Catalog 4300
August 2006

Industrial Tube Fittings, Adapters and Equipment



The World Standard



Our snowflake principle.

(Since no two applications are the same.)

Why work your designs around parts somebody else designed, just because they're available? We have an entire facility dedicated to delivering custom fittings, manufactured precisely to your specs or drawings and in record time – whether you need 2,000 or just that one-of-a-kind. Chances are it'll cost less than you thought, too. **So if you can't find the right fitting, adapter or flange within this catalog, call 1-866-222-2267.** Or e-mail inquiries regarding quotations to customfittings@Parker.com. You'd be amazed at the cool stuff we can do together.

⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale."

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Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio

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PRODUCT SPOTLIGHT

The latest from Parker, still your fitting authority.

Seal-Lok™ Lite

the compact, high-flow tube fitting

For high flow at low- to medium-pressure applications, such as fluid conveyance in fuel cell systems and semiconductor manufacturing, Parker's stainless steel Seal-Lok Lite fitting provides a remarkably compact, reliable solution:



- Shorter thread lengths and larger flow diameter than instrumentation-grade and traditional industrial hydraulic fittings
- The assembly and leak-free performance advantages of Seal-Lok ORFS (SAE J1453)
- Adaptable to Parker Flexflange™ and similar light-duty flexible corrugated stainless steel tube, flexible hose interfaces, as well as hard-line metallic tube
- Parker Parflange® method can be used, saving time and cost
- Torque method can be used, assuring more consistent assembly



Seal-Lok Lite flow diameter *Instrumentation flow diameter*



Seal-Lok Lite thread lengths *Instrumentation thread lengths*

Seal-Lok™ H_2 Fittings & Adapters

for onboard hydrogen and CNG fuel systems



In today's efforts to maximize fuel cell vehicle driving range, Seal-Lok with enhanced H_2 technology fulfills a key role. This "Parker Exclusive" series offers the industry's only O-ring face seal (ORFS) type and positionable fitting approved for 700-bar (10,000 psi) hydrogen service*. The full range of these stainless steel fittings and adapters is:

- Specifically designed with an enhanced sealing arrangement and approved O-ring compounds for on-board vehicle hydrogen storage and delivery systems
- Also approved for on-board vehicle compressed natural gas (CNG) storage and delivery up to 350 bar (5000 psi).**
- Designed with Parker's new H_2 stud and H_2 port – which is compatible with standard SAE connectors





*Series meets the requirements of EIHP Draft 12b, as tested by TÜV, and is the only fitting with approval for this demanding application.
**Seal Lok fittings and adapters in both steel and stainless steel material with tested O-ring compound are approved to the ECE R110 regulation and ISO 15500 standard.

Triple-Lok® 2

the soft-seal stainless steel 37° fitting

For a long-lasting, highly reliable seal, Parker's Triple-Lok 2 combines the versatility of our stainless steel Triple-Lok with an elastomeric seal design.



- Incorporates a replaceable soft seal in nose of flare, positioned to achieve leak-free connections without compromising fitting strength
- Up to 20% higher working pressures than standard stainless steel 37° flared fittings
- Features Parker's patented Robust Port Stud™ for easier assembly and further improved reliability for adjustable fittings
- Specially engineered groove design prevents nose collapse for assured field performance
- Can be used with standard flared tubes and hose ends – and uses standard O-rings in most sizes for further convenience and savings



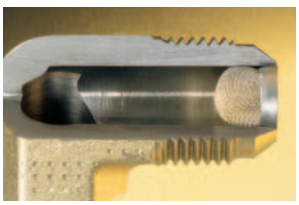
Parker Screen Fittings

for critical components and applications



Particles can find their way into a system during installation, maintenance and by other means. Critical and valuable components need one last line of defense. Parker screen fittings, implemented in addition to your filtration system, provide "protection at the connection."

- Ideal for protecting gauges and instrumentation, critical hydraulic components, precision orifices and expensive components in test bench circuits
- Retain particle sizes from 480 to 65 microns, depending on screen rating
- For hydraulic or pneumatic applications – constructed with stainless steel screen elements and available in standard fitting configurations, Triple-Lok 37° flare and Seal-Lok ORFS types
- Tested to determine the maximum pressure drop, screen retention and bi-directional flow capacity





PRODUCT SPOTLIGHT

The latest from Parker, still your fitting authority.

ACEsolutions™
advanced connection enhancements

At Parker, we never stop pursuing perfection. We're always working to further assure leak-free performance and make components maintain their like-new integrity longer. The results are advanced connection enhancements, or ACEsolutions. Starting with exclusive innovations like these, we're continuing to set new standards in performance and savings for you.



Robust Port Stud™

improved SAE adjustable port stud

The Robust Port Stud allows for easier, mistake-proof installation in the field – and eliminates the potential for backup washer damage that can lead to leaks.

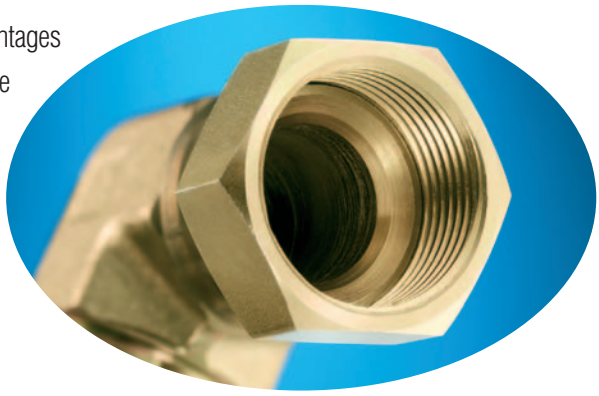
- Longer locknut provides more area to "wrench," while keeping the threads covered
- No need to retrofit any parts – functional dimensions are same as current SAE adjustable connectors

Just three basic assembly steps ensure that it's done right the first time: Thread the connector into the port. Back it off to align the tube end. Tighten the locknut.

Triple-Lok® Swivel Connection

improved performance by design

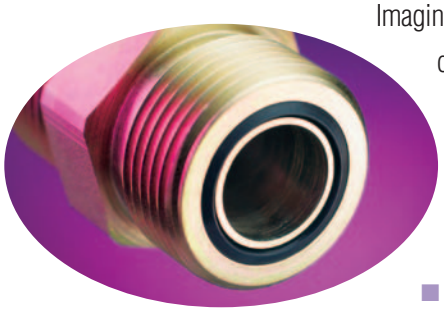
Higher pressure ratings and greater reliability are among the valuable advantages of our enhanced Triple-Lok female connection design. It features a dual-angle seat that accepts both 37° and 45° flare fittings – and repositions the sealing location away from the tip of the male nose. Compared with the previous swivel design, the resulting benefits include:



- Increased pressure ratings in most sizes (in fact, 72% higher than competitive product)
- Sealing position that helps protect cone and nose, and improves connection reliability
- Dual seat acceptance of 37° (all sizes) and 45° flare fittings (sizes 4, 5, 8, 10)
- No difference in overall swivel nut or fitting body size, no change in torque or assembly method

Trap-Seal™

innovative O-ring enhancement



Imagine, a seal that doesn't get pinched and fail prematurely. Parker's Trap-Seal, with its consistently positive retention in the groove, essentially eliminates the possibility of pop-out that can occur with standard round-shaped O-rings.

- Trapezoidal seal shape improves retention within Seal-Lok's ORFS groove
- Virtually eliminates costly leakage and/or pre-assembly handling time
- Significantly reduces need to replace/reinstall seal
- Standard O-ring can be used in field replacement (groove design unchanged)
- Same material and hardness (90 Durometer Nitrile) as Parker's standard O-ring

Chromium-6 Free

plating changes for new global standards

With the use of hexavalent chromium (Cr6) restricted in Europe, we've changed our metal plating process for the better. Our Chromium-6 Free process results in a new generation of characteristics in our metal fluid-connection components, including:

- Silver (no longer gold) appearance
- Safer for the environment
- Improved corrosion protection over previous plating
- No changes in assembly method or torque
- Packaging labeled “Chromium-6 Free” for easy identification

It's just one more example of Parker's drive to keep our products – and yours – in ready compliance with changing global requirements.

Parflange® Technology

the revolutionary tube connection system



Cut your tube assembly time by as much as 75%. In one quick operation, the Parflange process perfectly flanges (90°) or flares (37°), providing a reliable seal for high-pressure tubes up to 1-1/2" or 38 mm O.D. without brazing or welding – for a leak-free connection every time.

- Eliminates time-consuming pre-cleaning, post-cleaning and x-ray operations, as well as the need for cleaning solvents, weld rods, acetylene or flux
- Utilizes a patented orbital spindle process to produce a reliable flange with a smooth mating surface
- Creating a flat face requires no special skills and can be completed in fewer than 20 seconds

Available models include the 1050 WorkCentre for large-scale industrial production and the bench mountable 1025.



Custom Products

for applications as different as snowflakes

Parker Tube Fittings Division can manufacture custom products to your specifications, your drawings, or world standards – whether you need thousands or just one of a kind. And by turning to us, you can typically reduce your lead times and the price of lower-volume parts. With our exclusive Rapid Response system and integrated computer-to-machine technology we can:

- Produce new parts in remarkably short time frames
- Reduce machine set-up times
- Produce smaller-run quantities
- Respond to emergency orders within hours, not days

Next time you have a great idea or an urgent requirement, call Parker and ask for "custom fittings."

Introduction

The Parker Hannifin Tube Fittings Division 4300 digital catalog is a single Adobe™ Reader application that is made up of many files. We have added bookmarks and links to allow you to easily navigate through the document.

You'll notice that some text is highlighted in blue throughout the catalog. This means that the text has been linked to additional information about that subject. If you click on one of these words, you will immediately jump to a page with information about the subject highlighted in blue.

Navigation Buttons

In addition to Adobe's standard links and bookmarks, we have created special navigation buttons to help you find related pieces of information. You will find these buttons on the pages of the catalog that show our parts. Each of these navigation buttons will take you to specific information related to each part, as shown below:



Links to Visual Index



Links to Ordering Information



Links to Conformance Standards



Links to Assembly Instructions



Links to the TFD Web Site



Links to Reference Information

Where Did All the Dimensions Go?

If you've used previous editions of this catalog, you'll notice that most of the tables and graphics in this edition have been edited to show only the most relevant dimensions. A feature of this digital catalog is that we have created links to pages which show all of the dimensions of a part. Not every part has one of these "fully dimensioned" pages — only those parts that don't show the full dimensions in the catalog will have one.

These parts will have a navigation button near the part name that looks like this:



Click on the Full Dimensions button to go to the page which shows all the dimensions for that part. To return to the catalog, click on the Return To Catalog button:



Adobe Menu Bar

The Adobe menu bar is illustrated and described on the following page. For more information about how the Reader program works, select the "Reader Online Guide" from the Help menu.

Searching for a Specific Part

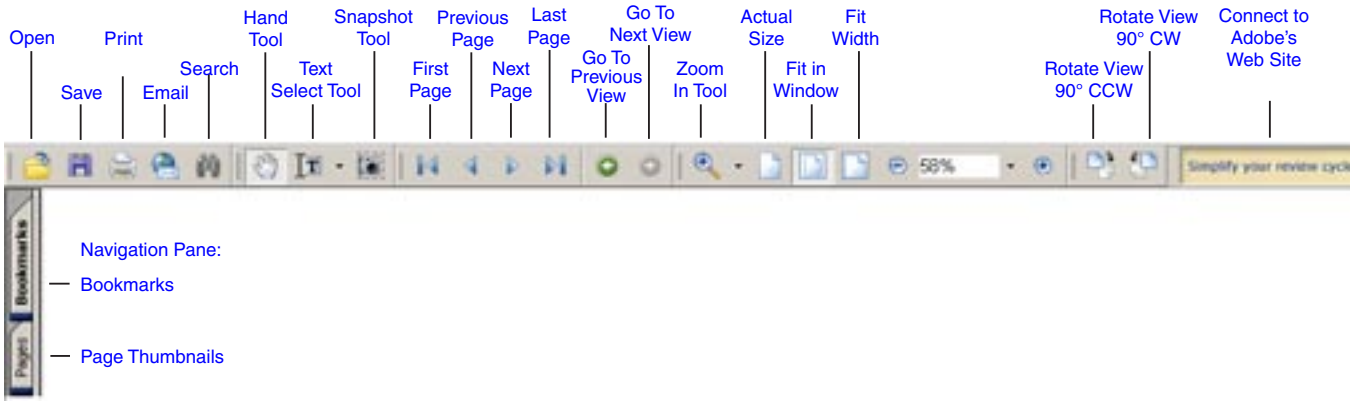
To make this digital catalog easier to use, we've created an index of all the key words and part numbers in the catalog. The Adobe menu bar, shown on the next page of this help file, shows the Search icon. It is found near the right side of the menu bar. The icon looks like a pair of binoculars with a page in the background. This icon allows you to search for any part in the catalog simply by clicking on the icon. After clicking on the icon, simply type in the word, phrase, or part number you want to find and a list of files will appear. Click on the first file in the list and the page will appear with the part number highlighted. To see the next reference, you can return to the full list of documents or use the "Next Highlight" button.

NOTE: Adobe™ as a trademark of Adobe Systems Incorporated.

Parker Hannifin Corporation
Tube Fittings Division
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http://www.parker.com/tfd

Overview of Adobe Reader with Search Capability Menu Bar

Using this digital catalog is simple once you've familiarized yourself with the Adobe™ Reader menu bar. Below is an illustration of the menu bar and a discussion of each button.

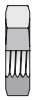
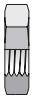
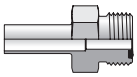
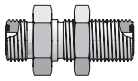
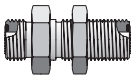
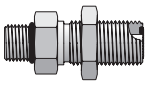
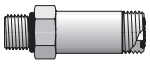
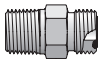
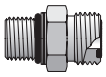
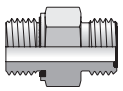
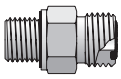
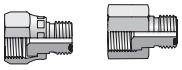
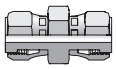
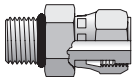
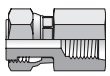
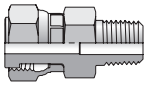
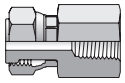
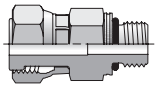
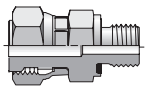
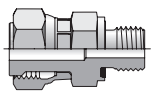
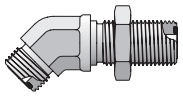
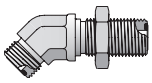
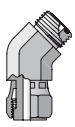
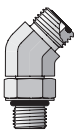
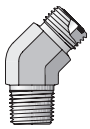
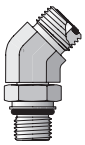
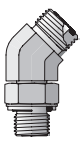


Open: Click to open a new file.
Save: Click to Save a file.
Print: Click to print the current document. The print dialog box will open and allow you to select your print options.
Email: Email a pdf.
Search: This tool searches for a word, a phrase, or a part number through all documents in the application.
Hand Tool: The Hand Tool is a move and selection tool. Use it to click on linked text and buttons to activate them. Use it to move the document page on-screen by clicking and dragging the Hand Tool in the direction you want the page to move.
Select Text Tool: Text can be selected in Adobe Reader, copied, and then pasted into other programs. Use the Select Text Tool to select text.
SnapShot Tool: Use this tool to copy text and graphics.
First Page: Click to go to the first page of the open, selected document.
Previous Page: Click to go to the previous page of the open, selected document.
Next Page: Click to go to the next page of the open, selected document. To move to a specific page, click on the page numbers in the status bar at the bottom of your screen. A window will open that allows you to enter the page number to which you want to go.
Last Page: Click to go to the last page of the open, selected document.
Go to Previous View: This button allows you to retrace your steps. Click on it to go to your previous view. This is helpful for returning to your original location after clicking a link to another location.
Go to Next View: Use this button to retrace your steps forward.
Zoom In Tool: Click on this tool, then on your document to zoom in. Click on the "Actual Size", "Fit in Window", or "Fit Width" button to return to another view.
Actual Size: Click to display the page at it's actual size.
Fit in Window: Click to scale the whole page to fit within your screen.
Fit Width: Click to scale the page width to fill the width of your screen.
Rotate View 90° CCW: Click to rotate the page 90° counter-clockwise.
Rotate View 90° CW: Click to rotate the page 90° clockwise.
Connect to Adobe's Web Site: Click to connect to Adobe's Web site.
Navigation Pane: The Navigation Pane displays the bookmarks and thumbnails that have been created for the file. When the Navigation Pane is toggled to "Hide", the bookmarks and thumbnails are not displayed and cannot be seen. Note that bookmarks and thumbnails can be displayed independently by using the Window menu and selecting Show Bookmarks or Show Page Thumbnails.
Bookmarks: Bookmarks appear on the left side of your screen and allow you to jump to a specific location from anywhere in the document. (Links, on the other hand, allow you to jump only from a specific location to a specific location.) Click on a bookmark to move immediate to that location.
Page Thumbnails: The page thumbnails tab diplays a very small picture of each page in the file. Click on a thumbnail to go to that page.

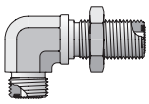
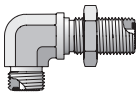
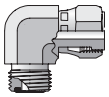
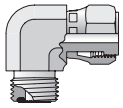
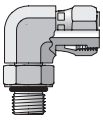
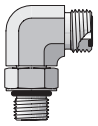
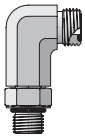
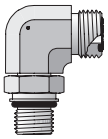
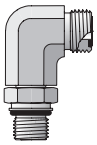
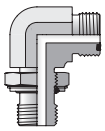
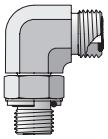
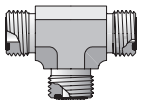
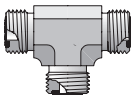
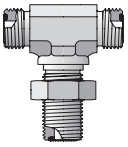
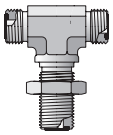
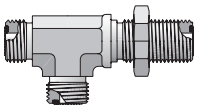
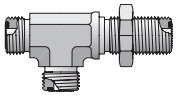
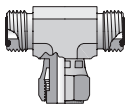
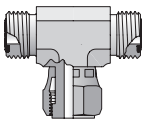
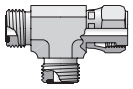
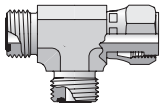
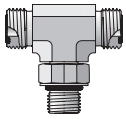
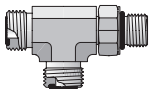
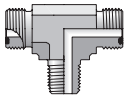
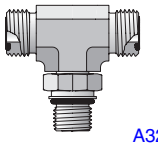
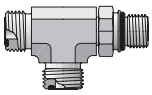
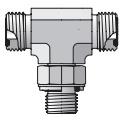
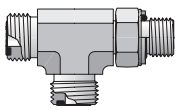
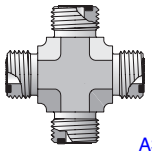
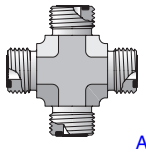
Seal-Lok™ O-Ring Face Seal Tube Fittings



The Fitting Authority

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	

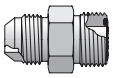
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

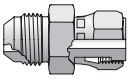
90° Elbows	**ELO** Union Elbow  A23	**EMLO** Union Elbow - mm Hex  A23	**WELO** Bulkhead Union  A24	**WEMLO** Bulkhead Union - mm Hex  A24	**C6LO** ORFS Swivel Elbow  A25
C6MLO Swivel Elbow - mm Hex  A25	**AOEL6** ORFS Swivel / SAE-ORB  A25	**C5OLO** ORFS / SAE-ORB  A25	**CC5OLO** ORFS / SAE-ORB - Long  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	

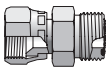
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

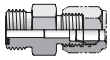
Conversion Adapters (Shown in Section L)

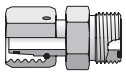
Conversion Adapters

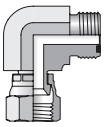
XHLO
37° Flare / ORFS

L3

XHL6
37° Flare / ORFS Swivel

L3

LOHX6
ORFS / 37° Swivel

L3

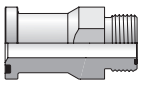
BUHLO
ORFS / Flareless (inch)

L4

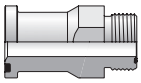
LOHU86
Metric Swivel (EO)/ORFS

L4

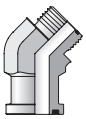
LOEX6
ORFS / 37° Swivel

L3

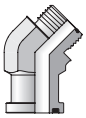
Flange Adapters (Shown in Section M)

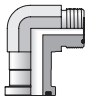
SAE Flange Adapters

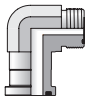
LOHQ1
Code 61 / ORFS

M10

LOHQ2
Code 62 / ORFS

M10

LOVQ1
Code 61 / ORFS

M28

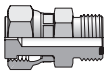
LOVQ2
Code 62 / ORFS

M28

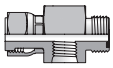
LOEQ1
Code 61 / ORFS

M29

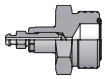
LOEQ2
Code 62 / ORFS

M29

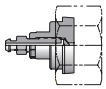
Diagnostic, Bleed Adapters & Screen Fittings (Shown in Section N)

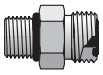
Diagnostic, Bleed Adapters & Screen Fittings

LOHL6 Orifice
Orifice Swivel with Orifice / ORFS

N9

LOHL6G5TP
Orifice Swivel / ORFS / SAE-ORB

N5

PNLOBA
Bleed Screw / ORFS

N10

FNLBA
Bleed Screw / SAE-ORB

N10

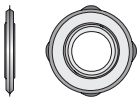
Screen Fittings

N12

O-Rings and Seals (Shown in Section O)

O-Rings and Seals

ORFS O-Ring

O3

PLS Bonded Seal

O3

SAE O-Ring

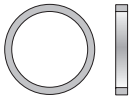
O3

ISO 6149 O-Ring

O4

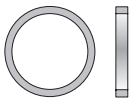
Metric O-Ring

O4

Metric Retaining Ring

O4

BSPP O-Ring

O5

BSPP Retaining O-Ring

O5

EOlastic Seal Ring

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).

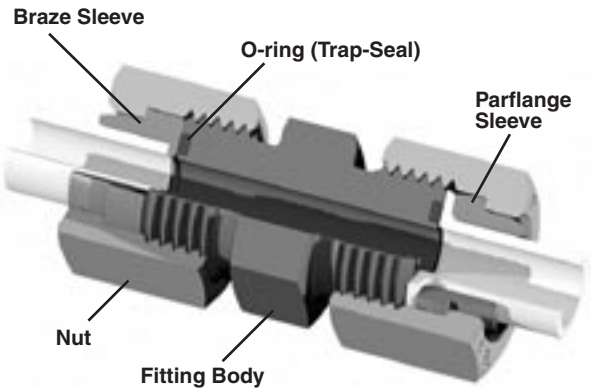


Fig. A3 — Seal-Lok Union cutaway with flanged and brazed assemblies

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.**

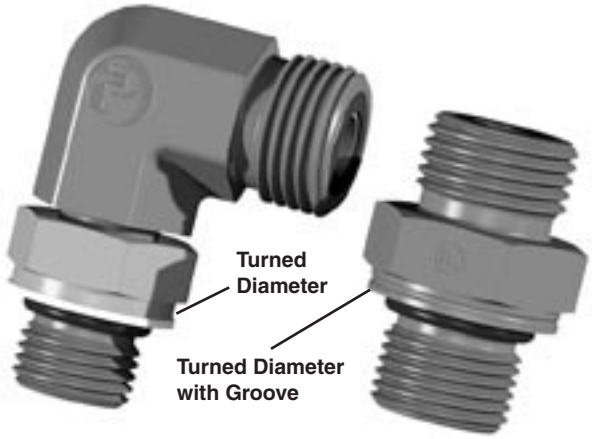


Fig. A4 — Metric Seal-Lok Straight and Shaped Connectors with Identification for use with ISO 6149-1 Port

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.

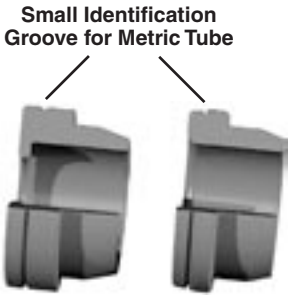


Fig. A5 — Metric (Tube) Seal-Lok Sleeves

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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.

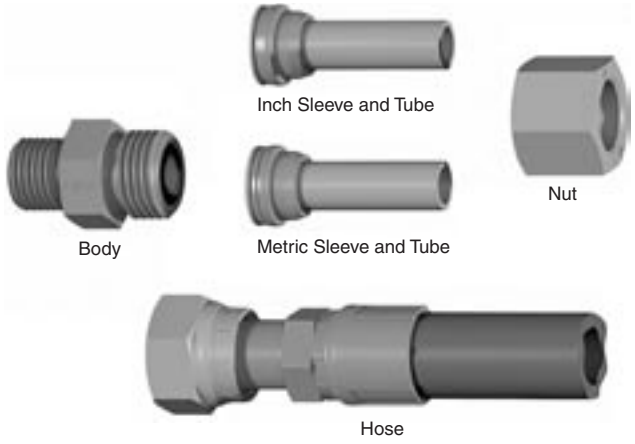


Fig. A6 — Seal-Lok Works with Inch or Metric Tube and Hose

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

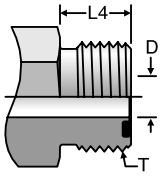
Feature	Advantage	Benefit
Conformance to SAE J1453 and ISO 8434-3	Versatility for end user and customer standardization efforts	Standardization reduces procurement costs.
Elastomeric seal	Tolerant of surface imperfections to provide leak-free connection	Reduces operational and maintenance costs
High 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

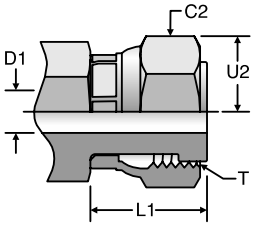
Dimensions and pressures for reference only, subject to change.

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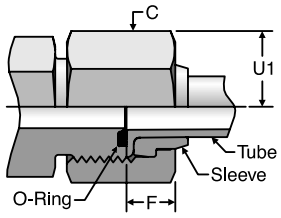
Seal-Lok O-Ring Face Seal Tube Ends



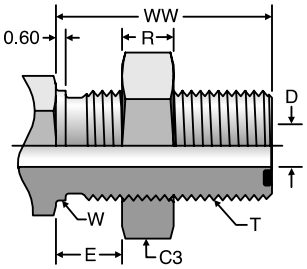
Seal-Lok Male Tube End



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.

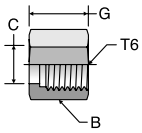
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Visual Index
How To Order
Specs
Assembly / Installation
3-D CAD Model
Reference Section

BL

Tube Nut
ORFS

SAE 520110



TUBE FITTING PART #	END SIZE (in.)	T6 UNF/UNF-2B	B HEX (in.)	C (in.)	G (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
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	•	

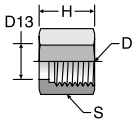
* Sizes 14 and 32 are not included in SAE J1453.

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

BML

Tube Nut – mm Hex
ORFS

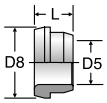
ISO 8434-3 NA
SAE 52M0110A



TUBE FITTING PART #	END SIZE (mm)	END SIZE (in.)	D THREAD UN/UNF-2B	D13 DRILL (mm)	H (mm)	S HEX (mm)	STANDARD MATERIAL FROM STOCK S	SS
4BML	6	1/4	9/16-18	10.5	15	17	•	
6BML	8,10	3/8	11/16-16	13.55	17	22	•	
8BML	12	1/2	13/16-16	16.6	20	24	•	
10BML	14,15,16	5/8	1-14	21.1	24	30	•	
12BML	18,20	3/4	1 3/16-12	24.15	26.5	36	•	
16BML	22,25	1	17/16-12	29.1	27.5	41	•	
20BML	28,30,32	1 1/4	1 11/16-12	36	27.5	50	•	
24BML	35,38	1 1/2	2-12	44	27.5	60	•	

TPL

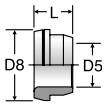
Parflange Sleeve
for Inch Tubing
ORFS Mechanically
Attachable Sleeve



TUBE FITTING PART #	D5 END SIZE (in.)	D8 DIA (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
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	•	

TPL (Metric)

Parflange Sleeve for
Metric Tubing
ORFS Mechanically
Attachable Sleeve



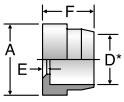
TUBE FITTING PART #	USED WITH FITTING SIZE	D5 END SIZE (mm)	D8 DIA (mm)	L (mm)	STANDARD MATERIAL FROM STOCK -S	-SS
TPLS6	-4	6	13	7.5	•	
TPLS8	-6	8	16	8.5	•	
TPLS10	-6	10	16	8.5	•	•
TPLS12	-8	12	19	10.5	•	•
TPLS14	-10	14	21	10.5		
TPLS15	-10	15	23.5	10.5	•	
TPLS16	-10	16	23.5	10.5	•	
TPLS18	-12	18	28	12	•	
TPLS20	-12	20	28	12	•	•
TPLS22	-16	22	34	13.5		
TPLS25	-16	25	34	13.5	•	
TPLS28	-20	28	40.5	13		
TPLS30	-20	30	40.5	13	•	
TPLS32	-20	32	40.5	13	•	
TPLS35	-24	35	48.5	12.5	•	
TPLS38	-24	38	48.5	12.5	•	

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

TL

Braze Sleeve for Inch Tubing
ORFS Silver Braze Sleeve



SAE 520115

TUBE FITTING PART #	END SIZE (in.)	A DIA (in.)	D* (in.)	E (in.)	F (in.)	STANDARD MATERIAL FROM STOCK -S	STANDARD MATERIAL FROM STOCK -SS
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	•	

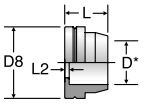
Unplated part, oil dipped for corrosion protection.

* D is for silver brazing.

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

TL (Metric)

Braze Sleeve for Metric Tubing
ORFS Silver Braze Sleeve



ISO 8434-3 BRSL
SAE 5201M15

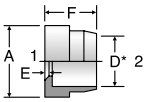
TUBE FITTING PART #	USED WITH FITTING SIZE	D* END SIZE (mm)	D8 DIA (mm)	L (mm)	L2 (mm)	STANDARD MATERIAL FROM STOCK -S	STANDARD MATERIAL FROM STOCK -SS
TLS6	-4	6	12.8	9.5	1	•	
TLS8	-6	8	15.8	9.5	1	•	
TLS10	-6	10	15.8	9.5	1	•	
TLS12	-8	12	18.9	9.5	1	•	•
TLS16	-10	16	23.5	10.5	1.5	•	•
TLS20	-12	20	27.9	14	1.5	•	•
TLS25	-16	25	34.2	15.5	1.5	•	
TLS30	-20	30	40.6	15.5	1.5	•	
TLS38	-24	38	48.5	15.5	1.5	•	

Unplated part, oil dipped for corrosion protection.

* D is for silver brazing.

TL-Reducer

Reducer Sleeve
ORFS Silver Braze Sleeve Reducer



SAE 520115

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

Unplated part, oil dipped for corrosion protection.

* D is for silver brazing.

** 12-14 TL must be assembled with 12-14 BL.

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Dimensions and pressures for reference only, subject to change.

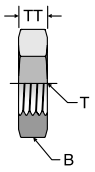
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

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WLNL

Bulkhead Locknut

SAE 520118



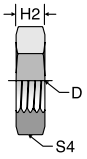
TUBE FITTING PART #	END SIZE (in.)	T TUBE END UN/UNF-2A	B HEX (in.)	TT (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
4 WLNL	1/4	9/16-18	13/16	0.27	•	•
6 WLNL	3/8	11/16-16	1	0.32	•	•
8 WLNL	1/2	13/16-16	1 1/8	0.35	•	•
10 WLNL	5/8	1-14	1 5/16	0.41	•	
12 WLNL	3/4	1 3/16-12	1 1/2	0.41	•	•
14 WLNL*	7/8	1 5/16-12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

WLNML

Bulkhead Locknut – mm Hex

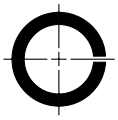
ISO 8434-3 BHLN
SAE 52M0118

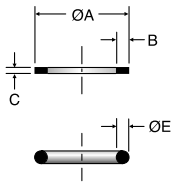


TUBE FITTING PART #	END SIZE (mm)	END SIZE (in.)	D TUBE END UN/UNF-2B	H2 (mm)	S4 HEX (mm)	STANDARD MATERIAL FROM STOCK S	SS
4WLNML	6	1/4	9/16-18	7	22	•	
6WLNML	8,10	3/8	11/16-16	8	27	•	
8WLNML	12	1/2	13/16-16	9	30	•	
10WLNML	14,15,16	5/8	1-14	10.5	36	•	
12WLNML	18,20	3/4	1 3/16-12	10.5	41	•	
16WLNML	22,25	1	1 7/16-12	10.5	46	•	
20WLNML	28,30,32	1 1/4	1 11/16-12	10.5	50	•	
24WLNML	35,38	1 1/2	2-12	10.5	60	•	

SBR

Silver Braze Ring for Inch Tubing





TUBE FITTING PART #	END SIZE (in.)	A DIA (in.)	B (in.)	C (in.)	E (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
4SBR	1/4	0.260	—	—	0.05	•	•
6SBR	3/8	0.390	0.07	0.03	—	•	•
8SBR	1/2	0.515	0.07	0.03	—	•	•
10SBR	5/8	0.640	0.07	0.03	—	•	•
12SBR	3/4	0.765	0.08	0.04	—	•	•
14SBR	7/8	0.890	—	—	0.06		
16SBR	1	1.015	0.08	0.04	—	•	•
20SBR	1 1/4	1.265	0.08	0.04	—	•	•
24SBR	1 1/2	1.515	0.08	0.04	—	•	•
32SBR	2	2.015	—	—	0.09	•	•

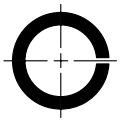
SBR recommended for steel or copper tubing.

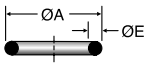
SBR-SS recommended for stainless tubing, but can be used on steel tubing.

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

SBR

Silver Braze Ring for MetricTubing





TUBE FITTING PART #	END SIZE (mm)	A DIA (mm)	E (mm)	STANDARD MATERIAL FROM STOCK -S	-SS
SBR6	6	6.4	1.2	•	
SBR8	8	8.4	1.2	•	
SBR10	10	10.4	1.2	•	
SBR12	12	12.4	1.2	•	
SBR14	14	14.4	1.2		
SBR15	15	15.4	1.2	•	
SBR16	16	16.4	1.2	•	
SBR18	18	18.4	1.2	•	
SBR20	20	20.4	1.6	•	
SBR22	22	22.4	1.6		
SBR25	25	25.4	1.6	•	
SBR28	28	28.4	1.6		
SBR30	30	30.4	1.6	•	
SBR32	32	32.4	1.6		
SBR35	35	35.4	1.6		
SBR38	38	38.4	1.6	•	
SBR42	42	42.4	1.6		
SBR50	50	50.4	2.4		

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.

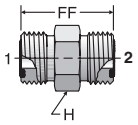
Dimensions and pressures for reference only, subject to change.

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HLO Full Dimensions

Union
ORFS / ORFS



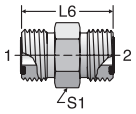
SAE 520101

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	FF (in.)	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 HLO	1/4	1/4	1.08	5/8	9.2	9.2
6 HLO	3/8	3/8	1.22	3/4	9.2	9.2
6-4 HLO	3/8	1/4	1.17	3/4	9.2	
8 HLO	1/2	1/2	1.39	7/8	9.2	9.2
8-6 HLO	1/2	3/8	1.33	7/8	9.2	
10 HLO	5/8	5/8	1.68	1 1/16	6.0	6.0
10-8 HLO	5/8	1/2	1.57	1 1/16	6.0	
12 HLO	3/4	3/4	1.85	1 1/4	6.0	6.0
12-10 HLO	3/4	5/8	1.80	1 1/4	6.0	
14 HLO*	7/8	7/8	1.87	1 3/8		
16 HLO	1	1	1.94	1 1/2	6.0	6.0
16-12 HLO	1	3/4	1.92	1 1/2	6.0	
20 HLO	1 1/4	1 1/4	2.02	1 3/4	6.0	
24 HLO	1 1/2	1 1/2	2.09	2 1/8	5.0	5.0
32 HLO*	2	2	2.87	2 3/4	3.0	

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

HMLO Full Dimensions

Union – mm Hex
ORFS / ORFS

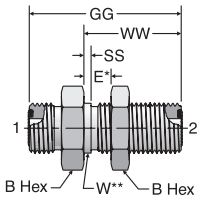


ISO 8434-3 S
SAE 52M0101

TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	L6 (mm)	S1 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4HMLO	6	1/4	27.5	14	9.2	
6HMLO	8,10	3/8	31	19	9.2	
8HMLO	12	1/2	35.5	22	9.2	
10HMLO	14,15,16	5/8	42.5	27	6.0	
12HMLO	18,20	3/4	47	32	6.0	
16HMLO	22,25	1	49.5	41	6.0	
20HMLO	28,30,32	1 1/4	51.5	46	6.0	
24HMLO	35,38	1 1/2	53	55	5.0	

WLO Full Dimensions

Bulkhead Union
ORFS / ORFS



SAE 520601
WLO-WLNL Body with Locknut
(See page A12 for WLNL)

TUBE FITTING PART #	END SIZE (in.)	B HEX (in.)	E MAX (in.)	GG (in.)	SS (in.)	W DIA (in.)	WW (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 WLO	1/4	13/16	0.53	1.90	0.06	0.56	1.24	9.2	9.2
6 WLO	3/8	1	0.53	2.09	0.06	0.69	1.34	9.2	9.2
8 WLO	1/2	1 1/8	0.53	2.30	0.06	0.81	1.44	9.2	9.2
10 WLO	5/8	1 5/16	0.52	2.62	0.06	1.00	1.60	6.0	
12 WLO	3/4	1 1/2	0.50	2.72	0.06	1.19	1.64	6.0	6.0
14 WLO	7/8	1 5/8	0.51	2.76	0.06	1.31	1.66		
16 WLO	1	1 3/4	0.51	2.76	0.06	1.44	1.66	6.0	6.0
20 WLO	1 1/4	2	0.51	2.76	0.06	1.69	1.66	6.0	
24 WLO	1 1/2	2 3/8	0.51	2.76	0.06	2.00	1.66	5.0	

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

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

Dimensions and pressures for reference only, subject to change.

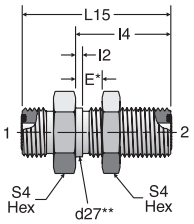
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WMLO Full Dimensions

Bulkhead Union – mm Hex
ORFS / ORFS

ISO 8434-3 BHS
SAE 52M0601
WMLO-WLNML - Body with Locknut
(See page A12 for WLNML)

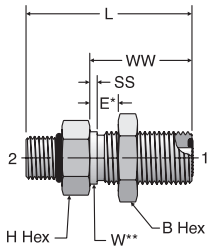


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	d27** (mm)	E (mm)	I2 (mm)	I4 (mm)	L15 (mm)	S4 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	STANDARD Dynamic Pressure (x 1,000 PSI) SS
4WMLO	6	1/4	14.3	14	31.5	1.5	48	22	9.2	
6WMLO	8,10	3/8	17.5	14	34	1.5	53	27	9.2	
8WMLO	12	1/2	20.6	14	36.5	2.5	58.5	30	9.2	
10WMLO	14,15,16	5/8	25.4	14	40.5	2.5	66.5	36	6.0	
12WMLO	18,20	3/4	30.2	14	41.5	3	69	41	6.0	
16WMLO	22,25	1	36.5	14	42	3	70	46	6.0	
20WMLO	28,30,32	1 1/4	42.9	14	42	3	70	50	6.0	
24WMLO	35,38	1 1/2	50.8	14	42	3	70	60	5.0	

* E – Maximum bulkhead thickness.
**d27 – Bulkhead pilot diameter. Recommended clearance hole is d27 + 0.4 mm

WF5OLO Full Dimensions

Straight Thread Bulkhead
Connector
ORFS / SAE-ORB
WF5OLO-WLNL - Body with Locknut
(See page A12 for WLNL)



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	B HEX (in.)	E MAX (in.)	H HEX (in.)	L (in.)	SS (in.)	W DIA (in.)	WW (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 WF5OLO	1/4	7/16-20	13/16	0.53	13/16	2.14	0.06	0.56	1.24	9.2	
4-6 WF5OLO	1/4	9/16-18	13/16	0.53	13/16	2.18	0.06	0.56	1.24		
6 WF5OLO	3/8	9/16-18	1	0.53	1	2.31	0.06	0.69	1.34	9.2	
8 WF5OLO	1/2	3/4-16	1 1/8	0.53	1 1/8	2.60	0.06	0.81	1.44	9.2	
10 WF5OLO	5/8	7/8-14	1 5/16	0.52	1 5/16	2.69	0.06	1.00	1.60	6.0	
12 WF5OLO	3/4	1 1/16-12	1 1/2	0.50	1 1/2	2.89	0.06	1.19	1.64	6.0	

* E – Maximum bulkhead thickness.
** W – Bulkhead pilot diameter. Recommended clearance hole is W + 0.015".

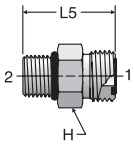
Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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F5OLO Full Dimensions

Straight Thread Connector
ORFS / SAE-ORB

SAE 520120

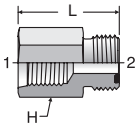


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	H HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 F5OLO	1/4	7/16-20	5/8	1.13	9.2	9.2
4-5 F5OLO	1/4	1/2-20	5/8	1.13	9.2	
4-6 F5OLO	1/4	9/16-18	3/4	1.20	9.2	9.2
4-8 F5OLO	1/4	3/4-16	7/8	1.32	9.2	
6 F5OLO	3/8	9/16-18	3/4	1.25	9.2	9.2
6-4 F5OLO	3/8	7/16-20	3/4	1.34	9.2	9.2
6-5 F5OLO	3/8	1/2-20	3/4	1.22	9.2	
6-8 F5OLO	3/8	3/4-16	7/8	1.38	9.2	9.2
6-10 F5OLO	3/8	7/8-14	1	1.53	9.2	9.2
6-12 F5OLO	3/8	1 1/16-12	1 1/4	1.68		
8 F5OLO	1/2	3/4-16	7/8	1.44	9.2	9.2
8-4 F5OLO	1/2	7/16-20	7/8	1.43	9.2	
8-6 F5OLO	1/2	9/16-18	7/8	1.47	6.0	9.2
8-10 F5OLO	1/2	7/8-14	1	1.59	6.0	
8-12 F5OLO	1/2	1 1/16-12	1 1/4	1.75	6.0	6.0
8-16 F5OLO	1/2	1 5/16-12	1 1/2	1.79	6.0	
10 F5OLO	5/8	7/8-14	1 1/16	1.70	6.0	6.0
10-6 F5OLO	5/8	9/16-18	1 1/16	1.65	6.0	
10-8 F5OLO	5/8	3/4-16	1 1/16	1.78	6.0	
10-12 F5OLO	5/8	1 1/16-12	1 1/4	1.86	6.0	
10-16 F5OLO	5/8	1 5/16-12	1 1/2	1.90	6.0	
12 F5OLO	3/4	1 1/16-12	1 1/4	1.92	6.0	6.0
12-8 F5OLO	3/4	3/4-16	1 1/4	1.91	6.0	6.0
12-10 F5OLO	3/4	7/8-14	1 1/4	1.99	6.0	6.0
12-16 F5OLO	3/4	1 5/16-12	1 1/2	1.96	6.0	6.0
14 F5OLO*	7/8	1 3/16-12	1 3/8	1.91		
16 F5OLO	1	1 5/16-12	1 1/2	1.98	6.0	6.0
16-10 F5OLO	1	7/8-14	1 1/2	2.04	6.0	
16-12 F5OLO	1	1 1/16-12	1 1/2	2.14	6.0	
16-20 F5OLO	1	1 5/8-12	1 7/8	2.06	6.0	6.0
20 F5OLO	1 1/4	1 5/8-12	1 7/8	2.06	6.0	6.0
20-16 F5OLO	1 1/4	1 5/16-12	1 7/8	2.28	6.0	6.0
20-24 F5OLO	1 1/4	1 7/8-12	2 1/8	2.13	5.0	
24 F5OLO	1 1/2	1 7/8-12	2 1/8	2.13	5.0	5.0
24-20 F5OLO	1 1/2	1 5/8-12	2 1/8	2.35	5.0	
32 F5OLO*	2	2 1/2-12	2 3/4	2.32	3.0	

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

G5LO Full Dimensions

Female Straight Thread Connector
ORFS / SAE-ORB

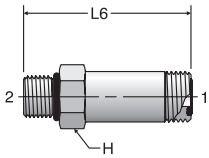


TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 UN/UNF-2B	H HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 G5LO	9/16-18	7/16-20	3/4	1.10	6.0	
6-4 G5LO	11/16-16	7/16-20	3/4	1.08	6.0	
8-4 G5LO	13/16-16	7/16-20	7/8	0.78	6.0	

FF5OLO Full Dimensions

Long Straight Thread Connector
ORFS-Long / SAE-ORB

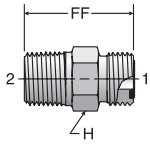
SAE 521720 (previously 520122)



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	H HEX (in.)	L6 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 FF5OLO	1/4	7/16-20	5/8	2.07	9.2	9.2
6 FF5OLO	3/8	9/16-18	3/4	2.27	9.2	
8 FF5OLO	1/2	3/4-16	7/8	2.68	9.2	9.2
10 FF5OLO	5/8	7/8-14	1 1/16	3.13	6.0	
12 FF5OLO	3/4	1 1/16-12	1 1/4	3.76	6.0	
16 FF5OLO	1	1 5/16-12	1 1/2	4.14	6.0	
20 FF5OLO	1 1/4	1 5/8-12	1 7/8	4.76	6.0	
24 FF5OLO	1 1/2	1 7/8-12	2 1/8	5.26	5.0	

FLO Full Dimensions

Male Pipe Connector
ORFS / NPTF



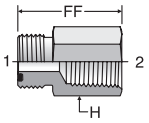
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	FF (in.)	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 FLO	1/4	1/8-27	1.07	5/8	6.0	6.0
4-4 FLO	1/4	1/4-18	1.26	5/8	6.0	6.0
4-6 FLO	1/4	3/8-18	1.32	3/4	6.0	6.0
4-8 FLO	1/4	1/2-14	1.52	7/8	6.0	
6 FLO	3/8	1/4-18	1.25	3/4	6.0	6.0
6-6 FLO	3/8	3/8-18	1.34	3/4	6.0	6.0
6-8 FLO	3/8	1/2-14	1.55	7/8	6.0	6.0
8 FLO	1/2	3/8-18	1.48	7/8	6.0	6.0
8-4 FLO	1/2	1/4-18	1.48	7/8	6.0	6.0
8-8 FLO	1/2	1/2-14	1.64	7/8	6.0	6.0
8-12 FLO	1/2	3/4-14	1.69	1 1/8	6.0	6.0
10 FLO	5/8	1/2-14	1.82	1 1/16	6.0	6.0
10-6 FLO	5/8	3/8-18	1.63	1 1/16		
10-12 FLO	5/8	3/4-14	1.82	1 1/8	5.5	
12 FLO	3/4	3/4-14	1.93	1 1/4	5.5	6.0
12-8 FLO	3/4	1/2-14	1.93	1 1/4	6.0	
12-16 FLO	3/4	1-11 1/2	2.13	1 3/8	4.5	
14 FLO	7/8	3/4-14	2.00	1 3/8		
16 FLO	1	1-11 1/2	2.19	1 1/2	4.5	4.5
16-12 FLO	1	3/4-14	2.00	1 1/2	5.5	5.5
16-20 FLO	1	1 1/4-11 1/2	2.30	1 3/4	3.0	
20 FLO	1 1/4	1 1/4-11 1/2	2.30	1 7/8	3.0	4.0
20-16 FLO	1 1/4	1-11 1/2	2.27	1 7/8	4.5	
24 FLO	1 1/2	1 1/2-11 1/2	2.40	2 1/8	3.0	3.0
32 FLO	2	2-11 1/2	2.79	2 3/4		1.8

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

GLO Full Dimensions

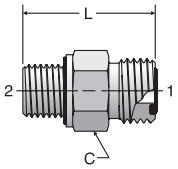
Female Pipe Connector
ORFS / Female Pipe



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	FF (in.)	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4-4 GLO	1/4	1/4-18	1.25	3/4	6.0	
6 GLO	3/8	1/4-18	1.30	3/4	6.0	
8-4 GLO	1/2	1/4-18	1.20	7/8	6.0	

F42EDMLO Full Dimensions

Male Connector – BSPP
(for ISO 1179-1 Port)
ORFS / BSPP-ED

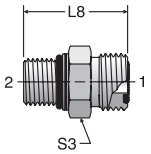


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4F42EDMLO	6	1/4	1/8 - 28	17	25.7	9.2	
4-4F42EDMLO	6	1/4	1/4 - 19	19	30.9	9.2	
4-6F42EDMLO	6	1/4	3/8 - 19	22	31.6	9.2	
4-8F42EDMLO	6	1/4	1/2 - 14	27	38.4	6.0	
6F42EDMLO	8,10	3/8	1/4 - 19	19	31.9	9.2	
6-2F42EDMLO	8,10	3/8	1/8 - 28	19	31.1	9.2	
6-6F42EDMLO	8,10	3/8	3/8 - 19	22	33	9.2	
6-8F42EDMLO	8,10	3/8	1/2 - 14	27	38.5	6.0	
6-12F42EDMLO	8,10	3/8	3/4 - 14	32	40.3	6.0	
8F42EDMLO	12	1/2	3/8 - 19	22	34.6	9.2	
8-4F42EDMLO	12	1/2	1/4 - 19	22	36.7	9.2	
8-8F42EDMLO	12	1/2	1/2 - 14	27	40.1	6.0	
8-12F42EDMLO	12	1/2	3/4 - 14	32	41.9	6.0	
10F42EDMLO	14,15,16	5/8	1/2 - 14	27	41.1	6.0	
10-6F42EDMLO	14,15,16	5/8	3/8 - 19	27	42.4	9.2	
10-12F42EDMLO	14,15,16	5/8	3/4 - 14	32	44.3	6.0	
10-16F42EDMLO	14,15,16	5/8	1 - 11	41	47.8		
12F42EDMLO	18,20	3/4	3/4 - 14	32	46.1	6.0	
12-8F42EDMLO	18,20	3/4	1/2 - 14	32	48.5	6.0	
12-16F42EDMLO	18,20	3/4	1 - 11	41	47.5	6.0	
12-20F42EDMLO	18,20	3/4	1 1/4 - 11	50	53.5	6.0	
16F42EDMLO	22,25	1	1 - 11	41	49.8	6.0	
16-12F42EDMLO	22,25	1	3/4 - 14	38	50.3	6.0	
16-20F42EDMLO	22,25	1	1 1/4 - 11	50	53.8	6.0	
16-24F42EDMLO	22,25	1	1 1/2 - 11	55	57.5	5.0	
20F42EDMLO	28,30,32	1 1/4	1 1/4 - 11	50	53.8	6.0	
20-16F42EDMLO	28,30,32	1 1/4	1 - 11	48	57.3	6.0	
20-24F42EDMLO	28,30,32	1 1/4	1 1/2 - 11	55	57.6	5.0	
24F42EDMLO	38	1 1/2	1 1/2 - 11	55	57.6	5.0	

F87OMLO Full Dimensions

Metric Straight Thread Connector
ORFS / ISO 6149

ISO 8434-3 SDS
SAE 52M0187

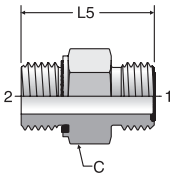


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 ISO 261	L8 (mm)	S3 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12F87OMLO	6	1/4	M12X1.5	28.5	17	9.2	
4M14F87OMLO	6	1/4	M14X1.5	29.5	19	9.2	
6M12F87OMLO	8,10	3/8	M12X1.5	32	19	9.2	
6M14F87OMLO	8,10	3/8	M14X1.5	32	19	9.2	
6M16F87OMLO	8,10	3/8	M16X1.5	33.5	22	9.2	
6M18F87OMLO	8,10	3/8	M18X1.5	36	24	9.2	
8M14F87OMLO	12	1/2	M14X1.5	35	22	9.2	
8M16F87OMLO	12	1/2	M16X1.5	36.5	24	9.2	
8M18F87OMLO	12	1/2	M18X1.5	38	24	9.2	
8M22F87OMLO	12	1/2	M22X1.5	39.5	27	6.0	
8M27F87OMLO	12	1/2	M27X2	44	32	6.0	
10M18F87OMLO	14,15,16	5/8	M18X1.5	41	27	6.0	
10M22F87OMLO	14,15,16	5/8	M22X1.5	42	27	6.0	
10M27F87OMLO	14, 15, 16	5/8	M27x2	47	32	6.0	
12M22F87OMLO	18,20	3/4	M22X1.5	45	32	6.0	
12M27F87OMLO	18,20	3/4	M27X2	48.5	32	6.0	
12M33F87OMLO	18,20	3/4	M33X2	51.5	41	6.0	
16M33F87OMLO	22,25	1	M33X2	52	41	6.0	
20M38F87OMLO*	28,30,32	1 1/4	M38X2	53	46	6.0	
20M42F87OMLO	28,30,32	1 1/4	M42X2	54.5	50	5.0	
24M48F87OMLO	35,38	1 1/2	M48X2	57	55	5.0	

* M38X2 is not included in ISO 6149.

F82EDMLO Full Dimensions

Male Connector – Metric
(for ISO 9974-1 Port)
ORFS / Metric-ED



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Metric	C HEX (mm)	L5 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12F82EDMLO	6	1/4	M12X1.5	17	29.7	9.2	
6M14F82EDMLO	8, 10	3/8	M14X1.5	22	32	9.2	
6M16F82EDMLO	8,10	3/8	M16X1.5	22	32	9.2	
8M18F82EDMLO	12	1/2	M18X1.5	24	34.6	9.2	
10M22F82EDMLO	14,15,16	5/8	M22X1.5	27	41.1	6.0	
12M27F82EDMLO	18,20	3/4	M27X2	32	46.1	6.0	
16M33F82EDMLO	22,25	1	M33X2	41	49.8	6.0	
20M42F82EDMLO	28,30,32	1 1/4	M42X2	50	53.8		

Dimensions and pressures for reference only, subject to change.

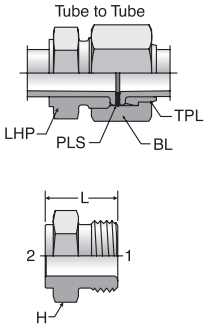
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index
How To Order
Specs
Assembly / Installation
3-D CAD Model
Reference Section

LHP (Inch)

Flange - Seal Connector
Tube-to-Tube

Full Dimensions



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	H HEX (in.)	L (in.)	Max. Tube Wall Thickness (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 LHP	1/4	5/8	0.59	0.049	6.0	
6 LHP	3/8	3/4	0.69	0.065	5.0	
8 LHP	1/2	7/8	0.79	0.095	5.5	
10 LHP	5/8	1 1/16	0.95	0.095	4.5	
12 LHP	3/4	1 1/4	1.00	0.120	4.5	
16 LHP	1	1 1/2	1.02	0.120	3.5	

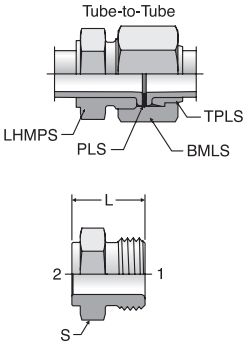
See page O3 for the required PLS bonded seal.

For availability of Parflange tooling, please contact the Tube Fittings Division.

LHMP (Metric)

Flange - Seal Connector
Tube-to-Tube

Full Dimensions



TUBE FITTING PART #	DASH SIZE	END SIZE 1 & 2 (mm)	L (mm)	S HEX (mm)	Max. Tube Wall Thickness (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS	B
LHMPS6	4	6	15	17	1			
LHMPS8	6	8	17.5	19	1.5			
LHMPS10	6	10	17.5	19	1.5			
LHMPS12	8	12	20	22	2			
LHMPS16	10	16	24	27	2			
LHMPS20	12	20	25.5	32	2.5			

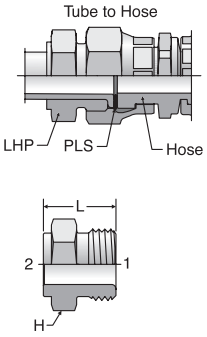
See page O3 for the required PLS bonded seal.

For availability of Parflange tooling, please contact the Tube Fittings Division.

LHP (Inch)

Flange - Seal Connector
Tube-to-Hose

Full Dimensions



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	H HEX (in.)	L (in.)	Max. Tube Wall Thickness (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 LHP	1/4	5/8	0.59	0.065	6.0		
6 LHP	3/8	3/4	0.69	0.083	6.0		
8 LHP	1/2	7/8	0.79	0.120	6.0		
10 LHP	5/8	1 1/16	0.95	0.120	6.0		
12 LHP	3/4	1 1/4	1.00	0.134	5.5		
16 LHP	1	1 1/2	1.02	0.120	3.5		

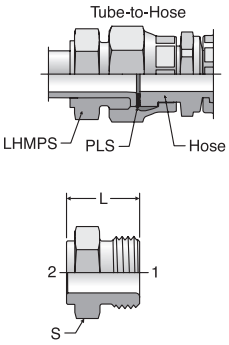
See page O3 for the required PLS bonded seal.

For availability of Parflange tooling, please contact the Tube Fittings Division.

LHMP (Metric)

Flange - Seal Connector
Tube-to-Hose

Full Dimensions



TUBE FITTING PART #	DASH SIZE	END SIZE 1 & 2 (mm)	L (mm)	S HEX (mm)	Max. Tube Wall Thickness (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS	B
LHMPS6	4	6	15	17	1.5			
LHMPS8	6	8	17.5	19	2			
LHMPS10	6	10	17.5	19	2			
LHMPS12	8	12	20	22	2.5			
LHMPS16	10	16	24	27	3			
LHMPS20	12	20	25.5	32	3.5			

See page O3 for the required PLS bonded seal.

For availability of Parflange tooling, please contact the Tube Fittings Division.

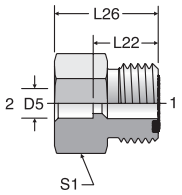
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

MMLOHB3 Full Dimensions

Braze Connector
ORFS / Braze Socket

ISO 8434-3 BRS
SAE 52M0104

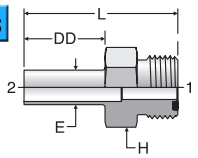


TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 (mm)	D5* DIA TUBE SOCKET	L22 (mm)	L26 (mm)	S1 HEX	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4-6MMLOHB3	6	1/4	6	6.15	13.5	22	17	9.2	
4-8MMLOHB3	6	1/4	8	8.15	13.5	22	17	9.2	
6-10MMLOHB3	8, 10	3/8	10	10.15	14.5	23	19	9.2	
8-12MMLOHB3	12	1/2	12	12.15	16	24.5	22	9.2	
10-16MMLOHB3	14, 15, 16	5/8	16	16.15	19	27.5	27	6.0	
12-20MMLOHB3	18, 20	3/4	20	20.18	21	33.5	32	6.0	
16-25MMLOHB3	22, 25	1	25	25.18	24.5	38.5	41	6.0	
20-30MMLOHB3	28, 30, 32	1 1/4	30	30.2	24.5	38.5	46	6.0	
24-38MMLOHB3	35, 38	1 1/2	38	38.2	24.5	38.5	55	5.0	

* D5 is for silver brazing. Standard steel parts are not recommended for welding.

LOHT3 Full Dimensions

Tube Stub Connector
ORFS / Tube Weld



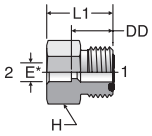
TUBE FITTING PART #	END SIZE 1 & 2 (in.)	DD (in.)	E DIA (in.)	H HEX (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -S	-SS*
4 LOHT3	1/4	0.88	0.25	5/8	1.58		•
6 LOHT3	3/8	0.88	0.38	3/4	1.67		•
8 LOHT3	1/2	1.00	0.50	7/8	1.89		•
12 LOHT3	3/4	1.16	0.75	1 1/4	2.35		•
16 LOHT3	1	1.13	1.00	1 1/2	2.40		•

* Contact Tube Fittings Division for pressure ratings.

LOHB3 Full Dimensions

Braze Connector
ORFS / Braze Socket

SAE 520104



TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	DD (in.)	E* DIA (in.)	H HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 LOHB3	1/4	1/4	0.52	0.26	5/8	0.86	9.2	
4-6 LOHB3	1/4	3/8	0.52	0.38	5/8	0.86	9.2	
6 LOHB3	3/8	3/8	0.56	0.38	3/4	0.90	9.2	
6-4 LOHB3	3/8	1/4	0.56	0.26	3/4	0.90	9.2	
6-8 LOHB3	3/8	1/2	0.56	0.51	3/4	0.90	9.2	
8 LOHB3	1/2	1/2	0.63	0.51	7/8	0.97	9.2	
8-4 LOHB3	1/2	1/4	0.64	0.26	7/8	0.97	9.2	
8-6 LOHB3	1/2	3/8	0.63	0.38	7/8	0.97	9.2	
8-10 LOHB3	1/2	5/8	0.63	0.63	7/8	0.97	6.0	
8-12 LOHB3	1/2	3/4	0.67	0.76	1 1/16	1.16	6.0	
10 LOHB3	5/8	5/8	0.73	0.63	1 1/16	1.07	6.0	
10-6 LOHB3	5/8	3/8	0.73	0.38	1 1/16	1.07	6.0	
10-8 LOHB3	5/8	1/2	0.73	0.51	1 1/16	1.07	6.0	
10-12 LOHB3	5/8	3/4	0.74	0.76	1 1/16	1.23	6.0	
12 LOHB3	3/4	3/4	0.83	0.76	1 1/4	1.32	6.0	
12-8 LOHB3	3/4	1/2	0.83	0.51	1 1/4	1.16	6.0	
12-10 LOHB3	3/4	5/8	0.83	0.63	1 1/4	1.16	6.0	
12-16 LOHB3	3/4	1	0.83	1.01	1 1/2	1.38	6.0	
14 LOHB3**	7/8	7/8	0.97	0.88	1 3/8	1.52		
16 LOHB3	1	1	0.97	1.01	1 1/2	1.52	6.0	
16-8 LOHB3	1	1/2	0.97	0.51	1 1/2	1.30	6.0	
16-12 LOHB3	1	3/4	0.97	0.76	1 1/2	1.46	6.0	
16-20 LOHB3	1	1 1/4	0.97	1.26	1 3/4	1.52	6.0	
20 LOHB3	1 1/4	1 1/4	0.97	1.26	1 3/4	1.52	6.0	
20-16 LOHB3	1 1/4	1	0.97	1.01	1 3/4	1.52	6.0	
20-24 LOHB3	1 1/4	1 1/2	0.97	1.51	2 1/8	1.52	5.0	
24 LOHB3	1 1/2	1 1/2	0.97	1.51	2 1/8	1.52	5.0	
24-20 LOHB3	1 1/2	1 1/4	0.97	1.26	2 1/8	1.52	5.0	

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

** Size 14 is not included in SAE J1453.

Dimensions and pressures for reference only, subject to change.

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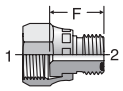
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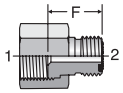
TRLON Full Dimensions

Tube End Reducer
ORFS Swivel / ORFS Tube End

SAE 520123 (body only)
SAE 520123A (body with large nut)



* Assembled with Crimp Nut



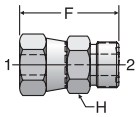
** Assembled with Large BL Nut

TUBE FITTING PART #			END SIZE		F	STANDARD Dynamic Pressure (x 1,000 PSI)	
TRLON	TRLON	TRLO					
*Crimp Nut Style	**Large BL Nut Style	***Body Only (For Style that Uses Large BL Nut)	1 (in.)	2 (in.)	(in.)	-S	-SS
6-4 TRLON	—	—	3/8	1/4	0.77	9.2	9.2
—	8-4 TRLON	8-4 TRLO	1/2	1/4	0.86	9.2	9.2
8-6 TRLON	—	—	1/2	3/8	0.88	9.2	9.2
—	10-4 TRLON	10-4 TRLO	5/8	1/4	0.90	6.0	
—	10-6 TRLON	10-6 TRLO	5/8	3/8	0.95	6.0	
—	10-8 TRLON	10-8 TRLO	5/8	1/2	1.02	6.0	6.0
—	12-4 TRLON	12-4 TRLO	3/4	1/4	0.98	6.0	
—	12-6 TRLON	12-6 TRLO	3/4	3/8	1.03	6.0	6.0
—	12-8 TRLON	12-8 TRLO	3/4	1/2	1.09	6.0	6.0
12-10 TRLON	—	—	3/4	5/8	1.16	6.0	
—	16-8 TRLON	16-8 TRLO	1	1/2	1.15	6.0	6.0
—	16-10 TRLON	16-10 TRLO	1	5/8	1.26	6.0	
16-12 TRLON	—	—	1	3/4	1.30	6.0	6.0
—	20-12 TRLON	20-12 TRLO	1 1/4	3/4	1.32	5.0	5.0
20-16 TRLON	—	—	1 1/4	1	1.51	5.0	
—	24-16 TRLON	24-16 TRLO	1 1/2	1	1.23	4.0	4.0
—	24-20 TRLON	24-20 TRLO	1 1/2	1 1/4	1.35	4.0	
—	32-20 TRLON	32-20 TRLO	2	1 1/4	1.42	3.0	
—	32-24 TRLON	32-24 TRLO	2	1 1/2	1.42	3.0	

* Assembled with crimp nut.
** Assembled with large BL nut.
***To order reducer without large nut (body only) remove the "N" from the part number (i.e., TRLO).

LOHL6 Full Dimensions

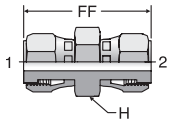
Tube End Extender / Expander
ORFS / ORFS Swivel



TUBE FITTING PART #	END SIZE		F	H HEX	STANDARD Dynamic Pressure (x 1,000 PSI)	
	1 (in.)	2 (in.)	(in.)	(in.)	-S	-SS
4 LOHL6	1/4	1/4	1.33	5/8	9.2	
6 LOHL6	3/8	3/8	1.44	3/4	9.2	
6-4 LOHL6	1/4	3/8	1.37	3/4	9.2	
8 LOHL6	1/2	1/2	1.67	7/8	9.2	
8-6 LOHL6	3/8	1/2	1.62	7/8	9.2	
10-8 LOHL6	1/2	5/8	1.81	1 1/16	6.0	
12-10 LOHL6	5/8	3/4	1.99	1 1/4	6.0	
16-12 LOHL6	3/4	1	2.16	1 1/2	6.0	
20-16 LOHL6	1	1 1/4	2.28	1 3/4	5.0	
24-20 LOHL6	1 1/4	1 1/2	2.35	2 1/8	4.0	

HL6 Full Dimensions

Swivel Nut Union
ORFS Swivel / ORFS Swivel



TUBE FITTING PART #	END SIZE		FF	H HEX	STANDARD Dynamic Pressure (x 1,000 PSI)	
	1 (in.)	2 (in.)	(in.)	(in.)	-S	-SS
4 HL6	1/4	1/4	1.59	5/8	9.2	
6 HL6	3/8	3/8	1.77	3/4	9.2	
8 HL6	1/2	1/2	2.12	7/8	9.2	
10 HL6	5/8	5/8	2.42	1 1/16	6.0	
12 HL6	3/4	3/4	2.74	1 1/4	6.0	
16 HL6	1	1	2.95	1 7/16	6.0	
20 HL6	1 1/4	1 1/4	3.12	1 3/4		
24 HL6	1 1/2	1 1/2	3.33	2 1/8		

Dimensions and pressures for reference only, subject to change.

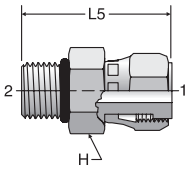
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F65OL Full Dimensions

Straight Thread Swivel Connector
ORFS Swivel / SAE-ORB

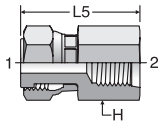
SAE 520181



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	H HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 F65OL	1/4	7/16-20	5/8	1.46	9.2	
6 F65OL	3/8	9/16-18	3/4	1.58	9.2	
8 F65OL	1/2	3/4-16	7/8	1.95	9.2	
10 F65OL	5/8	7/8-14	1 1/16	2.13	6.0	
12 F65OL	3/4	1 1/16-12	1 1/4	2.34	6.0	
16 F65OL	1	1 5/16-12	1 1/2	2.66	6.0	
20 F65OL	1 1/4	1 5/8-12	1 7/8	2.66	5.0	

G65L Full Dimensions

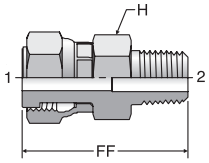
Straight Thread Swivel Female Connector
ORFS Swivel / SAE-ORB



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2B	H HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 G65L	1/4	7/16-20	3/4	1.38	6.0	
4-6 G65L	1/4	9/16-18	13/16	1.45		
6-4 G65L	3/8	7/16-20	3/4	1.51	6.0	
8-4 G65L	1/2	7/16-20	7/8	1.57	6.0	
8-6 G65L	1/2	9/16-18	7/8	1.6		
12 G65L	3/4	1 1/16-12	1 3/8	2.27		
16-4 G65L	1	7/16-20	1 3/8	1.55		
24-4 G65L	2	7/16-20	2	1.84		

F6L Full Dimensions

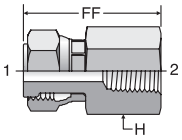
Pipe Thread Swivel Connector
ORFS Swivel / NPTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	FF (in.)	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 F6L	1/4	1/8-27	1.33	5/8	6.0	
4-4 F6L	1/4	1/4-18	1.52	5/8	6.0	
6 F6L	3/8	1/4-18	1.69	3/4	6.0	
6-6 F6L	3/8	3/8-18	1.67	3/4	6.0	
8 F6L	1/2	3/8-18	1.95	3/4	6.0	
8-8 F6L	1/2	1/2-14	2.14	7/8	6.0	
10 F6L	5/8	1/2-14	2.29	1 1/16	6.0	
12 F6L	3/4	3/4-14	2.37	1 1/4	5.5	
16 F6L	1	1-11 1/2	2.87	1 1/2	4.5	

G6L Full Dimensions

Female Pipe Thread Swivel Connector
ORFS Swivel / NPTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	FF (in.)	H (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4-4 G6L	1/4	1/4-18	1.48	3/4	6.0	
6 G6L	3/8	1/4-18	1.60	7/8	6.0	
8-4 G6L	1/2	1/4-18	1.75	7/8	6.0	

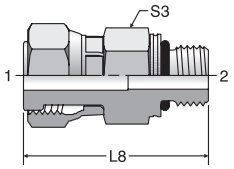
Dimensions and pressures for reference only, subject to change.

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F687OML Full Dimensions

Swivel ISO 6149 Connector
ORFS Swivel / ISO 6149



TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 ISO 261	L8 (mm)	S3 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12F687OML	6	1/4	M12x1.5	37	17	9.2	
6M12F687OML	8, 10	3/8	M12x1.5	39.2	19	9.2	
6M14F687OML	8, 10	3/8	M14x1.5	39.2	19	9.2	
6M16F687OML	8, 10	3/8	M16x1.5	43.5	22	9.2	
8M16F687OML	12	1/2	M16x1.5	47.8	22	9.2	
10M22F687OML	14, 15, 16	5/8	M22x1.5	53	27		
10M27F687OML	14, 15, 16	5/8	M27x2	57	32		
12M27F687OML	18, 20	3/4	M27x2	59.5	32	6.0	
16M33F687OML	22, 25	1	M33x2	67.5	41	6.0	

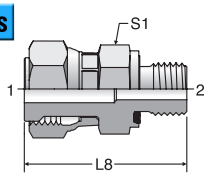
F682EDML Full Dimensions

Swivel Metric Connector
ORFS Swivel / Metric-ED

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 Metric	L8 (mm)	S1 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12F682EDML	6	1/4	M12x1.5	38.2	17	9.2	
6M14F682EDML	8, 10	3/8	M14x1.5	40.2	19		
8M16F682EDML	12	1/2	M16x1.5	47.3	22		
10M22F682EDML	14, 15, 16	5/8	M22X1.5	51.8	27	6.0	
12M27F682EDML	18, 20	3/4	M27X2	57.2	32		
16M33F682EDML	22, 25	1	M33X2	67	41	6.0	

F642EDML Full Dimensions

Swivel BSPP Connector
ORFS Swivel / BSPP-ED

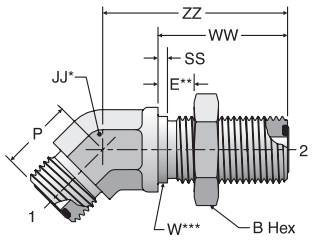


TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	L8 (mm)	S1 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
6F642EDML	8, 10	3/8	1/4	40.2	19	9.2	
8F642EDML	12	1/2	3/8	47.3	22	9.2	
10F642EDML	14, 15, 16	5/8	1/2	51.8	27	6.0	
12F642EDML	18, 20	3/4	3/4	57.2	32	6.0	
16F642EDML	22, 25	1	1	67	46		

WNLO Full Dimensions

45° Bulkhead Union Elbow
ORFS / ORFS

SAE 520801
WNLO-WLNL - Body with Locknut
(See page A12 for WLNL)



TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	B HEX (in.)	E MAX (in.)	JJ (in.)	P (in.)	SS (in.)	W DIA (in.)	WW (in.)	ZZ (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 WNLO	1/4	1/4	13/16	0.53	9/16	0.63	0.06	0.56	1.24	1.73	9.2	
6 WNLO	3/8	3/8	1	0.53	3/4	0.74	0.06	0.69	1.34	1.91	9.2	
8 WNLO	1/2	1/2	1 1/8	0.53	3/4	0.80	0.06	0.81	1.44	2.01	9.2	
10 WNLO	5/8	5/8	1 5/16	0.52	1 1/16	0.92	0.06	1.00	1.60	2.23	6.0	
12 WNLO	3/4	3/4	1 1/2	0.50	1 3/16	1.02	0.06	1.19	1.64	2.39	6.0	
16 WNLO	1	1	1 3/4	0.51	1 7/16	1.18	0.06	1.44	1.66	2.56	6.0	
20 WNLO	1 1/4	1 1/4	2	0.51	1 5/8	1.26	0.06	1.69	1.66	2.64	5.0	
24 WNLO	1 1/2	1 1/2	2 3/8	0.51	1 7/8	1.45	0.06	2.00	1.66	2.64	4.0	

* JJ – Across wrench flats.

** E – Maximum bulkhead thickness.

*** W – Bulkhead pilot diameter. Recommended clearnace hole is W + 0.015".

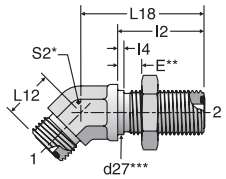
Dimensions and pressures for reference only, subject to change.

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http://www.parker.com/tfd

WNMLO Full Dimensions

45° Bulkhead Union Elbow – mm Hex
ORFS / ORFS

ISO 8434-3 BHE45
SAE 52M0801
WNMLO-WLNML - Body with Locknut
(See page A12 for WLNML)



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	d27 (mm)	E (mm)	I2 (mm)	I4 (mm)	L12 (mm)	L18 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4WNMLO	6	1/4	14.3	14	31.5	1.5	16	44	14	9.2	
6WNMLO	8,10	3/8	17.5	14	34	1.5	19	48.5	19		
8WNMLO	12	1/2	20.6	14	36.5	2.5	20.5	51	19		
10WNMLO	14,15,16	5/8	25.4	14	40.5	2.5	23.5	56.5	27		
12WNMLO	18,20	3/4	30.2	14	41.5	3	26	60.5	30		
16WNMLO	22,25	1	36.5	14	42	3	30	65	36		
20WNMLO	28,30,32	1 1/4	42.9	14	42	3	32	67	41	5.0	
24WNMLO	35,38	1 1/2	50.8	14	42	3	37	67	50		

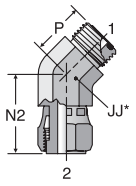
* S2 – Across Wrench Flats.

** E – Maximum bulkhead thickness.

***d27 – Bulkhead pilot diameter. Recommended clerance hole is d27 + 0.4 mm.

V6LO Full Dimensions

45° Swivel Nut Elbow
ORFS / ORFS Swivel



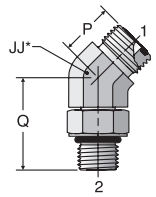
* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	JJ (in.)	N2 (in.)	P (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 V6LO	1/4	9/16	0.99	0.63	9.2	
6 V6LO	3/8	3/4	1.12	0.74	9.2	
8 V6LO	1/2	3/4	1.49	0.80	9.2	
10 V6LO	5/8	1 1/16	1.53	0.92	6.0	
12 V6LO	3/4	1 3/16	1.73	1.02	6.0	
16 V6LO	1	1 7/16	1.87	1.18	6.0	
20 V6LO	1 1/4	1 5/8	1.98	1.26	5.0	
24 V6LO	1 1/2	1 7/8	2.06	1.45	4.0	

V5OLO Full Dimensions

45° Straight Thread Elbow
ORFS / SAE-ORB

SAE 520320



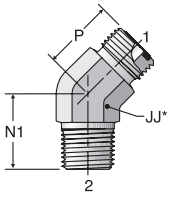
* JJ – Across Hex Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	JJ (in.)	P (in.)	Q (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 V5OLO	1/4	7/16-20	9/16	0.63	1.18	6.0	6.0
4-6 V5OLO	1/4	9/16-18	3/4	0.68	1.30	6.0	
6 V5OLO	3/8	9/16-18	3/4	0.74	1.30	6.0	6.0
6-4 V5OLO	3/8	7/16-20	3/4	0.74	1.22	6.0	
6-8 V5OLO	3/8	3/4-16	3/4	0.74	1.43	6.0	
8 V5OLO	1/2	3/4-16	3/4	0.80	1.43	6.0	6.0
8-6 V5OLO	1/2	9/16-18	3/4	0.80	1.27	6.0	
8-10 V5OLO	1/2	7/8-14	3/4	0.82	1.76	6.0	
10 V5OLO	5/8	7/8-14	1 1/16	0.92	1.76	6.0	6.0
10-8 V5OLO	5/8	3/4-16	1 1/16	0.92	1.59	6.0	
10-12 V5OLO	5/8	1 1/16-12	1 3/16	0.96	1.97	6.0	
12 V5OLO	3/4	1 1/16-12	1 3/16	1.02	1.97	6.0	6.0
12-10 V5OLO	3/4	7/8-14	1 3/16	1.02	1.81	6.0	
12-16 V5OLO	3/4	1 5/16-12	1 7/16	1.16	2.06	5.5	
14 V5OLO**	7/8	1 3/16-12	1 5/16	1.18	2.03		
16 V5OLO	1	1 5/16-12	1 7/16	1.18	2.06	5.5	5.5
16-10 V5OLO	1	7/8-14	1 7/16	1.18	1.89		
16-12 V5OLO	1	1 1/16-12	1 7/16	1.18	2.03	6.0	
16-20 V5OLO	1	1 5/8-12	1 5/8	1.26	2.11	4.0	
20 V5OLO	1 1/4	1 5/8-12	1 5/8	1.26	2.11	4.0	4.0
24 V5OLO	1 1/2	1 7/8-12	1 7/8	1.45	2.11	4.0	

**Size 14 is not included in SAE J1453.

VLO Full Dimensions

45° Male Elbow
ORFS / NPTF



* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	JJ (in.)	N1 (in.)	P (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 VLO	1/4	1/8-27	9/16	0.64	0.63	6.0	
4-4 VLO	1/4	1/4-18	9/16	0.86	0.68	6.0	
6 VLO	3/8	1/4-18	3/4	0.87	0.74	6.0	
6-6 VLO	3/8	3/8-18	3/4	0.87	0.74	6.0	
8 VLO	1/2	3/8-18	3/4	0.95	0.80	6.0	
8-8 VLO	1/2	1/2-14	7/8	1.17	0.86	6.0	
10 VLO	5/8	1/2-14	1 1/16	1.17	0.92	6.0	
12 VLO	3/4	3/4-14	1 5/16	1.30	1.02	4.0	
16 VLO	1	1-11 1/2	1 7/16	1.48	1.18	3.0	
20 VLO	1 1/4	1 1/4-11 1/2	1 5/8	1.67	1.26	2.5	

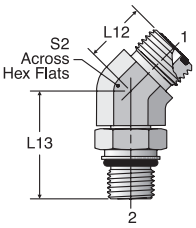
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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V87OMLO Full Dimensions

45° Metric Straight Thread Elbow
ORFS / ISO 6149

ISO 8434-3 SDE45
SAE 52M0387



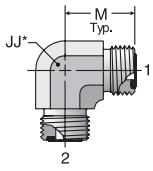
* S2 – Across Hex Flats

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 ISO 261	L12 (mm)	L13 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12V87OMLO	6	1/4	M12X1.5	16	30	14	6.0	
4M14V87OMLO	6	1/4	M14X1.5	18	31.5	17	6.0	
6M16V87OMLO	8,10	3/8	M16X1.5	19	33.5	17	6.0	
8M18V87OMLO	12	1/2	M18X1.5	20.5	37	19	6.0	
10M22V87OMLO	14,15,16	5/8	M22X1.5	23.5	44	27	6.0	
12M27V87OMLO	18,20	3/4	M27X2	26	50.5	27	6.0	
16M33V87OMLO	22,25	1	M33X2	30	52.5	36	5.0	
20M42V87OMLO	28,30,32	1 1/4	M42X2	32	54	41	4.0	
24M48V87OMLO	35,38	1 1/2	M48X2	37	56.5	50	4.0	

ELO Full Dimensions

Union Elbow
ORFS / ORFS

SAE 520201



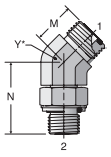
* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 ELO	1/4	1/4	9/16	0.85	9.2	9.2
6 ELO	3/8	3/8	3/4	0.98	9.2	9.2
8 ELO	1/2	1/2	3/4	1.10	9.2	9.2
10 ELO	5/8	5/8	1 1/16	1.31	6.0	
12 ELO	3/4	3/4	1 3/16	1.47	6.0	6.0
14 ELO**	7/8	7/8	1 5/16	1.63		
16 ELO	1	1	1 7/16	1.64	6.0	6.0
20 ELO	1 1/4	1 1/4	1 5/8	1.76	5.0	
24 ELO	1 1/2	1 1/2	1 7/8	1.92	4.0	4.0
32 ELO**	2	2	2 1/2	2.76	3.0	

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

V4OMLO Full Dimensions

Male 45° Elbow – BSPP
(for ISO 1179-1 Port)
ORFS / BSPP-ORR



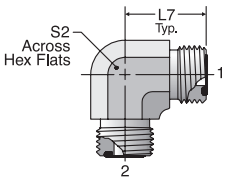
* Y – Across Hex Flats

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	M (mm)	N (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4V4OMLO	6	1/4	1/8 - 28	16	27.5	14	4.0	
4-4V4OMLO	6	1/4	1/4 - 19	17.5	32	19	4.0	
6V4OMLO	8,10	3/8	1/4 - 19	19	32	19	4.0	
6-6V4OMLO	8,10	3/8	3/8 - 19	19	33.5	19	4.0	
6-8V4OMLO	8,10	3/8	1/2 - 14	19.5	43.5	27	4.0	
8V4OMLO	12	1/2	3/8 - 19	20.5	33.5	19	4.0	
8-8V4OMLO	12	1/2	1/2-14	21	43.5	27	4.0	
10V4OMLO	14,15,16	5/8	1/2 - 14	23.5	43.5	27	4.0	
10-12V4OMLO	14,15,16	5/8	3/4 - 14	24.5	46.5	30	4.0	
12V4OMLO	18,20	3/4	3/4 - 14	26	46.5	30	4.0	
12-16V4OMLO	18,20	3/4	1 - 11	26	51	37	4.0	
16V4OMLO	22,25	1	1 - 11	30	51	37	4.0	

EMLO Full Dimensions

Union Elbow – mm Hex
ORFS / ORFS

ISO 8434-3 E
SAE 52M0201



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	1 & 2 (in.)	L7 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4EMLO	6	1/4	21.5	14	9.2	
6EMLO	8,10	3/8	25	19	9.2	
8EMLO	12	1/2	28	19	9.2	
10EMLO	14,15,16	5/8	33.5	27	6.0	
12EMLO	18,20	3/4	37.5	30	6.0	
16EMLO	22,25	1	41.5	36	6.0	
20EMLO	28,30,32	1 1/4	44.5	41	5.0	
24EMLO	35,38	1 1/2	49	50	4.0	

Dimensions and pressures for reference only, subject to change.

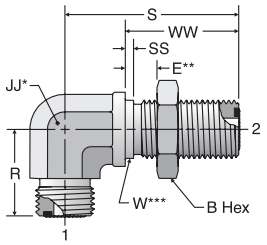
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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Visual Index
How To Order
Specs
Assembly / Installation
3-D CAD Model
Reference Section

WELO Full Dimensions

Bulkhead Union Elbow
ORFS / ORFS

SAE 520701
WELO-WLNL - Body with Locknut
(See page A12 for WLNL)



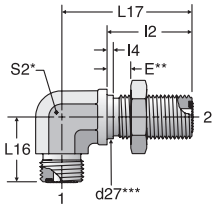
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	B HEX (in.)	E MAX (in.)	JJ (in.)	R (in.)	S (in.)	SS (in.)	W (in.)	WW (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 WELO	1/4	1/4	13/16	0.53	9/16	0.89	1.85	0.06	0.56	1.24	9.2	
6 WELO	3/8	3/8	1	0.53	3/4	1.02	2.05	0.06	0.69	1.34	9.2	
8 WELO	1/2	1/2	1 1/8	0.53	3/4	1.14	2.18	0.06	0.81	1.44	9.2	
10 WELO	5/8	5/8	1 5/16	0.52	1 1/16	1.36	2.48	0.06	1.00	1.60	6.0	
12 WELO	3/4	3/4	1 1/2	0.50	1 3/16	1.52	2.65	0.06	1.19	1.64	6.0	
14 WELO****	7/8	7/8	1 5/8	0.51	1 7/16	1.67	2.80	0.06	1.31	1.66		
16 WELO	1	1	1 3/4	0.51	1 7/16	1.67	2.80	0.06	1.44	1.66	6.0	
20 WELO	1 1/4	1 1/4	2	0.51	1 5/8	1.79	2.97	0.06	1.69	1.66	5.0	
24 WELO	1 1/2	1 1/2	2 3/8	0.51	1 7/8	1.95	3.13	0.06	2.00	1.66	4.0	

* JJ – Across wrench flats.
** E – Maximum bulkhead thickness.
*** W – Bulkhead pilot diameter. Recommended clearance hole is W + 0.015".
**** Size 14 is not included in SAE J1453.

WEMLO Full Dimensions

Bulkhead Union Elbow – mm Hex
ORFS / ORFS

ISO 8434-3 BHE
SAE 52M0701
WEMLOWLNML - Body with Locknut
(See page A12 for WLNML)



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	d27 (mm)	E (mm)	l2 (mm)	l4 (mm)	L16 (mm)	L17 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4WEMLO	6	1/4	14.3	14	31.5	1.5	22.5	47	14	9.2	
6WEMLO	8,10	3/8	17.5	14	34	1.5	26	52	19		
8WEMLO	12	1/2	20.6	14	36.5	2.5	29	55.5	19	9.2	
10WEMLO	14,15,16	5/8	25.4	14	40.5	2.5	34.5	63	27	6.0	
12WEMLO	18,20	3/4	30.2	14	41.5	3	38.5	67	30	6.0	
16WEMLO	22,25	1	36.5	14	42	3	42.5	71	36	6.0	
20WEMLO	28,30,32	1 1/4	42.9	14	42	3	45.5	75.5	41	5.0	
24WEMLO	35,38	1 1/2	50.8	14	42	3	49.5	79.5	50	4.0	

* S2 – Across wrench flats.
** E – Maximum bulkhead thickness.
***d27 - Bulkhead pilot diameter. Recommended clearance is d27 + 0.4 mm.

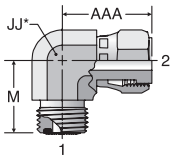
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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C6LO Full Dimensions

Swivel Nut Elbow
ORFS / ORFS Swivel

SAE 520221



* JJ – Across Wrench Flats

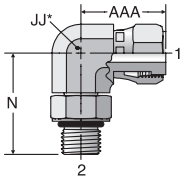
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	AAA (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 C6LO	1/4	1/4	1.07	9/16	0.85	9.2	9.2
6 C6LO	3/8	3/8	1.17	3/4	0.98	9.2	9.2
8 C6LO	1/2	1/2	1.49	3/4	1.10	9.2	9.2
10 C6LO	5/8	5/8	1.61	1 1/16	1.32	6.0	6.0
12 C6LO	3/4	3/4	1.83	1 3/16	1.48	6.0	6.0
14 C6LO**	7/8	7/8	2.07	1 5/16	1.63		
16 C6LO	1	1	2.11	1 7/16	1.64	6.0	6.0
20 C6LO	1 1/4	1 1/4	2.28	1 5/8	1.75	5.0	5.0
24 C6LO	1 1/2	1 1/2	2.41	1 7/8	1.92	4.0	

** Size 14 is not included in SAE J1453.

AOEL6 Full Dimensions

Straight Thread Swivel Elbow
ORFS Swivel / SAE-ORB

SAE 520281



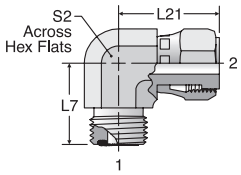
* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	AAA (in.)	JJ (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 AOEL6	1/4	7/16-20	1.04	9/16	1.29	6.0	
6 AOEL6	3/8	9/16-18	1.18	3/4	1.45	6.0	
8 AOEL6	1/2	3/4-16	1.49	3/4	1.60	6.0	
10 AOEL6	5/8	7/8-14	1.65	1 1/16	1.97	6.0	
12 AOEL6	3/4	1 1/16-12	1.79	1 1/16	2.17		
16 AOEL6	1	1 5/16-12	2.07	1 5/16	2.35		
20 AOEL6	1 1/4	1 5/8-12	2.29	1 5/8	2.45	4.0	
24 AOEL6	1 1/2	1 7/8-12	2.41	1 7/8	2.59	4.0	

C6MLO Full Dimensions

Swivel Nut Elbow – mm Hex
ORFS / ORFS Swivel

ISO 8434-3 SWE
SAE 52M0221



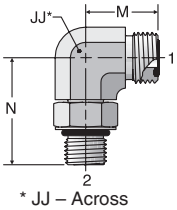
* S2 – Across Hex Flats

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (in.)	L7 (mm)	L21 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4C6MLO	6	1/4	21.5	26.5	14	9.2	
6C6MLO	8,10	3/8	25	29	19	9.2	
8C6MLO	12	1/2	28	38	19	9.2	
10C6MLO	14,15,16	5/8	33.5	41	27	6.0	
12C6MLO	18,20	3/4	37.5	46.5	30	6.0	
16C6MLO	22,25	1	41.5	53.5	36	6.0	
20C6MLO	28,30,32	1 1/4	44.5	58	41	5.0	
24C6MLO	35,38	1 1/2	49	61	50	4.0	

C5OLO Full Dimensions

Straight Thread Elbow
ORFS / SAE-ORB

SAE 520220



* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 C5OLO	1/4	7/16-20	9/16	0.85	1.29	6.0	6.0
4-6 C5OLO***	1/4	9/16-18	9/16	0.92	1.45	6.0	
4-8 C5OLO	1/4	3/4-16	3/4	0.97	1.60	6.0	
6 C5OLO	3/8	9/16-18	3/4	0.98	1.45	6.0	6.0
6-4 C5OLO	3/8	7/16-20	3/4	0.98	1.37	6.0	6.0
6-5 C5OLO	3/8	1/2-20	3/4	0.98	1.37	6.0	
6-8 C5OLO	3/8	3/4-16	3/4	1.04	1.60	6.0	6.0
6-10 C5OLO***	3/8	7/8-14	7/8	1.15	1.97	6.0	
6-12 C5OLO	3/8	1 1/16-12	1 1/16	1.28	2.17	6.0	
8 C5OLO	1/2	3/4-16	3/4	1.10	1.60	6.0	6.0
8-6 C5OLO	1/2	9/16-18	3/4	1.10	1.44	6.0	6.0
8-10 C5OLO***	1/2	7/8-14	7/8	1.21	1.97	6.0	
8-12 C5OLO	1/2	1 1/16-12	1 3/16	1.32	2.17	6.0	6.0
10 C5OLO	5/8	7/8-14	1 1/16	1.31	1.97	6.0	6.0
10-8 C5OLO	5/8	3/4-16	1 1/16	1.31	1.80	6.0	
10-12 C5OLO	5/8	1 1/16-12	1 3/16	1.41	2.17	6.0	
12 C5OLO	3/4	1 1/16-12	1 3/16	1.47	2.17	6.0	6.0
12-8 C5OLO	3/4	3/4-16	1 3/16	1.47	1.84	6.0	
12-10 C5OLO	3/4	7/8-14	1 3/16	1.47	2.01	6.0	
12-16 C5OLO	3/4	1 5/16-12	1 7/16	1.62	2.35	5.5	
14 C5OLO**	7/8	1 3/16-12	1 5/16	1.63	2.30		
16 C5OLO	1	1 5/16-12	1 7/16	1.64	2.35	5.5	5.5
16-12 C5OLO	1	1 1/16-12	1 7/16	1.64	2.32	6.0	6.0
16-20 C5OLO	1	1 5/8-12	1 5/8	1.76	2.45	4.0	
20 C5OLO	1 1/4	1 5/8-12	1 5/8	1.76	2.45	4.0	4.0
20-16 C5OLO	1 1/4	1 5/16-12	1 5/8	1.76	2.42	4.0	4.0
20-24 C5OLO	1 1/4	1 7/8-12	1 7/8	1.92	2.59	4.0	4.0
24 C5OLO	1 1/2	1 7/8-12	1 7/8	1.92	2.59	4.0	4.0
24-20 C5OLO	1 1/2	1 5/8-12	1 7/8	1.92	2.59	4.0	
32 C5OLO**	2	2 1/2-12	2 1/2	2.76	3.07	2.5	

** Sizes 14 and 32 are not included in SAE J1453.
*** JJ for these parts does not conform to SAE.

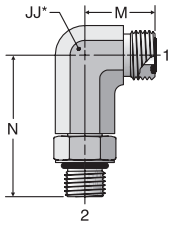
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

CC5OLO Full Dimensions

Long Straight Thread Elbow
ORFS-Long / SAE-ORB

SAE 521520

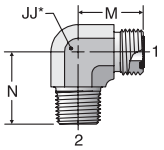


* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN-UNF-2A	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 CC5OLO	1/4	7/16-20	3/4	0.85	2.23	6.0	
6 CC5OLO	3/8	9/16-18	3/4	0.98	2.61	6.0	
8 CC5OLO	1/2	3/4-16	3/4	1.10	2.95	6.0	
10 CC5OLO	5/8	7/8-14	1 1/16	1.31	3.51	6.0	
12 CC5OLO	3/4	1 1/16-12	1 3/16	1.47	3.97	6.0	
16 CC5OLO	1	1 5/16-12	1 7/16	1.64	4.51	5.5	

CLO Full Dimensions

Male Pipe Elbow
ORFS / NPTF



* JJ – Across Wrench Flats

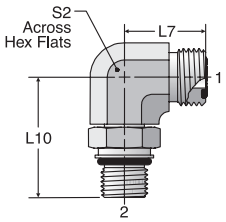
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 CLO	1/4	1/8-27	9/16	0.85	0.80	6.0	6.0
4-4 CLO	1/4	1/4-18	9/16	0.85	1.12	6.0	6.0
4-6 CLO	1/4	3/8-18	3/4	0.97	1.22	6.0	6.0
4-8 CLO	1/4	1/2-14	7/8	1.07	1.47	6.0	
6 CLO	3/8	1/4-18	3/4	0.98	1.09	6.0	6.0
6-6 CLO	3/8	3/8-18	3/4	0.98	1.22	6.0	6.0
6-8 CLO	3/8	1/2-14	7/8	1.15	1.47	6.0	6.0
8 CLO	1/2	3/8-18	3/4	1.10	1.22	6.0	6.0
8-4 CLO	1/2	1/4-18	3/4	1.10	1.22	6.0	6.0
8-8 CLO	1/2	1/2-14	7/8	1.10	1.47	6.0	6.0
8-12 CLO	1/2	3/4-14	1 1/16	1.32	1.59	4.0	
10 CLO	5/8	1/2-14	1 1/16	1.31	1.47	6.0	6.0
10-6 CLO	5/8	3/8-18	1 1/16	1.31	1.28	6.0	
10-12 CLO	5/8	3/4-14	1 3/16	1.41	1.59	4.0	
12 CLO	3/4	3/4-14	1 3/16	1.47	1.59	4.0	4.0
12-8 CLO	3/4	1/2-14	1 3/16	1.47	1.59	6.0	
12-16 CLO	3/4	1-11 1/2	1 5/16	1.62	1.97	3.0	
14 CLO*	7/8	3/4-14	1 5/16	1.63	1.69		
16 CLO	1	1-11 1/2	1 7/16	1.64	1.97	3.0	3.0
16-12 CLO	1	3/4-14	1 7/16	1.64	1.78	4.0	4.0
20 CLO	1 1/4	1 1/4-11 1/2	1 5/8	1.76	2.38	2.5	2.5
24 CLO	1 1/2	1 1/2-11 1/2	1 7/8	1.92	2.64	2.5	
24-20 CLO	1 1/2	1 1/4-11 1/2	1 7/8	1.92	2.61	2.5	

* Size 14 is not included in SAE J1453.

C87OMLO Full Dimensions

90° Metric Straight Thread Elbow
ORFS / ISO 6149

ISO 8434-3 SDE
SAE 52M0287



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 ISO 261	L7 (mm)	L10 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12C87OMLO	6	1/4	M12X1.5	21.5	33	14	6.0	
4M14C87OMLO	6	1/4	M14X1.5	24	35.5	17		
6M12C87OMLO	8,10	3/8	M12X1.5	25	35.5	17	6.0	
6M14C87OMLO	8,10	3/8	M14X1.5	25	35.5	17	6.0	
6M16C87OMLO	8,10	3/8	M16X1.5	25	37.5	17	6.0	
8M14C87OMLO	12	1/2	M14X1.5	28	36	19	6.0	
8M18C87OMLO	12	1/2	M18X1.5	28	41	19	6.0	
8M22C87OMLO	12	1/2	M22X1.5	31	49	27	6.0	
10M18C87OMLO	14,15,16	5/8	M18X1.5	33.5	47.5	37	6.0	
10M22C87OMLO	14,15,16	5/8	M22X1.5	33.5	49	27	6.0	
12M22C87OMLO	18,20	3/4	M22X1.5	37.5	49.5	27	6.0	
12M27C87OMLO	18,20	3/4	M27X2	37.5	55.5	27	6.0	
16M33C87OMLO	22,25	1	M33X2	41.5	59.5	36	5.0	
20M38C87OMLO*	28,30,32	1 1/4	M38X2	44.5	62	41	4.0	
20M42C87OMLO	28,30,32	1 1/4	M42X2	44.5	63	41	4.0	
24M48C87OMLO	35,38	1 1/2	M48X2	49	71.5	50	4.0	

* For special M38x2 (ISO 6149-1 style) port. The current ISO 6149 does not include the M38 size.

