TL**	2	2.41	2.01	0.06	0.65	•		

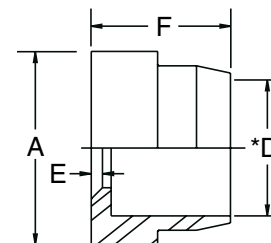
Unplated part, oil dipped for corrosion protection.

**Sizes 14 and 32 are not included in SAE J1453.

Reducer Sleeve TL Reducer

ORFS silver braze sleeve reducer*
SAE 520115

All dimensions are in inches



*D IS FOR SILVER BRAZING

TUBE FITTING PART #	TUBE O.D. (inch)	A (inch)	*D (inch)	E (inch)	F (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
6-4 TL	3/8 to 1/4	0.62	0.26	0.08	0.41	•	•	
8-4 TL	1/2 to 1/4	0.75	0.26	0.14	0.47	•		
8-6 TL	1/2 to 3/8	0.75	0.38	0.14	0.47	•		
10-4 TL	5/8 to 1/4	0.92	0.26	0.20	0.53	•		
10-6 TL	5/8 to 3/8	0.92	0.38	0.20	0.53	•		
10-8 TL	5/8 to 1/2	0.92	0.51	0.20	0.53	•		
12-4 TL	3/4 to 1/4	1.10	0.26	0.24	0.57	•		
12-6 TL	3/4 to 3/8	1.10	0.38	0.24	0.57	•		
12-8 TL	3/4 to 1/2	1.10	0.51	0.24	0.57	•		
12-10 TL	3/4 to 5/8	1.10	0.63	0.24	0.57	•		
12-14 TL	3/4 to 7/8	1.10	0.88	0.06	0.65	•		
16-8 TL	1 to 1/2	1.35	0.51	0.28	0.61	•		
16-10 TL	1 to 5/8	1.35	0.63	0.28	0.61	•		
16-12 TL	1 to 3/4	1.35	0.76	0.18	0.67	•		
16-14 TL	1 to 7/8	1.35	0.88	0.12	0.67	•		
20-12 TL	1 1/4 to 3/4	1.60	0.76	0.28	0.77	•		
20-16 TL	1 1/4 to 1	1.60	1.01	0.28	0.83	•		
24-16 TL	1 1/2 to 1	1.91	1.01	0.28	0.83	•		
24-20 TL	1 1/2 to 1 1/4	1.91	1.26	0.28	0.83	•		

Unplated part, oil dipped for corrosion protection.

Tube End Reducer

TRLON*

ORFS swivel / ORFS tube end

SAE 520123 (Body only); SAE 520123A (Body with Large Nut)

Part Number Information

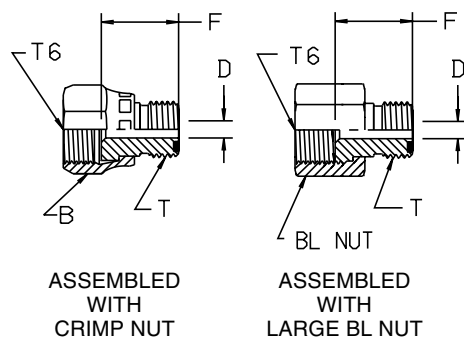
TRLN - Body with Large Nut or Crimp Nut

TRLON - Body with Large Nut or Crimp Nut, assembled with O-ring

TRL - Body with no Large Nut (for two-piece design only)

TRLO - Body with no Large Nut or Crimp Nut, assembled with O-ring
(for two-piece design only)

