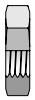
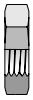
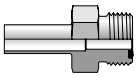
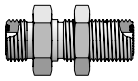
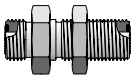
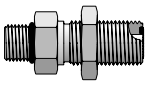
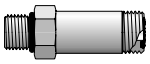
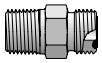
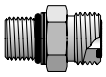
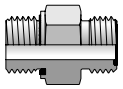
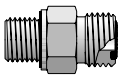
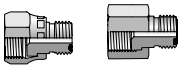
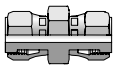
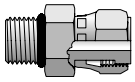
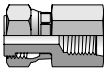
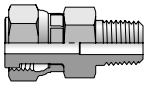
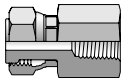
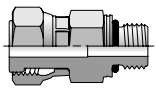
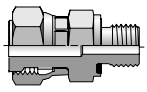
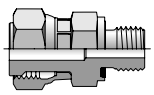
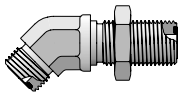
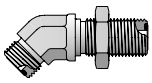
Nuts, Sleeves, Locknuts	**BL** Tube Nut  A10	**BML** Tube Nut - mm Hex  A10	**TPL (Inch and Metric)** Parflange Sleeve  A10	**TL (Inch and Metric)** Braze Sleeve  A11	**TL-Reducer** Braze Reducer Sleeve  A11
WLNL Bulkhead Locknut  A12	**WLNML** Blkhd Locknut - mm Hex  A12	**SBR (Inch and Metric)** Braze Ring  A12	**Straights**	**HLO** Union  A13	**HMLO** Union - mm Hex  A13
LHP ORFS Flange Seal  A17	**LHMP** ORFS Flange Seal  A17	**LOHB3** ORFS / Braze Socket  A18	**MMLOHB3** ORFS / Braze - mm Hex  A18	**LOHT3** ORFS / Tube Weld  A18	**WLO** Bulkhead Union  A13
WMLO Bulkhead Union - mm Hex  A14	**WF5OLO** ORFS Blkhd / SAE-ORB  A14	**F5OLO** ORFS / SAE-ORB  A15	**FF5OLO** ORFS - Long / SAE-ORB  A15	**G5LO** ORFS / SAE-ORB  A15	**FLO** ORFS / NPTF  A15
GLO ORFS / NPTF  A16	**F87OMLO** ORFS / ISO 6149  A16	**F82EDMLO** ORFS / Metric-ED  A16	**F42EDMLO** ORFS / BSPP-ED  A16	**Straight Swivels**	**TRLON** Tube End Reducer  A19
LOHL6 Extender and Expander  A19	**HL6** ORFS Swivel Union  A19	**F65OL** ORFS Swivel / SAE-ORB  A20	**G65L** ORFS Swivel / SAE-ORB  A20	**F6L** ORFS Swivel / NPTF  A20	**G6L** ORFS Swivel / NPTF  A20
F687OML ORFS Swivel / ISO 6149  A21	**F682EDML** ORFS Swivel / Metric-ED  A21	**F642EDML** ORFS Swivel / BSPP-ED  A21	**45° Elbows**	**WNLO** Bulkhead Union  A21	**WNMLO** Bulkhead Union - mm Hex  A22
V6LO ORFS Swivel Elbow  A22	**V5OLO** ORFS / SAE-ORB  A22	**VLO** ORFS / NPTF A22	**V87OMLO** ORFS / ISO 6149 A23	**V4OMLO** ORFS / BSPP-ORR A23	