Dimensions and pressures for reference only, subject to change.

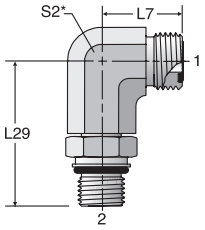
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index
How To Order
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3-D CAD Model
Reference Section

CC87OMLO Full Dimensions

Long 90° Metric Straight Thread Elbow
ORFS-Long / ISO 6149

ISO 8434-3 SDEL
SAE 52M1587

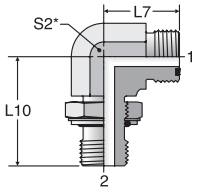


* S2 – Across Hex Flats

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 ISO 261	L7 (mm)	L29 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12CC87OMLO	6	1/4	M12X1.5	21.5	56.4	14		
6M14CC87OMLO	8,10	3/8	M14X1.5	25	56.4	19		
8M18CC87OMLO	12	1/2	M18X1.5	28	74.9	22	6.0	
10M22CC87OMLO	14,15,16	5/8	M22X1.5	33.5	87.9	27	6.0	
12M27CC87OMLO	18,20	3/4	M27X2	37.5	100.5	27	6.0	
16M33CC87OMLO	22,25	1	M33X2	41.5	114.5	36		

C8OMLO Full Dimensions

Metric Straight Thread Elbow
ORFS / Metric-ORR



* S2 – Across Hex Flats

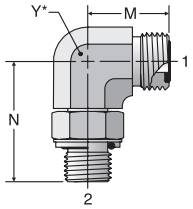
TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 ISO 261	L7 (mm)	L10 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12C8OMLO	6	1/4	M12X1.5	21.5	33	14	3.6	
6M12C8OMLO	8, 10	3/8	M12X1.5	25	35.5	17	3.6	
6M14C8OMLO	8, 10	3/8	M14X1.5	25	35.5	17	3.6	
6M16C8OMLO	8, 10	3/8	M16X1.5	25	37.5	17	3.6	
8M14C8OMLO	12	1/2	M14X1.5	28	36	19		
8M18C8OMLO	12	1/2	M18X1.5	28	41	19	3.6	
8M22C8OMLO	12	1/2	M22X1.5	31.5	49	27	3.6	
10M22C8OMLO	14, 15, 16	5/8	M22X1.5	33.5	49	27	3.6	
12M27C8OMLO	18, 20	3/4	M27X2	37.5	55.5	30	3.6	
16M33C8OMLO	22, 25	1	M33X2	41.5	59.5	36		
20M38C8OMLO	28, 30, 32	1 1/4	M38X2	44.5	62	41		
20M42C80MLO	28, 30, 32	1 1/4	M42X2	44.5	63	41	2.5	

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
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Columbus, Ohio
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C4OMLO Full Dimensions

Male Elbow – BSPP
(for ISO 1179-1 Port)
ORFS / BSPP-ORR



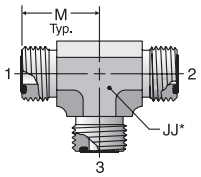
* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	M (mm)	N (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4C4OMLO	6	1/4	1/8-28	21.5	30	14	4.0	
4-4C4OMLO	6	1/4	1/4-19	23.5	36	19	4.0	
4-6C4OMLO	6	1/4	3/8-19	24.5	38	19	4.0	
6C4OMLO	8,10	3/8	1/4-19	25	36	19	4.0	4.0
6-6C4OMLO	8,10	3/8	3/8-19	26.5	38	19	4.0	
8-4C4OMLO	12	1/2	1/4-19	28	35.5	19	4.0	
8C4OMLO	12	1/2	3/8-19	28	38	19	4.0	
8-8C4OMLO	12	1/2	1/2-14	31	48.5	27	4.0	
8-12C4OMLO	12	1/2	3/4-14	33.5	51.5	30	4.0	
10-6C4OMLO	14,15,16	5/8	3/8-19	33.5	40.5	27		
10C4OMLO	14,15,16	5/8	1/2-14	33.5	48.5	27	4.0	
10-12C4OMLO	14,15,16	5/8	3/4-14	36	51.5	30	4.0	
10-16C4OMLO	14,15,16	5/8	1-11	39.5	58.5	36		
12-8C4OMLO	18,20	3/4	1/2-14	37.5	49.5	30	4.0	
12C4OMLO	18,20	3/4	3/4-14	37.5	51.5	30	4.0	
12-16C4OMLO	18,20	3/4	1-11	41	58.5	36	4.0	
16-12C4OMLO	22,25	1	3/4-14	41.5	56	36	4.0	
16C4OMLO	22,25	1	1-11	41.5	58.5	36	4.0	
16-20C4OMLO	22,25	1	1 1/4-11	44.5	61	41	3.0	
20-16C4OMLO	28,30,32	1 1/4	1-11	44.5	61	41	4.0	
20C4OMLO	28,30,32	1 1/4	1 1/4-11	44.5	61	41		
20-24C4OMLO	28,30,32	1 1/4	1 1/2-11	49	64.5	50	2.0	
24C4OMLO	35,38	1 1/2	1 1/2-11	49	64.5	50	2.0	

JLO Full Dimensions

Union Tee
ORFS (all three ends)

SAE 520401



* JJ – Across Wrench Flats

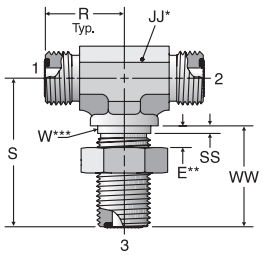
TUBE FITTING PART #	END SIZE 1-3 (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 JLO	1/4	9/16	0.85	9.2	9.2
6 JLO	3/8	3/4	0.98	9.2	9.2
8 JLO	1/2	3/4	1.10	9.2	9.2
10 JLO	5/8	1 1/16	1.31	6.0	6.0
12 JLO	3/4	1 3/16	1.47	6.0	6.0
14 JLO*	7/8	1 5/16	1.63		
16 JLO	1	1 7/16	1.64	6.0	6.0
20 JLO	1 1/4	1 5/8	1.76	5.0	5.0
24 JLO	1 1/2	1 7/8	1.92	4.0	4.0
32 JLO*	2	2 1/2	2.76	3.0	

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

WJLO Full Dimensions

Bulkhead Branch Tee
ORFS (all three ends)

SAE 520959
WJLO-WLNL - Body with Locknut
(See page A12 for WLNL)



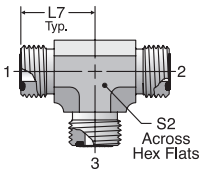
TUBE FITTING PART #	END SIZE 1-3 (in.)	E MAX (in.)	JJ (in.)	R (in.)	S (in.)	SS (in.)	W DIA (in.)	WW (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 WJLO	1/4	0.53	9/16	0.89	1.85	0.06	0.56	1.24	9.2	
6 WJLO	3/8	0.53	3/4	1.02	2.05	0.06	0.69	1.34	9.2	
8 WJLO	1/2	0.53	3/4	1.14	2.18	0.06	0.81	1.44	9.2	
10 WJLO	5/8	0.52	1 1/16	1.36	2.48	0.06	1.00	1.60	6.0	
12 WJLO	3/4	0.50	1 3/16	1.52	2.64	0.06	1.19	1.64	6.0	
16 WJLO	1	0.51	1 7/16	1.67	2.80	0.06	1.44	1.66	6.0	

* JJ – Across wrench flats.
** E – Maximum bulkhead thickness.
*** W – Bulkhead pilot diameter. Recommended clearance hole is W + 0.015".

JMLO Full Dimensions

Union Tee – mm Hex
ORFS (all three ends)

ISO 8434-3 T
SAE 52M0401



* S2 – Across Hex Flats

TUBE FITTING PART #	END SIZE 1-3 (mm)	1-3 (in.)	L7 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4JMLO	6	1/4	21.5	14	9.2	
6JMLO	8,10	3/8	25	19	9.2	
8JMLO	12	1/2	28	19	9.2	
10JMLO	14,15,16	5/8	33.5	27	6.0	
12JMLO	18,20	3/4	37.5	30	6.0	
16JMLO	22,25	1	41.5	36	6.0	
20JMLO	28,30,32	1 1/4	44.5	41	5.0	
24JMLO	35,38	1 1/2	49	50	4.0	

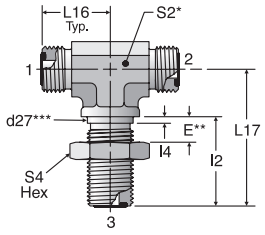
Dimensions and pressures for reference only, subject to change.

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WJMLO Full Dimensions

Bulkhead Union Tee – mm Hex
ORFS (all three ends)

ISO 8434-3 BHBT
SAE 52M0959
WJMLOWLNML - Body with Locknut
(See page A12 for WLNML)



TUBE FITTING PART #	END SIZE 1-3 (mm)	END SIZE 1-3 (in.)	d27 (mm)	E (mm)	I2 (mm)	I4 (mm)	L16 (mm)	L17 (mm)	S2 (mm)	S4 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	STANDARD Dynamic Pressure (x 1,000 PSI) SS
4WJMLO	6	1/4	14.3	14	31.5	1.5	22.5	47	14	22	9.2	
6WJMLO	8,10	3/8	17.5	14	34	1.5	26	52	19	27	9.2	
8WJMLO	12	1/2	20.6	14	36.5	2.5	29	55.5	19	30	9.2	
10WJMLO	14,15,16	5/8	25.4	14	40.5	2.5	34.5	63	27	36		
12WJMLO	18,20	3/4	30.2	14	41.5	3	38.5	67	30	41	6.0	
16WJMLO	22,25	1	36.5	14	42	3	42.5	71	36	46	6.0	
20WJMLO	28,30,32	1 1/4	42.9	14	42	3	45.5	75.5	41	50		
24WJMLO	35,38	1 1/2	50.8	14	42	3	49.5	79.5	50	60		

* S2 – Across wrench flats.

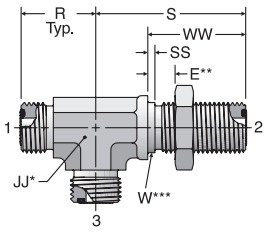
** E – Maximum bulkhead thickness.

***d27 - Bulkhead pilot diameter. Recommended clearance hole is d27 + 0.4 mm.

WJJLO Full Dimensions

Bulkhead Run Tee
ORFS (all three ends)

SAE 520958
WJJLOWLNML - Body with Locknut
(See page A12 for WLNL)



TUBE FITTING PART #	END SIZE 1-3 (in.)	E MAX (in.)	JJ (in.)	R (in.)	S (in.)	SS (in.)	W DIA (in.)	WW (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 WJJLO	1/4	0.53	9/16	0.89	1.85	0.06	0.56	1.24	9.2	
6 WJJLO	3/8	0.53	3/4	1.02	2.05	0.06	0.69	1.34	9.2	
8 WJJLO	1/2	0.53	3/4	1.14	2.18	0.06	0.81	1.44	9.2	9.2
10 WJJLO	5/8	0.52	1 1/16	1.36	2.48	0.06	1.00	1.60	6.0	
12 WJJLO	3/4	0.50	1 3/16	1.52	2.64	0.06	1.19	1.64	6.0	
16 WJJLO	1	0.51	1 7/16	1.67	2.80	0.06	1.44	1.66	6.0	
20 WJJLO	1 1/4	0.51	1 5/8	1.79	2.97	0.06	1.69	1.66	5.0	
24 WJJLO	1 1/2	0.51	1 7/8	1.95	3.13	0.06	2.00	1.66	4.0	

* JJ – Across wrench flats.

** E – Maximum bulkhead thickness.

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

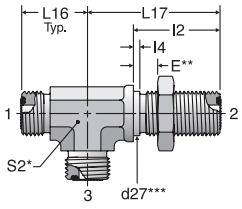
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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WJJMLO Full Dimensions

Bulkhead Run Tee – mm Hex
ORFS (all three ends)

ISO 8434-3 BHRT
SAE 52M0958
WJJMLOWLNML - Body with Locknut
(See page A12 for WLNML)



TUBE FITTING PART #	END SIZE 1-3 (mm)	END SIZE 1-3 (in.)	d27 (mm)	E (mm)	l2 (mm)	l4 (mm)	L16 (mm)	L17 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	STANDARD Dynamic Pressure (x 1,000 PSI) SS
4WJJMLO	6	1/4	14.3	14	31.5	1.5	22.5	47	14	9.2	
6WJJMLO	8,10	3/8	17.5	14	34	1.5	26	52	19	9.2	
8WJJMLO	12	1/2	20.6	14	36.5	2.5	29	55.5	19	9.2	
10WJJMLO	14,15,16	5/8	25.4	14	40.5	2.5	34.5	63	27	6.0	
12WJJMLO	18,20	3/4	30.2	14	41.5	3	38.5	67	30	6.0	
16WJJMLO	22,25	1	36.5	14	42	3	42.5	71	36	6.0	
20WJJMLO	28,30,32	1 1/4	42.9	14	42	3	45.5	75.5	41		
24WJJMLO	35,38	1 1/2	50.8	14	42	3	49.5	79.5	50		

* S2 – Across wrench flats.

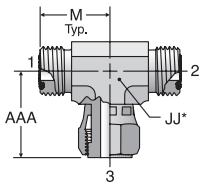
** E – Maximum bulkhead thickness.

***d27 - Bulkhead pilot diameter. Recommended clearance hole is d27 + 0.4 mm.

S6LO Full Dimensions

Swivel Nut Branch Tee
ORFS / ORFS / ORFS Swivel

SAE 520433



* JJ – Across Wrench Flats

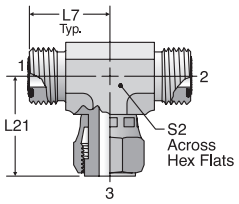
TUBE FITTING PART #	END SIZE 1-3 (in.)	AAA (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 S6LO	1/4	1.07	9/16	0.85	9.2	9.2
6 S6LO	3/8	1.17	3/4	0.98	9.2	9.2
8 S6LO	1/2	1.49	3/4	1.10	9.2	9.2
10 S6LO	5/8	1.65	1 1/16	1.31	6.0	6.0
12 S6LO	3/4	1.82	1 3/16	1.47	6.0	6.0
14 S6LO*	7/8	2.07	1 5/16	1.63		
16 S6LO	1	2.10	1 7/16	1.64	6.0	
20 S6LO	1 1/4	2.29	1 5/8	1.76	5.0	5.0
24 S6LO	1 1/2	2.41	1 7/8	1.92	4.0	

* Size 14 is not included in SAE J1453.

S6MLO Full Dimensions

Swivel Nut Branch Tee – mm Hex
ORFS / ORFS / ORFS Swivel

ISO 8434-3 SWBT
SAE 52M0433



* S2 – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1-3 (mm)	END SIZE 1-3 (in.)	L7 (mm)	L21 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	STANDARD Dynamic Pressure (x 1,000 PSI) SS
4S6MLO	6	1/4	21.5	26.5	14		
6S6MLO	8,10	3/8	25	29	19	9.2	
8S6MLO	12	1/2	28	38	19	9.2	
10S6MLO	14,15,16	5/8	33.5	41	27	6.0	
12S6MLO	18,20	3/4	37.5	46.5	30	6.0	
16S6MLO	22,25	1	41.5	53.5	36	6.0	
20S6MLO	28,30,32	1 1/4	44.5	58	41	4.0	
24S6MLO	35,38	1 1/2	49	61	50		

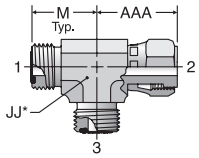
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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R6LO Full Dimensions

Swivel Nut Run Tee
ORFS / ORFS Swivel / ORFS

SAE 520432



* JJ – Across Wrench Flats

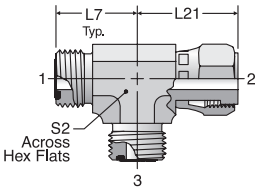
TUBE FITTING PART #	END SIZE 1-3 (in.)	AAA (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 R6LO	1/4	1.07	9/16	0.85	9.2	
6 R6LO	3/8	1.17	3/4	0.98	9.2	
8 R6LO	1/2	1.49	3/4	1.10	9.2	
10 R6LO	5/8	1.65	1 1/16	1.31	6.0	
12 R6LO	3/4	1.82	1 3/16	1.47	6.0	6.0
14 R6LO*	7/8	2.07	1 5/16	1.63		
16 R6LO	1	2.10	1 7/16	1.64	6.0	
20 R6LO	1 1/4	2.29	1 5/8	1.76	5.0	
24 R6LO	1 1/2	2.41	1 7/8	1.92	4.0	

* Size 14 is not included in SAE J1453.

R6MLO Full Dimensions

Swivel Nut Run Tee – mm Hex
ORFS / ORFS Swivel / ORFS

ISO 8434-3 SWRT
SAE 52M0432

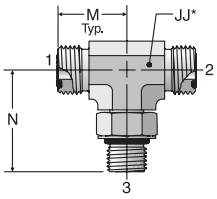


TUBE FITTING PART #	END SIZE 1-3 (mm)	(in.)	L7 (mm)	L21 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4R6MLO	6	1/4	21.5	26.5	14	9.2	
6R6MLO	8,10	3/8	25	29	19	9.2	
8R6MLO	12	1/2	28	38	19	9.2	
10R6MLO	14,15,16	5/8	33.5	41	27	6.0	
12R6MLO	18,20	3/4	37.5	46.5	30	6.0	
16R6MLO	22,25	1	41.5	53.5	36	6.0	
20R6MLO	28,30,32	1 1/4	44.5	58	41	4.0	
24R6MLO	35,38	1 1/2	49	61	50	4.0	

S5OLO Full Dimensions

Straight Thread Branch Tee
ORFS / ORFS / SAE-ORB

SAE 520429



* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 UN/UNF-2A	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 S5OLO	1/4	1/4	7/16-20	9/16	0.85	1.29	6.0	6.0
4-4-6 S5OLO	1/4	1/4	9/16-18	9/16	0.92	1.45	6.0	
6 S5OLO	3/8	3/8	9/16-18	3/4	0.98	1.45	6.0	6.0
6-6-4 S5OLO	3/8	3/8	7/16-20	3/4	0.98	1.45	6.0	
6-6-8 S5OLO	3/8	3/8	3/4-16	3/4	1.04	1.60	6.0	
8 S5OLO	1/2	1/2	3/4-16	3/4	1.10	1.60	6.0	6.0
8-8-10 S5OLO	1/2	1/2	7/8-14	1 1/16	1.21	1.97	6.0	
8-8-12 S5OLO	1/2	1/2	1 1/16-12	1 3/16	1.32	2.17	6.0	
10 S5OLO	5/8	5/8	7/8-14	1 1/16	1.31	1.97	6.0	
10-10-12 S5OLO	5/8	5/8	1 1/16-12	1 3/16	1.41	2.17	6.0	
12 S5OLO	3/4	3/4	1 1/16-12	1 3/16	1.47	2.17	6.0	6.0
12-12-16 S5OLO	3/4	3/4	1 5/16-12	1 7/16	1.62	2.35	5.5	
16 S5OLO	1	1	1 5/16-12	1 7/16	1.64	2.35	5.5	
16-16-20 S5OLO	1	1	1 5/8-12	1 5/8	1.76	2.45		
20 S5OLO	1 1/4	1 1/4	1 5/8-12	1 5/8	1.76	2.45	4.0	
24 S5OLO	1 1/2	1 1/2	1 7/8-12	1 7/8	1.92	2.59	4.0	

Dimensions and pressures for reference only, subject to change.

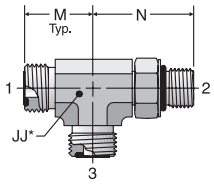
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R5OLO Full Dimensions

Straight Thread Run Tee
ORFS / SAE-ORB / ORFS

SAE 520428



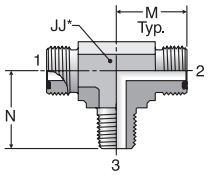
* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	END SIZE 3 (in.)	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 R5OLO	1/4	7/16-20	1/4	9/16	0.85	1.29	6.0	6.0
4-6-4 R5OLO	1/4	9/16-18	1/4	3/4	0.92	1.45	6.0	
6 R5OLO	3/8	9/16-18	3/8	3/4	0.98	1.45	6.0	6.0
6-8-6 R5OLO	3/8	3/4-16	3/8	3/4	1.04	1.60	6.0	
8 R5OLO	1/2	3/4-16	1/2	3/4	1.10	1.60	6.0	6.0
8-10-8 R5OLO	1/2	7/8-14	1/2	1 1/16	1.21	1.97	6.0	
10 R5OLO	5/8	7/8-14	5/8	1 1/16	1.31	1.97	6.0	6.0
10-12-10 R5OLO	5/8	1 1/16-12	5/8	1 3/16	1.41	2.17	6.0	
12 R5OLO	3/4	1 1/16-12	3/4	1 3/16	1.47	2.17	6.0	6.0
12-16-12 R5OLO	3/4	1 5/16-12	3/4	1 7/16	1.62	2.35	5.5	
16 R5OLO	1	1 5/16-12	1	1 7/16	1.64	2.35	5.5	5.5
16-20-16 R5OLO	1	1 5/8-12	1	1 5/8	1.76	2.45		
20 R5OLO	1 1/4	1 5/8-12	1 1/4	1 5/8	1.76	2.45	4.0	4.0
24 R5OLO	1 1/2	1 7/8-12	1 1/2	1 7/8	1.92	2.59	4.0	

SLO Full Dimensions

Male Pipe Tee
ORFS / ORFS / NPTF

SAE 520425



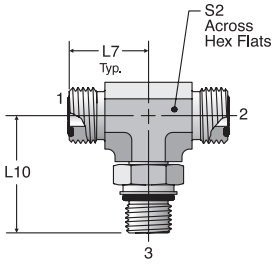
* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	END SIZE 3 NPTF	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4-4-4 SLO	1/4	1/4-18	9/16	0.85	1.12	6.0	
6 SLO	3/8	1/4-18	3/4	0.98	1.09	6.0	
6-6-6 SLO	3/8	3/8-18	3/4	0.98	1.22	6.0	
8 SLO	1/2	3/8-18	3/4	1.10	1.22	6.0	
8-8-8 SLO	1/2	1/2-14	7/8	1.10	1.47	6.0	
10 SLO	5/8	1/2-14	1 1/16	1.31	1.47		
12 SLO	3/4	3/4-14	1 3/16	1.47	1.59	4.0	
16 SLO	1	1-11 1/2	1 7/16	1.64	1.97	3.0	
20 SLO	1 1/4	1 1/4-11 1/2	1 5/8	1.76	2.38	2.5	

S87OMLO Full Dimensions

Metric Straight Thread Branch Tee
ORFS / ORFS / ISO 6149

ISO 8434-3 SDBT
SAE 52M0489



* S2 – Across Hex Flats

TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	END SIZE 3 ISO 261	L7 (mm)	L10 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12S87OMLO	6	1/4	M12X1.5	21.5	33	14		
4M14S87OMLO	6	1/4	M14X1.5	24	35.5	19	6.0	
6M14S87OMLO	8,10	3/8	M14X1.5	25	35.5	19	6.0	
6M16S87OMLO	8,10	3/8	M16X1.5	25	37.5	19	6.0	
8M14S87OMLO	12	1/2	M14X1.5	28	36	19		
8M18S87OMLO	12	1/2	M18X1.5	28	41	19	6.0	
8M22S87OMLO	12	1/2	M22X1.5	31	49	27	6.0	
10M22S87OMLO	14,15,16	5/8	M22X1.5	33.5	49	27	6.0	
12M27S87OMLO	18,20	3/4	M27X2	37.5	55.5	30	6.0	
16M33S87OMLO	22,25	1	M33X2	41.5	59.5	36	5.1	
20M42S87OMLO	28,30,32	1 1/4	M42X2	44.5	63	41	4.0	
24M48S87OMLO	35,38	1 1/2	M48X2	49	71.5	50		

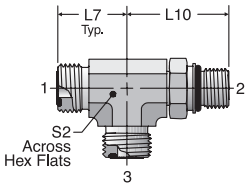
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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R87OMLO Full Dimensions

Metric Straight Thread Run Tee
ORFS / ISO 6149 / ORFS

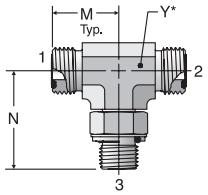
ISO 8434-3 SDRT
SAE 52M0488



TUBE FITTING PART #	END SIZE 1 & 3 (mm)	1 & 3 (in.)	2 ISO 261	L7 (mm)	L10 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4M12R87OMLO	6	1/4	M12X1.5	21.5	33	14	6.0	
4M14R87OMLO	6	1/4	M14X1.5	24	35.5	19	6.0	
6M14R87OMLO	8,10	3/8	M14X1.5	25	35.5	19		
6M16R87OMLO	8,10	3/8	M16X1.5	25	37.5	19	6.0	
8M14R87OMLO	12	1/2	M14X1.5	28	36	19	6.0	
8M18R87OMLO	12	1/2	M18X1.5	28	41	19	6.0	
8M22R87OMLO	12	1/2	M22X1.5	31	49	27	6.0	
10M22R87OMLO	14,15,16	5/8	M22X1.5	33.5	49	27	6.0	
12M27R87OMLO	18,20	3/4	M27X2	37.5	55.5	30	6.0	
16M33R87OMLO	22,25	1	M33X2	41.5	59.5	36	4.0	
20M42R87OMLO	28,30,32	1 1/4	M42X2	44.5	63	41	4.0	
24M48R87OMLO	35,38	1 1/2	M48X2	49	71.5	50	4.0	

S4OMLO Full Dimensions

Branch Tee – BSPP
(for ISO 1179-1 Port)
ORFS / ORFS / BSPP-ORR



* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 & 2 (mm)	1 & 2 (in.)	3 BSPP	M (mm)	N (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4S4OMLO	6	1/4	1/8-28	21.5	30	14	4.0	
4-4-4S4OMLO	6	1/4	1/4-19	23.5	36	19	4.0	
6S4OMLO	8,10	3/8	1/4-19	25	36	19	4.0	
6-6-6S4OMLO	8,10	3/8	3/8-19	26.5	38	19	4.0	
8S4OMLO	12	1/2	3/8-19	28	38	19	4.0	
8-8-8S4OMLO	12	1/2	1/2-14	31	48.5	27	4.0	
10S4OMLO	14,15,16	5/8	1/2-14	33.5	48.5	27	4.0	
10-10-12S4OMLO	14,15,16	5/8	3/4-14	36	51.5	30		
12S4OMLO	18,20	3/4	3/4-14	37.5	51.5	30	4.0	
16S4OMLO	22, 25	1	1-11	41.5	58.5	36	4.0	

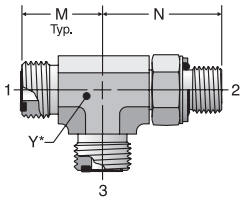
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R4OMLO Full Dimensions

Run Tee – BSPP
(for ISO 1179-1 Port)
ORFS / BSPP-ORR / ORFS



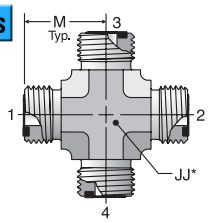
* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 & 3 (mm)	END SIZE 1 & 3 (in.)	END SIZE 2 BSPP	M (mm)	N (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4R4OMLO	6	1/4	1/8 - 28	21.5	30	14	4.0	
4-4-4R4OMLO	6	1/4	1/4 - 19	23.5	36	19	4.0	
6R4OMLO	8,10	3/8	1/4 - 19	25	36	19	4.0	
6-6-6R4OMLO	8,10	3/8	3/8 - 19	26.5	38	19	4.0	
8R4OMLO	12	1/2	3/8 -19	28	38	19	4.0	
8-8-8R4OMLO	12	1/2	1/2 - 14	31	48.5	27	4.0	
10R4OMLO	14,15,16	5/8	1/2 - 14	33.5	48.5	27	4.0	
10-12-10R4OMLO	14,15,16	5/8	3/4 - 14	36	51.5	30		
12R4OMLO	18,20	3/4	3/4 - 14	37.5	51.5	30	4.0	
12-16-12R4OMLO	18,20	3/4	1 - 11	41	58.5	37	4.0	
16R4OMLO	22,25	1	1 - 11	41.5	58.5	37	4.0	

KLO Full Dimensions

Union Cross
ORFS (all four ends)

SAE 520501



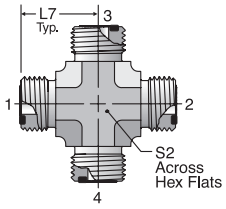
* JJ – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1-4 (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 KLO	1/4	9/16	0.85	9.2	
6 KLO	3/8	3/4	0.98	9.2	
8 KLO	1/2	3/4	1.10	9.2	
10 KLO	5/8	1 1/16	1.31	6.0	
12 KLO	3/4	1 3/16	1.47	6.0	
16 KLO	1	1 7/16	1.64	6.0	
20 KLO	1 1/4	1 5/8	1.76	5.0	

KMLO Full Dimensions

Union Cross – mm Hex
ORFS (all four ends)

ISO 8434-3 K
SAE 52M0501



TUBE FITTING PART #	END SIZE 1-4 (mm)	END SIZE 1-4 (in.)	L7 (mm)	S2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	STANDARD Dynamic Pressure (x 1,000 PSI) SS
4KMLO	6	1/4	21.5	14		
6KMLO	8,10	3/8	25	19		
8KMLO	12	1/2	28	19	9.2	
10KMLO	14,15,16	5/8	33.5	27		
12KMLO	18,20	3/4	37.5	30		
16KMLO	22,25	1	41.5	36		
20KMLO	28,30,32	1 1/4	44.5	41		
24KMLO	35,38	1 1/2	49	50		

Dimensions and pressures for reference only, subject to change.

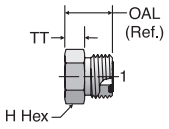
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Reference Section

PNLO Full Dimensions

Plug
ORFS

SAE 520109



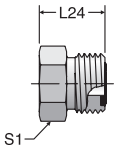
TUBE FITTING PART #	END SIZE 1 (in.)	H HEX (in.)	OAL (REF) (in.)	TT (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 PNLO	1/4	5/8	0.66	0.20	9.2	
6 PNLO	3/8	3/4	0.76	0.32	9.2	
8 PNLO	1/2	7/8	0.86	0.35	9.2	9.2
10 PNLO	5/8	1 1/16	1.02	0.41	6.0	
12 PNLO	3/4	1 1/4	1.08	0.41	6.0	6.0
14 PNLO*	7/8	1 3/8	1.10	0.49		
16 PNLO	1	1 1/2	1.10	0.41	6.0	6.0
20 PNLO	1 1/4	1 3/4	1.10	0.41	6.0	6.0
24 PNLO	1 1/2	2 1/8	1.10	0.41	5.0	
32 PNLO*	2	2 3/4	1.37	0.50		

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

PNMLO Full Dimensions

Plug – mm Hex
ORFS

ISO 8434-3 PL
SAE 52M0109

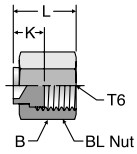


TUBE FITTING PART #	ORFS TUBE O.D. (mm)	(in.)	L24 (mm)	S1 HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4PNMLO	6	1/4	16.5	17	9.2	
6PNMLO	8,10	3/8	19	19	9.2	
8PNMLO	12	1/2	22	22	9.2	
10PNMLO	14,15,16	5/8	26	27	6.0	
12PNMLO	18,20	3/4	27.5	32	6.0	
16PNMLO	22,25	1	28	41	6.0	
20PNMLO	28,30,32	1 1/4	28	46	6.0	
24PNMLO	38	1 1/2	28	55		

FNL

Cap
ORFS

SAE 520112

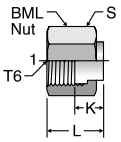


TUBE FITTING PART #	TUBE O.D. (in.)	T6 SWIVEL UN/UNF-2B	B HEX (in.)	K (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 FNL	1/4	9/16-18	11/16	0.34	0.65	9.2	9.2
6 FNL	3/8	11/16-16	13/16	0.39	0.76	9.2	9.2
8 FNL	1/2	13/16-16	15/16	0.45	0.88	9.2	9.2
10 FNL	5/8	1-14	1 1/8	0.51	1.04	6.0	6.0
12 FNL	3/4	1 3/16-12	1 3/8	0.57	1.14	6.0	6.0
14 FNL*	7/8	1 5/16-12	1 1/2	0.57	1.10		
16 FNL	1	1 7/16-12	1 5/8	0.61	1.18	6.0	6.0
20 FNL	1 1/4	1 11/16-12	1 7/8	0.61	1.18	6.0	6.0
24 FNL	1 1/2	2-12	2 1/4	0.61	1.18	5.0	5.0
32 FNL*	2	2 1/2-12	2 7/8	0.80	1.47	3.0	

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

FNML

Cap
ORFS



TUBE FITTING PART #	TUBE O.D. (mm)	(in.)	T6 SWIVEL UN/UNF-2B	K (mm)	L (mm)	S HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
4FNML	6	1/4	9/16-18	8.5	16.5	17		
6FNML	8, 10	3/8	11/16-16	10	18.5	22	9.2	
8FNML	12	1/2	13/16-16	11.5	21.5	24		
10FNML	14, 15, 16	5/8	1-14	13	25.5	30		
12FNML	18, 20	3/4	1 3/16-12	14.5	28	36		
16FNML	22, 25	1	1 7/16-12	15.5	29	41		
20FNML	28, 30, 32	1 1/4	1 11/16-12	15.5	29	50		
24FNML	35, 38	1 1/2	2-12	15.5	29	60		

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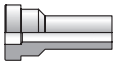
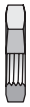
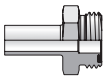
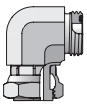
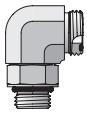
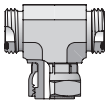
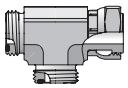
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Seal-Lok™ Lite O-Ring Face Seal Tube Fittings



The Fitting Authority

Nuts, Sleeves, Locknuts	**BLL** Nut  B7	**TPL (Inch & Metric)** Parflange Sleeve  A10	**TL (Inch & Metric)** Braze Sleeve  A11	**TLW1** Butt Weld Sleeve  B7	**WLLNL** Bulkhead Locknut  B7
SBR Braze Ring  B7	**Straights**	**HLLO** Union  B8	**LLOT1** Seal-Lok Lite/Flareless Tube Stub  B8	**WLLO** Bulkhead Union  B8	**F5OLLO** Seal-Lok Lite/SAE-ORB  B8
FLLO Seal-Lok Lite/PTF-Short  B8	**Straight Swivel**	**TRLLON** Tube End Reducer  B9	**90° Elbows**	**C6LLO** Seal-Lok Lite Swivel Nut Elbow  B9	**C5OLLO** Seal-Lok Lite/SAE-ORB  B9
CLLO Seal-Lok Lite/NPTF  B9	**Tees**	**JLLO** Union Tee  B9	**S6LLO** Seal-Lok Lite Swivel Branch  B9	**R6LLO** Seal-Lok Lite Swivel Run  B10	
Plugs and Caps	**PNLLO** Seal-Lok Lite Plug  B10	**FNLL** Seal-Lok Lite Cap  B10	**Conversion Adapters**	**LLOHX6** 37° Swivel/Seal-Lok Lite  B10	
Miscella-neous	**FLEX FLANGE** Flexible Metal Tube Assemblies  B11				

O-Rings and Seals (Shown in Section O)

O-Rings and Seals	**Seal-Lok Lite O-Rings**  O9	**SAE O-Rings** N0674  O9

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Seal-Lok Lite Introduction

Parker's Seal-Lok Lite fittings combine the traditional versatility of stainless steel Seal-Lok with the added feature of being adaptable to the new Flex Flange product line. Seal-Lok Lite fittings incorporate the O-ring face seal design to form a leak-tight seal. Seal-Lok Lite shaped fittings with SAE straight thread adjustable studs also feature Parker's new Robust Port Stud®, which provides improved reliability and easier assembly. Seal-Lok Lite fittings are **not** a direct interchange with standard industrial O-ring face seal fittings. Seal-Lok Lite's leak-free, compact design makes it suitable for use in applications for low pressure gases and general light duty industrial systems.



Fig. B1 – Seal-Lok Lite Fittings

Design and Construction

The Seal-Lok Lite fitting consists of four main components: a body, a sleeve, an O-ring and a nut. The body, sleeve, and nut are manufactured from 316 stainless steel.

The Seal-Lok Lite Fitting Body: Seal-Lok Lite fittings are manufactured in the most popular stainless steel sizes and configurations. The body is manufactured with Parker's CORG (Captive O-ring Groove), which keeps the O-ring captive during installation. Straight bodies are machined from cold drawn bar stock, ensuring consistent dimensional tolerances, improved strength and better surface finish. Shaped Seal-Lok Lite fittings are manufactured from a one-piece forged construction. This forged construction provides added strength and longer service life, while eliminating the potential leak path associated with multi-component brazed fittings.



Fig. B2– Captive O-ring Groove (CORG)

The Seal-Lok Lite Fitting Nut: Seal-Lok Lite tube nuts are machined from cold drawn bar stock. The Seal-Lok Lite tube nut is not interchangeable with the standard ORFS tube nut, as it is much shorter, more compact, and incorporates a metric thread.

The Seal-Lok Lite Parflange Sleeve: The preferred method of making a Seal-Lok Lite connection is by using the Parker Parflange machine to create the 90° flange on the tube end. The sleeve provides a contact shoulder for the nut and supports the flange and tubing. The Parflange process provides the following advantages:

- Several times faster than brazing
- No special pre- or post-flange cleaning
- Cleaner and safer than brazing
- Eliminates a potential leak path associated with braze joints

The Seal-Lok Lite fitting uses a standard Parflange sleeve and tooling. See Equipment section for the available Parflange tooling.

The Seal-Lok Lite 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. B3. The flat, smooth surface of the braze sleeve seals against the O-ring when fully assembled. The holding power is provided by the braze. An additional method is a butt weld connector (TLW1) that is also used with a tube nut. It is designed especially for orbital welders.

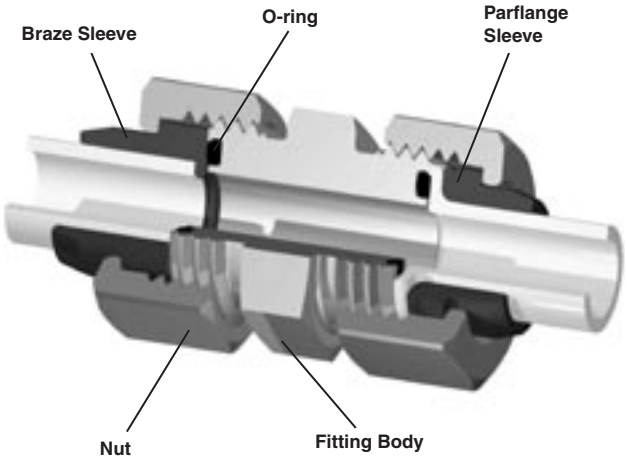


Fig. B3 – Seal-Lok Lite union cutaway with flanged and brazed assemblies

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How Seal-Lok Lite Fittings Work

The Seal-Lok Lite fitting body face contains a 70 durometer, Nitrile O-ring (N0674) 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.

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 Lite fittings practically unlimited remakeability. The O-ring should be inspected at each disassembly and replaced when necessary. See the O-ring section for replacement O-rings.

Flex Flange Assemblies

A unique feature of the Seal-Lok Lite fitting line is the adaptability to a line of light-duty flexible corrugated stainless steel tubes. The Flex Flange assembly is a complete flexible 316 stainless steel tube routing system. These factory pre-made assemblies are available in 3/8", 1/2", 3/4" and 1" tube sizes in a variety of assembly lengths.

The Flex Flange line offers working pressures up to 50 psig without permanently deforming the stainless corrugated assemblies. Flex Flange tube should not be used in applications:

- Where repeated movement or extreme vibration occurs
- Involving chlorides or salts
- As support for other components

Assembly and Installation

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

International Acceptance

Versatility: The versatility of the Seal-Lok Lite fitting is shown in Figure 4. A single Seal-Lok Lite fitting will mate with inch and metric tube, hose (Push-Lok and GPH), and Flex Flange. The universal tube nut and fitting body are used with either inch or metric tube, thus saving on component costs. The fitting body without the nut and sleeve is very popular as a hose/Flex Flange adapter.

Tube Wall Thickness: Recommended maximum tube wall thicknesses for Seal-Lok Lite fittings are provided in Table B1.

Seal-Lok Lite Size	Max. Inch Tube Wall	Max. Metric Tube Wall
-6	0.035	1
-8	0.035	1
-12	0.049	1.5
-16	0.049	1.5

Note: For wall thicknesses outside the recommended range, contact the Tube Fittings Division.

Table B1 – Recommended Max. Tube Wall Thickness

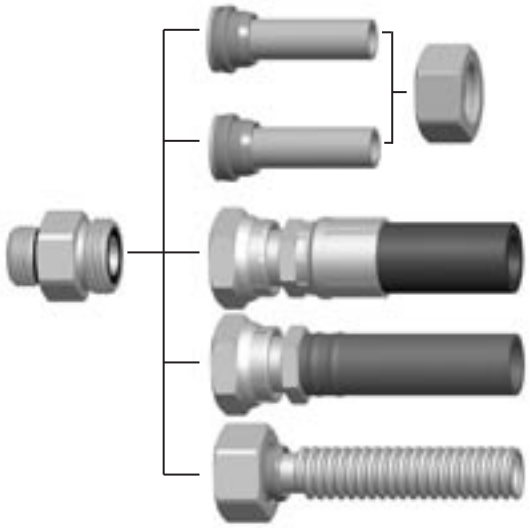


Fig. B4 – Seal-Lok Lite works with inch or metric tube, hose, and Flex Flange assemblies.



Fig. B5 – Seal-Lok Lite Flex Flange assembly.

Seal-Lok Fittings	Stainless Steel**	
	ASTM	Type
Forged Bodies	A182	316
Bar Stock Bodies	A479	316
Cold Formed Nuts	--	--
Machined Nuts*	A479	316
Braze Sleeves & Braze Connectors	A276	316L
Flange Sleeves	A479	316

Table B2 – Standard Material Specifications for Seal-Lok Lite Fittings

Dimensions and pressures for reference only, subject to change.

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Seal-Lok Lite Features

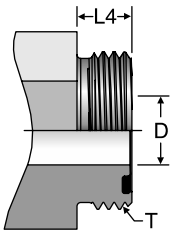
Feature	Advantage	Benefit
Compact design	Suitable selection for plumbing in limited or tight space in a compact system	Compact systems are more efficient and reduce the need for excessive routing of costly hose or tube
High flow diameter	Reduces pressure drop and increases system efficiency	Increases system performance while reducing operating costs
	Higher flow can be maintained through thin wall tubing	Reduces system cost and increases performance
Elastomeric seal	Tolerant of surface imperfections to provide leak-free connection	Reduces operational and maintenance 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	Reduces operational and maintenance costs
Forged Shapes	Higher resistance to mechanical shock and vibration that can lead to leakage	Reduces operational and maintenance costs
Adaptable to steel tube, Flex Flange, Push-Lok, and SS braided teflon hose	Versatility for end customer and for customer standardization efforts	Standardization reduces procurement and inventory 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.weld 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

Flex Flange Features

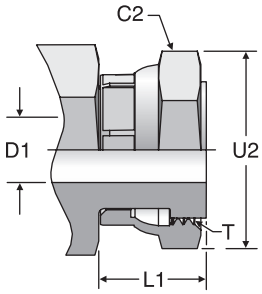
Feature	Advantage	Benefit
Flexibility	Able to connect in hard-to-reach areas and flex during assembly	More efficient assembly time and reduce the need for excessive routing of hose or tube
	Alternative to pre-bent rigid tube	No bending equipment or costs added to system
100% leak tested	Ensures there are no material defects in the tubing before nuts and sleeves are assembled	Helps ensure a leak-free system
Multiple sizes offered	Provides versatility for the end user. Available in 4 diameters and 7 different lengths.	Standardization reduces procurement costs
No tooling costs	Flex Flange is pre-assembled with nuts and sleeves	Eliminates tooling cost and assembly time needed for tube end assembly
Corrosion-resistant 316 Stainless Steel	Provides necessary corrosion resistance from media and environment	Eliminates failures due to corrosion
Plated steel nuts and sleeves	Reduces risk of galling	Eliminates leakage caused by galling prone to stainless steel products
	Helps provide a lower cost assembly by using components that are not exposed to the media source	Helps reduce system cost by not using expensive stainless steel materials
Increased worker productivity	Ease of assembly because of tube flexibility	Reduces assembly time associated with rigid tube

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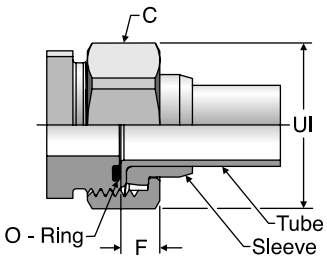
Seal-Lok Lite O-Ring Face Seal Tube Ends



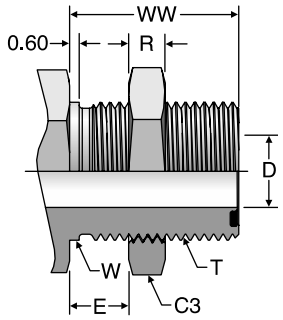
Seal-Lok Lite Male



Seal-Lok Lite Swivel Assembly



Seal-Lok Lite Tube End



Seal-Lok Lite WLL Body

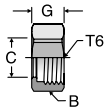
													Bulkhead			Across Corners	
			Thread	Tube Nut Hex	Swivel Nut Hex	Bulkhead Locknut Hex	Nominal Drill	Nominal Drill Swivel End	Max Bulkhead Thickness	Tube Nut Assembled Allowance	Swivel Turn Back	Male Turn Back	Locknut Thickness	Pilot Dia	Length	Tube Nut Hex	Swivel Nut Hex
SAE Dash Size	**Tube O.D.**		**T**	**C**	**C2**	**C3**	**D**	**D1**	**E**	**F**	**L1**	**L4**	**R**	**W**	**WW**	**U1**	**U2**
	(in.)	(mm)	Metric Thread	(in.)	(in.)	(in.)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)
6	3/8	8 10	M18X1.5	3/4	13/16	1	0.323	0.323	0.50	0.247	0.560	0.285	0.23	0.708	1.05	0.91	1.15
8	1/2	12	M22X1.5	15/16	15/16	1 1/8	0.453	0.453	0.50	0.267	0.590	0.301	0.23	0.866	1.06	1.04	1.29
12	3/4	18 20	M30X1.5	1 1/4	1 5/16	1 1/2	0.766	0.766	0.50	0.331	0.650	0.309	0.39	1.181	1.23	1.41	1.73
16	1	25	M36X1.5	1 5/8	1 5/8	1 3/4	0.953	0.953	0.50	0.426	0.805	0.396	0.41	1.417	1.34	1.81	2.01

1) Recommended clearance hole = W + 0.015.
2) See page O9 for Seal-Lok Lite O-rings.

Dimensions and pressures for reference only, subject to change.

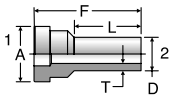
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BLL
Nut



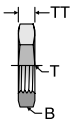
TUBE FITTING PART #	TUBE O.D. (in.)	T6 METRIC THREAD	B HEX (in.)	C (in.)	G (in.)	STANDARD FROM STOCK -SS
6 BLL	3/8	M18X1.5	3/4	0.53	0.44	•
8 BLL	1/2	M22X1.5	15/16	0.65	0.45	•
12 BLL	3/4	M30X1.5	1 1/4	0.95	0.52	•
16 BLL	1	M36X1.5	1 5/8	1.22	0.69	•

TLW1
Butt Weld Sleeve



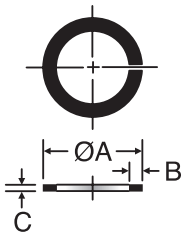
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	A (in.)	D (in.)	F (in.)	L (in.)	T (in.)	STANDARD FROM STOCK -SS
6-4X035 TLW1	3/8	1/4	0.62	0.250	1.26	0.75	0.035	•
6-4X049 TLW1	3/8	1/4	0.62	0.250	1.26	0.75	0.049	•
6-6X035 TLW1	3/8	3/8	0.62	0.375	1.20	0.75	0.035	•
6-6X049 TLW1	3/8	3/8	0.62	0.375	1.20	0.75	0.049	•
6-6X065 TLW1	3/8	3/8	0.62	0.375	1.20	0.75	0.065	•
8-8X049 TLW1	1/2	1/2	0.75	0.500	1.20	0.75	0.049	•
8-8X065 TLW1	1/2	1/2	0.75	0.500	1.20	0.75	0.065	•
12-12X065 TLW1	3/4	3/4	1.10	0.750	1.39	0.75	0.065	•
12-12X083 TLW1	3/4	3/4	1.10	0.750	1.39	0.75	0.083	•
12-12X095 TLW1	3/4	3/4	1.10	0.750	1.39	0.75	0.095	•
12-8X049 TLW1	3/4	1/2	1.10	0.500	1.52	0.75	0.049	•
16-16X083 TLW1	1	1	1.35	1.000	1.43	0.75	0.083	•
16-16X083 TLW1L	1	1	1.35	1.000	2.18	1.50	0.083	•
16-16X095 TLW1	1	1	1.35	1.000	1.43	0.75	0.095	•

WLLNL
Bulkhead Locknut



TUBE FITTING PART #	TUBE O.D. (in.)	T METRIC THREAD	B HEX (in.)	TT (in.)	STANDARD FROM STOCK -SS
6 WLLNL	3/8	M18X1.5	1	0.23	•
8 WLLNL	1/2	M22X1.5	1 1/8	0.23	•
12 WLLNL	3/4	M30X1.5	1 1/2	0.39	•
16 WLLNL	1	M36X1.5	1 3/4	0.41	•

SBR
Braze Ring



TUBE FITTING PART #	TUBE O.D. (in.)	A DIA. (in.)	C (in.)	B (in.)	STANDARD FROM STOCK -SS
6 SBR	3/8	0.390	0.03	0.07	•
8 SBR	1/2	0.515	0.03	0.07	•
12 SBR	3/4	0.765	0.04	0.08	•
16 SBR	1	1.015	0.04	0.08	•

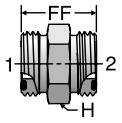
Dimensions and pressures for reference only, subject to change.

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HLLO Full Dimensions

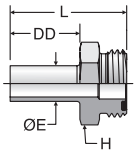
Union
SLL/SLL



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	H (in.)	FF (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 HLLO	3/8	3/8	3/4	0.82	1.5
8 HLLO	1/2	1/2	15/16	0.86	1.5
8-6 HLLO	1/2	3/8	15/16	0.84	1.5
12 HLLO	3/4	3/4	1 1/4	1.03	1.5
16 HLLO	1	1	1 1/2	1.27	1.5

LLOT1 Full Dimensions

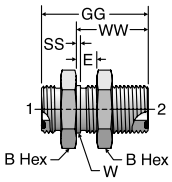
Seal-Lok Lite/
FlarelessTube Stub



TUBE FITTING PART #	TUBE O.D. (in.)	DD (in.)	E DIA. (in.)	H HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 LLOT1	3/8	0.73	3/8	3/4	1.22	1.5
8 LLOT1	1/2	1.00	1/2	15/16	1.50	1.5
12 LLOT1	3/4	1.03	3/4	1 1/4	1.56	1.5
16 LLOT1	1	1.36	1	1 1/2	2.01	1.5

WLLO Full Dimensions

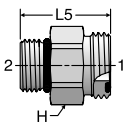
Bulkhead Union
SLL/SLL
WLLO-WLLNL – Body with locknut
(See page B7 for WLLNL)



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	B HEX (in.)	E MAX. BULKHEAD (in.)	GG (in.)	SS (in.)	W DIA. (mm)	WW (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 WLLO	3/8	3/8	1	0.5	1.58	0.06	18	1.05	1.5
8 WLLO	1/2	1/2	1 1/8	0.5	1.61	0.06	22	1.06	1.5
12 WLLO	3/4	3/4	1 1/2	0.5	1.95	0.06	30	1.23	1.5
16 WLLO	1	1	1 3/4	0.5	2.21	0.06	36	1.34	1.5

F5OLLO Full Dimensions

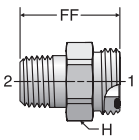
Straight Thread Connector
Seal-Lok Lite/SAE-ORB



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	H HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 F5OLLO	3/8	9/16-18	3/4	0.96	1.5
8 F5OLLO	1/2	3/4-16	15/16	0.98	1.5
12 F5OLLO	3/4	1 1/16-12	1 1/4	1.26	1.5
16 F5OLLO	1	1 5/16-12	1 1/2	1.41	1.5

FLLO Full Dimensions

Seal-Lok Lite/
PTF-Short



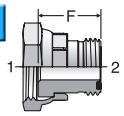
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 PTF	H HEX (in.)	FF (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 FLLO	3/8	1/4-18	3/4	1.06	1.5
6-6 FLLO	3/8	3/8-18	3/4	1.06	1.5
8 FLLO	1/2	3/8-18	7/8	1.08	1.5
12 FLLO	3/4	3/4-14	1 1/4	1.40	1.5
16 FLLO	1	1-11 1/2	1 1/2	1.71	1.5

Dimensions and pressures for reference only, subject to change.

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TRLLON Full Dimensions

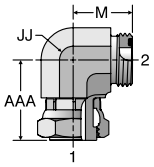
Tube End Reducer
SLL Swivel/SLL



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	F (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
8-6 TRLLON	1/2	3/8	0.78	1.5
12-6 TRLLON	3/4	3/8	0.64	1.5
12-8 TRLLON	3/4	1/2	0.66	1.5
16-8 TRLLON	1	1/2	0.68	1.5
16-12 TRLLON	1	3/4	0.69	1.5

C6LLO Full Dimensions

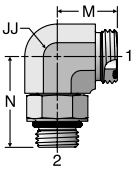
SLL/SLL Swivel
Swivel Nut Elbow



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	JJ (in.)	AAA (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 C6LLO	3/8	3/8	3/4	1.06	0.78	1.5
8 C6LLO	1/2	1/2	7/8	1.14	0.88	1.5
12 C6LLO	3/4	3/4	1 3/16	1.43	1.09	1.5
16 C6LLO	1	1	1 7/16	1.67	1.26	1.5

C5OLLO Full Dimensions

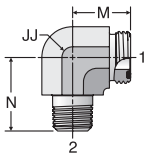
Straight Thread Elbow
Seal-Lok Lite/SAE-ORB



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 C5OLLO	3/8	9/16-18	3/4	0.78	1.18	1.5
8 C5OLLO	1/2	3/4-16	7/8	0.88	1.35	1.5
12 C5OLLO	3/4	1 1/16-12	1 1/3	1.09	1.80	1.5
16 C5OLLO	1	1 5/16-12	1 5/8	1.38	2.00	1.5

CLLO Full Dimensions

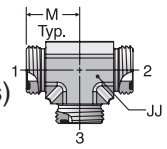
Male Pipe Elbow
Seal-Lok Lite/PTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 PTF	JJ (in.)	M (in.)	N (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 CLLO	3/8	1/4-18	3/4	0.78	0.99	1.5
6-6 CLLO	3/8	3/8-18	3/4	0.78	0.99	1.5
8 CLLO	1/2	3/8-18	7/8	0.88	1.04	1.5
8-8 CLLO	1/2	1/2-14	7/8	0.88	1.19	1.5
12 CLLO	3/4	3/4-14	1 3/16	1.09	1.45	1.5
16 CLLO	1	1-11 1/2	1 5/8	1.38	1.81	1.5

JLLO Full Dimensions

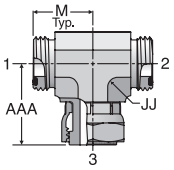
Union Tee
Seal-Lok Lite (All Three Ends)



TUBE FITTING PART #	END SIZE 1-3 (in.)	JJ (in.)	M (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 JLLO	3/8	3/4	0.78	1.5
8 JLLO	1/2	7/8	0.88	1.5
12 JLLO	3/4	1 5/16	1.09	1.5
16 JLLO	1	1 7/16	1.26	1.5

S6LLO Full Dimensions

Swivel Nut Branch Tee
SLL/SLL/SLL Swivel



TUBE FITTING PART #	END SIZE 1-3 (in.)	JJ (in.)	AAA (in.)	M Typ. (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 S6LLO	3/8	3/4	1.06	0.78	1.5
8 S6LLO	1/2	7/8	1.14	0.88	1.5
12 S6LLO	3/4	1 5/16	1.43	1.09	1.5
16 S6LLO	1	1 7/16	1.67	1.26	1.5

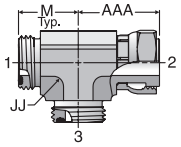
Dimensions and pressures for reference only, subject to change.

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R6LLO Full Dimensions

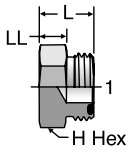
Swivel Nut Run Tee
SLL/SLL Swivel/SLL



TUBE FITTING PART #	END SIZE 1-3 (in.)	JJ (in.)	AAA (in.)	M Typ. (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 R6LLO	3/8	3/4	1.06	0.78	1.5
8 R6LLO	1/2	7/8	1.14	0.88	1.5
12 R6LLO	3/4	1 5/16	1.43	1.09	1.5
16 R6LLO	1	1 7/16	1.67	1.26	1.5

PNLLO Full Dimensions

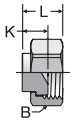
Seal-Lok Lite Plug



TUBE FITTING PART #	END SIZE 1 (in.)	H HEX (in.)	L (in.)	LL (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 PNLLO	3/8	3/4	0.56	0.28	1.5
8 PNLLO	1/2	15/16	0.58	0.28	1.5
12 PNLLO	3/4	1 1/4	0.72	0.41	1.5
16 PNLLO	1	1 1/2	0.81	0.41	1.5

FNLL Full Dimensions

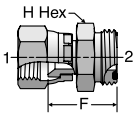
Seal-Lok Lite Cap



TUBE FITTING PART #	TUBE O.D. (in.)	B HEX (in.)	K (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
6 FNLL	3/8	3/4	0.35	0.55	1.5
8 FNLL	1/2	15/16	0.35	0.57	1.5
12 FNLL	3/4	1 1/4	0.42	0.64	1.5
16 FNLL	1	1 1/2	0.47	0.78	1.5

LLOHX6 Full Dimensions

37° Swivel/Seal-Lok Lite



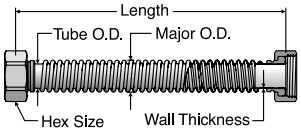
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	L (in.)	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS N0674
6 LLOHX6	3/8	3/8	0.88	3/4	1.5
8 LLOHX6	1/2	1/2	0.95	7/8	1.5
12 LLOHX6	3/4	3/4	1.14	1 1/4	1.5
16 LLOHX6	1	1	1.39	1 1/2	1.5

Dimensions and pressures for reference only, subject to change.

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FLEX FLANGE

Flexible Metal Tube Assemblies



TUBE FITTING PART #	TUBE SIZE (in.)	TUBE O.D. (in.)	LENGTH (in.)	MAJOR O.D. (in.)	WALL THICKNESS (in.)	HEX SIZE (in.)	STANDARD FROM STOCK PSI
FLEX-6-LLP-6	3/8	0.375	5.76	0.50	0.010	3/4	50
FLEX-6-LLP-9	3/8	0.375	8.76	0.50	0.010	3/4	50
FLEX-6-LLP-12	3/8	0.375	11.76	0.50	0.010	3/4	50
FLEX-6-LLP-18	3/8	0.375	17.76	0.50	0.010	3/4	50
FLEX-6-LLP-24	3/8	0.375	23.76	0.50	0.010	3/4	50
FLEX-6-LLP-30	3/8	0.375	29.76	0.50	0.010	3/4	50
FLEX-6-LLP-36	3/8	0.375	35.76	0.50	0.010	3/4	50
FLEX-8-LLP-6	1/2	0.500	5.74	0.66	0.010	15/16	50
FLEX-8-LLP-9	1/2	0.500	8.74	0.66	0.010	15/16	50
FLEX-8-LLP-12	1/2	0.500	11.74	0.66	0.010	15/16	50
FLEX-8-LLP-18	1/2	0.500	17.74	0.66	0.010	15/16	50
FLEX-8-LLP-24	1/2	0.500	23.74	0.66	0.010	15/16	50
FLEX-8-LLP-30	1/2	0.500	29.74	0.66	0.010	15/16	50
FLEX-8-LLP-36	1/2	0.500	35.74	0.66	0.010	15/16	50
FLEX-12-LLP-6	3/4	0.807	5.74	1.10	0.010	1 1/4	50
FLEX-12-LLP-9	3/4	0.807	8.74	1.10	0.010	1 1/4	50
FLEX-12-LLP-12	3/4	0.807	11.74	1.10	0.010	1 1/4	50
FLEX-12-LLP-18	3/4	0.807	17.74	1.10	0.010	1 1/4	50
FLEX-12-LLP-24	3/4	0.807	23.74	1.10	0.010	1 1/4	50
FLEX-12-LLP-30	3/4	0.807	29.74	1.10	0.010	1 1/4	50
FLEX-12-LLP-36	3/4	0.807	35.74	1.10	0.010	1 1/4	50
FLEX-16-LLP-6	1	1.041	5.72	1.30	0.012	1 1/2	50
FLEX-16-LLP-9	1	1.041	8.72	1.30	0.012	1 1/2	50
FLEX-16-LLP-12	1	1.041	11.72	1.30	0.012	1 1/2	50
FLEX-16-LLP-18	1	1.041	17.72	1.30	0.012	1 1/2	50
FLEX-16-LLP-24	1	1.041	23.72	1.30	0.012	1 1/2	50
FLEX-16-LLP-30	1	1.041	29.72	1.30	0.012	1 1/2	50
FLEX-16-LLP-36	1	1.041	35.72	1.30	0.012	1 1/2	50

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How To Order
Specs
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Reference Section

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

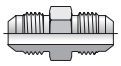
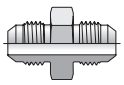
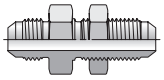
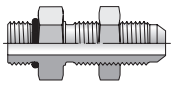
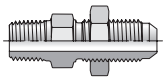
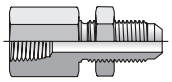
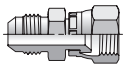
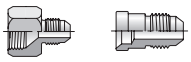
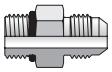
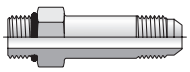
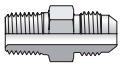
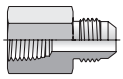
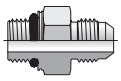
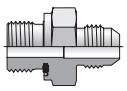
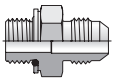
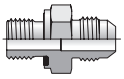
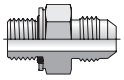
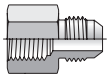
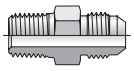
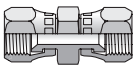
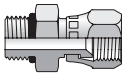
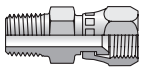
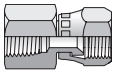
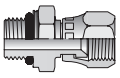
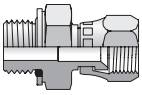
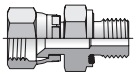
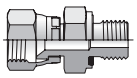
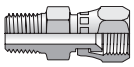
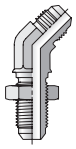
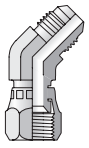
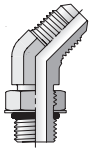
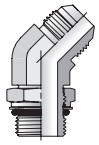
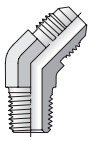
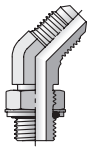
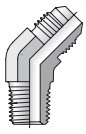
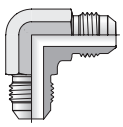
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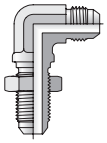
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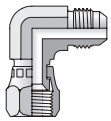


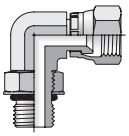
The Fitting Authority

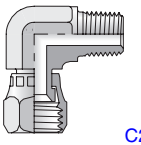
Nuts, Sleeves, Locknuts	**BTX** Nut  C14	**TX and TX Metric** Sleeve  C14	**WLN** Bulkhead Locknut  C15	**SBR** Braze Ring  C15	
Straights	**HTX** Union  C15	**LHTX** Large Hex Union  C15	**WTX** Bulkhead Union  C16	**WF5OX** SAE-ORB / 37° Bulkhead  C16	**WFTX** NPTF / 37° Bulkhead  C16
WGTX NPTF / 37° Bulkhead  C17	**XHX6** Extender and Expander  C17	**TRTX / TRTXN** Reducer  C18	**F5OX** SAE-ORB / 37° Flare  C19	**FF5OX** SAE-ORB / 37° – Long  C19	**XHB3** Braze Socket / 37° Flare  C19
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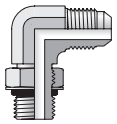
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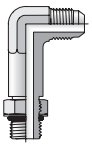
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Bulkhead Union

C27

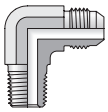
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37° Swivel Elbow

C27

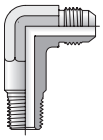
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SAE-ORB / 37° Swivel

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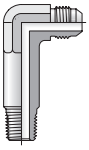
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NPTF / 37° Swivel

C28

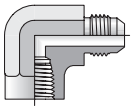
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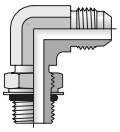
CC5OX
SAE-ORB / 37° – Long

C28

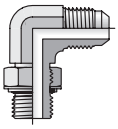
CTX
NPTF / 37° Flare

C29

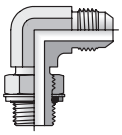
CCTX
NPTF / 37° Flare – Long

C29

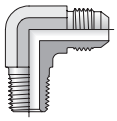
CCCTX
NPTF / 37° – Extra Long

C29

DTX
NPTF / 37° Flare

C30

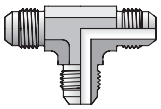
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ISO-6149 / 37° Flare

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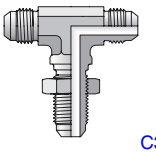
C8OMX
Metric-ORR / 37° Flare

C30

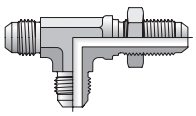
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BSPP-ORR / 37° Flare

C31

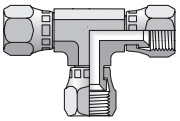
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BSPT / 37° Flare

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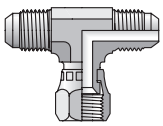
Tees

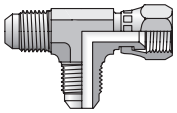
JTX
Union Tee

C31

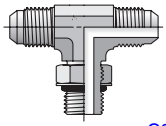
WJTX
Bulkhead Branch Tee

C32

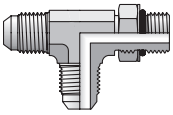
WJJTX
Bulkhead Run Tee

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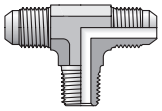
JX6
37° Swivel Union Tee

C33

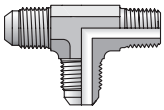
S6X
37° Swivel Branch Tee

C33

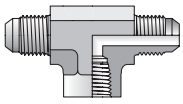
R6X
37° Swivel Run Tee

C33

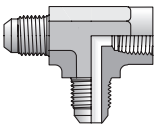
S5OX
SAE-ORB Branch Tee

C34

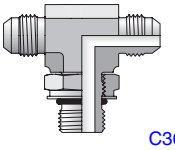
R5OX
SAE-ORB Run Tee

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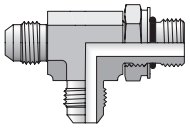
STX
NPTF Branch Tee

C35

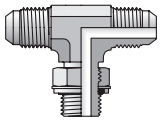
RTX
NPTF Run Tee

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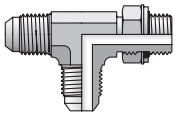
OTX
NPTF Branch Tee

C35

MTX
NPTF Run Tee

C35

S87OMX
ISO 6149 Branch Tee

C36

R87OMX
ISO 6149 Run Tee

C36

S4OMX
BSPP-ORR Branch Tee

C36

R4OMX
BSPP-ORR Run Tee

C36

Cross

KTX
Union Cross

C37

Plug and Cap

PNTX
37° Plug

C37

FNTX
37° Cap

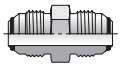
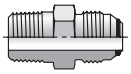
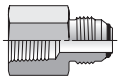
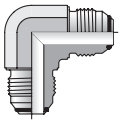
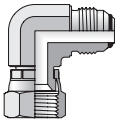
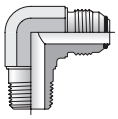
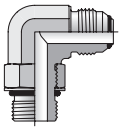
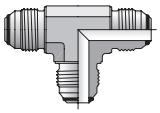
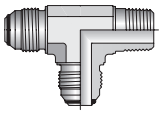
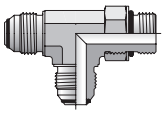
C37

T22X
Mountie Cap

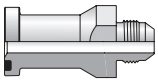
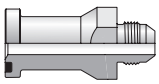
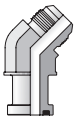
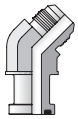
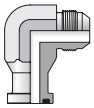
C37

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Triple-Lok® 2 Soft Seal Flare Tube Fittings

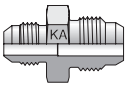
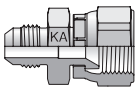
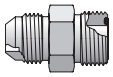
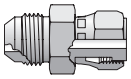
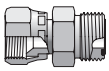
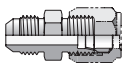
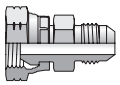
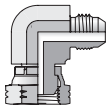
Straights	**HTXO** Union  C38	**F5OXO** SAE-ORB / 37° Flare  C38	**FTXO** NPTF / 37° Flare  C38	**GTXO** NPTF / 37° Flare  C38
90° Elbows	**ETXO** Union Elbow  C39	**C6XO** 37° Swivel Elbow  C39	**CTXO** NPTF / 37° Flare  C39	**C5OXO** SAE-ORB / 37° Flare  C39
Tees	**JTXO** Union Tee  C40	**RTXO** 37° Swivel Run Tee  C40	**R5OXO** SAE-ORB Run Tee  C40	

Flange Adapters (Shown in Section M)

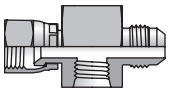
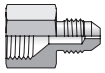
SAE Flange Adapters	**XHQ1** Code 61 / 37° Flare  M10	**XHQ2** Code 62 / 37° Flare  M10	**XVQ1** Code 61 / 37° Flare  M28	**XVQ2** Code 62 / 37° Flare  M28	**XEQ1** Code 61 / 37° Flare  M29
XEQ2 Code 62 / 37° Flare  M29					

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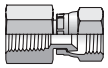
Conversion Adapters (Shown in Sections K and L)

Conversion Adapters	**XHU86** Metric Swivel (EO) / 37°  L5	**XHMKA** Komatsu 30° / 37° Flare  K6	**XHMKA6** Komatsu 30° Swivel /37°  K6	**XHLO** 37° Flare / ORFS  L3	**XHL6** 37° Flare / ORFS Swivel  L3
LOHX6 ORFS / 37° Swivel  L3	**XHBU** 37°Flare / Flareless  L4	**XHMK46** 37°Flare / BSPP Swivel  L5	**XEMK46** 37°Flare / BSPP Swivel  L5		

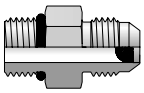
Diagnostic and Orifice Fittings (Shown in Section N)

Diagnostic Tee	**XHX6G5TP** 37° Flare / 37° Swivel / SAE-ORB  N5	**Orifice Fitting**	**XHX7** 37° Flare / 37° Female with Orifice  N11

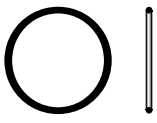
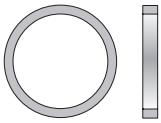
Gauge Fittings (Shown in Section N)

Gauge Fittings	**G6X** NPT Gauge / 37° Swivel  N7	**G4MXSMO** BSPP Gauge / 37° Flare  N6

Screen Fittings (Shown in Section N)

Screen Fittings	Screen Fittings  N12

O-Rings and Seals (Shown in Section O)

O-Rings and Seals	**XO O-Ring**  O3	**SAE O-Ring**  O3	**ISO 6149 O-Ring**  O4	**Metric O-Ring**  O4	**Metric Retaining Ring**  O4
BSPP O-Ring  O5	**BSPP Retaining Ring**  O5	**EOlastic Seal Ring**  O5			

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Visual Index

Triple-Lok Introduction

Parker pioneered the flare fitting concept early in the 20th century. The design has since gained worldwide acceptance due to it's many inherent features and customer benefits. Today, the 37° flare fitting it is the most widely used fitting in the world. Its appeal is in its simplicity, compact design, ease of assembly, reliability (single seal), material availability, adaptability to inch or metric tube, worldwide availability and acceptance. Further helping its acceptance is its widespread use as a hose adapter. As a tube fitting, it is especially suited for thin and medium wall thickness tube. Even though 37° flare fittings are generally considered to be 3000 psi fittings, Triple-Lok's capabilities range from 9000 psi for 1/4" size to 2000 psi for 2" size. Currently, it is used in virtually every application that uses fluid power for motion control.

Parker's Triple-Lok fittings meet the strict requirements of SAE J514 and ISO 8434-2 industry standards. Additionally, they meet many customer and industry-recognized conformance standards and type approvals.



Fig. C1 – Triple-Lok Fitting Body, Sleeve and Nut

Design and Construction

The Triple-Lok (37° flare fitting) design is simple. It uses an easily produced flare at the tube end to seal and hold fluid under high pressure. The fitting consists of three pieces: the body, sleeve and nut. The tube end is flared at a 37° angle (74° included angle) and held between the fitting nose (seat) and the sleeve (support) with the nut as shown in Fig. C2, providing a very effective (single) seal between the fitting nose and the tube flare.

The design of Triple-Lok fittings is very efficient. The fitting incorporates the smallest seal area of all fitting types. This seal area, as seen in Fig. C2, is only slightly larger than the fluid flow area. The small seal area results in a compact design, low assembly torque, and a relatively high-pressure capability.

The primary difference between a two-piece flare fitting and the three-piece design is the flare support sleeve. The support sleeve provides several key functions:

1. It provides a clamping surface for the tube flare.
2. It provides a bearing surface for the tube nut. The sleeve isolates the tube from the nut, minimizing the tube twist during assembly, a common problem of 2-piece flare fitting designs.
3. It provides support to the tube flare. The tapered fitting nose tends to "wedge open" the tube flare during assembly. The sleeve helps to resist this expansion, thus eliminating the possibility of tube flare and sleeve jamming inside the nut. This eliminates any waste of applied torque and allows for easy disassembly.
4. It makes the fitting adaptable to metric tube merely by changing its inside diameter (see Table C2).

Due to the popularity and simplicity of the 37° flare fitting, many manufacturers offer the product. Even though most manufacturers conform to the same dimensional standards, there are significant performance advantages with Parker's Triple-Lok fittings due to Parker's optimized manufacturing methods and commitment to quality.

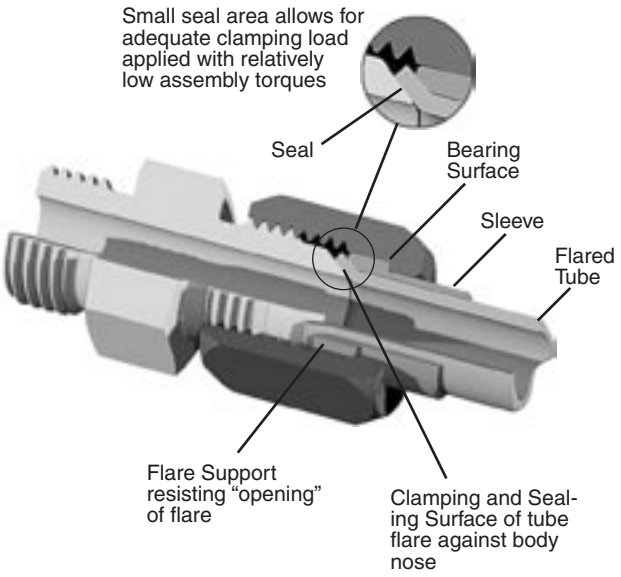


Fig. C2 – Triple-Lok Design and Features

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Materials and Manufacture

Triple-Lok fitting components are manufactured using state-of-the-art equipment and manufacturing technologies to assure construction integrity, optimum strength and toughness, long service life and the highest quality. At the heart of the Triple-Lok product line are the finest raw materials and manufacturing technologies as outlined in Table C1 and discussed below.

The Triple-Lok Body: Triple-Lok fittings are manufactured in over 65 configurations. Straight bodies are either cold formed or machined from cold drawn bar stock. The cold forming process ensures consistent dimensional tolerances, improved mechanical properties and better surface finishes. Shaped Triple-Lok fittings are manufactured from a one-piece forged construction. This forged construction eliminates the potential leak path associated with multi-component brazed fittings. Triple-Lok steel forged shapes also feature an optimum combination of hardness and toughness for high-pressure capability, minimal nose collapse (typical of sizes -10 and under) during repeated assembly and long service life, even under severe operating conditions.

The Triple-Lok Sleeves: Most steel Triple-Lok flare support sleeves are cold formed and heat treated for an optimum combination of strength and ductility. The largest size sleeves, -20, -24, and -32, are machined from high strength steel. Stainless steel and brass sleeves are machined from cold drawn barstock.

The Triple-Lok Tube Nuts: Triple-Lok steel tube nuts are cold formed, except in sizes –20, -24, and -32, which are machined from cold drawn barstock. Cold forming increases the material strength and its fatigue properties, imparting high strength and longer service life to the nuts. Smaller stainless steel nuts are also cold formed while all brass tube nuts are manufactured from cold drawn brass barstock. Most crimp swivel nuts are also cold formed.

Robust Port Stud: The adjustable port stud is manufactured with a longer locknut designed to cover the uppermost threads completely. Since the backup washer is never exposed to the upper threads, it cannot be damaged during assembly. During assembly, exposed upper threads, as common with fittings from other fitting manufacturers, can lead to a deformed backup washer that can pinch the o-ring and create an o-ring extrusion gap that has the potential to leak. The longer locknut also provides a greater grip area for the wrench.

Dual Angle Female Seat: The seat of the female swivel is manufactured with a dual angle that accepts both the 37° flare and 45° flare fitting (only sizes 4, 5, 8 and 10 45° flare fittings). The dual angle seat also repositions the seal location away from the tip of the male flare nose, preventing the nose from biting into the seat and making it more tolerant to minor nose tip damage.

How Triple-Lok Fittings Work

Tightening of the nut clamps the tube flare between the body nose (seat) producing a leak tight connection. This clamping on the 37° taper provides a measure of elasticity to the joint helping it to resist loosening under vibration. The clamping force results in a small radial load that tends to deform the fitting nose radially. The resistance of the nose to elastic deformation provides a constant preload (similar to a lockwasher) keeping it tight.

The clamping force provided by the nut resists the opposing force of the fluid under pressure. The joint remains leak tight as long as the clamping force is higher than the opposing pressure load. Properly assembled Triple-Lok fittings with appropriate tube will seal consistently under pressure until tube bursts.

Sealing in Triple-Lok fittings takes place between two smooth metal surfaces, the fitting nose and inside of the tube flare. Therefore, the sealing surfaces have to be smooth, free of any nicks, scratches, spiral tool marks, splits or weld beads. Seamless or welded and drawn fully annealed tube is recommended for Triple-Lok fittings for ease in flaring and bending. Certain types of harder tubes that are not fully annealed may not be suitable for flaring due to the potential for immediate or long-term cracking of the tube flare. For specific tube type and wall thickness recommendations, please see Table C3.

Triple-Lok Fittings	Steel		Stainless Steel		Brass	
	ASTM	Type	ASTM	Type	ASTM	Type
Cold Formed Bodies	A576	C1010/ C1008	—	—	—	—
Forged Bodies	A576	1214/ 1215	A182	316	B124	CA377
Bar Stock Bodies	A108	12L14	A479	316	B16 B453	CA360 CA345
Cold Formed Nuts	A576	C1010/ C1008	A276	316	B121	CA335
Bar Stock Tube Nuts	A108	12L14	A479	316	B16 B453	CA360 CA345
Cold Formed Sleeves	SAE 1020	SAE 1020	—	—	B111	CA443 CA444
Bar Stock Sleeves	A108	C1137	A479	316	B371	CA694

Table C1 – Standard Material Specifications for Triple-Lok Fittings

Note: On request, Triple-Lok fittings can be furnished in materials other than those shown above.

Finish: Zinc with yellow chromate (being changed to zinc chromium 6 free) is used on all standard steel products.

Assembly and Installation

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

Dimensions and pressures for reference only, subject to change.

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International Acceptance

The Triple-Lok male flare end is attachable to either inch tube, metric tube or a hose assembly. Parker offers many different port thread options for the various international hydraulic ports available. This is one of the primary reasons for its worldwide acceptance. Parker has traditionally offered a "Metric Triple-Lok" product line directed at the Metric, ISO-6149 and BSPP port users. Rather than carrying a separate catalog section, this range of international fittings has been integrated into the traditional "Triple-Lok" section.

To illustrate the versatility of Triple-Lok, refer to Fig. C3. A single 37° fitting body will accept both inch and metric tube sizes by simply changing the sleeve. Thus, a dedicated line of sleeves is offered for inch and metric tube. The universal tube nut and fitting body is used with either inch or metric tube, thus saving on component costs and making the Triple-Lok fitting more versatile. Also, the 37° body without the nut and sleeve is very popular as a hose adapter.

Study the following example illustrating the options with an SAE –8 (1/2") Triple-Lok fitting:

1. Fitting with a –8 (1/2") sleeve and –8 (1/2") tube nut can connect to a 1/2" o.d. flared tube.
2. Fitting with a 12 mm sleeve and –8 (1/2") tube nut can connect to 12 mm o.d. flared tube
3. Fitting without a nut and sleeve can be used as a 1/2" hose adapter when connected to a hose swivel.

Table C2 illustrates an even clearer picture of the flexibility of the Triple-Lok 37° system. It shows every "convertible sleeve" connection for the 37° flare design. For example, if 25 mm tube is being used, a –16 (1") 37° flare fitting together with a 25 mm (TXS25) sleeve and a standard –16 (1") flare fitting nut would be all the necessary components to connect and seal a 25 mm flared tube assembly.

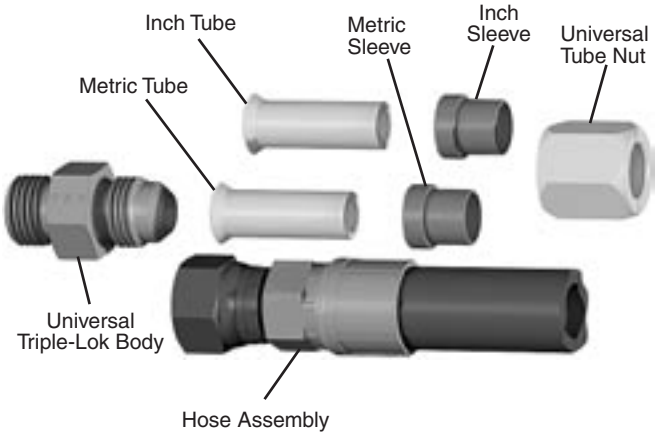


Fig. C3 – Triple-Lok's Adaptability to Inch Tube, Metric Tube, or Hose Assemblies

FITTING DASH SIZE	TUBE O.D.	METRIC TUBE SLEEVE PART #	NUT PART #
-4	6mm	TXS6	4 BTX-S
-5	8mm	5 TX-S	5 BTX-S
-6	10mm	TXS10	6 BTX-S
-8	12mm	TXS12	8 BTX-S
-10	14mm	TXS14	10 BTX-S
-10	15mm	TXS15	10 BTX-S
-10	16mm	10 TX-S	10 BTX-S
-12	18mm	TXS18	12 BTX-S
-12	20mm	20-12 TX-S	20-12 BTX-S
-14	22mm	TXS22	14 BTX-S
-16	25mm	TXS25	16 BTX-S
-20	28mm	TXS28	20 BTX-S
-20	30mm	TXS30	20 BTX-S
-20	32mm	TXS32	20 BTX-S
-24	35mm	TXS35	24 BTX-S
-24	38mm	24 TX-S	24 BTX-S

Table C2 – Triple-Lok Convertible Sleeve Connections

Tube Wall Thickness – Inch and Metric

Minimum/Maximum tube wall thickness is based on the pressure holding capacity of the fittings and subject to maximum wall thickness limitations.

FITTING DASH SIZE	WALL THICKNESS – INCH TUBE				WALL THICKNESS – METRIC TUBE			
	O.D.	WALL THICKNESS			O.D.	WALL THICKNESS		
	(in.)	Min.	(in.)	Max.	(mm)	Min.	(mm)	Max.
-2	1/8	0.010	–	0.035	–		–	
-3	3/16	0.010	–	0.035	–		–	
-4	1/4	0.020	–	0.065	6.0	0.5	–	2.0
-5	5/16	0.020	–	0.065	8.0	0.5	–	2.0
-6	3/8	0.020	–	0.065	10.0	0.5	–	2.0
-8	1/2	0.028	–	0.083	12.0	1.0	–	2.0
-10	5/8	0.035	–	0.095	14.0	1.0	–	2.5
-10	5/8	0.035	–	0.095	15.0	1.0	–	2.5
-10	5/8	0.035	–	0.095	16.0	1.0	–	2.5
-12	3/4	0.035	–	0.109	18.0	1.0	–	3.0
-12	3/4	0.035	–	0.109	20.0	1.0	–	3.0
-14	7/8	0.035	–	0.109	22.0	1.0	–	3.0
-16	1	0.035	–	0.120	25.0	1.0	–	3.0
-20	1 1/4	0.049	–	0.120	30.0	1.5	–	3.0
-20	1 1/4	0.049	–	0.120	32.0	1.5	–	3.0
-24	1 1/2	0.049	–	0.120	38.0	1.5	–	3.0
-32	2	0.058	–	0.134	50.0	1.5	–	3.5

Table C3 – Wall Thickness Chart for Inch and Metric Tubing

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Features, Advantages & Benefits

Feature	Advantage	Benefit
Small sealing area	Low assembly torque to achieve sealing.	Ease of assembly.
Metal-to-metal seal	Allows for wide range of operating temperatures and media.	Versatility for different applications.
No minimum wall thickness limitation	Allows for optimum tube selection and lower weight hydraulic package.	Reduces material cost and weight.
Short tube entry	Minimum tube prying required for installation and maintenance.	Easier installation and maintenance.
Adaptable to metric tube	Easily meets customer's needs for inch or metric tube.	Versatility for end customer and for customer standardization efforts.
International standard design	Meets global needs.	Standardization. Global acceptance.
Worldwide availability	Due to the proven design, worldwide customer acceptance, adaptability to metric and inch tube as well as hose adapter, Triple-Lok fittings are readily available throughout the world.	OEM and aftermarket support and parts readily available worldwide.
Used as hose adapter	Adapts directly to hose swivel connection, the most commonly used hose connection in the world. One connector for tube and hose.	Versatility for flexible system requirements. Minimizes connector proliferation.
Available in steel, stainless steel and brass	Wide selection.	Optimum match to customer's needs.
Longer adjustable locknut	Backup washer is never exposed to upper threads, preventing damage during assembly.	Insures proper assembly to prevent leaks.
	Increased grip area for wrench.	Easier installation
Dual angle female seat	Accepts both 37° and 45° flare fittings (size 4, 5, 8 and 10, 45° flare only).	Versatility for end customer. Minimize inventory
	Repositions seal location away from the tip of the nose, preventing nose from biting into mating seat and making it more tolerant to minor nose tip damage.	Higher quality assembly and longer service life.
Forged shapes	No potential leak path and longer fatigue life.	Long service life.
	Compact design.	Used in tighter spaces without redesigning.
Heat treated forgings	Optimum balance of strength and toughness. Mimimum nose collapse. Balanced strength and shock resistance.	Flow restrictions are minimal, repeated assembly possible, no leakage. Higher working pressure and longer service life.
Cold formed tube nuts and sleeves	Stronger than machined nuts.	Longer service life. More robust product.
Widest range of tube O.D. sizes available in a hydraulic fitting	All standard and several non-traditional sizes are available including: 1/8", 3/16", 5/16", 7/8", 2" and 2-1/2" tube O.D. sizes. Also, 16 different metric tube sizes are adaptable to Triple-Lok.	Additional flexibility for hydraulic systems.
Broad line of configurations and port ends available	Meets global needs for OEM and MRO applications.	Standardization and cost control. Less components. Eliminates conversion adapters.

Table C4 – Features, Advantages and Benefits

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Triple-Lok 2 Introduction

Parker's Triple-Lok 2 combines the versatility of stainless steel Triple-Lok with the added advantage of an elastomeric seal. Triple-Lok 2 incorporates a replaceable seal in the nose of the flare, which is positioned so that leak-free connections are made without compromising the strength of the fitting. Triple-Lok 2 shape fittings with SAE straight thread adjustable studs also feature Parker's new patent-pending design, providing easier assembly and improved reliability. Triple-Lok 2 can be used in any industrial application where corrosion resistance and leak-free connections are essential. Triple-Lok 2 is a direct interchange for any industrial 37° flare fitting, allowing current 37° flare fitting users to take advantage of Triple-Lok 2 without changing hoses or tubes.



Fig. C4 – Triple-Lok 2 Fitting Body, Sleeve and Nut

Design and Construction

The Triple-Lok 2 design incorporates an elastomeric seal in the nose of the 37° flare. The O-ring is positioned so that elastomeric sealing occurs with the mating tube regardless of tube wall thickness. It uses an easily produced flare at the tube end to seal and hold fluid under high pressure. The fitting consists of three pieces: the body (with O-ring), sleeve and nut (Fig. C4). The tube end is flared at a 37° angle (74° included angle) and held between the fitting nose (seat) and the sleeve (support) with the nut as shown in Fig. C5, providing a very effective elastomeric seal between the fitting nose and the tube flare.

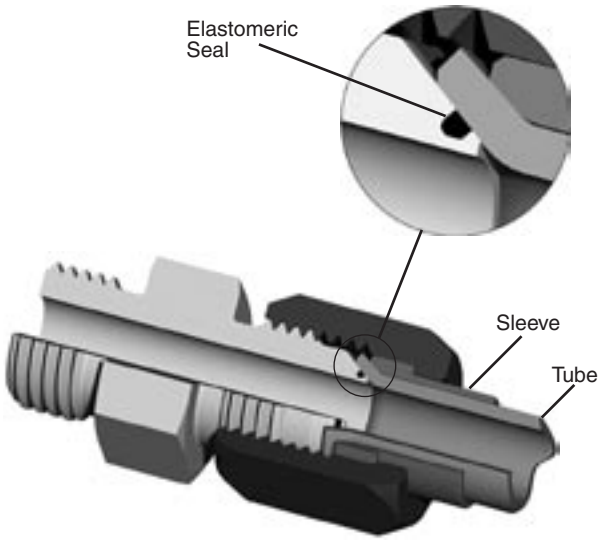


Fig. C5 – Triple-Lok 2 Design and Features

Materials and Manufacture

Triple-Lok 2 fitting components are manufactured using state-of-the-art equipment and manufacturing technologies to assure construction integrity, optimum strength and toughness, long service life and the highest quality. At the heart of the Triple-Lok 2 product line are the finest raw materials and manufacturing technologies as outlined in Table C5 and discussed below.

The Triple-Lok 2 Body: Triple-Lok 2 fittings are manufactured in the most popular stainless steel sizes and configurations. Straight bodies are machined from cold drawn bar stock. Shaped Triple-Lok 2 fittings are manufactured from a one-piece forged construction. This forged construction eliminates the potential leak path associated with multi-component brazed fittings.

The Triple-Lok Sleeves: Stainless steel sleeves are machined from cold drawn barstock.

The Triple-Lok Tube Nuts: The tube nuts are either cold formed or machined from cold drawn barstock. The cold forming process increases the material strength and its fatigue properties, imparting high strength and longer service life to the nuts.

Triple-Lok 2 Fittings	Stainless Steel	
	ASTM	Type
Forged Bodies	A182	316
Bar Stock Bodies	A479	316
Cold Formed Nuts	A276	316
Bar Stock Tube Nuts	A479	316
Bar Stock Sleeves	A479	316

Table C5 – Standard Material Specifications for Triple-Lok 2 Fittings

Finish: Stainless steel fittings are passivated.

How Triple-Lok 2 Fittings Work

Tightening of the nut clamps the tube flare between the body nose and O-ring, producing a leak tight connection. This

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clamping on the 37° taper provides a measure of elasticity to the joint helping it to resist loosening under vibration. The clamping force results in a small radial load that tends to deform the fitting nose radially. The resistance of the nose to elastic deformation provides a constant preload (similar to a lockwasher) keeping it tight.

The clamping force provided by the nut resists the opposing force of the fluid under pressure. The joint remains leak tight as long as the clamping force is higher than the opposing pressure load. Properly assembled Triple-Lok 2 fittings with appropriate tube will seal consistently under pressure until tube bursts.

Sealing in Triple-Lok 2 fittings takes place as the o-ring is compressed between the fitting body and the inside of the tube flare. The O-ring should be inspected at each disassembly and replaced when necessary. Seamless or welded and drawn fully annealed tube is recommended for Triple-Lok 2 fittings for ease in flaring and bending. Certain types of harder tubes that are not fully annealed may not be suitable for flaring due to the potential for immediate or long-term cracking of the tube flare. For specific tube type and wall thickness recommendations, please see Table C7.

Assembly and Installation

Assembly and installation instructions are the same as Triple-Lok 2 and located in Section T.

International Acceptance

To illustrate the versatility of Triple-Lok 2, refer to Fig. C6. A single 37° fitting body will accept both inch and metric tube sizes by simply changing the sleeve. Thus, a dedicated line of sleeves is offered for inch and metric tube. The universal tube nut and fitting body is used with either inch or metric tube, thus saving on component costs and making the Triple-Lok 2 fitting more versatile. Also, the fitting body without the nut and sleeve is very popular as a hose adapter.

Table C6 illustrates an even clearer picture of the flexibility of the Triple-Lok 2 Soft Seal 37° system. It shows every "convertible sleeve" connection for the 37° flare design. For example, if 25mm tube is being used, a –16 (1") Triple-Lok 2 37° Soft Seal flare fitting together with a 25mm (TXSS25) sleeve and a standard –16 (1") flare fitting nut would be all the necessary components to connect and seal a 25mm flared tube assembly.

Tube Wall Thickness – Inch and Metric

Minimum/Maximum tube wall thickness is based on the pressure holding capacity of the fittings and subject to maximum wall thickness limitations.