All dimensions are in inches



TUBE FITTING PART #										
 TRLON One Piece Design (With Crimp Nut)	 TRLON Two Piece Design (With Large Nut)	 TRLO Body Only (For Two-Piece Design Only)	TUBE O.D.	T TUBE END UN/UNF-2A	T6 UN/UNF-2B	B HEX	D DRILL	F	STANDARD MATERIAL FROM STOCK	
									S	SS
6-4 TRLON			3/8 to 1/4	9/16-18	11/16-16	13/16	0.172	0.77	•	•
8-6 TRLON	8-4 TRLON	8-4 TRLO	1/2 to 1/4	9/16-18	13/16-16	15/16	0.172	0.86	•	•
			1/2 to 3/8	11/16-16	13/16-16	15/16	0.264	0.88	•	•
	10-4 TRLON	10-4 TRLO	5/8 to 1/4	9/16-18	1-14	1 1/8	0.172	0.90	•	
	10-6 TRLON	10-6 TRLO	5/8 to 3/8	11/16-16	1-14	1 1/8	0.264	0.95	•	
	10-8 TRLON	10-8 TRLO	5/8 to 1/2	13/16-16	1-14	1 1/8	0.378	1.02	•	•
	12-4 TRLON	12-4 TRLO	3/4 to 1/2	9/16-18	1 3/16-12	1 3/8	0.172	0.98	•	
	12-6 TRLON	12-6 TRLO	3/4 to 3/8	11/16-16	1 3/16-12	1 3/8	0.264	1.03	•	•
	12-8 TRLON	12-8 TRLO	3/4 to 1/2	13/16-16	1 3/16-12	1 3/8	0.378	1.09	•	•
12-10 TRLON			3/4 to 5/8	1-14	1 3/16-12	1 3/8	0.484	1.16	•	
	16-8 TRLON	16-8 TRLO	1 to 1/2	13/16-16	1 7/16-12	1 5/8	0.378	1.15	•	•
	16-10 TRLON	16-10 TRLO	1 to 5/8	1-14	1 7/16-12	1 5/8	0.484	1.26	•	
16-12 TRLON			1 to 3/4	1 3/16-12	1 7/16-12	1 5/8	0.609	1.30	•	•
	20-12 TRLON	20-12 TRLO	1 1/4 to 3/4	1 3/16-12	1 11/16-12	1 7/8	0.609	1.32	•	
			1 1/4 to 1	1 7/16-12	1 11/16-12	1 7/8	0.812	1.51	•	
20-16 TRLON			1 1/2 to 1	1 7/16-12	2-12	2 1/4	0.812	1.23	•	•
	24-16 TRLON	24-16 TRLO	1 1/2 to 1 1/4	1 11/16-12	2-12	2 1/4	1.024	1.35	•	
	24-20 TRLON	24-20 TRLO	2 to 1 1/4	1 11/16-12	2 1/12-12	2 7/8	1.024	1.42	•	
	32-20 TRLON**	32-20 TRLO**	2 to 1 1/2	2-12	2 1/2-12	2 7/8	1.260	1.42	•	
	32-24 TRLON**	32-24 TRLO**	2 to 1 1/2	2-12	2 1/2-12	2 7/8	1.260	1.42	•	

See page B45 for information on replacement face seal O-rings.

* Please note change in nomenclature effective July 1, 2000.

** Size 32 is not included in SAE J1453.

Part Data

Tube End Expander

LOHL6

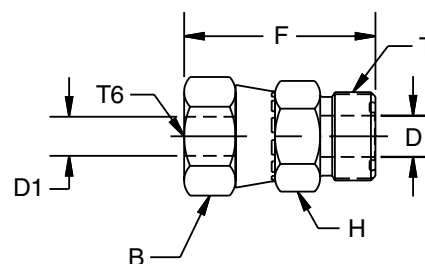
ORFS tube end / ORFS swivel

Part Number Information

LHL6 – Body only

LOHL6 – Assembled with O-rings

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	T6 SWIVEL UN/UNF-2B	B HEX (inch)	D* DRILL (inch)	D1* DRILL (inch)	H HEX (inch)	L2 (inch)	STANDARD MATERIAL FROM STOCK		
									S	SS	B
6-4 LOHL6	3/8	11/16-16	9/16-18	11/16	0.264	0.165	3/4	1.37	•		
8-6 LOHL6	1/2	13/16-16	11/16-16	13/16	0.378	0.264	7/8	1.52	•		
10-8 LOHL6	5/8	1-14	13/16-16	15/16	0.484	0.358	1 1/16	1.81	•		
12-10 LOHL6	3/4	1 3/16-12	1-14	1 1/8	0.609	0.453	1 1/4	1.99	•		
16-12 LOHL6	1	1 7/16-12	1 3/16-12	1 3/8	0.811	0.547	1 1/2	2.16	•		
20-16 LOHL6	1 1/4	1 11/16-12	1 7/16-12	1 5/8	1.024	0.783	1 3/4	2.28	•		
24-20 LOHL6	1 1/2	2-12	1 11/16-12	1 7/8	1.026	1.024	2 1/8	2.35	•		

See page B45 for information on replacement face seal O-rings.

* Manufacturing option permits a single drill through equal to the smaller of D and D1.