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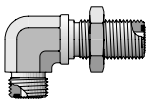
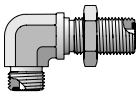
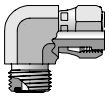
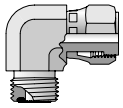
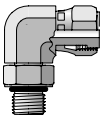
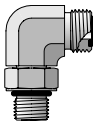
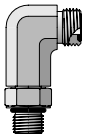
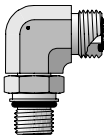
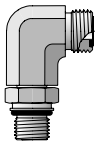
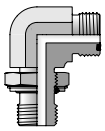
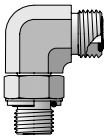
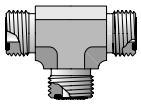
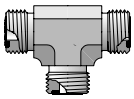
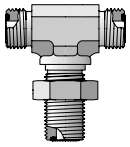
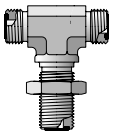
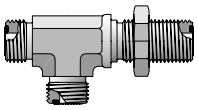
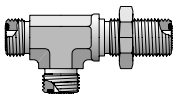
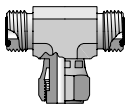
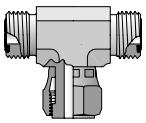
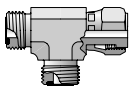
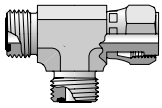
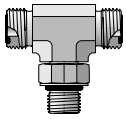
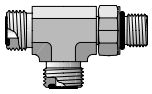
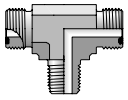
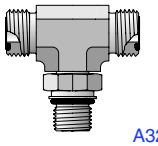
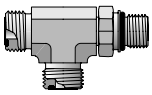
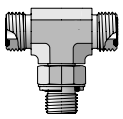
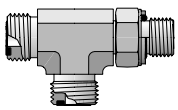
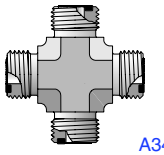
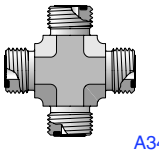
90° Elbows	**ELO** Union Elbow  A23	**EMLO** Union Elbow - mm Hex  A23	**WELO** Bulkhead Union  A24	**WEMLO** Bulkhead Union - mm Hex  A24	**C6LO** ORFS Swivel Elbow  A25
C6MLO Swivel Elbow - mm Hex  A25	**AOEL6** ORFS Swivel / SAE-ORB  A25	**C5OLO** ORFS / SAE-ORB  A25	**CC5OLO** ORFS / SAE-ORB - Long  A26	**CLO** ORFS / NPTF  A26	**C87OMLO** ORFS / ISO 6149  A26
CC87OMLO ORFS / ISO 6149 - Long  A27	**C8OMLO** ORFS / Metric-ORR  A27	**C4OMLO** ORFS / BSPP-ORR  A28	**Tees**	**JLO** Union Tee  A28	**JMLO** Union Tee - mm Hex  A28
WJLO Bulkhead Branch  A28	**WJMLO** Blkhd Branch - mm Hex  A29	**WJJLO** Bulkhead Run  A29	**WJJMLO** Bulkhead Run - mm Hex  A30	**S6LO** ORFS Swivel Branch  A30	**S6MLO** Swivel Branch - mm Hex  A30
R6LO ORFS Swivel Run  A31	**R6MLO** Swivel Run - mm Hex  A31	**S5OLO** SAE-ORB Branch Tee  A31	**R5OLO** SAE-ORB Run Tee  A32	**SLO** NPTF Branch Tee  A32	**S87OMLO** ISO 6149 Branch Tee  A32
R87OMLO ISO 6149 Run Tee  A33	**S4OMLO** BSPP-ORR Branch Tee  A33	**R4OMLO** BSPP-ORR Run Tee  A34	**Crosses**	**KLO** Union Cross  A34	**KMLO** Union Cross - mm Hex  A34
Plugs, Caps and Bleed Adapters	**PNLO** ORFS Plug  A35	**PNMLO** ORFS Plug - mm Hex  A35	**FNL** ORFS Cap  A35	**FNML** ORFS Cap - mm Hex  A35	

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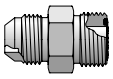
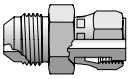
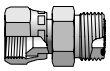
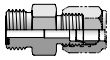
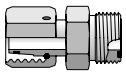
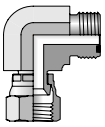
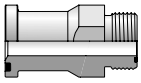
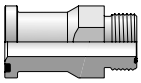
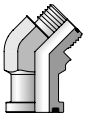
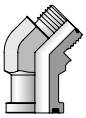
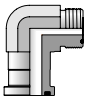
Conversion Adapters (Shown in Section L)

Conversion Adapters	XHLO 37° Flare / ORFS	XHL6 37° Flare / ORFS Swivel	LOHX6 ORFS / 37° Swivel	BUHLO ORFS / Flareless (inch)	LOHU86 Metric Swivel (EO)/ORFS
	 L3	 L3	 L3	 L4	 L4

LOEX6 ORFS / 37° Swivel
 L3

Flange Adapters (Shown in Section M)