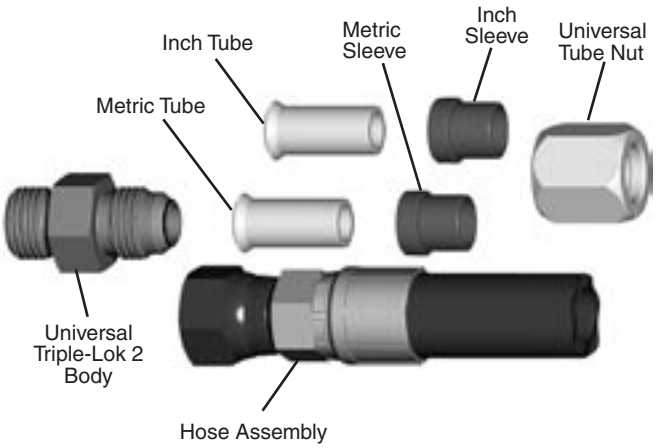


Fig. C6 – Triple-Lok 2's Adaptability to Inch Tube, Metric Tube, or Hose Assemblies

FITTING DASH SIZE	TUBE O.D.	METRIC TUBE SLEEVE PART #	NUT PART #
-4	6mm	TXSS6	4BTX-SS
-5	8mm	5 TX-SS	5BTX-SS
-6	10mm	TXSS10	6BTX-SS
-8	12mm	TXSS12	8BTX-SS
-10	14mm	TXSS14	10BTX-SS
-10	15mm	TXSS15	10BTX-SS
-10	16mm	10 TX-SS	10BTX-SS
-12	18mm	TXSS18	12BTX-SS
-12	20mm	20-12 TX-SS	20-12BTX-SS
-14	22mm	TXSS22	14BTX-SS
-16	25mm	TXSS25	16BTX-SS
-20	28mm	TXSS28	20BTX-SS
-20	30mm	TXSS30	20BTX-SS
-20	32mm	TXSS32	20BTX-SS
-24	35mm	TXSS35	24BTX-SS
-24	38mm	24 TX-SS	24BTX-SS

Table C6 – Triple-Lok 2 Convertible Sleeve Connections

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FITTING DASH SIZE	WALL THICKNESS – INCH TUBE				WALL THICKNESS – METRIC TUBE			
	O.D.	WALL THICKNESS			O.D.	WALL THICKNESS		
	(in.)	Min.	(in.)	Max.	(mm)	Min.	(mm)	Max.
-2	1/8	0.010	–	0.035	–		–	
-3	3/16	0.010	–	0.035	–		–	
-4	1/4	0.020	–	0.065	6.0	0.5	–	2.0
-5	5/16	0.020	–	0.065	8.0	0.5	–	2.0
-6	3/8	0.020	–	0.065	10.0	0.5	–	2.0
-8	1/2	0.028	–	0.083	12.0	1.0	–	2.0
-10	5/8	0.035	–	0.095	14.0	1.0	–	2.5
-10	5/8	0.035	–	0.095	15.0	1.0	–	2.5
-10	5/8	0.035	–	0.095	16.0	1.0	–	2.5
-12	3/4	0.035	–	0.109	18.0	1.0	–	3.0
-12	3/4	0.035	–	0.109	20.0	1.0	–	3.0
-14	7/8	0.035	–	0.109	22.0	1.0	–	3.0
-16	1	0.035	–	0.120	25.0	1.0	–	3.0
-20	1 1/4	0.049	–	0.120	30.0	1.5	–	3.0
-20	1 1/4	0.049	–	0.120	32.0	1.5	–	3.0
-24	1 1/2	0.049	–	0.120	38.0	1.5	–	3.0
-32	2	0.058	–	0.134	50.0	1.5	–	3.5

Table C7 – Wall Thickness Chart for Inch and Metric Tubing

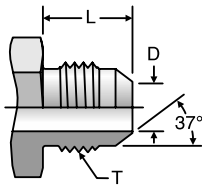
Features, Advantages & Benefits

Feature	Advantage	Benefit
Elastomeric seal	Tolerant of surface imperfections	Provides leak-free connection
Replaceable O-ring seal	Provides easy maintenance	Reduced down time and maintenance costs
Standard size O-rings in -10 thru -32	O-rings are readily available	Reduced down time and maintenance costs
Increased flow diameters versus other soft seal flare fittings	Less pressure drop and higher flow rates through fittings	More efficient hydraulic systems
Longer adjustable locknut	Backup washer is never exposed to upper threads, preventing damage during assembly.	Insures proper assembly to prevent leaks.
	Increased grip area for wrench.	Easier installation
Dual angle female seat	Accepts both 37° and 45° flare fittings (size 4, 5, 8 and 10 45˚ flare only).	Versatility for end customer. Minimize inventory
	Repositions seal location away from the tip of the nose, preventing nose from biting into mating seat and making it more tolerant to minor nose tip damage.	Higher quality assembly and longer service life.
Adaptable to metric tube	Easily meets customer's needs for inch or metric tube	Versatility for end customer and for customer standardization efforts
Used as hose adapter	Adapts directly to hose swivel connection, the most commonly used hose connection in the world. One connector for tube and hose.	Versatility for flexible system requirements. Minimizes connector proliferation.
Forged shapes	No potential leak path and longer fatigue life with compact design	Longer service life
Assembles using standard Triple-Lok assembly torque	No changes to assembly procedures	No additional training

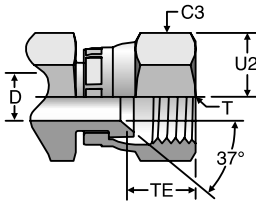
Table C8 – Features, Advantages and Benefits

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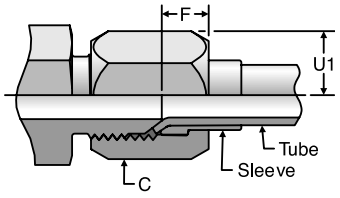
Triple-Lok 37° Flared Tube Ends



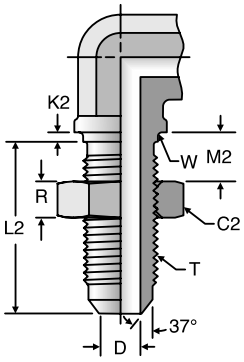
Triple-Lok Male Flare Tube End



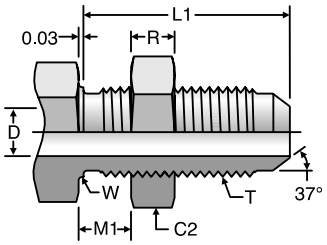
Triple-Lok Swivel



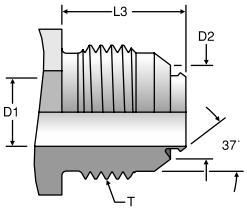
Triple-Lok Tube End Assembly



Triple-Lok Shape Bulkhead



Triple-Lok Straight Bulkhead



Triple-Lok 2 Male Flare Tube End

SAE Dash Size	Tube O.D.		Thread	Tube Nut Hex	Bulkhead Locknut Hex	Swivel Nut Hex		Max Drill		Male Turn Back		Assembly Allowance		Bulkhead					Max Bulkhead Thickness		Min. Flare Dia.
												Tube Nut	Swivel Nut	Pilot Length - Shapes	Length - Straights	Length - Shapes	Locknut Thickness	Pilot Dia (Max)	Straights	Shapes	
	(in.)	(mm)	T UN/UNF	C (in.)	C2 (in.)	C3 (in.)	(mm)	D (in)	D1 (in)	L (in)	L3 (in)	F (in)	TE (in)	K2 (in)	L1 (in)	L2 (in)	R (in)	W[1] (in)	M1 (in)	M2 (in)	D2 (in)
2	1/8	—	5/16-24	3/8	9/16	7/16	—	0.062	—	0.45		0.19	0.31	0.094	1.11	0.92	0.22	0.313	0.38	0.25	—
3	3/16	—	3/8-24	7/16	5/8	1/2	—	0.125	—	0.48		0.25	0.33	0.094	1.11	0.92	0.22	0.375	0.38	0.25	—
4	1/4	6	7/16-20	9/16	11/16	9/16	14	0.172	0.156	0.55	0.56	0.19	0.34	0.094	1.20	1.02	0.28	0.438	0.38	0.25	0.254
5	5/16	8	1/2-20	5/8	3/4	5/8	16	0.234	0.217	0.55	0.56	0.30	0.38	0.094	1.20	1.02	0.28	0.500	0.38	0.25	0.314
6	3/8	10	9/16-18	11/16	13/16	11/16	17	0.297	0.263	0.56	0.57	0.28	0.38	0.094	1.28	1.09	0.27	0.563	0.44	0.35	0.359
8	1/2	12	3/4-16	7/8	1	7/8	22	0.391	0.391	0.66	0.66	0.31	0.42	0.125	1.44	1.25	0.31	0.750	0.44	0.35	0.510
10	5/8	14 15 16	7/8-14	1	1 1/8	1	27	0.484	0.446	0.76	0.81	0.38	0.50	0.125	1.58	1.39	0.36	0.875	0.44	0.35	0.610
12	3/4	18 20	1 1/16-12	1 1/4	1 3/8	1 1/4	32	0.609	0.585	0.86	0.91	0.36	0.56	0.125	1.75	1.56	0.41	1.063	0.44	0.35	0.753
14	7/8	22	1 3/16-12	1 3/8	1 1/2	1 3/8	36	0.718	0.680	0.89	0.95	0.38	0.58	0.125	1.75	1.56	0.41	1.188	0.44	0.35	0.849
16	1	25	1 5/16-12	1 1/2	1 5/8	1 1/2	38	0.844	0.769	0.91	0.99	0.34	0.59	0.125	1.75	1.56	0.41	1.313	0.44	0.35	0.940
20	1 1/4	28 30 32	1 5/8-12	2	1 7/8	2	50	1.078	1.020	0.96	1.03	0.34	0.63	0.125	1.80	1.61	0.41	1.625	0.44	0.35	1.198
24	1 1/2	35 38	1 7/8-12	2 1/4	2 1/8	2 1/4	60	1.312	1.230	1.08	1.16	0.50	0.73	0.125	1.81	1.62	0.41	1.875	0.31	0.22	1.416
32	2	—	2 1/2-12	2 7/8	2 3/4	2 7/8	—	1.781	1.736	1.33	1.40	0.55	0.94	0.125	2.09	1.91	0.41	2.500	0.35	0.25	1.994
40 [2]	2 1/2	—	3-12	3-3/8	—	—	—	2.281	—		—	0.55	—	—	—	—	—	—	—	—	—

1) Recommended clearance hole = W + 0.015.

2) Not a standard SAE J514 size.

Dimensions and pressures for reference only, subject to change.

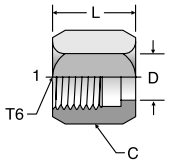
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BTX

Nut
37° Flare

SAE 070110
HPD Base # 06B

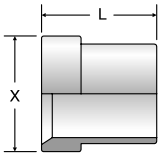


TUBE FITTING PART #	END SIZE (in.)	END SIZE (mm)	T6 UN/UNF-2B	C HEX (in.)	D (in.)	L (in.)	STANDARD FROM STOCK -S	-SS	-B
2 BTX	1/8	—	5/16-24	3/8	0.18	0.55	•	•	•
3 BTX	3/16	—	3/8-24	7/16	0.24	0.61	•	•	•
4 BTX	1/4	6	7/16-20	9/16	0.31	0.62	•	•	•
5 BTX	5/16	8	1/2-20	5/8	0.38	0.68	•	•	•
6 BTX	3/8	10	9/16-18	11/16	0.44	0.73	•	•	•
8 BTX	1/2	12	3/4-16	7/8	0.57	0.85	•	•	•
10 BTX	5/8	14, 15, 16	7/8-14	1	0.70	0.98	•	•	•
12 BTX	3/4	18	1 1/16-12	1 1/4	0.84	1.03	•	•	•
20-12 BTX	—	20	1 1/16-12	32.0 mm	21.9 mm	26.0 mm	•		
14 BTX	7/8	—	1 3/16-12	1 3/8	0.96	1.09	•	•	•
16 BTX	1	25	1 5/16-12	1 1/2	1.09	1.13	•	•	•
20 BTX	1 1/4	28, 30, 32	1 5/8-12	2	1.35	1.23	•	•	•
24 BTX	1 1/2	35, 38	1 7/8-12	2 1/4	1.62	1.42	•	•	•
32 BTX	2	42, 50	2 1/2-12	2 7/8	2.17	1.75	•	•	

TX (inch)

Sleeve
37° Flare

SAE 070115
HPD Base # 06S

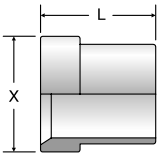


TUBE FITTING PART #	END SIZE (in.)	L (in.)	X (in.)	STANDARD FROM STOCK -S	-SS	-B
2 TX	1/8	0.34	0.27	•	•	•
3 TX	3/16	0.34	0.33	•	•	•
4 TX	1/4	0.41	0.38	•	•	•
5 TX	5/16	0.44	0.45	•	•	•
6 TX	3/8	0.50	0.50	•	•	•
8 TX	1/2	0.56	0.68	•	•	•
10 TX	5/8	0.66	0.80	•	•	•
12 TX	3/4	0.69	0.97	•	•	•
14 TX	7/8	0.75	1.10	•	•	•
16 TX	1	0.78	1.22	•	•	•
20 TX	1 1/4	0.91	1.53	•	•	•
24 TX	1 1/2	1.13	1.78	•	•	•
32 TX	2	1.19	2.41	•	•	

TX (metric)

Sleeve
37° Flare

SAE 070115



TUBE FITTING PART #	See Note	END SIZE (mm)	FITTING DASH SIZE	L (mm)	X (mm)	STANDARD FROM STOCK -S	-SS	-B
TXS6	3	6	-4	10.4	9.6	•		
5 TX	1	8	-5	11.2	11.4	•		
TXS10	3	10	-6	12.7	12.7	•	•	
TXS12	3	12	-8	14.2	17.3	•	•	
TXS14	3	14	-10	16.8	20.3	•		
TXS15	3	15	-10	16.8	20.3	•		
10 TX	1	16	-10	16.8	20.3	•		
TXS18	3	18	-12	17.3	24.6	•		
20-12 TX	2	20	-12	17.3	24.6	•		
TXS22	3	22	-14	19.0	27.8			
TXS25	3	25	-16	19.8	31.0	•		
TXS28	3	28	-20	23.1	38.9			
TXS30	3	30	-20	23.1	38.9	•		
TXS32	3	32	-20	23.1	38.9	•		
TXS35	3	35	-24	28.4	45.2			
24 TX	1	38	-24	28.4	45.2	•		

1. Inch sleeve for use with metric tubing.
2. Use with 20-12 BTX.
3. The part numbers above are for steel. Use “SS” in place of “S” for ordering stainless steel. Example: TXSS12

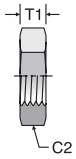
Dimensions and pressures for reference only, subject to change.

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WLN

Bulkhead Locknut

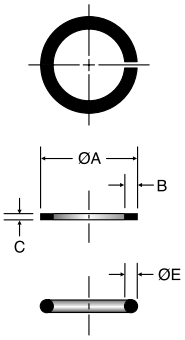
SAE 080118 and 070118
HPD Base # 53-XN



TUBE FITTING PART #	TUBE O.D. (in.)	C2 HEX (in.)	T1 (in.)	STANDARD FROM STOCK -S	-SS	-B
3 WLN	3/16	5/8	0.22	•	•	
4 WLN	1/4	11/16	0.28	•	•	•
5 WLN	5/16	3/4	0.28	•		•
6 WLN	3/8	13/16	0.27	•	•	•
8 WLN	1/2	1	0.31	•	•	•
10 WLN	5/8	1 1/8	0.36	•	•	•
12 WLN	3/4	1 3/8	0.41	•	•	•
14 WLN	7/8	1 1/2	0.41	•		
16 WLN	1	1 5/8	0.41	•	•	
20 WLN	1 1/4	1 7/8	0.41	•	•	
24 WLN	1 1/2	2 1/8	0.41	•	•	
32 WLN	2	2 3/4	0.41	•	•	

SBR

Braze Ring



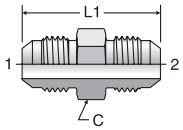
TUBE FITTING PART #	TUBE O.D. (in.)	A DIA. (in.)	B (in.)	C (in.)	E (in.)	STANDARD FROM STOCK -S	-SS	-B
4SBR	1/4	0.260			0.05	•	•	
6SBR	3/8	0.390	0.07	0.03		•	•	
8SBR	1/2	0.515	0.07	0.03		•	•	
10SBR	5/8	0.640	0.07	0.03		•	•	
12SBR	3/4	0.765	0.08	0.04		•	•	
14SBR	7/8	0.890			0.06			
16SBR	1	1.015	0.08	0.04		•	•	
20SBR	1 1/4	1.265	0.08	0.04		•	•	
24SBR	1 1/2	1.515	0.08	0.04		•	•	
32SBR	2	2.015			0.09	•	•	

HTX

Full Dimensions

Union
37° Flare / 37° Flare

SAE 070101
HPD Base # 0303



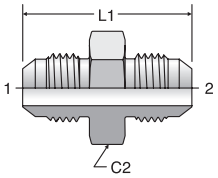
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 HTX	1/8	1/8	7/16	1.17	7.5	9.0	3.3
3 HTX	3/16	3/16	7/16	1.23	7.5	9.0	3.3
4 HTX	1/4	1/4	1/2	1.38	7.5	9.0	3.3
4-2 HTX	1/4	1/8	1/2	1.27		9.0	
4-3 HTX	1/4	3/16	1/2	1.30		9.0	
5 HTX	5/16	5/16	9/16	1.38	6.0	7.2	3.3
5-4 HTX	5/16	1/4	9/16	1.38		7.2	
6 HTX	3/8	3/8	5/8	1.41	6.0	7.2	3.3
6-4 HTX	3/8	1/4	5/8	1.41	6.0	7.2	
6-5 HTX	3/8	5/16	5/8	1.41		7.2	
8 HTX	1/2	1/2	13/16	1.62	6.0	7.2	3.3
8-4 HTX	1/2	1/4	13/16	1.52	6.0	7.2	
8-6 HTX	1/2	3/8	13/16	1.52	6.0	7.2	
10 HTX	5/8	5/8	15/16	1.88	5.0	6.0	3.3
10-8 HTX	5/8	1/2	15/16	1.78	5.0	6.0	
12 HTX	3/4	3/4	1 1/8	2.16	5.0	6.0	3.3
12-8 HTX	3/4	1/2	1 1/8	1.95	5.0	6.0	
12-10 HTX	3/4	5/8	1 1/8	2.05	5.0	6.0	
14 HTX	7/8	7/8	1 1/4	2.22	5.0	6.0	2.6
16 HTX	1	1	1 3/8	2.25	4.0	4.8	2.6
16-12 HTX	1	3/4	1 3/8	2.20	4.0	4.8	
20 HTX	1 1/4	1 1/4	1 11/16	2.44	4.0	4.8	
24 HTX	1 1/2	1 1/2	2	2.75	3.0	3.6	
24-10 HTX	1 1/2	5/8	2	2.42			
24-12 HTX	1 1/2	3/4	2	2.53		3.6	
24-16 HTX	1 1/2	1	2	2.58		3.6	
32 HTX	2	2	2 5/8	3.41	2.0	2.4	
32-24 HTX	2	1 1/2	2 5/8	2.81		2.4	

LHTX

Full Dimensions

Large Hex Union
37° Flare / 37° Flare

SAE 070119
HPD Base # 03L3



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C2 HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 LHTX	1/4	1/4	11/16	1.38	7.5	9.0	3.3
4-3 LHTX	1/4	3/16	11/16	1.30		9.0	
5 LHTX	5/16	5/16	3/4	1.38	6.0		
6 LHTX	3/8	3/8	13/16	1.41	6.0	7.2	3.3
6-4 LHTX	3/8	1/4	13/16	1.41		7.2	
8 LHTX	1/2	1/2	1	1.62	6.0	7.2	3.3
8-4 LHTX	1/2	1/4	1	1.52		7.2	
8-6 LHTX	1/2	3/8	1	1.52		7.2	
10 LHTX	5/8	5/8	1 1/8	1.88	5.0	6.0	
12 LHTX	3/4	3/4	1 3/8	2.16	5.0	6.0	
12-8 LHTX	3/4	1/2	1 3/8	1.95		6.0	
16 LHTX	1	1	1 5/8	2.25	4.0	4.8	
32 LHTX	2	2	2 3/4	3.41		2.4	

Dimensions and pressures for reference only, subject to change.

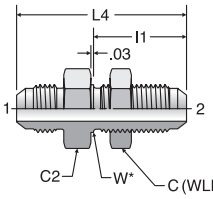
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WTX Full Dimensions

Bulkhead Union
37° Flare / 37° Flare

SAE 070601
HPD Base # 0353
WTX-WLN – Body with locknut
(See page C14 for WLN)



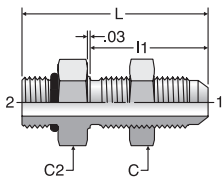
W* – Bulkhead pilot dia. recommended clearance hole +.015 over W dia.

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C HEX (in.)	C2 HEX (in.)	I1 (in.)	L4 (in.)	W DIA (in.)	MAX BULKHEAD WALL THICKNESS (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3 WTX	3/16	5/8	5/8	1.11	1.91	0.38	0.38	7.5		
4 WTX	1/4	11/16	11/16	1.20	2.08	0.44	0.33	7.5	9.0	3.3
5 WTX	5/16	3/4	3/4	1.20	2.08	0.50	0.33	6.0		3.3
6 WTX	3/8	13/16	13/16	1.28	2.19	0.56	0.42	6.0	7.2	3.3
8 WTX	1/2	1	1	1.44	2.44	0.75	0.44	6.0	7.2	3.3
10 WTX	5/8	1 1/8	1 1/8	1.58	2.75	0.88	0.43	5.0	6.0	3.3
12 WTX	3/4	1 3/8	1 3/8	1.75	3.09	1.06	0.44	5.0	6.0	3.3
14 WTX	7/8	1 1/2	1 1/2	1.75	3.13	1.19	0.41	5.0		
16 WTX	1	1 5/8	1 5/8	1.75	3.14	1.31	0.39	4.0	4.8	
20 WTX	1 1/4	1 7/8	1 7/8	1.80	3.31	1.63	0.40	4.0	4.8	
24 WTX	1 1/2	2 1/8	2 1/8	1.81	3.52	1.88	0.28	3.0	3.6	
32 WTX	2	2 3/4	2 3/4	2.09	4.20	2.50	0.28	2.0	2.4	

WF5OX Full Dimensions

ORB Bulkhead Connector
37° Flare / ORB

HPD Base # 0355
WF5OX-WLN – Body with locknut
(See page C15 for WLN)

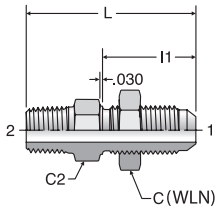


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	C HEX (in.)	C2 HEX (in.)	I1 (in.)	L (in.)	MAX BULKHEAD WALL THICKNESS (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 WF5OX	1/4	7/16-20	11/16	11/16	1.20	1.84	0.33	7.5		
6 WF5OX	3/8	9/16-18	13/16	13/16	1.28	2.02	0.42	6.0		
8 WF5OX	1/2	3/4-16	1	1	1.44	2.19	0.44	6.0		
10 WF5OX	5/8	7/8-14	1 1/8	1 1/8	1.58	2.47	0.43	5.0		
12 WF5OX	3/4	1 1/16-12	1 3/8	1 3/8	1.75	2.79	0.44	5.0		
16 WF5OX	1	1 5/16-12	1 5/8	1 5/8	1.75	2.90	0.39	4.5		

WFTX Full Dimensions

Male Bulkhead Connector
37° Flare / NPTF

HPD Base # 0153
WFTX-WLN – Body with locknut
(See page C15 for WLN)



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	C2 HEX (in.)	I1 (in.)	L (in.)	MAX BULKHEAD WALL THICKNESS (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 WFTX	1/4	1/8-27	11/16	11/16	1.20	1.88	0.33	6.0	6.0	
4-4 WFTX	1/4	1/4-18	11/16	11/16	1.20	2.07	0.33	6.0	6.0	
6 WFTX	3/8	1/4-18	13/16	13/16	1.28	2.15	0.42	6.0	6.0	
6-6 WFTX	3/8	3/8-18	3/4	13/16	1.28	2.16	0.42	6.0	6.0	
6-8 WFTX	3/8	1/2-14	7/8	13/16	1.28	2.41	0.42		6.0	
8 WFTX	1/2	3/8-18	1	1	1.44	2.31	0.44	6.0	6.0	
8-8 WFTX	1/2	1/2-14	1	1	1.44	2.56	0.44	6.0	6.0	
10 WFTX	5/8	1/2-14	1 1/8	1 1/8	1.58	2.71	0.43	5.0		
12 WFTX	3/4	3/4-14	1 3/8	1 3/8	1.75	2.95	0.44	5.0	5.0	
16 WFTX	1	1-11 1/2	1 5/8	1 5/8	1.75	3.14	0.39	4.5	4.5	

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Dimensions and pressures for reference only, subject to change.

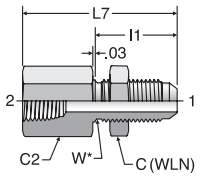
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Tube Fittings Division
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WGTX Full Dimensions

Female Bulkhead Connector
37° Flare / NPTF

HPD Base # 0253
WGTX-WLN – Body with locknut
(See page C15 for WLN)

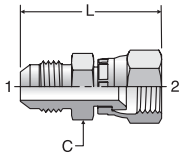


W* – Bulkhead pilot dia. recommended clearance hole +.015 over W dia.

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	C2 HEX (in.)	I1 (in.)	L7 (in.)	W DIA (in.)	MAX BULKHEAD WALL THICKNESS (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 WGTX	1/4	1/8-27	11/16	11/16	1.20	1.84	0.44	0.33	6.0	6.0	
4-4 WGTX	1/4	1/4-18	11/16	3/4	1.33	2.11	0.44	0.33	6.0	6.0	
6 WGTX	3/8	1/4-18	13/16	13/16	1.28	2.06	0.56	0.42	6.0	6.0	
6-6 WGTX	3/8	3/8-18	13/16	7/8	1.28	2.24	0.56	0.42	6.0	6.0	
8 WGTX	1/2	3/8-18	1	1	1.44	2.34	0.75	0.44	6.0	6.0	
8-8 WGTX	1/2	1/2-14	1	1 1/8	1.44	2.61	0.75	0.44	5.0	5.0	
10 WGTX	5/8	1/2-14	1 1/8	1 1/8	1.58	2.66	0.88	0.43	5.0	5.0	
12 WGTX	3/4	3/4-14	1 3/8	1 3/8	1.75	2.95	1.06	0.44	4.0	4.0	
14 WGTX	7/8	3/4-14	1 3/8	1 1/2	1.75	2.89	1.19	0.41	4.0		
16 WGTX	1	1-11 1/2	1 5/8	1 5/8	1.75	3.19	1.31	0.39	3.0		
24 WGTX	1 1/2	1 1/2-11 1/2	2 1/8	2 1/4	1.81	3.35	1.88	0.28	2.0	2.0	

XHX6 Full Dimensions

Extender and Expander
37° Flare / 37° Flare Swivel



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 XHX6	1/4	1/4	9/16	1.39	7.5		
6 XHX6	3/8	3/8	5/8	1.50	6.0		
6-4 XHX6	3/8	1/4	5/8	1.50	6.0		
8 XHX6	1/2	1/2	13/16	1.71	6.0		
8-6 XHX6	1/2	3/8	13/16	1.72	6.0		
10 XHX6	5/8	5/8	1	2.01	5.0		
10-8 XHX6	5/8	1/2	15/16	1.93	5.0		
12 XHX6	3/4	3/4	1 1/4	2.27	5.0		
12-10 XHX6	3/4	5/8	1 1/8	2.20	5.0		
16 XHX6	1	1	1 1/2	2.47	4.0		
16-12 XHX6	1	3/4	1 1/2	2.31	4.0		
20-16 XHX6	1 1/4	1	1 11/16	2.50	4.0		

Dimensions and pressures for reference only, subject to change.

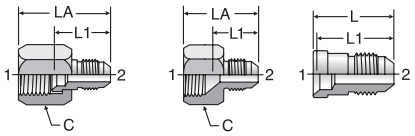
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Tube Fittings Division
Columbus, Ohio
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TRTX / TRTXN

Full Dimensions

Reducer
37° Flare

SAE 070123 / SAE 070123A
HPD Base # 0603 (TRTXN only)



TRTXN 2-piece (Nut and Insert)

TRTXN 1-piece (Non-swivel)

TRTX (Insert only)

TUBE FITTING PART #			END SIZE						STANDARD Dynamic Pressure (x 1,000 PSI)		
TRTXN 2-pc. Design (with Large Nut)	**TRTXN** 1-pc. Design (Machined Female)	**TRTX** Reducer Insert (For 2-pc. Design Only)	**1** (in.)	**2** (in.)	**C HEX** (in.)	**L (TRTX)** (in.)	**LA (TRTXN)** (in.)	**L1 (TRTX & TRTXN)** (in.)	**-S**	**-SS**	**-B**
4-2 TRTXN	–	**4-2 TRTX**	1/4	1/8	9/16	0.75	1.23	0.68		9.0	
–	**4-3 TRTXN**	–	1/4	3/16	9/16	–	1.09	–		9.0	
–	**5-4 TRTXN**	–	5/16	1/4	5/8	–	1.16	–	6.0	7.2	
6-4 TRTXN	–	**6-4 TRTX**	3/8	1/4	11/16	0.97	1.53	0.90	6.0	7.2	3.3
–	**6-5 TRTXN**	–	3/8	5/16	11/16	–	1.19	–	6.0	7.2	
8-4 TRTXN	–	**8-4 TRTX**	1/2	1/4	7/8	1.00	1.63	0.90	6.0	7.2	3.3
8-6 TRTXN	–	**8-6 TRTX**	1/2	3/8	7/8	1.00	1.63	0.90	6.0	7.2	3.3
10-4 TRTXN	–	**10-4 TRTX**	5/8	1/4	1	1.03	1.78	0.93	5.0	6.0	
10-6 TRTXN	–	**10-6 TRTX**	5/8	3/8	1	1.03	1.78	0.93	5.0	6.0	3.3
–	**10-8 TRTXN**	–	5/8	1/2	1	–	1.88	–	5.0	6.0	
12-4 TRTXN	–	**12-4 TRTX**	3/4	1/4	1 1/4	1.09	1.85	0.95	5.0	6.0	3.3
12-6 TRTXN	–	**12-6 TRTX**	3/4	3/8	1 1/4	1.09	1.85	0.95	5.0	6.0	3.3
12-8 TRTXN	–	**12-8 TRTX**	3/4	1/2	1 1/4	1.19	1.95	1.05	5.0	6.0	3.3
–	**12-10 TRTXN**	–	3/4	5/8	1 1/4	–	2.05	–	5.0	6.0	
14-6 TRTXN	–	**14-6 TRTX**	7/8	3/8	1 3/8	1.13	1.96	1.00	5.0		
14-10 TRTXN	–	**14-10 TRTX**	7/8	5/8	1 3/8	1.33	2.16	1.20	5.0		
–	**14-12 TRTXN**	–	7/8	3/4	1 3/8	–	1.84	–	5.0		
16-4 TRTXN	–	**16-4 TRTX**	1	1/4	1 1/2	1.22	2.07	1.09		4.8	
16-6 TRTXN	–	**16-6 TRTX**	1	3/8	1 1/2	1.22	1.90	1.09		4.8	
16-8 TRTXN	–	**16-8 TRTX**	1	1/2	1 1/2	1.27	2.11	1.14	4.0	4.8	
16-10 TRTXN	–	**16-10 TRTX**	1	5/8	1 1/2	1.38	2.06	1.25	4.0		
16-12 TRTXN	–	**16-12 TRTX**	1	3/4	1 1/2	1.47	2.32	1.34	4.0	4.8	
–	**16-14 TRTXN**	–	1	7/8	1 1/2	–	2.35	–	4.0		
20-12 TRTXN	–	**20-12 TRTX**	1 1/4	3/4	2	1.53	2.45	1.37	4.0	4.8	
20-16 TRTXN	–	**20-16 TRTX**	1 1/4	1	2	1.59	2.51	1.43	4.0	4.8	
24-8 TRTXN	–	**24-8 TRTX**	1 1/2	1/2	2 1/4	1.56	2.39	1.41		3.6	
24-12 TRTXN	–	**24-12 TRTX**	1 1/2	3/4	2 1/4	1.63	2.46	1.48		3.6	
24-16 TRTXN	–	**24-16 TRTX**	1 1/2	1	2 1/4	1.63	2.46	1.48	3.0	3.6	
24-20 TRTXN	–	**24-20 TRTX**	1 1/2	1 1/4	2 1/4	1.69	2.77	1.54	3.0		
32-24 TRTXN	–	**32-24 TRTX**	2	1 1/2	2 7/8	1.91	2.96	1.72	2.0	2.4	

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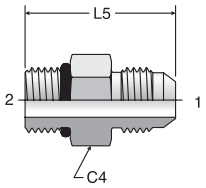
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

F5OX Full Dimensions

Straight Thread Connector
37° Flare / SAE-ORB

SAE 070120
HPD Base # 0503

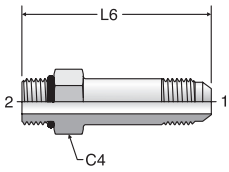


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	C4 HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 F5OX	1/8	5/16-24	7/16	1.06	7.5	9.0	
3 F5OX	3/16	3/8-24	1/2	1.10	7.5	9.0	
3-2 F5OX	3/16	5/16-24	1/2	1.10		9.0	
4 F5OX	1/4	7/16-20	9/16	1.23	7.5	9.0	
4-2 F5OX	1/4	5/16-24	9/16	1.02	7.5		
4-3 F5OX	1/4	3/8-24	9/16	1.19		9.0	
4-5 F5OX	1/4	1/2-20	5/8	1.23	6.0	7.2	
4-6 F5OX	1/4	9/16-18	11/16	1.28	6.0	7.2	
4-8 F5OX	1/4	3/4-16	7/8	1.38	6.0	7.2	
4-10 F5OX	1/4	7/8-14	1	1.49	5.0		
5 F5OX	5/16	1/2-20	5/8	1.23	6.0	7.2	
5-4 F5OX	5/16	7/16-20	9/16	1.23	6.0		
5-6 F5OX	5/16	9/16-18	11/16	1.30	6.0		
5-8 F5OX	5/16	3/4-16	7/8	1.37	6.0		
6 F5OX	3/8	9/16-18	11/16	1.30	6.0	7.2	
6-4 F5OX	3/8	7/16-20	5/8	1.27	6.0	7.2	
6-5 F5OX	3/8	1/2-20	5/8	1.27	6.0		
6-8 F5OX	3/8	3/4-16	7/8	1.38	6.0	7.2	
6-10 F5OX	3/8	7/8-14	1	1.50	5.0	6.0	
6-12 F5OX	3/8	1 1/16-12	1 1/4	1.66	5.0	6.0	
8 F5OX	1/2	3/4-16	7/8	1.48	6.0	7.2	
8-4 F5OX	1/2	7/16-20	13/16	1.50	6.0	7.2	
8-6 F5OX	1/2	9/16-18	13/16	1.44	6.0	7.2	
8-10 F5OX	1/2	7/8-14	1	1.59	5.0	6.0	
8-12 F5OX	1/2	1 1/16-12	1 1/4	1.77	5.0	6.0	
8-16 F5OX	1/2	1 5/16-12	1 1/2	1.78	4.5	5.4	
10 F5OX	5/8	7/8-14	1	1.70	5.0	6.0	
10-6 F5OX	5/8	9/16-18	11/16	1.71	5.0	6.0	
10-8 F5OX	5/8	3/4-16	15/16	1.64	5.0	6.0	
10-12 F5OX	5/8	1 1/16-12	1 1/4	1.86	5.0	6.0	
10-16 F5OX	5/8	1 5/16-12	1 1/2	1.89	4.5	5.4	
12 F5OX	3/4	1 1/16-12	1 1/4	1.97	5.0	6.0	
12-8 F5OX	3/4	3/4-16	1 1/8	1.94	5.0	6.0	
12-10 F5OX	3/4	7/8-14	1 1/8	1.88	5.0	6.0	
12-14 F5OX	3/4	1 3/16-12	1 3/8	1.96	5.0		
12-16 F5OX	3/4	1 5/16-12	1 1/2	1.99	4.5	5.4	
12-20 F5OX	3/4	1 5/8-12	1 7/8	2.08	4.0		
14 F5OX	7/8	1 3/16-12	1 3/8	1.99	5.0		
14-16 F5OX	7/8	1 5/16-12	1 1/2	2.02	4.5		
16 F5OX	1	1 5/16-12	1 1/2	2.05	4.5	5.4	
16-8 F5OX	1	3/4-16	1 3/8	1.78	4.5	5.4	
16-10 F5OX	1	7/8-14	1 3/8	2.08	4.5	5.4	
16-12 F5OX	1	1 1/16-12	1 3/8	1.99	4.5	5.4	
16-14 F5OX	1	1 3/16-12	1 3/8	2.05	4.5		
16-20 F5OX	1	1 5/8-12	1 7/8	2.13	4.0	4.8	
16-24 F5OX	1	1 7/8-12	2 1/8	2.20	3.0		
20 F5OX	1 1/4	1 5/8-12	1 7/8	2.17	4.0	4.8	
20-12 F5OX	1 1/4	1 1/16-12	1 11/16	2.30	4.0	4.8	
20-16 F5OX	1 1/4	1 5/16-12	1 11/16	2.33	4.0	4.8	
20-24 F5OX	1 1/4	1 7/8-12	2 1/8	2.24	3.0	3.6	
24 F5OX	1 1/2	1 7/8-12	2 1/8	2.38	3.0	3.6	
24-20 F5OX	1 1/2	1 5/8-12	2	2.53	3.0	3.6	
24-32 F5OX	1 1/2	2 1/2-12	2 3/4	2.53	2.0		
32 F5OX	2	2 1/2-12	2 3/4	2.78	2.0	2.4	
32-24 F5OX	2	1 7/8-12	2 5/8	2.94	2.0		

FF5OX Full Dimensions

Long Straight Thread Connector
37° Flare / SAE-ORB

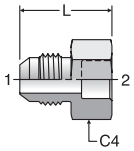
SAE 071720
HPD Base # 053E



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	C4 HEX (in.)	L6 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 FF5OX	1/4	7/16-20	9/16	2.08	7.5	9.0	
4-6 FF5OX	1/4	9/16-18	11/16	2.13		7.2	
6 FF5OX	3/8	9/16-18	11/16	2.31	6.0	7.2	
8 FF5OX	1/2	3/4-16	7/8	2.70	6.0	7.2	
10 FF5OX	5/8	7/8-14	1	3.03	5.0	6.0	
12 FF5OX	3/4	1 1/16-12	1 1/4	3.61	5.0	6.0	
16 FF5OX	1	1 5/16-12	1 1/2	3.98	4.5	5.4	
20 FF5OX	1 1/4	1 5/8-12	1 7/8	4.69	4.0		

XHB3 Full Dimensions

Braze Socket
37° Flare / Inch Tube Braze



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C4 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 XHB3	1/4	1/4	9/16	0.97	7.5		
6 XHB3	3/8	3/8	5/8	1.00	6.0		
6-4 XHB3	3/8	1/4	5/8	1.00	6.0		
6-8 XHB3	3/8	1/2	5/8	1.00	6.0		
8 XHB3	1/2	1/2	13/16	1.12	6.0		
8-10 XHB3	1/2	5/8	13/16	1.12	5.0		
10 XHB3	5/8	5/8	15/16	1.21	5.0		
10-8 XHB3	5/8	1/2	15/16	1.21	5.0		
10-12 XHB3	5/8	3/4	1 1/8	1.37	5.0		
12 XHB3	3/4	3/4	1 1/4	1.51	5.0		
12-10 XHB3	3/4	5/8	1 1/8	1.51	5.0		
12-16 XHB3	3/4	1	1 1/4	1.57	4.0		
16 XHB3	1	1	1 3/8	1.63	4.0		
16-20 XHB3	1	1 1/4	1 11/16	1.73	4.0		
20 XHB3	1 1/4	1 1/4	1 11/16	1.71	4.0		
20-24 XHB3	1 1/4	1 1/2	2	1.71	3.0		
24 XHB3	1 1/2	1 1/2	2	1.84	3.0		
32 XHB3	2	2	2 5/8	2.16			

Note: Braze rings are on page C15.

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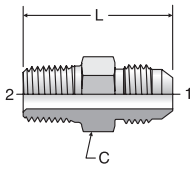
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
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http://www.parker.com/tfd

FTX Full Dimensions

Male Connector
37° Flare / NPTF

SAE 070102
HPD Base # 0103

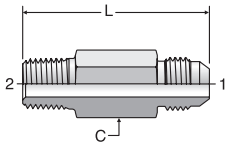


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 FTX	1/8	1/8-27	7/16	1.11	6.0	6.0	3.3
3 FTX	3/16	1/8-27	7/16	1.14	6.0	6.0	3.3
4 FTX	1/4	1/8-27	1/2	1.22	6.0	6.0	3.3
4-4 FTX	1/4	1/4-18	9/16	1.42	6.0	6.0	3.3
4-6 FTX	1/4	3/8-18	3/4	1.44	6.0	6.0	
4-8 FTX	1/4	1/2-14	7/8	1.69	6.0	6.0	3.3
5 FTX	5/16	1/8-27	9/16	1.22	6.0	6.0	3.3
5-4 FTX	5/16	1/4-18	9/16	1.42	6.0	6.0	3.3
5-6 FTX	5/16	3/8-18	3/4	1.44	6.0	6.0	
6 FTX	3/8	1/4-18	5/8	1.43	6.0	6.0	3.3
6-2 FTX	3/8	1/8-27	5/8	1.24	6.0	6.0	3.3
6-6 FTX	3/8	3/8-18	3/4	1.44	6.0	6.0	3.3
6-8 FTX	3/8	1/2-14	7/8	1.69	6.0	6.0	3.3
6-12 FTX	3/8	3/4-14	1 1/8	1.75	5.5	5.5	
8 FTX	1/2	3/8-18	13/16	1.53	6.0	6.0	3.3
8-2 FTX	1/2	1/8-27	1 3/16	1.34	6.0	6.0	
8-4 FTX	1/2	1/4-18	13/16	1.53	6.0	6.0	3.3
8-8 FTX	1/2	1/2-14	7/8	1.78	6.0	6.0	3.3
8-12 FTX	1/2	3/4-14	1 1/8	1.85	5.5	5.5	2.6
8-16 FTX	1/2	1-11 1/2	1 3/8	2.05	4.5	4.5	
10 FTX	5/8	1/2-14	15/16	1.89	5.0	5.0	3.3
10-6 FTX	5/8	3/8-18	15/16	1.70	5.0	5.0	3.3
10-12 FTX	5/8	3/4-14	1 1/8	1.95	5.0	5.0	
12 FTX	3/4	3/4-14	1 1/8	2.06	5.0	5.0	2.6
12-6 FTX	3/4	3/8-18	1 1/8	1.88	5.0	5.0	
12-8 FTX	3/4	1/2-14	1 1/8	2.06	5.0	5.0	2.9
12-16 FTX	3/4	1-11 1/2	1 3/8	2.25	5.0	5.0	
12-20 FTX	3/4	1 1/4-11 1/2	1 11/16	2.36	5.0		
14 FTX	7/8	3/4-14	1 1/4	2.09	5.0	5.0	2.9
16 FTX	1	1-11 1/2	1 3/8	2.30	4.5	4.5	2.0
16-8 FTX	1	1/2-14	1 3/8	2.11	4.5	4.5	
16-12 FTX	1	3/4-14	1 3/8	2.11	4.5	4.5	2.3
16-20 FTX	1	1 1/4-11 1/2	1 11/16	2.41	3.0	3.0	
16-24 FTX	1	1 1/2-11 1/2	2	2.50	3.0	3.0	
20 FTX	1 1/4	1 1/4-11 1/2	1 11/16	2.45	3.0	3.0	1.6
20-16 FTX	1 1/4	1-11 1/2	1 11/16	2.42	3.0	3.0	
20-24 FTX	1 1/4	1 1/2-11 1/2	2	2.55	3.0	3.0	
24 FTX	1 1/2	1 1/2-11 1/2	2	2.67	3.0	3.0	1.3
24-16 FTX	1 1/2	1-11 1/2	2	2.62	3.0	3.0	
24-20 FTX	1 1/2	1 1/4-11 1/2	2	2.66	3.0		
24-32 FTX	1 1/2	2-11 1/2	2 5/8	2.86	2.0		
32 FTX	2	2-11 1/2	2 5/8	3.11	2.0	2.0	
32-24 FTX	2	1 1/2-11 1/2	2 5/8	3.08	2.0	2.0	
40 FTX	2 1/2	2 1/2-8	3 1/4	3.38	1.0		

FFTX Full Dimensions

Long Male Connector
37° Flare / NPTF

SAE 071802
HPD Base # 013E

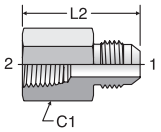


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 FFTX	1/4	1/8-27	1/2	1.81	6.0	6.0	
4-4 FFTX	1/4	1/4-18	9/16	2.25	6.0	6.0	
6 FFTX	3/8	1/4-18	5/8	2.25	6.0	6.0	
6-6 FFTX	3/8	3/8-18	3/4	2.50	6.0	6.0	
8 FFTX	1/2	3/8-18	13/16	2.75	6.0		
8-8 FFTX	1/2	1/2-14	15/16	2.80	6.0		
10 FFTX	5/8	1/2-14	15/16	3.12	5.0		
12 FFTX	3/4	3/4-14	1 1/8	3.50	5.0	5.0	

GTX Full Dimensions

Female Connector
37° Flare / NPTF

SAE 070103
HPD Base # 0203



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C1 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 GTX	1/8	1/8-27	9/16	1.12	6.0	6.0	3.3
3 GTX	3/16	1/8-27	9/16	1.13			3.3
4 GTX	1/4	1/8-27	9/16	1.19	6.0	6.0	3.3
4-4 GTX	1/4	1/4-18	3/4	1.39	6.0	6.0	3.3
4-6 GTX	1/4	3/8-18	7/8	1.45		6.0	
4-8 GTX	1/4	1/2-14	1 1/8	1.68		6.0	
5 GTX	5/16	1/8-27	9/16	1.17	6.0		3.3
5-4 GTX	5/16	1/4-18	3/4	1.39	6.0	6.0	3.3
6 GTX	3/8	1/4-18	3/4	1.41	6.0	6.0	3.3
6-2 GTX	3/8	1/8-27	5/8	1.19		6.0	
6-6 GTX	3/8	3/8-18	7/8	1.46	6.0	6.0	3.3
6-8 GTX	3/8	1/2-14	1 1/8	1.69	5.0	5.0	
8 GTX	1/2	3/8-18	7/8	1.56	6.0	6.0	3.3
8-4 GTX	1/2	1/4-18	13/16	1.55	6.0	6.0	
8-8 GTX	1/2	1/2-14	1 1/8	1.79	5.0	5.0	3.3
8-12 GTX	1/2	3/4-14	1 3/8	1.85	4.0	4.0	
10 GTX	5/8	1/2-14	1 1/8	1.89	5.0	5.0	3.3
10-12 GTX	5/8	3/4-14	1 3/8	1.95	4.0	4.0	
12 GTX	3/4	3/4-14	1 3/8	2.06	4.0	4.0	2.6
12-8 GTX	3/4	1/2-14	1 1/8	2.05	5.0	5.0	2.6
12-16 GTX	3/4	1-11 1/2	1 5/8	2.30	3.0	3.0	
14 GTX	7/8	3/4-14	1 3/8	2.06	4.0		
16 GTX	1	1-11 1/2	1 5/8	2.35	3.0	3.0	2.0
16-12 GTX	1	3/4-14	1 3/8	2.13	4.0	4.0	
16-20 GTX	1	1 1/4-11 1/2	2	2.44	2.5	2.5	
20 GTX	1 1/4	1 1/4-11 1/2	2	2.49	2.5	2.5	
20-16 GTX	1 1/4	1-11 1/2	1 3/4	2.47	3.0	3.0	
24 GTX	1 1/2	1 1/2-11 1/2	2 3/8	2.62	2.0	2.0	
32 GTX	2	2-11 1/2	2 7/8	2.97	1.5	1.5	

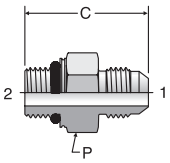
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

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F87OMX Full Dimensions

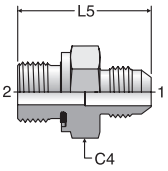
Male Connector – ISO 6149
37° Flare / ISO 6149



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	C (mm)	P (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F87OMX	6	1/4	M10x1	30.5	14	7.2		
5M12F87OMX	8	5/16	M12x1.5	33.5	19	6.0		
6M14F87OMX	10	3/8	M14x1.5	33.5	19	6.0		
6M16F87OMX	10	3/8	M16x1.5	35.1	22	6.0		
8M16F87OMX	12	1/2	M16x1.5	37.6	22	6.0		
8M18F87OMX	12	1/2	M18x1.5	39.1	24	5.0		
10M18F87OMX	14, 15, 16	5/8	M18x1.5	41.7	24	5.0		
10M22F87OMX	14, 15, 16	5/8	M22x1.5	42.9	27	5.0		
12M22F87OMX	18, 20	3/4	M22x1.5	45.5	27	5.0		
12M27F87OMX	18, 20	3/4	M27x2	49.0	32	5.0		
16M27F87OMX	25	1	M27x2	50.5	36	5.0		
16M33F87OMX	25	1	M33x2	51.6	41	4.0		
20M42F87OMX	30, 32	1 1/4	M42x2	54.9	50	4.0		
24M48F87OMX	38	1 1/2	M48x2	59.4	55	3.0		

F82EDMX Full Dimensions

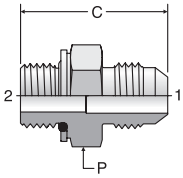
Male Connector – Metric
37° Flare / Metric-ED



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	C4 (mm)	L5 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F82EDMX	6	1/4	M10x1	14	31.0	7.2		
5M12F82EDMX	8	5/16	M12x1.5	17	33.5	6.0		
6M14F82EDMX	10	3/8	M14x1.5	19	33.5	6.0		
6M16F82EDMX	10	3/8	M16x1.5	22	35.1	6.0		
8M16F82EDMX	12	1/2	M16x1.5	22	37.6	6.0		
8M18F82EDMX	12	1/2	M18x1.5	24	39.1	5.0		
10M18F82EDMX	14,15,16	5/8	M18x1.5	24	41.7	5.0		
10M22F82EDMX	14,15,16	5/8	M22x1.5	27	42.9	5.0		
12M22F82EDMX	18,20	3/4	M22x1.5	27	45.5	5.0		
12M27F82EDMX	18,20	3/4	M27x2	32	49.0	5.0		
16M33F82EDMX	25	1	M33x2	41	51.6	4.0		
20M42F82EDMX	30,32	1 1/4	M42x2	50	54.9	4.0		

F8OMX Full Dimensions

Male Connector – Metric
37° Flare / Metric-ORR

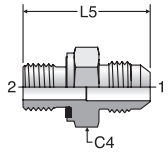


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	C (mm)	P (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F8OMX	6	1/4	M10x1	31.0	16	5.0		
5M12F8OMX	8	5/16	M12x1.5	33.5	19	5.0		
6M14F8OMX	10	3/8	M14x1.5	33.5	19	5.0		
8M16F8OMX	12	1/2	M16x1.5	37.6	22	5.0		
8M18F8OMX	12	1/2	M18x1.5	39.1	24	3.6		
10M18F8OMX	14, 15, 16	5/8	M18x1.5	41.7	24	3.6		
10M22F8OMX	14, 15, 16	5/8	M22x1.5	42.9	27	3.6		
12M22F8OMX	18, 20	3/4	M22x1.5	45.5	27	3.6		
12M24F8OMX	18, 20	3/4	M24x1.5	44.5	30	3.0		
12M27F8OMX	18, 20	3/4	M27x2	49.0	32	3.0		
16M27F8OMX	25	1	M27x2	50.5	36	3.0		
16M33F8OMX	25	1	M33x2	51.6	41	3.0		
20M42F8OMX	30, 32	1 1/4	M42x2	54.9	50	3.0		
24M48F8OMX	38	1 1/2	M48x2	59.4	55			

Note: If F8OMX is not available, use F82EDMX.

F42EDMX Full Dimensions

Male Connector – BSPP
37° Flare / BSPP-ED



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 BSPP	C4 (mm)	L5 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4F42EDMX	6	1/4	1/8-28	14	30.0	7.2		
4-4F42EDMX	6	1/4	1/4-19	19	34.8	6.0	6.0	
4-6F42EDMX	6	1/4	3/8-19	22	35.7	6.0		
4-8F42EDMX	6	1/4	1/2-14	30	39.2	5.0		
5F42EDMX	8	5/16	1/8-28	14	30.0	6.0		
5-4F42EDMX	8	5/16	1/4-19	19	34.8	6.0		
5-6F42EDMX	8	5/16	3/8-19	22	35.7	6.0		
6-2F42EDMX	10	3/8	1/8-28	16	31.0	6.0		
6F42EDMX	10	3/8	1/4-19	19	35.1	6.0		
6-6F42EDMX	10	3/8	3/8-19	22	36.0	6.0		
6-8F42EDMX	10	3/8	1/2-14	30	39.4	5.0		
8F42EDMX	12	1/2	3/8-19	22	33.5	6.0		
8-4F42EDMX	12	1/2	1/4-19	19	38.7	6.0		
8-8F42EDMX	12	1/2	1/2-14	30	42.0	5.0		
8-12F42EDMX	12	1/2	3/4-14	36	45.6	5.0		
10F42EDMX	14, 15, 16	5/8	1/2-14	30	44.5	5.0		
10-6F42EDMX	14, 15, 16	5/8	3/8-19	24	42.6	5.0		
10-12F42EDMX	14, 15, 16	5/8	3/4-14	32	48.1	5.0		
12F42EDMX	18, 20	3/4	3/4-14	36	50.9	5.0		
12-6F42EDMX	18, 20	3/4	3/8-19	27	50.1	5.0		
12-8F42EDMX	18, 20	3/4	1/2-14	30	49.0	5.0		
12-16F42EDMX	18, 20	3/4	1-11	46	53.4	4.0		
16F42EDMX	25	1	1-11	46	54.7	4.0		
16-12F42EDMX	25	1	3/4-14	36	52.7	4.5		
16-20F42EDMX	25	1	1 1/4-11	50	58.7	4.0		
20-16F42EDMX	30, 32	1 1/4	1-11	46	62.1	4.0		
20F42EDMX	30, 32	1 1/4	1 1/4-11	50	60.0	4.0		
20-24F42EDMX	30, 32	1 1/4	1 1/2-11	55	63.8	3.0		
24F42EDMX	38	1 1/2	1 1/2-11	55	67.1	3.0		
24-20F42EDMX	38	1 1/2	1 1/4-11	50	63.8	3.0		

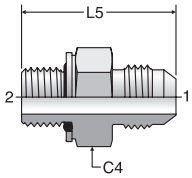
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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F4OMX Full Dimensions

Male Connector – BSPP
37° Flare / BSPP-ORR

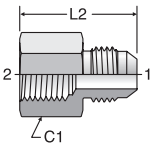


TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	C4 (mm)	L5 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4F4OMX	6	1/4	1/8-28	17	28.7	5.0		
4-4F4OMX	6	1/4	1/4-19	19	32.0	5.0		
4-6F4OMX	6	1/4	3/8-19	22	33.0	5.0		
4-8F4OMX	6	1/4	1/2-14	30	38.6	5.0		
5-4F4OMX	8	5/16	1/4-19	19	32.0	5.0		
5-6F4OMX	8	5/16	3/8-19	22	33.0	5.0		
6F4OMX	10	3/8	1/4-19	19	32.0	5.0		
6-6F4OMX	10	3/8	3/8-19	22	33.0	5.0		
6-8F4OMX	10	3/8	1/2-14	30	38.6	5.0		
8-4F4OMX	12	1/2	1/4-19	19	35.0	5.0		
8F4OMX	12	1/2	3/8-19	22	36.0	5.0		
8-8F4OMX	12	1/2	1/2-14	30	41.4	5.0		
8-12F4OMX	12	1/2	3/4-14	36	42.4	4.0		
10-6F4OMX	14, 15, 16	5/8	3/8-19	24	39.1	5.0		
10F4OMX	14, 15, 16	5/8	1/2-14	30	43.9	5.0		
12-8F4OMX	18, 20	3/4	1/2-14	30	46.7	5.0		
12F4OMX	18, 20	3/4	3/4-14	36	47.5	4.0		
12-16F4OMX	18, 20	3/4	1-11	46	52.6	4.0		
16-12F4OMX	25	1	3/4-14	36	48.5	4.0		
16F4OMX	25	1	1-11	46	53.6	4.0		
16-20F4OMX	25	1	1 1/4-11	50	55.1	3.6		
20F4OMX	30, 32	1 1/4	1 1/4-11	50	56.9	3.6		
24-20F4OMX	38	1 1/2	1 1/4-11	50	60.4	3.0		
24F4OMX	38	1 1/2	1 1/2-11	55	61.0	3.0		

Note: If F4OMX is not available, use F42EDMX.

G4MX Full Dimensions

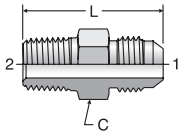
Female Connector – BSPP
37° Flare / BSPP



TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	C1 (mm)	L2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS	B
4G4MX	6	1/4	1/8-28	16	30.2	5.0		
4-4G4MX	6	1/4	1/4-19	19	35.3	5.0		
5G4MX	8	5/16	1/8-28	16	29.7	5.0		
6G4MX	10	3/8	1/4-19	19	35.6	5.0		
6-6G4MX	10	3/8	3/8-19	22	37.1	5.0		
8G4MX	12	1/2	3/8-19	22	39.6	5.0		
8-8G4MX	12	1/2	1/2-14	30	45.5	5.0		
10G4MX	14,15,16	5/8	1/2-14	30	48.0	5.0		
12G4MX	18,20	3/4	3/4-14	36	52.3	4.0		
16G4MX	25	1	1-11	46	59.7	4.0		

F3MX Full Dimensions

Male Connector – BSPT
37° Flare / BSPT

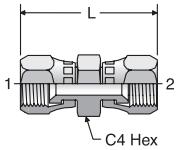


TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPT	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4F3MX	6	1/4	1/8-28	13	31.0	4.5		
4-4F3MX	6	1/4	1/4-19	14	36.0	4.5		
5F3MX	8	5/16	1/8-28	14	31.0	4.5		
5-4F3MX	8	5/16	1/4-19	14	36.0	4.5		
6F3MX	10	3/8	1/4-19	16	36.3	4.5		
6-6F3MX	10	3/8	3/8-19	19	36.4	4.5		
6-8F3MX	10	3/8	1/2-14	22	42.9	4.5		
8-4F3MX	12	1/2	1/4-19	19	38.9	4.5		
8F3MX	12	1/2	3/8-19	19	38.9	4.5		
8-8F3MX	12	1/2	1/2-14	22	45.5	4.5		
10-6F3MX	14,15,16	5/8	3/8-19	24	43.2	4.5		
10F3MX	14,15,16	5/8	1/2-14	24	48.0	4.5		
10-12F3MX	14,15,16	5/8	3/4-14	27	49.5	2.3		
12-8F3MX	18,20	3/4	1/2-14	27	52.3	4.5		
12F3MX	18,20	3/4	3/4-14	27	52.3	2.3		
12-16F3MX	18,20	3/4	1-11	36	57.1	2.3		
16-12F3MX	25	1	3/4-14	36	53.6	2.3		
16F3MX	25	1	1-11	36	58.4	2.3		
20-16F3MX	30,32	1 1/4	1-11	46	61.4	2.3		
20F3MX	30,32	1 1/4	1 1/4-11	46	62.2	2.3		
24F3MX	38	1 1/2	1 1/2-11	50	68.1	2.3		

HX6 Full Dimensions

Swivel Nut Union
37° Swivel / 37° Swivel

HPD Base # 0606



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C4 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 HX6	1/4	9/16	1.48	7.5	7.5	
6 HX6	3/8	11/16	1.75	6.0		
8 HX6	1/2	7/8	2.02	6.0		
10 HX6	5/8	1	2.24	5.0		
12 HX6	3/4	1 1/4	2.43	5.0		
16 HX6	1	1 1/2	2.68	4.0		

Dimensions and pressures for reference only, subject to change.

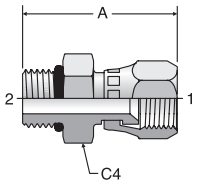
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F650X Full Dimensions

Swivel Straight Thread Connector
37° Swivel / SAE-ORB

HPD Base # 0506

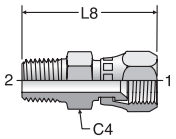


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	A (in.)	C4 HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 F65OX	1/4	7/16-20	1.31	9/16	7.5	9.0	
4-6 F65OX	1/4	9/16-18	1.37	11/16	6.0		
5 F65OX	5/16	1/2-20	1.35	5/8	6.0		
6 F65OX	3/8	9/16-18	1.43	11/16	6.0	7.2	
6-4 F65OX	3/8	7/16-20	1.37	9/16	6.0		
6-8 F65OX	3/8	3/4-16	1.50	7/8	6.0	7.2	
8 F65OX	1/2	3/4-16	1.61	7/8	6.0	7.2	
8-6 F65OX	1/2	9/16-18	1.54	13/16	6.0		
8-10 F65OX	1/2	7/8-14	1.88	7/8	5.0		
10 F65OX	5/8	7/8-14	1.84	1	5.0	6.0	
10-8 F65OX	5/8	3/4-16	1.67	1	5.0		
10-12 F65OX	5/8	1 1/16-12	1.92	1 1/4	5.0		
12 F65OX	3/4	1 1/16-12	2.07	1 1/4	5.0	6.0	
12-10 F65OX	3/4	7/8-14	2.10	1 1/4	5.0		
12-16 F65OX	3/4	1 5/16-12	2.24	1 1/2	4.5		
16 F65OX	1	1 5/16-12	2.28	1 1/2	4.0	4.8	
16-12 F65OX	1	1 1/16-12	2.14	1 1/2	4.5		
20 F65OX	1 1/4	1 5/8-12	2.49	2	4.0	4.8	

F6X Full Dimensions

Swivel Connector
37° Swivel / NPTF

HPD Base # 0106

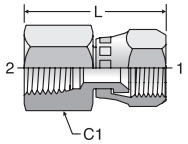


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C4 (in.)	L8 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 F6X	1/4	1/8-27	9/16	1.13	6.0	6.0	
4-4 F6X	1/4	1/4-18	9/16	1.46	6.0	6.0	
5-4 F6X	5/16	1/4-18	5/8	1.57	6.0		
6 F6X	3/8	1/4-18	11/16	1.59	5.0	5.0	
6-6 F6X	3/8	3/8-18	3/4	1.59	5.0	5.0	
8 F6X	1/2	3/8-18	7/8	1.69	5.0	5.0	
8-8 F6X	1/2	1/2-14	7/8	1.92	5.0	5.0	
10 F6X	5/8	1/2-14	1	2.05	5.0	5.0	
10-6 F6X	5/8	3/8-18	1	1.87	5.0		
12 F6X	3/4	3/4-14	1 1/4	2.15	5.0	5.0	
12-8 F6X	3/4	1/2-14	1 1/4	2.15	5.0	5.0	
16 F6X	1	1-11 1/2	1 1/2	2.50	3.6	3.6	
16-12 F6X	1	3/4-14	1 1/2	2.33	3.6		
20 F6X	1 1/4	1 1/4-11 1/2	2	2.76	3.0	3.0	
24 F6X	1 1/2	1 1/2-11 1/2	2 1/4	3.05	2.5	2.5	
32 F6X	2	2-11 1/2	2 5/8	3.38		2.0	

G6X Full Dimensions

Swivel Nut Female Connector
37° Swivel / NPTF

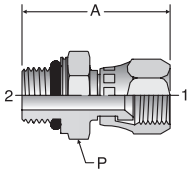
HPD Base # 0206



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C1 (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 G6X	1/4	1/8-27	9/16	1.27	6.0	6.0	
4-4 G6X	1/4	1/4-18	3/4	1.43	6.0	6.0	
6 G6X	3/8	1/4-18	3/4	1.44	5.0	5.0	
6-6 G6X	3/8	3/8-18	7/8	1.54	5.0	5.0	
6-8 G6X	3/8	1/2-14	1 1/8	1.80	5.0	5.0	
8 G6X	1/2	3/8-18	7/8	1.69	5.0	5.0	
8-8 G6X	1/2	1/2-14	1 1/8	1.94	5.0	5.0	
10 G6X	5/8	1/2-14	1 1/8	1.98	5.0	5.0	
12 G6X	3/4	3/4-14	1 3/8	2.08	4.0	4.0	
12-8 G6X	3/4	1/2-14	1 1/4	2.07		5.0	
16 G6X	1	1-11 1/2	1 5/8	2.45	3.0	3.0	
20 G6X	1 1/4	1 1/4-11 1/2	2	2.81	2.5	2.5	
24 G6X	1 1/2	1 1/2-11 1/2	2 3/8	3.01	2.0	2.0	
32 G6X	2	2-11 1/2	2 7/8	3.40	1.5	1.5	

F687OMX Full Dimensions

Swivel – ISO 6149 Connector
37° Swivel / ISO 6149



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	A (mm)	P (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F687OMX	6	1/4	M10x1	33.8	16	7.2		
5M12F687OMX	8	5/16	M12x1.5	44.0	22	6.0		
6M14F687OMX	10	3/8	M14x1.5	45.7	22	6.0		
8M16F687OMX	12	1/2	M16x1.5	46.6	27	6.0		
10M22F687OMX	14, 15, 16	5/8	M22x1.5	48.6	27	5.0		
12M27F687OMX	18, 20	3/4	M27x2	53.9	32	5.0		
16M33F687OMX	25	1	M33x2	57.5	38	4.0		

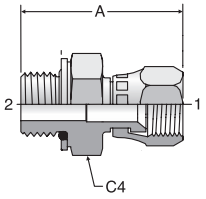
Dimensions and pressures for reference only, subject to change.

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F680MX Full Dimensions

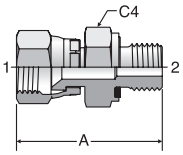
Swivel Metric ORR Connector
Metric-ORR / 37° Swivel



TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 Male Metric Parallel Thread	A (mm)	C4 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F68OMX	6	1/4	M10x1	34.3	16	5.0		
5M12F68OMX	8	5/16	M12x1.5	37.9	19	5.0		
6M14F68OMX	10	3/8	M14x1.5	38.5	19	5.0		
8M16F68OMX	12	1/2	M16x1.5	42.4	22	5.0		
10M22F68OMX	14, 15, 16	5/8	M22x1.5	47.9	27	3.6		
12M27F68OMX	18, 20	3/4	M27x2	52.3	32	3.0		
16M33F68OMX	25	1	M33x2	57.4	41	3.0		

F682EDMX Full Dimensions

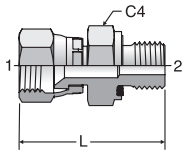
Metric-ED / 37° Swivel



TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 Male Metric Parallel Thread	A (mm)	C4 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F682EDMX	6	1/4	M10x1	24.0	14			
5M12F682EDMX	8	5/16	M12x1.5	28.8	17			
6M14F682EDMX	10	3/8	M14x1.5	30.4	19			
8M16F682EDMX	12	1/2	M16x1.5	33.5	22	6.0		
10M22F682EDMX	14, 15, 16	5/8	M22x1.5	37.6	27			
12M27F682EDMX	18, 20	3/4	M27x2	41.5	32	5.0		
16M33F682EDMX	25	1	M33x2	45.2	41	4.0		

F642EDMX Full Dimensions

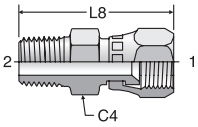
Swivel – BSPP Connector
37° Swivel / BSPP-ED



TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	C4 (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4F642EDMX	6	1/4	1/8-28	14	24.0	7.2	7.2	
4-4F642EDMX	6	1/4	1/4-19	19	29.0	6.0		
5F642EDMX	8	5/16	1/8-28	14	25.0			
5-4F642EDMX	8	5/16	1/4-19	19	29.0	6.0		
6F642EDMX	10	3/8	1/4-19	19	30.0	6.0		
6-6F642EDMX	10	3/8	3/8-19	22	31.0	6.0		
8F642EDMX	12	1/2	3/8-19	22	33.0	6.0		
8-4F642EDMX	12	1/2	1/4-19	19	33.0	6.0		
10F642EDMX	14, 15, 16	5/8	1/2-14	27	37.0	5.0		
10-6F642EDMX	14, 15, 16	5/8	3/8-19	22	35.0	5.0		
12F642EDMX	18, 20	3/4	3/4-14	32	42.0	5.0		
12-8F642EDMX	18, 20	3/4	1/2-14	27	40.0	5.0		
16F642EDMX	25	1	1-11	41	45.0	4.0		
16-12F642EDMX	25	1	3/4-14	36	43.0			
20F642EDMX	28, 30, 32	1 1/4	1 1/4-11	50	52.0	4.0		
20-16F642EDMX	28, 30, 32	1 1/4	1-11	41	54.0	4.0		
24F642EDMX	35, 38	1 1/2	1 1/2-11	55	58.0			
24-20F642EDMX	35, 38	1 1/2	1 1/4-11	50	60.0	3.0		

F63MX Full Dimensions

Swivel – BSPT Connector
37° Swivel / BSPT



TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPT	C4 (mm)	L8 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4F63MX	6	1/4	1/8-20	13	34.1	4.5		
4-4F63MX	6	1/4	1/4-19	14	38.1	4.5		
5F63MXS	8	5/16	1/8-20	13	34.1			
5-4F63MX	8	5/16	1/4-19	14	38.4	4.5		
6F63MX	10	3/8	1/4-19	14	40.3	4.5		
6-6F63MX	10	3/8	3/8-19	19	40.6	4.5		
8-4F63MX	12	1/2	1/4-19	19	42.8	4.5		
8F63MX	12	1/2	3/8-19	19	42.8	4.5		
10F63MX	14, 15, 16	5/8	1/2-14	22	51.2	4.5		
12-8F63MX	18, 20	3/4	1/2-14	27	54.6	4.5		
12F63MX	18, 20	3/4	3/4-14	27	54.6	2.3		
16-12F63MX	25	1	3/4-14	32	58.9	2.3		
16F63MX	25	1	1-11	36	63.8	2.3		
20F63MX	28, 30, 32	1 1/4	1 1/4-11	46	69.0	2.3		

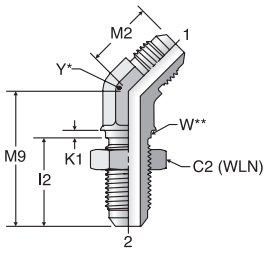
Dimensions and pressures for reference only, subject to change.

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WNTX Full Dimensions

45° Blulkhead Union Elbow
37° Flare / 37° Flare

SAE 070801
HPD Base # 3353
WNTX-WLN – Body with locknut
(See page C15 for WLN)



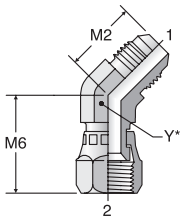
Y* – Across wrench flats.
W** – Bulkhead pilot dia. recommended clearance hole +.015 over W dia.

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C2 HEX (in.)	I2 (in.)	K1 (in.)	M2 (in.)	M9 (in.)	W DIA (in.)	MAX BULKHEAD WALL THICKNESS (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 WNTX	1/4	11/16	1.02	0.09	0.72	1.53	0.44	0.21	7/16	7.5	7.7	
5 WNTX	5/16	3/4	1.02	0.09	0.78	1.66	0.56	0.21	9/16	7.5		
6 WNTX	3/8	13/16	1.09	0.09	0.83	1.67	0.56	0.28	9/16	7.5	6.0	
8 WNTX	1/2	1	1.25	0.13	0.98	1.94	0.75	0.33	3/4	6.0	6.0	
10 WNTX	5/8	1 1/8	1.39	0.13	1.11	2.17	0.82	0.32	7/8	5.0		
12 WNTX	3/4	1 3/8	1.56	0.13	1.28	2.44	1.06	0.34	1 1/16	5.0	5.0	
16 WNTX	1	1 5/8	1.56	0.13	1.47	2.56	1.31	0.29	1 5/16	4.5	3.5	
20 WNTX	1 1/4	1 7/8	1.61	0.13	1.59	2.65	1.63	0.29	1 5/8	4.0		

V6X Full Dimensions

45° Swivel Nut Elbow
37° Flare / 37° Swivel

SAE 070321
HPD Base # 3703



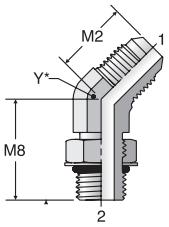
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	M2 (in.)	M6 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 V6X	1/4	0.72	0.94	7/16	7.5	7.7	
5 V6X	5/16	0.77	1.00	9/16	6.0		
6 V6X	3/8	0.83	1.12	9/16	6.0	6.0	
8 V6X	1/2	0.98	1.28	3/4	6.0	6.0	
10 V6X	5/8	1.11	1.44	7/8	5.0	5.0	
12 V6X	3/4	1.28	1.50	1 1/16	5.0	5.0	
14 V6X	7/8	1.39	1.62	1 3/16	5.0		
16 V6X	1	1.47	1.75	1 5/16	4.0	2.5	
20 V6X	1 1/4	1.59	2.03	1 5/8	4.0	2.5	
24 V6X	1 1/2	1.78	2.27	1 7/8	3.0		
32 V6X	2	2.22	2.76	2 1/2	2.0	1.5	

V50X Full Dimensions

45° Straight Thread Elbow
37° Flare / SAE-ORB

SAE 070320
HPD Base # 3503

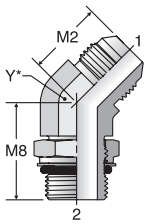


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M2 (in.)	M8 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 V5OX	1/4	7/16-20	0.72	1.05	7/16	6.0	6.0	
4-6 V5OX	1/4	9/16-18	0.82	1.14	9/16	6.0		
5 V5OX	5/16	1/2-20	0.77	1.05	9/16	6.0		
6 V5OX	3/8	9/16-18	0.83	1.14	9/16	6.0	5.4	
6-4 V5OX	3/8	7/16-20	0.83	1.08	9/16	6.0		
6-8 V5OX	3/8	3/4-16	0.86	1.30	3/4	6.0		
8 V5OX	1/2	3/4-16	0.98	1.30	3/4	6.0	5.4	
8-6 V5OX	1/2	9/16-18	0.98	1.09	3/4	6.0	5.4	
8-10 V5OX	1/2	7/8-14	1.00	1.52	7/8	5.0	5.4	
8-12 V5OX	1/2	1 1/16-12	1.04	1.73	1 1/16	5.0		
10 V5OX	5/8	7/8-14	1.11	1.52	7/8	5.0	5.4	
10-8 V5OX	5/8	3/4-16	1.11	1.38	7/8	5.0		
10-12 V5OX	5/8	1 1/16-12	1.16	1.73	1 1/16	5.0		
12 V5OX	3/4	1 1/16-12	1.28	1.73	1 1/16	5.0	5.4	
12-10 V5OX	3/4	7/8-14	1.28	1.58	1 1/16	5.0	5.4	
12-16 V5OX	3/4	1 5/16-12	1.42	1.86	1 5/16	4.0		
14 V5OX	7/8	1 3/16-12	1.45	1.86	1 5/16	5.0		
16 V5OX	1	1 5/16-12	1.47	1.86	1 5/16	4.0	3.0	
16-12 V5OX	1	1 1/16-12	1.47	1.86	1 5/16	4.0		
16-20 V5OX	1	1 5/8-12	1.55	1.91	1 5/8	4.0		
20 V5OX	1 1/4	1 5/8-12	1.59	1.91	1 5/8	4.0	2.5	
20-16 V5OX	1 1/4	1 5/16-12	1.59	1.91	1 5/8	4.0		
24 V5OX	1 1/2	1 7/8-12	1.78	1.91	1 7/8	3.0		
32 V5OX	2	2 1/2-12	2.22	1.86	2 1/2	2.0		

V87OMX Full Dimensions

Male 45° Elbow – ISO 6149
37° Flare / ISO 6149



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	M2 (mm)	M8 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M12V87OMX	6	1/4	M12X1.5	19.6	27.9	13	6.0		
6M14V87OMX	10	3/8	M14X1.5	21.1	28.0	14	6.0		
8M16V87OMX	12	1/2	M16 X 1.5	24.9	32.1	19	5.0		
10M22V87OMX	14, 15, 16	5/8	M22 X 1.5	28.2	37.2	22	5.0		
12M27V87OMX	18, 20	3/4	M27 X 2.0	32.5	43.2	27	5.0		
16M33V87OMX	25	1	M33 X 2.0	37.3	46.5	33	4.0		

Dimensions and pressures for reference only, subject to change.

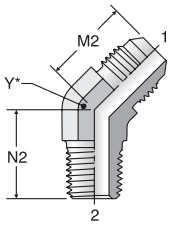
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Columbus, Ohio
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VTX Full Dimensions

45° Male Elbow
37° Flare / NPTF

SAE 070302
HPD Base # 3103

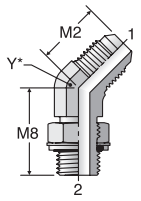


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M2 (in.)	N2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 VTX	1/8	1/8-27	0.69	0.53	7/16	6.0	6.0	
3 VTX	3/16	1/8-27	0.69	0.53	7/16	6.0		
4 VTX	1/4	1/8-27	0.72	0.64	7/16	6.0	6.0	3.3
4-4 VTX	1/4	1/4-18	0.82	0.86	9/16	6.0	6.0	3.3
4-6 VTX	1/4	3/8-18	0.92	0.95	3/4	6.0		
5 VTX	5/16	1/8-27	0.77	0.64	9/16	6.0	6.0	3.3
5-4 VTX	5/16	1/4-18	0.82	0.86	9/16	6.0	6.0	
6 VTX	3/8	1/4-18	0.83	0.86	9/16	6.0	6.0	3.3
6-2 VTX	3/8	1/8-27	0.83	0.67	9/16	6.0	6.0	3.3
6-6 VTX	3/8	3/8-18	0.87	0.95	3/4	6.0	6.0	3.3
6-8 VTX	3/8	1/2-14	1.06	1.17	7/8	6.0	6.0	
8 VTX	1/2	3/8-18	0.98	0.95	3/4	6.0	6.0	3.3
8-4 VTX	1/2	1/4-18	0.98	0.95	3/4	6.0	6.0	
8-8 VTX	1/2	1/2-14	0.99	1.17	7/8	6.0	6.0	3.3
8-12 VTX	1/2	3/4-14	1.04	1.20	1 1/16	4.0	4.0	
10 VTX	5/8	1/2-14	1.11	1.17	7/8	5.0	5.0	3.3
10-6 VTX	5/8	3/8-18	1.11	0.98	7/8	5.0	5.0	
10-12 VTX	5/8	3/4-14	1.28	1.20	1 1/16	4.0		
12 VTX	3/4	3/4-14	1.28	1.20	1 1/16	4.0	4.0	2.6
12-8 VTX	3/4	1/2-14	1.28	1.20	1 1/16	5.0	5.0	
12-16 VTX	3/4	1-11 1/2	1.42	1.48	1 5/16	3.0		
14 VTX	7/8	3/4-14	1.39	1.27	1 5/16	4.0		
16 VTX	1	1-11 1/2	1.47	1.48	1 5/16	3.0	3.0	2.0
16-12 VTX	1	3/4-14	1.47	1.29	1 5/16	4.0	4.0	
16-20 VTX	1	1 1/4-11 1/2	1.59	1.67	1 5/8	2.5		
20 VTX	1 1/4	1 1/4-11 1/2	1.59	1.67	1 5/8	2.5	2.5	
20-16 VTX	1 1/4	1-11 1/2	1.59	1.63	1 5/8	3.0		
24 VTX	1 1/2	1 1/2-11 1/2	1.78	1.77	1 7/8	2.5	2.5	
32 VTX	2	2-11 1/2	2.22	2.11	2 1/2	2.0		

V4OMX Full Dimensions

Male 45° Elbow – BSPP
37° Flare / BSPP-ORR



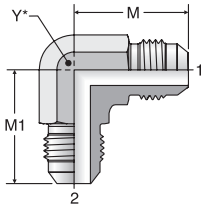
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 BSPP	M2 (mm)	M8 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4V4OMX	6	1/4	1/8-28	18.3	26.7	11	3.6		
6V4OMX	10	3/8	1/4-19	21.1	29.0	14	3.6		
8V4OMX	12	1/2	3/8-19	24.9	33.0	19	3.6		
10V4OMX	14,15,16	5/8	1/2-14	28.2	38.6	22	3.6		
12V4OMX	18,20	3/4	3/4-14	32.5	43.9	27	3.6		
16V4OMX	25	1	1-11	37.2	47.2	33	3.6		

ETX Full Dimensions

Union Elbow
37° Flare / 37° Flare

SAE 070201
HPD Base # 2303

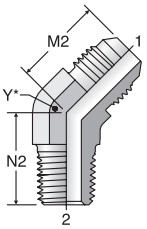


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	M (in.)	M1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 ETX	1/8	1/8	0.78	0.78	7/16	7.5	7.7	
3 ETX	3/16	3/16	0.83	0.83	7/16			
4 ETX	1/4	1/4	0.89	0.89	7/16	7.5	7.7	3.3
5 ETX	5/16	5/16	0.95	0.95	9/16	6.0	6.0	3.3
6 ETX	3/8	3/8	1.06	1.06	9/16	6.0	6.0	3.3
6-4 ETX	3/8	1/4	1.06	1.05	9/16	6.0		
8 ETX	1/2	1/2	1.25	1.25	3/4	6.0	6.0	3.3
8-6 ETX	1/2	3/8	1.25	1.14	3/4	6.0		
10 ETX	5/8	5/8	1.45	1.45	7/8	5.0	5.0	3.3
10-8 ETX	5/8	1/2	1.45	1.33	7/8	5.0		
12 ETX	3/4	3/4	1.66	1.66	1 1/16	5.0	5.0	3.3
12-8 ETX	3/4	1/2	1.66	1.42	1 1/16			
12-10 ETX	3/4	5/8	1.66	1.54	1 1/16		5.0	
14 ETX	7/8	7/8	1.73	1.73	1 3/16	5.0		
16 ETX	1	1	1.81	1.81	1 5/16	4.0	3.5	2.3
16-12 ETX	1 to 3/4	3/4	1.81	1.77	1 5/16			
20 ETX	1 1/4	1 1/4	2.06	2.06	1 5/8	4.0	3.0	
24 ETX	1 1/2	1 1/2	2.33	2.33	1 7/8	3.0	2.0	
32 ETX	2	2	3.06	3.06	2 1/2	2.0	1.5	

V3MX Full Dimensions

Male 45° Elbow – BSPT
37° Flare / BSPT



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 BSPT	M2 (mm)	N2 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4V3MX	6	1/4	1/8-28	18.3	16.3	11	4.5		
4-4V3MX	6	1/4	1/4-19	20.8	21.8	14	4.5		
6V3MX	10	3/8	1/4-19	21.1	21.8	14	4.5		
6-6V3MX	10	3/8	3/8-19	22.1	24.1	19	4.5		
8V3MX	12	1/2	3/8-19	24.9	24.1	19	4.5		
8-8V3MX	12	1/2	1/2-14	25.2	29.7	22	4.5		
12V3MX	18, 20	3/4	3/4-14	32.5	30.5	27	2.3		

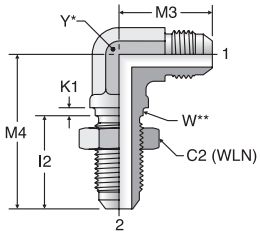
Dimensions and pressures for reference only, subject to change.

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WETX Full Dimensions

Bulkhead Union Elbow
37° Flare / 37° Flare

SAE 070701
HPD Base # 2353
WETX-WLN – Body with locknut
(See page C15 for WLN)



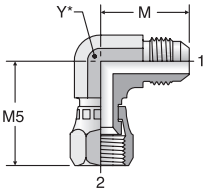
Y* – Across wrench flats.
W** – Bulkhead pilot dia. recommended clearance hole +.015 over W dia.

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C2 HEX (in.)	I2 (in.)	K1 (in.)	M3 (in.)	M4 (in.)	W DIA (in.)	MAX BULKHEAD WALL THICKNESS (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3 WETX	3/16	5/8	0.92	0.09	0.94	1.50	0.38	0.21	7/16		7.7	
4 WETX	1/4	11/16	1.20	0.09	0.97	1.59	0.44	0.21	7/16	7.5	7.7	3.3
5 WETX	5/16	3/4	1.02	0.09	1.06	1.72	0.50	0.21	9/16	6.0		
6 WETX	3/8	13/16	1.09	0.09	1.09	1.81	0.56	0.28	9/16	6.0	6.0	3.3
8 WETX	1/2	1	1.25	0.13	1.36	2.11	0.75	0.33	3/4	6.0	6.0	3.3
10 WETX	5/8	1 1/8	1.39	0.13	1.56	2.39	0.88	0.32	7/8	5.0	5.0	
12 WETX	3/4	1 3/8	1.56	0.13	1.78	2.67	1.06	0.34	1 1/16	5.0	5.0	
14 WETX	7/8	1 1/2	1.56	0.13	1.92	2.80	1.19	0.31	1 5/8	5.0		
16 WETX	1	1 5/8	1.56	0.13	1.94	2.80	1.31	0.29	1 5/8	4.0	3.5	
20 WETX	1 1/4	1 7/8	1.61	0.13	2.17	3.13	1.63	0.29	1 5/8	4.0		

C6X Full Dimensions

Swivel Nut Elbow
37° Flare / 37° Swivel

SAE 070221
HPD Base # 3903



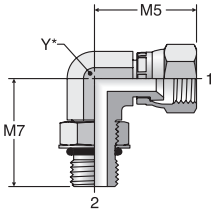
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3 C6X	3/16	3/16	0.83	1.00	7/16	7.5	7.7	
4 C6X	1/4	1/4	0.89	1.00	7/16	7.5	7.7	
5 C6X	5/16	5/16	0.95	1.06	9/16	6.0	6.0	
6 C6X	3/8	3/8	1.06	1.25	9/16	6.0	6.0	
8 C6X	1/2	1/2	1.25	1.38	3/4	6.0	6.0	
10 C6X	5/8	5/8	1.45	1.62	7/8	5.0	5.0	
12 C6X	3/4	3/4	1.66	1.75	1 1/16	5.0	5.0	
12-24 C6X	3/4	1 1/2	2.11	2.59	1 7/8			
14 C6X	7/8	7/8	1.80	1.78	1 5/16	5.0		
16 C6X	1	1	1.81	2.00	1 5/16	4.0	2.5	
16-12 C6X	1	3/4	1.81	1.87	1 5/16			
20 C6X	1 1/4	1 1/4	2.06	2.31	1 5/8	4.0	2.5	
24 C6X	1 1/2	1 1/2	2.33	2.59	1 7/8	3.0	2.0	
32 C6X	2	2	3.06	3.51	2 1/2	2.0	1.5	

AOEX6 Full Dimensions

Swivel Elbow Straight
Thread Connector
SAE-ORB / 37° Swivel

HPD Base # 2506



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 UN/UNF-2A	M5 (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 AOEX6	1/4	7/16-20	0.94	1.03	7/16	6.0		
6 AOEX6	3/8	9/16-18	1.27	1.25	9/16	6.0		
8 AOEX6	1/2	3/4-16	1.34	1.45	3/4	6.0		
10 AOEX6	5/8	7/8-14	1.62	1.70	7/8	5.0		
12 AOEX6	3/4	1 1/16-12	1.75	1.94	1 1/16	5.0		
16 AOEX6	1	1 5/16-12	2.01	2.05	1 5/16	4.0		

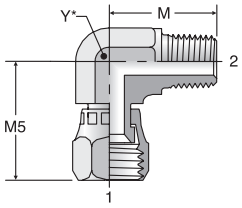
Dimensions and pressures for reference only, subject to change.

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X6EF Full Dimensions

Swivel Elbow Connector
37° Swivel / NPTF

HPD Base # 2106



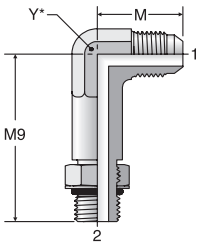
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 X6EF	1/4	1/8-27	0.78	1.01	7/16	6.0	6.0	
4-4 X6EF	1/4	1/4-18	1.09	1.13	9/16	6.0	6.0	
6 X6EF	3/8	1/4-18	1.09	1.27	9/16	5.0	5.0	
6-6 X6EF	3/8	3/8-18	1.22	1.27	3/4	5.0	5.0	
8 X6EF	1/2	3/8-18	1.22	1.34	3/4	5.0	5.0	
8-8 X6EF	1/2	1/2-14	1.47	1.48	7/8	5.0	5.0	
10 X6EF	5/8	1/2-14	1.47	1.62	7/8	5.0		
12 X6EF	3/4	3/4-14	1.59	1.75	1 1/16	4.0	4.0	
16 X6EF	1	1-11	1.97	2.01	1 5/16	3.0	3.0	

CC5OX Full Dimensions

Long Straight Thread Elbow
37° Flare / SAE-ORB

SAE 071520
HPD Base # 5503



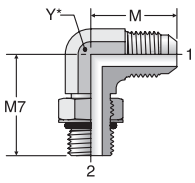
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M (in.)	M9 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 CC5OX	1/4	7/16-20	0.89	1.73	9/16	6.0		
6 CC5OX	3/8	9/16-18	1.06	2.08	9/16	6.0		
8 CC5OX	1/2	3/4-16	1.25	2.50	7/8	6.0		
10 CC5OX	5/8	7/8-14	1.45	2.89	7/8	5.0		
12 CC5OX	3/4	1 1/16-12	1.66	3.34	1 1/16	5.0		
16 CC5OX	1	1 5/16-12	1.81	3.72	1 5/16	4.0		

C5OX Full Dimensions

Straight Thread Elbow
37° Flare / SAE-ORB

SAE 070220
HPD Base # 2503



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 C5OX	1/8	5/16-24	0.77	0.94	7/16	5.0	6.0	
3 C5OX	3/16	3/8-24	0.83	0.94	7/16	5.0	6.0	
4 C5OX	1/4	7/16-20	0.89	1.03	7/16	6.0	6.0	
4-2 C5OX	1/4	5/16-24	0.89	0.92	7/16	5.0		
4-6 C5OX	1/4	9/16-18	1.05	1.25	9/16	6.0	5.4	
4-8 C5OX	1/4	3/4-16	1.13	1.45	3/4	6.0	5.4	
5 C5OX	5/16	1/2-20	0.95	1.13	9/16	6.0	5.4	
5-4 C5OX	5/16	7/16-18	0.95	1.13	9/16	6.0		
5-6 C5OX	5/16	9/16-18	1.06	1.25	9/16	6.0		
6 C5OX	3/8	9/16-18	1.06	1.25	9/16	6.0	5.4	
6-4 C5OX	3/8	7/16-20	1.06	1.19	9/16	6.0	5.4	
6-5 C5OX	3/8	1/2-20	1.06	1.19	9/16	6.0		
6-8 C5OX	3/8	3/4-16	1.14	1.45	3/4	6.0	5.4	
6-10 C5OX	3/8	7/8-14	1.23	1.70	7/8	5.0		
8 C5OX	1/2	3/4-16	1.25	1.45	3/4	6.0	5.4	
8-4 C5OX	1/2	7/16-20	1.25	1.26	3/4	6.0	5.4	
8-6 C5OX	1/2	9/16-18	1.25	1.34	3/4	6.0	5.4	
8-10 C5OX	1/2	7/8-14	1.34	1.70	7/8	5.0	5.4	
8-12 C5OX	1/2	1 1/16-12	1.42	1.94	1 1/16	5.0	5.4	
8-16 C5OX	1/2	1 5/16-12	1.52	2.05	1 5/16	4.0	3.0	
10 C5OX	5/8	7/8-14	1.45	1.70	7/8	5.0	5.4	
10-6 C5OX	5/8	9/16-18	1.45	1.41	7/8	5.0		
10-8 C5OX	5/8	3/4-16	1.45	1.55	7/8	5.0	5.4	
10-12 C5OX	5/8	1 1/16-12	1.53	1.94	1 1/16	5.0		
10-16 C5OX	5/8	1 5/16-12	1.64	2.05	1 5/16	4.0		
12 C5OX	3/4	1 1/16-12	1.66	1.94	1 1/16	5.0	5.4	
12-8 C5OX	3/4	3/4-16	1.66	1.63	1 1/16	5.0	5.4	
12-10 C5OX	3/4	7/8-14	1.66	1.78	1 1/16	5.0	5.4	
12-14 C5OX	3/4	1 3/16-12	1.77	2.00	1 5/16	5.0		
12-16 C5OX	3/4	1 5/16-12	1.81	2.05	1 5/16	4.0	3.0	
12-20 C5OX	3/4	1 5/8-12	1.97	2.25	1 5/8	4.0		
14 C5OX	7/8	1 3/16-12	1.73	2.00	1 5/16	5.0		
16 C5OX	1	1 5/16-12	1.81	2.05	1 5/16	4.0	3.0	
16-12 C5OX	1	1 1/16-12	1.81	2.05	1 5/16	4.0	3.0	
16-14 C5OX	1	1 3/16-12	1.81	2.07	1 5/16	4.0		
16-20 C5OX	1	1 5/8-12	2.01	2.25	1 5/8	4.0	2.5	
16-24 C5OX	1	1 7/8-12	2.16	2.39	1 7/8	3.0		
20 C5OX	1 1/4	1 5/8-12	2.06	2.25	1 5/8	4.0	2.5	
20-16 C5OX	1 1/4	1 5/16-12	2.06	2.25	1 5/8	4.0	2.5	
20-24 C5OX	1 1/4	1 7/8-12	2.20	2.39	1 7/8	3.0		
24 C5OX	1 1/2	1 7/8-12	2.33	2.39	1 7/8	3.0	2.0	
24-20 C5OX	1 1/2	1 5/8-12	2.33	2.39	1 7/8	3.0	2.0	
32 C5OX	2	2 1/2-12	3.06	2.89	2 1/2	2.0	1.5	
32-24 C5OX	2	1 7/8-12	3.06	2.89	2 1/2			

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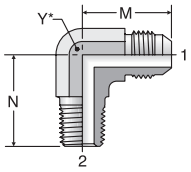
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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CTX Full Dimensions

Male Elbow
37° Flare / NPTF

SAE 070202
HPD Base # 2103



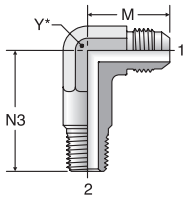
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 CTX	1/8	1/8-27	0.77	0.72	5/16	6.0	6.0	3.3
3 CTX	3/16	1/8-27	0.83	0.72	3/8	6.0	6.0	3.3
4 CTX	1/4	1/8-27	0.89	0.78	7/16	6.0	6.0	3.3
4-4 CTX	1/4	1/4-18	1.05	1.09	9/16	6.0	6.0	3.3
4-6 CTX	1/4	3/8-18	1.13	1.22	3/4	6.0	6.0	
4-8 CTX	1/4	1/2-14	1.23	1.44	7/8	6.0	6.0	
5 CTX	5/16	1/8-27	0.95	0.78	9/16	6.0	6.0	3.3
5-4 CTX	5/16	1/4-18	1.05	1.09	9/16	6.0	6.0	3.3
5-6 CTX	5/16	3/8-18	1.13	1.22	3/4	6.0	6.0	
6 CTX	3/8	1/4-18	1.06	1.09	9/16	6.0	6.0	3.3
6-2 CTX	3/8	1/8-27	1.06	0.90	9/16	6.0	6.0	3.3
6-6 CTX	3/8	3/8-18	1.14	1.22	3/4	6.0	6.0	3.3
6-8 CTX	3/8	1/2-14	1.22	1.47	7/8	6.0	6.0	3.3
6-12 CTX	3/8	3/4-14	1.31	1.59	1 1/16	4.0	4.0	
8 CTX	1/2	3/8-18	1.25	1.22	3/4	6.0	6.0	3.3
8-4 CTX	1/2	1/4-18	1.25	1.22	3/4	6.0	6.0	3.3
8-8 CTX	1/2	1/2-14	1.33	1.47	7/8	6.0	6.0	3.3
8-12 CTX	1/2	3/4-14	1.42	1.59	1 1/16	4.0	4.0	2.6
8-16 CTX	1/2	1-11 1/2	1.52	1.97	1 5/16	3.0	3.0	
10 CTX	5/8	1/2-14	1.45	1.47	7/8	5.0	5.0	3.3
10-6 CTX	5/8	3/8-18	1.45	1.28	7/8	5.0	5.0	3.3
10-12 CTX	5/8	3/4-14	1.53	1.59	1 1/16	4.0	4.0	
10-16 CTX	5/8	1-11 1/2	1.64	1.97	1 5/16	3.0		
12 CTX	3/4	3/4-14	1.66	1.59	1 1/16	4.0	4.0	2.6
12-6 CTX	3/4	3/8-18	1.66	1.41	1 1/16	5.0	5.0	
12-8 CTX	3/4	1/2-14	1.66	1.59	1 1/16	5.0	5.0	2.9
12-16 CTX	3/4	1-11 1/2	1.76	1.97	1 5/16	3.0	3.0	
14 CTX	7/8	3/4-14	1.80	1.69	1 5/16	4.0		2.3
16 CTX	1	1-11 1/2	1.81	1.97	1 5/16	3.0	3.0	2.0
16-8 CTX	1	1/2-14	1.81	1.66	1 5/16	4.0		
16-12 CTX	1	3/4-14	1.81	1.78	1 5/16	4.0	4.0	2.3
16-20 CTX	1	1 1/4-11 1/2	2.13	2.38	1 5/8	2.5	2.5	
20 CTX	1 1/4	1 1/4-11 1/2	2.06	2.38	1 5/8	2.5	2.5	1.6
20-16 CTX	1 1/4	1-11 1/2	2.06	2.06	1 5/8	3.0	3.0	
20-24 CTX	1 1/4	1 1/2-11 1/2	2.20	2.64	1 7/8	2.5		
24 CTX	1 1/2	1 1/2-11 1/2	2.33	2.64	1 7/8	2.5	2.5	
24-20 CTX	1 1/2	1 1/4-11 1/2	2.33	2.25	1 7/8	2.5	2.5	
24-32 CTX	1 1/2	2-11 1/2	2.81	3.00	2 1/2	2.0		
32 CTX	2	2-11 1/2	3.06	3.00	2 1/2	2.0	2.0	
32-24 CTX	2	1 1/2-11 1/2	3.06	2.97	2 1/2	2.0		
40 CTX	2 1/2	2 1/2-8	2.86	3.57	3 1/4			

CCTX Full Dimensions

Long Male Elbow
37° Flare / NPTF

SAE 071502
HPD Base # 5603



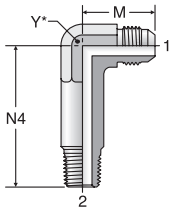
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	N3 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 CCTX	1/4	1/8-27	0.89	1.19	7/16	6.0	6.0	3.3
4-4 CCTX	1/4	1/4-18	1.05	1.44	9/16	6.0	6.0	
5 CCTX	5/16	1/8-27	0.95	1.17	9/16	6.0		
6 CCTX	3/8	1/4-18	1.06	1.56	9/16	6.0	6.0	3.3
6-6 CCTX	3/8	3/8-18	1.14	1.81	3/4	6.0	6.0	
8 CCTX	1/2	3/8-18	1.25	1.78	3/4	6.0		
8-8 CCTX	1/2	1/2-14	1.34	2.16	7/8	6.0	6.0	
8-12 CCTX	1/2	3/4-14	1.42	2.44	1 1/16	4.0		
10 CCTX	5/8	1/2-14	1.45	2.16	7/8	5.0	5.0	
12 CCTX	3/4	3/4-14	1.66	2.41	1 1/16	4.0	4.0	
14 CCTX	7/8	3/4-14	1.80	2.59	1 5/16			
16 CCTX	1	1-11 1/2	1.81	2.97	1 5/16	3.0	3.0	
20 CCTX	1 1/4	1 1/4-11 1/2	2.06	3.66	1 5/8	2.5	2.5	

CCCTX Full Dimensions

Extra Long Male Elbow
37° Flare / NPTF

SAE 071602
HPD Base # 5703



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	N4 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 CCCTX	1/4	1/8-27	0.89	1.56	7/16	6.0		3.3
4-4 CCCTX	1/4	1/4-18	1.05	2.03	9/16	6.0		
5 CCCTX	5/16	1/8-27	0.97	1.63	9/16	6.0		
6 CCCTX	3/8	1/4-18	1.06	2.07	9/16	6.0		3.3
6-6 CCCTX	3/8	3/8-18	1.14	2.34	3/4	6.0		
8 CCCTX	1/2	3/8-18	1.25	2.34	3/4	6.0		
8-8 CCTX	1/2	1/2-14	1.34	2.84	7/8	6.0	6.0	
10 CCCTX	5/8	1/2-14	1.45	2.84	7/8	5.0		
12 CCCTX	3/4	3/4-14	1.66	3.22	1 1/16	4.0		
16 CCCTX	1	1-11 1/2	1.81	3.97	1 5/16	3.0		
20 CCCTX	1 1/4	1 1/4-11 1/2	2.06	4.94	1 5/8			

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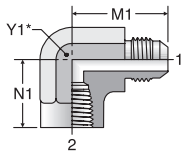
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

DTX Full Dimensions

Femle Elbow
37° Flare / NPTF

SAE 070203
HPD Base # 2203

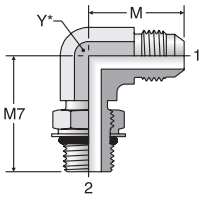


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 DTX	1/4	1/8-27	1.08	0.66	9/16	5.0	5.0	3.3
4-4 DTX	1/4	1/4-18	1.22	0.88	3/4	5.0	5.0	3.3
5 DTX	5/16	1/8-27	1.08	0.66	9/16	5.0		3.3
5-4 DTX	5/16	1/4-18	1.13	0.88	3/4	5.0	5.0	
6 DTX	3/8	1/4-18	1.23	0.88	3/4	5.0	5.0	3.3
6-2 DTX	3/8	1/8-27	1.23	0.67	9/16	5.0		
6-6 DTX	3/8	3/8-18	1.31	1.02	7/8	4.5	4.5	2.9
8 DTX	1/2	3/8-18	1.42	1.02	7/8	4.5	4.5	2.0
8-4 DTX	1/2	1/4-18	1.42	1.01	3/4	4.5	4.5	3.3
8-8 DTX	1/2	1/2-14	1.52	1.23	1 1/16	3.0	3.0	2.0
10 DTX	5/8	1/2-14	1.64	1.23	1 1/16	3.0	3.0	2.0
12 DTX	3/4	3/4-14	1.89	1.36	1 5/16	3.0	3.0	2.0
12-8 DTX	3/4	1/2-14	1.89	1.35	1 1/16	3.0	3.0	
14 DTX	7/8	3/4-14	1.86	1.42	1 5/16	3.0		
16 DTX	1	1-11 1/2	2.17	1.63	1 5/8	1.8	1.8	
20 DTX	1 1/4	1 1/4-11 1/2	2.33	1.70	1 7/8	1.5	1.5	
24 DTX	1 1/2	1 1/2-11 1/2	2.89	2.08	2 1/2	1.5	1.5	

C87OMX Full Dimensions

Male Elbow – ISO 6149
37° Flare / ISO 6149

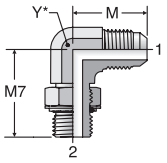


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10C87OMX	6	1/4	M10x1	22.6	25.0	11	6.0		
5M12C87OMX	8	5/16	M12x1.5	24.1	30.0	13	6.0		
6M14C87OMX	10	3/8	M14x1.5	26.9	34.9	14	6.0		
8M16C87OMX	12	1/2	M16x1.5	31.8	35.9	19	5.0		
8M18C87OMX	12	1/2	M18x1.5	31.8	36.8	19	5.0		
10M18C87OMX	14, 15, 16	5/8	M18x1.5	36.8	40.7	22	5.0		
10M22C87OMX	14, 15, 16	5/8	M22x1.5	36.8	41.7	22	5.0		
12M22C87OMX	18, 20	3/4	M22x.15	42.2	44.4	27	5.0		
12M27C87OMX	18, 20	3/4	M27x2	42.2	48.5	27	5.0		
16M33C87OMX	25	1	M33x2	46.0	51.2	33	4.0		

C8OMX Full Dimensions

Male Elbow – Metric-ORR
37° Flare / Metric-ORR



Y* – Across wrench flats

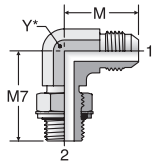
TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 1 (in.)	END SIZE 2 Male Metric Parallel Thread	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10C8OMX	6	1/4	M10x1	22.6	25.4	11	3.6		
5M12C8OMX	8	5/16	M12x1.5	24.1	28.5	13	3.6		
6M14C8OMX	10	3/8	M14x1.5	26.9	32.5	14	3.6		
8M16C8OMX	12	1/2	M16x1.5	31.8	36.4	19	3.6		
8M18C8OMX	12	1/2	M18x1.5	31.8	36.8	19	3.6		
10M18C8OMX	14, 15, 16	5/8	M18x1.5	36.8	41.0	22	3.6		
10M22C8OMX	14, 15, 16	5/8	M22x1.5	36.8	42.5	22	3.6		
12M22C8OMX	18, 20	3/4	M22x.1.5	42.2	44.0	27	3.6		
12M27C8OMX	18, 20	3/4	M27x2.0	42.2	50.0	27	2.5		
16M33C8OMX	25	1	M33x2.0	46.0	53.0	33	2.0		

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

C4OMX Full Dimensions

Male Elbow – BSPP
37° Flare / BSPP-ORR

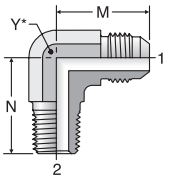


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPP	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4C4OMX	6	1/4	1/8-28	22.6	26.2	11	3.6		
4-4C4OMX	6	1/4	1/4-19	22.6	31.8	14	3.6		
5C4OMX	8	5/16	1/8-28	24.1	27.7	13	3.6		
5-4C4OMX	8	5/16	1/4-19	26.6	31.8	14	3.6		
5-6C4OMX	8	5/16	3/8-19	28.5	36.8	19	3.6		
6C4OMX	10	3/8	1/4-19	26.9	31.8	14	3.6		
6-6C4OMX	10	3/8	3/8-19	29.0	36.8	19	3.6	3.6	
8-4C4OMX	12	1/2	1/4-19	31.8	36.8	19	3.6		
8C4OMX	12	1/2	3/8-19	31.8	36.8	19	3.6		
8-8C4OMX	12	1/2	1/2-14	33.8	43.2	22	3.6		
10-6C4OMX	16	5/8	3/8-19	36.8	37.1	22	3.6		
10C4OMX	14,15,16	5/8	1/2-14	36.8	43.2	22	3.6		
10-12C4OMX	15	5/8	3/4-14	39.2	49.3	27	3.6		
12-8C4OMX	18,20	3/4	1/2-14	42.2	49.3	27	3.6		
12C4OMX	18,20	3/4	3/4-14	42.2	49.3	27	3.6		
12-16C4OMX	18	3/4	1-11	44.7	52.1	33	3.6		
16-12C4OMX	25	1	3/4-14	46.0	48.2	33	3.6		
16C4OMX	25	1	1-11	46.0	52.1	33	3.6		
20-16C4OMX	30,32	1 1/4	1-11	52.3	57.2	41	3.6		
20C4OMX	30,32	1 1/4	1 1/4-11	52.3	57.2	41	3.0		
24-20C4OMX	38	1 1/2	1 1/4-11	59.2	60.7	48	3.0		
24C4OMX	38	1 1/2	1 1/2-11	59.2	60.7	48	2.0		

C3MX Full Dimensions

Male Elbow – BSPT
37° Flare / BSPT



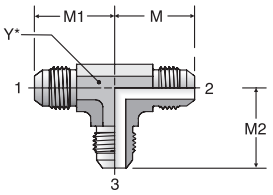
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (mm)	1 (in.)	2 BSPT	M (mm)	N (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4C3MX	6	1/4	1/8-28	22.6	19.8	11	4.5		
4-4C3MX	6	1/4	1/4-19	26.6	27.7	14	4.5		
5C3MX	8	5/16	1/8-28	24.1	19.8	13	4.5		
5-4C3MX	8	5/16	1/4-19	26.6	27.7	14	4.5		
6C3MX	10	3/8	1/4-19	26.9	27.7	14	4.5		
6-6C3MX	10	3/8	3/8-19	29.0	31.0	19	4.5		
6-8C3MX	10	3/8	1/2-14	31.0	37.3	22	4.5		
8-4C3MX	12	1/2	1/4-19	31.8	31.0	19	4.5		
8C3MX	12	1/2	3/8-19	31.8	31.0	19	4.5		
8-8C3MX	12	1/2	1/2-14	33.8	37.3	22	4.5		
10-6C3MX	14,15,16	5/8	3/8-19	36.5	32.5	22	4.5		
10C3MX	14,15,16	5/8	1/2-14	36.8	37.3	22	4.5		
10-12C3MX	14,15,16	5/8	3/4-14	39.2	40.4	27	2.3		
12-8C3MX	18,20	3/4	1/2-14	42.2	40.4	27	4.5		
12C3MX	18,20	3/4	3/4-14	42.2	40.4	27	2.3		
16-12C3MX	25	1	3/4-14	46.0	45.2	33	2.3		
16C3MX	25	1	1-11	46.0	50.0	33	2.3		
20-16C3MX	30,32	1 1/4	1-11	52.3	59.7	41	2.3		
20C3MX	30,32	1 1/4	1 1/4-11	52.3	60.5	41	2.3		
24C3MX	38	1 1/2	1 1/2-11	59.2	67.1	48	2.3		

JTX Full Dimensions

Union Tee
37° Flare (all three ends)

SAE 070401
HPD Base # 033T



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 (in.)	M (in.)	M1 (in.)	M2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 JTX	1/8	1/8	1/8	0.78	0.78	0.78	5/16	7.5	7.7	3.3
3 JTX	3/16	3/16	3/16	0.83	0.83	0.83	7/16	7.5	7.7	
4 JTX	1/4	1/4	1/4	0.89	0.89	0.89	7/16	7.5	7.7	3.3
4-4-3 JTX	1/4	1/4	3/16	0.89	0.89	0.81	7/16			
5 JTX	5/16	5/16	5/16	0.95	0.95	0.95	9/16	6.0	6.0	3.3
6 JTX	3/8	3/8	3/8	1.06	1.06	1.06	9/16	6.0	6.0	3.3
8 JTX	1/2	1/2	1/2	1.25	1.25	1.25	3/4	6.0	6.0	3.3
10 JTX	5/8	5/8	5/8	1.45	1.45	1.45	7/8	5.0	5.0	3.3
12 JTX	3/4	3/4	3/4	1.66	1.66	1.66	1 1/16	5.0	5.0	2.9
12-12-8 JTX	3/4	3/4	1/2	1.66	1.66	1.42	1 1/16		5.0	
12-16-12 JTX	3/4	1	3/4	1.77	1.81	1.77	1 5/16			
14 JTX	7/8	7/8	7/8	1.73	1.73	1.73	1 5/16	5.0		
16 JTX	1	1	1	1.81	1.81	1.81	1 5/16	4.0	3.5	2.3
20 JTX	1 1/4	1 1/4	1 1/4	2.06	2.06	2.06	1 5/8	4.0	3.0	
24 JTX	1 1/2	1 1/2	1 1/2	2.33	2.33	2.33	1 7/8	3.0	2.0	
24-16-16 JTX	1 1/2	1	1	2.33	2.16	2.16	1 7/8			
32 JTX	2	2	2	3.06	3.06	3.06	2 1/2	2.0	1.5	

Dimensions and pressures for reference only, subject to change.