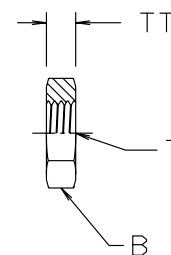
Bulkhead Locknut

WLNL

Bulkhead fitting locknut

SAE 520118

All dimensions are in inches

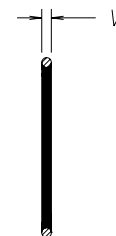
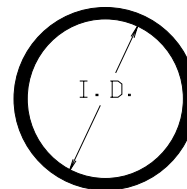


TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	B HEX (inch)	TT (inch)	STANDARD MATERIAL FROM STOCK		
					S	SS	B
4 WLNL	1/4	9/16-18	13/16	0.27	•	•	
6 WLNL	3/8	11/16-16	1	0.32	•	•	
8 WLNL	1/2	13/16-16	1 1/8	0.35	•	•	
10 WLNL	5/8	1-14	1 5/16	0.41	•		
12 WLNL	3/4	1 3/16-12	1 1/2	0.41	•	•	
14 WLNL*	7/8	1 5/16-12	1 5/8	0.41			
16 WLNL	1	1 7/16-12	1 3/4	0.41	•		
20 WLNL	1 1/4	1 11/16-12	2	0.41	•		
24 WLNL	1 1/2	2-12	2 3/8	0.41	•		

*Size 14 is not included in SAE J1453.

ORFS Tube End O-ring Face Seal O-ring

Part Number Information
Specify size and compound
Example: 2-018 N0756
All dimensions are in inches



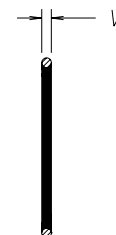
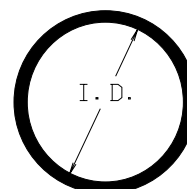
B

TUBE FITTING SIZE	O-RING PART #	TUBE O.D. (inch)	ID (inch)	W (inch)	STANDARD MATERIAL FROM STOCK		
					N0552	V0894	N0756
4	2-011	1/4	0.30	0.07	•	•	•
6	2-012	3/8	0.36	0.07	•	•	•
8	2-014	1/2	0.49	0.07	•	•	•
10	2-016	5/8	0.61	0.07	•	•	•
12	2-018	3/4	0.74	0.07	•	•	•
14	2-020	7/8	0.86	0.07	•	•	•
16	2-021	1	0.93	0.07	•	•	•
20	2-025	1 3/4	1.18	0.07	•	•	•
24	2-029	1 1/2	1.49	0.07	•	•	•
32	2-135	2	1.93	0.1	•	•	•

N0552 is the standard 90-durometer Nitrile (e.g., Buna-N).
V0894 is an optional 90-durometer fluorocarbon (e.g., Viton).
N0756 is an optional 75-durometer Nitrile (e.g., Buna-N) for CNG applications.
Other compounds may be purchased from O-ring Division (606) 269-2351.
[See page A29](#) for O-ring Material Selection and data.

SAE Straight Thread Port O-ring SAE O-ring

Part Number Information
Specify size and compound
Example: 3-906 N0552
All dimensions are in inches



TUBE FITTING SIZE	TUBE FITTING PART #	TUBE O.D. (inch)	ID (inch)	W (inch)	STANDARD MATERIAL FROM STOCK		
					N0552	V0894	N0756
2	3-902	1/8	0.24	0.06	•	•	•
3	3-903	3/16	0.30	0.06	•	•	•
4	3-904	1/4	0.35	0.07	•	•	•
5	3-905	5/16	0.41	0.07	•	•	•
6	3-906	3/8	0.47	0.08	•	•	•
8	3-908	1/2	0.64	0.09	•	•	•
10	3-910	5/8	0.76	0.10	•	•	•
12	3-912	3/4	0.92	0.12	•	•	•
14	3-914	7/8	1.05	0.12	•	•	•
16	3-916	1	1.17	0.12	•	•	•
20	3-920	1 1/4	1.48	0.12	•	•	•
24	3-924	1 1/2	1.72	0.12	•	•	•
32	3-932	2	2.34	0.12	•	•	•

N0552 is the standard 90-durometer Nitrile (e.g., Buna-N).
V0894 is an optional 90-durometer fluorocarbon (e.g., Viton).
N0756 is an optional 75-durometer Nitrile (e.g., Buna-N) for CNG applications.
Other compounds may be purchased from O-ring Division (606) 269-2351.
[See page A29](#) for O-ring Material Selection and data.