SAE Flange Adapters	LOHQ1 Code 61 / ORFS	LOHQ2 Code 62 / ORFS	LOVQ1 Code 61 / ORFS	LOVQ2 Code 62 / ORFS	LOEQ1 Code 61 / ORFS
	 M10	 M10	 M28	 M28	 M29

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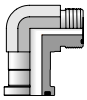
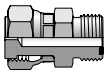
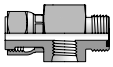
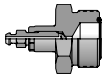
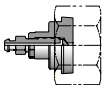
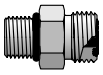
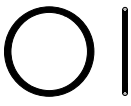
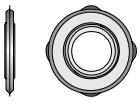
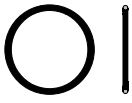
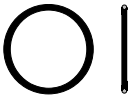
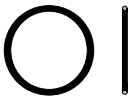
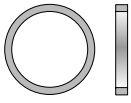
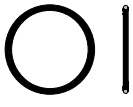
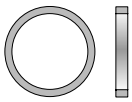
 M29

Diagnostic, Bleed Adapters & Screen Fittings (Shown in Section N)

Diagnostic, Bleed Adapters & Screen Fittings	LOHL6 Orifice Orifice Swivel with Orifice / ORFS	LOHL6G5TP Orifice Swivel / ORFS / SAE-ORB	PNLOBA Bleed Screw / ORFS	FNLBA Bleed Screw / SAE-ORB	Screen Fittings
	 N9	 N5	 N10	 N10	 N12

O-Rings and Seals (Shown in Section O)

O-Rings and Seals	ORFS O-Ring	PLS Bonded Seal	SAE O-Ring	ISO 6149 O-Ring	Metric O-Ring
	 O3	 O3	 O3	 O4	 O4

Metric Retaining Ring	BSPP O-Ring	BSPP Retaining O-Ring	EOlastic Seal Ring
 O4	 O5	 O5	 O6

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Seal-Lok 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. It meets or exceeds the strict requirements of SAE J1453 and ISO 8434-3. 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 (Fig. A1). As shown in Fig. A3, 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 of the fitting body to form a leak tight seal.

Seal-Lok fittings are suitable for a wide range of tube wall thicknesses and are readily adaptable to pipe, inch or metric tubing and hose. (Please refer to Tables A2 and A3 for min./max. tube wall thickness for inch and metric tubing, respectively). Seal-Lok's leak-free design and rugged construction make it suitable for a wide range of applications where higher pressures, vibration and impulse are prevalent. It is popular in markets such as construction, agriculture, machine tool, utility, paper making, automotive, etc.

Fig. A1 — Seal-Lok Fitting Body, O-ring, Sleeve and Nut

Design and Construction

The Seal-Lok fitting consists of four main components: a body, a sleeve, an O-ring and a nut. The more popular materials from which Seal-Lok is manufactured are shown in Table A1.

The Seal-Lok Fitting Body. There are over 60 different body configurations to choose from for specific applications. The body face is manufactured with Parker's CORG (captive O-ring groove), which keeps the high durometer O-ring captive during installation (see Fig. A2). In addition, the Seal-Lok fitting body shapes are forged for added strength and longer service life, eliminating the potential leak paths associated with multi-component brazed fittings. Straight products are made from cold drawn barstock. The cold drawing process ensures consistent dimensional tolerances, improved strength and better surface finish.

The Seal-Lok Fitting Nut. Seal-Lok tube nuts are either cold formed or machined from cold drawn bar stock, depending on the size. The cold forming process increases the material strength and its fatigue properties, imparting high strength and longer service life to the nuts.

The Seal-Lok Flange Sleeve. The preferred method of making a Seal-Lok connection is by using the Parker Parflange machine (see section S) 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 (see Fig. A3). The Parflange process provides the following advantages:

- Several times faster than brazing.
- Does not require any special pre- or post-flange cleaning.
- Cleaner and safer than brazing.
- Accommodates the use of plated or unplated sleeve and tube.
- Eliminates a potential leak path associated with braze joints.

Fig. A2 — Captive O-ring Groove (CORG) Cutaway

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

Table A1 — Standard Material Specifications for Seal-Lok

Fittings*All stainless steel nuts are coated to prevent galling at assembly.
Note: Other materials can be produced upon request.
Finish: Zinc with yellow chromate (being changed to zinc chromium 6 free) is used on all standard steel products. Stainless steel fittings are passivated.

Dimensions and pressures for reference only, subject to change.