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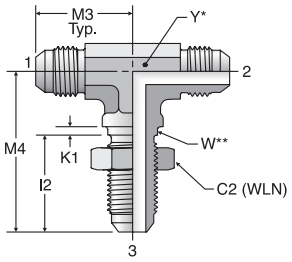
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WJTX Full Dimensions

Bulkhead Branch Tee
37° Flare (all three ends)

SAE 070959
HPD Base # 543T
WJTX-WLN – Body with locknut
(See page C15 for WLN)



Y* – Across wrench flats.
W** – Bulkhead pilot dia. recommended clearance hole +.015 over W dia.

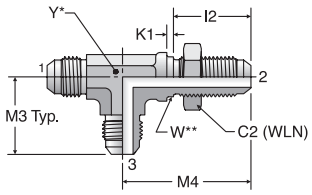
TUBE FITTING PART #	END SIZE 1 - 3 (in.)	C2 HEX (in.)	I2 (in.)	K1 (in.)	M3 (in.)	M4 (in.)	W DIA (in.)	MAX BULKHEAD WALL THICKNESS (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 WJTX	1/4	11/16	1.02	0.09	0.97	1.59	0.44	0.21	7/16	7.5	7.7	
6 WJTX	3/8	13/16	1.09	0.09	1.09	1.81	0.56	0.28	9/16	6.0	6.0	
8 WJTX	1/2	1	1.25	0.13	1.36	2.11	0.75	0.33	3/4	6.0	6.0	
10 WJTX	5/8	1 1/8	1.39	0.13	1.56	2.39	0.88	0.32	1 1/16	5.0		
12 WJTX	3/4	1 3/8	1.56	0.13	1.78	2.67	1.06	0.34	1 1/16	5.0	5.0	
16 WJTX	1	1 5/8	1.56	0.13	1.94	2.80	1.31	0.29	1 5/16	4.0		
20 WJTX* **	1 1/4	1 7/8	1.61	0.13	2.17	3.12	1.63	0.29	1 5/8			

***Machined from one-piece milled bar stock.

WJJTX Full Dimensions

Bulkhead Run Tee
37° Flare (all three ends)

SAE 070958
HPD Base # 533T
WJJTX-WLN – Body with locknut
(See page C15 for WLN)



Y* – Across wrench flats.
W** – Bulkhead pilot dia. recommended clearance hole +.015 over W dia.

TUBE FITTING PART #	END SIZE 1-3 (in.)	C2 HEX (in.)	I2 (in.)	K1 (in.)	M3 (in.)	M4 (in.)	W DIA (in.)	MAX BULKHEAD WALL THICKNESS (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 WJJTX	1/4	11/16	1.02	0.09	0.97	1.59	0.44	0.21	7/16	7.5	7.7	
6 WJJTX	3/8	13/16	1.09	0.09	1.09	1.81	0.56	0.28	9/16	6.0	6.0	
8 WJJTX	1/2	1	1.25	0.13	1.36	2.11	0.75	0.33	3/4	6.0	6.0	
10 WJJTX	5/8	1 1/8	1.39	0.13	1.56	2.39	0.88	0.32	7/8	5.0		
12 WJJTX	3/4	1 3/8	1.56	0.13	1.78	2.67	1.06	0.34	1 1/16	5.0	5.0	
16 WJJTX* **	1	1 5/8	1.56	0.13	1.94	2.80	1.31	0.29	1 7/16			
20 WJJTX* **	1 1/4	1 7/8	1.61	0.13	2.17	3.12	1.63	0.29	1 5/8			

***Machined from one-piece milled bar stock.

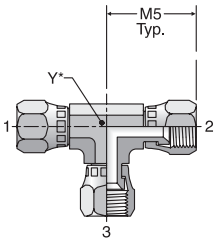
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Columbus, Ohio
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JX6 Full Dimensions

Swivel Nut Union Tee
37° Swivel (all three ends)

HPD Base # 069T



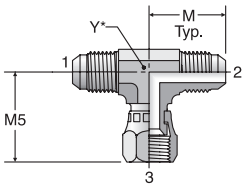
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1-3 (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 JX6	1/4	1.00	7/16	7.5		
6 JX6	3/8	1.25	9/16	6.0		
8 JX6	1/2	1.38	3/4	6.0		
10 JX6	5/8	1.62	3/4	5.0		
12 JX6	3/4	1.75	1 1/16	5.0		
16 JX6	1	2.00	1 3/16	4.0		

S6X Full Dimensions

Swivel Nut Branch Tee
37° Flare / 37° Flare /
37° Swivel

SAE 070433
HPD Base # 393T



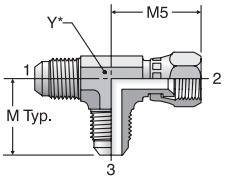
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1-3 (in.)	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 S6X	1/4	0.89	1.00	7/16	7.5	7.7	
5 S6X	5/16	0.95	1.16	9/16	6.0	6.0	
6 S6X	3/8	1.06	1.25	9/16	6.0	6.0	
8 S6X	1/2	1.25	1.38	3/4	6.0	6.0	
10 S6X	5/8	1.45	1.62	7/8	5.0	5.0	
12 S6X	3/4	1.66	1.75	1 1/16	5.0	5.0	
14 S6X	7/8	1.80	1.91	1 5/16	5.0		
16 S6X	1	1.81	2.00	1 5/16	4.0	2.5	
20 S6X	1 1/4	2.06	2.31	1 5/8	4.0	2.5	
24 S6X	1 1/2	2.33	2.67	1 7/8	3.0	2.0	

R6X Full Dimensions

Swivel Nut Run Tee
37° Flare / 37° Swivel /
37° Flare

SAE 070432
HPD Base # 063T



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1-3 (in.)	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 R6X	1/4	0.89	1.00	7/16	7.5	7.7	
5 R6X	5/16	0.95	1.16	9/16	6.0	6.0	
6 R6X	3/8	1.06	1.25	9/16	6.0	6.0	
8 R6X	1/2	1.25	1.38	3/4	6.0	6.0	
10 R6X	5/8	1.45	1.62	7/8	5.0	5.0	
12 R6X	3/4	1.66	1.75	1 1/16	5.0	5.0	
14 R6X	7/8	1.80	1.91	1 5/16	5.0		
16 R6X	1	1.81	2.00	1 5/16	4.0	2.5	
20 R6X	1 1/4	2.06	2.31	1 5/8	4.0	2.5	
24 R6X	1 1/2	2.33	2.59	1 7/8	3.0	2.0	

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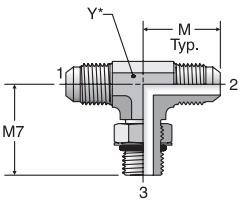
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S5OX Full Dimensions

Straight Thread Branch Tee
37° Flare / 37° Flare / SAE-ORB

SAE 070429
HPD Base # 253T



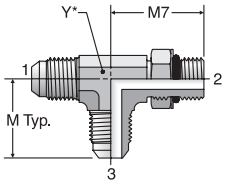
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 S5OX	1/4	1/4	7/16-20	0.89	1.03	7/16	6.0	6.0	
4-4-6 S5OX	1/4	1/4	9/16-18	1.05	1.25	9/16	6.0		
5 S5OX	5/16	5/16	1/2-20	0.97	1.13	9/16	6.0		
6 S5OX	3/8	3/8	9/16-18	1.06	1.25	9/16	6.0	5.4	
6-6-8 S5OX	3/8	3/8	3/4-16	1.14	1.45	3/4	6.0		
8 S5OX	1/2	1/2	3/4-16	1.25	1.45	3/4	6.0	5.4	
8-8-10 S5OX	1/2	1/2	7/8-14	1.33	1.70	7/8	5.0		
10 S5OX	5/8	5/8	7/8-14	1.45	1.70	7/8	5.0		
10-10-12 S5OX	5/8	5/8	1 1/16-12	1.54	1.94	1 1/16	5.0		
12 S5OX	3/4	3/4	1 1/16-12	1.66	1.94	1 1/16	5.0	5.4	
12-12-16 S5OX	3/4	3/4	1 5/16-12	1.77	2.05	1 5/16	4.0		
16 S5OX	1	1	1 5/16-12	1.81	2.05	1 5/16	4.0	3.0	
20 S5OX	1 1/4	1 1/4	1 5/8-12	2.06	2.25	1 5/8	4.0		
24 S5OX	1 1/2	1 1/2	1 7/8-12	2.33	2.39	1 7/8	3.0		
32 S5OX	2	2	2 1/2-12	3.06	2.89	2.50	2.0		

R5OX Full Dimensions

Straight Thread Run Tee
37° Flare / SAE-ORB / 37° Flare

SAE 070428
HPD Base # 053T



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 UN/UNF-2A	3 (in.)	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 R5OX	1/4	7/16-20	1/4	0.89	1.03	7/16	6.0	6.0	
4-6-4 R5OX	1/4	9/16-18	1/4	1.00	1.25	9/16	6.0	6.0	
5 R5OX	5/16	1/2-20	5/16	0.97	1.13	9/16	6.0		
6 R5OX	3/8	9/16-18	3/8	1.06	1.25	9/16	6.0	5.4	
6-8-6 R5OX	3/8	3/4-16	3/8	1.14	1.45	3/4	6.0		
8 R5OX	1/2	3/4-16	1/2	1.25	1.45	3/4	6.0	5.4	
8-6-8 R5OX	1/2	9/16-18	1/2	1.25	1.33	3/4		5.4	
8-10-8 R5OX	1/2	7/8-14	1/2	1.33	1.70	7/8	5.0		
8-12-8 R5OX	1/2	1 1/16-12	1/2	1.42	1.94	1 1/16		5.4	
10 R5OX	5/8	7/8-14	5/8	1.45	1.70	7/8	5.0	5.4	
10-12-10 R5OX	5/8	1 1/16-12	5/8	1.53	1.94	1 1/16	5.0		
12 R5OX	3/4	1 1/16-12	3/4	1.66	1.94	1 1/16	5.0	5.4	
12-16-12 R5OX	3/4	1 5/16-12	3/4	1.76	2.05	1 5/16	4.0		
16 R5OX	1	1 5/16-12	1	1.81	2.05	1 5/16	4.0	3.0	
20 R5OX	1 1/4	1 5/8-12	1 1/4	2.06	2.25	1 5/8	4.0	2.5	
24 R5OX	1 1/2	1 7/8-12	1 1/2	2.33	2.39	1 7/8	3.0		
32 R5OX	2	2 1/2-12	2	3.06	2.89	2 1/2	2.0		

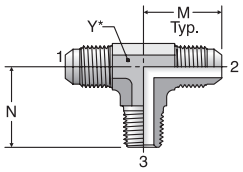
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STX Full Dimensions

Male Branch Tee
37° Flare / 37° Flare / NPTF

SAE 070425
HPD Base # 213T



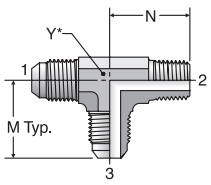
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	END SIZE 3 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3 STX	3/16	1/8-27	0.83	0.72	7/16	6.0		
4 STX	1/4	1/8-27	0.89	0.78	7/16	6.0	6.0	3.3
4-4-4 STX	1/4	1/4-18	1.05	1.09	9/16	6.0	6.0	3.3
4-4-6 STX	1/4	3/8-18	1.13	1.22	3/4		6.0	
5 STX	5/16	1/8-27	0.95	0.78	9/16	6.0	6.0	3.3
5-5-4 STX	5/16	1/4-18	1.05	1.09	9/16		6.0	
6 STX	3/8	1/4-18	1.06	1.09	9/16	6.0	6.0	3.3
6-6-6 STX	3/8	3/8-18	1.14	1.22	3/4	6.0	6.0	
8 STX	1/2	3/8-18	1.25	1.22	3/4	6.0	6.0	3.3
8-8-8 STX	1/2	1/2-14	1.34	1.47	7/8	6.0	6.0	
10 STX	5/8	1/2-14	1.45	1.47	7/8	5.0	5.0	3.3
12 STX	3/4	3/4-14	1.66	1.59	1 1/16	4.0	4.0	
14 STX	7/8	3/4-14	1.80	1.69	1 5/16	4.0		
16 STX	1	1-11 1/2	1.81	1.97	1 5/16	3.0	3.0	
20 STX	1 1/4	1 1/4-11 1/2	2.06	2.38	1 5/8	2.5	2.5	
24 STX	1 1/2	1 1/2-11 1/2	1.33	2.64	1 7/8	2.5	2.5	

RTX Full Dimensions

Male Run Tee
37° Flare / NPTF / 37° Flare

SAE 070424
HPD Base # 013T



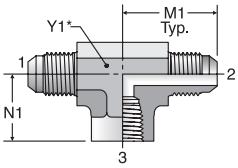
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	END SIZE 3 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3 RTX	3/16	1/8-27	0.83	0.72	7/16	6.0	6.0	
4 RTX	1/4	1/8-27	0.89	0.78	7/16	6.0	6.0	3.3
4-4-4 RTX	1/4	1/4-18	1.05	1.09	9/16	6.0	6.0	
5 RTX	5/16	1/8-27	0.97	0.81	9/16	6.0	6.0	3.3
5-4-5 RTX	5/16	1/4-18	1.05	1.09	9/16		6.0	
6 RTX	3/8	1/4-18	1.06	1.09	9/16	6.0	6.0	3.3
6-6-6 RTX	3/8	3/8-18	1.14	1.22	3/4	6.0	6.0	
8 RTX	1/2	3/8-18	1.25	1.22	3/4	6.0	6.0	3.3
8-8-8 RTX	1/2	1/2-14	1.34	1.47	7/8	6.0	6.0	
10 RTX	5/8	1/2-14	1.45	1.47	7/8	5.0	5.0	
12 RTX	3/4	3/4-14	1.66	1.59	1 1/16	4.0	4.0	
12-8-12 RTX	3/4	1/2-14	1.66	1.59	1 1/16		5.0	
14 RTX	7/8	3/4-14	1.80	1.69	1 5/16	4.0		
16 RTX	1	1-11 1/2	1.81	1.97	1 5/16	3.0	3.0	
20 RTX	1 1/4	1 1/4-11 1/2	2.06	2.38	1 5/8	2.5		
24 RTX	1 1/2	1 1/2-11 1/2	2.33	2.64	1 7/8	2.5	2.5	

OTX Full Dimensions

Female Branch Tee
37° Flare / 37° Flare / NPTF

SAE 070427
HPD Base # 223T



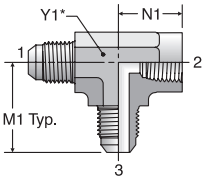
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 2 (in.)	END SIZE 3 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 OTX	1/4	1/8-27	1.08	0.66	9/16	5.0	5.0	3.3
4-4-4 OTX	1/4	1/4-18	1.13	0.88	3/4		5.0	
5 OTX	5/16	1/8-27	1.08	0.66	9/16	5.0		
6 OTX	3/8	1/4-18	1.24	0.88	3/4	5.0	5.0	3.3
6-6-6 OTX	3/8	3/8-18	1.23	1.02	7/8	4.5	4.5	
8 OTX	1/2	3/8-18	1.42	1.02	7/8	4.5	4.5	2.9
8-8-8 OTX	1/2	1/2-14	1.42	1.23	1 1/16	3.0	3.0	
10 OTX	5/8	1/2-14	1.64	1.24	1 1/16	3.0	3.0	
12 OTX	3/4	3/4-14	1.89	1.36	1 5/16	3.0	3.0	2.0
14 OTX	7/8	3/4-14	1.86	1.42	1 5/16	3.0		
16 OTX	1	1-11 1/2	2.17	1.63	1 5/8	1.8	1.2	
20 OTX	1 1/4	1 1/4-11 1/2	2.33	1.70	1 7/8	1.5		
24 OTX	1 1/2	1 1/2-11 1/2	2.89	2.08	2 1/2	1.5		

MTX Full Dimensions

Female Run Tee
37° Flare / NPTF / 37° Flare

SAE 070426
HPD Base # 023T



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 3 (in.)	END SIZE 2 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 MTX	1/4	1/8-27	1.08	0.66	9/16	5.0	5.0	3.3
4-4-4 MTX	1/4	1/4-18	1.13	0.88	3/4		5.0	
6 MTX	3/8	1/4-18	1.24	0.88	3/4	5.0	5.0	3.3
8 MTX	1/2	3/8-18	1.42	1.02	7/8	4.5	4.5	2.9
8-8-8 MTX	1/2	1/2-14	1.42	1.23	1 1/16	3.0	3.0	
10 MTX	5/8	1/2-14	1.64	1.24	1 1/16	3.0		
12 MTX	3/4	3/4-14	1.89	1.36	1 5/16	3.0	3.0	
14 MTX	7/8	3/4-14	1.86	1.42	1 5/16	3.0		
16 MTX	1	1-11 1/2	2.17	1.63	1 5/8	1.8		
20 MTX	1 1/4	1 1/4-11 1/2	2.33	1.70	1 7/8	1.5		
24 MTX	1 1/2	1 1/2-11 1/2	2.89	2.08	2 1/2			

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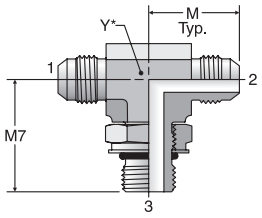
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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S87OMX Full Dimensions

ISO 6149 Branch Tee
37° Flare / 37° Flare / ISO 6149

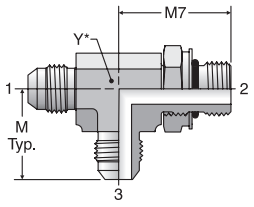


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	END SIZE 3 Male Metric Parallel Thread	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
6M14S87OMX	10	3/8	M14 x 1.5	26.9	33.5	14	6.0		
8M16S87OMX	12	1/2	M16 x 1.5	31.8	38.0	19			
10M22S87OMX	14,15,16	5/8	M22 x 1.5	36.8	42.5	22			
12M27S87OMX	18,20	3/4	M27 x 2	42.2	51.0	27			

R87OMX Full Dimensions

ISO 6149 Run Tee
37° Flare / ISO 6149 / 37° Flare

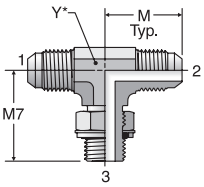


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 3 (mm)	END SIZE 1 & 3 (in.)	END SIZE 2 Male Metric Parallel Thread	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
6M14R87OMX	10	3/8	M14 x 1.5	26.9	33.5	14			
8M16R87OMX	12	1/2	M16 x 1.5	31.8	38.0	19	5.0		
10M22R87OMX	14,15,16	5/8	M22 x 1.5	36.8	42.5	22	5.0		
12M27R87OMX	18,20	3/4	M27 x 2	42.2	51	27	5.0		

S4OMX Full Dimensions

Male Branch Tee – BSPP
37° Flare / 37° Flare /
BSPP-ORR

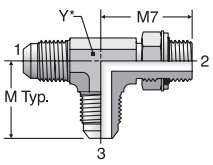


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 1 & 2 (in.)	END SIZE 3 BSPP	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4S4OMX	6	1/4	1/8-28	22.6	26.2	11	3.6		
6S4OMX	10	3/8	1/4-19	26.9	31.8	14	3.6		
8S4OMX	12	1/2	3/8-19	31.8	36.8	19	3.6		
10S4OMX	14,15,16	5/8	1/2-14	36.8	43.2	22	3.6		
12S4OMX	18,20	3/4	3/4-14	42.2	49.3	27	3.6		
16S4OMX	25	1	1-11	46.0	52.1	33	3.6		

R4OMX Full Dimensions

Male Run Tee – BSPP
37° Flare / BSPP-ORR /
37° Flare



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 & 3 (mm)	END SIZE 1 & 3 (in.)	END SIZE 2 BSPP	M (mm)	M7 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4R4OMX	6	1/4	1/8-28	22.6	26.2	11	3.6		
6R4OMX	10	3/8	1/4-19	26.9	31.8	14	3.6		
8R4OMX	12	1/2	3/8-19	31.8	36.8	19	3.6		
10R4OMX	14,15,16	5/8	1/2-14	36.8	43.2	22	3.6		
12R4OMX	18,20	3/4	3/4-14	42.2	49.3	27	3.6		
16R4OMX	25	1	1-11	46.0	52.1	33	3.6		
20R4OMX	28, 30, 32	1 1/4	1 1/4-11	52.3	57.2	41	3.0		

Dimensions and pressures for reference only, subject to change.

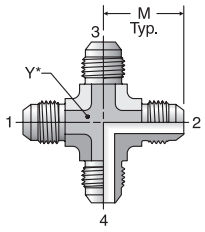
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KTX Full Dimensions

Union Cross
37° Flare (all four ends)

SAE 070501
HPD Base # 033X



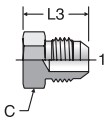
Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1-4 (in.)	M (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 KTX	1/4	0.89	7/16	7.5	7.7	3.3
5 KTX	5/16	0.95	9/16	6.0		
6 KTX	3/8	1.06	9/16	6.0	6.0	3.3
8 KTX	1/2	1.25	3/4	6.0	6.0	3.3
10 KTX	5/8	1.45	7/8	5.0		
12 KTX	3/4	1.66	1 1/16	5.0	5.0	
16 KTX	1	1.81	1 5/16	4.0		

PNTX Full Dimensions

Plug
37° Flare

SAE 070109
HPD Base # 03CP

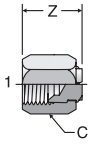


TUBE FITTING PART #	END SIZE 1 (in.)	C HEX (in.)	L3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 PNTX	1/8	7/16	0.70		9.0	
3 PNTX	3/16	7/16	0.73	7.5	9.0	
4 PNTX	1/4	1/2	0.80	7.5	9.0	3.3
5 PNTX	5/16	9/16	0.80	6.0	7.2	3.3
6 PNTX	3/8	5/8	0.84	6.0	7.2	3.3
8 PNTX	1/2	13/16	0.94	6.0	7.2	3.3
10 PNTX	5/8	15/16	1.10	5.0	6.0	3.3
12 PNTX	3/4	1 1/8	1.28	5.0	6.0	3.3
14 PNTX	7/8	1 1/4	1.31	5.0	5.0	
16 PNTX	1	1 3/8	1.33	4.5	5.4	
20 PNTX	1 1/4	1 11/16	1.45	4.0	4.8	
24 PNTX	1 1/2	2	1.66	4.0	4.8	
32 PNTX	2	2 5/8	2.05	2.0	2.4	

FNTX Full Dimensions

Cap
37° Flare

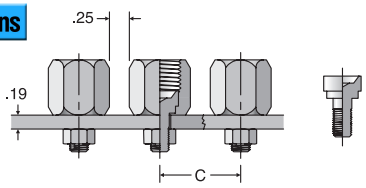
SAE 070112
HPD Base # 06CP



TUBE FITTING PART #	END SIZE 1 (in.)	C HEX (in.)	Z (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 FNTX	1/8	3/8	0.60	7.5	9.0	3.3
3 FNTX	3/16	7/16	0.66	7.5	9.0	3.3
4 FNTX	1/4	9/16	0.67	7.5	9.0	3.3
5 FNTX	5/16	5/8	0.77	6.0	7.2	3.3
6 FNTX	3/8	11/16	0.81	6.0	7.2	3.3
8 FNTX	1/2	7/8	0.94	6.0	7.2	3.3
10 FNTX	5/8	1	1.07	5.0	6.0	3.3
12 FNTX	3/4	1 1/4	1.24	5.0	6.0	3.3
14 FNTX	7/8	1 3/8	1.26	5.0		
16 FNTX	1	1 1/2	1.29	4.5	5.4	2.6
20 FNTX	1 1/4	2	1.39	4.0	4.8	
24 FNTX	1 1/2	2 1/4	1.70	4.0	4.8	
32 FNTX	2	2 7/8	2.01	2.0	2.4	

T22X Full Dimensions

Mountie Cap



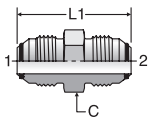
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UNC/UNF-2A	C (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 T22X	1/4	1/4-20	0.91	0.72	7.5		
6 T22X	3/8	1/4-20	1.08	0.81	6.0		
8 T22X	1/2	5/16-18	1.25	0.97	6.0		

Dimensions and pressures for reference only, subject to change.

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HTXO Full Dimensions

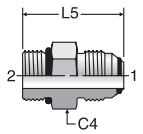
Union
37° Flare



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 HTXO	1/4	1/2	1.39	9.0
6 HTXO	3/8	5/8	1.42	7.7
8 HTXO	1/2	13/16	1.66	7.7
10 HTXO	5/8	15/16	1.98	6.0
12 HTXO	3/4	1 1/8	2.24	6.0
16 HTXO	1	1 3/8	2.41	5.4
20 HTXO	1 1/4	1 11/16	2.58	5.0
24 HTXO	1 1/2	2	2.90	5.0

F5OXO Full Dimensions

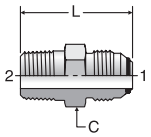
Straight Thread Connector
37° Flare / SAE-ORB



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	C4 HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 F5OXO	1/4	7/16-20	9/16	1.23	9.0
4-6 F5OXO	1/4	9/16-18	11/16	1.28	7.7
6 F5OXO	3/8	9/16-18	11/16	1.30	7.7
6-4 F5OXO	3/8	7/16-20	5/8	1.27	7.7
6-8 F5OXO	3/8	3/4-16	7/8	1.38	7.7
8 F5OXO	1/2	3/4-16	7/8	1.48	7.7
8-6 F5OXO	1/2	9/16-18	13/16	1.44	7.7
10 F5OXO	5/8	7/8-14	1	1.75	6.0
12 F5OXO	3/4	1 1/16-12	1 1/4	1.97	6.0
16 F5OXO	1	1 5/16-12	1 1/2	2.05	5.4
20 F5OXO	1 1/4	1 5/8-12	1 7/8	2.17	5.0
24 F5OXO	1 1/2	1 7/8-12	2 1/8	2.37	4.0
32 F5OXO	2	2 1/2-12	2 3/4	2.78	2.4

FTXO Full Dimensions

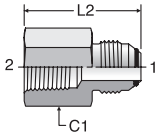
Male Connector
37° Flare / NPTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 FTXO	1/4	1/8-27	1/2	1.23	6.0
4-4 FTXO	1/4	1/4-18	9/16	1.43	6.0
6 FTXO	3/8	1/4-18	5/8	1.45	6.0
6-6 FTXO	3/8	3/8-18	3/4	1.46	6.0
8 FTXO	1/2	3/8-18	13/16	1.53	6.0
8-8 FTXO	1/2	1/2-14	7/8	1.78	6.0
10 FTXO	5/8	1/2-14	15/16	1.94	5.0
12 FTXO	3/4	3/4-14	1 1/8	2.10	5.0
16 FTXO	1	1-11 1/2	1 3/8	2.38	4.5
20 FTXO	1 1/4	1 1/4-11 1/2	1 11/16	2.52	3.0
24 FTXO	1 1/2	1 1/2-11 1/2	2	2.76	3.0
32 FTXO	2	2-11 1/2	2 5/8	3.18	2.0

GTXO Full Dimensions

Female Connector
37° Flare / NPTF



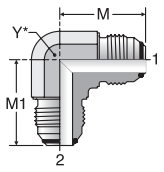
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C1 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 GTXO	1/4	1/8-27	9/16	1.20	6.0
6 GTXO	3/8	1/4-18	3/4	1.41	6.0
8 GTXO	1/2	3/8-18	7/8	1.58	6.0
10 GTXO	5/8	1/2-14	1 1/8	1.94	5.0
12 GTXO	3/4	3/4-14	1 3/8	2.10	4.8
16 GTXO	1	1-11 1/2	1 5/8	2.43	3.6
20 GTXO	1 1/4	1 1/4-11 1/2	2	2.56	3.0
24 GTXO	1 1/2	1 1/2-11 1/2	2 3/8	2.70	2.4

Dimensions and pressures for reference only, subject to change.

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ETXO Full Dimensions

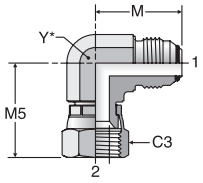
Union Elbow
37° Flare / 37° Flare



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	M (in.)	M1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 ETXO	1/4	0.90	0.90	7/16	7.7
6 ETXO	3/8	1.08	1.08	9/16	6.0
8 ETXO	1/2	1.25	1.25	3/4	6.0
10 ETXO	5/8	1.50	1.50	7/8	5.0
12 ETXO	3/4	1.70	1.70	1 1/16	5.0
16 ETXO	1	1.89	1.89	1 5/16	5.0
20 ETXO	1 1/4	2.13	2.13	1 5/8	5.0
24 ETXO	1 1/2	2.41	2.41	1 7/8	5.0

C6XO Full Dimensions

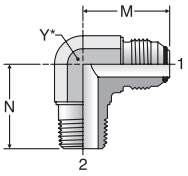
Swivel Nut Elbow
37° Flare / 37° Swivel



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C3 HEX (in.)	M (in.)	M5 (in.)	M10 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 C6XO	1/4	9/16	0.90	1.00	0.66	7/16	7.7
6 C6XO	3/8	11/16	1.08	1.25	0.88	9/16	6.0
8 C6XO	1/2	7/8	1.25	1.38	0.95	3/4	6.0
10 C6XO	5/8	1	1.50	1.62	1.13	7/8	5.0
12 C6XO	3/4	1 1/4	1.70	1.75	1.19	1 1/16	5.0
16 C6XO	1	1 1/2	1.89	2.00	1.41	1 5/16	2.5
20 C6XO	1 1/4	2	2.13	2.31	1.69	1 5/8	2.5

CTXO Full Dimensions

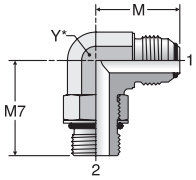
Male Elbow
37° Flare / NPTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 CTXO	1/4	1/8-27	0.90	0.78	7/16	6.0
4-4 CTXO	1/4	1/4-18	1.06	1.09	9/16	6.0
6 CTXO	3/8	1/4-18	1.08	1.09	9/16	6.0
6-6 CTXO	3/8	3/8-18	1.16	1.22	3/4	6.0
8 CTXO	1/2	3/8-18	1.25	1.22	3/4	6.0
8-8 CTXO	1/2	1/2-14	1.33	1.47	7/8	6.0
10 CTXO	5/8	1/2-14	1.51	1.47	7/8	5.0
12 CTXO	3/4	3/4-14	1.70	1.59	1 1/16	4.0
16 CTXO	1	1-11 1/2	1.89	1.97	1 5/16	3.0
20 CTXO	1 1/4	1 1/4-11 1/2	2.13	2.38	1 5/8	2.5
24 CTXO	1 1/2	1 1/2-11 1/2	2.41	2.64	1 7/8	2.5
32 CTXO	2	2-11 1/2	3.13	3.00	2 1/2	2.0

C5OXO Full Dimensions

Straight Thread Elbow
37° Flare / SAE-ORB



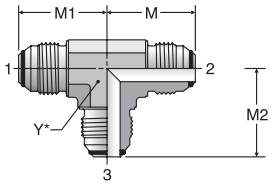
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 C5OXO	1/4	7/16-20	0.90	1.03	7/16	6.0
6 C5OXO	3/8	9/16-18	1.08	1.25	9/16	5.4
8 C5OXO	1/2	3/4-16	1.25	1.45	3/4	5.4
10 C5OXO	5/8	7/8-14	1.50	1.70	7/8	5.4
12 C5OXO	3/4	1 1/16-12	1.70	1.94	1 1/16	5.4
16 C5OXO	1	1 5/16-12	1.89	2.05	1 5/16	3.7
20 C5OXO	1 1/4	1 5/8-12	2.13	2.25	1 5/8	2.8
24 C5OXO	1 1/2	1 7/8-12	2.41	2.39	1 7/8	2.5
32 C5OXO	2	2 1/2-12	3.13	2.89	2 1/2	1.5

Dimensions and pressures for reference only, subject to change.

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JTXO Full Dimensions

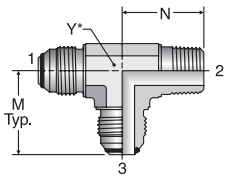
Union Tee
37° Flare (all three ends)



TUBE FITTING PART #	END SIZE 1 - 3 (in.)	M (in.)	M1 (in.)	M2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 JTXO	1/4	0.90	0.90	0.90	7/16	7.7
6 JTXO	3/8	1.08	1.08	1.08	9/16	6.0
8 JTXO	1/2	1.25	1.25	1.25	3/4	6.0
10 JTXO	5/8	1.50	1.50	1.50	7/8	5.0
12 JTXO	3/4	1.70	1.70	1.70	1 1/16	5.0
16 JTXO	1	1.89	1.89	1.89	1 5/16	5.0
20 JTXO	1 1/4	2.13	2.13	2.13	1 5/8	5.0
24 JTXO	1 1/2	2.41	2.41	2.41	1 7/8	5.0

RTXO Full Dimensions

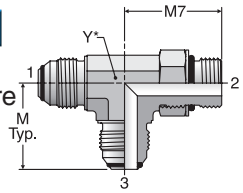
Male Run Tee
37° Flare / NPTF / 37° Flare



TUBE FITTING PART #	END SIZE 1 & 3 (in.)	END SIZE 2 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 RTXO	1/4	1/8-27	0.90	0.78	7/16	6.0
6 RTXO	3/8	1/4-18	1.08	1.09	9/16	6.0
8 RTXO	1/2	3/8-18	1.25	1.22	3/4	6.0
10 RTXO	5/8	1/2-14	1.51	1.47	7/8	5.0
12 RTXO	3/4	3/4-14	1.70	1.59	1 1/16	4.0
16 RTXO	1	1-11 1/2	1.89	1.97	1 5/16	3.0
20 RTXO	1 1/4	1 1/4-11 1/2	2.13	2.38	1 5/8	2.5
24 RTXO	1 1/2	1 1/2-11 1/2	2.41	2.64	1 7/8	2.5

R5OXO Full Dimensions

Straight Thread Run Tee
37° Flare / SAE-ORB / 37° Flare



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -SS
4 R5OXO	1/4	7/16-20	0.90	1.03	7/16	6.0
6 R5OXO	3/8	9/16-18	1.08	1.25	9/16	5.4
8 R5OXO	1/2	3/4-16	1.25	1.45	3/4	5.4
10 R5OXO	5/8	7/8-14	1.51	1.70	7/8	5.4
12 R5OXO	3/4	1 1/16-12	1.70	1.94	1 1/16	5.4
16 R5OXO	1	1 5/16-12	1.89	2.05	1 5/16	3.7
20 R5OXO	1 1/4	1 5/8-12	2.13	2.25	1 5/8	2.8

Visual Index
How To Order
Specs
Assembly / Installation
3-D CAD Model
Reference Section

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Ferulok® Flareless Bite Type Fittings



The Fitting Authority

Nuts, Ferrules, Locknuts

BU
Nut

D8

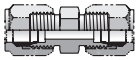
TU
Ferrules

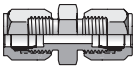
D8

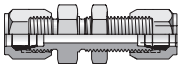
WLN
Bulkhead Locknut

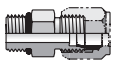
D8

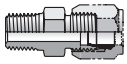
Straights

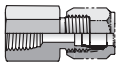
HBU
Union

D8

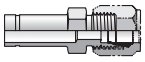
LHBU
Large Hex Union

D9

WBU
Bulkhead Union

D9

F5BU
SAE-ORB / Flareless

D9

FBU
NPTF / Flareless

D9

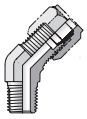
GBU
NPTF / Flareless

D10

TRBU
Tube End Reducer

D10

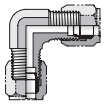
45° Elbows

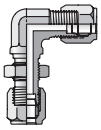
V5BU
SAE-ORB / Flareless

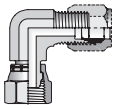
D10

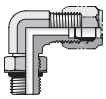
VBU
NPTF / Flareless

D10

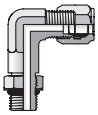
90° Elbows

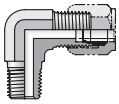
EBU
Union Elbow

D11

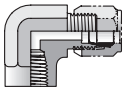
WEBU
Bulkhead Union Elbow

D11

C6BU
Flareless Swivel/Flareless

D11

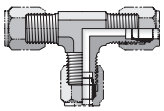
C5BU
SAE-ORB / Flareless

D11

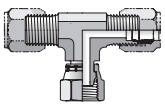
CC5BU
SAE-ORB / Flareless

D12

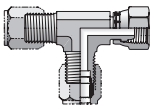
CBU
NPTF / Flareless

D12

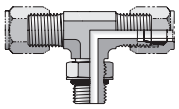
DBU
NPTF / Flareless

D12

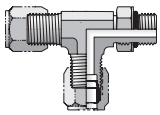
Tees

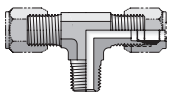
JBU
Union Tee

D13

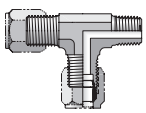
S6BU
Swivel Branch Tee

D13

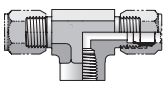
R6BU
Swivel Run Tee

D13

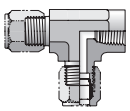
S5BU
SAE-ORB Branch Tee

D13

R5BU
SAE-ORB Run Tee

D14

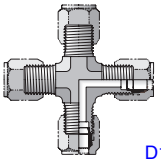
SBU
NPTF Branch Tee

D14

RBU
NPTF Run Tee

D14

OBU
NPTF Branch Tee

D14

MBU
NPTF Run Tee

D15

Cross

KBU
Union Cross

D15

Plugs and Caps

PNU
Plug

D15

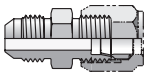
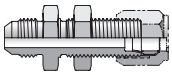
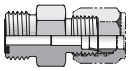
FNU
Cap

D15

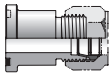
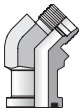
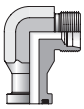
Dimensions and pressures for reference only, subject to change.

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Conversion Adapters (Shown in Section L)

Conversion Adapters	XHBU 37° Flare / Flareless	XHBU2 37° / Flareless Bulkhead	BUHLO ORFS / 24° Flareless
	 L4	 L4	 L4

Flange Adapters (Shown in Section M)

Flange Adapters	BUHQ1 Code 61 / Flareless	BUVQ1 Code 61 / Flareless	BUEQ1 Code 61 / Flareless
	 M10	 M28	 M29

O-Rings and Seals (Shown in Section O)

O-Rings	SAE O-Ring
	 O3

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index

Introduction

The basic flareless bite type fitting was first developed in Europe in the early 1930s. The Ferulok fitting was later developed by Parker Hannifin and introduced to the U.S. market in the mid-1940s. The Ferulok fitting design utilizes a combination of proven European features, coupled with many innovative product improvements instituted by Parker Hannifin. Today, the Ferulok fitting design and performance capabilities far exceed the strict requirements of SAE J514 and Military Standards (MILF18866). The Ferulok fitting is a flareless fitting that consists of a body, a one-piece precision machined ferrule, and a nut. On assembly, the ferrule "bites" into the outer surface of the tube with sufficient strength to hold the tube against pressure, without significant distortion of the inside tube diameter.

The ferrule also forms a pressure seal against the fitting body. Ferulok fittings have a visible bite, allowing the fitting assembler to visually inspect the bite quality, thus significantly minimizing the risk of improper assembly and related service problems.

Ferulok fittings are especially suitable for use with tube wall thickness ranging from medium to extra heavy. (Refer to Table D2, "Recommended Tube Wall Thickness.") Ferulok's robust construction and proven sealing characteristics have gained it popularity in diverse markets and applications. Ferulok fittings are routinely used in markets such as: machine tools, air compressors, chemical, military, oil refineries, paper making, thermoplastics processing, and many general industrial hydraulic applications.



Fig. D1 – Ferulok Components: Body, Ferrule and Nut

Design and Construction

The three components of the Ferulok fitting are designed and manufactured to produce a high pressure, leak-free joint upon proper assembly.

The Ferulok Body – Ferulok fitting bodies are available in over thirty configurations. The shaped products (i.e. elbows, tees, crosses) are hot forged, then machined to the stringent Ferulok fitting specifications. The forging process used by Parker further improves the strength and metallurgical properties of the fitting material. Straight products are made from cold drawn bar stock. The cold drawing operation ensures consistently tight dimensional tolerances, smooth surfaces and significantly improved strength.

The Ferulok Ferrules – Ferulok fitting ferrules are precision machined with all dimensions and surfaces closely controlled, particularly the critical bite edge, which is monitored on an ongoing basis. Ferrules are then heat-treated in a manner that provides the hardness, strength, and toughness necessary to satisfy the demanding service conditions that exist in industry today.

The Ferulok Nuts – Ferulok fitting nuts are either cold formed to size and shape, or machined from cold drawn material. The cold forming and cold drawing operations provide a more tightly packed grain structure, thus improving the material's strength. In addition, cold forming significantly improves the fatigue or endurance strength of the nuts.

Ferulok Fittings	Steel		Stainless Steel	
	ASTM	Type	ASTM	Type
Cold Formed Bodies	A576	C1010/C1008	—	—
Forged Bodies	A576	1214/1215	A182	316
Bar Stock Bodies	A108	12L14	A479	316
Cold Formed Tube Nuts	A576	C1010	A479	316L
Bar Stock Tube Nuts	A108	12L14	A479	316
Tube Ferrules	A108	12L14	A564	630

Table D1 – Standard Material Specifications for Ferulok Fittings

Note: On request, Ferulok can be furnished in materials other than those shown above.

Finish: Zinc with yellow chromate (being changed to Zinc Chromium 6 Free) is used on all standard steel products.

Dimensions and pressures for reference only, subject to change.

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Visual Index

How Ferulok Fittings Work

As mentioned in the introduction, the ferrule in the Ferulok fitting forms pressure tight seals with the tube and the fitting body. These seals are the result of several key characteristics graphically shown in Fig. D2. Below are detailed explanations of each of these key features.

A. When properly assembled, the wedging action of the Ferulok design will cause the end of the tube to press firmly against the seat in the body. This action will cause the tube to develop a small indentation circumferentially on the bottom of the tube. This indentation serves as a good post assembly inspection criterion.

B. As the ferrule moves forward, it contacts the tapered seat of the body, which causes the ferrule to cam inward into the tube. The leading edge of the hardened ferrule makes a clean 360° cut into the outside diameter of the tube. This cut is often termed a "bite" and thus "bite type fitting". As the ferrule makes its bite, a small ridge of material is plowed up in front of the ferrule. This intimate contact of the tube ridge with the ferrule's front face and bite edge gives the fitting its ability to retain high pressure without leaking or blowing off. A second seal point is also created between the now bowed ferrule and the fitting body seat.

C. As the ferrule bites into the tube, the mid section will bow and the inside diameter of the back area firmly grips the tube. This action keeps the stresses, caused by flexural and vibration loading, from being concentrated in the bite area. The "compression grip" at the back end is a key factor for long life in rigorous applications.

When properly assembled to the recommended tube, Ferulok fittings will consistently seal until the applied pressure is great enough to cause tube burst.

Although not as common, Ferulok fittings can be purchased without nuts and sleeves for use as a hose adapter (Fig. D3). Sealing occurs between the 24° cone of the fitting body and the hose swivel as shown.

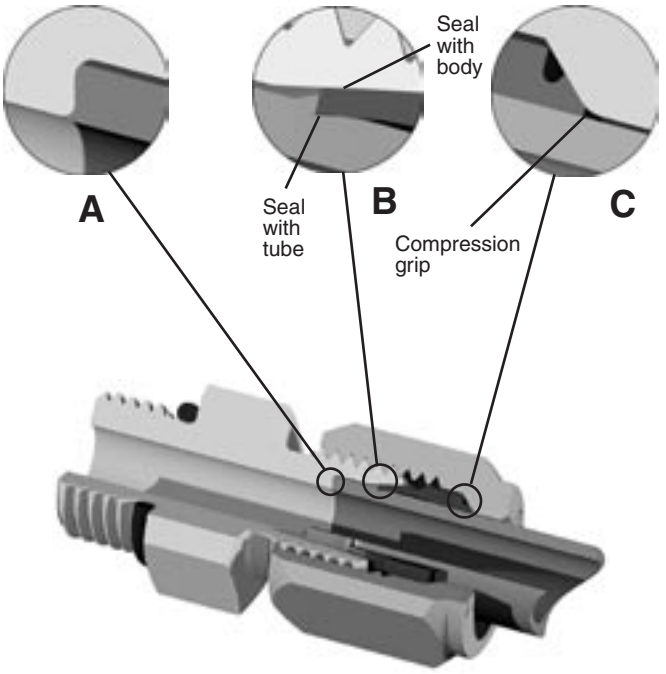


Fig. D2 – Assembled Ferulok Fitting with Tube

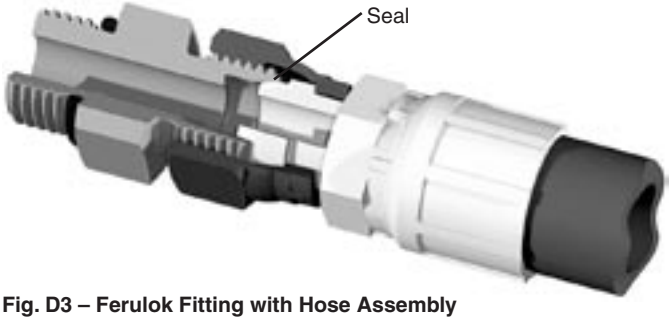


Fig. D3 – Ferulok Fitting with Hose Assembly

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Ferulok® fittings.

Tube Recommendation

Maximum tube wall thickness is based on the pressure holding capability of Ferulok fittings. Tubes above the recommended range can be used. However, the pressure holding capability of the assembly will be limited to the fitting capacity. The proper Ferulok assembly procedures as outlined on pages T23 - T26 of this catalog are critical to the performance of the fitting. Steel Ferulok works best with seamless or welded and drawn fully annealed tube, SAE J356, SAE J524, SAE J525 (max. hardness, RB72) or equivalent specification steel tube. For stainless steel Ferulok fittings, types 304 and 316 of ASTM A269, ASTM A213 (max. hardness, RB90) or equivalent stainless steel tube is recommended.

Ferulok fittings are also suitable for use with soft metal tube and various types of plastic tubes such as nylon, polyethylene, etc. When used with plastic tube, it is strongly recommended that a tube insert, such as T23UI, be used to prevent tube pull out due to tensile loading.

Consult the Parker Hannifin Tube Fittings Division for other combinations of tube and tube fitting materials not shown.

Size		Steel Stainless Steel	
O.D. Inches	Dash Number	Minimum Wall Thickness	Maximum Wall Thickness
1/8	-2	0.010	0.035
3/16	-3	0.020	0.049
1/4	-4	0.028	0.065
5/16	-5	0.028	0.065
3/8	-6	0.035	0.095
1/2	-8	0.049	0.120
5/8	-10	0.058	0.120
3/4	-12	0.065	0.120
7/8	-14	0.072	0.120
1	-16	0.083	0.148
1 1/4	-20	0.095	0.188
1 1/2	-24	0.095	0.220
2	-32	0.095	0.220

Table D2 — Recommended Tube Wall Thickness

Dimensions and pressures for reference only, subject to change.

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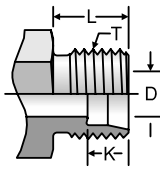
Visual Index

Feature	Advantage	Benefit
Visible bite (Style A Ferrule)	Easy to inspect for assemblers	Saves time. Assures proper assembly.
	Quickly verify recommended bite was achieved	Eliminates the risk of catastrophic failure
Distributed stresses	Stresses due to service flexural loading are distributed at several points	Stress concentration at the bite is minimized; bite area of the tube is protected
Ferrule with rear bevel	Firmly grips tube	Dampens the effects of vibration in the joint
Tube wall range	Suitable for use with a wide range of wall thicknesses from medium to extra-heavy	Flexibility in design
		Covers wide range of applications
Remakeability	Joints can be disassembled and reassembled many times	Allows for system maintenance
		Saves money by not replacing fittings
Metal-to-metal seal	Service temperature rating is only limited to the materials chosen	Good choice for either high or relatively low temperature applications
No flaring or flanging required	Ease of assembly. No special equipment required for smaller sizes.	No assembly equipment cost for many users
		Ease of on-the-machine and remote area assembly and maintenance
Protected sealing surface	24° sealing cone is less prone to damage from handling, etc.	Better seal reliability

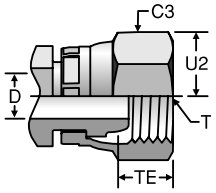
Table D3 — Features, Advantages and Benefits of Using Ferulok Fittings

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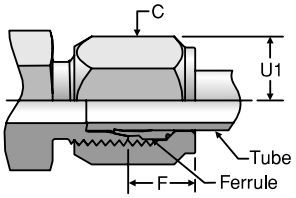
Ferulok Flareless Tube Ends



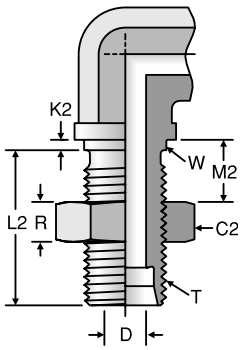
Ferulok Male Stud Tube End



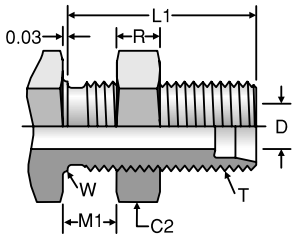
Ferulok Swivel



Ferulok Tube End Assembly



Ferulok Shape Bulkhead



Ferulok Straight Bulkhead

		Thread	Tube Nut Hex	Bulhkead Locknut Hex	Swivel Nut Hex	Max Drill	Allowance		Male Turn Back	Bulkhead					Max Bulkhead Thickness		Thread Engage-ment	Across Corners	
							Tube Nut Assembled	Tube		Pilot Length Shapes	Length - Straights	Length - Shapes	Locknut Thickness	Pilot Dia	Straights	Shapes		Tube Nut Hex	Swivel Nut Hex
SAE Dash Size	**Tube O.D.** (in.)	**T** UN/UNF	**C** (in.)	**C2** (in.)	**C3** (in.)	**D** (in)	**F** (in)	**K** (in)	**L** (in)	**K2** (in)	**L1** (in)	**L2** (in)	**R** (in)	**W**[1)] (in)	**M1** (in)	**M2** (in)	**TE** (in	**U1** (in)	**U2** (in)
2	1/8	5/16-24	3/8	916	7/16	0.093	0.31	0.19	0.375	0.09	1.02	0.83	0.22	0.31	0.28	0.38	0.22	0.22	0.25
3	3/16	3/8-24	7/16	5/8	1/2	0.125	0.34	0.24	0.422	0.09	1.06	0.88	0.22	0.37	0.28	0.38	0.25	0.25	0.29
4	1/4	7/16-20	9/16	11/16	9/16	0.203	0.42	0.24	0.453	0.09	1.13	0.94	0.28	0.44	0.28	0.38	0.29	0.33	0.33
5	5/16	1/2-20	5/8	3/4	5/8	0.234	0.42	0.26	0.453	0.09	1.12	0.94	0.28	0.50	0.28	0.38	0.31	0.36	0.36
6	3/8	9/16-18	11/16	13/16	11/16	0.281	0.47	0.26	0.469	0.09	1.17	0.98	0.27	0.56	0.31	0.41	0.34	0.40	0.40
8	1/2	3/4-16	7/8	1	7/8	0.422	0.50	0.31	0.562	0.13	1.31	1.12	0.31	0.75	0.31	0.41	0.32	0.51	0.51
10	5/8	7/8-14	1	1 1/8	1	0.500	0.53	0.36	0.625	0.13	1.45	1.27	0.36	0.88	0.38	0.44	0.37	0.58	0.59
12	3/4	1 1/16-12	1 1/4	1 3/8	1 1/4	0.656	0.56	0.36	0.688	0.13	1.56	1.38	0.41	1.06	0.38	0.44	0.42	0.72	0.73
14	7/8	1 3/16-12	1 3/8	1 1/2	1 3/8	0.719	0.53	0.36	0.688	0.13	1.56	1.38	0.41	1.19	0.38	0.44	0.34	0.79	0.79
16	1	1 5/16-12	1 1/2	1 5/8	1 1/2	0.875	0.66	0.42	0.688	0.13	1.56	1.38	0.41	1.31	0.38	0.44	0.32	0.87	0.88
20	1 1/4	1 5/8-12	2	1 7/8	2	1.093	0.72	0.42	0.688	0.13	1.56	1.38	0.41	1.62	0.38	0.44	0.33	1.15	1.17
24	1 1/2	1 7/8-12	2 1/4	2 1/8	2 1/4	1.344	0.72	0.49	0.688	0.13	1.56	1.38	0.41	1.87	0.38	0.44	0.34	1.30	1.29
32	2	2 1/2-12	2 7/8	2 3/4	2 7/8	1.813	0.84	0.49	0.688	0.13	1.77	1.58	0.41	2.50	0.56	0.63	0.34	1.66	1.64

1) Recommended clearance hole +0.015 over W dia.

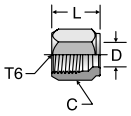
Dimensions and pressures for reference only, subject to change.

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BU

Nut
Flareless

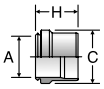


SAE 080110

TUBE FITTING PART #	TUBE O.D. (in.)	T6 UN/UNF-2B	C HEX (in.)	D DRILL (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
2 BU	1/8	5/16-24	3/8	0.130	0.53	•	•
3 BU	3/16	3/8-24	7/16	0.193	0.61	•	•
4 BU	1/4	7/16-20	9/16	0.255	0.70	•	•
5 BU	5/16	1/2-20	5/8	0.318	0.72	•	•
6 BU	3/8	9/16-18	11/16	0.380	0.75	•	•
8 BU	1/2	3/4-16	7/8	0.505	0.84	•	•
10 BU	5/8	7/8-14	1	0.631	0.92	•	•
12 BU	3/4	1 1/16-12	1 1/4	0.756	0.97	•	•
14 BU	7/8	1 3/16-12	1 3/8	0.881	1.00	•	•
16 BU	1	1 5/16-12	1 1/2	1.006	1.05	•	•
20 BU	1 1/4	1 5/8-12	2	1.260	1.05	•	•
24 BU	1 1/2	1 7/8-12	2 1/4	1.510	1.03	•	•
32 BU	2	2 1/2-12	2 7/8	2.014	1.12	•	•

TU

Ferrule
Flareless

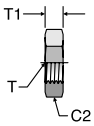


SAE 08115A

TUBE FITTING PART #	TUBE O.D. (in.)	A (in.)	C (in.)	H (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
2 TU	1/8	0.13	0.24	0.29	•	•
3 TU	3/16	0.19	0.31	0.33	•	•
4 TU	1/4	0.26	0.37	0.36	•	•
5 TU	5/16	0.32	0.43	0.37	•	•
6 TU	3/8	0.38	0.50	0.39	•	•
8 TU	1/2	0.51	0.66	0.43	•	•
10 TU	5/8	0.63	0.78	0.44	•	•
12 TU	3/4	0.76	0.93	0.48	•	•
14 TU	7/8	0.88	1.06	0.48	•	•
16 TU	1	1.01	1.19	0.48	•	•
20 TU	1 1/4	1.26	1.45	0.48	•	•
24 TU	1 1/2	1.51	1.69	0.48	•	•
32 TU	2	2.01	2.21	0.51	•	•

WLN

Bulkhead Locknut
Flareless



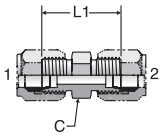
SAE 080118 and 070118

TUBE FITTING PART #	TUBE O.D. (in.)	T UN/UNF-2B	C2 HEX (in.)	L6 (in.)	STANDARD MATERIAL FROM STOCK -S	-SS
3 WLN	3/16	3/8-24	5/8	0.22	•	•
4 WLN	1/4	7/16-20	11/16	0.28	•	•
5 WLN	5/16	1/2-20	3/4	0.28	•	
6 WLN	3/8	9/16-18	13/16	0.27	•	•
8 WLN	1/2	3/4-16	1	0.31	•	•
10 WLN	5/8	7/8-14	1 1/8	0.36	•	•
12 WLN	3/4	1 1/16-12	1 3/8	0.41	•	•
14 WLN	7/8	1 3/16-12	1 1/2	0.41	•	
16 WLN	1	1 5/16-12	1 5/8	0.41	•	•
20 WLN	1 1/4	1 5/8-12	1 7/8	0.41	•	•
24 WLN	1 1/2	1 7/8-12	2 1/8	0.41	•	•
32 WLN	2	2 1/2-12	2 3/4	0.41	•	•

HBU

Full Dimensions

Union
Flareless / Flareless



SAE 080101

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	C HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 HBU	1/8	1/8	7/16	1.02	6.0	6.0
3 HBU	3/16	3/16	7/16	1.11	6.0	
4 HBU	1/4	1/4	1/2	1.19	6.0	6.0
5 HBU	5/16	5/16	9/16	1.19	6.0	6.0
6 HBU	3/8	3/8	5/8	1.24	6.0	6.0
6-4 HBU	3/8	1/4	5/8	1.22	6.0	6.0
8 HBU	1/2	1/2	13/16	1.42	5.0	5.0
10 HBU	5/8	5/8	15/16	1.61	5.0	5.0
12 HBU	3/4	3/4	1 1/8	1.81	4.5	4.5
14 HBU	7/8	7/8	1 1/4	1.81	4.0	
16 HBU	1	1	1 3/8	1.81	4.0	4.0
20 HBU	1 1/4	1 1/4	1 11/16	1.89	3.0	3.0
24 HBU	1 1/2	1 1/2	2	1.96	2.0	2.0
32 HBU	2	2	2 5/8	2.11	1.5	1.5

Dimensions and pressures for reference only, subject to change.

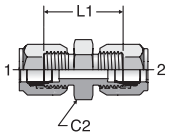
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LHBU Full Dimensions

Large Hex Union
Flareless / Flareless

SAE 080119

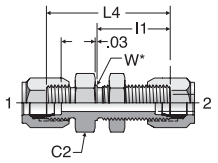


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C2 HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 LHBU	1/4	1/4	11/16	1.19	6.0	6.0
6 LHBU	3/8	3/8	13/16	1.23	6.0	6.0
6-4 LHBU	3/8	1/4	13/16	1.22		6.0
8 LHBU	1/2	1/2	1	1.42	5.0	5.0
8-6 LHBU	1/2	1/2	1	1.33		5.0
10 LHBU	5/8	5/8	1 1/8	1.61	5.0	
12 LHBU	3/4	3/4	1 3/8	1.81	4.5	4.5
16 LHBU	1	1	1 5/8	1.81	4.0	

WBU Full Dimensions

Bulkhead Union
Flareless / Flareless

SAE 080601



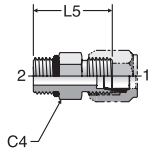
* W – Bulkhead pilot dia. recommended clearance hole is +.015 over W dia.

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C2 HEX (in.)	I1 (in.)	L4 (in.)	W (in.)	Max. Bulkhead Thickness	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 WBU	1/4	1/4	11/16	1.12	1.89	0.44	0.38	6.0	6.0
6 WBU	3/8	3/8	13/16	1.17	1.98	0.56	0.40	6.0	6.0
8 WBU	1/2	1/2	1	1.31	2.22	0.75	0.40	5.0	5.0
10 WBU	5/8	5/8	1 1/8	1.45	2.48	0.88	0.37	5.0	
12 WBU	3/4	3/4	1 3/8	1.56	2.72	1.06	0.43	4.5	4.5
16 WBU	1	1	1 5/8	1.56	2.72	1.31	0.43	4.0	

F5BU Full Dimensions

Straight Thread Connector
Flareless / SAE-ORB

SAE 080120

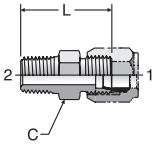


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	C4 HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 F5BU	1/8	5/16-24	7/16	1.00	5.0	
3 F5BU	3/16	3/8-24	1/2	1.05	5.0	5.0
4 F5BU	1/4	7/16-20	9/16	1.13	5.0	5.0
4-5 F5BU	1/4	1/2-20	5/8	1.13	5.0	5.0
4-6 F5BU	1/4	9/16-18	11/16	1.20	5.0	5.0
4-10 F5BU	1/4	7/8-14	1	1.40		5.0
5 F5BU	5/16	1/2-20	5/8	1.13	5.0	
6 F5BU	3/8	9/16-18	11/16	1.22	5.0	5.0
6-4 F5BU	3/8	7/16-20	5/8	1.19		
6-8 F5BU	3/8	3/4-16	7/8	1.28	5.0	5.0
8 F5BU	1/2	3/4-16	7/8	1.38	5.0	5.0
8-6 F5BU	1/2	9/16-18	13/16	1.28	5.0	
8-10 F5BU	1/2	7/8-14	1	1.50	5.0	5.0
8-12 F5BU	1/2	1 1/16-12	1 1/4	1.67	4.5	4.5
10 F5BU	5/8	7/8-14	1	1.56	5.0	5.0
10-12 F5BU	5/8	1 1/16-12	1 1/4	1.73		
12 F5BU	3/4	1 1/16-12	1 1/4	1.78	4.5	4.5
12-8 F5BU	3/4	3/4-16	1 1/8	1.75	4.5	4.5
12-16 F5BU	3/4	1 5/16-12	1 1/2	1.81	4.0	
16 F5BU	1	1 5/16-12	1 1/2	1.81	4.0	4.0
16-12 F5BU	1	1 1/16-12	1 3/8	1.81	4.0	
16-20 F5BU	1	1 5/8-12	1 7/8	1.91	3.0	
20 F5BU	1 1/4	1 5/8-12	1 7/8	1.91	3.0	3.0
24 F5BU	1 1/2	1 7/8-12	2 1/8	1.97	3.0	3.0
32 F5BU	2	2 1/2-12	2 3/4	2.13	2.0	

FBU Full Dimensions

Male Connector
Flareless / NPTF

SAE 080102



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 FBU	1/8	1/8-27	7/16	1.04	5.0	5.0
2-4 FBU	1/8	1/4-18	9/16	1.24	5.0	5.0
3 FBU	3/16	1/8-27	7/16	1.09	5.0	5.0
4 FBU	1/4	1/8-27	1/2	1.12	5.0	5.0
4-4 FBU	1/4	1/4-18	9/16	1.32	5.0	5.0
4-6 FBU	1/4	3/8-18	3/4	1.33	5.0	5.0
4-8 FBU	1/4	1/2-14	7/8	1.58	5.0	5.0
5 FBU	5/16	1/8-27	9/16	1.12	5.0	5.0
5-4 FBU	5/16	1/4-18	9/16	1.32	5.0	5.0
6 FBU	3/8	1/4-18	5/8	1.34	5.0	5.0
6-2 FBU	3/8	1/8-27	5/8	1.15	5.0	5.0
6-6 FBU	3/8	3/8-18	3/4	1.35	5.0	5.0
6-8 FBU	3/8	1/2-14	15/16	1.60	5.0	5.0
8 FBU	1/2	3/8-18	13/16	1.44	5.0	5.0
8-4 FBU	1/2	1/4-18	13/16	1.44	5.0	5.0
8-8 FBU	1/2	1/2-14	7/8	1.69	5.0	5.0
8-12 FBU	1/2	3/4-14	1 1/8	1.76	4.0	4.0
10 FBU	5/8	1/2-14	15/16	1.75	4.5	4.5
10-6 FBU	5/8	3/8-18	15/16	1.56	4.5	4.5
10-12 FBU	5/8	3/4-14	1 1/8	1.82	4.0	
12 FBU	3/4	3/4-14	1 1/8	1.88	4.0	4.0
12-8 FBU	3/4	1/2-14	1 1/8	1.88	4.0	4.0
14 FBU	7/8	3/4-14	1 1/4	1.88	3.0	
16 FBU	1	1-11 1/2	1 3/8	2.07	3.0	3.0
16-12 FBU	1	3/4-14	1 3/8	1.88	3.0	3.0
20 FBU	1 1/4	1 1/4-11 1/2	1 11/16	2.18	2.5	2.5
24 FBU	1 1/2	1 1/2-11 1/2	2	2.28	2.5	2.5
32 FBU	2	2-11 1/2	2 3/4	2.46	2.0	2.0

Dimensions and pressures for reference only, subject to change.

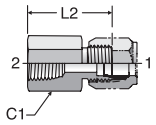
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GBU Full Dimensions

Female Connector
Flareless / NPTF

SAE 080103

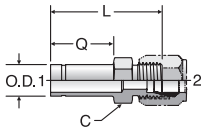


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C1 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 GBU	1/8	1/8-27	9/16	1.05	5.0	
4 GBU	1/4	1/8-27	9/16	1.09	5.0	5.0
4-4 GBU	1/4	1/4-18	3/4	1.29	5.0	5.0
5 GBU	5/16	1/8-27	9/16	1.08	5.0	
6 GBU	3/8	1/4-18	3/4	1.31	5.0	5.0
6-6 GBU	3/8	3/8-18	7/8	1.34	5.0	5.0
6-8 GBU	3/8	1/2-14	1 1/8	1.59	5.0	5.0
8 GBU	1/2	3/8-18	7/8	1.47	5.0	5.0
8-4 GBU	1/2	1/4-18	7/8	1.46	5.0	5.0
8-8 GBU	1/2	1/2-14	1 1/8	1.69	5.0	5.0
10 GBU	5/8	1/2-14	1 1/8	1.77	4.5	4.5
12 GBU	3/4	3/4-14	1 3/8	1.89	4.0	4.0
14 GBU	7/8	3/4-14	1 3/8	1.86	3.0	
16 GBU	1	1-11 1/2	1 5/8	2.13	3.0	3.0
20 GBU	1 1/4	1 1/4-	2	2.22	2.5	
24 GBU	1 1/2	1 1/2-	2 3/8	2.23	2.5	

TRBU Full Dimensions

Tube End Reducer
Tube / Flareless

SAE 080123

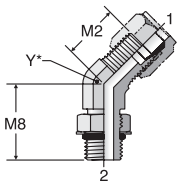


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C HEX (in.)	L (in.)	Q (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
6-4 TRBU	3/8	1/4	1/2	1.61	0.88	6.0	6.0
8-4 TRBU	1/2	1/4	9/16	1.73	1.00	5.0	5.0
8-6 TRBU	1/2	3/8	5/8	1.77	1.00	5.0	5.0
10-6 TRBU	5/8	3/8	11/16	1.86	1.09	5.0	
10-8 TRBU	5/8	1/2	13/16	1.95	1.09	4.5	4.5
12-6 TRBU	3/4	3/8	13/16	1.94	1.16	4.5	4.5
12-8 TRBU	3/4	1/2	13/16	2.03	1.16	4.5	4.5
12-10 TRBU	3/4	5/8	15/16	2.16	1.16	4.5	
14-10 TRBU	7/8	5/8	15/16	2.14	1.16	4.0	
16-8 TRBU	1	1/2	1 1/16	2.05	1.13	4.0	4.0
16-10 TRBU	1	5/8	1 1/16	2.11	1.13	4.0	
16-12 TRBU	1	3/4	1 1/8	2.25	1.13	4.0	4.0
20-16 TRBU	1 1/4	1	1 3/8	2.28	1.16	3.0	
24-12 TRBU	1 1/2	3/4	1 5/8	2.45	1.25	2.0	
24-16 TRBU	1 1/2	1	1 5/8	2.45	1.25	2.0	
24-20 TRBU	1 1/2	1 1/4	1 7/8	2.45	1.25	2.0	

V5BU Full Dimensions

45° Straight Thread Elbow
Flareless / SAE-ORB

SAE 080320



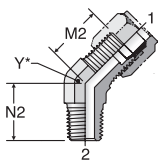
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M2 (in.)	M8 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 V5BU	1/4	7/16-20	0.70	1.05	7/16	5.0	5.0
6 V5BU	3/8	9/16-18	0.83	1.14	9/16	5.0	5.0
8 V5BU	1/2	3/4-16	0.98	1.30	3/4	5.0	
12 V5BU	3/4	1 1/16-12	1.27	1.73	1 1/16	4.0	
16 V5BU	1	1 5/16-12	1.36	1.86	1 5/16	3.0	

VBU Full Dimensions

45° Male Elbow
Flareless / NPTF

SAE 080302



* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M2 (in.)	N2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
3 VBU	3/16	1/8-27	0.64	0.53	7/16	5.0	
4 VBU	1/4	1/8-27	0.70	0.64	7/16	5.0	5.0
4-4 VBU	1/4	1/4-18	0.81	0.86	9/16	5.0	
5 VBU	5/16	1/8-27	0.75	0.66	9/16	5.0	
6 VBU	3/8	1/4-18	0.83	0.86	9/16	5.0	5.0
8 VBU	1/2	3/8-18	0.98	0.95	3/4	5.0	5.0
10 VBU	5/8	1/2-14	1.08	1.17	7/8	4.5	4.5
12 VBU	3/4	3/4-14	1.27	1.20	1 1/16	4.0	
14 VBU	7/8	3/4-14	1.34	1.30	1 5/16	3.0	
16 VBU	1	1-11 1/2	1.36	1.48	1 5/16	3.0	
20 VBU	1 1/4	1 1/4-11 1/2	1.45	1.67	1 5/8	2.5	

Dimensions and pressures for reference only, subject to change.

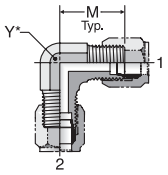
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EBU Full Dimensions

Union Elbow
Flareless / Flareless

SAE 080201

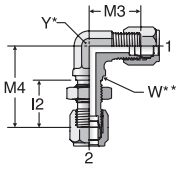


* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	M (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 EBU	1/8	1/8	0.78	7/16	5.0	
4 EBU	1/4	1/4	0.89	7/16	5.0	5.0
5 EBU	5/16	5/16	0.95	9/16	5.0	
6 EBU	3/8	3/8	1.05	9/16	5.0	5.0
8 EBU	1/2	1/2	1.25	3/4	5.0	5.0
10 EBU	5/8	5/8	1.42	7/8	4.5	4.5
12 EBU	3/4	3/4	1.58	1 1/16	4.0	4.0
14 EBU	7/8	7/8	1.66	1 5/16	3.0	
16 EBU	1	1	1.73	1 5/16	3.0	3.0
20 EBU	1 1/4	1 1/4	1.89	1 5/8	2.5	
24 EBU	1 1/2	1 1/2	2.02	1 7/8	2.0	2.0
32 EBU	2	2	2.45	2 1/2	1.5	

WEBU Full Dimensions

Bulkhead Union Elbow
Flareless / Flareless Bulkhead



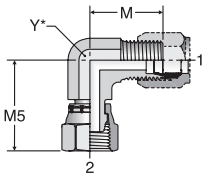
* Y – Across wrench flats.
W** – Bulkhead pilot dia. recommended clearance hole is +.015 over W dia.

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	I2 (in.)	M3 (in.)	M4 (in.)	W DIA (in.)	Y (in.)	Max. Bulkhead Thickness	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
6 WEBU	3/8	3/8	0.98	1.08	1.7	0.56	9/16	0.26	5.0	
8 WEBU	1/2	1/2	1.12	1.33	1.97	0.75	3/4	0.30	5.0	

C6BU Full Dimensions

Swivel Nut Elbow
Flareless / Flareless Swivel

SAE 080221



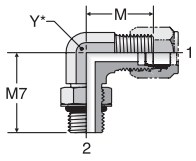
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 C6BU	1/4	1/4	0.89	1.00	7/16	5.0	5.0
6 C6BU	3/8	3/8	1.05	1.25	9/16	5.0	5.0
8 C6BU	1/2	1/2	1.25	1.38	3/4	5.0	5.0
10 C6BU	5/8	5/8	1.42	1.62	7/8	4.5	
12 C6BU	3/4	3/4	1.58	1.75	1 1/16	4.0	4.0
16 C6BU	1	1	1.73	2.00	1 5/16	3.0	
20 C6BU	1 1/4	1 1/4	1.89	2.31	1 5/8	2.5	

C5BU Full Dimensions

Straight Thread Elbow
Flareless / SAE-ORB

SAE 080220



* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
3 C5BU	3/16	3/8-24	0.84	0.94	7/16	5.0	5.0
4 C5BU	1/4	7/16-20	0.89	1.03	7/16	5.0	5.0
5 C5BU	5/16	1/2-20	0.95	1.13	9/16	5.0	5.0
6 C5BU	3/8	9/16-18	1.05	1.25	9/16	5.0	5.0
6-8 C5BU	3/8	3/4-16	1.14	1.45	3/4	5.0	
8 C5BU	1/2	3/4-16	1.25	1.45	3/4	5.0	5.0
8-6 C5BU	1/2	9/16-18	1.27	1.33	3/4	5.0	
8-10 C5BU	1/2	7/8-14	1.34	1.70	7/8	4.5	
8-12 C5BU	1/2	1 1/16-12	1.43	1.94	1 1/16	4.0	
10 C5BU	5/8	7/8-14	1.42	1.70	7/8	4.5	4.5
12 C5BU	3/4	1 1/16-12	1.58	1.94	1 1/16	4.0	4.0
12-8 C5BU	3/4	3/4-16	1.58	1.63	1 1/16	4.0	
12-10 C5BU	3/4	7/8-14	1.58	1.78	1 1/16	4.0	
12-16 C5BU	3/4	1 5/16-12	1.73	2.05	1 5/16		
16 C5BU	1	1 5/16-12	1.73	2.05	1 5/16	3.0	3.0
16-12 C5BU	1	1 1/16-12	1.73	2.05	1 5/16	3.0	
20 C5BU	1 1/4	1 5/8-12	1.89	2.25	1 5/8	2.5	
24 C5BU	1 1/2	1 7/8-12	2.02	2.39	1 7/8	2.0	2.0
32 C5BU	2	2 1/2-12	2.45	2.89	2 1/2	1.5	

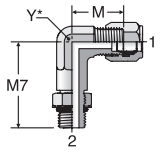
Dimensions and pressures for reference only, subject to change.

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CC5BU Full Dimensions

Straight Thread Elbow
Flareless / SAE-ORB Long



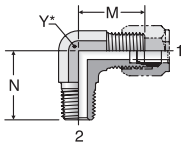
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 CC5BU	1/4	7/16-20	0.89	1.43	7/16	5.0	
6 CC5BU	3/8	9/16-18	1.05	1.72	9/16	5.0	
8 CC5BU	1/2	3/4-16	1.25	2.02	3/4	5.0	
10 CC5BU	5/8	7/8-14	1.42	2.39	7/8	4.5	
12 CC5BU	3/4	1 1/16-12	1.58	2.69	1 1/16	4.0	
16 CC5BU	1	1 5/16-12	1.73	3.13	1 5/16	3.0	

CBU Full Dimensions

Male Elbow
Flareless / NPTF

SAE 080202



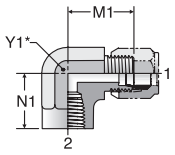
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 CBU	1/8	1/8-27	0.77	0.72	7/16	5.0	5.0
3 CBU	3/16	1/8-27	0.83	0.72	7/16	5.0	
4 CBU	1/4	1/8-27	0.89	0.78	7/16	5.0	5.0
4-4 CBU	1/4	1/4-18	1.03	1.09	9/16	5.0	5.0
4-6 CBU	1/4	3/8-18	1.12	1.22	3/4	5.0	5.0
5 CBU	5/16	1/8-27	0.95	0.81	9/16	5.0	5.0
5-4 CBU	5/16	1/4-18	1.03	1.09	9/16	5.0	5.0
6 CBU	3/8	1/4-18	1.05	1.09	9/16	5.0	5.0
6-2 CBU	3/8	1/8-27	1.05	0.90	9/16	5.0	5.0
6-6 CBU	3/8	3/8-18	1.14	1.22	3/4	5.0	5.0
6-8 CBU	3/8	1/2-14	1.24	1.47	7/8	5.0	5.0
8 CBU	1/2	3/8-18	1.25	1.22	3/4	5.0	5.0
8-4 CBU	1/2	1/4-18	1.25	1.16	3/4	5.0	5.0
8-8 CBU	1/2	1/2-14	1.35	1.47	7/8	5.0	5.0
8-12 CBU	1/2	3/4-14	1.43	1.59	1 1/16	4.0	
10 CBU	5/8	1/2-14	1.42	1.47	7/8	4.5	4.5
10-6 CBU	5/8	3/8-18	1.42	1.28	7/8	4.5	
12 CBU	3/4	3/4-14	1.58	1.59	1 1/16	4.0	4.0
12-8 CBU	3/4	1/2-14	1.58	1.59	1 1/16	4.0	4.0
14 CBU	7/8	3/4-14	1.66	1.69	1 5/16	3.0	
16 CBU	1	1-11 1/2	1.73	1.97	1 5/16	3.0	3.0
16-12 CBU	1	3/4-14	1.73	1.78	1 5/16	3.0	3.0
20 CBU	1 1/4	1 1/4-11 1/2	1.89	2.38	1 5/8	2.5	2.5
24 CBU	1 1/2	1 1/2-11 1/2	2.02	2.64	1 7/8	2.5	2.5
32 CBU	2	2-11 1/2	2.45	3.00	2 1/2	2.0	

DBU Full Dimensions

Female Elbow
Flareless / NPTF

SAE 080203



* Y1 – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 DBU	1/4	1/8-27	0.89	0.66	9/16	5.0	5.0
4-4 DBU	1/4	1/4-18	1.03	0.88	3/4	5.0	5.0
5 DBU	5/16	1/8-27	0.95	0.66	9/16	5.0	
6 DBU	3/8	1/4-18	1.05	0.88	3/4	5.0	5.0
6-6 DBU	3/8	3/8-18	1.13	1.02	7/8	4.5	4.5
8 DBU	1/2	3/8-18	1.23	1.02	7/8	3.0	3.0
8-4 DBU	1/2	1/4-18	1.23	0.88	3/4	5.0	5.0
8-8 DBU	1/2	1/2-14	1.34	1.23	1 1/16	3.0	3.0
10 DBU	5/8	1/2-14	1.42	1.23	1 1/16	3.0	3.0
12 DBU	3/4	3/4-14	1.58	1.36	1 5/16	3.0	3.0
14 DBU	7/8	3/4-14	1.62	1.42	1 5/16	3.0	
16 DBU	1	1-11 1/2	1.73	1.63	1 5/8	1.7	
20 DBU	1 1/4	1 1/4-11 1/2	2.08	1.70	1 7/8	1.5	
24 DBU	1 1/2	1 1/2-11 1/2	2.58	2.08	2 1/2	1.0	

Dimensions and pressures for reference only, subject to change.

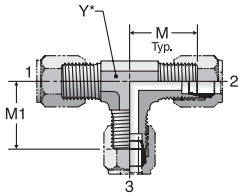
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JBU Full Dimensions

Union Tee
Flareless (all three ends)

SAE 080401



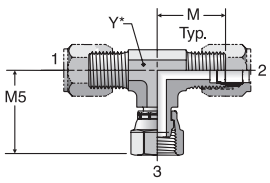
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 (in.)	M (in.)	M1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 JBU	1/8	1/8	1/8	0.77	0.77	7/16	5.0	
3 JBU	3/16	3/16	3/16	0.84	0.84	7/16	5.0	
4 JBU	1/4	1/4	1/4	0.89	0.89	7/16	5.0	5.0
5 JBU	5/16	5/16	5/16	0.95	0.95	9/16	5.0	5.0
6 JBU	3/8	3/8	3/8	1.05	1.05	9/16	5.0	5.0
8 JBU	1/2	1/2	1/2	1.25	1.25	3/4	5.0	5.0
8-8-6 JBU	1/2	1/2	3/8	1.25	1.14	3/4	5.0	
10 JBU	5/8	5/8	5/8	1.42	1.42	7/8	4.5	4.5
12 JBU	3/4	3/4	3/4	1.58	1.58	1 1/16	4.0	4.0
14 JBU	7/8	7/8	7/8	1.66	1.66	1 5/16	3.0	
16 JBU	1	1	1	1.73	1.73	1 5/16	3.0	3.0
20 JBU	1 1/4	1 1/4	1 1/4	1.89	1.89	1 5/8	2.5	2.5
24 JBU	1 1/2	1 1/2	1 1/2	2.02	2.02	1 7/8	2.0	2.0

S6BU Full Dimensions

Swivel Nut Branch Tee
Flareless / Flareless
Swivel

SAE 080202



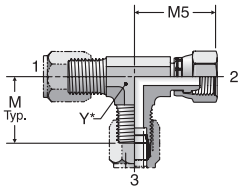
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 (in.)	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 S6BU	1/4	1/4	1/4	0.89	1.00	7/16	5.0	5.0
6 S6BU	3/8	3/8	3/8	1.05	1.25	9/16	5.0	5.0
8 S6BU	1/2	1/2	1/2	1.25	1.38	3/4	5.0	5.0
12 S6BU	3/4	3/4	3/4	1.58	1.75	1 1/16	4.0	4.0

R6BU Full Dimensions

Swivel Nut Run Tee
Flareless / Flareless
Swivel

SAE 080432



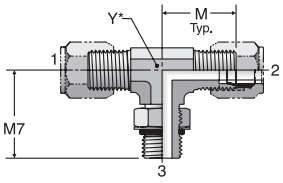
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 (in.)	M (in.)	M5 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 R6BU	1/4	1/4	1/4	0.89	1.00	7/16	5.0	5.0
6 R6BU	3/8	3/8	3/8	1.05	1.25	9/16	5.0	5.0
8 R6BU	1/2	1/2	1/2	1.25	1.38	3/4	5.0	5.0
12 R6BU	3/4	3/4	3/4	1.58	1.75	1 1/16	4.0	4.0
16 R6BU	1	1	1	1.73	2.00	1 5/16	3.0	

S5BU Full Dimensions

Straight Thread
Branch Tee
Flareless / SAE-ORB

SAE 080429



* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 UN/UNF-2A	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 S5BU	1/4	1/4	7/16-20	0.89	1.03	7/16	5.0	5.0
6 S5BU	3/8	3/8	9/16-18	1.05	1.25	9/16	5.0	5.0
8 S5BU	1/2	1/2	3/4-16	1.25	1.45	3/4	5.0	5.0
12 S5BU	3/4	3/4	1 1/16-12	1.58	1.94	1 1/16	4.0	4.0
16 S5BU	1	1	1 5/16-12	1.73	2.05	1 5/16	3.0	

Dimensions and pressures for reference only, subject to change.

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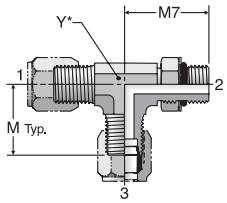
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R5BU Full Dimensions

Straight Thread Run Tee
Flareless / SAE-ORB

SAE 080428



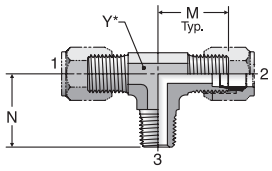
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 UN/UNF-2A	3 (in.)	M (in.)	M7 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 R5BU	1/4	7/16-20	1/4	0.89	1.03	7/16	5.0	5.0
6 R5BU	3/8	9/16-18	3/8	1.05	1.25	9/16	5.0	5.0
8 R5BU	1/2	3/4-16	1/2	1.25	1.45	3/4	5.0	5.0
10 R5BU	5/8	7/8-14	5/8	1.42	1.70	7/8	4.5	
12 R5BU	3/4	1 1/16-12	3/4	1.58	1.94	1 1/16	4.0	4.0
16 R5BU	1	1 5/16-12	1	1.73	2.05	1 5/16	3.0	

SBU Full Dimensions

Male Branch Tee
Flareless / NPTF

SAE 080425



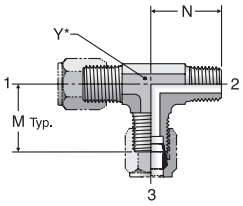
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 SBU	1/8	1/8	1/8-27	0.77	0.72	7/16	5.0	5.0
4 SBU	1/4	1/4	1/8-27	0.89	0.78	7/16	5.0	5.0
4-4-4 SBU	1/4	1/4	1/4-18	1.03	1.09	9/16	5.0	5.0
5 SBU	5/16	5/16	1/8-27	0.95	0.81	9/16	5.0	
6 SBU	3/8	3/8	1/4-18	1.05	1.09	9/16	5.0	5.0
8 SBU	1/2	1/2	3/8-18	1.25	1.22	3/4	5.0	5.0
8-8-8 SBU	1/2	1/2	1/2-14	1.35	1.47	7/8	5.0	5.0
10 SBU	5/8	5/8	1/2-14	1.42	1.47	7/8	4.5	
12 SBU	3/4	3/4	3/4-14	1.58	1.59	1 1/16	4.0	4.0
14 SBU	7/8	7/8	3/4-14	1.66	1.69	1 5/16	3.0	
16 SBU	1	1	1-11 1/2	1.73	1.97	1 5/16	3.0	3.0

RBU Full Dimensions

Male Run Tee
Flareless / NPTF

SAE 080424



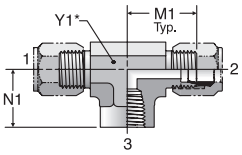
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 NPTF	3 (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 RBU	1/4	1/8-27	1/4	0.89	0.78	7/16	5.0	5.0
4-4-4 RBU	1/4	1/4-18	1/4	1.03	1.09	9/16	5.0	5.0
5 RBU	5/16	1/8-27	5/16	0.95	0.81	9/16	5.0	
6 RBU	3/8	1/4-18	3/8	1.05	1.09	9/16	5.0	5.0
8 RBU	1/2	3/8-18	1/2	1.25	1.22	3/4	5.0	
8-8-8 RBU	1/2	1/2-14	1/2	1.34	1.47	7/8	5.0	5.0
10 RBU	5/8	1/2-14	5/8	1.42	1.47	7/8	4.5	
12 RBU	3/4	3/4-14	3/4	1.58	1.59	1 1/16	4.0	4.0
14 RBU	7/8	3/4-14	7/8	1.62	1.69	1 5/16	3.0	
16 RBU	1	1-11 1/2	1	1.73	1.97	1 5/16	3.0	

OBU Full Dimensions

Female Branch Tee
Flareless / NPTF

SAE 080427



* Y1 – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 OBU	1/4	1/4	1/8-27	0.89	0.66	9/16	5.0	5.0
4-4-4 OBU	1/4	1/4	1/4-18	1.03	0.88	3/4	5.0	5.0
6 OBU	3/8	3/8	1/4-18	1.05	0.88	3/4	5.0	5.0
8 OBU	1/2	1/2	3/8-18	1.23	1.02	7/8	3.0	3.0
10 OBU	5/8	5/8	1/2-14	1.42	1.23	1 1/16	3.0	
12 OBU	3/4	3/4	3/4-14	1.58	1.36	1 5/16	3.0	
14 OBU	7/8	7/8	3/4-14	1.62	1.42	1 5/16	3.0	
16 OBU	1	1	1-11 1/2	1.73	1.62	1 5/8	1.7	
20 OBU	1 1/4	1 1/4	1 1/4-11 1/2	2.08	1.70	1 7/8	1.5	

Dimensions and pressures for reference only, subject to change.

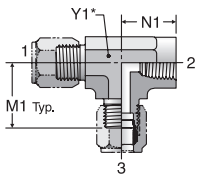
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MBU Full Dimensions

Female Run Tee
Flareless / NPTF

SAE 080426



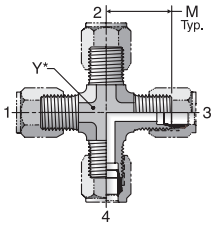
* Y1 – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	END SIZE 3 (in.)	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 MBU	1/4	1/8-27	1/4	0.89	0.66	9/16	5.0	
6 MBU	3/8	1/4-18	3/8	1.05	0.88	3/4	5.0	
8 MBU	1/2	3/8-18	1/2	1.23	1.02	7/8	3.0	
10 MBU	5/8	1/2-14	5/8	1.42	1.23	1 1/16	3.0	
12 MBU	3/4	3/4-14	3/4	1.58	1.36	1 5/16	3.0	
16 MBU	1	1-11 1/2	1	1.73	1.62	1 5/8	1.7	

KBU Full Dimensions

Union Cross
Flareless (all four ends)

SAE 080501



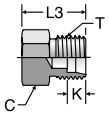
* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1-4 (in.)	M (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 KBU	1/4	0.89	7/16	5.0	5.0
6 KBU	3/8	1.05	9/16	5.0	5.0
8 KBU	1/2	1.25	3/4	5.0	5.0
12 KBU	3/4	1.58	1 1/16	4.0	

PNU

Plug
Flareless

SAE 080109

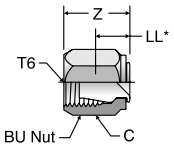


TUBE FITTING PART #	TUBE O.D. (in.)	T TUBE END UN/UNF-2A	C HEX (in.)	K (in.)	L3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 PNU	1/8	5/16-24	7/16	0.19	0.63	6.0	
4 PNU	1/4	7/16-20	1/2	0.24	0.72	6.0	6.0
5 PNU	5/16	1/2-20	9/16	0.26	0.72	6.0	
6 PNU	3/8	9/16-18	5/8	0.26	0.75	6.0	6.0
8 PNU	1/2	3/4-16	13/16	0.31	0.84	5.0	5.0
10 PNU	5/8	7/8-14	15/16	0.36	0.97	5.0	
12 PNU	3/4	1 1/16-12	1 1/8	0.36	1.09	4.5	4.5
16 PNU	1	1 5/16-12	1 3/8	0.42	1.09	4.0	

FNU

Cap
Flareless Swivel

SAE 080112



* LL – Fitting end to rear of plug

TUBE FITTING PART #	TUBE O.D. (in.)	T6 UN/UNF-2B	C HEX (in.)	LL (in.)	Z (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
2 FNU	1/8	5/16-24	3/8	0.34	0.55		6.0
4 FNU	1/4	7/16-20	9/16	0.36	0.73	6.0	6.0
5 FNU	5/16	1/2-20	5/8	0.40	0.77	6.0	
6 FNU	3/8	9/16-18	11/16	0.42	0.80	6.0	6.0
8 FNU	1/2	3/4-16	7/8	0.44	0.87	5.0	5.0
10 FNU	5/8	7/8-14	1	0.47	0.98	5.0	5.0
12 FNU	3/4	1 1/16-12	1 1/4	0.48	1.00	4.5	4.5
16 FNU	1	1 5/16-12	1 1/2	0.58	1.08	4.0	4.0
20 FNU	1 1/4	1 5/8-12	2	0.64	1.11	3.0	

Dimensions and pressures for reference only, subject to change.