Part Data

Silver Braze Ring for Inch Tubing

SBR

Part Number Information

Specify size and tube material

Example: 8 SBR (Braze ring for 1/2" steel or copper tubing)

8 SBR-SS (Braze ring for 1/2" stainless steel tubing)

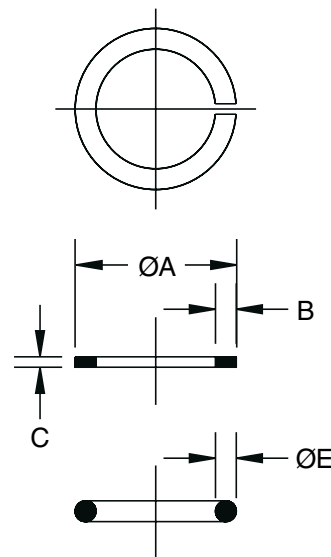
All dimensions are in inches

TUBE FITTING PART #	TUBE O.D. (inch)	A DIA (inch)	E (inch)	C (inch)	B (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
4SBR	1/4	0.33	0.05			•	•	
6SBR	3/8	0.49		0.03	0.07	•	•	
8SBR	1/2	0.57		0.03	0.07	•	•	
10SBR	5/8	0.61		0.03	0.07	•	•	
12SBR	3/4	0.65		0.04	0.08	•	•	
14SBR	7/8	0.72	0.06					
16SBR	1	0.80		0.04	0.08	•	•	
20SBR	1 1/4	0.88		0.04	0.08	•	•	
24SBR	1 1/2	1.00		0.04	0.08	•	•	
32SBR	2	1.98	0.09			•	•	

SBR recommended for steel or copper tubing.

SBR-SS recommended for stainless tubing, but can be used on steel tubing.

Contact the Tube Fittings Division for braze rings used in marine or special applications.

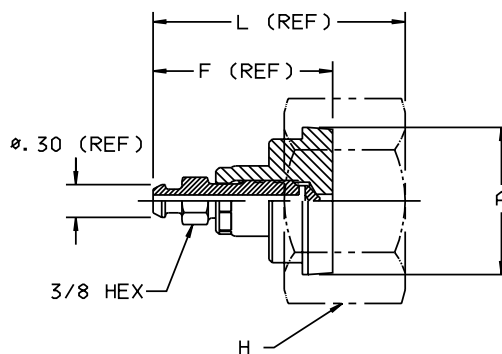


ORFS Tube End Cap Bleed Adapter

FNLBA

Use with Standard BL Nut

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	A (inch)	F (inch)	H (inch)	L (inch)	STANDARD MATERIAL FROM STOCK		
						S	SS	B
8 FNLBA	1/2	0.75	1.63	15/16	2.07	•		
10 FNLBA	5/8	0.89	1.63	1 1/8	2.17	•		
12 FNLBA	3/4	1.06	1.63	1 3/8	2.21	•		
16 FNLBA	1	1.31	1.63	1 5/8	2.21	•		
20 FNLBA	1 1/4	1.56	1.63	1 7/8	2.21	•		
24 FNLBA	1 1/2	1.88	1.63	2 1/4	2.21	•		

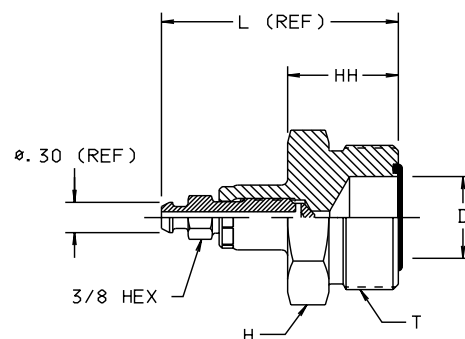
Tightening torque for bleed screw is 35-40 in-lb.

ORFS Tube End Plug Bleed Adapter

PNLOBA

Part Number Information
PNLBA - Body Only
PNLOBA - Assembled with O-Ring

All dimensions are in inches



TUBE FITTING PART #	TUBE O.D. (inch)	T TUBE END UN/UNF-2A	D DRILL (inch)	H (inch)	HH (inch)	L (inch)	STANDARD MATERIAL FROM STOCK		
							S	SS	B
4 PNLOBA	1/4	9/16-18	0.172	11/16	0.80	1.90	•		
6 PNLOBA	3/8	11/16-16	0.264	3/4	0.85	1.97	•		
8 PNLOBA	1/2	13/16-16	0.378	7/8	0.91	2.07	•		
10 PNLOBA	5/8	1-12	0.484	1 1/16	1.02	2.19	•		
12 PNLOBA	3/4	1 3/16-12	0.608	1 1/4	1.08	2.27	•		
16 PNLOBA	1	1 7/16-12	0.811	1 1/2	1.10	2.35	•		
20 PNLOBA	1 1/4	1 11/16-12	1.024	1 3/4	1.10	2.41	•		
24 PNLOBA	1 1/2	2-12	1.260	2 1/8	1.10	2.48	•		

See page B45 for information on replacement face seal O-rings.
Tightening torque for bleed screw is 35-40 in-lb.

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of the Next Section