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The Seal-Lok Braze Sleeve. A second method of sleeve attachment is with the braze sleeve. The sleeve is brazed to the tube end as shown in Fig. A3. The flat, smooth surface of the braze sleeve seals against the O-ring when fully assembled. The holding power is provided by the braze.

The Seal-Lok Trap-Seal™. The Trap-Seal, with its consistently positive retention in the groove, essentially eliminates the possibility of full or partial O-ring pop out. The seal's trapezoidal shaped cross-section leads to improved retention within Seal-Lok's CORG groove and virtually eliminates costly leakage and time consuming pre-assembly handling. The groove design has not changed, so the standard O-ring can be used for seal replacement in the field. Currently, the Trap-Seal is offered in 90-durometer Nitrile (NBR).

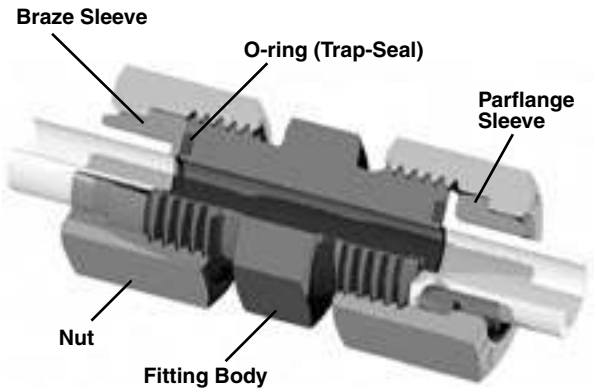

Fig. A3 — Seal-Lok Union cutaway with flanged and brazed assemblies

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. A3).

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, minimizing 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 practically unlimited remakeability. The O-ring should be inspected at each disassembly and replaced when necessary. **See the O-Rings and Seals section for information on replacement ORFS O-rings.**

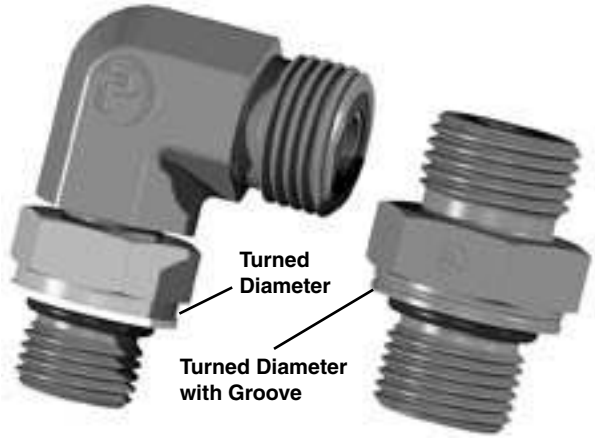

Fig. A4 — Metric Seal-Lok Straight and Shaped Connectors with Identification for use with ISO 6149-1 Port

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Seal-Lok fittings.

Metric Seal-Lok

The tube/hose end connection for metric Seal-Lok is the same as standard (inch) Seal-Lok. It consists of a body, a flange or braze sleeve, an O-ring and a nut. The difference is at the port end of the fitting. Instead of the SAE straight thread connection, it features a similar connection with metric threads per ISO 6149-2. Additionally, the fitting body, tube nut and locknut are manufactured with metric hexes or forging wrench flats. The metric Seal-Lok fittings meet or exceed all requirements of ISO 8434-3.

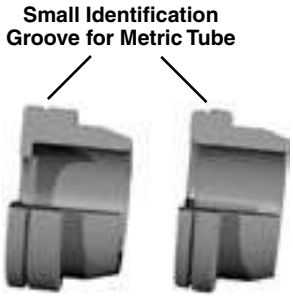

Fig. A5 — Metric (Tube) Seal-Lok Sleeves

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Identification

To differentiate metric Seal-Lok from standard (inch) Seal-Lok, the following identification features have been incorporated in the design:

- Straight connectors (straight studs) have a short length of turn diameter with a small groove machined in it's middle, as seen in Fig. A4.
- The locknuts on shaped connectors (stud elbows, tees and crosses) have a similar turn diameter adjacent to the washer, without a groove, as seen in Fig. A4.
- The sleeve is identified by a small groove machined on its large diameter as shown in Fig. A5.

Versatility

The Seal-Lok fitting is very versatile in that it can be used with inch and metric tubing, as well as hose (see Fig A6).