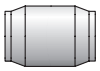
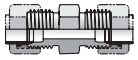
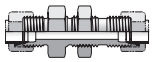
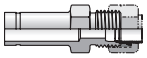
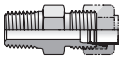
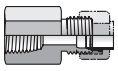
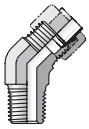
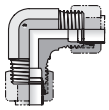
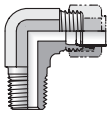
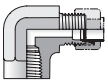
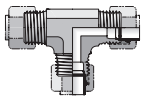
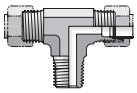
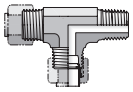
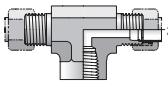
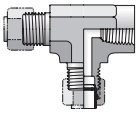
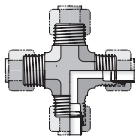
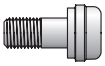
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Intru-Lok® Flareless Bite Type Fittings



The Fitting Authority

Nuts, Ferrules, Inserts	**BIP** Knurled Nut  E6	**BI2** Nut  E6	**BTI2** Nut and Ferrule  E6	**TI2** Ferrule  E6	**TIP** Expander / Insert  E6
T23UI Insert  E6	**Straights**	**HBI2** Union  E7	**WBI2** Bulkhead Union  E7	**TRBI2** Tube End Reducer  E7	**FBI2** NPTF / Intru-Lok  E7
GBI2 NPTF / Intru-Lok  E7	**45° Elbow**	**VBI2** NPTF / Intru-Lok  E7	**90° Elbows**	**EBI2** Union Elbow  E8	**CBI2** NPTF / Intru-Lok  E8
DBI2 NPTF / Intru-Lok  E8	**Tees**	**JBI2** Union Tee  E8	**SBI2** NPTF Branch Tee  E8	**RBI2** NPTF Run Tee  E8	**OBI2** NPTF Branch Tee  E9
MBI2 NPTF Run Tee  E9	**Cross**	**KBI2** Union Cross  E9	**Plugs and Caps**	**PNI** Plug  E9	**FNI** Cap  E9
T22X Mountie  C37					

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Visual Index

Introduction

The Intru-Lok bite type fitting was developed by Parker Hannifin and introduced to the U.S. market in the late 1950's. This fitting addresses those applications that require a bite by the ferrule in brass, copper, aluminum and plastic tubing systems. The Intru-Lok fitting is a flareless fitting that consists of a body, a one-piece precision-machined ferrule, and a nut. On assembly, the ferrule "bites" into the outer surface of the tube with sufficient strength to hold the tube against pressure. The ferrule also forms a pressure seal against the fitting body.

Intru-Lok fittings allow the fitting assembler to visually inspect the bite quality, thus significantly minimizing the risk of improper assembly and related service problems.

Intru-Lok fittings are routinely used in markets, such as: Machine tools, chemical, oil refineries, paper making, thermo-plastics processing, air and lube lines, pilot lines, panel boards, etc.

Design and Construction

The three components of Intru-Lok fittings are designed and manufactured to produce a reliable, leak free joint upon assembly.

The Intru-Lok Body – Intru-Lok fittings' bodies are available in over fifteen configurations. The shaped products (i.e., elbows, tees, and crosses) are hot forged, then machined to the stringent Intru-Lok fitting specifications. Straight products are made from cold drawn bar stock. The cold drawing operation ensures consistently tight dimensional tolerances, as well as significantly improved strength.

The Intru-Lok Ferrule – Intru-Lok fitting ferrules are precision machined with all dimensions and surfaces, particularly the critical bite edge, monitored on an ongoing basis.

The Intru-Lok Nuts – Intru-Lok fitting nuts are machined from cold drawn bar stock. The cold drawing operation provides a more tightly packed grain structure, thus improving the material's strength. In addition, cold forming significantly improves the fatigue properties or endurance limits of the nuts.

How Intru-Lok Fittings Work

In assembly, the ferrule is driven forward on the tube by the nut during pre-set. As the ferrule moves forward it contacts the tapered seat area of the body, which causes the ferrule to cam inward into the tube. The leading edge of the ferrule is thus able to make a clean 360 degree cut into the outside diameter of the tubing. This cut in the tubing is often referred to as a "Bite"; thus the term: **Bite Type Fitting**. As the ferrule makes its bite, a small ridge of tube material is raised up in front of the ferrule.

Assembly and Installation

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

Pressure Rating

The contact of the tube ridge with the ferrule's front face and bite edge gives the fitting its ability to retain pressure without leaking or blowing off. When properly assembled to the recommended tubing, Intru-Lok fittings will consistently seal up to 1500 psi working pressure in all sizes.



Fig. E1 – Intru-Lok Components: Body, Ferrule and Nut

Intru-Lok Fittings	Brass	
	ASTM	Type
Forged Bodies	B124	CA377
Bar Stock Bodies	B16	CA360
	B453	CA345
Bar Stock Tube Nuts	B16	CA360
Tube Ferrules	B16	CA360

Table E1 – Standard Material Specifications for Intru-Lok Fittings

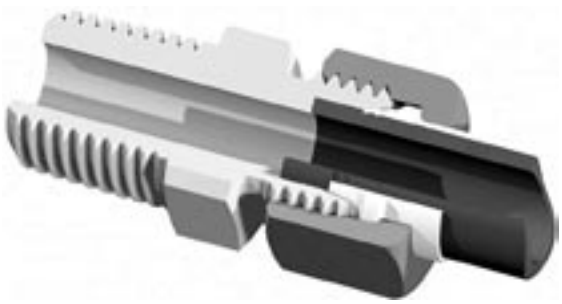


Fig. E2 – Assembled Intru-Lok Fitting

Dimensions and pressures for reference only, subject to change.

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Visual Index

Intru-Lok Features

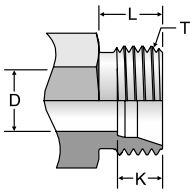
Feature	Advantage	Benefit
1500 PSI pressure rating	Relatively high pressure rating	Versatility and reliability
Brass construction	Media compatability	Easily used for instrumentation, pilot, pneumatic, water, and lube lines
Tube Material compatability	For use with copper, aluminum, and many thermoplastic tube materials	Versatility, especially with instrumentation applications
Bite type design	Bite-type design assures safe leak-free, and vibration resistant connection compared to compression fittings	Reliability and greater holding power
Visible bite shows proper assembly	Risk associated with tube blowout is virtually eliminated	Reliability
Forged bodies	High impact strength and fatigue resistance	Long service life
Ferrule and nut do not have to be removed for assembly	Easy make up procedure	Quick and repeatable installation procedures
Low assembly torque	Easy installation	Quick installation
Captive Ferrules	Cannot reverse ferrule orientation	Error proof assembly
Additional clearance on backhole of tube nuts	Allows for tube nut to slide around bent tube	Tighter and neater tube bends and installation
Temperature Rating	-65°F to + 400°F temperature rating	Versatility
Knurled nut (optional for use with plastic tube)	Quick installation in areas where wrench clearances are not available (tighten by hand)	Quick assembly and disassembly. No tools required

Table E2 — Features, Advantages and Benefits of Using Intru-Lok Fittings

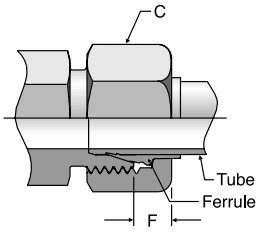
Dimensions and pressures for reference only, subject to change.

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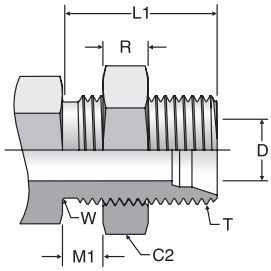
Intrulok Flareless Tube Ends



Intrulok Male Stud Tube End



Intrulok Tube End Assembly



Intrulok Straight Bulkhead

		Thread	Tube Nut Hex	Bulhkead Locknut Hex	Max Drill	Allowance		Male Turn Back	Bulkhead			Max Bulkhead Thickness
						Tube Nut Assembled	Tube		Length	Locknut Thickness	Pilot Dia	
SAE Dash Size	**Tube O.D.** (in.)	**T** UN/UNF	**C** (in.)	**C2** (in.)	**D** (in)	**F** (in)	**K** (in)	**L** (in)	**L1** (in)	**R** (in)	**W**[1)] (in)	**M1** (in)
2	1/8	5/16-24	3/8	9/16	0.093	0.13	0.19	0.28	NA	NA	NA	NA
3	3/16	3/8-24	7/16	5/8	0.125	0.15	0.24	0.25	NA	NA	NA	NA
4	1/4	7/16-20	1/2	11/16	0.203	0.16	0.24	0.30	0.88	0.28	0.44	0.28
5	5/16	1/2-20	9/16	3/4	0.234	0.18	0.26	0.33	NA	NA	NA	NA
6	3/8	9/16-18	5/8	13/16	0.282	0.19	0.26	0.36	0.94	0.27	0.56	0.31
8	1/2	3/4-16	7/8	1	0.422	0.23	0.31	0.44	1.06	0.31	0.75	0.31

1) Recommended clearance hole +0.015 over W dia

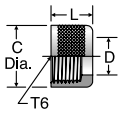
Dimensions and pressures for reference only, subject to change.

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Visual Index
How To Order
Specs
Assembly / Installation
Reference Section

BIP*

Knurled Nut
Intru-Lok

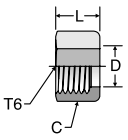


TUBE FITTING PART #	END SIZE (in.)	T6 TUBE END UN/UNF-2B	D2 DIA. (in.)	D (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -B
4 BIP	1/4	7/16-20	0.5	0.26	0.39	•
6 BIP	3/8	9/16-18	0.63	0.38	0.42	•

* For use with thermoplastic tube and TIP expander / insert.

BI2

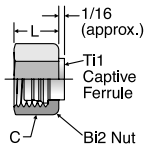
Nut
Intru-Lok



TUBE FITTING PART #	END SIZE (in.)	T6 TUBE END UN/UNF-2B	C HEX (in.)	D (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -B
2 BI2	1/8	5/16-24	3/8	0.17	0.36	•
3 BI2	3/16	3/8-24	7/16	0.23	0.34	•
4 BI2	1/4	7/16-20	1/2	0.3	0.44	•
5 BI2	5/16	1/2-20	9/16	0.36	0.45	•
6 BI2	3/8	9/16-18	5/8	0.42	0.45	•
8 BI2	1/2	3/4-16	7/8	0.56	0.58	•

BTI2

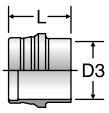
Nut and Ferrule
Intru-Lok



TUBE FITTING PART #	END SIZE (in.)	C HEX (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -B
2 BTI2	1/8	3/8	0.36	•
3 BTI2	3/16	7/16	0.34	•
4 BTI2	1/4	1/2	0.44	•
5 BTI2	5/16	9/16	0.45	•
6 BTI2	3/8	5/8	0.45	•
8 BTI2	1/2	7/8	0.58	•

TI2

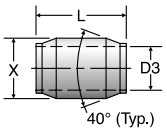
Ferrule
Intru-Lok



TUBE FITTING PART #	TUBE O.D. (in.)	D3 (in.)	L (in.)	STANDARD MATERIAL FROM STOCK -B
2 TI2	1/8	0.13	0.35	•
3 TI2	3/16	0.19	0.39	•
4 TI2	1/4	0.26	0.4	•
5 TI2	5/16	0.32	0.42	•
6 TI2	3/8	0.38	0.41	•
8 TI2	1/2	0.51	0.52	•

TIP*

Expander / Insert

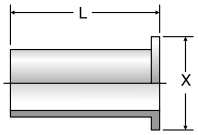


TUBE FITTING PART #	TUBE O.D. (in.)	D3 (in.)	L (in.)	X DIA (in.)	STANDARD MATERIAL FROM STOCK -B
4 TIP	1/4	0.14	0.45	0.22	•
6 TIP	3/8	0.22	0.45	0.3	•

* For use with thermoplastic tube and BIP nut.

T23UI

Insert



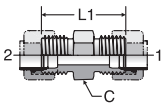
TUBE FITTING PART #	TUBE O.D. (in.)	TUBE WALL THICKNESS (in.)	L (in.)	X DIA (in.)	STANDARD MATERIAL FROM STOCK -B
4 T23UI	1/4	0.04	0.53	0.23	•
5 T23UI	5/16	0.062	0.56	0.29	•
6 T23UI	3/8	0.062	0.56	0.35	•
8 T23UI	1/2	0.062	0.64	0.47	•

Dimensions and pressures for reference only, subject to change.

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HBI2 Full Dimensions

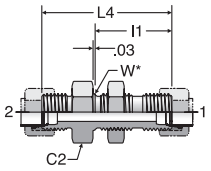
Union
Intru-Lok / Intru-Lok



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 HBI2	1/8	1/8	3/8	0.81	1.5
3 HBI2	3/16	3/16	3/8	0.75	1.5
4 HBI2	1/4	1/4	7/16	0.84	1.5
5 HBI2	5/16	5/16	1/2	0.91	1.5
6 HBI2	3/8	3/8	9/16	1.03	1.5
8 HBI2	1/2	1/2	3/4	1.19	1.5

WBI2 Full Dimensions

Bulkhead Union
Intru-Lok / Intru-Lok

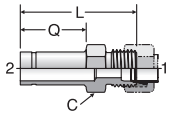


* W – Pilot drill diameter

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C2 HEX (in.)	I1 (in.)	L4 (in.)	W DIA (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 WBI2	1/4	1/4	9/16	0.88	1.34	0.44	1.5
6 WBI2	3/8	3/8	11/16	0.94	1.56	0.56	1.5
8 WBI2	1/2	1/2	7/8	1.06	1.75	0.75	1.5

TRBI2 Full Dimensions

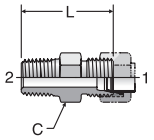
Tube End Reducer
Intru-Lok



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C HEX (in.)	L (in.)	Q (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4-3 TRBI2	1/4	3/16	7/16	1	0.56	1.5
6-4 TRBI2	3/8	1/4	7/16	1.06	0.59	1.5
8-4 TRBI2	1/2	1/4	9/16	1.3	0.75	1.5

FBI2 Full Dimensions

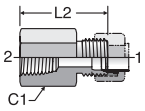
Male Connector
Intru-Lok / NPTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 FBI2	1/8	1/8-27	7/16	0.86	1.5
3 FBI2	3/16	1/8-27	7/16	0.81	1.5
4 FBI2	1/4	1/8-27	7/16	0.88	1.5
4-4 FBI2	1/4	1/4-18	9/16	1.08	1.5
4-8 FBI2	1/4	1/2-14	7/8	1.31	1.5
5 FBI2	5/16	1/8-27	1/2	0.94	1.5
5-4 FBI2	5/16	1/4-18	9/16	1.14	1.5
6 FBI2	3/8	1/4-18	9/16	1.17	1.5
6-2 FBI2	3/8	1/8-27	9/16	0.97	1.5
6-6 FBI2	3/8	3/8-18	11/16	1.19	1.5
6-8 FBI2	3/8	1/2-14	7/8	1.42	1.5
8 FBI2	1/2	3/8-18	3/4	1.28	1.5
8-4 FBI2	1/2	1/4-18	3/4	1.27	1.5
8-8 FBI2	1/2	1/2-14	7/8	1.5	1.5

GBI2 Full Dimensions

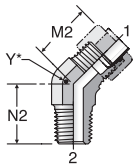
Female Connector
Intru-Lok / NPTF



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C1 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 GBI2	1/8	1/8-27	9/16	0.78	1.5
3 GBI2	3/16	1/8-27	9/16	0.75	1.5
4 GBI2	1/4	1/8-27	9/16	0.8	1.5
4-4 GBI2	1/4	1/4-18	3/4	0.97	1.5
6 GBI2	3/8	1/4-18	3/4	0.98	1.5
6-2 GBI2	3/8	1/8-27	9/16	0.86	1.5
6-6 GBI2	3/8	3/8-18	7/8	1.08	1.5
6-8 GBI2	3/8	1/2-14	1 1/8	1.23	1.5
8 GBI2	1/2	3/8-18	7/8	1.16	1.5
8-4 GBI2	1/2	1/4-18	13/16	1.16	1.5
8-8 GBI2	1/2	1/2-14	1 1/8	1.31	1.5

VBI2 Full Dimensions

45° Male Elbow
Intru-Lok / NPTF



Y* – Across wrench flats

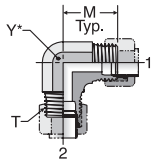
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M2 (in.)	N2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 VBI2	1/4	1/8-27	0.5	0.63	7/16	1.5
5 VBI2	5/16	1/8-27	0.59	0.63	9/16	1.5
6 VBI2	3/8	1/4-18	0.69	0.84	9/16	1.5

Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
http://www.parker.com/tfd

EBI2 Full Dimensions

Union Elbow
Intru-Lok / Intru-Lok

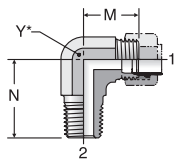


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	M (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 EBI2	1/4	1/4	0.67	7/16	1.5
6 EBI2	3/8	3/8	0.72	9/16	1.5
8 EBI2	1/2	1/2	0.89	3/4	1.5

CBI2 Full Dimensions

Male Elbow
Intru-Lok / NPTF

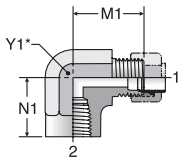


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 CBI2	1/8	1/8-27	0.66	0.69	5/16	1.5
3 CBI2	3/16	1/8-27	0.56	0.67	3/8	1.5
4 CBI2	1/4	1/8-27	0.59	0.69	3/8	1.5
4-4 CBI2	1/4	1/4-18	0.72	0.91	9/16	1.5
5 CBI2	5/16	1/8-27	0.8	0.74	9/16	1.5
5-4 CBI2	5/16	1/4-18	0.78	0.91	9/16	1.5
6 CBI2	3/8	1/4-18	0.72	0.91	9/16	1.5
6-2 CBI2	3/8	1/8-27	0.72	0.81	9/16	1.5
6-6 CBI2	3/8	3/8-18	0.86	1	3/4	1.5
6-8 CBI2	3/8	1/2-14	1	1.27	5/8	1.5
8 CBI2	1/2	3/8-18	0.88	1	3/4	1.5
8-4 CBI2	1/2	1/4-18	0.88	1.06	3/4	1.5
8-8 CBI2	1/2	1/2-14	1.09	1.38	7/8	1.5

DBI2 Full Dimensions

Female Elbow
Intru-Lok / NPTF

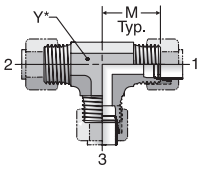


Y1* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 1 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 DBI2	1/8	1/8-27	0.69	0.53	9/16	1.5
3 DBI2	3/16	1/8-27	0.66	0.53	9/16	1.5
4 DBI2	1/4	1/8-27	0.72	0.55	9/16	1.5
4-4 DBI2	1/4	1/4-18	0.84	0.69	3/4	1.5
6 DBI2	3/8	1/4-18	0.92	0.69	3/4	1.5
6-6 DBI2	3/8	3/8-18	1	0.81	7/8	1.5
8-8 DBI2	1/2	1/2-14	1.13	0.94	1	1.5

JBI2 Full Dimensions

Union Tee
Intru-Lok (all three ends)

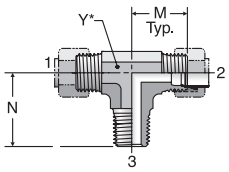


Y1* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	END SIZE 3 (in.)	M (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 JBI2	1/8	1/8	1/8	0.63	5/16	1.5
3 JBI2	3/16	3/16	3/16	0.59	3/8	1.5
4 JBI2	1/4	1/4	1/4	0.59	3/8	1.5
5 JBI2	5/16	5/16	5/16	0.66	9/16	1.5
6 JBI2	3/8	3/8	3/8	0.72	9/16	1.5
8 JBI2	1/2	1/2	1/2	0.88	3/4	1.5

SBI2 Full Dimensions

Male Branch Tee
Intru-Lok / Intru-Lok / NPTF

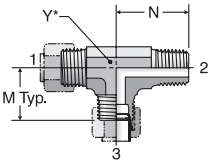


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	END SIZE 3 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 SBI2	1/8	1/8	1/8-27	0.63	0.69	11/32	1.5
4 SBI2	1/4	1/4	1/8-27	0.61	0.78	3/8	1.5
4-4-4 SBI2	1/4	1/4	1/4-18	0.75	0.98	3/8	1.5
6 SBI2	3/8	3/8	1/4-18	0.72	0.91	9/16	1.5

RBI2 Full Dimensions

Male Run Tee
Intru-Lok / NPTF / Intru-Lok



Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	END SIZE 3 (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 RBI2	1/8	1/8/27	1/8	0.63	0.69	5/16	1.5
3 RBI2	3/16	1/8-27	3/16	0.59	0.69	3/8	1.5
4 RBI2	1/4	1/8-27	1/4	0.59	0.69	3/8	1.5
4-4-4 RBI2	1/4	1/4-18	1/4	0.75	0.98	9/16	1.5
6 RBI2	3/8	1/4-18	3/8	1.05	1.07	9/16	1.5

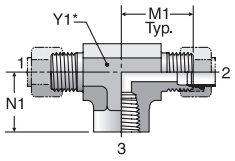
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index
How To Order
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OBI2 Full Dimensions

Female Branch Tee
Intru-Lok / NPTF

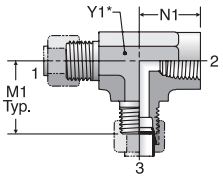


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 OBI2	1/4	1/4	1/8-27	0.72	0.53	9/16	1.5
4-4-4 OBI2	1/4	1/4	1/4-18	0.86	0.69	3/4	1.5
6 OBI2	3/8	3/8	1/4-18	0.92	0.69	3/4	1.5
8 OBI2	1/2	1/2	3/8-18	1.09	0.81	7/8	1.5

MBI2 Full Dimensions

Female Run Tee
Intru-Lok / NPTF / Intru-Lok

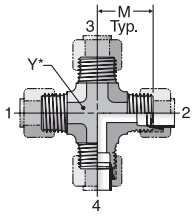


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 NPTF	M1 (in.)	N1 (in.)	Y1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 OBI2	1/4	1/4	1/8-27	0.72	0.53	9/16	1.5
4-4-4 OBI2	1/4	1/4	1/4-18	0.86	0.69	3/4	1.5
6 OBI2	3/8	3/8	1/4-18	0.92	0.69	3/4	1.5
8 OBI2	1/2	1/2	3/8-18	1.09	0.81	7/8	1.5

KBI2 Full Dimensions

Union Cross
Intru-Lok (all four ends)

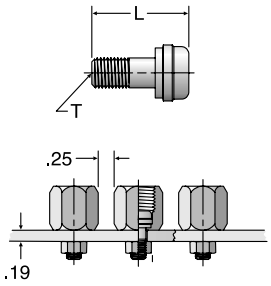


Y* – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 (in.)	4 (in.)	M (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 KBI2	1/4	1/4	1/4	1/4	0.66	7/16	1.5
6 KBI2	3/8	3/8	3/8	3/8	0.78	1/2	1.5

T22I

Mountie

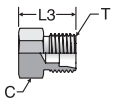


Typical application

TUBE FITTING PART #	TUBE O.D. (in.)	T TUBE END UN/UNF-2A	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 T22I	1/4	1/4-20	0.81	1.5
6 T22I	3/8	1/4-20	0.81	1.5

PNI Full Dimensions

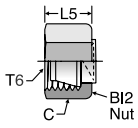
Plug
Intru-Lok



TUBE FITTING PART #	TUBE O.D. (in.)	T TUBE END UN/UNF-2A	C HEX (in.)	L3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
4 PNI	1/4	7/16-20	7/16	0.5	1.5
5 PNI	5/16	1/2-20	1/2	0.52	1.5
6 PNI	3/8	9/16-18	9/16	0.59	1.5
8 PNI	1/2	3/4-16	3/4	0.67	1.5

FNI

Cap
Intru-Lok



TUBE FITTING PART #	TUBE O.D. (in.)	C HEX (in.)	L5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -B
2 FNI	1/8	3/8	0.36	1.5
3 FNI	3/16	7/16	0.34	1.5
4 FNI	1/4	1/2	0.44	1.5
5 FNI	5/16	9/16	0.45	1.5
6 FNI	3/8	5/8	0.45	1.5
8 FNI	1/2	7/8	0.58	1.5

Dimensions and pressures for reference only, subject to change.

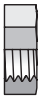
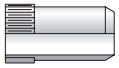
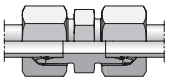
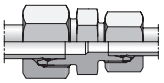
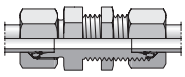
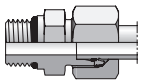
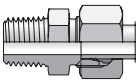
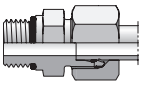
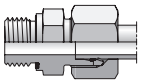
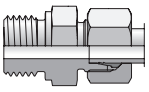
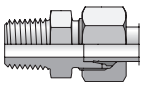
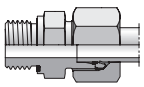
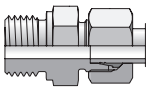
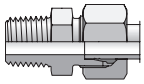
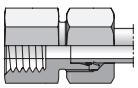
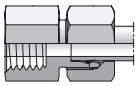
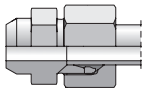
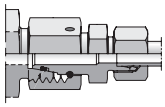
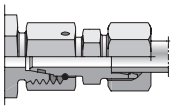
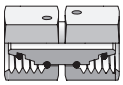
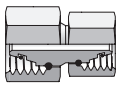
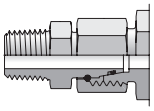
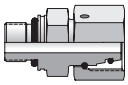
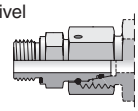
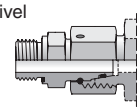
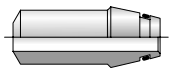
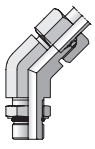
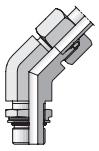
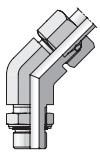
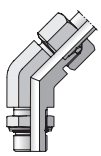
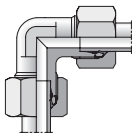
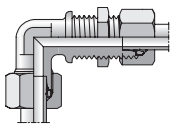
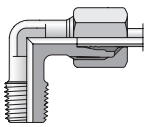
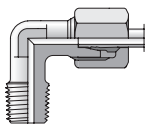
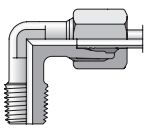
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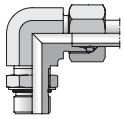
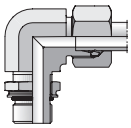
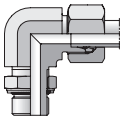
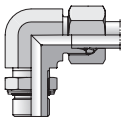
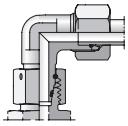
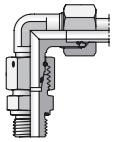
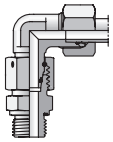
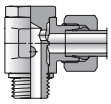
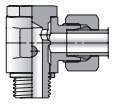
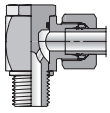
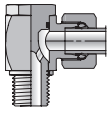
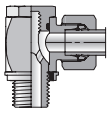
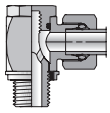
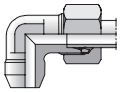
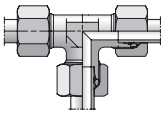
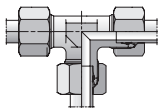
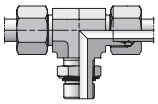
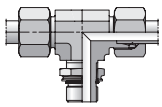
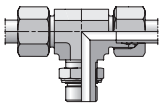
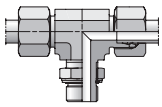
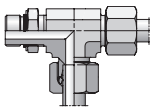
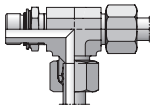
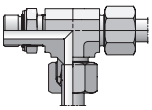
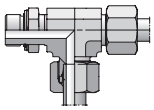
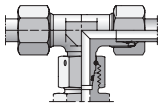
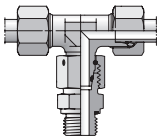
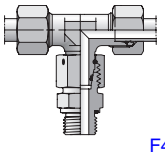
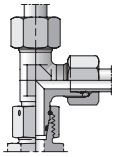
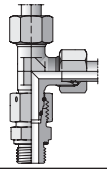
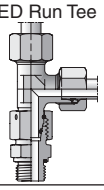
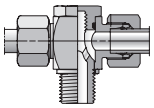
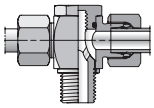
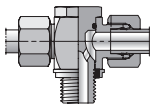
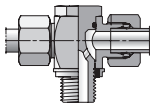
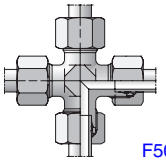
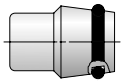
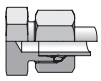
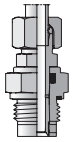
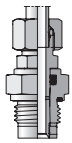
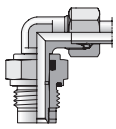
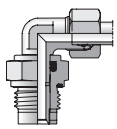
EO and EO-2 Metric Bite Type Fittings



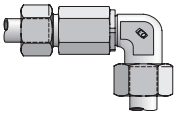
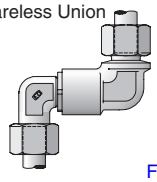
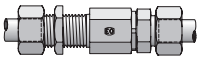
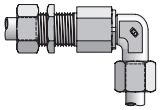
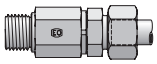
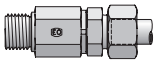
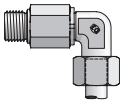
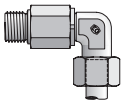
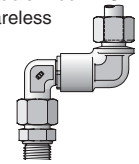
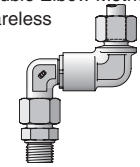
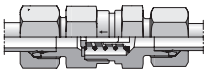
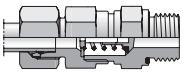
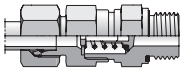
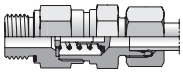
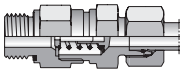
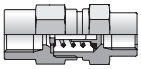
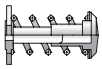
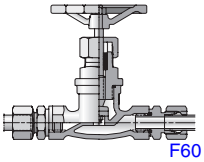
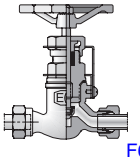
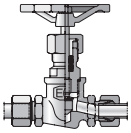
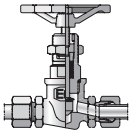
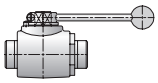
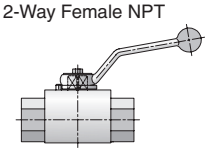
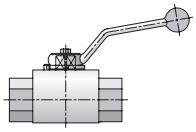
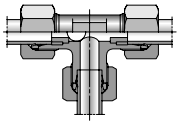
The Fitting Authority

Nuts, Sleeves, Locknut, Inserts	**M** Nut  F13	**FM** Functional Nut  F14	**DPR** Progressive Ring  F13	**D** Cutting Ring  F13	**PSR** Progressive Ring  F13
GM Bulkhead Locknut  F15	**E** Insert for Plastic Tube  F15	**VH** Insert for Metal Tube  F15	**Straights**	**G** Union  F16	**GR** Reducer Union  F16
SV Bulkhead Union  F17	**ESV** Weld Bulkhead Union  F17	**GE-UNF/UN** SAE-ORB / Flareless  F18	**GE-NPT** NPT / Flareless  F18	**GEO** ISO 6149 / Flareless  F19	**GE-R-ED** BSPP-ED / Flareless  F19
GE-R BSPP / Flareless  F20	**GE-R keg** BSPT / Flareless  F20	**GE-M-ED** Metric-ED / Flareless  F21	**GE-M** Metric / Flareless  F22	**GE-M keg** Metric Taper / Flareless  F22	**GAI-R** Female BSPP / Flareless  F22
GAI-M Female Metric / Flareless  F23	**AS** Butt Weld / Flareless  F23	**Straight Swivels**	**RED** Tube End Reducer  F24	**DA** Extender  F25	**GZ** Swivel Union  F25
GZR Swivel Union Reducer  F25	**EGE-NPT** NPT / Flareless Swivel  F25	**EGEO** ISO 6149 / Flareless Swivel  F26	**EGE-R-ED** BSPP-ED / Flareless Swivel  F26	**EGE-M-ED** Metric-ED / Flareless Swivel  F26	**SKA** Butt Weld / Flareless Swivel  F26
45° Elbows	**VEE-UNF/UN** SAE-ORB / Flareless  F27	**VEE-OR** ISO 6149 / Flareless  F27	**VEE-R** BSPP-ORR / Flareless  F28	**VEE-M** Metric-ORR / Flareless  F28	
90° Elbows	**W** Union Elbow  F29	**WSV** Bulkhead Union Elbow  F30	**WE-NPT** NPT / Flareless  F30	**WE-R keg** BSPT / Flareless  F31	**WE-M keg** Metric Taper / Flareless  F31

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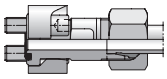
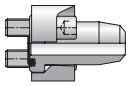
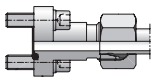
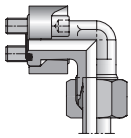
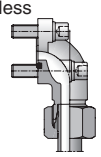
WEE-UNF/UN SAE-ORB / Flareless  F32	**WEE-OR** ISO 6149 / Flareless  F32	**WEE-R** BSPP-ORR / Flareless  F33	**WEE-M** Metric-ORR / Flareless  F33	**EW** Flareless Swivel / Flare-less  F34	**EW-R-ED** BSPP-ED / Flareless  F35
EW-M-ED Metric-ED / Flareless  F35	**SWVE-R** Banjo BSPP / Flareless  F36	**SWVE-M** Banjo Metric / Flareless  F36	**WH-R** Banjo BSPP / Flareless  F37	**WH-M** Banjo Metric / Flareless  F37	**WH-R-KDS** Banjo BSPP / Flareless  F38
WH-M-KDS Banjo Metric / Flareless  F38	**WAS** Butt Weld / Flareless  F39	**Tees**	**T** Union Tee  F39	**TR** Reducer Tee  F40	**TEE-UNF/UN** SAE-ORB Branch Tee  F41
TEE-OR ISO 6149 Branch Tee  F42	**TEE-R** BSPP-ORR Branch Tee  F42	**TEE-M** Metric-ORR Branch Tee  F43	**LEE-UNF/UN** SAE-ORB Run Tee  F43	**LEE-OR** ISO 6164 Run Tee  F44	**LEE-R** BSPP-ORR Run Tee  F44
LEE-M Metric-ORR Run Tee  F44	**ET** Swivel Branch Tee  F45	**ET-R-ED** BSPP-ED Branch Tee  F45	**ET-M-ED** Metric-ED Branch Tee  F46	**EL** Swivel Run Tee  F46	**EL-R-ED** BSPP-ED Run Tee  F47
EL-M-ED Metric-ED Run Tee  F47	**TH-R** Banjo BSPP Branch Tee  F48	**TH-M** Banjo Metric Branch Tee  F48	**TH-R-KDS** Banjo BSPP Branch Tee  F49	**TH-M-KDS** Banjo Metric Branch Tee  F49	
Cross	**K** Union Cross  F50	**Caps and Plugs**	**VKA** Flareless Cap  F50	**ROV** Flareless Plug  F50	
Plain Bear-ing Rotary Fittings	**DVGE-R** BSPP-ED / Flareless  F51	**DVGE-M** Metric-ED / Flareless  F52	**DVWE-R** BSPP-ED / Flareless  F51	**DVWE-M** Metric-ED / Flareless  F52	

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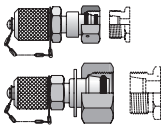
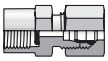
Ball Bearing Rotary Fittings	**DG101** Flareless Union  F53	**DG103** Flareless Union  F53	**DG105** Flareless Union  F53	**DG107** Union Bulkhead  F53	**DG108** 90° Union Bulkhead  F54
DG102-R BSPP-ED / Flareless  F54	**DG102-M** Metric-ED / Flareless  F54	**DG104-R** 90° BSPP-ED / Flareless  F54	**DG104-M** 90° Metric-ED / Flareless  F55	**DG106-R** Double Elbow BSPP / Flareless  F55	**DG106-M** Double Elbow Metric / Flareless  F55
Check Valves	**RHD** Union  F56	**RHV-R-ED** BSPP-ED / Flareless  F56	**RHV-M-ED** Metric-ED / Flareless  F57	**RHZ-R-ED** BSPP-ED / Flareless  F57	**RHZ-M-ED** Metric-ED / Flareless  F58
RHDI Female BSPP Union  F58	**RVP** Cartridge  F59	**I-TL** Internal Parts  F59	**Shut-Off Valves**	**DV** Low Pressure  F60	**LD** Medium Pressure  F60
VDHA High Pressure  F61	**VDHB** High Pressure – Panel Mount  F61	**Ball Valves**	**KH** 2-Way Flareless Union  F62	**KH-NPT** 2-Way Female NPT  F63	**KH-R** 2-Way Female BSPP  F63
Alternating Valves	**WV** Union Tee  F63				

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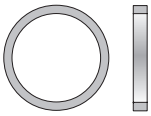
Flange Adapters (Shown in Section M)

Flange Adapters					
	GFS Code 61, 62 / Metric Flareless  M12	**AS** Code 61, 62 / Weld Butt – Tube Metric  M24	**BFG** DIN Flange / Metric Flareless  M13	**WFS** Code 61, 62 / Metric Flareless  M31	**BFW** DIN Flange / Metric Flareless  M32

Diagnostic and Specialty Adapters (Shown in Section N)

Test Point Connectors				
GMA3 EO Tube / EO Tube / EMA-3 Diagnostic Tip  N5	**VKA3** EO Swivel / Diagnostic Tip  N8	**MAVE** BSPP Gauge / EO Swivel  N6	**MAV** BSPP Gauge / EO Tube  N6	

O-Rings and Seals (Shown in Section O)

O-Rings and Seals					
Bonded Seal for Banjo Fittings  O7	**Metal Seal for Banjo Fittings**  O7	**Pressure Gauge Sealing Ring**  O8	**EOlastic Seal Ring**  O5	**EO O-Ring**  O8	
EO-2 Sealing Ring  O6	**Metric Retaining Ring**  O4				

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EO Progressive Ring Fittings — Introduction

The flareless bite type fitting was pioneered by Ermeto in Germany in the early 1930's. When Parker Hannifin acquired Ermeto, it introduced the EO fittings to the US. Today, the EO fittings are the most widely used bite type fittings in the world.

The EO progressive ring fitting is a flareless metric fitting (for metric tube)that consists of a body, a progressive ring (ferrule) and a nut. On assembly, two cutting edges of the progressive ring "bite" into the outer surface of the tube ensuring the necessary holding power and seal for high operating pressures.



Fig. H1 — EO fitting components: Body, progressive ring and nut

The fittings and components listed in this catalog are intended solely for the assembly of connections for fluid applications.

Three series of EO tube fittings (LL, L and S) and accessories are manufactured in accordance with DIN 2353 (summary) which today is represented by international standard 8434-1 on the basis of decades of experience.*

To ensure functional safety of EO tube fittings, only EO parts should be used in their assembly. Routing of tubes should be carried out in accordance with Parker/EO recommended practices. Assembly instructions are available.

Design and Construction

The three components of EO fittings are designed and manufactured to produce a strong, reliable, leak-free joint upon proper assembly.

The EO Body. EO fitting bodies are available in over thirty configurations. The shaped products (i.e., elbows, tees, crosses) are hot forged, then machined to the stringent EO fitting specifications. The forging process used by Parker further improves the strength and metallurgical properties of the fitting material.

Straight products are made from cold drawn bar stock. The cold drawing operation ensures consistently tight dimensional tolerances, as well as significantly improved strength.

The EO Progressive Ring (Cutting Ring). EO progressive rings are precision machined with all dimensions and surfaces, particularly the critical bite edges, monitored on an ongoing basis. The rings are then heat treated in a manner that provides the hardness, strength, and toughness necessary to satisfy the demanding service conditions that exist in industry today. The original progressive ring, known as DPR, is now being replaced with the new generation, called PSR. PSR is stronger and features a "positive stop" to eliminate over-tightening.

The EO Nut. EO fitting nuts are either cold formed, hot formed or machined from cold drawn material. The cold forming and cold drawing operations provide a more tightly packed grain structure, thus improving the material's strength. In addition, cold forming significantly improves the fatigue properties or endurance limits of the nuts.

Standard Material Specifications

Steel fittings:
EO tube fittings – Materials according to DIN 3859-1

Stainless steel fittings:
EO tube fittings – X6CrNIMoTi 17122 in accordance with DIN 17440 / EN 10088, material no. 1.4571.

Brass fittings:
EO tube fittings – CUZN35Ni2 in accordance with DIN 17660, material no. 2.0540.

Elastomer seals: NBR (BUNA-N), FKM (Fluorocarbon)

Surface Finish - Steel fittings:

Standard LL Series	Body, Nuts, and Rings	– Zinc clear chromate, Chromium 6 Free
L+S Series	Body and Nuts	– Zinc clear chromate, Chromium 6 Free
	Progressive Rings (PSR)	– Zinc clear chromate, Chromium 6 Free

Short codes for surface protection procedure in accordance with DIN 267 part 9 or DIN 50942.

How EO Fittings Work: Function of Progressive Ring Fittings

The EO progressive ring fitting produces a low to high pressure, leak free connection of tubes and components in fluid systems. The basic function of the EO progressive ring is the controlled progressive bite of the ring into the tube due to a unique internal geometry.

The front cutting edge has already started cutting into the tube before the second cutting edge starts. As soon as both cutting edges have cut the tube to the designed depth further advance is limited by the stop edge.

Owing to the design of both cutting edges and stop edge all forces arising are equally distributed. This distribution along with the specially designed interior collar of the ring guarantees increased safety, particularly with regard to vibration and flexure stresses. The design and function of the progressive cutting ring ensure that service vibration loading is not present in the areas of the tubing where the bite is made.

*The selection of LL, L or S design should be made by the user on the basis of intended system pressure. The pertinent maximum recommended working pressures are shown throughout this catalog in individual data charts of the various fitting configurations.

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The stop edge causes a sharp increase in tightening forces which is clearly perceptible. After assembly, a visible collar of cut tube material must completely fill the space in front of the first cutting edge. With stainless steel tube and hose connections made from free cutting steel, the collar is less due to the harder material.

During assembly, it is absolutely essential that the tube is held firmly against the stop in the inner cone of the fitting; if not, the cutting process will not take place satisfactorily. Reassembly can be performed an unlimited number of times.

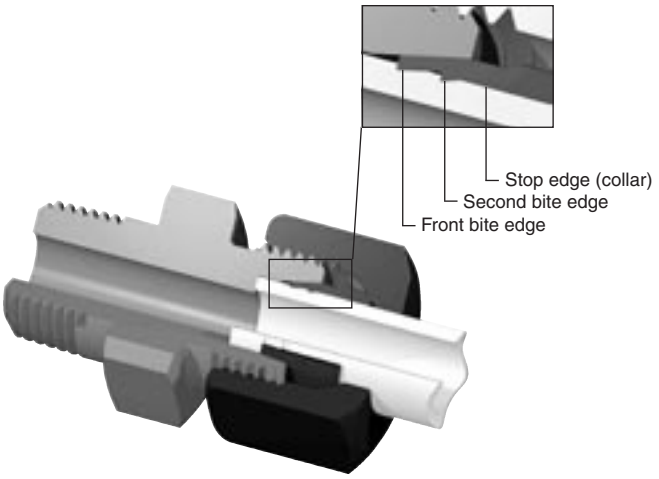


Fig. F2 — How EO fittings work

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for EO and EO-2 Metric Bite type fittings.

Weld Nipples

EO weld nipple fittings with an O-ring seal between weld nipple and body give impressive pull out resistance and sealing integrity, and a sensible alternative to the progressive ring. Fittings bodies and nuts are fully interchangeable for weld nipple and progressive ring fittings of the same series and tube outside diameter. Weld nipples SKA conform to DIN 3865 form A, which today is represented by international standard ISO 8434-4.

Ball Bearing Rotary Fittings

DG Ball Bearing Rotary Fittings: These compact, maintenance-free construction, service proven fittings combine ball and plain bearings with constant lubrication and relatively wear resistant annular piston seals. They are rated for working pressures up to 250 bar, have a low starting torque and have a suitable pressure/RPM rate.

Ball bearing rotary fittings are designed for connecting a fixed point to a rotating, swiveling or moving machine part via tubing or hoses. Thus axial torsion of tubing or hoses can be prevented. They are suitable for hydraulic oils and lubricants of mineral oil base, not suitable for water or gases. Nominal temperature range is -35°C to +80°C.

Fitting Instructions:

The life of rotary fitting depends considerably in a stress-free line connection. Therefore, the direct connection with tube is to be avoided. For connection to hoses the use of swivel nut fittings is recommended with short, straight lines (approx. length 5x hose O.D.). Thus shocks and vibrations can be absorbed.

Assemble tube ends in accordance with the Tube End Assembly Information on pages T12 through T13. Assemble BSPP and metric stud ends in accordance with torque values on page T5.

Tube O.D.	Nominal bore (mm)	Permissible number of revolutions (rpm) under a working pressure** of:					Torque at 250 bar/Nm
		25 bar	64 bar	100 bar	160 bar	250 bar	
6 8	4 6	1500	750	400	200	85	0.08
12 16	10 13	800	400	200	100	45	0.24
20 25	16 20	300	150	75	38	15	0.8
30 38	25 30	200	100	50	25	10	2.0

Table F1 — Ball Bearing Recommended RPM and Starting Torques

**A minimum working pressure of 10 bar is necessary.

Plain Bearing Rotary Fittings

Plain Bearing Rotary Fittings: These compact, maintenance-free construction, service proven fittings are rated for low pressure tube and hose with slow rotating, swiveling or moving machine parts up to 64 bar (L series) and 160 bar (S series).

Plain bearing rotary fittings are designed for connecting a fixed point to a rotating, swiveling or moving machine part via tubing or hoses. Thus axial torsion of tubing or hoses can be prevented. They are suitable for hydraulic oils and lubricants of mineral oil base, not suitable for water or gases. Nominal temperature range is -35°C to +100°C.

Series L Tube O.D.	6	8	10	12	15	18	22	28	35	
Permissible RPM	28	28	21	17	13	10	10	7	7	
Series S Tube O.D.	6	8	10	12	14	16	20	25	30	38
Permissible RPM	11	11	9	7	5	5	4	4	3	3

Table F2 — Plain Bearing Recommended RPM

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Fitting Instructions:

The life of a rotary fitting depends considerably in a stress-free line connection. Therefore, the direct connection with tube is to be avoided. For connection to hoses, the use of swivel nut fittings is recommended with short, straight lines (approx. length 5x hose O.D.). Thus, shocks and vibrations can be absorbed.

Non-Return Valves

Characteristics: Sealing is achieved by using a 90° cone with a packing washer of synthetic material. Valve has a lift stop which provides safe free outlet, shock-absorbing, muffled opening and no reduction of cross section. Maximum flow velocity not more than 8 m/sec (for higher flow velocities special tests are required).

Opening Pressure: Approximately 1 bar standard (on request also 0.2, 0.5, 2, 3, 4, 5 & 6 bar are available). Please specify nonstandard opening pressures on order as follows: Tube Fitting part number, opening pressure, material. Ex: RHD12L2BCF is a RHD12LCF with 2 bar opening pressure. Tolerance of (cracking) pressure is ±20%.

Tube Recommendations

For steel fittings:

Seamless cold drawn steel tubes made from material St. 35.4 or from conditioned base material St. 37.4 in accordance with DIN 1630, state of delivery NBK (normal annealed) with tube outer and inner diameter tolerances in accordance with DIN 2391/ISO 3304. Max. hardness: HRB 75.

For stainless steel fittings:
Material no. 1.4571 and 1.4541

Seamless drawn tubes made from austenitic, stainless steel materials no. 1.4571 and 1.4541, in accordance with DIN/EN/ISO 1127. Max. hardness: HRB 90.

These tubes are particularly recommended for tube fittings, since the tube outer diameter and wall thickness, tolerances correspond to those of steel tubes in accordance with DIN 2391/ISO 3304.

For brass fittings:

Seamless drawn copper tube made from material with short code SF-Cu F37 in accordance with DIN 1786.

Tube wall thicknesses:

In order to determine the necesary tube wall thicknesses for applications, refer to the calculated pressures provided in the tables for EO metric tubing. The calculated pressures DIN 2413-I are for static and DIN 2413-III for dynamic loads.

The maximum wall thickness is based on the pressure holding capacity of the fitting. In some cases, the wall thickness of the tube might be too thin for reliable service and an insert must be used to prevent excessive tube collapse. See assembly section for recommended tube wall thicknesses.

Plastic tube:

EO fittings are suitable for use with various types of plastic tubes such as nylon, polyethylene, etc. When used with plastic tube, an insert (see page F15) must be used to prevent tube pull out due to tensile loading.

Features, Advantages & Benefits

- **Visible Bite —** The critical front bite of the progressive ring is clearly visible to tube fitters & inspectors. The presence of the recommended bite virtually eliminates any risk of catastrophic blow-off. This is a very important safety feature.
- **Sealing Capability —** EO fittings have demonstrated a remarkable ability to remain leak free under various service conditions ranging from sealing high vacuum and small molecules gases to high pressure hydraulic fluids.
- **Distributed Stresses —** Stresses due to service flexural loading are distributed at several points in the joint, thus stress concentration in the bite is minimized.
- **Vibration Control —** The rear bevel of the ferrule firmly grips tubing, thus dampening the effects of system vibration in the joint.
- **Progressive Ring Design —** The progressive ring design provides a second bite for improved reliability and higher working pressure capability. This design also decreases the risk of improper assembly because of the sharp, high torque rise which occurs when the fitting is properly tightened.
- **Envelope Size —** EO fittings are relatively small and compact, making it a suitable selection for plumbing in limited or tight space.
- **Temperature Rating —** EO fittings are suitable for sub-zero through elevated temperature applications. Service temperature rating is limited by the material chosen.
- **Compatibility —** Since EO fittings can be manufactured from a wide range of metals, its compatibility factor with various fluids and atmospheric conditions is virtually limitless. One simply has to select and specify EO fittings from an acceptable material that best satisfies the service conditions.
- **Tube Wall —** EO fittings are suitable for use with light wall, medium wall, heavy wall, and extra heavy wall tubing. (Light wall tube may require support sleeve (VH), as shown in Assembly/Installation Section.)
- **Re-Usability / Remakeability —** Joints can be disassembled and reassembled many times to facilitate system maintenance. This reduces the labor and material costs that would otherwise result from tube and fittings replacement.
- **Assembly —** No expensive, complicated tooling is necessary to assemble EO fittings. Assembly is simple when the procedures described in the Assembly / Installation section are followed (see pages T28 - T33).
- **Materials —** EO fittings can be manufactured from almost any metallic material. The more popular materials currently used for EO fittings are: stainless steel, carbon steel, and brass. On request, the Tube Fitting Division will machine EO fittings from other appropriate material specified by users.
- **Manufacture —** EO fittings are manufactured under tight quality control which ensures that the product routinely satisfies or surpasses the requirements of the pertinent industrial standards.
- **World Wide Popularity —** The bite type fitting design has worldwide acceptance and is especially popular in Europe.

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- **Finish —** Steel EO fittings have a zinc clear Chromium-6 Free finish. This finish provides good corrosion protection.
- **Silver Plated Nuts —** Stainless steel tube nuts are prelubricated with silver plated threads (size 15L-42L, 12S-38S). Thread galling is eliminated and assembly torque is reduced as much as 40 percent. This increases the speed and efficiency for stainless steel fitting assembly.
- **Availability —** EO fittings are available as standard in over thirty different configurations, and as many as twenty-seven different size combinations in some configurations.
- **Configurations —** Popular configurations for EO fittings are shown in the Visual Index. Other configurations can be manufactured on request.

EO-2 Fitting System — Introduction



Fig. F3 — EO-2: Fitting body and functional nut

The EO-2 high pressure tube fitting generation is the most recent development of the Tube Fitting Division Europe. It was introduced in an effort to eliminate leakage in all fluid systems.

The common feature of all EO-2 fittings is elastomeric seals on all joints. This assures leakfree operation without retightening — even under severe working conditions. Another breakthrough in bite-type technology is the simple assembly and cost-saving handling of the unique EO-2 Functional Nut.

EO-2 is a true metric design according to 24° bite-type standards such as: ISO 8434-1, DIN 2353 or DIN 3861. It covers all three series (LL, L and S) of the broad EO tube fitting program.

This resulted in a great acceptance with equipment manufactures that are targeting an absolute leakfree systems without sacrificing the convenience of using metric bite type fittings.

Design and Construction

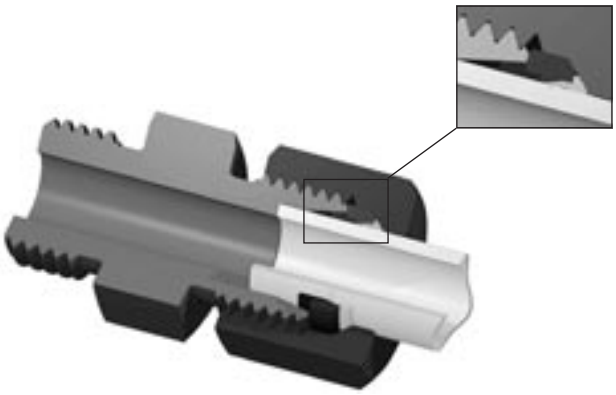


Fig. F4 — EO-2: The metallic support of the sealing ring acts just like an integrated preassembly tool.

Elastomeric Sealing

The elastomeric seal assures a hermetically sealed tube joint. It is located in between the inner cone of the fitting body and the tube surface, thus blocking the only possible leak path. Due to its large cross-section, the seal effectively compensates for all manufacturing tolerances on tube and fitting cone.

The sealing effect is pressure supported which makes the EO-2 fitting suitable for high pressure applications. The static compression also eliminates air-ingress into the fluid system at underpressure conditions.

Elastomerically sealed EO-2 fittings do not require any retightening even in heavy-duty applications. Seal extrusion is prevented by proper housing without gaps or dead volume. The sealing lip is bonded to a metallic support ring.

Standard Material Specifications

Steel fittings:
EO-2 tube fittings – Materials according to DIN 3859-1

Stainless steel fittings:
EO-2 tube fittings – X6CrNIMoTi 17122 in accordance with DIN 17440 / EN 10088, material no. 1.4571.

Brass fittings:
EO-2 tube fittings – CUZN35Ni2 in accordance with DIN 17660, material no. 2.0540.

Elastomer seals: NBR (BUNA-N), FPM (Fluorocarbon)

Surface Finish - Steel fittings:

Standard		
LL Series	Body, Nuts, and Rings	- Zinc clear chromate, Chromium 6 Free
L+S Series	Body and Nuts	- Zinc clear chromate, Chromium 6 Free

Short codes for surface protection procedure in accordance with DIN 267 part 9 or DIN 50942.

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How EO-2 Fittings Work

The retaining ring bites into the tube in accordance to the proven bite ring principle. The elastomeric seal reduces the danger of over- or underassembly by a special EO-2 design feature: Before assembly there is a gap in between the flat surfaces of the retaining ring and the metallic support ring of the seal. As soon as the retaining ring has reached the proper incision depth, the gap closes, resulting in a sharp increase of assembly torque. This results in uniform and reliable fitting assemblies. The assembly result can easily be inspected by just checking if the gap is closed.

The separation of sealing and holding functions to two separate elements finally allows a more effective solution of the over-and undertightening problems typically associated with bite type fittings.

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for EO and EO-2 Metric Bite type fittings.

Integrated Assembly Tool

The metallic support ring of the seal is made of a specially designed material and heat-treatment to act as an assembly tool. This makes sure that the retaining ring securely cuts into the tube surface without damaging the sensitive inner cone of the fitting body.

This unique feature of EO-2 fittings even allows direct assembly of tube without any additional pre-assembly process. An EOMAT machine (or other hydraulic tool) is strongly recommended to allow easy assembly of large dimension tube and drastically save total assembly time, effort and costs. The integrated assembly tool of EO-2 fittings even helps to save further costs and trouble when using an EOMAT-type presetting machine: As the presetting cone is only in contact with the elastomeric sealing lip, it cannot be worn out or damaged even after thousands of assemblies. This not only saves replacement costs but also avoids leakage problems caused by worn presetting tools.

The Functional Nut

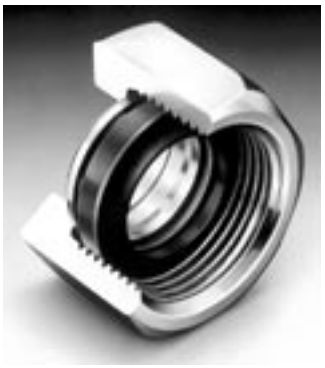


Fig. F5 — The unique Functional Nut allows easy handling and quick assembly.

The unique Functional Nut simplifies handling of fitting components and helps to minimize storage and procurement costs. The sealing and retaining rings are combined as a pair and are inserted into the internal thread of the nut in such a manner that they cannot fall out, so that these three parts form one functional element.

Individual components such as seal or retaining ring cannot be forgotten, confused or assembled in the wrong orientation. Time and cost are saved by eliminating searching and arranging the components to make up individual joints.

Functional Nuts are completely interchangeable with the full range of EO tube fitting ends.

After assembly and disassembly, the sealing ring can be replaced individually without cutting off the tube end.

Tube Recommendations

For steel fittings:

Seamless cold drawn steel tubes made from material St. 35.4 or from conditioned base material St. 37.4 in accordance with DIN 1630, state of delivery NBK (normal annealed) with tube outer and inner diameter tolerances in accordance with DIN 2391/ISO 3304. Max. hardness: HRB 75.

For stainless steel fittings:
Material no. 1.4571 and 1.4541

Seamless drawn tubes made from austenitic, stainless steel materials no. 1.4571 and 1.4541, in accordance with DIN/EN/ISO 1127. Max. hardness: HRB 90.

These tubes are particularly recommended for tube fittings, since the tube outer diameter and wall thickness, tolerances correspond to those of steel tubes in accordance with DIN 2391/ISO 3304.

Tube wall thicknesses:

In order to determine the necesary tube wall thicknesses for applications, refer to the calculated pressures provided in the tables for EO metric tubing. The calculated pressures DIN 2413-I are for static and DIN 2413-III for dynamic loads.

The maximum wall thickness is based on the pressure holding capacity of the fitting. In some cases, the wall thickness of the tube might be too thin for reliable service and an insert must be used to prevent excessive tube collapse. See assembly section for recommended tube wall thicknesses.

Plastic tube:

EO-2 fittings are suitable for use with various types of plastic tubes such as nylon, polyethylene, etc. When used with plastic tube, an insert (see page F15) must be used to prevent tube pull out due to tensile loading.

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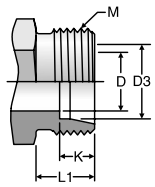
Features, Advantages and Benefits of the EO-2 Fitting System

In addition to the general advantages of the EO tube fitting system, the unique EO-2 fitting features offer even more specific benefits:

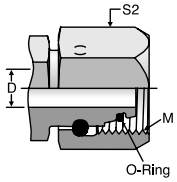
- **Sealing Capability —** An elastomeric seal forms the primary sealing element, thus assuring leak-free sealing. Even low-viscosity media such as water or gas are hermetically sealed. Hydraulic systems, therefore, do not "sweat" at fittings.
- **High Pressure Resistance —** EO-2 fittings are rated up to Pmax 900 bar. Sealing lip and seal arrangements have both been designed so that the sealing effect is supported by system pressure. The interaction of the retaining ring and the integrated preassembly tool results in uniform and reliable fitting assembly.
- **Durability —** The elastomeric seal does not require any retightening even after years of operation under severe working conditions.
- **Bite Control —** The ideal bite depth is controlled by the fitting design rather than by the fitters force. Closing the gap at the end of the manual assembly, the fitter gets clear signal that setting is completed and the joint is ready for inspection.
- **Functional Nut —** Individual components such as the retaining ring or seal cannot be lost, forgotten, confused or assembled in the wrong orientation. This dramatically saves assembly cost and helps to avoid dangerous assembly errors.
- **Assembly Cost —** With less than 10 seconds cycle time on the EOMAT III/A (actual presetting process: 1.4 seconds), the cost of presetting EO-2 is extremely low.
- **Integrated Preassembly Tool —** Each EO-2 Functional Nut comes assembled with an integrated assembly tool that makes sure that the retaining ring securely cuts into the tube surface without damaging the sensitive inner cone of the fitting body. This greatly reduces the danger of tube blow-off, even when using stainless steel tube.
- **Unlimited Presetting Tool Lifetime —** When EOMAT machines are used for cost-efficient presetting, the preassembly tools do not wear out as they are only in contact with the rubber seal. This avoids dangerous blow-off which can result when traditional bite-type fittings are assembled using worn presetting tools.
- **Make-up —** From the wrench-tight position of the preset EO-2 joint, one short pull on the wrench (approx. 1/6 to 1/4 turn) gives the assembly a quick high rise to required torque. EO-2 fittings have a solid "hit-home-feel" and excellent over-torque resistance.
- **Visible Inspection —** There is no doubt if an EO-2 Functional Nut has been preset correctly or not. Inspection is as simple as checking if the gap between retaining ring and sealing ring is completely closed. The tube end does not have to be disassembled out of the fitting for bite inspection.
- **No Phantom Leaks —** Lubrication is not mandatory for the assembly of steel EO-2 fittings. The machine operator will not be irritated about lubricant coming out of the fittings once the hydraulic system gets hot.
- **Re-Usability / Remakeability —** EO-2 fittings can be disassembled and reassembled many times. There is no wear or widening of the vulnerable inner cone. Damaged seals can easily be replaced. All spare DOZ-seals are marked by size-code (e.g.: 12-L).
- **On-Site Maintenance —** For the maintenance and replacement of EO-2 fittings a set of wrenches is sufficient. Additional in line components, such as test points (GMA), ball valves (KH) or T-fittings can be added to an existing assembly within minutes.
- **Interchangeability —** The EO-2 Functional Nut can be used for the whole variety of the broad range of more than 50 configurations in some 25 sizes of standard EO LL, L and S-series fittings. Changeover from Progressive ring or weld nipple is easy by the simple use of EO-2 Functional Nuts.
- **Reliability —** Millions of EO-2 fittings are working trouble-free in applications like: Mobile construction equipment, stationary machine tools, hydraulic presses, plastic injection molding machines, shipbuilding, offshore exploration, submarines, railway trains and military equipment. Leakage does not occur on EO-2 pipework.
- **Trouble-Free —** Regular bite type fittings allow typical assembly-errors such as: confusion of bite type ring material and size. Also, the use of worn-out preassembly tool may result in fitting failure. The clever EO-2 design eliminates most of these mistakes without making the assembly process more complicated.
- **Popularity —** EO-2 fittings are as easy to assemble as traditional bite type fittings, but they eliminate most of their typical assembly problems. EO-2 fittings are therefore appreciated by an increasing number of original equipment manufacturers. EO-2 also has become the fitting of choice of end-users that appreciate the leakfree performance, the easy maintenance and the global availability of the metric soft-seal bite type system.

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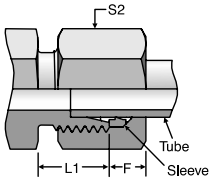
EO and EO-2 Metric Tube Ends



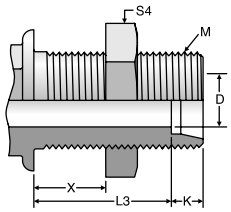
EO/EO-2 Male Tube End



EO/EO-2 Swivel



EO/EO-2 Assembly



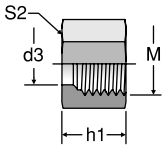
EO/EO-2 Bulkhead

Size	End Size D3 (mm)	Thread M Metric	Drill D (mm)	Tube Nut Assembled Allowance F (mm)	Tube Depth K (mm)	Male Turn Back L1 (mm)	Bulkhead Length L3 (mm)	Tube/Swivel Nut Hex S2 (mm)	Bulkhead Nut Hex S4 (mm)	Max Bulkhead Thickness X (mm)
4LL	4	M8x1	3	5.5	4.0	8	—	10	—	—
6LL	6	M10x1	4.5	6	5.5	8	—	12	—	—
8LL	8	M12x1	6	6	5.5	9	—	14	—	—
10LL	10	M14x1	8	6	5.5	9	—	17	—	—
12LL	12	M16x1	10	6	6.0	9	—	19	—	—
6L	6	M12x1.5	4	8	7.0	10	34	14	17	16
8L	8	M14x1.5	6	8	7.0	10	34	17	19	16
10L	10	M16x1.5	8	8	7.0	11	35	19	22	16
12L	12	M18x1.5	10	8	7.0	11	36	22	24	16
15L	15	M22x1.5	12	8	7.0	12	38	27	30	16
18L	18	M26x1.5	15	9	7.5	12	40	32	36	16
22L	22	M30x2	19	9	7.5	14	42	36	41	16
28L	28	M36x2	24	9	7.5	14	43	41	46	16
35L	35	M45x2	30	11	10.5	16	47	50	55	16
42L	42	M52x2	36	12	11.0	16	47	60	65	16
6S	6	M14x1.5	4	8	7.0	12	36	17	19	16
8S	8	M16x1.5	5	8	7.0	12	36	19	22	16
10S	10	M18x1.5	7	9	7.5	12	37	22	24	16
12S	12	M20x1.5	8	9	7.5	12	38	24	27	16
14S	14	M22x1.5	10	10	8.0	14	40	27	30	16
16S	16	M24x1.5	12	10	8.5	14	41	30	32	16
20S	20	M30x2	16	11	10.5	16	44	36	41	16
25S	25	M36x2	20	12	12.0	18	47	46	46	16
30S	30	M42x2	25	13	13.5	20	51	50	50	16
38S	38	M52x2	32	15	16.0	22	53	60	65	16

Dimensions and pressures for reference only, subject to change.

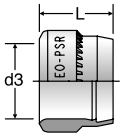
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M
Nut



STANDARD FROM STOCK TUBE FITTING PART #			d3 Tube O.D.	M Metric	S2	h1
STEEL	STAINLESS	BRASS	(mm)	Thread	(mm)	(mm)
M04LLCFX	M04LL71X	M04LLMSX	4	M8 x 1	10	11.0
M06LLCFX	M06LL71X	M06LLMSX	6	M10 x 1	12	11.5
M08LLCFX	M08LL71X	M08LLMSX	8	M12 x 1	14	13.0
M10LLCFX	—	M10LLMSX	10	M14 x 1	17	13.0
M12LLCFX	—	M12LLMSX	12	M16 x 1	19	13.0
M06LCFX	M06LEODURX	M06LMSX	6	M12 x 1.5	14	15.0
M08LCFX	M08LEODURX	M08LMSX	8	M14 x 1.5	17	15.0
M10LCFX	M10LEODURX	M10LMSX	10	M16 x 1.5	19	16.0
M12LCFX	M12LEODURX	M12LMSX	12	M18 x 1.5	22	16.0
M15LCFX	M15LEODURX	M15LMSX	15	M22 x 1.5	27	17.5
M18LCFX	M18LEODURX	M18LMSX	18	M26 x 1.5	32	18.5
M22LCFX	M22LEODURX	M22LMSX	22	M30 x 2	36	20.5
M28LCFX	M28LEODURX	M28LMSX	28	M36 x 2	41	21.0
M35LCFX	M35LEODURX	M35LMSX	35	M45 x 2	50	24.0
M42LCFX	M42LEODURX	M42LMSX	42	M52 x 2	60	24.0
M06SCFX	M06SEODURX	M06SMSX	6	M14 x 1.5	17	17.0
M08SCFX	M08SEODURX	M08SMSX	8	M16 x 1.5	19	17.0
M10SCFX	M10SEODURX	M10SMSX	10	M18 x 1.5	22	18.0
M12SCFX	M12SEODURX	M12SMSX	12	M20 x 1.5	24	18.0
M14SCFX	M14SEODURX	M14SMSX	14	M22 x 1.5	27	21.0
M16SCFX	M16SEODURX	M16SMSX	16	M24 x 1.5	30	21.0
M20SCFX	M20SEODURX	M20SMSX	20	M30 x 2	36	24.5
M25SCFX	M25SEODURX	M25SMSX	25	M36 x 2	46	27.0
M30SCFX	M30SEODURX	M30SMSX	30	M42 x 2	50	29.0
M38SCFX	M38SEODURX	M38SMSX	38	M52 x 2	60	32.5

PSR
Progressive Ring
For L and S series only

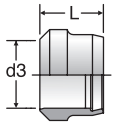


STANDARD FROM STOCK TUBE FITTING PART #	d3 Tube O.D.	L
STEEL	(mm)	(mm)
PSR06LX*	6	9.5
PSR08LX*	8	9.5
PSR10LX*	10	10.0
PSR12LX*	12	10.0
PSR15LX	15	10.0
PSR18LX	18	10.0
PSR22LX	22	10.5
PSR28LX	28	10.5
PSR35LX	35	13.5
PSR42LX	42	13.5
PSR14SX	14	10.0
PSR16SX	16	10.5
PSR20SX	20	12.5
PSR25SX	25	12.5
PSR30SX	30	13.0
PSR38SX	38	13.5

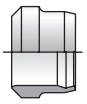
* PSR Progressive Rings in sizes 6, 8, 10 and 12mm are the same for both Series L and S.

PSR Progressive Rings: Zinc plated and clear chromated

DPR
Progressive Ring
For L and S series only



DPR:
Progressive Ring



D:
Cutting Ring

D
Cutting (Locking) Ring
For LL series and all brass

STANDARD FROM STOCK TUBE FITTING PART #			d3 Tube O.D.	L
STEEL	STAINLESS	BRASS	(mm)	(mm)
D04LLX	—	D04LLMSX	4	6.0
D06LLX	D06LL71X	D06LLMSX	6	7.0
D08LLX	D08LL71X	D08LLMSX	8	7.0
D10LLX	—	D10LLMSX	10	7.0
D12LLX	—	D12LLMSX	12	7.5
DPR06LX*	DPR06L71X*	D06LMSX*	6	9.5
DPR08LX*	DPR08L71X*	D08LMSX*	8	9.5
DPR10LX*	DPR10L71X*	D10LMSX*	10	10.0
DPR12LX*	DPR12L71X*	D12LMSX*	12	10.0
DPR15LX	DPR15L71X	D15LMSX	15	10.0
DPR18LX	DPR18L71X	D18LMSX	18	10.0
DPR22LX	DPR22L71X	D22LMSX	22	10.5
DPR28LX	DPR28L71X	D28LMSX	28	10.5
DPR35LX	DPR35L71X	D35LMSX	35	13.5
DPR42LX	DPR42L71X	D42LMSX	42	13.5
DPR14SX	DPR14S71X	D14SMSX	14	10.0
DPR16SX	DPR16S71X	D16SMSX	16	10.5
DPR20SX	DPR20S71X	D20SMSX	20	12.5
DPR25SX	DPR25S71X	D25SMSX	25	12.5
DPR30SX	DPR30S71X	D30SMSX	30	13.0
DPR38SX	DPR38S71X	D38SMSX	38	13.5

* DPR Progressive Rings in sizes 6, 8, 10 and 12mm are the same for both Series L and S.

Cutting (locking) Rings, Series LL: Zinc plated and clear chromate (CF)

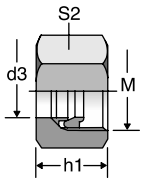
ProgressiveRings, Series L and S: Zinc plated and olive chromated (A3D)

Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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FM

EO-2 Dual Funtion Nut



TUBE FITTING PART #	SERIES	d3 END SIZE (mm)	M Metric Thread	h1 (mm)	S2 (mm)	STANDARD FROM STOCK CF	SSA	VITCF	VITSSA	71
FM04LL	LL	4	M8 x 1	11	10	•	•			
FM06LL	very light	6	M10 x 1	11.5	12	•	•			
FM06L	L	6	M12 x 1.5	15	14	•				•
FM08L	light	8	M14 x 1.5	15	17	•	•	•		•
FM10L		10	M16 x 1.5	16	19	•	•	•	•	•
FM12L		12	M18 x 1.5	16	22	•	•			•
FM15L		15	M22 x 1.5	17.5	27	•	•			•
FM18L		18	M26 x 1.5	18.5	32	•	•		•	
FM22L		22	M30 x 2	20.5	36	•	•			•
FM28L		28	M36 x 2	21	41	•	•	•		•
FM35L		35	M45 x 2	24	50	•	•			
FM42L		42	M52 x 2	24	60	•	•	•		
FM06S	S	6	M14 x 1.5	17	17	•				
FM08S	heavy	8	M16 x 1.5	17	19	•		•		
FM10S		10	M18 x 1.5	18	22	•		•		•
FM12S		12	M20 x 1.5	18	24	•	•		•	•
FM14S		14	M22 x 1.5	21	27	•				
FM16S		16	M24 x 1.5	21	30	•	•		•	•
FM20S		20	M30 x 2	24.5	36	•	•			•
FM25S		25	M36 x 2	27	46	•	•		•	
FM30S		30	M42 x 2	29	50	•	•		•	
FM38S		38	M52 x 2	32.5	60	•			•	

FM Component Breakdown by Material

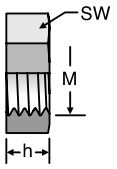
	Nut	Bite Ring	Seal Ring	Elastomer	Nut Finish
CF	Steel	Steel	Steel	NBR	Zinc Clear
SSA	Steel	Stainless Steel	Steel	NBR	Zinc Clear
VITCF	Steel	Steel	Steel	FPM	Zinc Clear
VITSSA	Steel	Stainless Steel	Steel	FPM	Zinc Clear
71	Stainless Steel	Stainless Steel	Stainless Steel	FPM	Passivated

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GM

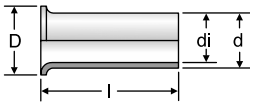
Bulkhead Locknout



TUBE FITTING PART #	FOR USE WITH		h (mm)	M Metric Thread	SW (mm)	STANDARD FROM STOCK CFX	71X	MSX
GM06L	6L		6	M12 x 1.5	17	•		
GM08L	8L	6S	6	M14 x 1.5	19	•		
GM10L	10L	8S	6	M16 x 1.5	22	•		
GM12L	12L	10S	6	M18 x 1.5	24	•	•	
GM12S		12S	6	M20 x 1.5	27	•		
GM15L	15L	14S	7	M22 x 1.5	30	•	•	
GM16S		16S	7	M24 x 1.5	32	•		
GM18L	18L		8	M26 x 1.5	36	•		
GM22L	22L	20S	8	M30 x 2	41	•		
GM28L	28L	25S	9	M36 x 2	46	•		
GM30S		30S	9	M42 x 2	50	•		
GM35L	35L		9	M45 x 2	55	•		
GM42L	42L	38S	10	M52 x 2	65			

E

Tube Insert
For Plastic Tube

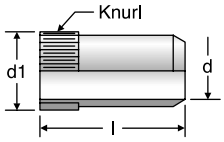


TUBE FITTING PART #	USE WITH TUBE O.D. ø	I.D. ø	d (mm)	D (mm)	di (mm)	l (mm)
E04/02X	4	2.0	2.0	3.5	1.3	8
E04/2.5X	4	2.5	2.5	4.0	1.7	8
E0506/03X	5	3.0	3.0	5.0	2.2	14
E0506/03X	6	3.0	3.0	5.0	2.2	14
E0506/04X	5	4.0	4.0	5.0	3.2	14
E0506/04X	6	4.0	4.0	5.0	3.2	14
E08/04X	8	4.0	4.0	6.6	3.2	14
E06/05X	6	5.0	5.0	6.0	4.0	14
E08/05X	8	5.0	5.0	8.0	4.0	14
E10/05X	10	5.0	5.0	8.5	4.0	15
E0810/06X	8	6.0	6.0	8.0	5.0	15
E0810/06X	10	6.0	5.0	8.5	4.0	15
E10/08X	10	8.0	8.0	10.0	6.7	15
E12/08X	12	8.0	8.0	12.0	6.7	15
E12/09X	12	9.0	9.0	12.0	7.7	15
E1215/10X	12	10.0	10.0	12.0	8.7	15
E1215/10X	15	10.0	10.0	12.0	8.7	15
E1215/10X	16	10.0	10.0	12.0	8.7	15
E15/12X	15	12.0	12.0	14.0	10.7	15
E1516/12.5X	15	12.5	12.5	14.8	11.2	15
E1516/12.5X	16	12.5	12.5	14.8	11.2	15
E18/14X	18	14.0	14.0	17.8	12.7	15
E1820/16X	18	16.0	16.0	17.8	14.7	20
E1820/16X	20	16.0	16.0	17.8	14.7	20
E22/18X	22	18.0	18.0	21.8	16.7	16

Note: E inserts are made of brass.

VH

Tube Insert
For Thin Walled Metal Tube



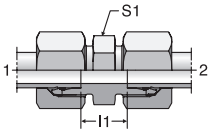
TUBE FITTING PART #	FOR TUBE I.D. Ø (mm)	d (mm)	d1 (mm)	L (mm)	STANDARD FROM STOCK CFX	71X	MSX
VH04	4	2.6	3.8	14	•		•
VH04.5	4.5	3.1	4.3	14			
VH05	5	3.6	4.8	14			
VH06	6	4.6	5.8	14	•		•
VH07	7	5.6	6.8	15.5	•		
VH08	8	6.6	7.8	15.5	•	•	•
VH09	9	7.6	8.8	15.5			•
VH10	10	8.6	9.8	15.5	•	•	•
VH12	12	10.2	11.8	17	•		
VH13	13	11.2	12.8	17		•	•
VH14	14	12.2	13.8	17	•		
VH15	15	13.2	14.8	20	•		
VH16	16	14.2	15.8	20			
VH17	17	15.2	16.8	20	•		
VH18	18	16.2	17.8	20	•		
VH19	19	17.2	18.8	16			•
VH20	20	18.2	19.8	21.5			•
VH21	21	19.2	20.8	21.5			
VH22	22	20.2	21.8	23.5			
VH24	24	22.2	23.8	23.5			
VH25	25	23.2	24.8	23.5			•
VH26	26	24.2	25.8	23.5			
VH27	27	25.2	26.8	23.5			
VH30	30	27.8	29.8	26.5			
VH31	31	28.8	30.8	26.5			•
VH32	32	29.8	31.8	26.5			
VH33	33	30.8	32.8	26.5			
VH38	38	35.8	37.8	21	•		

Dimensions and pressures for reference only, subject to change.

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G Full Dimensions

Union
24° Flareless / 24° Flareless

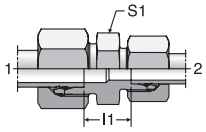


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (mm)	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
G04LL	4	4	12	9	100	100	63	100	
G06LL	6	6	9	11	100	100	63	100	
G08LL	8	8	12	12	100	100	63		
G10LL	10	10	12	14	100		63		
G12LL	12	12	11	17	100				
G06L	6	6	10	12	315	315	200	315	315
G08L	8	8	11	14	315	315	200	315	315
G10L	10	10	13	17	315	315	200	315	315
G12L	12	12	14	19	315	315	200	315	315
G15L	15	15	16	24	315	315	200	315	315
G18L	18	18	16	27	315	315	200	315	315
G22L	22	22	20	32	160	160	100	160	160
G28L	28	28	21	41	160	160	100	160	160
G35L	35	35	20	46	160		100	160	160
G42L	42	42	21	55	160		100	160	160
G06S	6	6	16	14	630	630	400	630	630
G08S	8	8	18	17	630	630	400	630	630
G10S	10	10	17	19	630	630	400	630	
G12S	12	12	19	22	630	630	400	630	630
G14S	14	14	22	24	630		400	630	
G16S	16	16	21	27	400	400	250	400	400
G20S	20	20	23	32	400	400	250	400	400
G25S	25	25	26	41	400	400	250	400	
G30S	30	30	27	46	400	400	250	400	400
G38S	38	38	29	55	315		205	315	315

For EO-2 part number, insert "Z" between size and pressure series. Example: G06ZLCF

GR Full Dimensions

Union Reducer
24° Flareless / 24° Flareless



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (mm)	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GR06/04LL	6	4	10.5	11	100				
GR08/04LL	8	4	12.5	12	100				
GR08/06LL	8	6	11.0	12	100				
GR08/06L	8	6	11.0	14	315	315		315	315
GR10/06L	10	6	12.0	17	315	315		315	
GR10/08L	10	8	12.0	17	315	315		315	
GR12/06L	12	6	13.0	19	315			315	
GR12/08L	12	8	13.0	19	315			315	
GR12/10L	12	10	14.0	19	315	315		315	
GR15/10L	15	10	15.0	24	315	315			
GR15/12L	15	12	15.0	24	315	315		315	
GR18/10L	18	10	15.5	27	315	315		315	
GR18/12L	18	12	15.5	27	315	315		315	
GR18/15L	18	15	16.5	27	315			315	
GR22/12L	22	12	17.5	32	160			160	
GR22/15L	22	15	18.5	32	160				160
GR22/18L	22	18	18.0	32	160	160		160	
GR28/18L	28	18	19.0	41	160			160	
GR28/22L	28	22	21.0	41	160	160		160	
GR35/22L	35	22	21.0	46	160			160	
GR35/28L	35	28	21.0	46	160				
GR08/06S	8	6	18.0	17	630				
GR10/06S	10	6	17.5	19	630				
GR10/08S	10	8	17.5	19	630				
GR12/06S	12	6	19.5	22	630			630	
GR12/08S	12	8	19.5	22	630			630	
GR12/10S	12	10	19.0	22	630				
GR14/10S	14	10	20.5	24	630				
GR14/12S	14	12	20.5	24	630			630	
GR16/12S	16	12	20.0	27	400	400			
GR16/14S	16	14	21.5	27	400				
GR20/10S	20	10	22.0	32	400				
GR20/12S	20	12	22.0	32	400			400	
GR20/16S	20	16	23.0	32	400			400	
GR25/16S	25	16	25.5	41	400				
GR25/20S	25	20	25.5	41	400			400	
GR30/20S	30	20	26.0	46	400				
GR30/25S	30	25	26.5	46	400			400	
GR38/30S	38	30	29.5	55	315				

For EO-2 part number, insert "Z" between size and pressure series. Example: GR06/04ZLLCF

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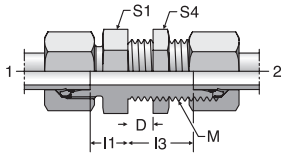
Dimensions and pressures for reference only, subject to change.

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SV Full Dimensions

Bulkhead Union
24° Flareless / 24° Flareless



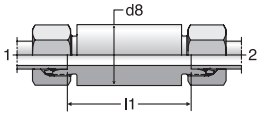
D = 16mm, max. bulkhead thickness

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (mm)	M Metric Thread	l 1 (mm)	l 3 (mm)	S1 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
SV06L	6	6	M12 x 1.5	7	27.0	17	17	315	315		315	315
SV08L	8	8	M14 x 1.5	8	27.0	19	19	315	315		315	315
SV10L	10	10	M16 x 1.5	10.0	28.0	22	22	315	315		315	
SV12L	12	12	M18 x 1.5	10.0	29.0	24	24	315	315		315	
SV15L	15	15	M22 x 1.5	12.0	31.0	27	30	315	315		315	
SV18L	18	18	M26 x 1.5	13.5	32.5	32	36	315	315	200	315	
SV22L	22	22	M30 x 2	16.5	34.5	36	41	160	160	100	160	160
SV28L	28	28	M36 x 2	18.5	35.5	41	46	160		100	160	
SV35L	35	35	M45 x 2	18.5	36.5	50	55	160			160	
SV42L	42	42	M52 x 2	19.0	36.0	60	65	160			160	
SV06S	6	6	M14 x 1.5	12.0	29.0	19	19	630		400	630	
SV08S	8	8	M16 x 1.5	13.0	29.0	22	22	630	630	400	630	
SV10S	10	10	M18 x 1.5	14.5	29.5	24	24	630	630	400	630	
SV12S	12	12	M20 x 1.5	14.5	30.5	27	27	630	630	400	630	
SV14S	14	14	M22 x 1.5	17.0	32.0	30	30	630				
SV16S	16	16	M24 x 1.5	16.5	31.5	32	32	400	400		400	
SV20S	20	20	M30 x 2	17.5	33.5	41	41	400			400	
SV25S	25	25	M36 x 2	20.0	35.0	46	46	400		250	400	
SV30S	30	30	M42 x 2	21.5	37.5	50	50	400			400	
SV38S	38	38	M52 x 2	22.0	37.0	65	65	315			315	

For EO-2 part number, insert "Z" between size and pressure series. Example: SV06ZLCF

ESV Full Dimensions

Weld Bulkhead Fitting
24° Flareless / 24° Flareless



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (mm)	d8 (mm)	l 1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
ESV06L	6	6	18	56	500				
ESV08L	8	8	20	56	500				
ESV10L	10	10	22	58	500	315		315	
ESV12L	12	12	25	58	400				
ESV15L	15	15	28	70	400	315			
ESV18L	18	18	32	69	400			315	
ESV22L	22	22	36	73	250			160	
ESV28L	28	28	40	73	250				
ESV35L	35	35	50	71	250				
ESV42L	42	42	60	70	250				
ESV06S	6	6	20	60	800				
ESV08S	8	8	22	60	800	630			
ESV10S	10	10	25	59	800			630	
ESV12S	12	12	28	59	630	630			
ESV14S	14	14	30	72	630				
ESV16S	16	16	35	71	630				
ESV20S	20	20	38	71	420			400	
ESV25S	25	25	45	72	420				
ESV30S	30	30	50	73	420				
ESV38S	38	38	60	72	420				

For EO-2 part number, insert "Z" between size and pressure series.
Example: ESV06ZL71
Note: Weld fitting. Omit "CF" in the part number for steel material.

Dimensions and pressures for reference only, subject to change.

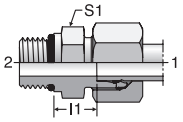
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GE-UNF/UN

Full Dimensions

Male Connector
24° Flareless / SAE-ORB



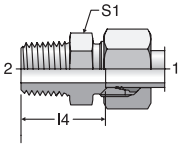
TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 UN/UNF-2A	l 1 (mm)	L1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GE08L7/16UNF	8	7/16-20	10.0	25	17	315			315	
GE10L7/16UNF	10	7/16-20	11.0	26	17	315			315	
GE12L9/16UNF	12	9/16-18	11.0	26	19	315			315	
GE12L3/4UNF	12	3/4-16	13.0	28	24	315			315	
GE12L7/8UNF	12	7/8-14	14.3	29	27	315			315	
GE15L3/4UNF	15	3/4-16	14.0	29	24	315			315	
GE18L3/4UNF	18	3/4-16	14.5	31	27	315			315	
GE18L7/8UNF	18	7/8-14	14.8	31	27	315			315	
GE22L7/8UNF	22	7/8-14	16.8	33	32	160			160	
GE22L11/16UN	22	1 1/16-12	16.5	33	32	160			160	
GE22L15/16UN	22	1 5/16-12	17.5	34	41	160			160	
GE28L11/16UN	28	1 1/16-12	17.5	34	41	160			160	
GE28L15/16UN	28	1 5/16-12	17.5	34	41	160			160	
GE35L15/16UN	35	1 5/16-12	17.5	39	46	160			160	
GE35L15/8UN	35	1 5/8-12	17.5	39	50	160			160	
GE42L15/8UN	42	1 5/8-12	19.0	42	55	160			160	
GE08S7/16UNF	8	7/16-20	15.0	30	17	630			630	
GE10S9/16UNF	10	9/16-18	14.5	31	19	630			630	
GE12S9/16UNF	12	9/16-18	14.5	31	22	630			630	
GE12S3/4UNF	12	3/4-16	17.5	34	24	630			630	
GE16S3/4UNF	16	3/4-16	15.5	34	24	400			400	
GE16S7/8UNF	16	7/8-14	18.8	37	27	400			400	
GE20S3/4UNF	20	3/4-16	20.5	42	32	400			400	
GE20S7/8UNF	20	7/8-14	20.8	42	32	400			400	
GE20S11/16UN	20	1 1/16-12	20.5	42	32	400			400	
GE25S11/16UN	25	1 1/16-12	23.0	47	36	400			400	
GE25S15/16UN	25	1 5/16-12	23.0	47	41	400			400	
GE30S15/16UN	30	1 5/16-12	23.5	50	46	400			400	
GE30S15/8UN	30	1 5/8-12	23.5	50	50	400			400	
GE38S15/8UN	38	1 5/8-12	26.0	57	55	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: GE08ZL7/16UNFCF

GE-NPT

Full Dimensions

Male Connector
24° Flareless / NPTF



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 NPT	l 4 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
GE04LL1/8NPT	4	1/8-27	18.0	11	100	100	
GE06LL1/8NPT	6	1/8-27	16.5	11	100	100	63
GE08LL1/8NPT	8	1/8-27	18.5	12	100	100	63
GE06L1/8NPT	6	1/8-27	17.0	12	315	315	200
GE06L1/4NPT	6	1/4-18	23.0	17	315	315	200
GE08L1/4NPT	8	1/4-18	23.0	17	315	315	200
GE10L1/4NPT	10	1/4-18	24.0	17	315	315	200
GE10L3/8NPT	10	3/8-18	25.0	19	315	315	
GE12L1/4NPT	12	1/4-18	25.0	19	315	315	200
GE12L3/8NPT	12	3/8-18	25.0	19	315	315	200
GE12L1/2NPT	12	1/2-14	30.0	22	315	315	200
GE15L1/2NPT	15	1/2-14	31.0	24	315	315	200
GE18L1/2NPT	18	1/2-14	31.5	27	315	315	200
GE22L3/4NPT	22	3/4-14	33.5	32	160	160	100
GE28L1NPT	28	1-11 1/2	39.5	41	160	160	100
GE35L11/4NPT	35	1 1/4-11 1/2	40.5	46	160	160	
GE42L11/2NPT	42	1 1/2-11 1/2	42.0	55	160	160	
GE06S1/4NPT	6	1/4-18	28.0	17	630		
GE08S1/4NPT	8	1/4-18	28.0	17	630	630	
GE10S1/4NPT	10	1/4-18	27.5	19	630		
GE10S3/8NPT	10	3/8-18	27.5	19	630	630	630
GE12S1/4NPT	12	1/4-18	29.5	22	630	630	
GE12S3/8NPT	12	3/8-18	29.5	22	630	630	
GE12S1/2NPT	12	1/2-14	34.5	22	630	630	
GE14S1/2NPT	14	1/2-14	36.0	24	630	630	
GE16S1/2NPT	16	1/2-14	39.5	32	400	400	260
GE20S3/4NPT	20	3/4-14	37.5	32	400	400	260
GE25S1NPT	25	1-11 1/2	45.0	41	400	400	
GE30S11/4NPT	30	1 1/4-11 1/2	46.5	46	400	400	
GE38S11/2NPT	38	1 1/2-11 1/2	49.0	55	315		

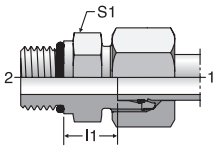
Note: Not sold with EO-2 Functional Nut.

Dimensions and pressures for reference only, subject to change.

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GEO Full Dimensions

Male Connector
24° Flareless / ISO 6149

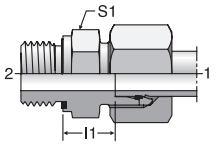


TUBE FITTING PART #	END SIZE 1 (mm)	2 Metric Thread	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GEO04LLM	4	M8 x 1	9.5	11	100			100	
GEO04LLM10x1	4	M10 x 1	9.5	13	100			100	
GEO06LLM	6	M10 x 1	8.0	13	100			100	
GEO06LM	6	M10 x 1	8.5	14	315			315	
GEO08LM	8	M12 x 1.5	10.0	17	315			315	
GEO10LM	10	M14 x 1.5	11.0	19	315			315	
GEO12LM	12	M16 x 1.5	12.5	22	315			315	
GEO15LM	15	M18 x 1.5	13.5	24	315			315	
GEO18LM	18	M22 x 1.5	14.5	27	315			315	
GEO22LM27x2	22	M27 x 2	16.5	32	160			160	
GEO28LM	28	M33 x 2	17.5	41	160			160	
GEO35LM	35	M42 x 2	17.5	50	160			160	
GEO42LM	42	M48 x 2	19.0	55	160			160	
GEO06SM	6	M12 x 1.5	13.0	17	630			630	
GEO08SM	8	M14 x 1.5	15.0	19	630				
GEO10SM	10	M16 x 1.5	15.0	22	630				
GEO12SM	12	M18 x 1.5	17.0	24	630			630	
GEO16SM	16	M22 x 1.5	18.5	27	400			400	
GEO20SM	20	M27 x 2	20.5	32	400			400	
GEO25SM	25	M33 x 2	23.0	41	400			400	
GEO30SM	30	M42 x 2	23.5	50	400			400	
GEO38SM	38	M48 x 2	26.0	55	315				

For EO-2 part number, insert "Z" between size and pressure series.
Example: GEO06ZLMCF

GE-R-ED Full Dimensions

Male Connector
24° Flareless / BSPP



DIN 3852-2 Form E

TUBE FITTING PART #	END SIZE 1 (mm)	2 BSPP	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GE04LLRED	4	G 1/8 A	9.5	14	100			100	
GE06LLRED	6	G 1/8 A	8.0	14	100			100	
GE06LRED	6	G 1/8 A	8.5	14	315	315		315	
GE06LR1/4ED	6	G 1/4A	10.0	19	315	315		315	
GE08LR1/8ED	8	G 1/8 A	9.5	14	315	315			
GE08LRED	8	G 1/4A	10.0	19	315	315		315	315
GE08LR3/8ED	8	G 3/8 A	11.5	22	315	315		315	
GE10LRED	10	G 1/4A	11.0	19	315	315		315	
GE10LR3/8ED	10	G 3/8 A	12.5	22	315	315		315	
GE10LR1/2ED	10	G 1/2 A	13.0	27	315	315			
GE12LR1/4ED	12	G 1/4A	12.0	19	315	315		315	
GE12LRED	12	G 3/8 A	12	22	315	315		315	
GE12LR1/2ED	12	G 1/2 A	14	27	315	315		315	315
GE15LR3/8ED	15	G 3/8 A	12	24	315	315		315	
GE15LRED	15	G 1/2 A	14	27	315	315		315	315
GE18LRED	18	G 1/2 A	14.0	27	315	315		315	
GE18LR3/4ED	18	G 3/4 A	16.0	32	160	160		315	
GE22LRED	22	G 3/4 A	16.0	32	160	160			160
GE28LRED	28	G1 A	18.0	41	160	160		160	
GE35LRED	35	G1 1/4A	20.0	50	160	160			
GE42LRED	42	G1 1/2 A	22.0	55	160	160			
GE06SRED	6	G 1/4A	13.0	19	630	630		630	630
GE08SRED	8	G 1/4A	15.0	19	630	630		630	
GE08SR3/8ED	8	G 3/8 A	15.5	22	630	630		630	
GE10SR1/4ED	10	G 1/4A	14.5	19	630			630	630
GE10SRED	10	G 3/8 A	15.0	22	630	630		630	
GE10SR1/2ED	10	G 1/2 A	17.5	27	630	630		630	
GE12SR1/4ED	12	G 1/4A	16.5	22	630			630	
GE12SRED	12	G 3/8 A	17.0	22	630	630		630	
GE12SR1/2ED	12	G 1/2 A	17.5	27	630			630	
GE14SRED	14	G 1/2 A	19.0	27	630			630	
GE16SR3/8ED	16	G 3/8 A	18.0	27	400	400		400	400
GE16SRED	16	G 1/2 A	18.5	27	400	400		400	400
GE16SR3/4ED	16	G 3/4 A	20.5	32	400	400		400	400
GE20SRED	20	G 3/4 A	20.5	32	400	400		400	400
GE25SR1/2ED	25	G 1/2 A	23.0	41	400			400	
GE25SRED	25	G1 A	23.0	41	400	400		400	400
GE30SRED	30	G1 1/4A	23.5	50	400	400		400	
GE38SRED	38	G1 1/2 A	26.0	55	315	315		315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: GE06ZLREDCF

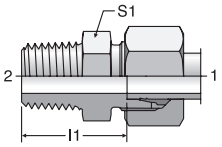
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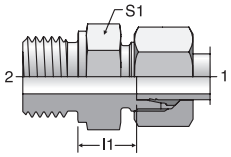
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GE-R Full Dimensions

Male Connector
24° Flareless / BSPT or BSPP



R (BSPT) thread



Cutting face DIN 3852, form B, G (BSPP) thread

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPT / BSPP	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
GE04LLR	4	R 1/8 keg.	16.0	11	100		63
GE06LLR	6	R 1/8 keg.	14.5	11	100	100	63
GE08LLR	8	R 1/8 keg.	16.5	12	100	100	63
GE08LLR1/4	8	R 1/4 keg.	20.5	14	100	100	63
GE10LLR	10	R 1/4 keg.	20.5	14	100		63
GE12LLR	12	R 1/4 keg.	20.0	17	100		63
GE12LLR3/8	12	R 3/8 keg.	20.0	17	100		
GE06LR	6	G 1/8 A	8.5	14	315	315	200
GE06LR1/8KEG	6	R 1/8 keg.	15.0	12	315		
GE06LR1/4	6	G 1/4 A	10.0	19	315	315	200
GE06LR3/8	6	G 3/8 A	11.5	22	315		200
GE06LR1/2	6	G 1/2 A	12.0	27	315	315	
GE08LR	8	G 1/4 A	10.0	19	315	315	200
GE08LR1/8	8	G 1/8 A	8.5	14	315	315	
GE08LR1/4KEG	8	R 1/4 keg.	20.0	17	315		
GE08LR3/8	8	G 3/8 A	11.5	22	315	315	200
GE08LR1/2	8	G 1/2 A	12.0	27	315	315	200
GE10LR	10	G 1/4 A	11.0	19	315	315	200
GE10LR1/4KEG	10	R 1/4 keg.	21.0	17	315		
GE10LR3/8	10	G 3/8 A	12.5	22	315	315	
GE10LR1/2	10	G 1/2 A	13.0	27	315	315	200
GE12LR	12	G 3/8 A	12.5	22	315	315	
GE12LR1/4	12	G 1/4 A	12.0	19	315	315	
GE12LR1/4KEG	12	R 1/4 keg.	22.0	19	315		
GE12LR3/8KEG	12	R 3/8 keg.	22.0	19	315		
GE12LR1/2	12	G 1/2 A	13.0	27	315	315	200
GE12LR1/2KEG	12	R 1/2 keg.	24.0	24	315		
GE12LR3/4	12	G 3/4 A	14.0	32	315		
GE15LR	15	G 1/2A	14.0	27	250	250	160
GE15LR3/8	15	G 3/8 A	13.5	24	250	250	160
GE15LR3/8KEG	15	R 3/8 keg.	23.0	24	315		
GE15LR1/2KEG	15	R 1/2 keg.	25.0	24	315		
GE15LR3/4	15	G 3/4 A	15.0	32	250		
GE18LR	18	G 1/2 A	14.5	27	250	250	160
GE18LR3/8	18	G 3/8 A	14.0	27	250		160
GE18LR1/2KEG	18	R 1/2 keg.	25.5	27	315		
GE18LR3/4	18	G 3/4 A	14.5	32	250	250	
GE22LR	22	G 3/4 A	16.5	32	160		100
GE22LR1/2	22	G 1/2 A	16.5	32	160	160	100
GE22LR3/4KEG	22	R 3/4 keg.	29.5	32	160		
GE28LR	28	G 1 A	17.5	41	160	160	100
GE28LR3/4	28	G 3/4 A	17.5	41	160		
GE35LR	35	G 1 1/4 A	17.5	50	160		100
GE35LR1	35	G 1 A	17.5	46	160		
GE42LR	42	G 1 1/2 A	19.0	55	160		100

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
GE06SR	6	G 1/4 A	13.0	19	400		250
GE06SR1/2	6	G 1/2 A	18.0	27	400		
GE08SR	8	G 1/4 A	15.0	19	400	400	250
GE08SR3/8	8	G 3/8 A	15.5	22	400		
GE10SR	10	G 3/8 A	15.0	22	400	400	250
GE10SR1/4	10	G 1/4 A	14.5	19	400		
GE10SR1/2	10	G 1/2 A	17.5	27	400	400	
GE12SR	12	G 3/8 A	17.0	22	400	400	250
GE12SR1/4	12	G 1/4 A	16.5	22	400	400	
GE12SR1/2	12	G 1/2 A	17.5	27	400	400	
GE14SR	14	G 1/2 A	19.0	27	400		250
GE14SR3/8	14	G 3/8 A	18.5	24	400		
GE16SR	16	G 1/2 A	18.5	27	400	400	250
GE16SR3/8	16	G 3/8 A	18.0	27	400	400	
GE16SR3/4	16	G 3/4 A	20.5	32	400		
GE20SR	20	G 3/4 A	20.5	32	400	400	250
GE20SR1/2	20	G 1/2 A	20.5	32	400	400	
GE25SR	25	G 1 A	23.0	41	250		160
GE25SR3/4	25	G 3/4 A	23.0	41	250		
GE30SR	30	G 1 1/4 A	23.5	50	160		100
GE30SR1	30	G 1 A	23.5	46	160	160	
GE38SR	38	G 1 1/2 A	26.0	55	160		100
GE38SR11/4	38	G 1 1/4 A	26.0	55	160		

Note: "keg." refers to tapered threads.
Not sold with EO-2 Functional Nut.