The following example illustrates the options with a ½" (-8) Seal-Lok fitting:

- ½" fitting and ½" nut can connect to ½" tubing using the ½" sleeve.
- ½" fitting and ½" nut can connect to 12 mm tubing using 12 mm sleeve.
- Without nut and sleeve, ½" fitting can connect to hose.

The process also works in reverse. A metric Seal-Lok fitting and metric nut can connect to inch tubing by simply using the inch sleeve.

Tube Wall Thickness

Recommended min/max tube wall thicknesses for inch and metric Seal-Lok are provided in Tables A2 and A3, respectively. When using the braze method, all tube wall thicknesses can be used. For Parflange min/max tube wall thickness range, please refer to page S26 for tooling availability.

With any fitting, proper assembly and installation is critical to its success. Please refer to pages T13-T18 for the proper assembly and installation procedures for the Seal-Lok fitting.

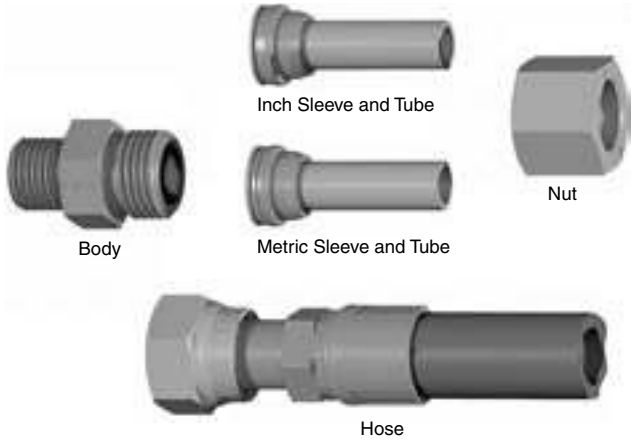

Fig. A6 — Seal-Lok Works with Inch or Metric Tube and Hose

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 A2 — Recommended Min./Max. Tube Wall Thickness for Inch Seal-Lok

	Steel, Alloy Steel, Stainless Steel, Copper, Monel	
O.D. Size in mm	Wall Thickness in mm	Used With Fitting Size
6	.5 - 2.25	-4
8	1.0 - 2.5	-6
10	1.0 - 3.0	-6
12	1.0 - 3.5	-8
14	1.0 - 4.0	-10
15	1.0 - 3.0	-10
16	1.0 - 3.0	-10
18	1.0 - 3.0	-12
20	1.5 - 4.0	-12
22	1.0 - 3.0	-16
25	2.0 - 5.0	-16
28	1.5 - 5.0	-20
30	2.0 - 5.0	-20
32	2.0 - 2.5	-20
35	2.0 - 6.0	-24
38	2.5 - 7.0	-24

Table A3 — Recommended Min./Max. Tube Wall Thickness for Metric Seal-Lok

Dimensions and pressures for reference only, subject to change.

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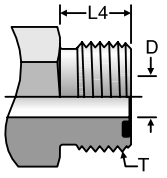
Seal-Lok Features

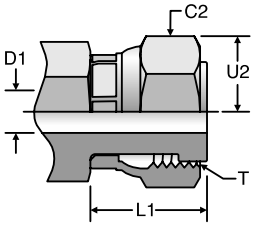
Feature	Advantage	Benefit
Conformance to SAE J1453 and ISO 8434-3	Versatility for end user and customer standardization efforts	Standardization reduces procurement costs.
Elastomeric seal	Tolerant of surface imperfections to provide leak-free connection	Reduces operational and maintenance costs
High pressure rating	Good for wider range of applications, providing opportunity to standardize	Standardization reduces procurement costs
No tube entry (flat-face design)	Easy and fast drop-in installation	Saves assembly and disassembly time
Captive O-ring groove (CORG)	Prevents O-ring fall-out to ensure positive and leak-free connection	Redues operational and maintenance costs
Forged Shapes	Higher resistance to mechanical shock and vibration that can lead to leakage	Reduces operational and maintenance costs
Similar envelope size to 37˚ flared fitting	Minimizes re-design of hydraulic systems	Reduces re-design costs
Wide tube wall range (no wall thickness limitation for braze method; however, recommended min/max ranges are shown on page A7)	Allows for greater flexibility in design of hydraulic system	Reduces design costs
Resistance to over-torque	Minimizes damage during assembly	Reduces operational and maintenance costs
Unlimited reusability/ remakeability	Extends the service life of the fitting	Reduces maintenance costs and component replacement costs.
Parflange method of assembly	Several times faster than brazing/welding	Reduces assembly cost
	No special pre- and post-braze welding cleaning	Reduces tube preparation cost
	No open flame or heat source required	Improves operator safety
	No braze joint or potential leak path	Reduces operational and maintenance costs