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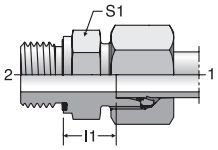
Dimensions and pressures for reference only, subject to change.

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GE-M-ED

Full Dimensions

Male Connector
24° Flareless / Metric with
EOlastic Seal



DIN 3852-1, form E

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GE06LMED	6	M10 x 1	8.5	14	315	315		315	
GE08LMED	8	M12 x 1.5	10.0	17	315			315	
GE10LMED	10	M14 x 1.5	11.0	19	315			315	
GE12LMED	12	M16 x 1.5	12.5	22	315	315		315	
GE12LM18X1.5ED	12	M18 x 1.5	12.5	24	315			315	
GE12LM22X1.5ED	12	M22 x 1.5	14.0	27	315			315	
GE15LMED	15	M18 x 1.5	13.5	24	315			315	
GE15LM22X1.5ED	15	M22 x 1.5	15.0	27	315			315	
GE18LMED	18	M22 x 1.5	14.5	27	315			315	
GE22LMED	22	M26 x 1.5	16.5	32	160			160	
GE28LMED	28	M33 x 2	17.5	41	160			160	
GE35LMED	35	M42 x 2	17.5	50	160	160			
GE42LMED	42	M48 x 2	19.0	55	160			160	
GE06SMED	6	M12 x 1.5	13.0	17	630			630	
GE08SMED	8	M14 x 1.5	15.0	19	630	630		630	
GE10SMED	10	M16 x 1.5	15.0	22	630			630	
GE12SMED	12	M18 x 1.5	17.0	24	630			630	
GE14SMED	14	M20 x 1.5	19.0	27	630			630	
GE16SMED	16	M22 x 1.5	18.5	27	400			400	
GE20SMED	20	M27 x 2	20.5	32	400	400		400	
GE25SMED	25	M33 x 2	23.0	41	400			400	
GE30SMED	30	M42 x 2	23.5	50	400				
GE38SMED	38	M48 x 2	26.0	55	315			315	

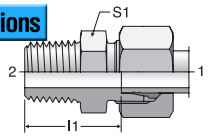
For EO-2 part number, insert "Z" between size and pressure series.
Example: GE06ZLMEDCF

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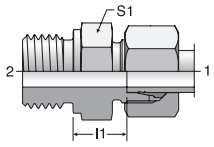
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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GE-M Full Dimensions

Male Connector
24° Flareless / Metric



Metric taper thread



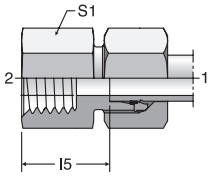
Cutting face DIN 3852, form B, Metric thread

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
GE04LLM6X1KEG	4	M6 x 1 keg.	16.0	9	100		
GE04LLM	4	M8 x 1 keg.	16.0	10	100	100	63
GE06LLM	6	M10 x 1 keg.	14.5	11	100		63
GE08LLM	8	M10 x 1 keg.	16.5	12	100		63
GE06LM	6	M10 x 1	8.5	14	315	315	200
GE08LM	8	M12 x 1.5	10.0	17	315	315	200
GE10LM	10	M14 x 1.5	11.0	19	315	315	200
GE10LM16X1.5	10	M16 x 1.5	12.0	22	315	315	
GE10LM18X1.5	10	M18 x 1.5	12.5	24	315		
GE10LM22X1.5	10	M22 x 1.5	14.0	27	315		
GE12LM14X1.5	12	M14 x 1.5	11.0	19	315		
GE12LM	12	M16 x 1.5	12.5	22	315	315	
GE12LM18X1.5	12	M18 x 1.5	12.5	24	315		
GE12LM22X1.5	12	M22 x 1.5	14.0	27	315		
GE15LM16X1.5	15	M16 x 1.5	13.0	24	250		
GE15LM	15	M18 x 1.5	13.5	24	250		
GE15LM22X1.5	15	M22 x 1.5	15.0	27	250		
GE18LM18X1.5	18	M18 x 1.5	14.0	27	250		
GE18LM	18	M22 x 1.5	14.5	27	250	250	160
GE22LM22X1.5	22	M22 x 1.5	16.5	32	160		
GE22LM	22	M26 x 1.5	16.5	32	160		100
GE28LM	28	M33 x 2	17.5	41	160	160	
GE35LM	35	M42 x 2	17.5	50	160		
GE42LM	42	M48 x 2	19.0	55	160		
GE06SM	6	M12 x 1.5	13.0	17	400		
GE08SM	8	M14 x 1.5	15.0	19	400		
GE10SM	10	M16 x 1.5	15.0	22	400		
GE12SM	12	M18 x 1.5	17.0	24	400		
GE12SM22X1.5	12	M22 x 1.5	17.5	27	400		
GE14SM	14	M20 x 1.5	19.0	27	400		
GE16SM18X1.5	16	M18 x 1.5	18.0	27	400		
GE16SM	16	M22 x 1.5	18.5	27	400		
GE20SM	20	M27 x 2	20.5	32	400		
GE25SM	25	M33 x 2	23.0	41	250		
GE30SM	30	M42 x 2	23.5	50	160		
GE38SM	38	M48 x 2	26.0	55	160		

Note: "keg." refers to taper threads.
Not sold with EO-2 Functional Nut.

GAI-R Full Dimensions

Female Connector
24° Flareless / BSPP



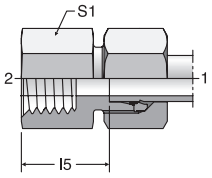
TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 5 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GAI06LR	6	G 1/8	19.0	14	315		200	315	
GAI08LR	8	G 1/4	24.0	19	315		200	315	
GAI08LR3/8	8	G 3/8	25.0	24	315			315	
GAI08LR1/2	8	G 1/2	29.0	27	315			315	
GAI10LR	10	G 1/4	25.0	19	315	315	200	315	
GAI10LR3/8	10	G 3/8	26.0	24	315			315	
GAI10LR1/2	10	G 1/2	30.0	27	315			315	
GAI12LR	12	G 3/8	26.0	24	315		200	315	
GAI12LR1/2	12	G 1/2	30.0	27	315	315		315	
GAI15LR	15	G 1/2	31.0	27	315	315	200	315	315
GAI18LR	18	G 1/2	30.5	27	315	315	200	315	
GAI22LR	22	G 3/4	35.5	36	160	160	100	160	
GAI28LR	28	G 1	38.0	41	160			160	
GAI35LR	35	G 1 1/4	41.0	55	160			160	
GAI42LR	42	G 1 1/2	42.5	60	160			160	
GAI06SR	6	G 1/4	26.0	19	400			400	
GAI08SR	8	G 1/4	26.0	19	400			400	
GAI10SR	10	G 3/8	26.5	24	400			400	
GAI12SR	12	G 3/8	26.5	24	400				
GAI14SR	14	G 1/2	32.0	30	400				
GAI16SR	16	G 1/2	31.5	30	400			400	400
GAI20SR	20	G 3/4	34.5	36	315			315	
GAI25SR	25	G 1	37.5	41	315			315	
GAI30SR	30	G 1 1/4	42.0	55	315				
GAI38SR	38	G 1 1/2	43.5	60	250				

For EO-2 part number, insert "Z" between size and pressure series.
Example: GAI06ZLRCF

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GAI-M Full Dimensions

Female Connector
24° Flareless / Metric

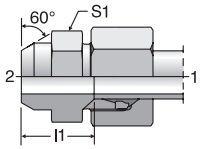


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 5 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
GAI06LM	6	M10 x 1	19.5	14	315			315	
GAI08LM	8	M12 x 1.5	24.0	17	315				
GAI10LM	10	M14 x 1.5	25.0	19	315			315	
GAI12LM	12	M16 x 1.5	26.0	22	315			315	
GAI15LM	15	M18 x 1.5	28.0	24	315			315	
GAI18LM	18	M22 x 1.5	29.5	30	315			315	
GAI22LM	22	M26 x 1.5	34.5	32	160			160	
GAI28LM	28	M33 x 2	37.5	41					
GAI35LM	35	M42 x 2	40.5	55					
GAI42LM	42	M48 x 2	42.0	60					
GAI06SM	6	M12 x 1.5	26.0	17					
GAI08SM	8	M14 x 1.5	26.0	17	400			400	
GAI10SM	10	M16 x 1.5	26.5	22	400				
GAI12SM	12	M18 x 1.5	27.5	24	400				
GAI14SM	14	M20 x 1.5	31.0	27					
GAI16SM	16	M22 x 1.5	30.5	30	400				
GAI20SM	20	M27 x 2	34.5	36	315				
GAI25SM	25	M33 x 2	37.0	41	315				
GAI30SM	30	M42 x 2	41.5	55	315				
GAI38SM	38	M48 x 2	43.0	60					

For EO-2 part number, insert "Z" between size and pressure series.
Example: GAI06ZLMCF

AS Full Dimensions

Weld Connector
24° Flareless / Butt Weld



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (mm)	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
AS06L	6	10	14.0	12		315			
AS08L	8	12	16.0	14	315				
AS10L	10	14	18.0	17	315	315		315	
AS12L	12	16	18.0	19	315	315		315	
AS15L	15	19	22.0	22		315		315	
AS18L	18	22	23.5	27	315			315	
AS22L	22	27	28.5	32	160			160	
AS28L	28	32	30.5	41	160			160	
AS35L	35	40	32.5	46	160			160	
AS42L	42	46	35.0	55	160			160	
AS06S	6	11	19.0	14	630				
AS08S	8	13	21.0	17	630				
AS10S	10	15	22.5	19	630				
AS12S	12	17	24.5	22	630				
AS14S	14	19	27.0	24	630				
AS16S	16	21	26.5	27	400				
AS20S	20	26	29.5	32	400	400			
AS25S	25	31	32.0	41	400				
AS30S	30	36	35.5	46	400	400			
AS38S	38	44	38.0	55	315				

Note: Weld fitting. Omit "CF" in the part number for steel material.
For EO-2 part number, insert "Z" between size and pressure series.
Example: AS06ZL

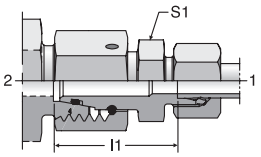
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Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

RED Full Dimensions

Tube End Reducer
Flareless Swivel / 24° Flareless



L-Series

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RED06L/04LL	4	M12 x 1.5	24.5	9	250			250	
RED08/06L	6	M14 x 1.5	23.5	12	250			315	
RED10/06L	6	M16 x 1.5	25	14	315			315	
RED10/08L	8		25	14	315			315	
RED12/06L	6	M18 x 1.5	25	17	315			315	
RED12/08L	8		25	17	315			315	
RED12/10L	10		26	17	315			315	
RED15/06L	6	M22 x 1.5	28.5	19	315			315	
RED15/08L	8		28.5	19	315			315	
RED15/10L	10		29.5	19	315	315		315	
RED15/12L	12		29.5	19	315			315	
RED18/06L	6	M26 x 1.5	28	24	315			315	
RED18/08L	8		28	24	315			315	
RED18/10L	10		29	24	315	315		315	
RED18/12L	12		29	24	315	315		315	
RED18/15L	15		30	24	315			315	
RED22/06L	6	M30 x 2	32	27	160			160	
RED22/08L	8		32	27	160			160	
RED22/10L	10		33	27	160			160	
RED22/12L	12		33	27	160			160	
RED22/15L	15		34	27	160			160	
RED22/18L	18		33.5	27	160	160		160	
RED28/06L	6	M36 x 2	34	32	160			160	
RED28/08L	8		34	32	160			160	
RED28/10L	10		35	32	160			160	
RED28/12L	12		35	32	160			160	
RED28/15L	15		36	32	160			160	
RED28/18L	18		35.5	32	160			160	
RED28/22L	22		37.5	32	160			160	
RED35/12L	12	M45 x 2	38	41				160	
RED35/15L	15		39	41	160			160	
RED35/18L	18		38.5	41	160			160	
RED35/22L	22		40.5	41	160			160	
RED35/28L	28		40.5	41	160			160	
RED42/18L	18	M52 x 2	42	50	160			160	
RED42/22L	22		44	50	160			160	
RED42/28L	28		44	50	160			160	
RED42/35L	35		43	50	160	160		160	

For EO-2 part number, insert "Z" between size and pressure series.
Example: RED08/06ZLCF

S-Series

TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RED08/06S	6	M16 x 1.5	27.0	14	630			630	
RED10/06S	6	M18 x 1.5	27.5	17	630			630	
RED10/08S	8		27.5	17	630			630	
RED12/06S	6	M20 x 1.5	29.0	17	630			630	
RED12/08S	8		29.0	17	630			630	
RED12/10S	10		29.5	19	630			630	
RED14/06S	6	M22 x 1.5	31.5	19	630				
RED14/08S	8		31.5	19	630				
RED14/10S	10		31.0	19	630				
RED14/12S	12		31.0	22	630			630	
RED16/06S	6	M24 x 1.5	32.0	22	400			400	
RED16/08S	8		32.0	22	400			400	
RED16/10S	10		31.5	22	400			400	
RED16/12S	12		31.5	22	400			400	
RED16/14S	14		33.0	24	400				
RED20/06S	6	M30 x 2	36.0	27	400			400	
RED20/08S	8		36.0	27	400			400	
RED20/10S	10		35.5	27	400			400	
RED20/12S	12		35.5	27	400			400	
RED20/14S	14		37.0	27	400				
RED20/16S	16		36.5	27	400			400	
RED25/06S	6	M36 x 2	38.5	32				400	
RED25/08S	8		38.5	32	400			400	
RED25/10S	10		38.0	32	400			400	
RED25/12S	12		38.0	32	400			400	
RED25/14S	14		39.5	32	400				
RED25/16S	16		39.0	32	400	400		400	
RED25/20S	20		39.0	32	400			400	
RED30/08S	8	M42 x 2	44.0	41				400	
RED30/10S	10		43.5	41	400			400	
RED30/12S	12		43.5	41	400			400	
RED30/14S	14		45.0	41					
RED30/16S	16		44.5	41	400			400	
RED30/20S	20		44.5	41	400			400	
RED30/25S	25		45.0	41	400			400	
RED38/12S	12	M52 x 2	47.0	50	315			315	
RED38/16S	16		48.0	50	315			315	
RED38/20S	20		48.0	50	315			315	
RED38/25S	25		48.5	50	315			315	
RED38/30S	30		49.0	50	315			315	

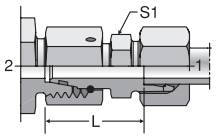
For EO-2 part number, insert "Z" between size and pressure series.
Example: RED08/06ZSCF

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

DA Full Dimensions

Distance Piece Adapter
Flareless Swivel / 24° Flareless

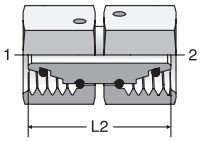


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	L (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
DA06L	6	M12 x 1.5	36	12				315	
DA08L	8	M14 x 1.5	36	14	315				
DA10L	10	M16 x 1.5	36	17	315				
DA12L	12	M18 x 1.5	36	19	315			315	
DA15L	15	M22 x 1.5	36	24	315				
DA18L	18	M26 x 1.5	36	27	315				
DA22L	22	M30 x 2	40	32	160				
DA28L	28	M36 x 2	40	41	160				
DA35L	35	M45 x 2	50	46					
DA42L	42	M52 x 2	60	55					
DA06S	6	M14 x 1.5	36	12					
DA08S	8	M16 x 1.5	36	14	630				
DA10S	10	M18 x 1.5	36	17					
DA12S	12	M22 x 1.5	36	19	630				630
DA14S	14	M24 x 1.5	40	24					
DA16S	16	M26 x 1.5	40	27	400				
DA20S	20	M30 x 2	46	32	400				
DA25S	25	M36 x 2	50	41	400				
DA30S	30	M45 x 2	56	46	400				
DA38S	38	M52 x 2	60	55	315				

For EO-2 part number, insert "Z" between size and pressure series.
Example: DA06ZLCF

GZ Full Dimensions

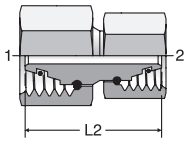
Swivel Union
Flareless Swivel /
Flareless Swivel



TUBE FITTING PART #	END SIZE 1 & 2 Metric	L2 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
GZ06L	M12 x 1.5	32	315		
GZ08L	M14 x 1.5	32	315	315	
GZ10L	M16 x 1.5	33	315		
GZ12L	M18 x 1.5	33	315		
GZ15L	M22 x 1.5	38	315		
GZ18L	M26 x 1.5	36	315		
GZ22L	M30 x 2	42	160		
GZ28L	M36 x 2	46	160		
GZ35L	M45 x 2	48	160		
GZ42L	M52 x 2	52	160		
GZ06S	M14 x 1.5	32	630		
GZ08S	M16 x 1.5	33	630		
GZ10S	M18 x 1.5	33	630		
GZ12S	M20 x 1.5	36	630		
GZ14S	M22 x 1.5	39	630		
GZ16S	M24 x 1.5	39	400		
GZ20S	M30 x 2	44	400		
GZ25S	M36 x 2	46	400		
GZ30S	M42 x 2	52	400		
GZ38S	M52 x 2	52	315		

GZR Full Dimensions

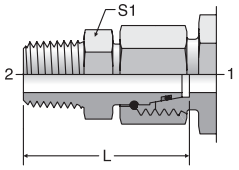
Swivel Union Reducer
Flareless Swivel / Flareless Swivel



TUBE FITTING PART #	END SIZE 1 Metric	END SIZE 2 Metric	L2 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
GZR06L/06S	M14 x 1.5	M12 x 1.5	32	315		
GZR08L/08S	M16 x 1.5	M14 x 1.5	33	315		
GZR10L/10S	M18 x 1.5	M16 x 1.5	33	315		
GZR12L/12S	M20 x 1.5	M18 x 1.5	36	315		
GZR12/08L	M18 x 1.5	M14 x 1.5	34	315		
GZR15/08L	M22 x 1.5	M14 x 1.5	39	315		
GZR15/12L	M22 x 1.5	M18 x 1.5	39	315		
GZR18L/16S	M26 x 1.5	M24 x 1.5	39	315		
GZR22L/20S	M30 x 2	M30 x 2	44	160		
GZR28L/25S	M36 x 2	M36 x 2	46	160		
GZR28/22L	M36 x 2	M30 x 2	46	160		
GZR35L/30S	M45 x 2	M42 x 2	52	160		
GZR42L/38S	M52 x 2	M52 x 2	52	160		
GZR16S/15L	M24 x 1.5	M22 x 1.5	39	315		
GZR20S/18L	M30 x 2	M26 x 1.5	44	315		
GZR25S/22L	M36 x 2	M30 x 2	46	160		
GZR30S/28L	M42 x 2	M36 x 2	52	160		
GZR38S/35L	M52 x 2	M45 x 2	52	160		

EGE-NPT Full Dimensions

Swivel Connector
Flareless Swivel / NPT



TUBE FITTING PART #	END SIZE 1 Metric	END SIZE 2 NPT	L (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
EGE06L1/8NPT	M12 x 1.5	1/8-27	31.5	11	315		
EGE08L1/4NPT	M14 x 1.5	1/4-18	37.5	14	315		
EGE10L1/4NPT	M16 x 1.5	1/4-18	38.0	14	315		
EGE12L3/8NPT	M18 x 1.5	3/8-18	40.0	19	315		
EGE15L1/2NPT	M22 x 1.5	1/2-14	49.5	22	315		
EGE18L1/2NPT	M26 x 1.5	1/2-14	49.0	24	315		
EGE22L3/4NPT	M30 x 2	3/4-14	52.0	27	160		
EGE28L1NPT	M36 x 2	1-11 1/2	61.0	36	160		
EGE35L11/4NPT	M45 x 2	1 1/4-11 1/2	65.5	46	160		
EGE42L11/2NPT	M52 x 2	1 1/2-11 1/2	68.5	50	160		
EGE06S1/4NPT	M14 x 1.5	1/4-18	37.5	14	630		
EGE08S1/4NPT	M16 x 1.5	1/4-18	38.0	14	630		
EGE10S3/8NPT	M18 x 1.5	3/8-18	40.5	19	630		
EGE12S3/8NPT	M20 x 1.5	3/8-18	42.0	19	630		
EGE14S1/2NPT	M22 x 1.5	1/2-14	50.5	22	630		
EGE16S1/2NPT	M24 x 1.5	1/2-14	51.0	22	400		
EGE20S3/4NPT	M30 x 2	3/4-14	54.0	27	400		
EGE25S1NPT	M36 x 2	1-11 1/2	63.5	36	400		
EGE30S11/4NPT	M42 x 2	1 1/4-11 1/2	70.5	46	400		
EGE38S11/2NPT	M52 x 2	1 1/2-11 1/2	73.5	50	315		

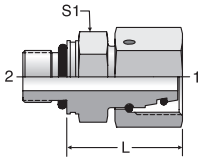
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EGEO Full Dimensions

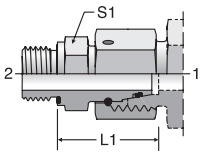
Swivel Connector
Metric ISO 6149 / Flareless Swivel



TUBE FITTING PART #	END SIZE 1 Metric	END SIZE 2 Metric	L (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
EGEO06LM	M12 x 1.5	M10 x 1	24.5	14	315		
EGEO08LM	M14 x 1.5	M12 x 1.5	26.5	17	315		
EGEO10LM	M16 x 1.5	M14 x 1.5	27.5	19	315		
EGEO12LM	M18 x 1.5	M16 x 1.5	30.5	22	315		
EGEO15LM	M22 x 1.5	M18 x 1.5	31.5	24	315		
EGEO18LM	M26 x 1.5	M22 x 1.5	31.5	27	315		
EGEO22LM27X2	M30 x 2	M27 x 2	32.5	32			
EGEO28LM	M36 x 2	M33 x 2	35.0	41			
EGEO35LM	M45 x 2	M42 x 2	42.5	50			
EGEO08SM	M16 x 1.5	M14 x 1.5	29.5	19			
EGEO10SM	M18 x 1.5	M16 x 1.5	32.0	22			
EGEO12SM	M20 x 1.5	M18 x 1.5	34.0	24	630		
EGEO16SM	M24 x 1.5	M22 x 1.5	37.0	27			
EGEO20SM	M30 x 2	M27 x 2	43.0	32			
EGEO25SM	M36 x 2	M33 x 2	48.0	41			
EGEO30SM	M42 x 2	M42 x 2	51.0	50			

EGE-R-ED Full Dimensions

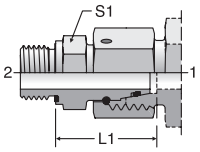
Swivel Connector
Flareless Swivel / BSPP with
EOlastic Seal



TUBE FITTING PART #	END SIZE 1 Metric	END SIZE 2 BSPP	L1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
EGE06LRED	M12 x 1.5	G 1/8A	24.5	14	315	315	
EGE08LRED	M14 x 1.5	G 1/4A	29.5	19	315	315	
EGE10LRED	M16 x 1.5	G 1/4A	27.5	19	315		
EGE12LRED	M18 x 1.5	G 3/8A	34.0	22	315		
EGE15LRED	M22 x 1.5	G 1/2A	32.0	27	315	315	
EGE18LRED	M26 x 1.5	G 1/2A	31.5	27	315	315	
EGE22LRED	M30 x 2	G 3/4A	32.5	32	160	160	
EGE28LRED	M36 x 2	G 1A	35.0	41	160		
EGE35LRED	M45 x 2	G 1 1/4A	42.5	50	160		
EGE42LRED	M52 x 2	G 1 1/2A	46.5	55	160		
EGE06SRED	M14 x 1.5	G 1/4A	27.0	19	630	630	
EGE08SRED	M16 x 1.5	G 1/4A	29.5	19	630		
EGE10SRED	M18 x 1.5	G 3/8A	32.0	22	630		
EGE12SRED	M20 x 1.5	G 3/8A	34.0	22	630		
EGE14SRED	M22 x 1.5	G 1/2A	36.5	27	630		
EGE16SRED	M24 x 1.5	G 1/2A	37.0	27	400	400	
EGE20SRED	M30 x 2	G 3/4A	43.0	32	400	400	
EGE25SRED	M36 x 2	G 1A	48.0	41	400		
EGE30SRED	M42 x 2	G 1 1/4A	51.0	50	400	400	
EGE38SRED	M52 x 2	G 1 1/2A	60.0	55	315	315	

EGE-M-ED Full Dimensions

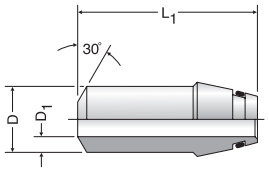
Swivel Connector
Flareless Swivel / Metric with
EOlastic Seal



TUBE FITTING PART #	END SIZE 1 Metric	END SIZE 2 Metric	L1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
EGE06LMED	M12 x 1.5	M10 x 1	24.5	14	315		
EGE08LMED	M14 x 1.5	M12 x 1.5	26.5	17	315		
EGE10LMED	M16 x 1.5	M14 x 1.5	27.5	19	315		
EGE12LMED	M18 x 1.5	M16 x 1.5	30.5	22	315		
EGE15LMED	M22 x 1.5	M18 x 1.5	31.5	24	315		
EGE18LMED	M26 x 1.5	M22 x 1.5	31.5	27	315		
EGE22LMED	M30 x 2	M26 x 1.5	32.5	32	160		
EGE28LMED	M36 x 2	M33 x 2	35.0	41	160		
EGE35LMED	M45 x 2	M42 x 2	42.5	50	160		
EGE42LMED	M52 x 2	M48 x 2	46.5	55	160		
EGE06SMED	M14 x 1.5	M12 x 1.5	27.0	17	630	630	
EGE08SMED	M16 x 1.5	M14 x 1.5	29.5	19	630		
EGE10SMED	M18 x 1.5	M16 x 1.5	32.0	22	630		
EGE12SMED	M20 x 1.5	M18 x 1.5	34.0	24	630		
EGE14SMED	M22 x 1.5	M20 x 1.5	36.5	27	630		
EGE16SMED	M24 x 1.5	M22 x 1.5	37.0	27	400		
EGE20SMED	M30 x 2	M27 x 2	43.0	32	400		
EGE25SMED	M36 x 2	M33 x 2	48.0	41	400		
EGE30SMED	M42 x 2	M42 x 2	51.0	50	400		
EGE38SMED	M52 x 2	M48 x 2	60.0	55	315		

SKA Full Dimensions

Weld Nipple
24° Flareless /
ISO 8434-4 Butt Weld



TUBE FITTING PART #	D (mm)	D1 (mm)	L1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
SKA10X1	10	8	32.5	249		
SKA10X1.5	10	7	32.5	358		
SKA10X2	10	6	32.5	460		
SKA12X1.5	12	9	32.5	305	297	
SKA12X2	12	8	32.5	393	383	
SKA12X2.5	12	7	32.5	476		
SKA16X1.5	16	13	39.0	234		
SKA16X2	16	12	39.0	305		
SKA16X2.5	16	11	39.0	372		
SKA16X3	16	10	39.0	400	400	
SKA20X2	20	16	45.0	249		
SKA20X2.5	20	15	45.0	305		
SKA20X3	20	14	45.0	358	349	
SKA20X4	20	12	45.0	400		
SKA25X3	25	19	49.5	294		
SKA25X4	25	17	49.5	379		
SKA25X5	25	15	49.5	400		
SKA30X3	30	24	52.0	249		
SKA30X4	30	22	52.0	323	314	
SKA30X5	30	20	52.0	393		
SKA30X6	30	18	52.0	400		
SKA38X4	38	30	56.5	261	254	
SKA38X5	38	28	56.5	315		
SKA38X6	38	26	56.5	315		
SKA38X7	38	24	56.5			

Note: Weld fitting. Omit "CF" in the part number for steel material. Part does not include the tube nut. Size 10 and 12 SKA will work for Series L & S

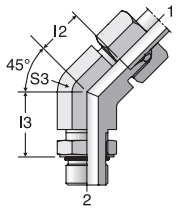
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VEE-UNF Full Dimensions

Adjustable Locknut 45° Elbow
24° Flareless / SAE-ORB

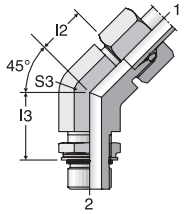


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 UN/UNF-2A	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
VEE06L7/16UNF	6	7/16-20	9	19	14				315	
VEE08L7/16UNF	8	7/16-20	12	19	14					
VEE10L7/16UNF	10	9/16-18	12	24	19				315	
VEE12L9/16UNF	12	9/16-18	14	24	19					
VEE12L3/4UNF	12	3/4-16	14	24	19					
VEE15L3/4UNF	15	3/4-16	17	24	22	315			315	
VEE15L7/8UNF	15	7/8-14	17	24	22					
VEE18L7/8UNF	18	7/8-14	17	30	27				315	
VEE18L11/16UN	18	1 1/16-12	17	30	30					
VEE22L11/16UN	22	1 1/16-12	19	33	30					
VEE28L15/16UN	28	1 5/16-12	23	35	36					
VEE35L15/8UN	35	1 5/8-12	27	37	50					
VEE42L17/8UN	42	1 7/8-12	26	37	50					
VEE06S7/16UNF	6	7/16-20	9	18	14					
VEE08S9/16UNF	8	9/16-18	12	21	19					
VEE10S9/16UNF	10	9/16-18	13	21	19				400	
VEE12S3/4UNF	12	3/4-16	17	22	22	400				
VEE16S7/8UNF	16	7/8-14	16	29	27					
VEE20S11/16UN	20	1 1/16-12	16	31	30					
VEE25S11/16UN	25	11/16-12	30	33	36					
VEE30S15/8UN	30	1 5/8-12	24	35	50					
VEE38S17/8UN	38	1 7/8-12	21	35	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: VEE06ZL7/16UNFCF

VEE-OR Full Dimensions

Adjustable Locknut 45° Elbow
24° Flareless / Metric ISO 6149



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
VEE06LMOR	6	M10 x 1	9	20	14				315	
VEE08LMOR	8	M12 x 1.5	12	18	14					
VEE10LMOR	10	M14 x 1.5	12	22	19					
VEE12LMOR	12	M16 x 1.5	14	23	19	315				
VEE15LMOR	15	M18 x 1.5	17	23	22					
VEE18LMOR	18	M22 x 1.5	17	30	27					
VEE22LM27X2OR	22	M27 x 2	19	30	30					
VEE28LMOR	28	M33 x 2	23	34	36					
VEE35LMOR	35	M42 x 2	27	36	50					
VEE42LMOR	42	M48 x 2	26	36	50	160				
VEE06SMOR	6	M12 x 1.5	9	18	14	400			400	
VEE08SMOR	8	M14 x 1.5	12	18	19					
VEE10SMOR	10	M16 x 1.5	13	22	19	400			400	
VEE12SMOR	12	M18 x 1.5	17	23	22					
VEE16SMOR	16	M22 x 1.5	16	20	27					
VEE20SMOR	20	M27 x 2	16	33	30					
VEE25SMOR	25	M33 x 2	19	35	36					
VEE30SMOR	30	M42 x 2	24	36	50					
VEE38SMOR	38	M48 x 2	21	36	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: VEE06ZLMORCF

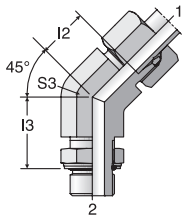
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VEE-R Full Dimensions

Adjustable Locknut 45° Elbow
24° Flareless / BSPP ORR

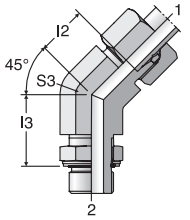


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	i (mm)	l 2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
VEE06LR	6	G 1/8A	7	9	14	315			315	
VEE08LR	8	G 1/4A	9	12	14	315			315	
VEE10LR	10	G 1/4A	9	12	19	315			315	
VEE12LR	12	G 3/8A	9	14	19	250			250	
VEE15LR	15	G 1/2A	13	17	22				250	
VEE18LR	18	G 1/2A	13	17	27	250			250	
VEE22LR	22	G 3/4A	13	19	30	160			160	
VEE28LR	28	G 1A	15	23	36	160			160	
VEE35LR	35	G 1 1/4A	15	27	50				160	
VEE42LR	42	G 1 1/2A	15	26	50	160			160	
VEE06SR	6	G 1/4A	9	9	14	315			315	
VEE08SR	8	G 1/4A	9	12	19					
VEE10SR	10	G 3/8A	9	13	19	250				
VEE12SR	12	G 3/8A	9	17	22					
VEE16SR	16	G 1/2A	13	16	27					
VEE20SR	20	G 3/4A	12	16	27					
VEE25SR	25	G 1A	14	19	36				250	
VEE30SR	30	G 1 1/4A	15	24	50				160	
VEE38SR	38	G 1 1/2A	15	21	50	160			160	

For EO-2 part number, insert "Z" between size and pressure series.
Example: VEE06ZLRCF

VEE-M Full Dimensions

Adjustable Locknut 45° Elbow
24° Flareless / Metric ORR



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
VEE06LM	6	M10 x 1	9	20	14				315	
VEE08LM	8	M12 x 1.5	12	18	14	315				
VEE10LM	10	M14 x 1.5	12	22	19					
VEE12LM	12	M16 x 1.5	14	23	19					
VEE15LM	15	M18 x 1.5	17	23	22				315	
VEE18LM	18	M22 x 1.5	17	30	27				250	
VEE22LM27X2	22	M27 x 2	19	30	30					
VEE28LM	28	M33 x 2	23	34	36					
VEE35LM	35	M42 x 2	27	36	50					
VEE42LM	42	M48 x 2	26	36	50					
VEE06SM	6	M12 x 1.5	9	18	14					
VEE08SM	8	M14 x 1.5	12	18	19	315				
VEE10SM	10	M16 x 1.5	13	22	19					
VEE12SM	12	M18 x 1.5	17	23	22					
VEE16SM	16	M22 x 1.5	16	30	27					
VEE20SM	20	M27 x 2	16	33	30					
VEE25SM	25	M33 x 2	19	35	36					
VEE30SM	30	M42 x 2	24	36	50					
VEE38SM	38	M48 x 2	21	36	50					

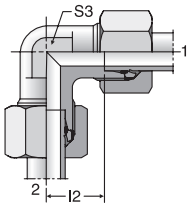
For EO-2 part number, insert "Z" between size and pressure series.
Example: VEE06ZLMCF

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W Full Dimensions

Elbow Union
24° Flareless / 24° Flareless



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	l 2 (mm)	S3 (mm)	S3 (Stainless Steel) (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
* W04LL	4	11	9	9	100	100		100	
* W06LL	6	9.5	11	9	100	100		100	
* W08LL	8	11.5	12	12	100	100			
* W10LL	10	12.5	14	12	100				
* W12LL	12	13	17	14	100				
* W06L	6	12	12	12	315	315		315	
* W08L	8	14	14	12	315	315	200	315	
* W10L	10	15	17	14	315	315	200	315	
* W12L	12	17	19	17	315	315	200	315	315
W15L	15	21	19	19	315	315	200	315	315
W18L	18	23.5	24	24	315	315	200	315	315
W22L	22	27.5	27	27	160	160	100	160	
W28L	28	30.5	36	36	160		100	160	
W35L	35	34.5	41	41	160		100	160	
W42L	42	40	50	50	160		100	160	
* W06S	6	16	14	12	630			630	
* W08S	8	17	17	14	630	630		630	
* W10S	10	17.5	19	17	630			630	
* W12S	12	21.5	22	17	630	630		630	630
W14S	14	22	19	19	630			630	630
W16S	16	24.5	24	24	400	400	250	400	400
W20S	20	26.5	27	27	400	400	250	400	
W25S	25	30	36	36	400		250	400	
W30S	30	35.5	41	41	400	400	250	400	
W38S	38	41	50	50	315		200	315	315

* Extruded body.
For EO-2 part number, insert "Z" between size and pressure series.
Example: W04ZLLCF

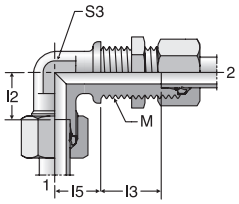
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WSV Full Dimensions

Bulkhead Union Elbow
24° Flareless / 24° Flareless

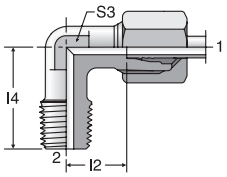


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	M Metric	l 2 (mm)	l 3 (mm)	l 5 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WSV06L	6	M12 x 1.5	12.0	27.0	14	12	315	315	200	315	
WSV08L	8	M14 x 1.5	14.0	27.0	17	12	315	315	200	315	
WSV10L	10	M16 x 1.5	15.0	28.0	18	14	315	315	200	315	
WSV12L	12	M18 x 1.5	17.0	29.0	20	17	315	315	200	315	
WSV15L	15	M22 x 1.5	21.0	31.0	23	19	315	315	200	315	
WSV18L	18	M26 x 1.5	23.5	32.5	24	24	315	315	200	315	
WSV22L	22	M30 x 2	27.5	34.5	30	27	160			160	
WSV28L	28	M36 x 2	30.5	35.5	34	36	160			160	
WSV35L	35	M45 x 2	34.5	36.5	39	41	160			160	
WSV42L	42	M52 x 2	40.0	36.0	43	50	160			160	
WSV06S	6	M14 x 1.5	16.0	29.0	17	12	630			630	
WSV08S	8	M16 x 1.5	17.0	29.0	18	14	630			630	
WSV10S	10	M18 x 1.5	17.5	29.5	20	17	630			630	
WSV12S	12	M20 x 1.5	21.5	30.5	21	17	630			630	
WSV14S	14	M22 x 1.5	22.0	32.0	23	19	630			630	
WSV16S	16	M24 x 1.5	24.5	31.5	24	24	400			400	
WSV20S	20	M30 x 2	26.5	33.5	30	27	400			400	
WSV25S	25	M36 x 2	30.0	35.0	34	36	400			400	
WSV30S	30	M42 x 2	35.5	37.5	39	41	400			400	
WSV38S	38	M52 x 2	41.0	37.0	43	50	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: WSV06ZLCF

WE-NPT Full Dimensions

Male Elbow
24° Flareless / NPT



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 NPT	l 2 (mm)	l 4 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
* WE04LL1/8NPT	4	1/8-27	11.0	17	9	100		
* WE06LL1/8NPT	6	1/8-27	9.5	17	9	100		65
* WE08LL1/8NPT	8	1/8-27	11.5	20	12	100		
* WE06L1/8NPT	6	1/8-27	12.0	20	12	315	315	
WE06L1/4NPT	6	1/4-18	14.0	26	14	315		
* WE08L1/4NPT	8	1/4-18	14.0	26	12	315	315	
* WE10L1/4NPT	10	1/4-18	15.0	27	12	315	315	
* WE12L3/8NPT	12	3/8-18	17.0	28	17	315	315	200
WE12L1/4NPT	12	1/4-18	17.0	28	19	315	315	
WE12L1/2NPT	12	1/2-14	21.0	34	19	315		
WE15L1/2NPT	15	1/2-14	21.0	34	19	315	315	
WE18L1/2NPT	18	1/2-14	23.5	36	24	315	315	
WE22L3/4NPT	22	3/4-14	27.5	42	27	160	160	
WE28L1NPT	28	1-11 1/2	30.5	48	36	160		
WE35L11/4NPT	35	1 1/4-11 1/2	34.5	54	41	160		
WE42L11/2NPT	42	1 1/2-11 1/2	40.0	61	50	160		
* WE06S1/4NPT	6	1/4-18	16.0	26	12	630	630	
* WE08S1/4NPT	8	1/4-18	17.0	27	14	630		
* WE10S3/8NPT	10	3/8-18	17.5	28	17	630	630	
* WE12S3/8NPT	12	3/8-18	22.5	28	17	630		
WE14S1/2NPT	14	1/2-14	22.0	34	19	630		
WE16S1/2NPT	16	1/2-14	24.5	36	24	400	400	
WE20S3/4NPT	20	3/4-14	26.5	42	27	400		
WE25S1NPT	25	1-11 1/2	30.0	48	36	400		
WE30S11/4NPT	30	1 1/4-11 1/2	35.5	54	41	400		
WE38S11/2NPT	38	1 1/2-11 1/2	41.0	61	50	315		

* Extruded body.

Dimensions and pressures for reference only, subject to change.

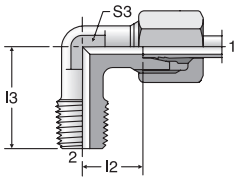
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WE-R keg

Full Dimensions

Male Elbow
24° Flareless / BSPT



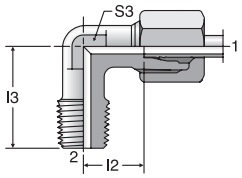
TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPT	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
* WE04LLR	4	R1/8 keg.	11	17	11	100		
* WE06LLR	6	R1/8 keg.	9.5	17	11	100	100	
* WE08LLR	8	R1/8 keg.	11.5	20	12	100	100	63
* WE10LLR	10	R1/4 keg.	12.5	23	14	100		
* WE12LLR	12	R1/4 keg.	13	23	17	100		
* WE06LR	6	R1/8 keg.	12	20	12	315	315	200
* WE08LR	8	R1/4 keg.	14	26	14	315	315	200
* WE10LR	10	R1/4 keg.	15	27	17	315	315	200
* WE12LR	12	R3/8 keg.	17	28	19	315		200
WE12LR	12	R1/4 keg.	17	27	19	315		
WE15LR	15	R1/2 keg.	21	34	19	315	315	
WE18LR	18	R1/2 keg.	23.5	36	24	315	315	200
WE22LR	22	R3/4 keg.	27.5	42	27	160		
* WE06SR	6	R1/4 keg.	16	26	14	400	400	
* WE08SR	8	R1/4 keg.	17	27	17	400		
* WE10SR	10	R3/8 keg.	18	28	19	400	400	
* WE12SR	12	R3/8 keg.	21.5	28	22	400		
WE14SR	14	R1/2 keg.	22	32	19	400		
WE16SR	16	R1/2 keg.	24.5	32	24	400	400	

* Extruded body.
Note: keg. refers to taper threads.

WE-M keg

Full Dimensions

Male Elbow
24° Flareless / Metric Taper Thread



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
* WE06LLM	6	M10 x 1 keg.	9.5	17	11	100		
* WE08LLM	8	M10 x 1 keg.	11.5	20	12	100		
* WE06LM	6	M10 x 1 keg.	12	20	12	315		
* WE08LM	8	M12 x 1.5 keg.	14	26	14	315	315	
* WE10LM	10	M14 x 1.5 keg.	15	27	17	315		
WE12LM	12	M16 x 1.5 keg.	17	28	19	315		
WE15LM	15	M18 x 1.5 keg.	21	32	19	315		
WE18LM	18	M22 x 1.5 keg.	23.0	36	24	315		
* WE06SM	6	M12 x 1.5 keg.	16	26	14	400		
* WE08SM	8	M14 x 1.5 keg.	17	27	17	400	400	
* WE10SM	10	M16 x 1.5 keg.	17.5	28	19	400		
* WE12SM	12	M18 x 1.5 keg.	21.5	28	22	400		
WE14SM	14	M20 x 1.5 keg.	22	32	19	400		
WE16SM	16	M22 x 1.5 keg.	24.5	32	24	400		

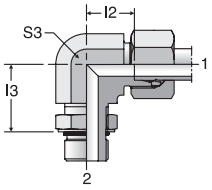
* Extruded body.
Note: keg. refers to taper threads.

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WEE-UNF Full Dimensions

Adjustable Locknut Elbow
24° Flareless / SAE-ORB

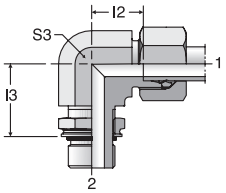


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 UN / UNF	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WEE06L7/16UNF	6	7/16-20	14	19	14	315			315	
WEE08L7/16UNF	8	7/16-20	16	19	14	315			315	
WEE10L9/16UNF	10	9/16-18	17	24	19	315			315	
WEE12L9/16UNF	12	9/16-18	19	25	19	315			315	
WEE12L3/4UNF	12	3/4-16	19	25	19	315			315	
WEE15L3/4UNF	15	3/4-16	21	28	22	315			315	
WEE15L7/8UNF	15	7/8-14	21	28	22	315			315	
WEE18L7/8UNF	18	7/8-14	24	32	27	315			315	
WEE18L11/16UN	18	1 1/16-12	24	32	30	315			315	
WEE22L11/16UN	22	1 1/16-12	28	35	30	160			160	
WEE28L15/16UN	28	1 5/16-12	31	42	36	160			160	
WEE35L15/8UN	35	1 5/8-12	38	46	50	160			160	
WEE42L17/8UN	42	1 7/8-12	38	47	50	160			160	
WEE06S7/16UNF	6	7/16-20	15	20	14	400				
WEE08S9/16UNF	8	9/16-18	17	25	19	400			400	
WEE10S9/16UNF	10	9/16-18	18	26	19	400			400	
WEE12S3/4UNF	12	3/4-16	22	30	22	400				
WEE16S7/8UNF	16	7/8-14	25	34	27	400			400	
WEE20S11/16UN	20	1 1/16-12	28	37	30	400				
WEE25S11/16UN	25	1 1/16-12	30	50	36	400			400	
WEE30S15/8UN	30	1 5/8-12	36	50	50	250			250	
WEE38S17/8UN	38	1 7/8-12	34	51	50				250	

For EO-2 part number, insert "Z" between size and pressure series.
Example: WEE06ZL7/16UNFCF

WEE-OR Full Dimensions

Adjustable Locknut Elbow
24° Flareless / Metric ISO 6149



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 3 (mm)	l 2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WEE04LLMOR	4	M8 x 1	7.1	19.8	12	250				
WEE04LLM10X1MOR	4	M10 x 1	7.1	19.8	11					
WEE06LLMOR	6	M10 x 1	7.1	19.8	14				250	
WEE06LLM12X1.5MOR	6	M12 x 1.5	9.6	23.2	14				250	
WEE06LMOR	6	M10 x 1	7	20	14	315			315	
WEE08LMOR	8	M12 x 1.5	10	22	14	315			315	
WEE10LMOR	10	M14 x 1.5	10	25	19	315			315	
WEE12LMOR	12	M16 x 1.5	10	26	19	315				
WEE15LMOR	15	M18 x 1.5	11	30	22	315			315	
WEE18LMOR	18	M22 x 1.5	12	33	27	315				
WEE22LM27X2OR	22	M27 x 2	14	35	30	160			160	
WEE28LMOR	28	M33 x 2	14	38	36	160			160	
WEE35LMOR	35	M42 x 2	14	48	50					
WEE42LMOR	42	M48 x 2	16	49	50					
WEE06SMOR	6	M12 x 1.5	10	22	14	400			400	
WEE08SMOR	8	M14 x 1.5	10	26	19				400	
WEE10SMOR	10	M16 x 1.5	11	27	19	400				
WEE12SMOR	12	M18 x 1.5	12	31	22				400	
WEE16SMOR	16	M22 x 1.5	14	35	27	400				
WEE20SMOR	20	M27 x 2	16	39	30	400			400	
WEE25SMOR	25	M33 x 2	16	44	36	315				
WEE30SMOR	30	M42 x 2	17	51	50	250				
WEE38SMOR	38	M48 x 2	19	54	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: WEE04ZLLMORCF

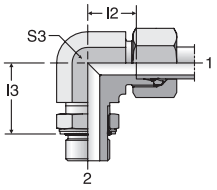
Dimensions and pressures for reference only, subject to change.

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WEE-R Full Dimensions

Adjustable Locknut Elbow
24° Flareless / BSPP ORR

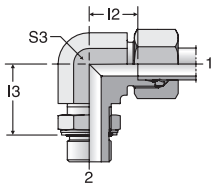


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WEE04LLR	4	G 1/8A	11	20	11				250	
WEE06LLR	6	G 1/8A	11	20	11	250				
WEE06LR	6	G 1/8A	14	19	14	315			315	
WEE08LR	8	G 1/4A	16	23	14	315			315	
WEE10LR	10	G 1/4A	17	25	19	315			315	
WEE12LR	12	G 3/8A	19	28	19	250			250	
WEE15LR	15	G 1/2A	21	30	22	250			250	
WEE18LR	18	G 1/2A	24	36	27	250			250	
WEE22LR	22	G 3/4A	28	36	30	160			160	
WEE28LR	28	G 1A	31	44	36	160			160	
WEE35LR	35	G 1 1/4A	38	50	50	160			160	
WEE42LR	42	G 1 1/2A	38	52	50	160			160	
WEE06SR	6	G 1/4A	15	23	14	315			315	
WEE08SR	8	G 1/4A	17	27	19	315			315	
WEE10SR	10	G 3/8A	18	29	19	250			250	
WEE12SR	12	G 3/8A	22	29	22	250			250	
WEE16SR	16	G 1/2A	25	36	27	250			250	
WEE20SR	20	G 3/4A	28	39	30	250			250	
WEE25SR	25	G 1A	30	44	36	250			250	
WEE30SR	30	G 1 1/4A	36	49	50	160			160	
WEE38SR	38	G 1 1/2A	34	55	50	160			160	

For EO-2 part number, insert "Z" between size and pressure series.
Example: WEE04ZLLRCF

WEE-M Full Dimensions

Adjustable Locknut Elbow
24° Flareless / Metric ORR



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WEE06LM	6	M10 x 1	14	20	14	315			315	
WEE08LM	8	M12 x 1.5	16	22	14	315				
WEE10LM	10	M14 x 1.5	17	24	19	315			315	
WEE12LM	12	M16 x 1.5	19	25	19	315			315	
WEE15LM	15	M18 x 1.5	21	31	22					
WEE18LM	18	M22 x 1.5	24	33	27	250			250	
WEE22LM27X2	22	M27 x 2	28	36	30					
WEE28LM	28	M33 x 2	31	39	36					
WEE35LM	35	M42 x 2	38	49	50					
WEE42LM	42	M48 x 2	38	50	50					
WEE06SM	6	M12 x 1.5	15	22	14	315			315	
WEE08SM	8	M14 x 1.5	17	26	19	315			315	
WEE10SM	10	M16 x 1.5	18	27	19	315			315	
WEE12SM	12	M18 x 1.5	22	31	22					
WEE16SM	16	M22 x 1.5	25	36	27	250			250	
WEE20SM	20	M27 x 2	28	39	30					
WEE25SM	25	M33 x 2	30	44	36				160	
WEE30SM	30	M42 x 2	36	51	50	160				
WEE38SM	38	M48 x 2	34	54	50				160	

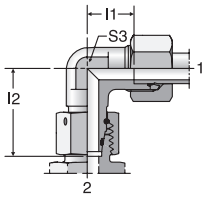
For EO-2 part number, insert "Z" between size and pressure series.
Example: WEE06ZLMCF

Dimensions and pressures for reference only, subject to change.

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EW Full Dimensions

Swivel Nut Elbow
24° Flareless / Flareless Swivel



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	l 2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
EW06L	6	M12 x 1.5	12.0	26.0	12	315	315		315	
EW08L	8	M14 x 1.5	14.0	27.5	12	315	315		315	
EW10L	10	M16 x 1.5	15.0	29.0	14	315	315		315	
EW12L	12	M18 x 1.5	17.0	29.5	17	315	315		315	
EW15L	15	M22 x 1.5	21.0	32.5	19	315	315		315	
EW18L	18	M26 x 1.5	23.5	35.5	24	315	315		315	
EW22L	22	M30 x 2	27.5	38.5	27	160	160		160	
EW28L	28	M36 x 2	30.5	41.5	36	160			160	
EW35L	35	M45 x 2	34.5	51.0	41	160			160	
EW42L	42	M52 x 2	40.0	56.0	50	160			160	
EW06S	6	M14 x 1.5	16.0	27.0	12	630	630		630	
EW08S	8	M16 x 1.5	17.0	27.5	14	630	630		630	
EW10S	10	M18 x 1.5	17.5	30.0	17	630			630	
EW12S	12	M20 x 1.5	21.5	31.0	17	630			630	
EW14S	14	M22 x 1.5	22.0	35.0	19	630			630	
EW16S	16	M24 x 1.5	24.5	36.5	24	400	400		400	
EW20S	20	M30 x 2	26.5	44.5	27	400	400		400	
EW25S	25	M36 x 2	30.0	50.0	36	400			400	
EW30S	30	M42 x 2	35.5	55.0	41	400	400		400	
EW38S	38	M52 x 2	41.0	63.0	50	315			315	

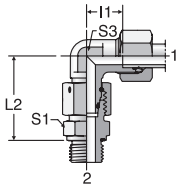
For EO-2 part number, insert "Z" between size and pressure series.
Example: EW06ZLCF

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EW-R-ED Full Dimensions

Assembled Adjustable Swivel Elbow
24° Flareless / BSPP with EOlastic Seal

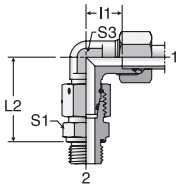


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	I 1 (mm)	L2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
EW06LRED	6	G 1/8 A	12.0	34.5	14	12	315			315	
EW08LRED	8	G 1/4 A	14.0	37.5	19	12	315			315	
EW10LRED	10	G 1/4 A	15.0	40.0	19	14	315			315	
EW12LRED	12	G 3/8 A	17.0	42.0	22	17	315			315	
EW15LRED	15	G 1/2 A	21.0	46.5	27	19	315			315	
EW18LRED	18	G 1/2 A	23.5	50.0	27	24	315			315	
EW22LRED	22	G 3/4 A	27.5	55.0	32	27	160			160	
EW28LRED	28	G 1A	30.5	59.0	41	36	160			160	
EW35LRED	35	G 1 1/4 A	34.5	68.5	50	41	160				
EW42LRED	42	G 1 1/2 A	40.0	75.0	55	50	160				
EW06SRED	6	G 1/4 A	16.0	40.0	19	12	630			630	
EW08SRED	8	G 1/4 A	17.0	42.5	19	14	630			630	
EW10SRED	10	G 3/8 A	17.5	45.0	22	17	630			630	
EW12SRED	12	G 3/8 A	21.5	48.0	22	17	630				
EW14SRED	14	G 1/2 A	22.0	54.0	27	19	630				
EW16SRED	16	G 1/2 A	24.5	55.0	27	24	400			400	
EW20SRED	20	G 3/4 A	26.5	65.0	32	27	400			400	
EW25SRED	25	G 1A	30.0	73.0	41	36	400			400	
EW30SRED	30	G 1 1/4 A	35.5	78.5	50	41	400			400	
EW38SRED	38	G 1 1/2 A	41.0	89.0	55	50	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: EW06ZLREDCF

EW-M-ED Full Dimensions

Assembled Adjustable Swivel Elbow
24° Flareless / Metric Parallel with EOlastic Seal



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	I 1 (mm)	L2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
EW06LMED	6	M10 x 1	12	34.5	14	12	315			315	
EW08LMED	8	M12 x 1.5	14	37.5	17	12	315			315	
EW10LMED	10	M14 x 1.5	15	40.0	19	14	315			315	
EW12LMED	12	M16 x 1.5	17	42.0	22	17	315			315	
EW15LMED	15	M18 x 1.5	21	46.0	24	19	315			315	
EW18LMED	18	M22 x 1.5	23.5	50.0	27	24	315			315	
EW22LMED	22	M26 x 1.5	27.5	55.0	32	27	160			160	
EW28LMED	28	M33 x 2	30.5	59.0	41	36	160			160	
EW35LMED	35	M42 x 2	34.5	68.5	50	41	160			160	
EW42LMED	42	M48 x 2	40	75.0	55	50	160			160	
EW06SMED	6	M12 x 1.5	16	40.0	17	12	630			630	
EW08SMED	8	M14 x 1.5	17	42.5	19	14	630			630	
EW10SMED	10	M16 x 1.5	17.5	45.0	22	17	630			630	
EW12SMED	12	M18 x 1.5	21.5	48.0	24	17	630			630	
EW14SMED	14	M20 x 1.5	22	54.0	27	19	630			630	
EW16SMED	16	M22 x 1.5	24.5	55.0	27	24	400			400	
EW20SMED	20	M27 x 2	26.5	65.0	32	27	400			400	
EW25SMED	25	M33 x 2	30	73.0	41	36	400			400	
EW30SMED	30	M42 x 2	35.5	78.5	50	41	400			400	
EW38SMED	38	M48 x 2	41	89.0	55	50	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: EW06ZLMEDCF

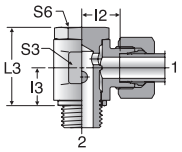
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SWVE-R Full Dimensions

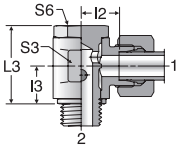
Banjo Elbow
24° Flareless / BSPP



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
SWVE04LLR	4	G 1/8 A	11.5	10	21.0	14	14	63		
SWVE06LLR	6	G 1/8 A	10.0	10	21.5	14	14	63		
SWVE08LLR	8	G 1/8 A	11.0	10	21.0	14	14	63		
SWVE06LR	6	G 1/8 A	10.5	10	21.0	14	14	160		
SWVE08LR	8	G 1/4 A	13.0	13	27.0	19	19	160		
SWVE10LR	10	G 1/4 A	14.0	13	27.0	19	19	160		
SWVE12LR	12	G 3/8 A	15.5	15	32.0	22	21	100		
SWVE15LR	15	G 1/2 A	19.0	18	37.5	27	27	100		
SWVE18LR	18	G 1/2 A	20.5	21.5	44.0	30	27	100		
SWVE22LR	22	G 3/4 A	25.5	24	49.0	36	32	100		
SWVE06SR	6	G 1/4 A	15.0	13	27.0	19	19	160		
SWVE08SR	8	G 1/4 A	15.0	13	27.0	19	19	160		
SWVE10SR	10	G 3/8 A	16.0	15	32.0	22	22	100		
SWVE12SR	12	G 3/8 A	17.0	18	37.0	24	24	100		
SWVE14SR	14	G 1/2 A	20.0	18	37.0	27	27	100		
SWVE16SR	16	G 1/2 A	21.5	21.5	44.0	30	27	100		
SWVE20SR	20	G 3/4 A	24.5	24	49.0	36	32	100		

SWVE-M Full Dimensions

Banjo Elbow
24° Flareless / Metric Parallel



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
SWVE04LLM	4	M8 x 1	10.5	8	17	12	12	63		
SWVE06LLM	6	M10 x 1	10.0	10	21	14	14	63		
SWVE08LLM	8	M10 x 1	11.0	10	21	14	14	63		
SWVE06LM	6	M10 x 1	10.5	10	21.5	14	14	160		
SWVE08LM	8	M12 x 1.5	12.0	12	25	17	17	160		
SWVE10LM	10	M14 x 1.5	14.0	13	27	19	19	160		
SWVE12LM	12	M16 x 1.5	15.5	15	32	22	21	100		
SWVE15LM	15	M18 x 1.5	17.5	18	37.5	24	24	100		
SWVE18LM	18	M22 x 1.5	20.5	21.5	44	30	27	100		
SWVE22LM	22	M26 x 1.5	25.5	24	49	36	32	100		
SWVE06SM	6	M12 x 1.5	14.0	12	25	17	17	160		
SWVE08SM	8	M14 x 1.5	15.0	13	27	19	19	160		
SWVE10SM	10	M16 x 1.5	16.0	15	32	22	22	100		
SWVE12SM	12	M18 x 1.5	17.0	18	37	24	24	100		
SWVE14SM	14	M20 x 1.5	20.0	18	37	27	27	100		
SWVE16SM	16	M22 x 1.5	21.5	21.5	44	30	27	100		
SWVE20SM	20	M27 x 2	24.5	24	49	36	32	100		

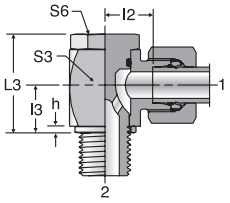
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WH-R Full Dimensions

High Pressure Banjo Elbow
24° Flareless / BSPP

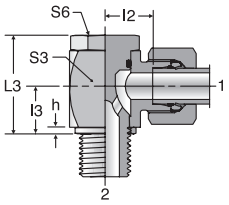


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WH06LR	6	G 1/8 A	2.5	12.0	10.5	24	17	17	250	250	160		
WH08LR	8	G 1/4 A	3.0	14.5	14.0	30	22	19	250		160		
WH10LR	10	G 1/4 A	3.0	15.5	14.0	30	22	19	250		160		
WH12LR	12	G 3/8 A	3.0	18.0	16.5	36	27	24	250	250	160		
WH15LR	15	G 1/2 A	4.5	21.5	21.5	45	32	30	250	250	160		
WH18LR	18	G 1/2 A	4.5	21.0	21.5	45	32	30	250	250	160		
WH22LR	22	G 3/4 A	3.5	27.5	24.0	53	41	36	160				
WH28LR	28	G 1A	3.5	32.0	30.5	66	50	46	160				
WH35LR	35	G 1 1/4 A	3.5	36.0	35.5	76	60	55	160				
WH42LR	42	G 1 1/2 A	3.5	40.5	40.5	87	70	60	160				
WH06SR	6	G 1/4 A	3.0	16.5	14.0	30	22	19	315		200		
WH08SR	8	G 1/4 A	3.0	16.5	14.0	30	22	19	315		200		
WH10SR	10	G 3/8 A	3.0	18.5	16.5	36	27	24	315		200		
WH12SR	12	G 3/8 A	3.0	18.5	16.5	36	27	24	315		200		
WH14SR	14	G 1/2 A	4.5	22.5	21.5	45	32	30	315				
WH16SR	16	G 1/2 A	4.5	22.0	21.5	45	32	30	315				315
WH20SR	20	G 3/4 A	3.5	26.5	24.0	53	41	36	160				
WH25SR	25	G 1A	3.5	31.5	30.5	66	50	46	160				
WH30SR	30	G 1 1/4 A	3.5	37.0	34.5	76	60	55	160				
WH38SR	38	G 1 1/2 A	3.5	41.5	40.5	87	70	60	160				

For EO-2 part number, insert "Z" between size and pressure series.
Example: WH06ZLRCF

WH-M Full Dimensions

High Pressure Banjo Elbow
24° Flareless / Metric Parallel



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WH06LM	6	M10 x 1	2.5	12.0	10.5	24	17	17	250				
WH08LM	8	M12 x 1.5	3.0	14.5	14.0	30	22	19	250				
WH10LM	10	M14 x 1.5	3.0	15.5	14.0	30	22	19	250				
WH12LM	12	M16 x 1.5	3.0	18.0	16.5	36	27	24	250				
WH15LM	15	M18 x 1.5	3.0	21.5	18.5	39.5	30	30	250				
WH18LM	18	M22 x 1.5	4.5	21.0	21.5	45	32	30	250	250			
WH22LM	22	M26 x 1.5	3.5	27.5	24.0	53	41	36	160				
WH28LM	28	M33 x 2	3.5	32.0	30.5	66	50	46	160				
WH35LM	35	M42 x 2	3.5	36.0	35.5	76	60	55					
WH42LM	42	M48 x 2	3.5	40.5	40.5	87	70	60					
WH06SM	6	M12 x 1.5	3.0	16.5	14.0	30	22	19	315				
WH08SM	8	M14 x 1.5	3.0	16.5	14.0	30	22	19	315				
WH10SM	10	M16 x 1.5	3.0	18.5	16.5	36	27	24	315				
WH12SM	12	M18 x 1.5	3.0	20.0	18.5	39.5	27	27	315				
WH14SM	14	M20 x 1.5	3.0	22.5	20.0	43.5	32	30					
WH16SM	16	M22 x 1.5	4.5	22.0	21.5	45	32	30	315				
WH20SM	20	M27 x 2	3.5	26.5	24.0	53	41	36	160				
WH25SM	25	M33 x 2	3.5	31.5	30.5	66	50	46	160				
WH30SM	30	M42 x 2	3.5	37.0	35.5	76	60	55					
WH38SM	38	M48 x 2	3.5	41.5	40.5	87	70	60	160				

For EO-2 part number, insert "Z" between size and pressure series.
Example: WH06ZLMCF

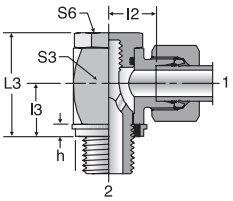
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WH-R-KDS Full Dimensions

High Pressure Banjo Elbow
24° Flareless / BSPP

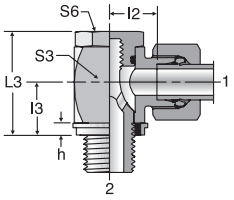


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WH06LRKDS	6	G 1/8 A	2.5	12.0	10.5	24	17	17	315			315	
WH08LRKDS	8	G 1/4 A	3.0	14.5	14.0	30	22	19	315			315	
WH10LRKDS	10	G 1/4 A	3.0	15.5	14.0	30	22	19	315			315	
WH12LRKDS	12	G 3/8 A	3.0	18.0	16.5	36	27	24	315			315	
WH15LRKDS	15	G 1/2 A	4.5	21.5	21.5	45	32	30	315			315	
WH18LRKDS	18	G 1/2 A	4.5	21.0	21.5	45	32	30	315			315	
WH22LRKDS	22	G 3/4 A	3.5	27.5	24.0	53	41	36	160			160	
WH28LRKDS	28	G 1A	3.5	32.0	30.5	66	50	46	160			160	
WH35LRKDS	35	G 1 1/4 A	3.5	36.0	35.5	76	60	55	160			160	
WH42LRKDS	42	G 1 1/2 A	3.5	40.5	40.5	87	70	60	160			160	
WH06SRKDS	6	G 1/4 A	3.0	16.5	14.0	30	22	19	400	400			
WH08SRKDS	8	G 1/4 A	3.0	16.5	14.0	30	22	19	400			400	
WH10SRKDS	10	G 3/8 A	3.0	18.5	16.5	36	27	24	400			400	
WH12SRKDS	12	G 3/8 A	3.0	18.5	16.5	36	27	24	400			400	
WH14SRKDS	14	G 1/2 A	4.5	22.5	21.5	45	32	30	400				
WH16SRKDS	16	G 1/2 A	4.5	22.0	21.5	45	32	30	315			315	
WH20SRKDS	20	G 3/4 A	3.5	26.5	24.0	53	41	36	315			315	
WH25SRKDS	25	G 1A	3.5	31.5	30.5	66	50	46	250			250	
WH30SRKDS	30	G 1 1/4 A	3.5	37.0	34.5	76	60	55	160			160	
WH38SRKDS	38	G 1 1/2 A	3.5	41.5	40.5	87	70	60	160			160	

For EO-2 part number, insert "Z" between size and pressure series.
Example WH06ZLRKDSCF
***Stainless Steel (71) part numbers have KD instead of KDS.**
Example: WHO6SRKD71

WH-M-KDS Full Dimensions

High Pressure Banjo Elbow
Banjo Metric / Flareless



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WH06LMKDS	6	M10 x 1	2.5	12.0	10.5	24.0	17	17	315			315	
WH08LMKDS	8	M12 x 1.5	3.0	14.5	14.0	30.0	22	19	315				
WH10LMKDS	10	M14 x 1.5	3.0	15.5	14.0	30.0	22	19	315			315	
WH12LMKDS	12	M16 x 1.5	3.0	18.0	16.5	36.0	27	24				315	
WH15LMKDS	15	M18 x 1.5	3.0	21.5	18.5	39.5	30	30	315			315	
WH18LMKDS	18	M22 x 1.5	4.5	21.0	21.5	45.0	32	30					
WH22LMKDS	22	M26 x 1.5	3.5	27.5	24.0	53.0	41	36					
WH28LMKDS	28	M33 x 2	3.5	32.0	30.5	66.0	50	46					
WH35LMKDS	35	M42 x 2	3.5	36.0	35.5	76.0	60	55				160	
WH42LMKDS	42	M48 x 2	3.5	40.5	40.5	87.0	70	60					
WH06SMKDS	6	M12 x 1.5	3.0	16.5	14.0	30.0	22	19	400				
WH08SMKDS	8	M14 x 1.5	3.0	16.5	14.0	30.0	22	19	400				
WH10SMKDS	10	M16 x 1.5	3.0	18.5	16.5	36.0	27	24	400			400	
WH12SMKDS	12	M18 x 1.5	3.0	20.0	18.5	39.5	27	27	400			400	
WH14SMKDS	14	M20 x 1.5	3.0	22.5	20.0	43.5	32	30					
WH16SMKDS	16	M22 x 1.5	4.5	22.0	21.5	45.0	32	30	315			315	
WH20SMKDS	20	M27 x 2	3.5	26.5	24.0	53.0	41	36	315				
WH25SMKDS	25	M33 x 2	3.5	31.5	30.5	66.0	50	46	250				
WH30SMKDS	30	M42 x 2	3.5	37.0	35.5	76.0	60	55					
WH38SMKDS	38	M48 x 2	3.5	41.5	40.5	87.0	70	60					

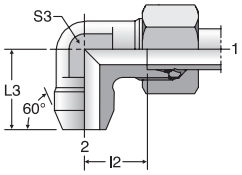
For EO-2 part number, insert "Z" between size and pressure series.
Example: WH06ZLMKDSCF
***Stainless Steel (71) part numbers have KD instead of KDS.**
Example: WH06SMKD71

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WAS Full Dimensions

Weld Elbow
24° Flareless / Butt Weld

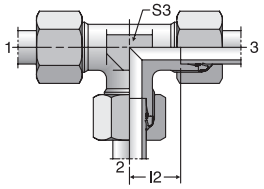


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 (mm)	l 2 (mm)	L3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
WAS06L	6	10	12.0	19	12					
WAS08L	8	12	14.0	23	12					
WAS10L	10	14	15.0	24	14	315				
WAS12L	12	16	17.0	25	17					
WAS15L	15	19	21.0	30	19					
WAS18L	18	22	23.5	33	24					
WAS22L	22	27	27.5	37	27					
WAS28L	28	32	30.5	42	36					
WAS35L	35	40	34.5	49	41					
WAS42L	42	46	40.0	57	50					
WAS06S	6	11	16.0	23	12					
WAS08S	8	13	17.0	24	14					
WAS10S	10	15	17.5	25	17					
WAS12S	12	17	21.5	29	17					
WAS14S	14	19	22.0	30	19					
WAS16S	16	21	24.5	33	24					
WAS20S	20	26	26.5	37	27					
WAS25S	25	31	30.0	42	36					
WAS30S	30	36	35.5	49	41					
WAS38S	38	44	41.0	57	50					

Note: Weld fitting. Omit "CF" in the part number for steel material.
For EO-2 part number, insert "Z" between size and pressure series.
Example: WAS06ZL

T Full Dimensions

Union Tee
24° Flareless



TUBE FITTING PART #	END SIZE 1 - 3 (mm)	l 2 (mm)	S3 (mm)	S3 (Only Stainless Steel) (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
***T04LL**	4	11.0	9	9	100	100	63	100	
***T06LL**	6	9.5	11	9	100		63	100	
***T08LL**	8	11.5	12	12	100	100	63		
***T10LL**	10	12.5	14	12	100		63		
T12LL	12	15.0	14	14	100				
***T06L**	6	12.0	12	12	315	315	200	315	315
***T08L**	8	14.0	14	12	315	315	200	315	
T10L	10	15.0	14	14	315	315	200	315	
T12L	12	17.0	17	17	315	315	200	315	
T15L	15	21.0	19	19	315	315	200	315	315
T18L	18	23.5	24	24	315	315	200	315	315
T22L	22	27.5	27	27	160	160	100	160	160
T28L	28	30.5	36	36	160	160	100	160	
T35L	35	34.5	41	41	160	160	100	160	
T42L	42	40.0	50	50	160	160	100	160	
***T06S**	6	16.0	14	12	630	630	400	630	
T08S	8	17.0	14	14	630	630	400	630	
T10S	10	17.5	17	17	630	630	400	630	
T12S	12	21.5	17	17	630	630	400	630	
T14S	14	22.0	19	19	630	630	400	630	
T16S	16	24.5	24	24	400	400	250	400	400
T20S	20	26.5	27	27	400	400	250	400	
T25S	25	30.0	36	36	400	400	250	400	
T30S	30	35.5	41	41	400	400	250	400	
T38S	38	41.0	50	50	315	315	200	315	

* Extruded body.
For EO-2 part number, insert "Z" between size and pressure series.
Example: T04ZLLCF

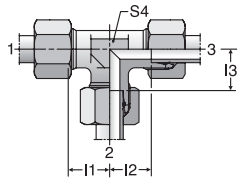
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TR Full Dimensions

Tee-Reducer
24° Flareless



TUBE FITTING PART #	END SIZE 1 (mm)	2 (mm)	3 (mm)	l 1 (mm)	l 2 (mm)	l 3 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	71	MS	EO-2 CF	71
TR04/08/04LL	4	8	4	13.0	13.0	11.5	12	100				
TR06/04/06LL	6	4	6	9.5	9.5	11.0	11	100				
TR06/08/06L	6	8	6	14.0	14.0	14.0	14	315				
TR08/06/08L	8	6	8	14.0	14.0	14.0	14	315				
TR06/10/06L	6	10	6	15.0	15.0	15.0	14	315				
TR08/10/08L	8	10	8	15.0	15.0	15.0	14	315				
TR10/06/10L	10	6	10	15.0	15.0	15.0	14	315				
TR10/08/10L	10	8	10	15.0	15.0	15.0	14	315				
TR10/10/06L	10	10	6	15.0	15.0	15.0	14	315				
TR08/12/08L	8	12	8	17.0	17.0	17.0	17	315				
TR12/06/12L	12	6	12	17.0	17.0	17.0	17					
TR12/08/08L	12	8	8	17.0	17.0	17.0	17	315				
TR12/08/12L	12	8	12	17.0	17.0	17.0	17	315				
TR12/10/10L	12	10	10	17.0	17.0	17.0	17	315				
TR12/10/12L	12	10	12	17.0	17.0	17.0	17	315				
TR12/12/10L	12	12	10	17.0	17.0	17.0	17	315				
TR10/15/10L	10	15	10	21.0	21.0	21.0	19					
TR12/15/12L	12	15	12	21.0	21.0	21.0	19	315				
TR15/06/15L	15	6	15	21.0	21.0	21.0	19	315				
TR15/10/15L	15	10	15	21.0	21.0	21.0	19	315				
TR15/12/12L	15	12	12	21.0	21.0	21.0	19	315				
TR15/12/15L	15	12	15	21.0	21.0	21.0	19	315				
TR15/15/12L	15	15	12	21.0	21.0	21.0	19	315				
TR12/18/12L	12	18	12	24.0	24.0	23.5	24					
TR18/10/10L	18	10	10	23.5	24.0	24.0	24	315				
TR18/10/18L	18	10	18	23.5	23.5	24.0	24	315				
TR18/12/18L	18	12	18	23.5	23.5	24.0	24	315				
TR18/15/18L	18	15	18	23.5	23.5	24.0	24	315				
TR18/18/10L	18	18	10	23.5	24.0	23.5	24	315				
TR22/10/22L	22	10	22	27.5	27.5	28.0	27					
TR22/12/22L	22	12	22	27.5	27.5	28.0	27	160				
TR22/15/15L	22	15	15	27.5	28.0	28.0	27					
TR22/15/22L	22	15	22	27.5	27.5	28.0	27	160				
TR22/18/18L	22	18	18	27.5	27.5	27.5	27	160				
TR22/18/22L	22	18	22	27.5	27.5	27.5	27	160				
TR22/22/18L	22	22	18	27.5	27.5	27.5	27					
TR28/10/28L	28	10	28	30.5	30.5	31.0	36	160				
TR28/12/28L	28	12	28	30.5	30.5	31.0	36	160				
TR28/15/28L	28	15	28	30.5	30.5	31.0	36					
TR28/18/28L	28	18	28	30.5	30.5	30.5	36	160				
TR28/22/22L	28	22	22	30.5	30.5	30.5	36					
TR28/22/28L	28	22	28	30.5	30.5	30.5	36	160				

Series S is continued on the next page.

For EO-2 part number, insert "Z" between size and pressure series.
Example: TR06/08/06ZLLCF

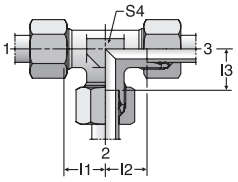
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TR Full Dimensions

Tee-Reducer
24° Flareless



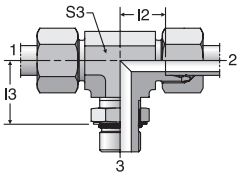
TUBE FITTING PART #	END SIZE 1 (mm)	2 (mm)	3 (mm)	l 1 (mm)	l 2 (mm)	l 3 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	71	MS	EO-2 CF	71
TR10/06/10S	10	6	10	17.5	17.5	18.0	17					
TR12/08/08S	12	8	8	21.5	22.0	22.0	17					
TR12/08/12S	12	8	12	21.5	21.5	22.0	17					
TR12/10/12S	12	10	12	21.5	21.5	21.5	17					
TR12/16/12S	12	16	12	25.5	25.5	24.5	24	400				
TR16/06/16S	16	6	16	24.5	24.5	26.0	24					
TR16/08/16S	16	8	16	24.5	24.5	26.0	24	400				
TR16/10/16S	16	10	16	24.5	24.5	25.5	24					
TR16/12/16S	16	12	16	24.5	24.5	25.5	24	400				
TR16/20/16S	16	20	16	28.5	28.5	26.5	27	400				
TR20/10/20S	20	10	20	26.5	26.5	29.5	27	400				
TR20/12/20S	20	12	20	26.5	26.5	29.5	27	400				
TR20/16/20S	20	16	20	26.5	26.5	28.5	27	400				
TR20/25/20S	20	25	20	31.5	31.5	30.0	36	400				
TR25/16/25S	25	16	25	30.0	30.0	33.5	36	400				
TR25/20/25S	25	20	25	30.0	30.0	31.5	36	400				
TR25/30/25S	25	30	25	37.0	37.0	35.5	41					

Series L is on the previous page.

For EO-2 part number, insert "Z" between size and pressure series.
Example: TR10/06/10ZSCF

TEE-UNF Full Dimensions

Adjustable Locknut Branch Tee
24° Flareless / SAE-ORB



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	3 UN/UNF-2A	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	71	MS	EO-2 CF	71
TEE06L7/16UNF	6	7/16-20	14	19	14	315			315	
TEE08L7/16UNF	8	7/16-20	16	19	14	315				
TEE10L9/16UNF	10	9/16-18	17	24	19					
TEE12L9/16UNF	12	9/16-18	19	25	19				315	
TEE12L3/4UNF	12	3/4-16	19	25	19				315	
TEE15L3/4UNF	15	3/4-16	21	28	22	315			315	
TEE15L7/8UNF	15	7/8-14	21	28	22	315			315	
TEE18L7/8UNF	18	7/8-14	24	32	27				315	
TEE18L11/16UN	18	1 1/16-12	24	32	30				315	
TEE22L11/16UN	22	1 1/16-12	28	35	30				160	
TEE28L15/16UN	28	1 5/16-12	31	42	36				160	
TEE35L15/8UN	35	1 5/8-12	38	46	50					
TEE42L17/8UN	42	1 7/8-12	38	47	50					
TEE06S7/16UNF	6	7/16-20	15	20	14					
TEE08S9/16UNF	8	9/16-18	17	25	19					
TEE10S9/16UNF	10	9/16-18	18	26	19	400			400	
TEE12S3/4UNF	12	3/4-16	22	30	22					
TEE16S7/8UNF	16	7/8-14	25	34	27					
TEE20S11/16UN	20	1 1/16-12	28	37	30	400				
TEE25S11/16UN	25	1 1/16-12	30	50	36					
TEE30S15/8UN	30	1 5/8-12	36	50	50					
TEE38S17/8UN	38	1 7/8-12	34	51	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: TEE06ZL7/16UNFCF

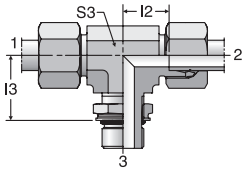
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TEE-OR Full Dimensions

Adjustable Locknut Branch Tee
24° Flareless / Metric ISO 6149

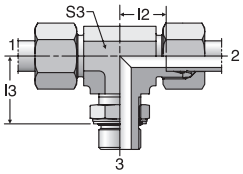


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TEE06LMOR	6	M10x1	14	20	14					
TEE08LMOR	8	M12x1.5	16	22	14	315				
TEE10LMOR	10	M14x1.5	17	25	19	315				
TEE12LMOR	12	M16x1.5	19	26	19	315				
TEE15LMOR	15	M18x1.5	21	30	22					
TEE18LMOR	18	M22x1.5	24	33	27	315				
TEE22LM27X2OR	22	M27x2	28	35	30	160				
TEE28LMOR	28	M33x2	31	38	36	160				
TEE35LMOR	35	M42x2	38	48	50					
TEE42LMOR	42	M48x2	38	49	50	160				
TEE06SMOR	6	M12x1.5	15	22	14					
TEE08SMOR	8	M14x1.5	17	26	19				400	
TEE10SMOR	10	M16x1.5	18	27	19					
TEE12SMOR	12	M18x1.5	22	31	22					
TEE16SMOR	16	M22x1.5	25	35	27					
TEE20SMOR	20	M27x2	28	39	30					
TEE25SMOR	25	M33x2	30	44	36					
TEE30SMOR	30	M42x2	36	51	50					
TEE38SMOR	38	M48x2	34	54	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: TR06ZLMORCF

TEE-R Full Dimensions

Adjustable Locknut Branch Tee
24° Flareless / BSPP ORR



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 BSPP	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TEE06LR	6	G 1/8A	14	19	14	315			315	
TEE08LR	8	G 1/4A	16	23	14	315			315	
TEE10LR	10	G 1/4A	17	25	19	315			315	
TEE12LR	12	G 3/8A	19	28	19	250			250	
TEE15LR	15	G 1/2A	21	30	22	250			250	
TEE18LR	18	G 1/2A	24	36	27	250			250	
TEE22LR	22	G 3/4A	28	36	30	160				
TEE28LR	28	G 1A	31	44	36	160			160	
TEE35LR	35	G 1 1/4A	38	50	50				160	
TEE42LR	42	G 1 1/2A	38	52	50				160	
TEE06SR	6	G 1/4A	15	23	14				315	
TEE08SR	8	G 1/4A	17	27	19				315	
TEE10SR	10	G 3/8A	18	29	19	250			250	
TEE12SR	12	G 3/8A	22	29	22	250				
TEE16SR	16	G 1/2A	25	36	27	250				
TEE20SR	20	G 3/4A	28	39	30	250			250	
TEE25SR	25	G 1A	30	44	36	250			250	
TEE30SR	30	G 1 1/4A	36	49	50	160			160	
TEE38SR	38	G 1 1/2A	34	55	50	160				

For EO-2 part number, insert "Z" between size and pressure series.
Example: TEE06ZLRCF

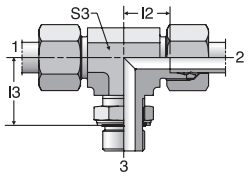
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TEE-M Full Dimensions

Adjustable Locknut Branch Tee
24° Flareless / Metric ORR

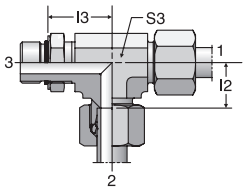


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TEE06LM	6	M10x1	14	20	14	315				
TEE08LM	8	M12x1.5	16	22	14	315			315	
TEE10LM	10	M14x1.5	17	25	19	315			315	
TEE12LM	12	M16x1.5	19	26	19	315				
TEE15LM	15	M18x1.5	21	30	22				315	
TEE18LM	18	M22x1.5	24	33	27	315			315	
TEE22LM27X2	22	M27x2	28	35	30					
TEE28LM	28	M33x2	31	38	36	160			160	
TEE35LM	35	M42x2	38	48	50					
TEE42LM	42	M48x2	38	49	50					
TEE06SM	6	M12x1.5	15	22	14	400			400	
TEE08SM	8	M14x1.5	17	26	19	400			400	
TEE10SM	10	M16x1.5	18	27	19	400			400	
TEE12SM	12	M18x1.5	22	31	22	400			400	
TEE16SM	16	M22x1.5	25	35	27	400			400	
TEE20SM	20	M27x2	28	39	30	400			400	
TEE25SM	25	M33x2	30	44	36	315			315	
TEE30SM	30	M42x2	36	51	50	250			250	
TEE38SM	38	M48x2	34	54	50	200			200	

For EO-2 part number, insert "Z" between size and pressure series.
Example: TEE06ZLMCF

LEE-UNF Full Dimensions

Adjustable Locknut Run Tee
24° Flareless / SAE-ORB



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 UN/UNF-2A	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
LEE06L7/16UNF	6	7/16-20	14	19	14				315	
LEE08L7/16UNF	8	7/16-20	16	19	14	315			315	
LEE10L9/16UNF	10	9/16-18	17	24	19	315				
LEE12L9/16UNF	12	9/16-18	19	25	19				315	
LEE12L3/4UNF	12	3/4-16	19	25	19	315			315	
LEE15L3/4UNF	15	3/4-16	21	28	22				315	
LEE15L7/8UNF	15	7/8-14	21	28	22				315	
LEE18L7/8UNF	18	7/8-14	24	32	27				315	
LEE18L11/16UN	18	1 1/16-12	24	32	30	315			315	
LEE22L11/16UN	22	1 1/16-12	28	35	30				160	
LEE28L15/16UN	28	1 5/16-12	31	42	36				160	
LEE35L15/8UN	35	1 5/8-12	38	46	50				160	
LEE42L17/8UN	42	1 7/8-12	38	47	50				160	
LEE06S7/16UNF	6	7/16-20	15	20	14					
LEE08S9/16UNF	8	9/16-18	17	25	19					
LEE10S9/16UNF	10	9/16-18	18	26	19	400				
LEE12S3/4UNF	12	3/4-16	22	30	22	400				
LEE16S7/8UNF	16	7/8-14	25	34	27	400				
LEE20S11/16UN	20	1 1/16-12	28	37	30	400				
LEE25S11/16UN	25	1 1/16-12	30	50	36					
LEE30S15/8UN	30	1 5/8-12	36	50	50	250				
LEE38S17/8UN	38	1 7/8-12	34	51	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: LEE06ZL7/16UNFCF

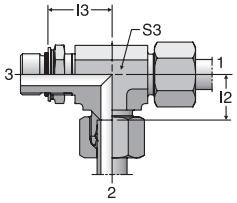
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LEE-OR Full Dimensions

Adjustable Locknut Run Tee
24° Flareless / Metric ISO 6149

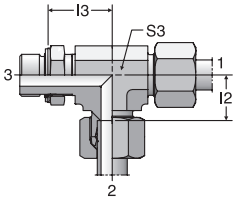


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
LEE06LMOR	6	M10 x 1	14	20	14					
LEE08LMOR	8	M12 x 1.5	16	22	14	315				
LEE10LMOR	10	M14 x 1.5	17	25	19	315				
LEE12LMOR	12	M16 x 1.5	19	26	19	315				
LEE15LMOR	15	M18 x 1.5	21	30	22	315				
LEE18LMOR	18	M22 x 1.5	24	33	27	315				
LEE22LM27x2OR	22	M27 x 2	28	35	30	160				
LEE28LMOR	28	M33 x 2	31	38	36	160				
LEE35LMOR	35	M42 x 2	38	48	50					
LEE42LMOR	42	M48 x 2	38	49	50					
LEE06SMOR	6	M12 x 1.5	15	22	14	400				
LEE08SMOR	8	M14 x 1.5	17	26	19					
LEE10SMOR	10	M16 x 1.5	18	27	19					
LEE12SMOR	12	M18 x 1.5	22	31	22					
LEE16SMOR	16	M22 x 1.5	25	35	27					
LEE20SMOR	20	M27 x 2	28	35	30					
LEE25SMOR	25	M33 x 2	30	44	36	315				
LEE30SMOR	30	M42 x 2	36	51	50					
LEE38SMOR	38	M48 x 2	34	54	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: LEE06ZLMORCF

LEE-R Full Dimensions

Adjustable Locknut Run Tee
24° Flareless / BSPP ORR

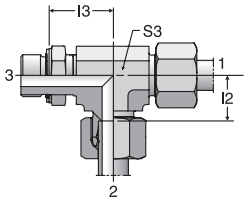


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 BSPP	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
LEE06LR	6	G 1/8A	14	19	14	315			315	
LEE08LR	8	G 1/4A	16	23	14	315			315	
LEE10LR	10	G 1/4A	17	25	19	315			315	
LEE12LR	12	G 3/8A	19	28	19	250			250	
LEE15LR	15	G 1/2A	21	30	22	250			250	
LEE18LR	18	G 1/2A	24	36	27	250			250	
LEE22LR	22	G 3/4A	28	36	30	160			160	
LEE28LR	28	G 1A	31	44	36	160			160	
LEE35LR	35	G 1 1/4A	38	50	50				160	
LEE42LR	42	G 1 1/2A	38	52	50	160			160	
LEE06SR	6	G 1/4A	15	23	14	315				
LEE08SR	8	G 1/4A	17	27	19					
LEE10SR	10	G 3/8A	18	29	19				250	
LEE12SR	12	G 3/8A	22	29	22	250				
LEE16SR	16	G 1/2A	25	36	27				250	
LEE20SR	20	G 3/4A	28	39	30	250			250	
LEE25SR	25	G 1A	30	44	36				250	
LEE30SR	30	G 1 1/4A	36	49	50				160	
LEE38SR	38	G 1 1/2A	34	55	50				160	

For EO-2 part number, insert "Z" between size and pressure series.
Example: LEE06ZLRCF

LEE-M Full Dimensions

Adjustable Locknut Run Tee
24° Flareless / Metric ORR



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	l 2 (mm)	l 3 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
LEE06LM	6	M10 x 1	14	20	14					
LEE08LM	8	M12 x 1.5	16	22	14				315	
LEE10LM	10	M14 x 1.5	17	25	19					
LEE12LM	12	M16 x 1.5	19	26	19	315			315	
LEE15LM	15	M18 x 1.5	21	30	22				315	
LEE18LM	18	M22 x 1.5	24	33	27				250	
LEE22LM27X2	22	M27 x 2	28	35	30					
LEE28LM	28	M33 x 2	31	38	36				160	
LEE35LM	35	M42 x 2	38	48	50					
LEE42LM	42	M48 x 2	38	49	50					
LEE06SM	6	M12 x 1.5	15	22	14					
LEE08SM	8	M14 x 1.5	17	26	19	315				
LEE10SM	10	M16 x 1.5	18	27	19					
LEE12SM	12	M18 x 1.5	22	31	22					
LEE16SM	16	M22 x 1.5	25	35	27					
LEE20SM	20	M27 x 2	28	39	30					
LEE25SM	25	M33 x 2	30	44	36					
LEE30SM	30	M42 x 2	36	51	50					
LEE38SM	38	M48 x 2	34	54	50				160	

For EO-2 part number, insert "Z" between size and pressure series.
Example: LEE06ZLMCF

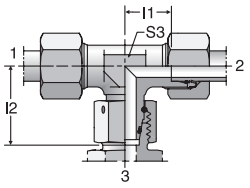
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ET Full Dimensions

Swivel Nut Branch Tee
24° Flareless / 24° Flareless /
Flareless Swivel

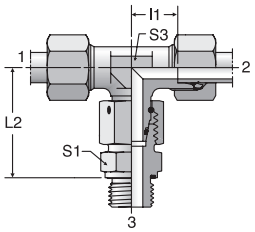


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	l 1 (mm)	l 2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
ET06L	6	M12 x 1.5	12.0	26.0	12	315			315	
ET08L	8	M14 x 1.5	14.0	27.5	12	315			315	
ET10L	10	M16 x 1.5	15.0	29.0	14	315	315		315	
ET12L	12	M18 x 1.5	17.0	29.5	17	315	315			315
ET15L	15	M22 x 1.5	21.0	32.5	19	315			315	
ET18L	18	M26 x 1.5	23.5	35.5	24	315			315	
ET22L	22	M30 x 2	27.5	38.5	27	160			160	
ET28L	28	M36 x 2	30.5	41.5	36	160			160	
ET35L	35	M45 x 2	34.5	51.0	41	160			160	
ET42L	42	M52 x 2	40.0	56.0	50	160			160	
ET06S	6	M14 x 1.5	16.0	27.0	12	630			630	
ET08S	8	M16 x 1.5	17.0	27.5	14	630			630	
ET10S	10	M18 x 1.5	17.5	30.0	17	630			630	
ET12S	12	M20 x 1.5	21.5	31.0	17	630			630	
ET14S	14	M22 x 1.5	22.0	35.0	19	630				
ET16S	16	M24 x 1.5	24.5	36.5	24	400	400		400	
ET20S	20	M30 x 2	26.5	44.5	27	400			400	
ET25S	25	M36 x 2	30.0	50.0	36	400			400	
ET30S	30	M42 x 2	35.5	55.0	41	400			400	
ET38S	38	M52 x 2	41.0	63.0	50	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: ET06ZLCF

ET-R-ED Full Dimensions

Assembled Adjustable Swivel Branch Tee
24° Flareless / 24° Flareless /
BSPP with EOlastic Seal



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 BSPP	l 1 (mm)	L2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
ET06LRED	6	G 1/8 A	12.0	34.5	14	12	315				
ET08LRED	8	G 1/4 A	14.0	37.5	19	12	315			315	
ET10LRED	10	G 1/4 A	15.0	40.0	19	14	315				
ET12LRED	12	G 3/8 A	17.0	42.0	22	17	315			315	
ET15LRED	15	G 1/2 A	21.0	46.5	27	19	315			315	
ET18LRED	18	G 1/2 A	23.5	50.0	27	24	315			315	
ET22LRED	22	G 3/4 A	27.5	55.0	32	27	160			160	
ET28LRED	28	G 1A	30.5	59.0	41	36	160				
ET35LRED	35	G 1 1/4 A	34.5	68.5	50	41					
ET42LRED	42	G 1 1/2 A	40.0	75.0	55	50					
ET06SRED	6	G 1/4 A	16.0	40.0	19	12	630				
ET08SRED	8	G 1/4 A	17.0	42.5	19	14	630			630	
ET10SRED	10	G 3/8 A	17.5	45.0	22	17	630			630	
ET12SRED	12	G 3/8 A	21.5	48.0	22	17	630			630	
ET14SRED	14	G 1/2 A	22.0	54.0	27	19					
ET16SRED	16	G 1/2 A	24.5	55.0	27	24	400				
ET20SRED	20	G 3/4 A	26.5	65.0	32	27	400			400	
ET25SRED	25	G 1A	30.0	73.0	41	36	400				
ET30SRED	30	G 1 1/4 A	35.5	78.5	50	41					
ET38SRED	38	G 1 1/2 A	41.0	89.0	55	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: ET06ZLREDCF

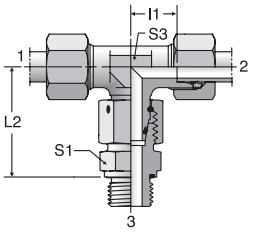
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ET-M-ED Full Dimensions

Assembled Adjustable Swivel Branch Tee
24° Flareless / 24° Flareless /
Metric Parallel with EOlastic Seal

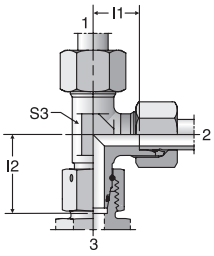


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	I 1 (mm)	L2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
ET06LMED	6	M10 x 1	12.0	34.5	14	12					
ET08LMED	8	M12 x 1.5	14.0	37.5	17	12	315				
ET10LMED	10	M14 x 1.5	15.0	40.0	19	14	315			315	
ET12LMED	12	M16 x 1.5	17.0	42.0	22	17	315				
ET15LMED	15	M18 x 1.5	21.0	46.0	24	19	315				
ET18LMED	18	M22 x 1.5	23.5	50.0	27	24	315				
ET22LMED	22	M26 x 1.5	27.5	55.0	32	27	160				
ET28LMED	28	M33 x 2	30.5	59.0	41	36	160				
ET35LMED	35	M42 x 2	34.5	68.5	50	41					
ET42LMED	42	M48 x 2	40.0	75.0	55	50	160				
ET06SMED	6	M12 x 1.5	16.0	40.0	17	12					
ET08SMED	8	M14 x 1.5	17.0	42.5	19	14					
ET10SMED	10	M16 x 1.5	17.5	45.0	22	17	630				
ET12SMED	12	M18 x 1.5	21.5	48.0	24	17	630				
ET14SMED	14	M20 x 1.5	22.0	54.0	27	19					
ET16SMED	16	M22 x 1.5	24.5	55.0	27	24	400				
ET20SMED	20	M27 x 2	26.5	65.0	32	27					
ET25SMED	25	M33 x 2	30.0	73.0	41	36	400				
ET30SMED	30	M42 x 2	35.5	78.5	50	41					
ET38SMED	38	M48 x 2	41.0	89.0	55	50					

For EO-2 part number, insert "Z" between size and pressure series.
Example: ET06ZLMEDCF

EL Full Dimensions

Swivel Nut Run Tee
24° Flareless / Flareless Swivel



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	I 1 (mm)	I 2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
EL06L	6	M12 x 1.5	12.0	26.0	12	315			315	
EL08L	8	M14 x 1.5	14.0	27.5	12	315			315	
EL10L	10	M16 x 1.5	15.0	29.0	14	315			315	
EL12L	12	M18 x 1.5	17.0	29.5	17	315	315		315	
EL15L	15	M22 x 1.5	21.0	32.5	19	315			315	
EL18L	18	M26 x 1.5	23.5	35.5	24	315			315	
EL22L	22	M30 x 2	27.5	38.5	27	160			160	
EL28L	28	M36 x 2	30.5	41.5	36	160			160	
EL35L	35	M45 x 2	34.5	51.0	41	160			160	
EL42L	42	M52 x 2	40.0	56.0	50	160			160	
EL06S	6	M14 x 1.5	16.0	27.0	12	630			630	
EL08S	8	M16 x 1.5	17.0	27.5	14	630			630	
EL10S	10	M18 x 1.5	17.5	30.0	17	630			630	
EL12S	12	M20 x 1.5	21.5	31.0	17	630	630		630	
EL14S	14	M22 x 1.5	22.0	35.0	19	630			630	
EL16S	16	M24 x 1.5	24.5	36.5	24	400			400	
EL20S	20	M30 x 2	26.5	44.5	27	400			400	
EL25S	25	M36 x 2	30.0	50.0	36	400			400	
EL30S	30	M42 x 2	35.5	55.0	41	400			400	
EL38S	38	M52 x 2	41.0	63.0	50	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: EL06ZLCF

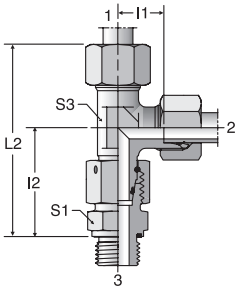
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EL-R-ED Full Dimensions

Adjustable Assembled Swivel Run Tee
24° Flareless / BSPP with EOlastic Seal

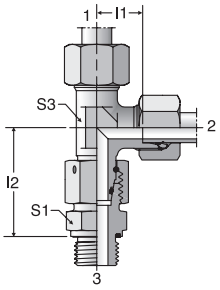


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 BSPP	I 1 (mm)	I 2 (mm)	L2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
EL06LRED	6	G 1/8 A	12.0	34.5	61	14	12	315			315	
EL08LRED	8	G 1/4 A	14.0	37.5	66	19	12	315				
EL10LRED	10	G 1/4 A	15.0	40.0	70	19	14	315			315	
EL12LRED	12	G 3/8 A	17.0	42.0	74	22	17	315			315	
EL15LRED	15	G 1/2 A	21.0	46.5	83	27	19	315			315	
EL18LRED	18	G 1/2 A	23.5	50.0	90	27	24	315			315	
EL22LRED	22	G 3/4 A	27.5	55.0	99	32	27	160			160	
EL28LRED	28	G 1 A	30.5	59.0	106	41	36	160				
EL35LRED	35	G 1 1/4 A	34.5	68.5	125	50	41				160	
EL42LRED	42	G 1 1/2 A	40.0	75.0	138	55	50				160	
EL06SRED	6	G 1/4 A	16.0	40.0	71	19	12	630			630	
EL08SRED	8	G 1/4 A	17.0	42.5	74	19	14	630			630	
EL10SRED	10	G 3/8 A	17.5	45.0	79	22	17	630			630	
EL12SRED	12	G 3/8 A	21.5	48.0	86	22	17	630			630	
EL14SRED	14	G 1/2 A	22.0	54.0	94	27	19	630				
EL16SRED	16	G 1/2 A	24.5	55.0	98	27	24	400			400	
EL20SRED	20	G 3/4 A	26.5	65.0	113	32	27	400			400	
EL25SRED	25	G 1 A	30.0	73.0	127	41	36	400			400	
EL30SRED	30	G 1 1/4 A	35.5	78.5	141	50	41				400	
EL38SRED	38	G 1 1/2 A	41.0	89.0	161	55	50				315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: EL06ZLREDCF

EL-M-ED Full Dimensions

Adjustable Assembled Swivel Run Tee
24° Flareless / Metric Parallel with EOlastic Seal



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	I 1 (mm)	I 2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
EL06LMED	6	M10 x 1	12.0	34.5	14	12	315				
EL08LMED	8	M12 x 1.5	14.0	37.5	17	12	315				
EL10LMED	10	M14 x 1.5	15.0	40.0	19	14	315				
EL12LMED	12	M16 x 1.5	17.0	42.0	22	17	315				
EL15LMED	15	M18 x 1.5	21.0	46.5	24	19					
EL18LMED	18	M22 x 1.5	23.5	50.0	27	24	315				
EL22LMED	22	M26 x 1.5	27.5	55.0	32	27	160				
EL28LMED	28	M33 x 2	30.5	59.0	41	36	160				
EL35LMED	35	M42 x 2	34.5	68.5	50	41					
EL42LMED	42	M48 x 2	40.0	75.0	55	50					
EL06SMED	6	M12 x 1.5	16.0	40.0	17	12	630				
EL08SMED	8	M14 x 1.5	17.0	42.5	19	14					
EL10SMED	10	M16 x 1.5	17.5	45.0	22	17					
EL12SMED	12	M18 x 1.5	21.5	48.0	24	17	630				
EL14SMED	14	M20 x 1.5	22.0	54.0	27	19					
EL16SMED	16	M22 x 1.5	24.5	55.0	27	24	400				
EL20SMED	20	M27 x 2	26.5	65.0	32	27	400				
EL25SMED	25	M33 x 2	30.0	73.0	41	36	400				
EL30SMED	30	M42 x 2	35.5	78.5	50	41					
EL38SMED	38	M48 x 2	41.0	89.0	55	50	315				

For EO-2 part number, insert "Z" between size and pressure series.
Example: EL06ZLMEDCF

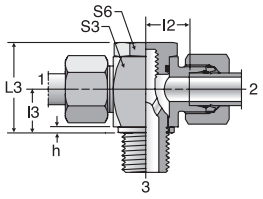
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TH-R Full Dimensions

High Pressure Banjo Tee
24° Flareless / 24° Flareless / BSPP

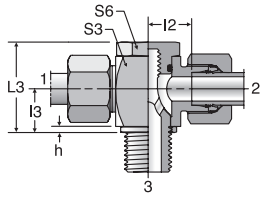


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 BSPP	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TH06LR	6	G 1/8 A	2.5	12.0	10.5	24	17	17	250			250	
TH08LR	8	G 1/4 A	3.0	14.5	14.0	30	22	19	250			250	
TH10LR	10	G 1/4 A	3.0	15.5	14.0	30	22	19	250			250	
TH12LR	12	G 3/8 A	3.0	18.0	16.5	36	27	24	250	250		250	
TH15LR	15	G 1/2 A	4.5	21.5	21.5	45	32	30	250			250	
TH18LR	18	G 1/2 A	4.5	21.0	21.5	45	32	30	250			250	
TH22LR	22	G 3/4 A	3.5	27.5	24.0	53	41	36	160			160	
TH28LR	28	G 1 A	3.5	32.0	30.5	66	50	46	160			160	
TH35LR	35	G 1 1/4 A	3.5	36.0	35.5	76	60	55	160			160	
TH42LR	42	G 1 1/2 A	3.5	40.5	40.5	87	70	60	160			160	
TH06SR	6	G 1/4 A	3.0	16.5	14.0	30	22	19	315			315	315
TH08SR	8	G 1/4 A	3.0	16.5	14.0	30	22	19	315			315	315
TH10SR	10	G 3/8 A	3.0	18.5	16.5	36	27	24	315			315	315
TH12SR	12	G 3/8 A	3.0	18.5	16.5	36	27	24	315			315	315
TH14SR	14	G 1/2 A	4.5	22.5	21.5	45	32	30	315			315	
TH16SR	16	G 1/2 A	4.5	22.0	21.5	45	32	30	315			315	315
TH20SR	20	G 3/4 A	3.5	26.5	24.0	53	41	36	160			160	
TH25SR	25	G 1 A	3.5	31.5	30.5	66	50	46				160	
TH30SR	30	G 1 1/4 A	3.5	37.0	35.5	76	60	55	160			160	160
TH38SR	38	G 1 1/2 A	3.5	41.5	40.5	87	70	60				160	160

For EO-2 part number, insert "Z" between size and pressure series.
Example: TH06ZLRCF

TH-M Full Dimensions

High Pressure Banjo Tee
24° Flareless / 24° Flareless / Metric Parallel



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TH06LM	6	M10 x 1	2.5	12.0	10.5	24.0	17	17	250			250	
TH08LM	8	M12 x 1.5	3.0	14.5	14.0	30.0	22	19	250			250	
TH10LM	10	M14 x 1.5	3.0	15.5	14.0	30.0	22	19	250			250	
TH12LM	12	M16 x 1.5	3.0	18.0	16.5	36.0	27	24	250			250	
TH15LM	15	M18 x 1.5	3.0	21.5	18.5	39.5	30	30	250			250	
TH18LM	18	M22 x 1.5	4.5	21.0	21.5	45.0	32	30	250			250	
TH22LM	22	M26 x 1.5	3.5	27.5	24.0	53.0	41	36	160			160	
TH28LM	28	M33 x 2	3.5	32.0	30.5	66.0	50	46	160			160	
TH35LM	35	M42 x 2	3.5	36.0	35.5	76.0	60	55		160		160	160
TH42LM	42	M48 x 2	3.5	40.5	40.5	87.0	70	60		160		160	160
TH06SM	6	M12 x 1.5	3.0	16.5	14.0	30.0	22	19	315	315		315	315
TH08SM	8	M14 x 1.5	3.0	16.5	14.0	30.0	22	19	315	315		315	315
TH10SM	10	M16 x 1.5	3.0	18.5	16.5	36.0	27	24	315	315		315	315
TH12SM	12	M18 x 1.5	3.0	20.0	18.5	39.5	27	27	315	315		315	315
TH14SM	14	M20 x 1.5	3.0	22.5	20.0	43.5	32	30	315	315		315	315
TH16SM	16	M22 x 1.5	4.5	22.0	21.5	45.0	32	30	315	315		315	315
TH20SM	20	M27 x 2	3.5	26.5	24.0	53.0	41	36	160	160		160	160
TH25SM	25	M33 x 2	3.5	31.5	30.5	66.0	50	46	160			160	
TH30SM	30	M42 x 2	3.5	37.0	35.5	76.0	60	55		160		160	160
TH38SM	38	M48 x 2	3.5	41.5	40.5	87.0	70	60		160		160	160

For EO-2 part number, insert "Z" between size and pressure series.
Example: TH06ZLMCF

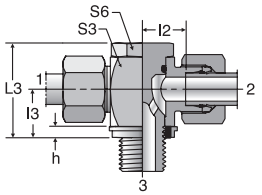
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TH-R-KDS Full Dimensions

High Pressure Banjo Tee
24° Flareless / 24° Flareless / BSPP

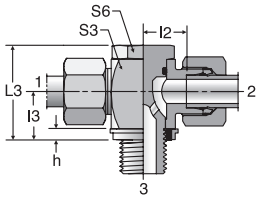


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 BSPP	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TH06LRKDS	6	G 1/8 A	2.5	12.0	10.5	24	17	17	315				
TH08LRKDS	8	G 1/4 A	3.0	14.5	14.0	30	22	19	315			315	
TH10LRKDS	10	G 1/4 A	3.0	15.5	14.0	30	22	19				315	
TH12LRKDS	12	G 3/8 A	3.0	18.0	16.5	36	27	24	315				
TH15LRKDS	15	G 1/2 A	4.5	21.5	21.5	45	32	30					
TH18LRKDS	18	G 1/2 A	4.5	21.0	21.5	45	32	30				315	
TH22LRKDS	22	G 3/4 A	3.5	27.5	24.0	53	41	36					
TH28LRKDS	28	G 1 A	3.5	32.0	30.5	66	50	46					
TH35LRKDS	35	G 1 1/4 A	3.5	36.0	35.5	76	60	55					
TH42LRKDS	42	G 1 1/2 A	3.5	40.5	40.5	87	70	60					
TH06SRKDS	6	G 1/4 A	3.0	16.5	14.0	30	22	19					
TH08SRKDS	8	G 1/4 A	3.0	16.5	14.0	30	22	19	400				
TH10SRKDS	10	G 3/8 A	3.0	18.5	16.5	36	27	24				400	
TH12SRKDS	12	G 3/8 A	3.0	18.5	16.5	36	27	24	400				
TH14SRKDS	14	G 1/2 A	4.5	22.5	21.5	45	32	30					
TH16SRKDS	16	G 1/2 A	4.5	22.0	21.5	45	32	30					
TH20SRKDS	20	G 3/4 A	3.5	26.5	24.0	53	41	36	315				
TH25SRKDS	25	G 1 A	3.5	31.5	30.5	66	50	46					
TH30SRKDS	30	G 1 1/4 A	3.5	37.0	35.5	76	60	55	160				
TH38SRKDS	38	G 1 1/2 A	3.5	41.5	40.5	87	70	60	160				

For EO-2 part number, insert "Z" between size and pressure series.
Example: TH06ZLRKDSCF

TH-M-KDS Full Dimensions

High Pressure Banjo Tee
24° Flareless / 24° Flareless / Metric Parallel



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	END SIZE 3 Metric	h (mm)	l 2 (mm)	l 3 (mm)	L3 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
TH06LMKDS	6	M10 x 1	2.5	12.0	10.5	24	17	17					
TH08LMKDS	8	M12 x 1.5	3.0	14.5	14.0	30	22	19	315				
TH10LMKDS	10	M14 x 1.5	3.0	15.5	14.0	30	22	19					
TH12LMKDS	12	M16 x 1.5	3.0	18.0	16.5	36	27	24					
TH15LMKDS	15	M18 x 1.5	3.0	21.5	18.5	39.5	30	30	315				
TH18LMKDS	18	M22 x 1.5	4.5	21.0	21.5	45	32	30					
TH22LMKDS	22	M26 x 1.5	3.5	27.5	24.0	53	41	36					
TH28LMKDS	28	M33 x 2	3.5	32.0	30.5	66	50	46					
TH35LMKDS	35	M42 x 2	3.5	36.0	35.5	76	60	55					
TH42LMKDS	42	M48 x 2	3.5	40.5	40.5	87	70	60					
TH06SMKDS	6	M12 x 1.5	3.0	16.5	14.0	30	22	19					
TH08SMKDS	8	M14 x 1.5	3.0	16.5	14.0	30	22	19					
TH10SMKDS	10	M16 x 1.5	3.0	18.5	16.5	36	27	24					
TH12SMKDS	12	M18 x 1.5	3.0	20.0	18.5	39.5	27	27					
TH14SMKDS	14	M20 x 1.5	3.0	22.5	20.0	43.5	32	30					
TH16SMKDS	16	M22 x 1.5	4.5	22.0	21.5	45	32	30	315				
TH20SMKDS	20	M27 x 2	3.5	26.5	24.0	53	41	36					
TH25SMKDS	25	M33 x 2	3.5	31.5	30.5	66	50	46					
TH30SMKDS	30	M42 x 2	3.5	37.0	35.5	76	60	55					
TH38SMKDS	38	M48 x 2	3.5	41.5	40.5	87	70	60					

For EO-2 part number, insert "Z" between size and pressure series.
Example: TH06ZLMKDSCF

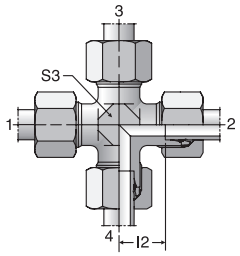
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K Full Dimensions

Union Cross
24° Flareless



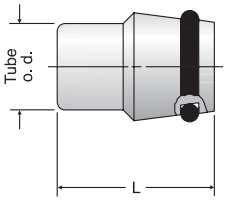
TUBE FITTING PART #	END SIZE 1 - 4 (mm)	l 2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
K04LL	4	11.0	9	100				
K06LL	6	9.5	9	100				
K08LL	8	11.5	12	100				
K06L	6	12.0	12	315			315	
K08L	8	14.0	12	315			315	
K10L	10	15.0	14	315			315	
K12L	12	17.0	17	315			315	
K15L	15	21.0	19	315			315	
K18L	18	23.5	24	315			315	
K22L	22	27.5	27	160			160	
K28L	28	30.5	36	160			160	
K35L	35	34.5	41	160				
K42L	42	40.0	50				160	
K06S	6	16.0	12	630	630			
K08S	8	17.0	14	630			630	
K10S	10	17.5	17	630				
K12S	12	21.5	17	630				
K14S	14	22.0	19	400			400	
K16S	16	24.5	24	400				
K20S	20	26.5	27	315			315	
K25S	25	30.0	36	315			315	
K30S	30	35.5	41	315			315	
K38S	38	41.0	50	315				

For EO-2 part number, insert "Z" between size and pressure series.
Example: K06ZLCF

VKA

Cap

Full Dimensions

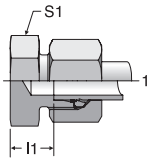


TUBE FITTING PART #	END SIZE 1 (mm)	L (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
VKA06	6	18.5	315		200
VKA08	8	18.5	315	315	200
VKA10	10	20.0	315	315	200
VKA12	12	20.5	315	315	200
VKA15	15	20.5	315	315	200
VKA18	18	22.5	315		200
VKA22	22	25.0	160	160	100
VKA28	28	25.5	160		100
VKA35	35	30.0	160	160	
VKA42	42	30.0	160		
VKA06	6	18.5	630		400
VKA08	8	18.5	630	630	400
VKA10	10	20.0	630	630	400
VKA12	12	20.5	630	630	400
VKA14	14	22.5	630	630	400
VKA16	16	23.5	400		250
VKA20	20	28.5	400	400	250
VKA25	25	29.0	400	400	250
VKA30	30	30.5	400	400	
VKA38	38	33.0	315	315	

Note: Part does not include tube nut.
Sizes 6,8,10 & 12 work with L and S Series.

ROV Full Dimensions

Plug
24° Flareless



TUBE FITTING PART #	END SIZE 1 (mm)	l 1 (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
ROV06L	6	7	12	315			315	
ROV08L	8	8	14	315			315	
ROV10L	10	9	17	315			315	
ROV12L	12	10.0	19	315	315		315	
ROV15L	15	11.0	24	315			315	
ROV18L	18	11.5	27	315			315	
ROV22L	22	13.5	32	160	160		160	160
ROV28L	28	14.5	41	160			160	
ROV35L	35	14.5	46	160			160	
ROV42L	42	16.0	55	160			160	
ROV06S	6	11.0	14	630	630		630	
ROV08S	8	13.0	17	630			630	
ROV10S	10	12.5	19	630			630	
ROV12S	12	14.5	22	630	630		630	
ROV14S	14	16.0	24	630				
ROV16S	16	15.5	27	400			400	
ROV20S	20	17.5	32	400			400	
ROV25S	25	20.0	41	400			400	
ROV30S	30	20.5	46	400			400	
ROV38S	38	23.0	55	315			315	

For EO-2 part number, insert "Z" between size and pressure series.
Example: ROV06ZLCF

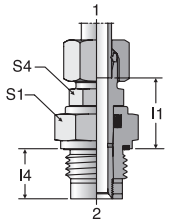
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DVGE-R Full Dimensions

Plain Bearing Rotary Straight
24° Flareless / BSPP with EOlastic Seal*

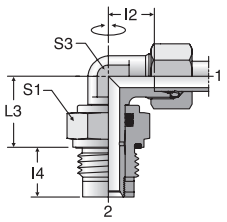


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 1 (mm)	l 4 (mm)	S1 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DVGE06LR	6	G 1/4 A	21.0	18.0	19	12	40		
DVGE08LR	8	G 1/4 A	21.0	18.0	19	14	40		
DVGE10LR	10	G 3/8 A	25.0	18.0	24	17	40		
DVGE12LR	12	G 1/2 A	27.0	21.0	27	19	40		
DVGE15LR	15	G 3/4 A	32.0	24.0	32	24	40		
DVGE18LR	18	G 1A	35.0	27.5	41	27	40		
DVGE22LR	22	G 1A	39.0	27.5	41	32	40		
DVGE28LR	28	G 1 1/4 A	40.5	31.0	50	41	40		
DVGE35LR	35	G 1/2 A	44.5	35.0	55	46			
DVGE06SR	6	G 1/4 A	23.0	18.0	19	14			
DVGE08SR	8	G 1/4 A	24.0	18.0	19	17	100		
DVGE10SR	10	G 3/8 A	26.5	18.0	24	19	100		
DVGE12SR	12	G 1/2 A	28.5	21.0	27	22			
DVGE16SR	16	G 3/4 A	33.5	24.0	32	27			
DVGE20SR	20	G 1A	38.0	27.5	41	32	100		
DVGE25SR	25	G 1A	40.5	27.5	41	41	100		
DVGE30SR	30	G 1 1/4 A	41.5	31.0	50	46	100		
DVGE38SR	38	G 1 1/2 A	47.0	35.0	55	55			

***Note:** Port depth must be deeper than standard DIN 3852-2.

DVWE-R Full Dimensions

Plain Bearing Rotary Elbow
24° Flareless / BSPP with EOlastic Seal*



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 2 (mm)	l 4 (mm)	L 3 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DVWE06LR	6	G 1/4 A	12.0	18.0	20.0	19	12	40		
DVWE08LR	8	G 1/4 A	14.0	18.0	21.0	19	12	40		
DVWE10LR	10	G 3/8 A	15.0	18.0	26.0	24	14	40		
DVWE12LR	12	G 1/2 A	17.0	21.0	27.0	27	17	40		
DVWE15LR	15	G 3/4 A	21.0	24.0	33.0	32	19	40		
DVWE18LR	18	G 1A	23.5	27.5	37.5	41	27	40		
DVWE22LR	22	G 1A	27.5	27.5	39.5	41	27	40		
DVWE28LR	28	G 1 1/4 A	30.5	31.0	44.0	50	36			
DVWE35LR	35	G 1/2 A	34.5	35.0	54.0	55	41			
DVWE06SR	6	G 1/4 A	16.0	18.0	21.0	19	12			
DVWE08SR	8	G 1/4 A	17.0	18.0	22.0	19	14	100		
DVWE10SR	10	G 3/8 A	17.5	18.0	27.0	24	17	100		
DVWE12SR	12	G 1/2 A	21.5	21.0	28.0	27	17	100		
DVWE16SR	16	G 3/4 A	24.5	24.0	34.0	32	24			
DVWE20SR	20	G 1A	26.5	27.5	39.5	41	27			
DVWE25SR	25	G 1A	30.0	27.5	42.5	41	36	100		
DVWE30SR	30	G 1 1/4 A	35.5	31.0	48.0	50	41	100		
DVWE38SR	38	G 1 1/2 A	41.0	35.0	55.0	55	50			

***Note:** Port depth must be deeper than standard DIN 3852-2.

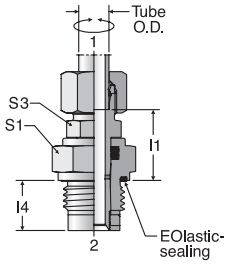
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DVGE-M Full Dimensions

Plain Bearing Rotary Straight
24° Flareless / Metric Parallel with EOlastic Seal*

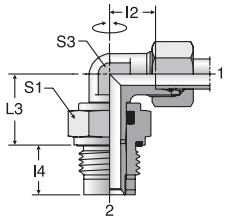


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	l 4 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DVGE06LM	6	M 14 x 1.5	20.0	18.0	19	12			
DVGE08LM	8	M 14 x 1.5	21.0	18.0	19	12			
DVGE10LM	10	M 18 x 1.5	26.0	18.0	24	14	40		
DVGE12LM	12	M 22 x 1.5	27.0	21.0	27	17			
DVGE15LM	15	M 27 x 2	33.0	24.0	32	19			
DVGE18LM	18	M 33 x 2	37.5	27.5	41	27			
DVGE22LM	22	M 33 x 2	39.5	27.5	41	27			
DVGE28LM	28	M 42 x 2	44.0	31.0	50	36	40		
DVGE35LM	35	M 48 x 2	54.0	35.0	55	41			
DVGE06SM	6	M 14 x 1.5	21.0	18.0	19	12			
DVGE08SM	8	M 14 x 1.5	22.0	18.0	19	14			
DVGE10SM	10	M 18 x 1.5	27.0	18.0	24	17			
DVGE12SM	12	M 22 x 1.5	28.0	21.0	27	17			
DVGE16SM	16	M 27 x 2	34.0	24.0	32	24			
DVGE20SM	20	M 33 x 2	39.5	27.5	41	27			
DVGE25SM	25	M 33 x 2	42.5	27.5	41	36			
DVGE30SM	30	M 42 x 2	48.0	31.0	50	41	100		
DVGE38SM	38	M 48 x 2	55.0	35.0	55	50			

***Note:** Port depth must be deeper than standard DIN 3852-1.

DVWE-M Full Dimensions

Plain Bearing Rotary Elbow
24° Flareless / Metric Parallel with EOlastic Seal*



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 4 (mm)	L3 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DVWE06LM	6	M 14 x 1.5	12.0	18.0	20.0	19	12	40		
DVWE08LM	8	M 14 x 1.5	14.0	18.0	21.0	19	12	40		
DVWE10LM	10	M 18 x 1.5	15.0	18.0	26.0	24	14			
DVWE12LM	12	M 22 x 1.5	17.0	21.0	27.0	27	17			
DVWE15LM	15	M 27 x 2	21.0	24.0	33.0	32	19			
DVWE18LM	18	M 33 x 2	23.5	27.5	37.5	41	27			
DVWE22LM	22	M 33 x 2	27.5	27.5	39.5	41	27			
DVWE28LM	28	M 42 x 2	30.5	31.0	44.0	50	36			
DVWE35LM	35	M 48 x 2	34.5	35.0	54.0	55	41			
DVWE06SM	6	M 14 x 1.5	16.0	18.0	21.0	19	12	100		
DVWE08SM	8	M 14 x 1.5	17.0	18.0	22.0	19	14	100		
DVWE10SM	10	M 18 x 1.5	17.5	18.0	27.0	24	17			
DVWE12SM	12	M 22 x 1.5	21.5	21.0	28.0	27	17			
DVWE16SM	16	M 27 x 2	24.5	24.0	34.0	32	24			
DVWE20SM	20	M 33 x 2	26.5	27.5	39.5	41	27			
DVWE25SM	25	M 33 x 2	30.0	27.5	42.5	41	36			
DVWE30SM	30	M 42 x 2	35.5	31.0	48.0	50	41			
DVWE38SM	38	M 48 x 2	41.0	35.0	55.0	55	50			

***Note:** Port depth must be deeper than standard DIN 3852-1.

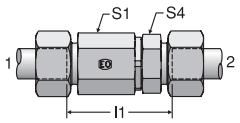
Dimensions and pressures for reference only, subject to change.

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DG101 Full Dimensions

Ball Bearing Rotary Union
24° Flareless / 24° Flareless

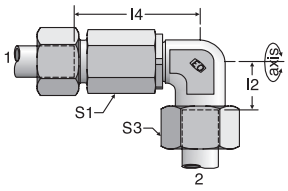


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	l 1 (mm)	S1 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG101/06S	6	47	22	17			
DG101/08S	8	47	22	17	•		
DG101/12S	12	57	30	24	•		
DG101/16S	16	57	30	27	•		
DG101/20S	20	71	41	36	•		
DG101/25S	25	72	41	41	•		
DG101/30S	30	82	60	46			
DG101/38S	38	82	60	55			

Note: See Table F1 on page F7 for RPM/working pressure data.

DG103 Full Dimensions

Ball Bearing Rotary Elbow
24° Flareless / 24° Flareless

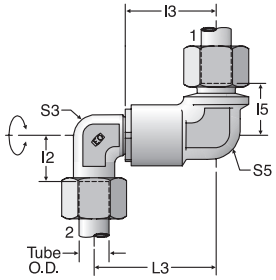


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	l 2 (mm)	l 4 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG103/06S	6	16.0	44.5	22	17			
DG103/08S	8	17.0	44.5	22	19	•		
DG103/12S	12	21.5	55.5	30	24	•		
DG103/16S	16	24.5	54.5	30	30	•		
DG103/20S	20	26.5	72.5	41	36	•		
DG103/25S	25	30.0	71.0	41	46			
DG103/30S	30	35.5	89.0	60	50	•		
DG103/38S	38	41.0	86.5	60	60			

Note: See Table F1 on page F7 for RPM/working pressure data.

DG105 Full Dimensions

Ball Bearing Rotary Union
24° Flareless / 24° Flareless

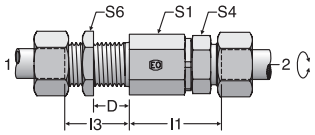


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	l 2 (mm)	l 3 (mm)	l 5 (mm)	L3 (mm)	S3 (mm)	S5 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG105/12S	12	21.5	39.5	26.5	81	22	24			
DG105/16S	16	24.5	39.5	25.5	87	22	24	•		
DG105/20S	20	26.5	56.5	39.5	109	36	32			
DG105/25S	25	30.0	56.5	38.0	116	36	32	•		
DG105/30S	30	35.5	65.0	44.5	133	50	50			
DG105/38S	38	41.0	65.0	42.0	145	50	50	•		

Note: See Table F1 on page F7 for RPM/working pressure data.

DG107 Full Dimensions

Ball Bearing Rotary Bulkhead Union
24° Flareless / 24° Flareless



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	D (mm)	l 1 (mm)	l 3 (mm)	S1 (mm)	S4 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG107/06S	6	5	42.0	16.0	22	17	19	•		
DG107/08S	8	5	42.0	16.0	22	17	22	•		
DG107/12S	12	5	52.5	15.5	30	24	27	•		
DG107/16S	16	5	51.5	17.5	30	27	32	•		
DG107/20S	20	15	65.5	28.5	41	36	41	•		
DG107/25S	25	15	66.0	30.0	41	41	46	•		
DG107/30S	30	15	75.5	30.5	60	46	50	•		
DG107/38S	38	15	76.0	31.0	60	55	65	•		

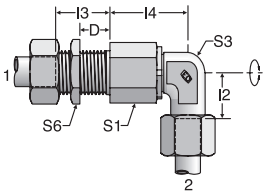
Note: See Table F1 on page F7 for RPM/working pressure data.

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DG108 Full Dimensions

Ball Bearing Rotary Bulkhead Elbow
24° Flareless / 24° Flareless

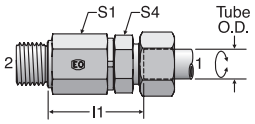


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	D (mm)	l 2 (mm)	l 3 (mm)	l 4 (mm)	S1 (mm)	S3 (mm)	S6 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG108/06S	6	5	16.0	16.0	39.5	22	17	19			
DG108/08S	8	5	17.0	16.0	39.5	22	17	22	•		
DG108/12S	12	5	21.5	15.5	51.0	30	22	27	•		
DG108/16S	16	5	24.5	17.5	49.0	30	22	32	•		
DG108/20S	20	15	26.5	28.5	67.0	41	36	41			
DG108/25S	25	15	30.0	30.0	65.0	41	36	46			
DG108/30S	30	15	35.5	30.5	82.5	60	50	50			
DG108/38S	38	15	41.0	31.0	80.5	60	50	65			

Note: See Table F1 on page F7 for RPM/working pressure data.

DG102-R Full Dimensions

Ball Bearing Rotary Straight
24° Flareless / BSPP

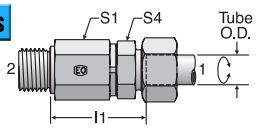


TUBE FITTING PART #	END SIZE 1 (mm)	2 BSPP	l 1 (mm)	S1 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG102/06SR	6	G 1/4 A	42.0	22	17	•		
DG102/08SR	8	G 1/4 A	42.0	22	17	•		
DG102/12SR	12	G 3/8 A	52.5	30	24	•		
DG102/16SR	16	G 1/2 A	51.5	30	27	•		
DG102/20SR	20	G 3/4 A	65.5	41	36			
DG102/25SR	25	G 1 A	66.0	41	41			
DG102/30SR	30	G 1 1/4 A	75.5	60	46	•		
DG102/38SR	38	G 1 1/2 A	76.0	60	55	•		

Note: See Table F1 on page F7 for RPM/working pressure data.

DG102-M Full Dimensions

Ball Bearing Rotary Straight
24° Flareless / Metric Parallel

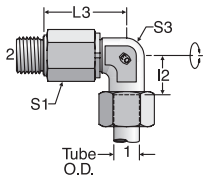


TUBE FITTING PART #	END SIZE 1 (mm)	2 Metric	l 1 (mm)	S1 (mm)	S4 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG102/06SM	6	M14 x 1.5	42.0	22	17	•		
DG102/08SM	8	M14 x 1.5	42.0	22	17			
DG102/12SM	12	M18 x 1.5	52.5	30	24	•		
DG102/16SM	16	M22 x 1.5	51.5	30	27	•		
DG102/20SM	20	M27 x 2	65.5	41	36			
DG102/25SM	25	M33 x 2	66.0	41	41			
DG102/30SM	30	M42 x 2	75.5	60	46			
DG102/38SM	38	M48 x 2	76.0	60	55			

Note: See Table F1 on page F7 for RPM/working pressure data.

DG104-R Full Dimensions

Ball Bearing Rotary Elbow
24° Flareless / BSPP with
EOlastic Seal



TUBE FITTING PART #	END SIZE 1 (mm)	2 BSPP	l2 (mm)	L3 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG104/06SR	6	G 1/4 A	16.0	39.5	22	17	•		
DG104/08SR	8	G 1/4 A	17.0	39.5	22	17	•		
DG104/12SR	12	G 3/8 A	21.5	51.0	30	22	•		
DG104/16SR	16	G 1/2 A	24.5	49.0	30	22	•		
DG104/20SR	20	G 3/4 A	26.5	67.0	41	36	•		
DG104/25SR	25	G 1 A	30.0	65.0	41	36	•		
DG104/30SR	30	G 1 1/4 A	35.5	82.5	60	50	•		
DG104/38SR	38	G 1 1/2 A	41.0	80.5	60	50			

Note: See Table F1 on page F7 for RPM/working pressure data.

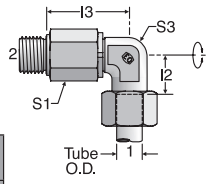
Dimensions and pressures for reference only, subject to change.

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DG104-M Full Dimensions

Ball Bearing Rotary Elbow
24° Flareless / Metric Parallel

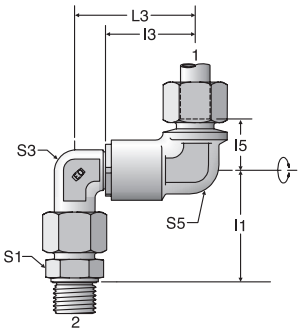


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 2 (mm)	l 3 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG104/06SM	6	M14 x 1.5	16.0	39.5	22	17			
DG104/08SM	8	M14 x 1.5	17.0	39.5	22	17	•		
DG104/12SM	12	M18 x 1.5	21.5	51.0	30	22	•		
DG104/16SM	16	M22 x 1.5	24.5	49.0	30	22	•		
DG104/20SM	20	M27 x 2	26.5	67.0	41	36			
DG104/25SM	25	M33 x 2	30.0	65.0	41	36	•		
DG104/30SM	30	M42 x 2	35.5	82.5	60	50			
DG104/38SM	38	M48 x 2	41.0	80.5	60	50			

Note: See Table F1 on page F7 for RPM/working pressure data.

DG106-R Full Dimensions

Ball Bearing Rotary Double Elbow
24° Flareless / BSPP with EOlastic Seal

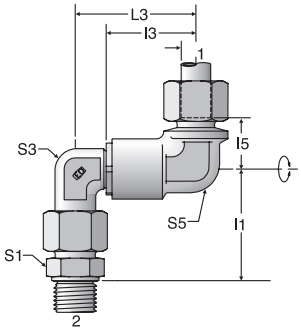


TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	l 1 (mm)	l 3 (mm)	l 5 (mm)	L3 (mm)	S1 (mm)	S3 (mm)	S5 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG106/12SR	12	G 3/8 A	55.5	39.5	26.5	53.0	22	24	22			
DG106/16SR	16	G 1/2 A	61.5	39.5	25.5	53.0	27	24	24	•		
DG106/20SR	20	G 3/4 A	69.5	56.5	39.5	76.0	32	36	32			
DG106/25SR	25	G 1 A	78	56.5	38.0	76.0	41	36	32			
DG106/30SR	30	G 1 1/4 A	86.5	65.0	44.5	92.5	50	50	50			
DG106/38SR	38	G 1 1/2 A	101.0	65.0	42.0	92.5	55	50	50			

Note: See Table F1 on page F7 for RPM/working pressure data.

DG106-M Full Dimensions

Ball Bearing Rotary Double Elbow
24° Flareless / Metric Parallel



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	l 1 (mm)	l 3 (mm)	l 5 (mm)	L3 (mm)	S1 (mm)	S3 (mm)	S5 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
DG106/12SM	12	M18 x 1.5	55.5	39.5	26.5	53	24	24	22			
DG106/16SM	16	M22 x 1.5	61.5	39.5	25.5	53	27	24	24			
DG106/20SM	20	M27 x 2	69.5	56.5	39.5	76	32	36	32	•		
DG106/25SM	25	M33 x 2	78.0	56.5	38.0	76	41	36	32			
DG106/30SM	30	M42 x 2	86.5	65.0	44.5	92.5	50	50	50			
DG106/38SM	38	M48 x 2	101.0	65.0	42.0	92.5	55	50	50			

Note: See Table F1 on page F7 for RPM/working pressure data.

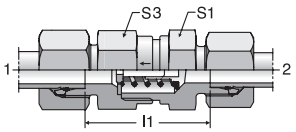
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RHD Full Dimensions

Non-Return Valve
24° Flareless / 24° Flareless



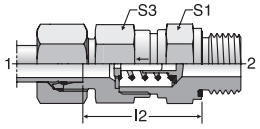
TUBE FITTING PART #	END SIZE 1 & 2 (mm)	DN SIZE (mm)	l 1 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RHD06L	6	4	29.0	17	17	250			250	
RHD08L	8	6	30.0	19	19	250			250	
RHD10L	10	8	40.5	22	24	250	250		250	
RHD12L	12	10	43.5	27	30	250	250		250	
RHD15L	15	12	47.5	27	32	250			250	
RHD18L	18	16	51.5	36	36	160			160	
RHD22L	22	20	61.5	41	46	160			160	
RHD28L	28	25	69.5	50	55	100			100	
RHD35L	35	32	74.5	60	60	100			100	
RHD42L	42	32	74.0	65	70	100			100	
RHD06S	6	3	34.5	19	19	400				
RHD08S	8	4	34.5	19	19	400				
RHD10S	10	6	40.5	22	24	400				
RHD12S	12	8	42.5	24	27	400			400	
RHD14S	14	10	47.5	27	32					
RHD16S	16	12	50.5	32	36	315	315			
RHD20S	20	16	54.5	41	46	250	250		250	
RHD25S	25	20	58.5	46	50	250	250			
RHD30S	30	25	69.5	60	60	250				
RHD38S	38	32	75.5	65	70	250			250	

Note: These valves are not compatible with steam, oxygen and explosive gases.

For EO-2 part number, insert "Z" between size and pressure series.
Example: RHD06ZLCF
For Optional Opening Pressures see page F8.

RHV-R-ED Full Dimensions

Non-Return Valve
24° Flareless / BSPP
with EOlastic Seal



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	DN SIZE (mm)	l 2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RHV06LRED	6	G 1/8 A	4	28.0	17	17	250				
RHV08LRED	8	G 1/4 A	6	30.0	19	19	250			250	
RHV10LRED	10	G 1/4 A	8	38.5	22	24	250				
RHV12LRED	12	G 3/8 A	10	42.5	27	30	250			250	
RHV15LRED	15	G 1/2 A	12	45.5	27	32	250				
RHV18LRED	18	G 1/2 A	16	50.0	36	36	160			160	160
RHV22LRED	22	G 3/4 A	20	55.0	41	46	160			160	160
RHV28LRED	28	G 1 A	25	63.0	50	55	100			100	
RHV35LRED	35	G 1 1/4 A	32	69.0	60	60	100			100	
RHV42LRED	42	G 1 1/2 A	32	68.5	65	70	100			100	
RHV06SRED	6	G 1/4 A	3	31.5	19	19	400				
RHV08SRED	8	G 1/4 A	4	31.5	19	19	400	400			
RHV10SRED	10	G 3/8 A	6	38.0	22	24	400				
RHV12SRED	12	G 3/8 A	8	41.0	24	27	400				
RHV14SRED	14	G 1/2 A	10	44.5	27	32					
RHV16SRED	16	G 1/2 A	12	48.0	32	36	315			315	
RHV20SRED	20	G 3/4 A	16	52.0	41	46	250				
RHV25SRED	25	G 1 A	20	54.5	46	50	250				
RHV30SRED	30	G 1 1/4 A	25	64.0	60	60	250				
RHV38SRED	38	G 1 1/2 A	32	69.5	65	70	250				

Note: These valves are not compatible with steam, oxygen and explosive gases.

For EO-2 part number, insert "Z" between size and pressure series.
Example: RHV06ZLREDCF

For Optional Opening Pressures see page F8.

Dimensions and pressures for reference only, subject to change.

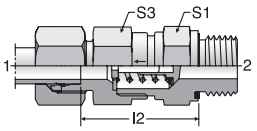
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RHV-M-ED

Full Dimensions

Non-Return Valve
24° Flareless / Metric Parallel
with EOlastic Seal



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	DN SIZE (mm)	l 2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RHV06LMED	6	M10 x 1	4	28.0	17	17	250				
RHV08LMED	8	M12 x 1.5	6	29.0	19	19	250				
RHV10LMED	10	M14 x 1.5	8	38.5	22	24					
RHV12LMED	12	M16 x 1.5	10	42.5	27	30	250				
RHV15LMED	15	M18 x 1.5	12	45.5	27	32					
RHV18LMED	18	M22 x 1.5	16	50.0	36	36					
RHV22LMED	22	M26 x 1.5	20	55.0	41	46					
RHV28LMED	28	M33 x 2	25	63.0	50	55					
RHV35LMED	35	M42 x 2	32	69.0	60	60					
RHV42LMED	42	M48 x 2	32	68.5	65	70					
RHV06SMED	6	M12 x 1.5	3	31.5	19	19					
RHV08SMED	8	M14 x 1.5	4	31.5	19	19					
RHV10SMED	10	M16 x 1.5	6	38.0	22	24					
RHV12SMED	12	M18 x 1.5	8	41.0	24	27					
RHV14SMED	14	M20 x 1.5	10	44.5	27	32					
RHV16SMED	16	M22 x 1.5	12	48.0	32	36					
RHV20SMED	20	M27 x 2	16	52.0	41	46					
RHV25SMED	25	M33 x 2	20	54.5	46	50					
RHV30SMED	30	M42 x 2	25	64.0	60	60					
RHV38SMED	38	M48 x 2	32	69.5	65	70					

For EO-2 part number, insert "Z" between size and pressure series.
Example: RHV06ZLMEDCF

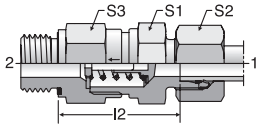
For Optional Opening Pressures see page F8.

Note: These valves are not compatible with steam, oxygen and explosive gases.

RHZ-R-ED

Full Dimensions

Non-Return Valve
24° Flareless / BSPP



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 BSPP	DN SIZE (mm)	l 2 (mm)	S1 (mm)	S2 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RHZ06LRED	6	G 1/8 A	4	26.5	17	14	17	250				
RHZ08LRED	8	G 1/4 A	6	28.5	19	17	19	250				
RHZ10LRED	10	G 1/4 A	8	38.5	22	19	24	250				
RHZ12LRED	12	G 3/8 A	10	40.5	27	22	30	250			250	
RHZ15LRED	15	G 1/2 A	12	42.5	27	27	32	250			250	
RHZ18LRED	18	G 1/2 A	16	48.0	36	32	36	160			160	
RHZ22LRED	22	G 3/4 A	20	56.0	41	36	46	160			160	
RHZ28LRED	28	G 1 A	25	64.0	50	41	55	100			100	
RHZ35LRED	35	G 1 1/4 A	32	70.0	60	50	60	100				
RHZ42LRED	42	G 1 1/2 A	32	70.5	65	60	70					
RHZ06SRED	6	G 1/4 A	3	31.5	19	17	19	400				
RHZ08SRED	8	G 1/4 A	4	31.5	19	19	19	400				
RHZ10SRED	10	G 3/8 A	6	38.0	22	22	24		400			
RHZ12SRED	12	G 3/8 A	8	41.0	24	24	27	400				
RHZ14SRED	14	G 1/2 A	10	43.5	27	27	32					
RHZ16SRED	16	G 1/2 A	12	46.0	32	30	36	315				
RHZ20SRED	20	G 3/4 A	16	50.0	41	36	46	250				
RHZ25SRED	25	G 1 A	20	54.5	46	46	50	250				
RHZ30SRED	30	G 1 1/4 A	25	64.0	60	50	60					
RHZ38SRED	38	G1 1/2 A	32	71.5	65	60	70					

For EO-2 part number, insert "Z" between size and pressure series.
Example: RHZ06ZLREDCF

For Optional Opening Pressures see page F8.

Note: These valves are not compatible with steam, oxygen and explosive gases.

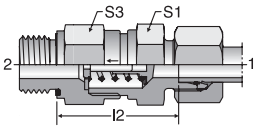
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
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RHZ-M-ED Full Dimensions

Non-Return Valve
24° Flareless / Metric Parallel with EOlastic Seal



TUBE FITTING PART #	END SIZE 1 (mm)	END SIZE 2 Metric	DN SIZE (mm)	l 2 (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
RHZ06LMED	6	M10 x 1	4	26.5	17	17	250				
RHZ08LMED	8	M12 x 1.5	6	28.5	19	19					
RHZ10LMED	10	M14 x 1.5	8	38.5	22	24	250				
RHZ12LMED	12	M16 x 1.5	10	40.5	27	30	250				
RHZ15LMED	15	M18 x 1.5	12	42.5	27	32				250	
RHZ18LMED	18	M22 x 1.5	16	48.0	36	36					
RHZ22LMED	22	M26 x 1.5	20	56.0	41	46					
RHZ28LMED	28	M33 x 2	25	64.0	50	55					
RHZ35LMED	35	M42 x 2	32	70.0	60	60					
RHZ42LMED	42	M48 x 2	32	70.5	65	70					
RHZ06SMED	6	M12 x 1.5	3	31.5	19	19	400				
RHZ08SMED	8	M14 x 1.5	4	31.5	19	19					
RHZ10SMED	10	M16 x 1.5	6	38.0	22	24					
RHZ12SMED	12	M18 x 1.5	8	41.0	24	27					
RHZ14SMED	14	M20 x 1.5	10	43.5	27	32					
RHZ16SMED	16	M22 x 1.5	12	46.0	32	36					
RHZ20SMED	20	M27 x 2	16	50.0	41	46					
RHZ25SMED	25	M33 x 2	20	54.5	46	50					
RHZ30SMED	30	M42 x 2	25	64.0	60	60					
RHZ38SMED	38	M48 x 2	32	71.5	65	70					

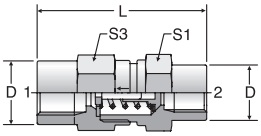
For EO-2 part number, insert "Z" between size and pressure series.
Example: RHZ06ZLMEDCF

For Optional Opening Pressures see page F8.

Note: These valves are not compatible with steam, oxygen and explosive gases.

RHDI Full Dimensions

Non-Return Valve
BSPP Female / BSPP Female



TUBE FITTING PART #	END SIZE 1 & 2 BSPP	DN SIZE (mm)	D (mm)	L (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
RHDI1/8	G 1/8	3	19	42.5	19	19		400	
RHDI1/4	G 1/4	4	19	51	19	19	400		
RHDI3/8	G 3/8	8	24	60	24	27	400		
RHDI1/2	G 1/2	12	32	72	32	36	315	315	
RHDI3/4	G 3/4	16	41	84	41	46	250		
RHDI1	G 1	20	46	95	46	50	250		
RHDI11/4	G 1 1/4	25	60	110	60	60	250	250	
RHDI11/2	G 1 1/2	32	65	114	65	70	250	250	

For Optional Opening Pressures see page F8.

Note: These valves are not compatible with steam, oxygen and explosive gases.

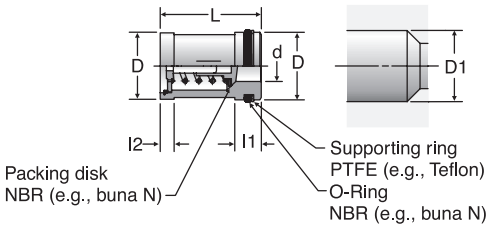
Dimensions and pressures for reference only, subject to change.

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RVP Full Dimensions

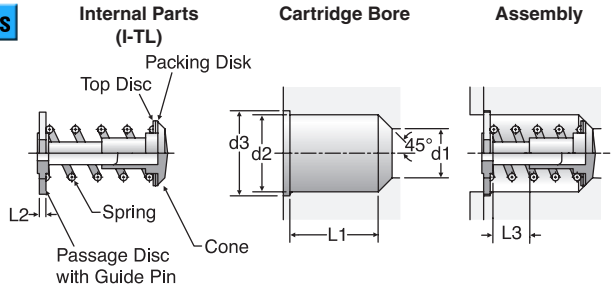
Non-Return Valve
Cartridge



TUBE FITTING PART #	d (mm)	D (mm)	D1 (mm)	l 1 (mm)	l 2 (mm)	L (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
RVP13	3.5	13	13	9.5	6.0	23.0		400	
RVP16	5.5	16	16	9.5	6.5	26.5	400	400	
RVP20	7.5	20	20	9.5	6.5	30.0	400	400	
RVP24	9.5	24	24	12.0	7.5	35.0	315	315	
RVP27	11.5	27	27	12.0	7.5	38.0		315	
RVP35	15.0	35	35	12.0	9.5	44.5	250	250	
RVP40	19.0	40	40	12.0	11.0	50.5		250	
RVP47	24.0	47	47	13.0	13.0	60.0		250	
RVP55	29.0	55	55	16.0	13.0	70.0		250	

I-TL Full Dimensions

Non-Return Valve
Internal Parts



TUBE FITTING PART #	For Use With	d1 (mm)	d2 (mm)	d3 (mm)	L1 (mm)	L2 (mm)	L3 (mm)	STANDARD FROM STOCK CF	71	MS
ITL06L	6L, 8S	3.5	7.5	8.55	8.2	2.0	1.0	•		
ITL08L	8L, 10S	5.5	10.2	11.55	11.0	2.0	1.7	•		
ITL10L	10L, 12S	7.5	13.0	14.05	14.0	2.0	2.3	•		
ITL12L	12L, 14S	9.5	16.7	18.05	16.5	2.5	2.9	•		
ITL15L	15L, 16S	11.5	19.5	20.55	19.0	2.5	3.5	•		
ITL18L	18L, 20S	15	25.2	27.10	22.5	3.0	4.4			
ITL22L	22L, 25S	19	30.8	32.60	27.0	3.0	5.5	•		
ITL28L	28L, 30S	24	38.6	40.60	32.5	3.5	7.3			
ITL35L	35L, 42L, 38S	29	45.7	48.10	37.5	3.5	8.9			

Note: Omit “CF” in the part number for steel material.

Standard: Material steel zinc plated (A3K), springs phophated and oiled. Packing disc of NBR (e.g., buna N), opening pressure 1 bar.

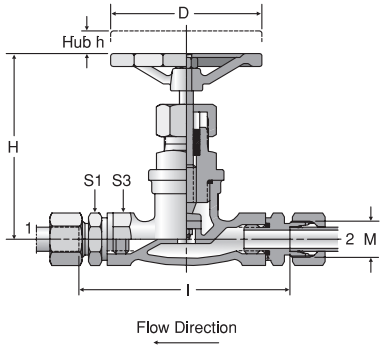
On request:
- Packing disc of FKM (e.g., fluorocarbon)
- Stainless steel 1.4571, packing disc of NBR (e.g., buna N) or FKM (e.g., fluorocarbon) (on request).

Temperature rating, without pressure reductions of steel non-return valves with NBR seals (e.g., buna N-standard) is -35°C to +100°C and with FKM seals (e.g., fluorocarbon) (on request) is -25°C to +120°C.

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DV Full Dimensions

Shut-Off Valve, PN 10
24° Flareless / 24° Flareless

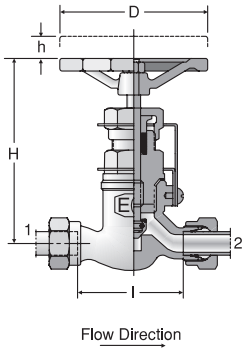


TUBE FITTING PART #	END SIZE 1 & 2 (mm)	M Metric	DN SIZE (mm)	D (mm)	h (mm)	H (mm)	l (mm)	S1 (mm)	S3 (mm)	STANDARD Pressure Rating (bar) EO CF	71	MS
DV06L	6	12 x 1.5	5	50	7	63	88	22	21			10
DV08L	8	14 x 1.5	6	50	7	63	88	22	21			
DV10L	10	16 x 1.5	8	50	7	63	90	22	21			10
DV12L	12	18 x 1.5	10	50	7	63	90	22	21			10
DV15L	15	22 x 1.5	12	50	8	65	93	27	25			10
DV18L	18	26 x 1.5	16	50	8	67	94	27	25			10
DV22L	22	30 x 2	20	60	8	67	108	32	32			10
DV28L	28	36 x 2	25	60	10	95	125	41	38			10
DV35L	35	45 x 2	32	70	10	102	145	50	47			10

Note: The pressure specification PN for hand operated shut-off valves applies to the design factor 1.5 (according to DIN 3230 T5 and ISO 5208). Omit "MS" in the part number for brass material.

LD Full Dimensions

Shut-Off Valve, PN 40
24° Flareless / 24° Flareless



TUBE FITTING PART #	END SIZE 1 & 2 (mm)	DN SIZE (mm)	D (mm)	h LIFT (mm)	H (mm)	l (mm)	STANDARD Pressure Rating (bar) EO CF	71	MS
LD10S	10	6	63	7	98	45			40
LD12S	12	8	63	7	98	49			40
LD14S	14	10	63	7	98	54			40
LD16S	16	12	80	9	110	67			40
LD20S	20	16	80	9	110	69			40
LD25S	25	20	100	12	129	86			40
LD30S	30	25	100	12	129	93			40
LD38S	38	32	100	12	158	108			40

Note: The pressure specification PN for hand operated shut-off valves applies to the design factor 1.5 (according to DIN 3230 T5 and ISO 5208).
Omit "MS" in the part number for brass material.

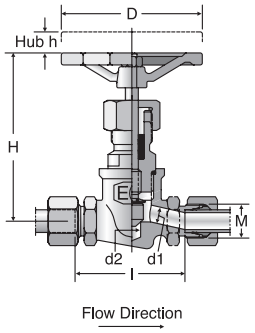
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VDHA Full Dimensions

High Pressure Valve
24° Flareless / 24° Flareless

TUBE FITTING PART #	END SIZE (mm)	DN SIZE (mm)	d1 (mm)	d2 (mm)	D (mm)	h (mm)	H (mm)	l (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
VDHA06S	6	3	4	9.5	100	6	120	66					
VDHA08S	8	4	5	9.5	100	6	120	66					
VDHA10S	10	6	7	9.5	100	6	120	65					
VDHA12S	12	8	8	9.5	100	6	120	65	250				
VDHA14S	14	10	10	9.5	100	6	120	84					
VDHA16S	16	12	11	9.5	100	6	120	83	160				
VDHA20S	20	16	13	11.0	100	6	120	79					
VDHA25S	25	20	17	12.0	125	9	143	106	160				
VDHA30S	30	25	19	22.5	125	12	164	103	100				
VDHA38S	38	32	25	26.5	180	12	198	118	100				

For EO-2 part number, insert "Z" between size and pressure series.
Example: VDHA06ZS



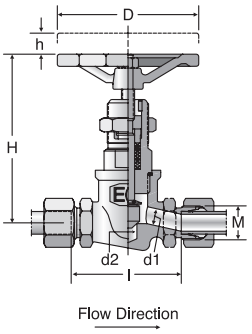
Internal threaded spindle and body of low grade forged stainless steel

VDHB Full Dimensions

High Pressure Valve – Panel Mount
24° Flareless / 24° Flareless

TUBE FITTING PART #	END SIZE (mm)	DN SIZE (mm)	M Metric	d1 (mm)	d2 (mm)	D (mm)	h (mm)	H (mm)	l (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS	EO-2 CF	EO-2 71
VDHB06S	6	4	14 x 1.5	4	9.5	100	6	124	66	160			160	
VDHB08S	8	4	16 x 1.5	5	9.5	100	6	124	66	160			160	
VDHB10S	10	6	18 x 1.5	7	9.5	100	6	124	65	160	160		160	
VDHB12S	12	8	20 x 1.5	8	9.5	100	6	124	65	160	160		160	
VDHB14S	14	10	22 x 1.5	10	9.5	100	6	124	84	160			160	
VDHB16S	16	12	24 x 1.5	11	9.5	100	6	124	83	160			160	160
VDHB20S	20	16	30 x 2	13	11.0	100	6	124	79	160			160	
VDHB25S	25	20	36 x 2	17	12.0	125	9	153	106	160			160	

For EO-2 part number, insert "Z" between size and pressure series.
Example: VDHB06ZS



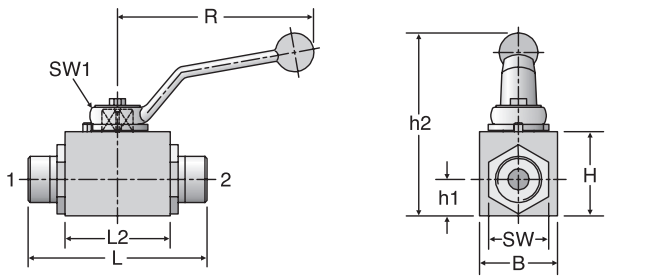
External threaded spindle and body of low grade forged stainless steel

Dimensions and pressures for reference only, subject to change.

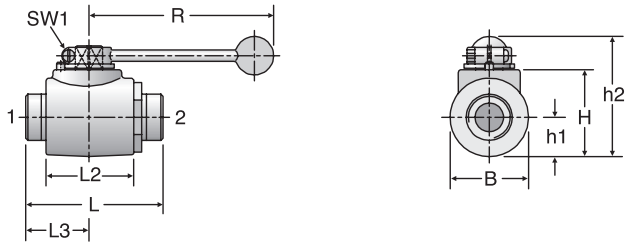
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KH Full Dimensions

Two-Way Ball Valve
24° Flareless / 24° Flareless



DN4 - DN25



DN32 - DN40

TUBE FITTING PART #	END SIZE (mm)	DN SIZE (mm)	B (mm)	h1 (mm)	h2 (mm)	H (mm)	L (mm)	L2 (mm)	L3 (mm)	R (mm)	SW1 (mm)	EO			EO-2	
												CF	71	MS	CF	71
KH06L	6	4	20	10.0	55.0	25	67	36	—	76	7	125				
KH08L	8	6	20	10.0	55.0	25	67	36	—	76	7	125				
KH10L	10	8	30	14.5	68.0	35	75	45	—	100	8	125			125	
KH12L	12	10	30	14.5	68.0	35	75	45	—	100	8	125	125			
KH15L	15	12	35	17.0	92.0	40	83	51	—	112	10	125	125		125	
KH18L	18	16	45	20.0	105.0	45	82	50	—	166	11	125			125	
KH22L	22	20	45	24.0	113.0	55	99	60	—	187	14				63	
KH28L	28	25	55	26.0	118.0	60	108	70	—	187	14	63			63	
KH35L	35	32	73	36.5	180.5	80	121	79	58.5	240	17					
KH42L	42	40	85	42.5	190.5	90	118	76	52.5	250	17	63				
KH08S	8	4	20	10.0	55.0	25	73	36	—	76	7	200				
KH10S	10	6	20	10.0	55.0	25	73	36	—	76	7	200				
KH12S	12	8	30	14.5	68.0	35	77	45	—	100	8	200				
KH14S	14	10	30	14.5	68.0	35	81	45	—	100	8	200				
KH16S	16	12	35	17.0	92.0	40	87	51	—	112	10	160				
KH20S	20	16	40	20.0	105.0	45	90	50	—	166	11	160	160		160	
KH25S	25	20	45	24.0	113.0	55	107	60	—	187	14	125				
KH30S	30	25	55	36.0	118.0	60	120	70	—	187	14	125				
KH38S	38	32	73	36.5	180.5	80	127	73	58.5	320	17	63				

For EO-2 part number, insert "Z" between size and pressure series.
Example: KH08ZSCF. Omit "CF" in the part number for steel material.

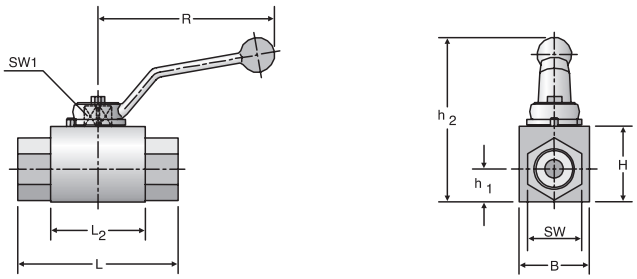
Dimensions and pressures for reference only, subject to change.

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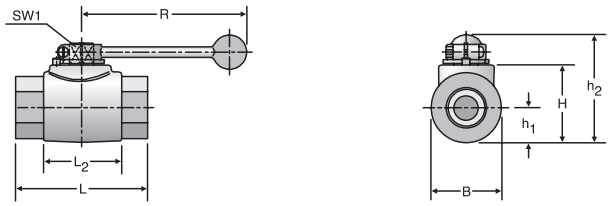
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KH-R/NPT

Two-Way Ball Valve
Female BSPP / Female BSPP
Female NPT / Female NPT



DN4-DN25



DN32-DN40

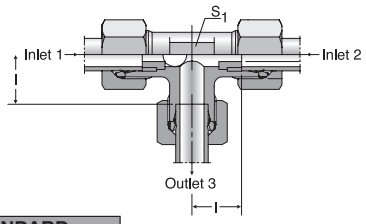
TUBE FITTING PART #	END SIZE 1 & 2 NPT / BSPT	DN SIZE (mm)	B (mm)	h1 (mm)	h2 (mm)	H (mm)	L (mm)	L2 (mm)	R (mm)	SW1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
KH1/8X	1/8-28	4	20	10.0	55.0	25	69	36	76	7	200		
KH1/4X	1/4-19	6	20	10.0	55.0	25	69	36	76	7	200		
KH3/8X	3/8-19	10	30	14.5	68.0	35	73	45	100	8	200		
KH1/2X	1/2-14	12	35	17.0	92.0	40	82	51	112	10	200		
KH5/8X	5/8-14	16	40	20.0	105.0	45	88	50	166	11			
KH3/4X	3/4-14	20	45	24.0	113.0	55	93	60	187	14	125		
KH1X	1-11	25	55	26.0	118.0	60	113	70	187	14	125		
KH11/4X	1 1/4-11	32	73	36.5	104.5	80	110	70	240	17	195		
KH11/2X	1 1/2-11	40	85	42.5	114.5	90	114	75	240	17	195		
KH1/8NPTX	1/8-27	4	20	10.0	55.0	25	69	36	76	7			
KH1/4NPTX	1/4-18	6	20	10.0	55.0	25	69	36	76	7	200		
KH3/8NPTX	3/8-18	10	30	14.5	68.0	35	73	45	100	8	200		
KH1/2NPTX	1/2-14	12	35	17.0	92.0	40	82	51	112	10	200		
KH3/4NPTX	3/4-14	20	45	24.0	113.0	55	93	60	187	14	125		
KH1NPTX	1-11 1/2	25	55	26.0	118.0	60	113	70	187	14	125		
KH11/4NPTX	1 1/4-11 1/2	32	73	36.5	104.5	80	110	70	240	17	125		
KH11/2NPTX	1 1/2-11 1/2	40	85	42.5	114.5	90	114	75	240	17			

Note: Omit “CF” in the part number for steel material.

WV

Full Dimensions

Alternating Valve
24° Flareless



TUBE FITTING PART #	END SIZE 1 - 3 (mm)	I (mm)	S1 (mm)	STANDARD Pressure Rating (bar) EO CF	EO 71	EO MS
WV08L	8	14	14	160		
WV10L	10	15	17	160		
WV12L	12	17	19	160		
WV15L	15	21	19			

Dimensions and pressures for reference only, subject to change.

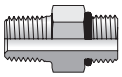
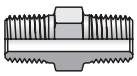
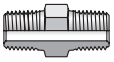
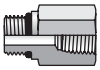
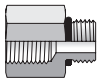
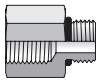
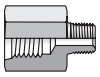
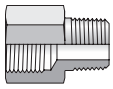
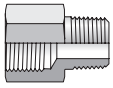
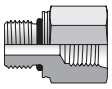
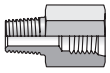
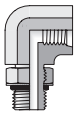
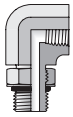
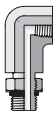
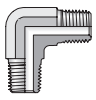
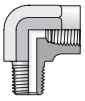
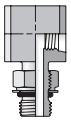
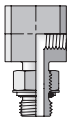
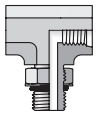
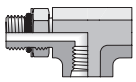
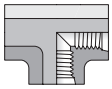
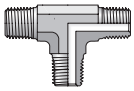
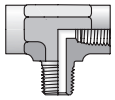
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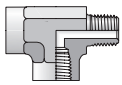
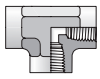
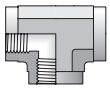
Pipe Fittings and Port Adapters



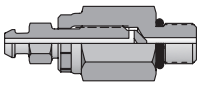
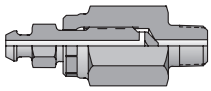
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Nipples	**F5OHAO** SAE-ORB / SAE-ORB  G11	**F5OF** SAE-ORB / NPTF  G11	**FF** NPTF / NPTF  G11	**FFF** NPTF / NPTF Long  G11	**FF33M** BSPT / BSPT  G12
Couplings	**G5HG5** SAE-ORB / SAE-ORB  G12	**GG** NPTF / NPTF  G12	**GG44M** BSPP / BSPP  G12	**Reducers, Expanders, Conversions**	**F5OG5** SAE-ORB / SAE-ORB  G13
F5OG SAE-ORB / NPTF  G13	**F5OHG8** SAE-ORB / Metric  G13	**F5OHG4** SAE-ORB / BSPP  G13	**FHG5** NPTF / SAE-ORB  G14	**FG** NPTF / NPTF  G14	**PTR** Pipe Thread Reducer  G14
FHG8 NPTF / Metric  G14	**FHG4** NPTF / BSPP  G15	**F87OHG87** ISO 6149 / ISO 6149  G15	**F8OHG5** Metric-ORR / SAE-ORB  G15	**F8OHG** Metric-ORR / NPTF  G15	**F4OHG5** BSPP-ORR / SAE-ORB  G16
F4OHG BSPP-ORR / NPTF  G16	**PTR34** BSPT / BSPP  G16	**RI-ED** BSPP-ED / BSPP  G17	**RI** BSPP-CF / BSPP  G18	**F3HG** BSPT/ NPTF  G19	**F3HG5** BSPT / SAE-ORB  G19
45° Elbows	**CD45** NPTF / NPTF  G19	**DD45** NPTF / NPTF  G19	**90° Elbows**	**AOEG5** SAE-ORB / SAE-ORB  G19	**AOEG** SAE-ORB / NPTF  G19
AOE4G SAE-ORB / NPTF Long  G20	**CR** NPTF / NPTF  G20	**CD** NPTF / NPTF  G20	**DD** NPTF / NPTF  G20	**A87LPOEG87LPM** ISO 6149 / ISO 6149  G21	**A4OEG4M** BSPP-ORR / BSPP  G21
Tees	**G5G5JAO** SAE-ORB Branch Tee  G21	**AOG5JG5** SAE-ORB Run Tee  G22	**G5G5JG5** SAE-ORB Tee  G22	**RRS** NPTF Tee  G22	**MMS** NPTF Branch Tee  G22

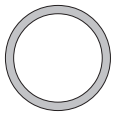
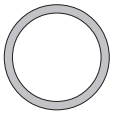
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MRO NPTF Run Tee  G22	**MMO** NPTF Tee  G23	**MMO444** BSPP Tee  G23	**Cross**	**KMMOO** NPTF Cross  G23	
Plugs, Bleed Adapters	**P5ON** SAE-ORB Hex Head  G23	**HP5ON** SAE-ORB Hollow Hex  G24	**HP** NPTF Hex Head  G24	**SHP** NPTF Square Head  G24	**HHP** NPTF Hollow Hex Head  G24
HPC NPTF Pipe Cap  G25	**P87OMN** ISO 6149 Hex Head  G25	**VSTI M-OR** ISO 6149 Hollow Hex  G25	**VSTI M-ED** Metric-ED Hollow Hex  G25	**VSTI R-ED** BSPP-ED Hollow Hex  G26	**P47OMN** BSPP-ORB Hex Head  G26
HP3M BSPT Hex Head  G26					

Diagnostic, Orifice and Bleed Adapters (Shown in Section N)

Bleed Adapters	**P5ONBA** Bleed Screw / Bleed Adapter  N12	**HPBA** Bleed Screw / NPT  N12

O-Rings and Seals (Shown in Section O)

O-Rings and Seals	**SAE O-Ring**  O3	**ISO 6149 O-Ring**  O4	**Metric O-Ring**  O4	**Metric Retaining Ring**  O4	**BSPP O-Ring**  O5
BSPP Retaining Ring  O5					

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Visual Index

Introduction

This Section contains adapters with thread types including: NPT, NPTF, BSPT, BSPP, SAE UN/UNF, and Metric. All the threads in this section are made to industry specifications with conformance shown in Table G1.

Design and Construction

Shaped products (elbows, tees and crosses) are hot forged and machined, while straights are manufactured from cold drawn barstock. Where applicable, these products are made in conformance with the design criteria of the Society of Automotive Engineers Standards, SAE J514, J530.

Parker Fluid Connector products made from steel and brass, for the most part, have NPTF threads. Stainless steel products may have NPT or slightly modified NPT threads to minimize the chance of galling on assembly.

Standard Material Specifications: The standard materials used in the manufacture of Industrial Pipe and Adapter fittings are shown in Table G2.

Note: Upon request, pipe fittings, adapters and plugs could be furnished in materials other than those shown in the material specifications chart.

Finish - Zinc plating with yellow chromate (being changed to zinc chromium 6 free) is used on all standard steel products. Stainless steel fittings are passivated.

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Pipe Fittings and Port Adapters.

Thread	Standard
NPT	ANSI B1.20.1, FED-STD-H28/7
NPTF	SAE J476, ANSI B1.20.3, FED-STD-H28/8
BSPT	BS 21, ISO 7/1
BSPP	BS 2779, ISO 228/1
Metric	ISO 261, ANSI B1.13M, FED-STD-H28/21
UN/UNF*	ANSI B1.1, FED-STD-H28/2

*Class 2A or 2B

Table G1 — Thread Conformance Standards

Pipe Fittings, Adapters and Plugs	Steel		Stainless Steel		Brass	
	ASTM	Type	ASTM	Type	ASTM	Type
Forged Bodies	A576	1214/1215	A182	316	B124	CA377
Bar Stock Bodies	A108	12L14	A479	316	B16 B453	CA360 CA345
Cold Formed Bodies	A576	C1010 / C1008	—	—	—	—

Table G2 — Standard Material Specifications for Industrial Pipe Fittings and Adapters

How Port Connections Work

Tapered ("Pipe") Threads

There are three types of tapered threads commonly used in industrial applications.

- NPT/NPTF
- BSPT
- Metric Taper

All three thread styles noted above use the same basic metal-to-metal sealing design for achieving a seal. Although very similar, there are differences in the thread dimensions, pitch, and flank angle that do not allow interchangeability.

NPT / NPTF Threads

NPT threads, when assembled without a sealant, leave a spiral leak path at the crest-root junction as shown in Fig. G1. To seal pressurized fluid, NPT threads require a suitable sealant. NPTF threads (Dryseal), on the other hand, when assembled, do not leave the spiral leak path. This is because they have controlled truncation at the crest and root, ensuring metal-to-metal crest-root contact prior to, or just as the male-female thread flanks make contact as seen in Fig. G2. Upon further tightening, the thread crests are flattened out until the flanks also make metal-to-metal contact as seen in Fig. G3. Thus, theoretically at least, there is no passage left for the fluid to leak, provided all surfaces are flawless and dimensions exact. **In reality, this is not the case and a sealant/lubricant is necessary to achieve a leak free joint, even with NPTF threads.** The sealant/lubricant fills all imperfections in the surfaces affecting the seal and also provides lubrication to ease assembly and minimize galling.

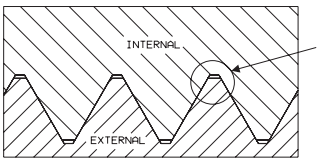


Fig. G1 — NPT: Wrench Tight, No Crest-Root Contact, Flank Contact Only

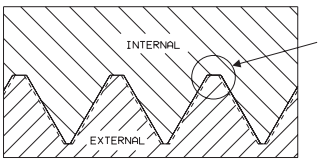


Fig. G2 — NPTF: Hand Tight, Crest to Root Contact

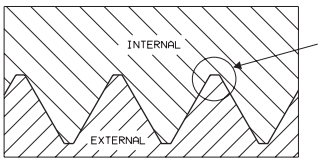


Fig. G3 — NPTF: Wrench Tight, Crest to Root and Flank Contact

Dimensions and pressures for reference only, subject to change.

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Visual Index

Application Guidelines for Tapered Threads

Straight Connectors with NPT/NTPF 3/4-14 and Smaller

Straight connectors with 3/4-14 NPT/NPTF and smaller male pipe threads have very high pressure holding capability and seal reliability when used in applications without “make and break” (such as maintenance) requirements.

They are also well suited for low cycle non-pulsating (static) applications with pressures in excess of 6,000 psi.

Straight Connectors with NPT/NPTF above 3/4 -14 and All Shaped Connectors with NPT/NPTF Threads

It is difficult to always tighten shapes with pipe threads to an optimum tightness level because of orientation requirements. Also, all connectors in this category with pipe threads have low reliability for leak free operation in dynamic applications. Therefore, they are not preferred where a leak free joint is required.

All NPTF Connectors

While a pipe thread connection can be disassembled and re-assembled in low-pressure systems, it is not intended to be a frequently assembled and disassembled connection. (When connectors are known to be disassembled and re-assembled repeatedly, pipe connections are not preferred for high-pressure systems.)

For the above applications, a port connection with an elastomeric seal, such as SAE straight thread port (SAE J1926/ISO11926), SAE four bolt split flange (SAE J518/ISO 6162), and ISO 6149 is recommended. For applications where elastomeric seals can’t be used, consult the manufacturer.

As noted, BSPT and metric taper are designed and perform similarly. Follow the NPT/NPTF guidelines for their application.

In general, tapered thread connections have the following limitations which should be considered when specifying port connections:

- Poor dynamic sealing characteristics
- Possible expansion, and even cracking, of the port
- Orientation is a concern in shaped connectors
- Larger threads are more prone to leakage because of more potential leak points
- System contamination due to thread sealant
- Prone to galling, especially in stainless steel
- Limited remakeability

Parallel Thread Adapters

Straight, or parallel, thread ports in various forms are becoming more popular in hydraulic systems because they are more reliable and easier to service.

Three types of threads are used for parallel thread ports:

- UN/UNF (SAE straight thread)
- BSPP (British Standard Pipe, Parallel)
- Metric parallel

Because parallel threads only serve one function (i.e. holding the fitting in place), some other means of sealing is always present, such as an elastomeric O-ring or a metal seal. There are many variations of sealing methods, and in some cases, they are interchangeable among the different thread forms and may appear to be similar.

UN / UNF Threads

SAE J1926 uses **UN/UNF** threads and is often referred to as SAE Straight Thread. The female port is often referred to as ORB or O-ring boss. This port style, shown in Fig. G4, is widely used in North America.



Fig. G4 — Typical O-Ring Boss Port

BSPP

In Europe, Japan and many other former Commonwealth nations, the British Standard Pipe thread form, BSP, is still used extensively to connect pipes and components in hydraulic systems. The BSP thread is offered in a straight (parallel) form known as BSPP and a tapered form known as BSPT. These threads feature a 55° flank angle. Fittings in this section with male BSPP threads use a primary sealing method of an O-ring and retaining ring, as shown in Fig. G5.



Fig. G5 — O-Ring with Retaining Ring

Additional sealing methods such as a cutting face or an EOlastic seal, as shown in Fig. G6, are also available on other fittings within the catalog. These BSPP fittings are all designed to thread into a female BSPP port (ISO 1179), however, the seal is created with one of the aforementioned sealing methods, not with the threads. It is also important to note that with these BSPP threaded connections, the seal occurs on the port surface, or spotface, not in an O-ring gland or chamfer as SAE and ISO-6149 straight thread do. A detail of the BSPP port is shown on page U29.



Fig. G6 — O-Ring in Fitting Groove

Dimensions and pressures for reference only, subject to change.

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Metric Parallel

In Europe, primarily in Germany, the traditional metric parallel thread form is used extensively to connect components in hydraulic systems. This metric thread is designed to thread into and seal in a female Metric parallel port conforming to ISO-9974-1 (DIN-3852, Part 1). Fittings in this section with male metric threads use a primary sealing method of an O-ring and retaining ring (similar to Fig. G5). Additional sealing methods such as a cutting face or an EOlastic seal (similar to Fig. G6) are also available on other fittings within the catalog. Sealing is accommodated with one of the aforementioned sealing methods, not with the threads. It is also important to note that with these male metric threads, the seal occurs on the top face (spotface) of the port, not in an O-ring gland or chamfer as in SAE and ISO-6149 straight threads. A detail of this metric port is shown on page U25.

To minimize further proliferation of additional port thread styles, the International Standards Organization Technical Committee 131 completed the development of a world standard leak-free port connection. It is recommended that this port, ISO 6149-1, be specified in all new hydraulic fluid power applications. Parker and other fluid connector manufacturers have expanded product offering to incorporate the ISO 6149 male studs as a standard on many tube fitting products. Parker offers the ISO 6149 male stud end, shown in Fig. G7, on several tube fitting products including: Seal-Lok, Triple-Lok, EO, EO-2, Conversion Adapters, Plugs, etc. This port, utilizes metric parallel threads for mechanical holding power and a sealing method similar to the proven SAE Straight Thread O-ring port. A detail of this metric port is shown on page U26.

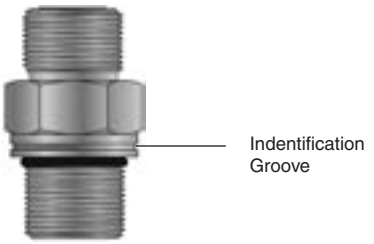


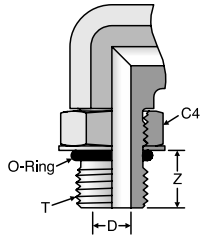
Fig. G7 — ISO 6149 Male

Feature	Advantage	Benefit
Tapered Thread Fittings		
Compact size	Suitable selection for plumbing in limited or tight space in a compact system.	Compact systems are more efficient and reduce the need for excessive routing of costly hose or tube
Widespread acceptability	Available worldwide for OEM and MRO applications	Eases efforts to find component parts and replacement fittings, reducing unnecessary downtime
High static pressure rating	Allows for use in high pressure applications	Increases versatility of fitting
Offered in three standard materials (Steel, Stainless Steel, and Brass)	Allows customer to match media and temperature applications without special fittings and seals.	Reduces component procurement costs and increases fitting availability
Adaptable to ORFS, Flareless Bite-type, Metric Bite-type, 37° flare, etc.	Versatility for end customer and for customer standardization efforts	Standardization reduces procurement costs
High temperature applications	Is not limited by temperature range of elastomeric seal	Increases versatility of fitting
Straight Thread Fittings		
Reliable sealing in dynamics applications	Ideal in systems with high pressure and cycling	Provides reliable, long-term sealing
Unlimited reusability/ remakeability	Extends the service life of the fitting	Reduces maintenance costs and component replacement costs
No thread sealant needed	Eliminates the potential for contaminating and damaging sensitive hydraulic components due to thread sealant	Reduces maintenance costs and component replacement costs
Infinite positioning of shaped adapters	Eliminates potential of damaging adapter and/or component by incorrectly assembling to accomplish correct orientation	Improves assembly time and reduces maintenance costs
Elastomeric seal	Tolerant of minor surface imperfections to provide leak-free connection	Reduces operational and maintenance costs

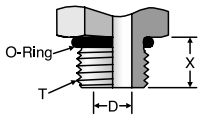
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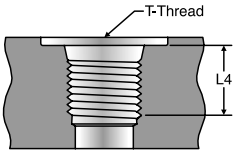
Port Ends for SAE J1926-1 (ISO 11926-1) Port



SAE J1926 Adjustable



SAE J1926 Nonadjustable



SAE J1926-1 Port[2)]

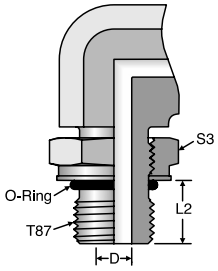
	Thread	Locknut Hex	Drill	Minimum Thread	Stud Length	
SIZE	**T** UN/UNF	**C4** (inch)	**D Max** (inch)	**L4 Min** (inch)	**X** (inch)	**Z Max** (inch)
LIGHT DUTY (TRIPLE-LOK, FERULOK, ADAPTERS)						
2	5/16-24	7/16	0.063	0.390	0.297	0.36
3	3/8-24	1/2	0.125	0.390	0.297	0.33
4	7/16-20	9/16	0.172	0.454	0.360	0.39
5	1/2-20	5/8	0.234	0.454	0.360	0.43
6	9/16-18	11/16	0.297	0.500	0.391	0.43
8	3/4-16	7/8	0.391	0.562	0.438	0.49
10	7/8-14	1	0.484	0.656	0.500	0.56
12	1 1/16-12	1 1/4	0.609	0.750	0.594	0.65
14	1 3/16-12	1 3/8	0.719	0.750	0.594	0.65
16	1 5/16-12	1 1/2	0.844	0.750	0.594	0.65
20	1 5/8-12	1 7/8	1.078	0.750	0.594	0.65
24	1 7/8-12	2 1/8	1.312	0.750	0.594	0.65
32	2 1/2-12	2 3/4	1.781	0.750	0.594	0.59
HEAVY DUTY (SEAL-LOK)						
2	5/16-24	1/2	0.063	0.390	0.374	0.38
3	3/8-24	9/16	0.125	0.390	0.374	0.39
4	7/16-20	5/8	0.172	0.454	0.433	0.43
5	1/2-20	11/16	0.236	0.454	0.433	0.44
6	9/16-18	3/4	0.264	0.500	0.472	0.47
8	3/4-16	15/16	0.378	0.562	0.551	0.54
10	7/8-14	1 1/16	0.484	0.656	0.630	0.63
12	1 1/16-12	1 3/8	0.609	0.750	0.728	0.73
14	1 3/16-12	1 1/2	0.709	0.750	0.728	0.73
16	1 5/16-12	1 5/8	0.811	0.750	0.728	0.73
20	1 5/8-12	1 7/8	1.024	0.750	0.728	0.73
24	1 7/8-12	2 1/8	1.260	0.750	0.728	0.73
32	2 1/2-12	2 3/4	1.575	0.750	0.728	0.73

1) See page O3 for SAE O-rings.
2) See page U26 for port details.

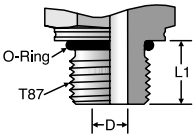
Dimensions and pressures for reference only, subject to change.

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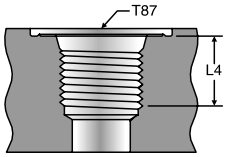
Port Ends for ISO 6149-1 Port



ISO 6149 Adjustable



ISO 6149 Nonadjustable



ISO 6149 Port[2)]

SIZE	Thread T87 Metric	Drill D Max (mm)	Minimum Thread L4 Min (mm)	Stud Length L1 (mm)	Stud Length L2 Max (mm)	Lockhead Hex S3 (mm)
LIGHT DUTY (TRIPLE-LOK, FERULOK, ADAPTERS)						
M8	M8X1	3	10.0	8.5	8.7	12
M10	M10X1	4.5	10.0	8.5	8.7	14
M12	M12X1.5	6	11.5	11.0	11.1	17
M14	M14X1.5	7.5	11.5	11.0	11.1	19
M16	M16X1.5	9	13.0	11.5	11.6	22
M18	M18X1.5	11	14.5	12.5	12.6	24
M20	M20X1.5	—	14.5			—
M22	M22X1.5	14	15.5	13.0	13.0	27
M27	M27X2	18	19.0	16.0	16.0	32
M30	M30X2	—	19.0			—
M33	M33X2	23	19.0	16.0	16.0	41
M38	M38X2	—	19.0			—
M42	M42X2	30	19.5	16.0	16.0	50
M48	M48X2	36	22.0	17.5	17.3	55
M60	M60X2	44	24.5	17.5	17.3	65
HEAVY DUTY (SEAL-LOK)						
M8	M8X1	2	10.0	9.5	9.7	12
M10	M10X1	3	10.0	9.5	9.7	14
M12	M12X1.5	4	11.5	11.0	11.1	17
M14	M14X1.5	6	11.5	11.0	11.1	19
M16	M16X1.5	7	13.0	12.5	12.6	22
M18	M18X1.5	9	14.5	14.0	14.1	24
M20	M20X1.5	11	14.5	14.0		—
M22	M22X1.5	12	15.5	15.0	15.0	27
M27	M27X2	15	19.0	18.5	18.0	32
M30	M30X2	18	19.0	18.5	18.5	36
M33	M33X2	20	19.0	18.5	18.5	41
M38	M38X2	26	19.0	18.5	19.0	46
M42	M42X2	26	19.5	19.0	19.0	50
M48	M48X2	32	22.0	21.5	21.5	55
M60	M60X2	40	24.5	24.0	24.0	65

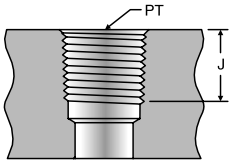
1) See page O4 for ISO 6149 O-rings.

2) See page U25 for port details.

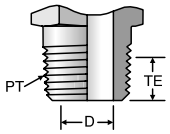
Dimensions and pressures for reference only, subject to change.

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NPTF and BSPT Port Ends



NPTF and BSPT Port



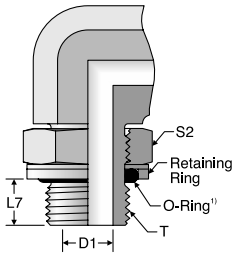
NPTF and BSPT Stud

	Thread	Drill	Minimum Thread	Thread Engagement
SIZE	**PT**	**D Max** (inch)	**J** (inch)	**TE** (inch)
NPTF				
2	1/8-27	0.188	0.31	0.24
4	1/4-18	0.281	0.44	0.34
6	3/8-18	0.406	0.47	0.34
8	1/2-14	0.531	0.59	0.46
12	3/4-14	0.719	0.63	0.46
16	1-11 1/2	0.938	0.75	0.59
20	1 1/4-11 1/2	1.250	0.78	0.59
24	1 1/2-11 1/2	1.500	0.81	0.59
32	2-11 1/2	1.938	0.81	0.59
BSPT				
2	1/8-28	0.188	0.31	0.24
4	1/4-19	0.281	0.44	0.34
6	3/8-19	0.406	0.47	0.34
8	1/2-14	0.531	0.59	0.46
12	3/4-14	0.719	0.63	0.46
16	1-11	0.938	0.75	0.59
20	1 1/4-11	1.250	0.78	0.59
24	1 1/2-11	1.438	0.81	0.59
32	2-11	1.938	0.81	0.59

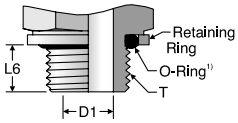
Dimensions and pressures for reference only, subject to change.

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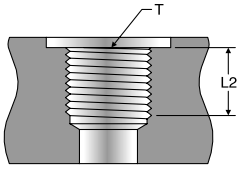
Port Ends for ISO 9974-1 and 1179-1 Ports



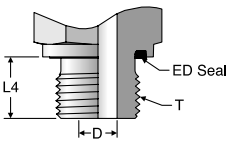
ISO 9974 and 1179 Adjustable O-Ring with Retaining Ring[2]



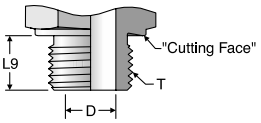
ISO 9974 and 1179 Non-Adjustable O-Ring with Retaining Ring[2]



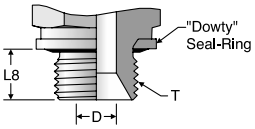
ISO 9974[3] and 1179[4] Port



ISO 9974 and 1179 ED Seal



ISO 9974 and 1179 Cutting Face Seal



Dowty Seal Stud End for ISO 9974-1 and ISO 1179-1 Ports

ISO 9974

	Thread	O-Ring, RR Stud	Light Duty (L Series)	Heavy Duty (S Series)	Port Min Depth	ED Stud	O-Ring, RR Non-Adj Stud	O-Ring, RR Adj-Stud	O-Ring, RR Adj-Stud, Locknut Hex	Dowty Seal Stud	Cutting Face Stud
		Drill Max									
SIZE	**T** Metric	**D1** (mm)	**D** (mm)		**L2** (mm)	**L4** (mm)	**L6** (mm)	**L7** (mm)	**S2** (mm)	**L8** (mm)	**L9** (mm)
M8	M8X1	2	—	—	8	—	8.0	8.6	11	—	8
M10	M10X1	4	4	—	8	8	8.0	8.7	14	—	8
M12	M12X1.5	5	6	4	12	12	8.7	10.0	17	—	12
M14	M14X1.5	7	7	5	12	12	8.7	10.0	19	—	12
M16	M16X1.5	9	9	7	12	12	9.0	11.3	21	—	12
M18	M18X1.5	11	11	8	12	12	11.0	12.2	22	—	12
M20	M20X1.5	11	-	10	14	14	12.7	—	—	—	14
M22	M22X1.5	13	14	12	14	14	12.7	13.7	27	—	14
M26	M26X1.5	13	18	—	16	16	14.0	—	—	—	16
M27	M27X2	16	—	16	16	16	15.0	16.8	32	—	16
M33	M33X2	22	23	20	18	18	15.0	16.8	38	—	18
M42	M42X2	28	30	25	20	20	15.5	17.3	48	—	20
M48	M48X2	36	36	32	22	22	19.5	19.3	55	—	22
M60	M60X2	44	—	—	24.5	—	20.5	22.3	65	—	—

ISO 1179

	Thread	O-Ring, RR Stud	Light Duty (L Series)	Heavy Duty (S Series)	Port Min Depth	ED Stud	O-Ring, RR Non-Adj Stud	O-Ring, RR Adj-Stud	O-Ring, RR Adj-Stud, Locknut Hex	Dowty Seal Stud	Cutting Face Stud
		Drill Max									
SIZE	**T** BSPP	**D1** (mm)	**D** (mm)		**L2** (mm)	**L4** (mm)	**L6** (mm)	**L7** (mm)	**S2** (mm)	**L8** (mm)	**L9** (mm)
2	1/8-28	4.4	4	—	8	8	6.3	7.2	14	8	8
4	1/4-19	7.5	7	5	12	12	9.4	9.4	19	11	12
6	3/8-19	9.9	9	8	12	12	9.4	9.3	22	12	12
8	1/2-14	12.3	14	12	14	14	12.6	13.1	30	14	14
12	3/4-14	15.5	18	16	16	16	12.6	13.1	36	16	16
16	1-11	21.5	23	20	18	18	16.0	14.7	46	16	18
20	1-1/4-11	27.5	30	25	20	20	16.0	14.7	50	19	20
24	1-1/2-11	33.0	36	32	22	22	16.0	14.7	55	22	22
32	2-11	—	—	—	26	—	16.0	14.7	75	25	—

1) See Section O for O-rings and seals.
2) O-ring with retaining ring stud ends are not shown in ISO 9974.
3) See page U30 for ISO 9974-1 port details.
4) See page U29 for ISO 1179-1 port details.

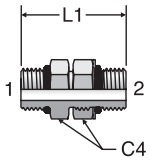
Dimensions and pressures for reference only, subject to change.

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F5OHAO Full Dimensions

Straight Thread Union
SAE-ORB / SAE-ORB

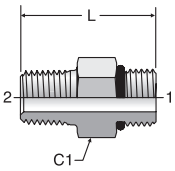
HPD Base # 0505



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 UN/UNF-2A	C4 HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 F5OHAO	7/16-20	7/16-20	9/16	1.27	6.0	6.0	
6 F5OHAO	9/16-18	9/16-18	11/16	1.41	6.0	6.0	
8 F5OHAO	3/4-16	3/4-16	7/8	1.56	6.0	6.0	
10 F5OHAO	7/8-14	7/8-14	1	1.81	5.0	5.0	
12 F5OHAO	1 1/16-12	1 1/16-12	1 1/4	2.13	5.0	5.0	
16 F5OHAO	1 5/16-12	1 5/16-12	1 1/2	2.13	4.0	4.0	
20 F5OHAO	1 5/8-12	1 5/8-12	1 7/8	2.13	4.0	4.0	
24 F5OHAO	1 7/8-12	1 7/8-12	2 1/8	2.13	3.0	3.0	
32 F5OHAO	2 1/2-12	2 1/2-12	2 3/4	2.13	2.0	2.0	

F5OF Full Dimensions

Male Pipe Adapter
SAE-ORB / NPTF



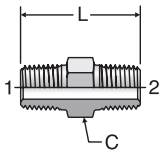
TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPTF	C1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4-1/8 F5OF	7/16-20	1/8-27	9/16	1.00	6.0	6.0	
4-1/4 F5OF	7/16-20	1/4-18	9/16	1.20		6.0	
5-1/4 F5OF	1/2-20	1/4-18	5/8	1.20		6.0	
6-1/4 F5OF	9/16-18	1/4-18	11/16	1.25	6.0	6.0	
6-3/8 F5OF	9/16-18	3/8-18	11/16	1.34	6.0	6.0	
8-1/4 F5OF	3/4-16	1/4-18	7/8	1.36			
8-3/8 F5OF	3/4-16	3/8-18	7/8	1.36	6.0	6.0	
8-1/2 F5OF	3/4-16	1/2-14	7/8	1.53	6.0	6.0	
10-1/2 F5OF	7/8-14	1/2-14	1	1.59	6.0	6.0	
12-1/2 F5OF	1 1/16-12	1/2-14	1 1/4	1.80			
12-3/4 F5OF	1 1/16-12	3/4-14	1 1/4	1.80	5.0	6.0	
16-3/4 F5OF	1 5/16-12	3/4-14	1 1/2	1.78		5.4	
16-1 F5OF	1 5/16-12	1-11 1/2	1 1/2	1.98	4.5	5.4	
20-1 1/4 F5OF	1 5/8-12	1 1/4-11 1/2	1 7/8	2.02	3.0	3.6	
24-1 1/2 F5OF	1 7/8-12	1 1/2-11 1/2	2 1/8	2.25			

Note: All "F5OF" fittings have a 30° chamfer for sealing with NPSM swivel type fittings.

FF Full Dimensions

Pipe Nipple
NPTF / NPTF

HPD Base # 0101

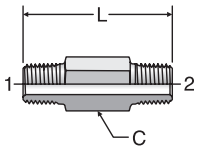


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 FF	1/8-27	1/8-27	7/16	1.06	6.0	7.2	3.9
1/4 x 1/8 FF	1/4-18	1/8-27	5/8	1.25	6.0	7.2	3.9
1/4 FF	1/4-18	1/4-18	5/8	1.45	6.0	7.2	3.9
3/8 x 1/8 FF	3/8-18	1/8-27	3/4	1.45	6.0	7.2	3.9
3/8 x 1/4 FF	3/8-18	1/4-18	3/4	1.45	6.0	7.2	3.9
3/8 FF	3/8-18	3/8-18	3/4	1.45	6.0	7.2	3.9
1/2 x 1/8 FF	1/2-14	1/8-27	7/8	1.52		7.2	
1/2 x 3/8 FF	1/2-14	3/8-18	7/8	1.70	6.0	7.2	3.9
1/2 x 1/4 FF	1/2-14	1/4-18	7/8	1.70	6.0	7.2	3.9
1/2 FF	1/2-14	1/2-14	7/8	1.89	6.0	7.2	3.9
3/4 x 1/4 FF	3/4-14	1/4-18	1 1/8	1.78	5.5	6.6	3.5
3/4 x 3/8 FF	3/4-14	3/8-18	1 1/8	1.78		6.6	
3/4 x 1/2 FF	3/4-14	1/2-14	1 1/8	1.96	5.5	6.6	3.5
3/4 FF	3/4-14	3/4-14	1 1/8	1.96	5.5	6.6	3.5
1 x 1/4 FF	1-11 1/2	1/4-18	1 3/8	1.96			
1 x 3/8 FF	1-11 1/2	3/8-18	1 3/8	1.96		5.4	
1 x 1/2 FF	1-11 1/2	1/2-14	1 3/8	2.09		5.4	
1 x 3/4 FF	1-11 1/2	3/4-14	1 3/8	2.09	4.5	5.4	
1 FF	1-11 1/2	1-11 1/2	1 3/8	2.34	4.5	5.4	3.0
1 1/4 x 1 FF	1 1/4-11 1/2	1-11 1/2	1 3/4	2.45	3.0	3.6	
1 1/4 FF	1 1/4-11 1/2	1 1/4-11 1/2	1 3/4	2.48	3.0	3.6	
1 1/2 x 1 FF	1 1/2-11 1/2	1-11 1/2	2	2.55	3.0	3.6	
1 1/2 FF	1 1/2-11 1/2	1 1/2-11 1/2	2	2.61	3.0	3.6	
2 x 1 1/2 FF	2-11 1/2	1 1/2-11 1/2	2 1/2	2.79		2.4	
2 FF	2-11 1/2	2-11 1/2	2 1/2	2.83	2.0	2.4	

Note: All steel "FF" fittings have a 30° chamfer for sealing with NPSM swivel type fittings.