Table A4 — Seal-Lok Features, Advantages and Benefits

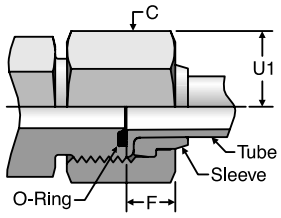
Seal-Lok O-Ring Face Seal Tube Ends



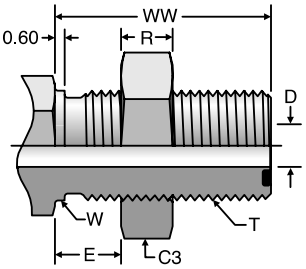
Seal-Lok Male Tube End



Seal-Lok Swivel



Seal-Lok Tube End Assembly



Seal-Lok Bulkhead

															Bulkhead			Across Corners	
			Thread	Tube Nut Hex		Swivel Nut Hex		Bulkhead Locknut Hex		Nominal Drill Tube End	Nominal Drill Swivel End	Max Bulkhead Thickness	Tube Nut Assembled Allowance	Swivel Turn Back	Male Turn Back	Locknut Thickness	Pilot Dia	Length	Tube Nut Hex	Swivel Nut Hex
SAE Dash Size	**Tube O.D.**		**T**	**C**		**C2**		**C3**		**D[1)]**	**D1[1)]**	**E**	**F**	**L1**	**L4**	**R**	**W[2)]**	**WW**	**U1**	**U2**
	(in.)	(mm)	UN/UNF	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)
4	1/4	6	9/16-18	11/16	17	11/16	17	13/16	22	0.172	0.165	0.55	0.255	0.642	0.394	0.27	0.563	1.24	0.80	0.80
6	3/8	8 10	11/16-16	13/16	22	13/16	22	1	27	0.264	0.264	0.55	0.295	0.715	0.441	0.32	0.688	1.34	0.94	0.94
8	1/2	12	13/16-16	15/16	24	15/16	24	1 1/8	30	0.378	0.358	0.55	0.394	0.865	0.512	0.35	0.813	1.44	1.08	1.08
10	5/8	14 15 16	1-14	1 1/8	30	1 1/8	30	1 5/16	36	0.484	0.453	0.55	0.393	0.980	0.618	0.41	1.000	1.60	1.30	1.30
12	3/4	18 20	1 3/16-12	1 3/8	36	1 3/8	36	1 1/2	41	0.609	0.547	0.55	0.452	1.110	0.677	0.41	1.188	1.64	1.58	1.58
14	7/8	—	1 5/16-12	1 1/2		1 1/2		1 5/8		0.709	0.709	0.55	0.512	1.145	0.697	0.41	1.313	1.66	1.74	1.74
16	1	22 25	1 7/16-12	1 5/8	41	1 5/8	41	1 3/4	46	0.811	0.783	0.55	0.512	1.190	0.697	0.41	1.438	1.66	1.88	1.88
20	1 1/4	28 30 32	1 11/16-12	1 7/8	50	1 7/8	50	2	50	1.024	1.024	0.55	0.512	1.251	0.697	0.41	1.688	1.66	2.16	2.16
24	1 1/2	35 38	2-12	2 1/4	60	2 1/4	60	2 3/8	60	1.260	1.260	0.55	0.512	1.330	0.697	0.41	2.000	1.66	2.60	2.60
32	2	42 50	2 1/2-12	2 7/8		2 7/8		2 3/4		1.772	1.772	0.50	0.629	1.690	0.874	0.54	2.500	1.83	3.32	3.32

1) D and D1 nominal may vary from the values shown in the chart by 0.004 to 0.008. Also, D for -4 metric based Seal-Lok may be D.197 (5 mm) to satisfy ISO 8434-3 (1994 edition). Contact the Tube Fittings Division if there are any questions.

2) Recommended clearance hole = W + 0.015.

3) See page O3 for ORFS O-rings.

Dimensions and pressures for reference only, subject to change.

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