FFF Full Dimensions

Long Pipe Nipple
NPTF / NPTF



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 x 1.5 FFF	1/8-27	1/8-27	7/16	1.5		7.2	3.9
1/8 x 2.0 FFF	1/8-27	1/8-27	7/16	2.0		7.2	3.9
1/8 x 2.5 FFF	1/8-27	1/8-27	7/16	2.5		7.2	3.9
1/8 x 3.0 FFF	1/8-27	1/8-27	7/16	3.0		7.2	3.9
1/4 x 1.5 FFF	1/4-18	1/4-18	5/8	1.5		7.2	3.9
1/4 x 2.0 FFF	1/4-18	1/4-18	5/8	2.0		7.2	3.9
1/4 x 2.5 FFF	1/4-18	1/4-18	5/8	2.5		7.2	3.9
1/4 x 3.0 FFF	1/4-18	1/4-18	5/8	3.0		7.2	3.9
1/4 x 4.0 FFF	1/4-18	1/4-18	5/8	4.0		7.2	3.9
3/8 x 2.0 FFF	3/8-18	3/8-18	3/4	2.0		7.2	
3/8 x 3.0 FFF	3/8-18	3/8-18	3/4	3.0		7.2	
3/8 x 3.5 FFF	3/8-18	3/8-18	3/4	3.5		7.2	
3/8 x 4.0 FFF	3/8-18	3/8-18	3/4	4.0		7.2	
1/2 x 2.0 FFF	1/2-14	1/2-14	7/8	2.0		7.2	
1/2 x 2.5 FFF	1/2-14	1/2-14	7/8	2.5		7.2	
1/2 x 3.0 FFF	1/2-14	1/2-14	7/8	3.0		7.2	3.9
1/2 x 4.0 FFF	1/2-14	1/2-14	7/8	4.0		7.2	
1/2 x 6.0 FFF	1/2-14	1/2-14	7/8	6.0		7.2	
3/4 x 3.0 FFF	3/4-14	3/4-14	1 1/8	3.0		6.6	
1 x 3.0 FFF	1-11 1/2	1-11 1/2	1 3/8	3.0		5.4	

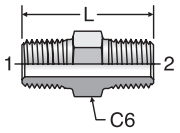
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

FF33M

Full Dimensions

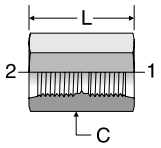
BSPT Pipe Nipple
BSPT / BSPT



TUBE FITTING PART #	END SIZE 1 BSPT	END SIZE 2 BSPT	C6 HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8FF33M	1/8-28	1/8-28	10	27	6.0		
1/4x1/8FF33M	1/4-19	1/8-28	14	32	6.0		
1/4FF33M	1/4-19	1/4-19	14	37	6.0		
3/8x1/4FF33M	3/8-19	1/4-19	17	37	6.0		
3/8FF33M	3/8-19	3/8-19	17	37	6.0		
1/2FF33M	1/2-14	1/2-14	22	48	6.0		
1/2x3/8FF33M	1/2-14	3/8-19	22	43	6.0		
3/4FF33M	3/4-14	3/4-14	27	50	5.5		
3/4x1/2FF33M	3/4-14	1/2-14	27	50			
1X3/4FF33M	1-11	3/4-14	36	55	4.5		
1FF33M	1-11	1-11	36	59	4.5		

G5HG5

Straight Thread Coupling
Female SAE / Female SAE

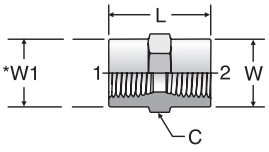


TUBE FITTING PART #	END SIZE 1 UN/UNF-2B	END SIZE 2 UN/UNF-2B	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 G5HG5	7/16-20	7/16-20	11/16	1.13	7.0		
6 G5HG5	9/16-18	9/16-18	13/16	1.26	6.0		
8 G5HG5	3/4-16	3/4-16	1	1.42	5.0		
10 G5HG5	7/8-14	7/8-14	1 3/16	1.60	4.5		
12 G5HG5	1 1/16-12	1 1/16-12	1 3/8	1.85	4.5		
16 G5HG5	1 5/16-12	1 5/16-12	1 5/8	1.85	3.5		

GG

Pipe Coupling
NPTF / NPTF

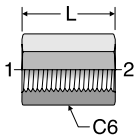
SAE 140138
HPD Base # 0202



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	C HEX (in.)	L (in.)	W (in.)	W1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 GG	1/8-27	1/8-27	5/8	0.75	0.63	0.63	6.0	6.0	3.9
1/4 x 1/8 GG	1/4-18	1/8-27	3/4	0.94	0.75	0.63	6.0	6.0	3.9
1/4 GG	1/4-18	1/4-18	3/4	1.13	0.75	0.75	6.0	6.0	3.9
3/8 x 1/8 GG	3/8-18	1/8-27	7/8	1.03	0.88	0.63	6.0	6.0	3.9
3/8 x 1/4 GG	3/8-18	1/4-18	7/8	1.13	0.88	0.75	6.0	6.0	3.9
3/8 GG	3/8-18	3/8-18	7/8	1.13	0.88	0.88	6.0	6.0	3.9
1/2 x 1/8 GG	1/2-14	1/8-27	1 1/8	1.06	1.13	0.63		6.0	
1/2 x 1/4 GG	1/2-14	1/4-18	1 1/8	1.38	1.13	0.75	5.0	6.0	3.2
1/2 x 3/8 GG	1/2-14	3/8-18	1 1/8	1.50	1.13	0.88	5.0	6.0	3.2
1/2 GG	1/2-14	1/2-14	1 1/8	1.50	1.13	1.13	5.0	6.0	3.2
3/4 x 1/4 GG	3/4-14	1/4-18	1 3/8	1.55	1.36	0.75		4.8	
3/4 x 1/2 GG	3/4-14	1/2-14	1 3/8	1.88	1.36	1.13	4.0	4.8	
3/4 GG	3/4-14	3/4-14	1 3/8	1.53	1.38	1.38	4.0	4.8	2.6
1 GG	1-11 1/2	1-11 1/2	1 5/8	1.89	1.63	1.63	3.0	3.6	1.9
1 x 1/2 GG	1-11 1/2	1/2-14	1 5/8	1.77	1.63	1.13		3.6	
1 x 3/4 GG	1-11 1/2	3/4-14	1 5/8	1.77	1.63	1.38		3.6	
1 1/4 GG	1 1/4-11 1/2	1 1/4-11 1/2	2	1.93	2.00	2.00	2.5	3.0	
1 1/4 x 1 GG	1 1/4-11 1/2	1-11 1/2	2	1.93	2.00	1.63		3.0	
1 1/2 GG	1 1/2-11 1/2	1 1/2-11 1/2	2 3/8	1.93	2.38	2.38	2.0	2.4	
1 1/2 x 1 1/4 GG	1 1/2-11 1/2	1 1/4-11 1/2	2 3/8	1.93	2.37	2.37		2.4	
2 GG	2-11 1/2	2-11 1/2	2 7/8	1.97	2.88	2.88		2.4	

GG44M

BSPP Female Union
BSPP / BSPP



TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	C6 HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8GG44M	1/8-28	1/8-28	14	19	6.0		
1/4X1/8GG44M	1/4-19	1/8-28	17	24	6.0		
1/4GG44M	1/4-19	1/4-19	17	28	6.0		
3/8GG44M	3/8-19	3/8-19	22	28	6.0		
3/8x1/4GG44M	3/8-19	1/4-19	22	28	6.0		
1/2x3/8GG44M	1/2-14	3/8-19	27	31	5.0		
1/2GG44M	1/2-14	1/2-14	27	32.5	5.0		
1GG44M	1-11	1-11	46	42	3.0		

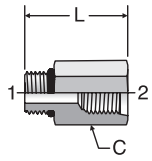
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

F5OG5 Full Dimensions

Straight Thread Reducer / Expander
SAE-ORB / SAE-ORB

SAE 090136
HPD Base # 0510

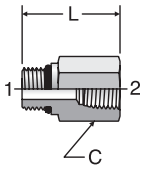


TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 UN/UNF-2B	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2-4 F5OG5	5/16-24	7/16-20	11/16	1.03	7.5		
4-4 F5OG5	7/16-20	7/16-20	11/16	1.08		7.5	
4-6 F5OG5	7/16-20	9/16-18	13/16	1.16	6.0	6.0	
6-4 F5OG5	9/16-18	7/16-20	11/16	1.03	6.0	6.0	
6-6 F5OG5	9/16-18	9/16-18	13/16	1.16	6.0		
6-8 F5OG5	9/16-18	3/4-16	1 1/16	1.38	6.0	6.0	
8-4 F5OG5	3/4-16	7/16-20	7/8	1.13	6.0		
8-6 F5OG5	3/4-16	9/16-18	7/8	1.13	6.0	6.0	
8-10 F5OG5	3/4-16	7/8-14	1 1/8	1.56	4.5	4.5	
10-4 F5OG5	7/8-14	7/16-20	1	0.81	5.0		
10-6 F5OG5	7/8-14	9/16-18	1	1.26	5.0	6.0	
10-8 F5OG5	7/8-14	3/4-16	1	1.31	5.0	6.0	
10-12 F5OG5	7/8-14	1 1/16-12	1 3/8	1.69	4.5	4.5	
12-4 F5OG5	1 1/16-12	7/16-20	1 1/4	1.00	5.0		
12-6 F5OG5	1 1/16-12	9/16-18	1 1/4	1.00	5.0		
12-8 F5OG5	1 1/16-12	3/4-16	1 1/4	1.45	5.0	6.0	
12-10 F5OG5	1 1/16-12	7/8-14	1 1/4	1.53	5.0	5.0	
12-16 F5OG5	1 1/16-12	1 5/16-12	1 5/8	1.88	3.5	3.5	
16-6 F5OG5	1 5/16-12	9/16-18	1 1/2	1.00	4.5		
16-8 F5OG5	1 5/16-12	3/4-16	1 1/2	1.00	4.5	4.5	
16-10 F5OG5	1 5/16-12	7/8-14	1 1/2	1.00	4.5		
16-12 F5OG5	1 5/16-12	1 1/16-12	1 1/2	1.75	4.5	4.5	
16-20 F5OG5	1 5/16-12	1 5/8-12	2 1/8	1.97	3.0		
20-6 F5OG5	1 5/8-12	9/16-18	1 7/8	1.00		4.0	
20-8 F5OG5	1 5/8-12	3/4-16	1 7/8	1.00	4.0		
20-10 F5OG5	1 5/8-12	7/8-14	1 7/8	1.00	4.0		
20-12 F5OG5	1 5/8-12	1 1/16-12	1 7/8	1.00	4.0	4.0	
20-16 F5OG5	1 5/8-12	1 5/16-12	1 7/8	1.72	4.0	4.0	
20-24 F5OG5	1 5/8-12	1 7/8-12	2 1/2	1.88	3.0	3.0	
24-6 F5OG5	1 7/8-12	9/16-18	2 1/8	1.00	3.0		
24-12 F5OG5	1 7/8-12	1 1/16-12	2 1/8	1.00	3.0	3.0	
24-16 F5OG5	1 7/8-12	1 5/16-12	2 1/8	1.00	3.0	3.0	
24-20 F5OG5	1 7/8-12	1 5/8-12	2 1/8	1.75	3.0	3.0	
32-20 F5OG5	2 1/2-12	1 5/8-12	2 3/4	1.00	2.0		
32-24 F5OG5	2 1/2-12	1 7/8-12	2 3/4	1.80	2.0	2.0	

F5OG Full Dimensions

Female Pipe Adapter
SAE-ORB / NPTF

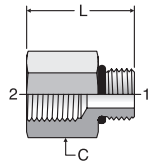
SAE 090156



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2-1/8 F5OG	5/16-24	1/8-27	9/16	0.91		6.0	
4-1/8 F5OG	7/16-20	1/8-27	9/16	1.00	6.0	6.0	
4-1/4 F5OG	7/16-20	1/4-18	3/4	1.16	6.0	6.0	
5-1/8 F5OG	1/2-20	1/8-27	5/8	1.06	6.0		
5-1/4 F5OG	1/2-20	1/4-18	3/4	1.19	6.0		
6-1/8 F5OG	9/16-18	1/8-27	11/16	1	6.0		
6-1/4 F5OG	9/16-18	1/4-18	3/4	1.16	6.0	6.0	
6-3/8 F5OG	9/16-18	3/8-18	7/8	1.28	6.0	6.0	
6-1/2 F5OG	9/16-18	1/2-14	1 1/8	1.53	5.0	6.0	
8-1/8 F5OG	3/4-16	1/8-27	7/8	0.80		6.0	
8-1/4 F5OG	3/4-16	1/4-18	7/8	1.13	6.0	6.0	
8-3/8 F5OG	3/4-16	3/8-18	7/8	1.28	6.0	6.0	
8-1/2 F5OG	3/4-16	1/2-14	1 1/8	1.50	5.0	6.0	
10-1/4 F5OG	7/8-14	1/4-18	1	0.81	5.0	6.0	
10-3/8 F5OG	7/8-14	3/8-18	1	1.31	5.0	6.0	
10-1/2 F5OG	7/8-14	1/2-14	1 1/8	1.53	5.0	6.0	
10-3/4 F5OG	7/8-14	3/4-14	1 3/8	1.63	4.0		
12-1/4 F5OG	1 1/16-12	1/4-18	1 1/4	1.00		6.0	
12-3/8 F5OG	1 1/16-12	3/8-18	1 1/4	1.00	5.0	6.0	
12-1/2 F5OG	1 1/16-12	1/2-14	1 1/4	1.41	5.0	6.0	
12-3/4 F5OG	1 1/16-12	3/4-14	1 3/8	1.72	4.0	4.8	
14-1/2 F5OG	1 3/16-12	1/2-14	1 3/8	1.06	5.0		
14-3/4 F5OG	1 3/16-12	3/4-14	1 3/8	1.69	4.0		
16-1/2 F5OG	1 5/16-12	1/2-14	1 1/2	1.00	5.0	6.0	
16-3/4 F5OG	1 5/16-12	3/4-14	1 1/2	1.50	4.0	4.8	
16-1 F5OG	1 5/16-12	1-11 1/2	1 5/8	1.88	3.0	3.6	
20-1 F5OG	1 5/8-12	1-11 1/2	1 7/8	1.00	3.0	3.6	
20-1 1/2 F5OG	1 5/8-12	1 1/2-14	2 1/4	2.16	2.5	3.0	
20-1 1/4 F5OG	1 5/8-12	1 1/4-11 1/2	2	1.97		3.0	
24-1 F5OG	1 7/8-12	1-11 1/2	2 1/8	1.00	3.0	3.6	
24-1 1/4 F5OG	1 7/8-12	1 1/4-11 1/2	2 1/8	1.94	2.5		
24-1 1/2 F5OG	1 7/8-12	1 1/2-11 1/2	2 1/4	2.00	2.0	2.4	
32-2 F5OG	2 1/2-12	2-11 1/2	2 7/8	2.06	2.0	2.4	

F5OHG8 Full Dimensions

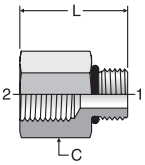
Conversion Adapter
SAE-ORB / Metric



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 METRIC STR	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4M10F5OHG8	7/16-20	M10X1	5/8	0.95	6.0		
4M12F5OHG8	7/16-20	M12X1.5	3/4	1.14	6.0		
6M14F5OHG8	9/16-18	M14X1.5	13/16	1.17	6.0		
6M16F5OHG8	9/16-18	M16X1.5	15/16	1.17	6.0		
8M16F5OHG8	3/4-16	M16X1.5	15/16	1.30	6.0		
8M18F5OHG8	3/4-16	M18X1.5	1	1.30	6.0		
10M22F5OHG8	7/8-14	M22X1.5	1 3/16	1.46	5.0		
12M27F5OHG8	1 1/16-12	M27X2	1 1/2	1.72	5.0		
16M33F5OHG8	1 5/16-12	M33X2	1 3/4	1.81	5.0		

F5OHG4 Full Dimensions

Conversion Adapter
SAE-ORB / BSPP



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 BSPP	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4-1/8F5OHG4	7/16-20	1/8-28	5/8	0.96	6.0		
4-1/4F5OHG4	7/16-20	1/4-19	3/4	1.16	6.0		
6-1/4F5OHG4	9/16-18	1/4-19	3/4	1.19	6.0		
6-3/8F5OHG4	9/16-18	3/8-19	7/8	1.19	6.0		
8-1/4F5OHG4	3/4-16	1/4-19	7/8	1.32	6.0		
8-3/8F5OHG4	3/4-16	3/8-19	15/16	1.32	6.0		
10-1/2F5OHG4	7/8-14	1/2-14	1 1/8	1.52	5.0		
12-3/4F5OHG4	1 1/16-12	3/4-14	1 7/16	1.74	4.0		
16-1F5OHG4	1 5/16-12	1-11	1 7/8	1.87	3.0		

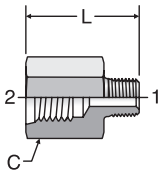
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

FHG5 Full Dimensions

Female Straight Thread Adapter
NPTF / SAE-ORB

HPD Base # 0110

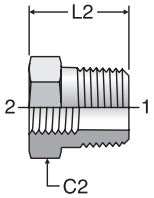


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 UN/UNF-2A	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8-4 FHG5	1/8-27	7/16-20	11/16	1.06			
1/8-5 FHG5	1/8-27	1/2-20	3/4	1.09	6.0		
1/4-6 FHG5	1/4-18	9/16-18	3/4	1.36	6.0		
3/8-6 FHG5	3/8-18	9/16-18	3/4	1.42	6.0		
3/8-8 FHG5	3/8-18	3/4-16	1	1.50	5.0		
1/2-6 FHG5	1/2-14	9/16-18	7/8	1.58	6.0		
1/2-8 FHG5	1/2-14	3/4-16	1	1.66	5.0		
1/2-10 FHG5	1/2-14	7/8-14	1 1/4	1.75	4.5		
3/4-8 FHG5	3/4-14	3/4-16	1 1/8	1.13			
3/4-12 FHG5	3/4-14	1 1/16-12	1 3/8	1.97	4.5		
1-16 FHG5	1-11 1/2	1 5/16-12	1 5/8	2.13	3.5		

PTR Full Dimensions

Pipe Thread Reducer
NPTF / NPTF

SAE 140140
HPD Base # 0102

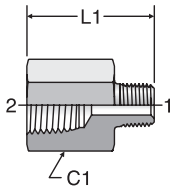


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	C2 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/4 x 1/8 PTR	1/4-18	1/8-27	5/8	0.86	6.0	6.0	3.9
3/8 x 1/8 PTR	3/8-18	1/8-27	3/4	0.86	6.0	6.0	3.9
3/8 x 1/4 PTR	3/8-18	1/4-18	3/4	0.86	6.0	6.0	3.9
1/2 x 1/8 PTR	1/2-14	1/8-27	7/8	1.11	6.0	6.0	3.2
1/2 x 1/4 PTR	1/2-14	1/4-18	7/8	1.11	6.0	6.0	3.2
1/2 x 3/8 PTR	1/2-14	3/8-18	7/8	1.11	6.0	6.0	3.2
3/4 x 1/8 PTR	3/4-14	1/8-27	1 1/8	1.17		6.0	
3/4 x 1/4 PTR	3/4-14	1/4-18	1 1/8	1.17	5.5	6.0	3.7
3/4 x 3/8 PTR	3/4-14	3/8-18	1 1/8	1.17	5.5	6.0	3.7
3/4 x 1/2 PTR	3/4-14	1/2-14	1 1/8	1.17	5.0	6.0	3.3
1 x 1/8 PTR	1-11 1/2	1/8-27	1 3/8	1.36		5.4	
1 x 1/4 PTR	1-11 1/2	1/4-18	1 3/8	1.36	4.5	5.4	
1 x 3/8 PTR	1-11 1/2	3/8-18	1 3/8	1.36	4.5	5.4	3.0
1 x 1/2 PTR	1-11 1/2	1/2-14	1 3/8	1.36	4.5	5.4	3.0
1 x 3/4 PTR	1-11 1/2	3/4-14	1 3/8	1.36	4.0	4.8	2.7
1 1/4 x 1/4 PTR	1 1/4-11 1/2	1/4-18	1 3/4	1.47		3.6	
1 1/4 x 3/8 PTR	1 1/4-11 1/2	3/8-18	1 3/4	1.47		3.6	
1 1/4 x 1/2 PTR	1 1/4-11 1/2	1/2-14	1 3/4	1.47	3.0	3.6	
1 1/4 x 3/4 PTR	1 1/4-11 1/2	3/4-14	1 3/4	1.47	3.0	3.6	
1 1/4 x 1 PTR	1 1/4-11 1/2	1-11 1/2	1 3/4	1.47	3.0	3.6	
1 1/2 x 1/4 PTR	1 1/2-11 1/2	1/4-18	2	1.52		3.6	
1 1/2 x 3/8 PTR	1 1/2-11 1/2	3/8-18	2	1.58		3.6	
1 1/2 x 1/2 PTR	1 1/2-11 1/2	1/2-14	2	1.58		3.6	
1 1/2 x 3/4 PTR	1 1/2-11 1/2	3/4-14	2	1.58	3.0	3.6	
1 1/2 x 1 PTR	1 1/2-11 1/2	1-11 1/2	2	1.58	3.0	3.6	
1 1/2 x 1 1/4 PTR	1 1/2-11 1/2	1 1/4-11 1/2	2	1.58	2.5	3.0	
2 x 1/2 PTR	2-11 1/2	1/2-14	2 1/2	1.75		2.4	
2 x 3/4	2-11 1/2	3/4-14	2 1/2	1.75		2.4	
2 x 1 PTR	2-11 1/2	1-11 1/2	2 1/2	1.75	2.0	2.4	
2 x 1 1/4 PTR	2-11 1/2	1 1/4-11 1/2	2 1/2	1.75	2.0	2.4	
2 x 1 1/2 PTR	2-11 1/2	1 1/2-11 1/2	2 1/2	1.75	2.0	2.4	

FG Full Dimensions

Expander / Adapter
NPTF / NPTF

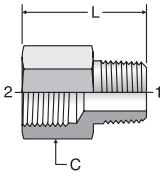
SAE 140139
HPD Base # 0201



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	C1 HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 x 1/16 FG	1/16-27	1/8-27	5/8	1.03	6.0	6.0	
1/8 FG	1/8-27	1/8-27	5/8	1.03	6.0	6.0	
1/4 x 1/8 FG	1/8-27	1/4-18	3/4	1.21	6.0	6.0	3.9
1/4 FG	1/4-18	1/4-18	3/4	1.39	6.0	6.0	3.9
3/8 x 1/8 FG	1/8-27	3/8-18	7/8	1.25	6.0	6.0	
3/8 x 1/4 FG	1/4-18	3/8-18	7/8	1.44	6.0	6.0	3.9
3/8 FG	3/8-18	3/8-18	7/8	1.44	6.0	6.0	3.9
1/2 x 1/8 FG	1/8-27	1/2-14	1 1/8	1.50	5.0	6.0	3.2
1/2 x 1/4 FG	1/4-18	1/2-14	1 1/8	1.69	5.0	6.0	3.2
1/2 x 3/8 FG	3/8-18	1/2-14	1 1/8	1.69	5.0	6.0	3.2
1/2 FG	1/2-14	1/2-14	1 1/8	1.87	5.0	6.0	3.2
3/4 FG	3/4-14	3/4-14	1 3/8	1.93	4.0	4.8	
3/4 x 1/4 FG	1/4-18	3/4-14	1 3/8	1.75	4.0	4.8	2.6
3/4 x 3/8 FG	3/8-18	3/4-14	1 3/8	1.75		4.8	
3/4 x 1/2 FG	1/2-14	3/4-14	1 3/8	1.93	4.0	4.8	2.6
1 FG	1-11 1/2	1-11 1/2	1 5/8	2.37		3.6	
1 x 1/4 FG	1/4-18	1-11 1/2	1 5/8	2.01		3.6	
1 x 1/2 FG	1/2-14	1-11 1/2	1 5/8	2.19	3.0	3.6	
1 x 3/4 FG	3/4-14	1-11 1/2	1 5/8	2.19	3.0	3.6	
1 1/4 FG	1 1/4-11 1/2	1 1/4-11 1/2	2	2.50	2.5		
1 1/4 x 1 FG	1-11 1/2	1 1/4-11 1/2	2	2.47		3.0	
1 1/2 x 1 FG	1-11 1/2	1 1/2-11 1/2	2 3/8	2.47		2.4	
1 1/2 x 1 1/4 FG	1 1/4-11 1/2	1 1/2-11 1/2	2 3/8	2.50	2.0		
2 FG	2-11 1/2	2-11 1/2	2 7/8	2.66			

FHG8 Full Dimensions

Conversion Adapter
NPTF / Metric



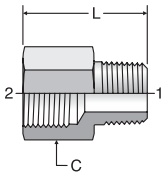
TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 METRIC STR	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8M10FHG8	1/8-27	M10X1	5/8	0.95	6.0		
1/8M12FHG8	1/8-27	M12X1.5	3/4	1.16	6.0		
1/4M14FHG8	1/4-18	M14X1.5	13/16	1.35	6.0		
1/4M16FHG8	1/4-18	M16X1.5	15/16	1.37	6.0		
3/8M18FHG8	3/8-18	M18X1.5	1	1.36	6.0		
1/2M22FHG8	1/2-14	M22X1.5	1 3/16	1.65	6.0		
3/4M27FHG8	3/4-14	M27X2	1 1/2	1.77	5.5		

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

FHG4 Full Dimensions

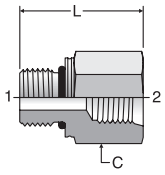
Conversion Adapter
NPTF / BSPP



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 BSPP	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/4X1/4FHG4	1/4-18	1/4-19	3/4	1.33	6.0		
1/4X3/8FHG4	1/4-18	3/8-19	13/16	1.40	6.0		
3/8X1/4FHG4	3/8-18	1/4-19	3/4	1.31	6.0		
3/8X3/8FHG4	3/8-18	3/8-19	1	1.34	6.0		
1/2X3/8FHG4	1/2-14	3/8-19	15/16	1.50	6.0		
1/2X1/2FHG4	1/2-14	1/2-14	1 1/8	1.66	5.0		
3/4X3/4FHG4	3/4-14	3/4-14	1 7/16	1.75	4.0		

F87OHG87 Full Dimensions

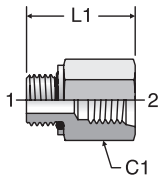
Reducer / Expander
ISO 6149 / ISO 6149



TUBE FITTING PART #	END SIZE 1 METRIC STR	END SIZE 2 METRIC STR	C HEX	L	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
M8M10F87OHG87M	M8X1	M10X1	17	27.0	10.0		
M10M8F87OHG87M	M10X1	M8X1	14	27.5	10.0		
M10M12F87OHG87M	M10X1	M12X1.5	19	30.0	8.0		
M12M10F87OHG87M	M12X1.5	M10X1	17	29.5	10.0		
M12M14F87OHG87M	M12X1.5	M14X1.5	22	32.0	7.0		
M12M16F87OHG87M	M12X1.5	M16X1.5	24	33.5	6.0		
M14M12F87OHG87M	M14X1.5	M12X1.5	19	32.0	8.0		
M14M16F87OHG87M	M14X1.5	M16X1.5	24	33.5	6.0		
M16M14F87OHG87M	M16X1.5	M14X1.5	22	34.0	7.0		
M16M18F87OHG87M	M16X1.5	M18X1.5	27	37.0	6.0		
M18M16F87OHG87M	M18X1.5	M16X1.5	24	37.0	6.0		
M18M20F87OHG87M	M18X1.5	M20X1.5	30	39.5	6.0		
M20M18F87OHG87M	M20X1.5	M18X1.5	27	38.5	6.0		
M20M22F87OHG87M	M20X1.5	M22X1.5	30	39.5	5.0		
M22M20F87OHG87M	M22X1.5	M20X1.5	27	41.5	5.0		
M27M22F87OHG87M	M27X2.0	M22X1.5	32	46.0	5.0		
M27M33F87OHG87M	M27X2.0	M33X2.0	46	52.0	5.0		
M33M27F87OHG87M	M33X2.0	M27X2.0	41	48	5.0		
M33M42F87OHG87M	M33X2.0	M42X2.0	55	54.0	4.0		
M42M27F87OHG87M	M42X2.0	M27X2.0	50	54.0			
M42M33F87OHG87M	M42X2.0	M33X2.0	50	54.0	3.0		
M42M48F87OHG87M	M42X2.0	M48X2.0	65	57.0			

F8OHG5 Full Dimensions

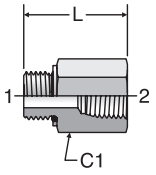
Conversion Adapter
Metric-ORR / SAE-ORB
(for ISO 9974 / DIN 3852-1 Port)



TUBE FITTING PART #	END SIZE 1 METRIC STR	END SIZE 2 UN/UNF-2B	C1 HEX (in.)	L1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
M10-4F8OHG5	M10x1	7/16-20	11/16	1.06	5.0		
M10-6F8OHG5	M10X1	9/16-18	7/8	1.15	5.0		
M14-6F8OHG5	M14x1.5	9/16-18	13/16	1.19	5.0		
M16-8F8OHG5	M16x1.5	3/4-16	1	1.31	5.0		
M18-8F8OHG5	M18X1.5	3/4-16	1	1.38	3.5		
M22-10F8OHG5	M22x1.5	7/8-14	1 1/8	1.5	3.5		
M27-12F8OHG5	M27x2	1 1/16-12	1 1/4	1.88	3.5		
M33-16F8OHG5	M33x2	1 5/16-12	1 5/8	1.91			
M42-20F8OHG5	M42x2	1 5/8-12	2	1.91			

F8OHG Full Dimensions

Conversion Adapter
Metric-ORR / NPTF
(for ISO 9974 / DIN 3852-1 Port)



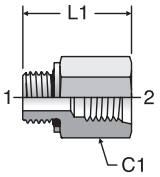
TUBE FITTING PART #	END SIZE 1 METRIC STR	END SIZE 2 NPTF	C1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
M10-1/8F8OHG	M10X1.0	1/8-27	9/16	0.99	5.0		
M12-1/4F8OHG	M12X1.5	1/4-18	3/4	1.24	5.0		
M14-1/4F8OHG	M14X1.5	1/4-18	3/4	1.24	5.0		
M16-3/8F8OHG	M16X1.5	3/8-18	7/8	1.36	5.0		
M16-1/2F8OHG	M16X1.5	1/2-14	1 1/8	1.58	5.0		
M18-3/8F8OHG	M18X1.5	3/8-18	15/16	1.42	5.0		
M18-1/2F8OHG	M18X1.5	1/2-14	1 1/8	1.67	5.0		
M22-1/2F8OHG	M22X1.5	1/2-14	1 1/8	1.68	3.5		
M27-3/4F8OHG	M27X2.0	3/4-14	1 3/8	1.87	3.5		
M33-1F8OHG	M33X2.0	1-11 1/2	1 5/8	2.11	3.0		

Dimensions and pressures for reference only, subject to change.

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F4OHG5 Full Dimensions

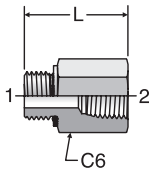
Conversion Adapter
BSPP-ORR / SAE-ORB
(for ISO 1179-1 / DIN 3852-2 Port)



TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 UN/UNF-2B	C1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8-4F4OHG5	1/8-28	7/16-20	11/16	1	5.0		
1/4-4F4OHG5	1/4-19	7/16-20	3/4	1.11	5.0		
1/4-6F4OHG5	1/4-19	9/16-18	13/16	1.25	5.0		
3/8-4F4OHG5	3/8-19	7/16-20	7/8	1.19	5.0		
3/8-5F4OHG5	3/8-19	1/2-20	7/8	1.19	5.0		
3/8-6F4OHG5	3/8-19	9/16-18	7/8	1.25	5.0	5.0	
3/8-8F4OHG5	3/8-19	3/4-16	1	1.33	5.0		
1/2-10F4OHG5	1/2-14	7/8-14	1 1/8	1.6	3.5		
3/4-12F4OHG5	3/4-14	1 1/16-12	1 3/8	1.74	3.5	3.5	
1-16F4OHG5	1-11	1 5/16-12	1 3/4	1.92	3.5		
1 1/4-16F4OHG5	1 1/4-11	1 5/16-12	2	1.95	2.0		
1 1/4-20F4OHG5	1 1/4-11	1 5/8-12	2	1.95	2.0		

F4OHG Full Dimensions

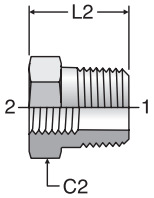
Conversion Adapter
BSPP-ORR / NPTF
(for ISO 1179-1 / DIN 3852-2 Port)



TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 NPTF	C6 HEX (in.)	L (in)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8x1/8F4OHG	1/8-28	1/8-27	5/8	0.97	5		
1/4x1/4F4OHG	1/4-19	1/4-18	3/4	1.28	5		
3/8x3/8F4OHG	3/8-19	3/8-18	7/8	1.33	5		
1/2x1/2F4OHG	1/2-14	1/2-14	1 1/8	1.73	3.5		
3/4x3/4F4OHG	3/4-14	3/4-14	1 3/8	1.77	3.5		
1x1F4OHG	1-11	1-11 1/2	1 5/8	2.17	3		

PTR34 Full Dimensions

BSPT Reducing Adapter
BSPT / BSPP



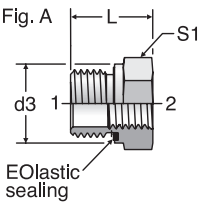
TUBE FITTING PART #	END SIZE 1 BSPT	END SIZE 2 BSPP	C HEX (in.)	L2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/4X1/8PTR34M	1/4-19	1/8-28	17	28	6.0		
3/8X1/4PTR34M	3/8-19	1/4-19	19	33	6.0		
1/2X1/4PTR34M	1/2-14	1/4-19	22	39	5.0		
1/2X3/8PTR34M	1/2-14	3/8-19	22	39	5.0		

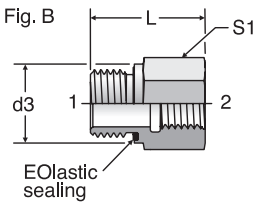
Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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RI-ED Full Dimensions

BSPP Reducing Adatper / Expander
BSPP / BSPP-ED
(for ISO 1179-1 / DIN 3852-2 Port)





TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	d3 (mm)	L (mm)	S1 (mm)	Fig.	STANDARD Dynamic Pressure (x 1,000 PSI) CF	71	MS
RI1/8EDX1/4	G1/8A	G1/4	14	31	19	B	5.8	5.8	
RI1/8EDX3/8	G1/8A	G3/8	14	32	24	B	5.8	5.8	
RI1/4EDX1/8	G1/4A	G1/8	19	29	19	B	5.8	5.8	
RI1/4EDX3/8	G1/4A	G3/8	19	36	24	B	5.8	5.8	
RI1/4EDX1/2	G1/4A	G1/2	19	40	30	B	5.8	5.8	
RI1/4EDX3/4	G1/4A	G3/4	19	43	36	B	5.8		
RI3/8EDX1/8	G3/8A	G1/8	22	22.5	22	A	5.8		
RI3/8EDX1/4	G3/8A	G1/4	22	36	22	B	5.8	5.8	
RI3/8EDX1/2	G3/8A	G1/2	22	41	30	B	5.8		
RI3/8EDX3/4	G3/8A	G3/4	22	44	36	B	4.5		
RI1/2EDX1/8	G1/2A	G1/8	27	24	27	A	5.8	5.8	
RI1/2EDX1/4	G1/2A	G1/4	27	24	27	A	5.8	5.8	
RI1/2EDX3/8	G1/2A	G3/8	27	37	27	B	5.8		
RI1/2EDX3/4	G1/2A	G3/4	27	46	36	B	4.5		
RI1/2EDX1	G1/2A	G1	27	49	41	B	4.5		
RI1/2EDX11/4	G1/2A	G1 1/4	27	53	55	B	4.5		
RI3/4EDX1/4	G3/4A	G1/4	32	26	32	A	4.5	4.5	
RI3/4EDX3/8	G3/4A	G3/8	32	26	32	A	4.5	4.5	
RI3/4EDX1/2	G3/4A	G1/2	32	43	32	B	4.5	4.5	
RI3/4EDX1	G3/4A	G1	32	51	41	B	4.5		
RI3/4EDX11/4	G3/4A	G1 1/4	32	55	55	B	4.5		
RI3/4EDX11/2	G3/4A	G1 1/2	32	57	60	B			
RI1EDX1/4	G1A	G1/4	40	29	41	A	4.5	4.5	
RI1EDX3/8	G1A	G3/8	40	29	41	A	4.5	4.5	
RI1EDX1/2	G1A	G1/2	40	29	41	A	4.5	4.5	
RI1EDX3/4	G1A	G3/4	40	49	41	B	4.5	4.5	
RI1EDX11/4	G1A	G1 1/4	40	57	55	B	4.5	4.5	
RI1EDX11/2	G1A	G1 1/2	40	59	60	B	3.6	3.6	
RI11/4EDX1/2	G1 1/4A	G1/2	50	32	50	A	4.5		
RI11/4EDX3/4	G1 1/4A	G3/4	50	32	50	A	4.5	4.5	
RI11/4EDX1	G1 1/4A	G1	50	53	50	B	4.5	4.5	
RI11/4EDX11/2	G1 1/4A	G1 1/2	50	60	60	B	3.6		
RI11/2EDX1/2	G1 1/2A	G1/2	55	36	55	A	3.6		
RI11/2EDX3/4	G1 1/2A	G3/4	55	36	55	A	3.6	3.6	
RI11/2EDX1	G1 1/2A	G1	55	36	55	A	3.6	3.6	
RI11/2EDX11/4	G1 1/2A	G1 1/4	55	58	55	B	3.6		
RI2EDX11/2	G2 A	G1 1/2	72	65	70	B	2.3		

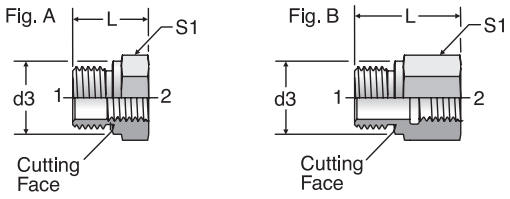
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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Visual Index
Specs
Assembly / Installation
3-D CAD Model
Reference Section

RI Full Dimensions

BSPP Reducing Adatper / Expander
BSPP / BSPP-CF
(for ISO 1179-1 / DIN 3852-2 Port)



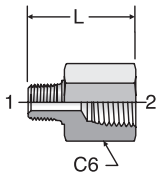
TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	d3 (mm)	L (mm)	S1 (mm)	Fig.	STANDARD Dynamic Pressure (x 1,000 PSI) CFX	71X	MSX
RI1/8X1/4	G 1/8A	G 1/4	14	31	19	B	5.8		
RI1/8X3/8	G 1/8A	G 3/8	14	32	24	B	5.8		
RI1/4X1/8	G 1/4A	G 1/8	18	28	19	B	5.8		
RI1/4X3/8	G 1/4A	G 3/8	18	36	24	B	5.8	5.8	
RI1/4X1/2	G 1/4A	G 1/2	18	40	30	B	5.8	5.8	
RI1/4X3/4	G 1/4A	G 3/4	18	43	36	B	4.5		
RI3/8X1/8	G 3/8A	G 1/8	22	22.5	22	A	5.8		
RI3/8X1/4	G 3/8A	G 1/4	22	36	22	B	5.8	5.8	
RI3/8X1/2	G 3/8A	G 1/2	22	41	30	B	5.8		
RI3/8X3/4	G 3/8A	G 3/4	22	44	36	B			
RI1/2X1/8	G 1/2A	G 1/8	26	24	27	A	5.8		
RI1/2X1/4	G 1/2A	G 1/4	26	24	27	A	4.5	4.5	
RI1/2X3/8	G 1/2A	G 3/8	26	36	27	B	4.5	4.5	3.0
RI1/2X3/4	G 1/2A	G 3/4	26	46	36	B	4.5	4.5	3.0
RI1/2X1	G 1/2A	G 1	26	49	41	B	2.3		
RI1/2X11/4	G 1/2A	G 1 1/4	26	53	55	B	4.5		
RI3/4X1/4	G 3/4A	G 1/4	32	26	32	A	4.5		
RI3/4X3/8	G 3/4A	G 3/8	32	26	32	A	4.5	4.5	
RI3/4X1/2	G 3/4A	G 1/2	32	41	32	B	4.5	4.5	
RI3/4X1	G 3/4A	G 1	32	51	41	B	2.3		1.5
RI3/4X11/4	G 3/4A	G 1 1/4	32	55	55	B	2.3		
RI3/4X11/2	G 3/4A	G 1 1/2	32	57	60	B	4.5		
RI1X1/4	G 1A	G 1/4	39	29	41	A	4.5	4.5	
RI1X3/8	G 1A	G 3/8	39	29	41	A	4.5		
RI1X1/2	G 1A	G 1/2	39	29	41	A	4.5		
RI1X3/4	G 1A	G 3/4	39	47	41	B	2.3	2.3	
RI1X11/4	G 1A	G 1 1/4	39	57	55	B	2.3	2.3	
RI1X11/2	G 1A	G 1 1/2	39	59	60	B	2.3		
RI11/4X1/2	G 1 1/4A	G 1/2	49	32	50	A	2.3		
RI11/4X3/4	G 1 1/4A	G 3/4	49	32	50	A	2.3		
RI11/4X1	G 1 1/4A	G 1	49	52	50	B	2.3	2.3	
RI11/4X11/2	G 1 1/4A	G 1 1/2	49	60	60	B	2.3		
RI11/2X1/2	G 1 1/2A	G 1/2	55	36	55	A	2.3		
RI11/2X3/4	G 1 1/2A	G 3/4	55	36	55	A	2.3		
RI11/2X1	G 1 1/2A	G 1	55	36	55	A	2.3		
RI11/2X11/4	G 1 1/2A	G 1 1/4	55	58	55	B	2.3		
RI2X11/2	G 2A	G 1 1/2	68	62	70	B			

Dimensions and pressures for reference only, subject to change.

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F3HG Full Dimensions

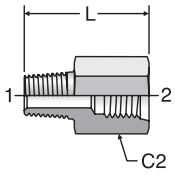
Conversion Adapter
NPTF / BSPT



TUBE FITTING PART #	END SIZE 1 BSPT	END SIZE 2 NPTF	C6 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 x 1/8F3HG	1/8-28	1/8-27	9/16	1.08	6.0		
1/4 x 1/4F3HG	1/4-19	1/4-18	3/4	1.37	6.0		
3/8 x 3/8F3HG	3/8-19	3/8-18	7/8	1.38	6.0		
1/2 x 1/2F3HG	1/2-14	1/2-14	1 1/8	1.88	5.0		
3/4 x 3/4F3HG	3/4-14	3/4-14	1 3/8	1.95	4.0		
1 x 1F3HG	1-11	1-11 1/2	1 5/8	2.38	3.0		
1 1/2 x 1 1/2F3HG	1 1/2-11	1 1/2-11 1/2	2 3/8	2.53	2.0		

F3HG5 Full Dimensions

Conversion Adapter
BSPT / SAE-ORB

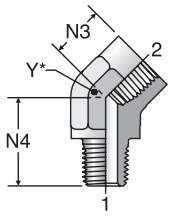


TUBE FITTING PART #	END SIZE 1 BSPT	END SIZE 2 UN/UNF-2B	C1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8-4F3HG5	1/8-28	7/16-20	11/16	1.09	6.0		
1/8-5F3HG5	1/8-28	1/2-20	3/4	1.09	6.0		
1/4-6F3HG5	1/4-19	9/16-18	13/16	1.36	6.0		
3/8-8F3HG5	3/8-19	3/4-16	1	1.45	5.0		
1/2-10F3HG5	1/2-14	7/8-14	1 1/8	1.78	4.5		
3/4-12F3HG5	3/4-14	1 1/16-12	1 3/8	1.92	4.5		
1-16F3HG5	1-11	1 5/16-12	1 5/8	2.13	3.5		

CD45 Full Dimensions

45° Pipe Elbow
NPTF / NPTF

SAE 140339
HPD Base # 3102

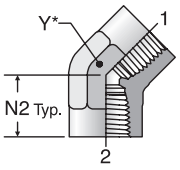


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	N3 (in.)	N4 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 CD45	1/8-27	1/8-27	0.47	0.72	9/16	5.0	5.0	3.2
1/4 CD45	1/4-18	1/4-18	0.63	1.05	3/4	5.0	5.0	3.2
3/8 CD45	3/8-18	3/8-18	0.72	1.06	7/8	4.5	4.5	2.9
1/2 CD45	1/2-14	1/2-14	0.91	1.34	1 1/16	3.0	3.0	1.9
3/4 CD45	3/4-14	3/4-14	0.97	1.38	1 5/16	3.0	3.0	1.9
1 CD45	1-11 1/2	1-11 1/2	1.13	1.72	1 5/8	1.8	1.8	
1 1/4 CD45	1 1/4-11 1/2	1 1/4-11 1/2	1.63	1.80	1 7/8	1.5	1.5	

DD45 Full Dimensions

45° Female Pipe Elbow
NPTF / NPTF

SAE 140338
HPD Base # 4202

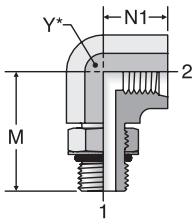


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	N2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/4 DD45	1/4-18	1/4-18	0.69	3/4	5.0		
3/8 DD45	3/8-18	3/8-18	0.75	7/8	4.5		
1/2 DD45	1/2-14	1/2-14	0.94	1 1/16	3.0		
3/4 DD45	3/4-14	3/4-14	1.00	1 5/16	3.0		
1 DD45	1-11 1/2	1-11 1/2	1.19	1 5/8	1.8		

AOEG5 Full Dimensions

Straight Thread Elbow
SAE-ORB / SAE-ORB

HPD Base # 2510



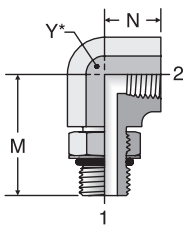
* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 UN/UNF-2B	M (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 AOEG5	7/16-20	7/16-20	1.23	0.63	3/4	5.0		
6 AOEG5	9/16-18	9/16-18	1.38	0.75	7/8	5.0		
8 AOEG5	3/4-16	3/4-16	1.59	0.88	1 1/16	5.0		
10 AOEG5	7/8-14	7/8-14	1.81	1.02	1 1/16	4.5		
12 AOEG5	1 1/16-12	1 1/16-12	2.00	1.21	1 5/16	3.0		
16 AOEG5	1 5/16-12	1 5/16-12	2.26	1.33	1 5/8	3.0		

AOEG Full Dimensions

Female Pipe Elbow
NPT / SAE-ORB

HPD Base # 2502



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPTF	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
6-1/4 AOEG	9/16-18	1/4-18	1.34	0.63	3/4	5.0		
8-3/8 AOEG	3/4-16	3/8-18	1.47	0.63	7/8	4.5		
10-1/2 AOEG	7/8-14	1/2-14	1.81	0.75	1 1/16	3.0		
12-3/4 AOEG	1 1/16-12	3/4-14	2.00	0.81	1 5/16	3.0		
16-1 AOEG	1 5/16-12	1-11 1/2	2.25	1.00	1 5/8	1.8		

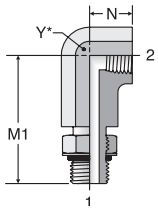
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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AOE4G Full Dimensions

Extra Long Female Pipe Elbow
NPTF / SAE-ORB

HPD Base # 5502

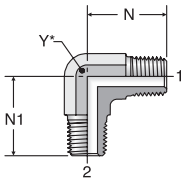


TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPTF	M1 (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
8-3/8 AOE4G	3/4-16	3/8-18	2.94	0.63	7/8	4.5		
10-1/2 AOE4G	7/8-14	1/2-14	3.56	0.75	1 1/16	3.0		
12-3/4 AOE4G	1 1/16-12	3/4-14	4.06	0.81	1 5/16	3.0		
16-1 AOE4G	1 5/16-12	1-11 1/2	4.63	1.00	1 5/8	1.8		

CR Full Dimensions

Male Pipe Elbow
NPTF / NPTF

SAE 140237*



* Y – Across Wrench Flats

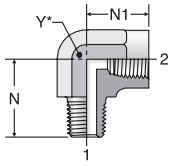
TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	N (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 CR	1/8-27	1/8-27	0.78	0.78	7/16	6.0	6.0	3.9
1/4 CR	1/4-18	1/4-18	1.09	1.09	9/16	6.0	6.0	3.9
3/8 CR	3/8-18	3/8-18	1.22	1.22	3/4	6.0	6.0	3.9
3/8 x 1/4 CR	3/8-18	1/4-18	1.22	1.22	3/4	6.0	6.0	
1/2 CR	1/2-14	1/2-14	1.47	1.47	7/8	6.0	6.0	3.9
1/2 x 3/8 CR	1/2-14	3/8-18	1.47	1.28	7/8	6.0	6.0	
3/4 CR	3/4-14	3/4-14	1.59	1.59	1 1/16	4.0	4.0	2.6
3/4 x 1/2 CR	3/4-14	1/2-14	1.59	1.47	1 1/16	4.0		
1 CR	1-11 1/2	1-11 1/2	1.97	1.97	1 5/8		3.0	
1 x 3/4 CR	1-11 1/2	3/4-14	1.97	1.78	1 5/16	3.0		
1 1/4 CR	1 1/4-11 1/2	1 1/4-11 1/2	2.22	2.22	1 7/8	2.5	2.5	
1 1/2 CR	1 1/2-11 1/2	1 1/2-11 1/2	2.34	2.34	1 7/8	2.5		

* Not shown in SAE J514, but coded per SAE J846.

CD Full Dimensions

Street Elbow
NPTF / NPTF

SAE 140239
HPD Base # 2102

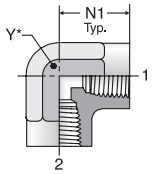


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	N (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 CD	1/8-27	1/8-27	0.78	0.66	9/16	5.0	5.0	3.2
1/8 x 1/4 CD	1/8-27	1/4-18	0.90	0.88	9/16	5.0	5.0	
1/4 CD	1/4-18	1/4-18	1.09	0.88	3/4	5.0	5.0	3.2
1/4 x 1/8 CD	1/4-18	1/8-27	1.09	0.66	9/16	5.0	5.0	
1/4 x 1/2 CD	1/4-18	1/2-14	1.28	1.23	1 1/16		3.0	
1/4 x 3/8 CD	1/4-18	3/8-18	1.22	1.01	7/8	4.5	4.5	
3/8 CD	3/8-18	3/8-18	1.22	1.02	7/8	4.5	4.5	3.0
3/8 x 1/4 CD	3/8-18	1/4-18	1.22	0.88	3/4	5.0	5.0	
3/8 x 1/2 CD	3/8-18	1/2-14	1.28	1.23	1 1/16	3.0	3.0	
1/2 CD	1/2-14	1/2-14	1.47	1.23	1 1/16	3.0	3.0	1.9
1/2 x 3/8 CD	1/2-14	3/8-18	1.48	1.25	7/8	4.5	4.5	
1/2 x 3/4 CD	1/2-14	3/4-14	1.58	1.36	1 5/16	3.0		
3/4 CD	3/4-14	3/4-14	1.59	1.36	1 5/16	3.0	3.0	1.9
3/4 x 1/2 CD	3/4-14	1/2-14	1.59	1.23	1 1/16	3.0	3.0	
1 CD	1-11 1/2	1-11 1/2	1.97	1.63	1 5/8	1.8	1.8	1.2
1 1/4 CD	1 1/4-11 1/2	1 1/4-11 1/2	2.38	1.70	1 7/8	1.5	1.5	
1 1/4 x 1 1/2 CD	1 1/4-11 1/2	1 1/2-11 1/2	2.61	2.08	2 1/2	1.5		
1 1/2 CD	1 1/2-11 1/2	1 1/2-11 1/2	2.64	2.08	2 1/2	1.5	1.5	

DD Full Dimensions

Female Pipe Elbow
NPTF / NPTF

SAE 140238
HPD Base # 2202



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPTF	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 DD	1/8-27	1/8-27	0.66	9/16	5.0	5.0	3.2
1/4 DD	1/4-18	1/4-18	0.88	3/4	5.0	5.0	3.2
3/8 DD	3/8-18	3/8-18	1.02	7/8	4.5	4.5	3.0
1/2 DD	1/2-14	1/2-14	1.23	1 1/16	3.0	3.0	1.9
1/2 x 3/8 DD	1/2-14	3/8-18	1.23	1 1/16			
3/4 DD	3/4-14	3/4-14	1.36	1 5/8	3.0	3.0	1.9
1 DD	1-11 1/2	1-11 1/2	1.63	1 7/8	1.8	1.8	1.2
1 1/4 DD	1 1/4-11 1/2	1 1/4-11 1/2	1.70	1 7/8	1.5	1.5	
1 1/2 DD	1 1/2-11 1/2	1 1/2-11 1/2	2.08	2 1/2	1.5	1.5	

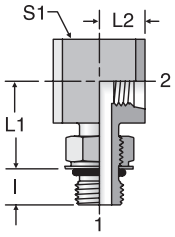
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

A87LPOEG87LPM

Full Dimensions

ISO 6149* Female Elbow
SHORT ISO 6149 / SHORT ISO 6149



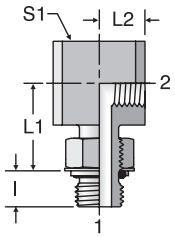
TUBE FITTING PART #	END SIZE 1 Metric	END SIZE 2 Metric	I (mm)	L1 (mm)	L2 (mm)	S1 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
M08A87LPOEG87LPM	M8X1	M8X1	8.5	13.5	7.5	15			
M10A87LPOEG87LPM	M10X1	M10X1	8.5	14.5	7.5	15			
M12A87LPOEG87LPM	M12X1.5	M12X1.5	11	17	10	20	3.6		
M14A87LPOEG87LPM	M14X1.5	M14X1.5	11	18	10	20	3.6		

* Male and female thread lengths have been shortened for compact design. The lengths do not conform to ISO 6149.

A4OEG4M

Full Dimensions

BSPP Female Elbow
BSPP-ORR / BSPP



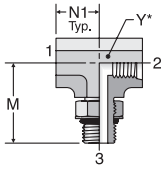
TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	D1 (mm)	I (mm)	L1 (mm)	L2 (mm)	S1 (mm)	STANDARD MATERIAL FROM STOCK -S	-SS	-B
2-2A4OEG4M	G 1/8 A	G 1/8 A	15	6.5	18.5	7	15	3.6		

* Male and female thread lengths have been shortened for compact design. The lengths do not conform to ISO 1179 / DIN 3852-2.

G5G5JAO

Full Dimensions

Straight Thread Branch Tee
SAE-ORB (all three ends)



* Y – Across Wrench Flats

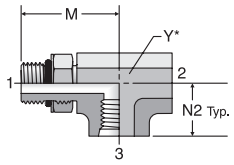
TUBE FITTING PART #	END SIZE 1 UN/UNF-2B	END SIZE 2 UN/UNF-2B	END SIZE 3 UN/UNF-2A	M (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 G5G5JAO	7/16-20	7/16-20	7/16-20	1.23	0.63	3/4	5.0		
6 G5G5JAO	9/16-18	9/16-18	9/16-18	1.38	0.75	7/8	5.0		
8 G5G5JAO	3/4-16	3/4-16	3/4-16	1.59	0.88	1 1/16	5.0		
10 G5G5JAO	7/8-14	7/8-14	7/8-14	1.81	1.02	1 1/16	4.5		
12 G5G5JAO	1 1/16-12	1 1/16-12	1 1/16-12	2.00	1.21	1 5/16	3.0		
16 G5G5JAO	1 5/16-12	1 5/16-12	1 5/16-12	2.25	1.33	1 5/8	3.0		

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

AOG5JG5 Full Dimensions

Straight Thread Run Tee
SAE-ORB (all three ends)

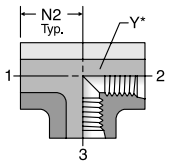


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 UN/UNF-2B	END SIZE 3 UN/UNF-2B	M (in.)	N2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 AOG5JG5	7/16-20	7/16-20	7/16-20	1.23	0.74	3/4	5.0		
6 AOG5JG5	9/16-18	9/16-18	9/16-18	1.38	0.86	7/8	5.0		
8 AOG5JG5	3/4-16	3/4-16	3/4-16	1.59	1.03	1 1/16	5.0		
10 AOG5JG5	7/8-14	7/8-14	7/8-14	1.81	1.18	1 1/16	4.5		
12 AOG5JG5	1 1/16-12	1 1/16-12	1 1/16-12	2.00	1.39	1 5/16	3.0		
16 AOG5JG5	1 5/16-12	1 5/16-12	1 5/16-12	2.25	1.52	1 5/8	3.0		

G5G5JG5

Female Straight Thread Tee
SAE-ORB (all three ends)



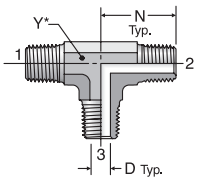
* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1-3 UN/UNF-2B	N2 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4 G5G5JG5	7/16-20	0.74	3/4	5.0		
6 G5G5JG5	9/16-18	0.86	3/4	5.0		
8 G5G5JG5	3/4-16	1.03	1 1/16	5.0		
10 G5G5JG5	7/8-14	1.18	1 1/16	4.5		
12 G5G5JG5	1 1/16-12	1.39	1 5/16	3.0		
16 G5G5JG5	1 5/16-12	1.52	1 5/8	3.0		

RRS Full Dimensions

Male Pipe Tee
NPTF (all three ends)

SAE 140437

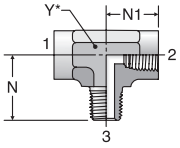


TUBE FITTING PART #	END SIZE 1-3 NPTF	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 RRS	1/8-27	0.78	7/16	6.0	6.0	3.9
1/4 RRS	1/4-18	1.09	9/16	6.0	6.0	3.9
3/8 RRS	3/8-18	1.22	3/4	6.0	6.0	3.9
1/2 RRS	1/2-14	1.47	7/8	6.0	6.0	3.9
3/4 RRS	3/4-14	1.59	1 1/16	4.0	4.0	

MMS Full Dimensions

Male Branch Tee
NPTF (all three ends)

SAE 140425
HPD Base # 212T

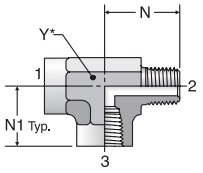


TUBE FITTING PART #	END SIZE 1-3 NPTF	N (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 MMS	1/8-27	0.78	0.66	9/16	5.0	5.0	3.2
1/4 MMS	1/4-18	1.09	0.88	3/4	5.0	5.0	3.2
3/8 MMS	3/8-18	1.22	1.02	7/8	4.5	4.5	3.0
1/2 MMS	1/2-14	1.47	1.23	1 1/16	3.0	3.0	1.9
3/4 MMS	3/4-14	1.59	1.36	1 5/16	3.0	3.0	
1 MMS	1-11 1/2	1.97	1.62	1 5/8	1.8	1.8	

MRO Full Dimensions

Male Run Tee
NPTF (all three ends)

SAE 140424
HPD Base # 012T



TUBE FITTING PART #	END SIZE 1-3 NPTF	N (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 MRO	1/8-27	0.78	0.66	9/16	5.0	5.0	3.2
1/4 MRO	1/4-18	1.09	0.88	3/4	5.0	5.0	3.2
3/8 MRO	3/8-18	1.22	1.02	7/8	4.5	4.5	3.0
1/2 MRO	1/2-14	1.47	1.23	1 1/16	3.0	3.0	1.9
3/4 MRO	3/4-14	1.59	1.36	1 5/16	3.0	3.0	
1 MRO	1-11 1/2	1.97	1.63	1 5/8	1.8	1.8	
1 1/4 MRO	1 1/4-11 1/2	2.38	1.70	1 7/8	1.5	1.5	
1 1/2 MRO	1 1/2-11 1/2	2.64	2.08	2 1/2	1.5	1.5	

Dimensions and pressures for reference only, subject to change.

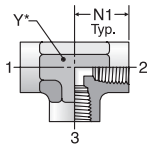
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index
Specs
Assembly / Installation
3-D CAD Model
Reference Section

MMO

Female Pipe Tee
NPTF (all three ends)

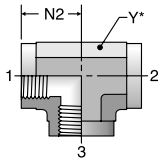
SAE 140438
HPD Base # 022T



TUBE FITTING PART #	END SIZE 1-3 NPTF	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 MMO	1/8-27	0.66	9/16	5.0	5.0	3.2
1/4 MMO	1/4-18	0.88	3/4	5.0	5.0	3.2
3/8 MMO	3/8-18	1.02	7/8	4.5	4.5	3.0
1/2 MMO	1/2-14	1.23	1 1/16	3.0	3.0	1.9
3/4 MMO	3/4-14	1.36	1 5/16	3.0	3.0	1.9
1 MMO	1-11 1/2	1.63	1 5/8	1.8	1.8	1.2
1 1/4 MMO	1 1/4-11 1/2	1.70	1 7/8	1.5	1.5	
1 1/2 MMO	1 1/2-11 1/2	2.08	2 1/2	1.5	1.5	

MMO444

Female BSPP Tee
BSPP (all three ends)



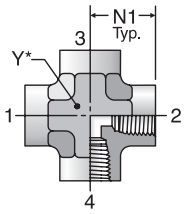
TUBE FITTING PART #	END SIZE 1-3 BSPP	N2 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/4MMO444M	1/4-19	22.4	19	5.0		
3/8MMO444M	3/8-19	25.9	22	4.5		
1/2MMO444M	1/2-14	31.2	27	3.0		
3/4MMO444M	3/4-14	34.5	33	3.0		
1MMO444M	1-11	41.1	41	1.8		

KMMOO

Full Dimensions

Female Pipe Cross
NPTF (all four ends)

SAE 140538
HPD Base # 022X



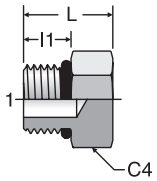
TUBE FITTING PART #	END SIZE 1-4 NPTF	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 KMMOO	1/8-27	0.66	9/16	5.0	5.0	3.2
1/4 KMMOO	1/4-18	0.88	3/4	5.0	5.0	3.2
3/8 KMMOO	3/8-18	1.02	7/8	4.5	4.5	
1/2 KMMOO	1/2-14	1.23	1 1/16	3.0	3.0	1.9
3/4 KMMOO	3/4-14	1.36	1 5/16	3.0		
1 KMMOO	1-11 1/2	1.63	1 5/8	1.8		

P5ON

Full Dimensions

Hex Head Plug
SAE-ORB

SAE 090109A
HPD Base # 05CP



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	C4 HEX (in.)	l1 (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 P5ON	5/16-24	7/16	0.30	0.60	7.5	9.0	
3 P5ON	3/8-24	1/2	0.30	0.60	7.5	9.0	
4 P5ON	7/16-20	9/16	0.36	0.67	7.5	9.0	
5 P5ON	1/2-20	5/8	0.36	0.67	6.0	7.2	
6 P5ON	9/16-18	11/16	0.39	0.73	6.0	7.2	
8 P5ON	3/4-16	7/8	0.44	0.80	6.0	7.2	
10 P5ON	7/8-14	1	0.50	0.94	6.0	7.2	
12 P5ON	1 1/16-12	1 1/4	0.59	1.09	6.0	7.2	
14 P5ON	1 3/16-12	1 3/8	0.59	1.09	5.5		
16 P5ON	1 5/16-12	1 1/2	0.59	1.13	5.5	6.6	
20 P5ON	1 5/8-12	1 7/8	0.59	1.20	4.0	4.8	
24 P5ON	1 7/8-12	2 1/8	0.59	1.27	3.0	3.6	
32 P5ON	2 1/2-12	2 3/4	0.59	1.44	2.0	2.4	

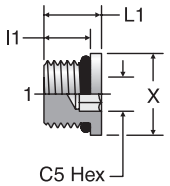
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

HP5ON Full Dimensions

Hollow Hex Plug
SAE-ORB

SAE 090109B
HPD Base # 05HP

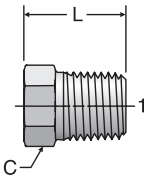


TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	C5 HEX (in.)	I1 (in.)	L1 (in.)	X DIA (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2 HP5ON	5/16-24	1/8	0.30	0.40	0.44	6.0	6.0	
3 HP5ON	3/8-24	1/8	0.30	0.40	0.50	6.0	6.0	
4 HP5ON	7/16-20	3/16	0.36	0.47	0.56	6.0	6.0	
5 HP5ON	1/2-20	3/16	0.36	0.47	0.63	6.0	6.0	
6 HP5ON	9/16-18	1/4	0.40	0.50	0.69	6.0	6.0	
8 HP5ON	3/4-16	5/16	0.44	0.58	0.88	6.0	6.0	
10 HP5ON	7/8-14	3/8	0.50	0.65	1.00	6.0	6.0	
12 HP5ON	1 1/16-12	9/16	0.59	0.77	1.25	6.0	6.0	
14 HP5ON	1 3/16-12	9/16	0.59	0.77	1.38	5.5		
16 HP5ON	1 5/16-12	5/8	0.59	0.77	1.50	5.5	5.5	
20 HP5ON	1 5/8-12	3/4	0.59	0.77	1.88	4.0		
24 HP5ON	1 7/8-12	3/4	0.59	0.77	2.13	3.0	3.0	

HP Full Dimensions

Hex Head Pipe Plug
NPTF

SAE 130109E
HPD Base # 01CP

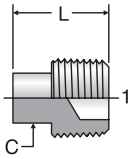


TUBE FITTING PART #	END SIZE 1 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 HP	1/8-27	7/16	0.56	6.0	7.2	3.9
1/4 HP	1/4-18	9/16	0.75	6.0	7.2	3.9
3/8 HP	3/8-18	11/16	0.78	6.0	7.2	3.9
1/2 HP	1/2-14	7/8	0.97	6.0	7.2	3.9
3/4 HP	3/4-14	1 1/16	1.06	5.5	6.6	3.5
1 HP*	1-11 1/2	1 5/16	1.25	4.5	5.4	3.0
1 1/4 HP	1 1/4-11 1/2	1 3/4	1.41	3.0	3.6	
1 1/2 HP	1 1/2-11 1/2	2	1.50	3.0	3.6	
2 HP	2-11 1/2	2 1/2	1.69	2.0	3.0	

*** 1 HP-SS Hex is 1 3/8**

SHP Full Dimensions

Square Head Plug
NPTF

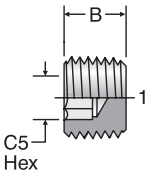


TUBE FITTING PART #	END SIZE 1 NPTF	C SQUARE (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 SHP	1/8-27	9/32	0.51	6.0	7.2	
1/4 SHP	1/4-18	3/8	0.75	6.0		
3/8 SHP	3/8-18	7/16	0.83	6.0		
1/2 SHP	1/2-14	9/16	1.08	6.0		
3/4 SHP	3/4-14	5/8	1.14	6.0		
1 SHP	1-11 1/2	13/16	1.38	5.5		

HHP Full Dimensions

Hollow Hex Pipe Plug
NPTF

SAE 130109N
HPD Base # 01HP



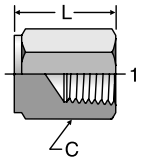
TUBE FITTING PART #	END SIZE 1 NPTF	B (in.)	C5 INTERNAL HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/16 HHP	1/16-27	0.30	5/32	6.0		
1/8 HHP	1/8-27	0.30	3/16	6.0	7.2	3.9
1/4 HHP	1/4-18	0.46	1/4	6.0	7.2	3.9
3/8 HHP	3/8-18	0.46	5/16	6.0	7.2	
1/2 HHP	1/2-14	0.61	3/8	6.0	7.2	
3/4 HHP	3/4-14	0.62	9/16	5.5	6.6	
1 HHP	1-11 1/2	0.77	3/4	4.5	5.4	
1 1/4 HHP	1 1/4-11 1/2	0.77	3/4	3.0		
1 1/2 HHP	1 1/2-11 1/2	0.83	3/4	3.0		
2 HHP	2-11 1/2	0.86	3/4	2.0		

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

HPC

Hex Pipe Cap
NPTF

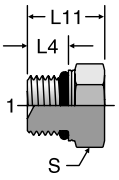


TUBE FITTING PART #	END SIZE 1 NPTF	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 HPC	1/8-27	9/16	.75		6.0	
1/4 HPC	1/4-18	3/4	.91		6.0	
3/8 HPC	3/8-18	7/8	1.03		6.0	
1/2 HPC	1/2-14	1 1/16	1.34		6.0	
3/4 HPC	3/4-14	1 1/4	1.44		4.8	
1 HPC	1-11 1/2	1 5/8	1.68		3.6	
1 1/2 HPC	1 1/2-1 1/2	2 3/8	1.92		2.4	

P87OMN

ISO 6149 Hex Head Plug
ISO 6149
(for ISO 6149-1 Port)

SAE J2244-4* 62M0109A



TUBE FITTING PART #	END SIZE 1 THREAD	L4 (mm)	L11 (mm)	S HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
M8P87OMN	M8X1	8.5	16.2	12			
M10P87OMN	M10X1	8.5	16.2	14	8.0		
M12P87OMN	M12X1.5	11	18.5	17	9.0		
M14P87OMN	M14X1.5	11	19.5	19	9.0		
M16P87OMN	M16X1.5	11.5	21.5	22	9.0		
M18P87OMN	M18X1.5	12.5	23.5	24	9.0		
M20P87OMN	M20X1.5	12.5	24	27			
M22P87OMN	M22X1.5	13	25.5	27	6.0		
M27P87OMN	M27X2	16	32	32	6.0		
M30P87OMN	M30X2	16	32	36			
M33P87OMN	M33X2	16	32	41	6.0		
M42P87OMN	M42X2	16	34	50	4.0		
M48P87OMN	M48X2	17.5	35.5	55			
M60P87OMN	M60X2	17.5	33	65			

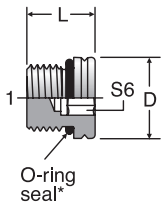
* SAE J2244-4 and ISO 6149-4 are draft standards.

VSTI M-OR

Full Dimensions

ISO 6149 Hollow Hex Plug
ISO 6149
(for ISO 6149-1 Port)

SAE J2244-4* 62M0109B



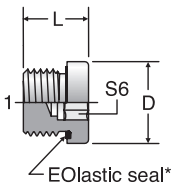
TUBE FITTING PART #	END SIZE 1 THREAD	D (mm)	L (mm)	S6 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) CF*	71*	MS*
VSTI10X1OR	M10 x 1	13	13.5	5	9.1		
VSTI12X1.5OR	M12 x 1.5	17	15.1	6	9.1		
VSTI14X1.5OR	M14 x 1.5	19	16	6	9.1		
VSTI16X1.5OR	M16 x 1.5	21	17.5	8	9.1		
VSTI18X1.5OR	M18 x 1.5	23	19	8	9.1		
VSTI22X1.5OR	M22 x 1.5	27	20	10	9.1		
VSTI27X2OR	M27 x 2	32	23.5	12	5.8		
VSTI33X2OR	M33 x 2	38	25	14	5.8		
VSTI42X2OR	M42 x 2	48	25.5	22	5.8		

* SAE J2244-4 is a draft standard

VSTI M-ED

Full Dimensions

Metric Hollow Hex Plug
Metric-ED
(for ISO 9974-1 / DIN 3852-1 Port)



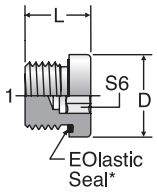
TUBE FITTING PART #	END SIZE 1 THREAD	D (mm)	L (mm)	S6 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) CF	71	MS
VSTI10X1ED	M10 x 1	14	12	5	5.8	5.8	
VSTI12X1.5ED	M12 x 1.5	17	17	6	5.8	5.8	
VSTI14X1.5ED	M14 x 1.5	19	17	6	5.8	5.8	
VSTI16X1.5ED	M16 x 1.5	22	17	8	5.8	5.8	
VSTI18X1.5ED	M18 x 1.5	24	17	8	5.8	5.8	
VSTI20X1.5ED	M20 x 1.5	26	19	10	5.8		
VSTI22X1.5ED	M22 x 1.5	27	19	10	5.8		
VSTI26X1.5ED	M26 x 1.5	32	21	12	5.8		
VSTI27X2ED	M27 x 2	32	21	12	5.8		
VSTI33X2ED	M33 x 2	40	22.5	17	5.8		
VSTI42X2ED	M42 x 2	50	22.5	22	4.5		
VSTI48X2ED	M48 x 2	55	22.5	24	4.5		

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

VSTI R-ED Full Dimensions

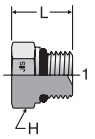
BSPP Hollow Hex Plug
BSPP-ED
(for ISO 1179-1 / DIN 3852-2 Port)



TUBE FITTING PART #	END SIZE 1 BSPP	D (mm)	L (mm)	S6 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) CF	71	MS
VSTI1/8ED	G 1/8 A	14	12	5	5.8	5.8	
VSTI1/4ED	G 1/4 A	19	17	6	5.8	5.8	
VSTI3/8ED	G 3/8 A	22	17	8	5.8	5.8	
VSTI1/2ED	G 1/2 A	27	19	10	5.8	5.8	
VSTI3/4ED	G 3/4 A	32	21	12	5.8	5.8	
VSTI1ED	G 1 A	40	22.5	17	5.8	5.8	
VSTI1 1/4ED	G 1 1/4 A	50	22.5	22	4.5	4.5	
VSTI1 1/2ED	G 1 1/2 A	55	22.5	24	4.5	4.5	

P47OMN Full Dimensions

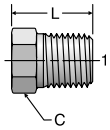
Hex Head Plug
BSPP-ORB



TUBE FITTING PART #	END SIZE 1 BSPP	H HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
4P47OMN	1/4-19	19	19.1	5.0		
P6P47OMN	3/8-19	22	20.0	5.0		
8P47OMN	1/2-14	27	24.1	5.0		
M14P87OMN	3/4-14	36	26.9	4.0		
M16P87OMN	1-11	41	31.0	3.0		

HP3M Full Dimensions

Hex Head Pipe Plug
BSPT



TUBE FITTING PART #	END SIZE 1 BSPT	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
1/8 HP3M	1/8-28	10	14.2	6.0		
1/4 HP3M	1/4-19	14	19.1	6.0		
3/8 HP3M	3/8-19	17	19.8	6.0		
1/2 HP3M	1/2-14	22	24.6	6.0		
3/4 HP3M	3/4-14	27	26.9	5.5		
1 HP3M	1-11	36	31.8	4.5		

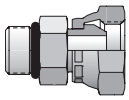
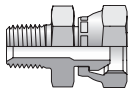
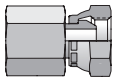
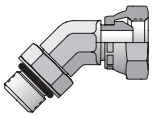
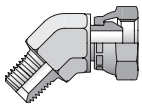
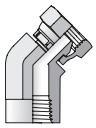
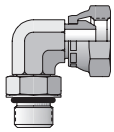
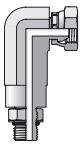
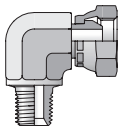
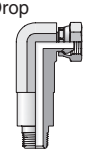
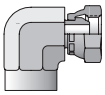
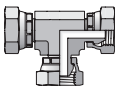
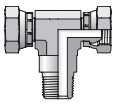
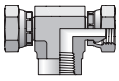
Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
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Pipe Swivels



The Fitting Authority

Straights	**0507** SAE-ORB / NPSM Swivel  H6	**0107** NPTF / NPSM Swivel  H6	**0207** NPTF / NPSM Swivel  H6	**45° Elbows**	**3507** SAE-ORB / NPSM Swivel  H6
3107 NPTF / NPSM Swivel  H7	**3207** NPTF / NPSM Swivel  H7	**90° Elbows**	**2507** SAE-ORB / NPSM Swivel  H7	**5507** SAE-ORB / NPSM Swivel  H7	**2107** NPTF / NPSM Swivel  H8
5607 NPTF / NPSM Swivel Long Drop  H8	**2207** NPTF / NPSM Swivel  H8	**Tees**	**077T** NPSM Swivel / NPSM Swivel / NPSM Swivel  H8	**217T** NPSM Swivel / NPSM Swivel / NPTF  H9	**227T** NPSM Swivel / NPSM Swivel / NPTF  H9

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index

Introduction

Pipe swivel connections are one of the most traditional types of hydraulic connections. NPSM swivel adapters add versatility to male NPT hose and adapter connections. They are especially suited for manufacturers and end users that rely on this versatility. As a result, equipment manufacturers can simplify their hose assembly requirements by specifying NPSM adapters. See Fig. H1 for an illustration of this product flexibility.

Parker offers a full line of NPSM pipe swivel adapters. Fourteen configurations are available as standard, many of which are available in steel and stainless steel. Parker's pipe swivels are designed for use with male NPT/NPTF hose fittings and adapters with a 30° machined seat.



Adapter Port Connection



NPSM / NPT Union

Fig. H1 — Illustration of the flexibility of the NPT Port and Hose Adapter system

Design and Construction

Pipe swivel adapters are manufactured in accordance to SAE J514 specifications, and thus are designed to work in conjunction with several manufacturers' hose and adapter products. Unlike most pipe thread connections, NPSM swivel adapters do not seal on the threads. NPSM swivel connections incorporate parallel threads, as opposed to tapered. Sealing is accomplished between the nose of the swivel and the mating seat of the NPT pipe thread. This creates a metal-to-metal seal as shown in Fig H2. Thus, a mating NPT male connector must have this 30° seat to ensure proper sealing. A full internal 30° seat with surface finish requirements of 125 Ra or better is required. See SAE J516 for specific requirements of the 30° seat.

Construction: Shaped pipe swivels are manufactured from a hot forged construction. Straight adapters and crimp nuts are manufactured from cold drawn barstock. All Parker pipe swivels with male NPT ends include a 30° machined seat for NPSM swivel connections.

Not all male NPT ends have the 30° seat. Parts that have this seat will include a note in the catalog.

Threads:

NPTF:	ANSI B1.20.1, FED-STD-H28/7
NPT:	SAEJ476, ANSI B1.20.3, FED-STD-H28/8
NPSM:	ANSI B1.20.1, FED-STD-H28/7
*UN/UNF:	ANSI B1.1, FED-STD-H28/2 (*Class 2A or 2B)

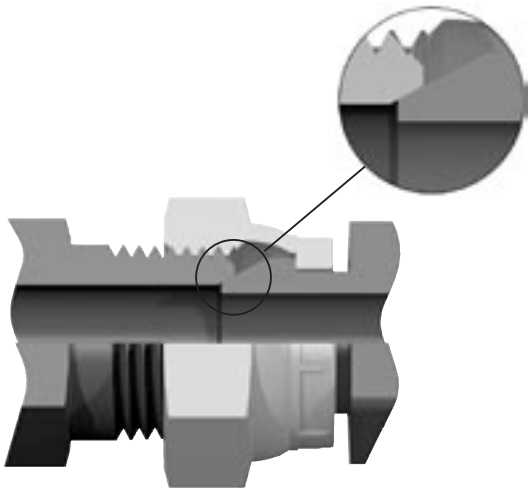


Fig. H2 — Illustration showing how NPSM swivel adapters seal on mating chamfer in male pipe thread

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Pipe Swivels.

Materials Specifications

Pipe swivels are manufactured using state-of-the-art equipment and manufacturing technologies to assure construction integrity, long service life and the highest strength & quality. These materials are shown in Table H1.

Upon request, pipe swivels can be furnished in materials, sizes and configurations other than Parker's standard offering.

07 Adapters	Carbon Steel		Stainless Steel	
	ASTM	Type	ASTM	Type
Forged Bodies	A576	1214/1215	A182	316
Bar Stock Bodies	A108	12L14	A479	316
Crimp Swivel Nuts	A108	12L14	A479	316

Note: On request, 07 adapters can be furnished in materials other than those shown above.

Finish: Zinc with yellow chromate (being changed to zinc chromium 6 free) is used on all standard steel products. Stainless steel fittings are passivated.

Table H1 — Standard Materials

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

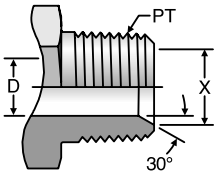
Visual Index

Feature	Advantage	Benefit
Metal-to-metal seal	Allows for a wide range of operating temperatures and media	Allows for increased versatility of pipe swivels
30° seat on male pipe end of all Parker pipe swivels	Allows pipe swivel to be used as both a port adapter and NPSM swivel connection	Improves versatility for flexible system requirements
Available in steel and stainless steel	Allows customer to match media and temperature applications without special fittings and seals	Standardization reduces procurement costs
Forged shapes	Higher resistance to mechanical shock and vibration that can lead to leakage	Reduces operational and maintenance costs
	Optimum balance of strength and machinability minimizes potential deformation while maintaining higher assembly torques and operating pressures	
Adaptable to SAE and NPT/ NPTF ports	Versatility for end customer and for customer standardization efforts	Standardization reduces procurement costs

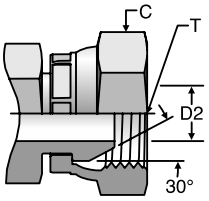
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
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Columbus, Ohio
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Pipe Swivel (NPSM) Ends



Male Pipe End



NPSM Pipe Swivel

	NPT/NPTF Thread	NPSM Thread	Hex - Swivel	Drill - Male	Drill - Swivel	Chamfer Dia.	Thread Length
Size	**PT** NPT/NPTF	**T** NPSM	**C** (in.)	**D** (in.)	**D2** (in.)	**X** (in.)	**L** (in.)
2	1/8-27	1/8-27	9/16	0.188	0.156	0.281	0.38
4	1/4-18	1/4-18	11/16	0.281	0.219	0.344	0.56
6	3/8-18	3/8-18	7/8	0.406	0.344	0.469	0.56
8	1/2-14	1/2-14	1	0.531	0.469	0.625	0.75
12	3/4-14	3/4-14	1 1/4	0.719	0.641	0.813	0.75
16	1-11 1/2	1-11 1/2	1 1/2	0.938	0.844	1.031	0.94
20	1 1/4-11 1/2	1 1/4-11 1/2	1 7/8	1.250	1.141	1.344	0.97
24	1 1/2-11 1/2	1 1/2-11 1/2	2 1/8	1.500	1.359	1.625	1.00
32	2-11 1/2	2-11 1/2	2 5/8	1.938	1.813	2.063	1.03

Dimensions and pressures for reference only, subject to change.

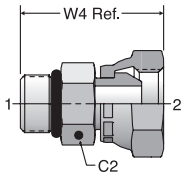
Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

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Specs
Assembly / Installation
3-D CAD Model
Reference Section

0507 Full Dimensions

Straight Thread Adapter
SAE-ORB / NPSM Swivel

SAE 140157

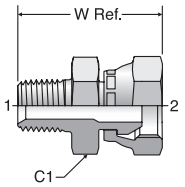


TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPSM	C2 HEX BODY (in.)	W4 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
0507-4-2	7/16-20	1/8-27	9/16	1.21	6.0		
0507-4-4	7/16-20	1/4-18	9/16	1.32	6.0		
0507-5-4	1/2-20	1/4-18	5/8	1.32	6.0		
0507-6-4	9/16-18	1/4-18	11/16	1.35	6.0		
0507-6-6	9/16-18	3/8-18	11/16	1.37	6.0		
0507-6-8	9/16-18	1/2-14	3/4	1.57	5.0		
0507-8-4	3/4-16	1/4-18	7/8	1.43	6.0		
0507-8-6	3/4-16	3/8-18	7/8	1.45	6.0		
0507-8-8	3/4-16	1/2-14	7/8	1.56	5.0		
0507-8-12	3/4-16	3/4-14	1	1.79	4.0		
0507-10-6	7/8-14	3/8-18	1	1.59	5.0		
0507-10-8	7/8-14	1/2-14	1	1.73	5.0		
0507-10-12	7/8-14	3/4-14	1 1/4	1.88	4.0		
0507-12-8	1 1/16-12	1/2-14	1 1/4	1.88	5.0		
0507-12-12	1 1/16-12	3/4-14	1 1/4	1.97	4.0		
0507-12-16	1 1/16-12	1-11 1/2	1 1/2	2.12	3.0		
0507-14-12	1 3/16-12	3/4-14	1 3/8	1.97	4.0		
0507-16-12	1 5/16-12	3/4-14	1 1/2	1.90	4.0		
0507-16-16	1 5/16-12	1-11 1/2	1 1/2	2.12	3.0		
0507-20-16	1 5/8-12	1-11 1/2	1 7/8	2.20	3.0		
0507-20-20	1 5/8-12	1 1/4-11 1/2	1 7/8	2.21	2.5		
0507-24-24	1 7/8-12	1 1/2-11 1/2	2 1/8	2.39			
0507-32-32	2 1/2-12	2-11 1/2	2 3/4	2.49			

0107 Full Dimensions

Male Pipe Adapter
NPTF / NPSM Swivel

SAE 140130

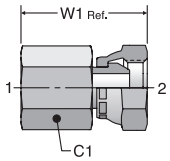


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	W (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
0107-2-2	1/8-27	1/8-27	9/16	1.09	6.0	6.0	
0107-2-4	1/8-27	1/4-18	5/8	1.24	6.0	6.0	
0107-4-2	1/4-18	1/8-27	11/16	1.39	6.0	6.0	
0107-4-4	1/4-18	1/4-18	11/16	1.43	6.0	6.0	
0107-4-6	1/4-18	3/8-18	13/16	1.45	6.0	6.0	
0107-4-8	1/4-18	1/2-14	15/16	1.44	5.0		
0107-6-4	3/8-18	1/4-18	11/16	1.49	6.0	6.0	
0107-6-6	3/8-18	3/8-18	7/8	1.51	6.0	6.0	
0107-6-8	3/8-18	1/2-14	15/16	1.73	5.0	5.0	
0107-8-4	1/2-14	1/4-18	1	2.27	6.0		
0107-8-6	1/2-14	3/8-18	7/8	1.70	6.0	6.0	
0107-8-8	1/2-14	1/2-14	1	1.91	5.0	5.0	
0107-8-12	1/2-14	3/4-14	1 1/4	2.04	4.0	4.0	
0107-12-8	3/4-14	1/2-14	1 1/8	1.91	5.0		
0107-12-12	3/4-14	3/4-14	1 1/4	2.04	4.0	4.0	
0107-12-16	3/4-14	1-11 1/2	1 1/2	2.17	3.0	3.0	
0107-16-12	1-11 1/2	3/4-14	1 3/8	2.29	4.0		
0107-16-16	1-11 1/2	1-11 1/2	1 1/2	2.37	3.0	3.0	
0107-16-20	1-11 1/2	1 1/4-11 1/2	1 3/4	2.38	2.5		
0107-20-16	1 1/4-11 1/2	1-11 1/2	1 7/8	2.46	3.0		
0107-20-20	1 1/4-11 1/2	1 1/4-11 1/2	1 7/8	2.47	2.5	2.5	
0107-20-24	1 1/4-11 1/2	1 1/2-11 1/2	2 1/8	2.58	2.0		
0107-24-20	1 1/2-11 1/2	1 1/4-11 1/2	2 1/8	2.51	2.5	2.5	
0107-24-24	1 1/2-11 1/2	1 1/2-11 1/2	2 1/8	2.61	2.0	2.0	
0107-32-32	2-11 1/2	2-11 1/2	2 5/8	2.80	1.5	1.5	

0207 Full Dimensions

Female Pipe Adapter
NPTF / NPSM Swivel

SAE 140131

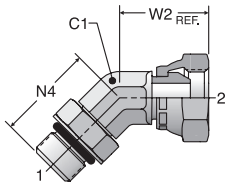


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	W1 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
0207-2-2	1/8-27	1/8-27	9/16	1.02	6.0	6.0	
0207-2-4	1/8-27	1/4-18	11/16	1.33	6.0		
0207-4-2	1/4-18	1/8-27	9/16	1.32	6.0		
0207-4-4	1/4-18	1/4-18	11/16	1.43	6.0	6.0	
0207-6-4	3/8-18	1/4-18	7/8	1.49	6.0	6.0	
0207-6-6	3/8-18	3/8-18	7/8	1.51	6.0	6.0	
0207-6-8	3/8-18	1/2-14	1	1.64	5.0		
0207-8-4	1/2-14	1/4-18	1	1.70	5.0		
0207-8-6	1/2-14	3/8-18	1	1.73	5.0	5.0	
0207-8-8	1/2-14	1/2-14	1	1.79	5.0	5.0	
0207-12-8	3/4-14	1/2-14	1 1/4	1.85	4.0		
0207-12-12	3/4-14	3/4-14	1 1/4	1.97	4.0	4.0	
0207-16-12	1-11 1/2	3/4-14	1 1/2	2.28	3.0		
0207-16-16	1-11 1/2	1-11 1/2	1 1/2	2.37	3.0	3.0	
0207-20-20	1 1/4-11 1/2	1 1/4-11 1/2	1 7/8	2.38	2.5		
0207-24-24	1 1/2-11 1/2	1 1/2-11 1/2	2 1/8	2.42	2.0		
0207-32-32	2-11 1/2	2-11 1/2	2 5/8	2.55	1.5	1.5	

3507 Full Dimensions

45° Straight Thread Elbow
SAE-ORB / NPSM Swivel

SAE 140357



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPSM	C1 HEX (in.)	N4 (in.)	W2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3507-4-4	7/16-20	1/4-18	7/16	1.05	0.79	6.0		
3507-6-4	9/16-18	1/4-18	9/16	1.11	0.94	6.0		
3507-6-6	9/16-18	3/8-18	9/16	1.14	1.03	6.0		
3507-6-8	9/16-18	1/2-14	3/4	1.08	1.16	5.0		
3507-8-6	3/4-16	3/8-18	3/4	1.3	1.02	6.0		
3507-8-8	3/4-16	1/2-14	3/4	1.30	1.18	5.0		
3507-8-12	3/4-16	3/4-14	3/4	1.41	1.37	3.0		
3507-10-6	7/8-14	3/8-18	1 1/16	1.35	0.98	5.0		
3507-10-8	7/8-14	1/2-14	7/8	1.52	1.17	5.0		
3507-10-12	7/8-14	3/4-14	1 1/16	1.36	1.40	3.0		
3507-12-8	1 1/16-12	1/2-14	1 1/16	1.54	1.12	5.0		
3507-12-12	1 1/16-12	3/4-14	1 1/16	1.73	1.37	3.0		
3507-16-16	1 5/16-12	1-11 1/2	1 5/16	1.86	1.52	2.5		

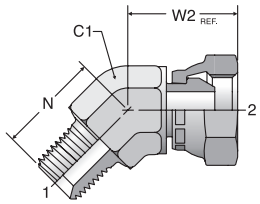
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

3107 Full Dimensions

45° Male Pipe Elbow
NPTF / NPSM Swivel

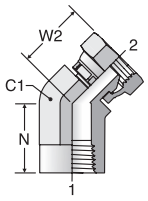
SAE 140330



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	N (in.)	W2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3107-2-2	1/8-27	1/8-27	7/16	0.52	0.77	6.0		
3107-4-4	1/4-18	1/4-18	9/16	0.86	0.91	6.0	6.0	
3107-6-6	3/8-18	3/8-18	3/4	0.95	1.10	6.0	6.0	
3107-6-8	3/8-18	1/2-14	1 1/16	1.09	1.16			
3107-8-4	1/2-14	1/4-18	1 1/16	1.34	0.96			
3107-8-6	1/2-14	3/8-18	7/8	1.17	1.10	6.0		
3107-8-8	1/2-14	1-2/14	7/8	1.17	1.17	5.0	5.0	
3107-8-12	1/2-14	3/4-14	1 1/16	1.50	1.24	3.0		
3107-12-8	3/4-14	1/2-14	1 1/16	1.20	1.23	4.0		
3107-12-12	3/4-14	3/4-14	1 1/16	1.20	1.37	3.0	3.0	
3107-12-16	3/4-14	1-11 1/2	1 5/16	1.50	1.32			
3107-16-12	1-11 1/2	3/4-14	1 5/16	1.48	1.47	3.0		
3107-16-16	1-11 1/2	1-11 1/2	1 5/16	1.48	1.52	2.5	2.5	
3107-20-16	1 1/4-11 1/2	1-11 1/2	1 5/8	1.75	1.55	2.5		
3107-20-20	1 1/4-11 1/2	1 1/4-11 1/2	1 5/8	1.67	1.61	2.0		
3107-24-24	1 1/2-11 1/2	1 1/2-11 1/2	1 7/8	1.77	1.77	2.0	2.0	
3107-32-32	2-11 1/2	2-11 1/2	2 1/2	2.11	1.89	1.1		

3207 Full Dimensions

45° Female Pipe Elbow
NPTF / NPSM Swivel

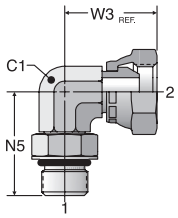


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	N (in.)	W2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
3207-4-4	1/4-18	1/4-18	3/4	0.91	0.94	5.0		
3207-6-6	3/8-18	3/8-18	7/8	1.00	0.97	4.5		
3207-8-8	1/2-14	1/2-14	1 1/16	1.01	1.12	3.0		
3207-12-12	3/4-14	3/4-14	1 5/16	1.25	1.31	3.0		
3207-16-16	1-11 1/2	1-11 1/2	1 5/8	1.44	1.55	1.8		

2507 Full Dimensions

Straight Thread Elbow
SAE-ORB / NPSM Swivel

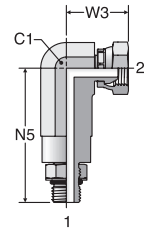
SAE 140257



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPSM	C1 HEX (in.)	N5 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2507-4-4	7/16-20	1/4-18	7/16	1.03	0.97	6.0		
2507-4-6	7/16-20	3/8-18	9/16	1.28	1.23	6.0		
2507-6-4	9/16-18	1/4-18	9/16	1.25	1.06	6.0		
2507-6-6	9/16-18	3/8-18	9/16	1.25	1.10	6.0		
2507-6-8	9/16-18	1/2-14	3/4	1.41	1.29	5.0		
2507-8-4	3/4-16	1/4-18	3/4	1.30	1.09	6.0		
2507-8-6	3/4-16	3/8-18	3/4	1.45	1.19	6.0		
2507-8-8	3/4-16	1/2-14	3/4	1.45	1.33	5.0		
2507-8-12	3/4-16	3/4-14	3/4	1.62	1.65	3.0		
2507-10-6	7/8-14	3/8-18	7/8	1.70	1.26	5.0		
2507-10-8	7/8-14	1/2-14	7/8	1.70	1.40	5.0		
2507-10-12	7/8-14	3/4-14	7/8	1.78	1.62	3.0		
2507-12-8	1 1/16-12	1/2-14	1 1/16	1.94	1.50	5.0		
2507-12-12	1 1/16-12	3/4-14	1 1/16	1.94	1.65	3.0		
2507-12-16	1 1/16-12	1-11 1/2	1 3/16	2.08	1.91	2.5		
2507-16-12	1 5/16-12	3/4-14	1 3/16	2.08	1.89	3.0		
2507-16-16	1 5/16-12	1-11 1/2	1 5/16	2.05	1.91	2.5		
2507-20-20	1 5/8-12	1 1/4-11 1/2	1 5/8	2.25	2.16	2.0		
2507-24-24	1 7/8-12	1 1/2-11 1/2	1 7/8	2.39	2.31			

5507 Full Dimensions

Long Straight Thread Elbow
SAE-ORB / NPSM Swivel



TUBE FITTING PART #	END SIZE 1 UN/UNF-2A	END SIZE 2 NPSM	C1 HEX (in.)	N5 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
5507-4-4	7/16-20	1/4-18	3/4	2.19	1.13	6.0		
5507-6-6	9/16-18	3/8-18	7/8	2.59	1.20	6.0		
5507-8-6	3/4-16	3/8-18	7/8	2.47	1.20	6.0		

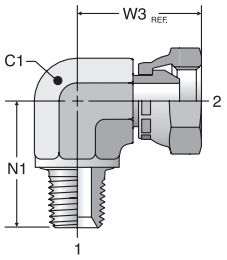
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2107 Full Dimensions

Male Pipe Elbow
NPTF / NPSM Swivel

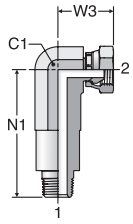
SAE 140230



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	N1 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2107-2-2	1/8-27	1/8-27	7/16	0.72	0.85	6.0	6.0	
2107-2-4	1/8-27	1/4-18	7/16	1.00	0.97	6.0		
2107-4-2	1/4-18	1/8-27	9/16	0.90	1.05		6.0	
2107-4-4	1/4-18	1/4-18	9/16	1.09	1.06	6.0	6.0	
2107-4-6	1/4-18	3/8-18	3/4	1.09	1.28	6.0	6.0	
2107-6-4	3/8-18	1/4-18	3/4	1.22	1.17	6.0	6.0	
2107-6-6	3/8-18	3/8-18	3/4	1.22	1.28	6.0	6.0	
2107-6-8	3/8-18	1/2-14	3/4	1.22	1.33	5.0	5.0	
2107-8-4	1/2-14	1/4-18	7/8	1.69	1.18	6.0		
2107-8-6	1/2-14	3/8-18	7/8	1.47	1.35	6.0	6.0	
2107-8-8	1/2-14	1/2-14	7/8	1.47	1.40	5.0	5.0	
2107-8-12	1/2-14	3/4-14	1 1/16	1.47	1.65	3.0	3.0	
2107-12-6	3/4-14	3/8-18	1 1/16	1.59	1.48	4.0		
2107-12-8	3/4-14	1/2-14	1 1/16	1.59	1.53	4.0	4.0	
2107-12-12	3/4-14	3/4-14	1 1/16	1.59	1.65	3.0	3.0	
2107-12-16	3/4-14	1-11 1/2	1 3/16	2.19	1.72	2.5		
2107-16-12	1-11 1/2	3/4-14	1 5/16	1.97	1.82	3.0	3.0	
2107-16-16	1-11 1/2	1-11 1/2	1 5/16	1.97	1.91	2.5	2.5	
2107-16-20	1-11 1/2	1 1/4-11 1/2	1 7/16	2.41	1.87	2.0		
2107-20-16	1 1/4-11 1/2	1-11 1/2	1 5/8	2.62	1.98	2.5		
2107-20-20	1 1/4-11 1/2	1 1/4-11 1/2	1 5/8	2.38	2.11	2.0		
2107-24-24	1 1/2-11 1/2	1 1/2-11 1/2	1 7/8	2.64	2.31	2.0		
2107-32-32	2-11 1/2	2-11 1/2	2 1/2	3.00	2.70	1.1	1.1	

5607 Full Dimensions

Long Male Pipe Elbow
NPTF / NPSM Swivel

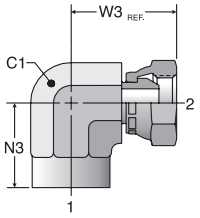


TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	N1 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
5607-2-2	1/8-27	1/8-27	9/16	1.64	0.92	6.0		
5607-4-4	1/4-18	1/4-18	3/4	2.25	1.16	6.0		
5607-6-6	3/8-18	3/8-18	7/8	2.76	1.20	6.0		
5607-8-8	1/2-14	1/2-14	1 1/16	3.19	1.48	5.0		
5607-12-12	3/4-14	3/4-14	1 5/16	3.66	1.69	3.0		
5607-16-16	1-11 1/2	1-11 1/2	1 7/8	4.31	2.15	2.5		

2207 Full Dimensions

Female Pipe Elbow
NPTF / NPSM Swivel

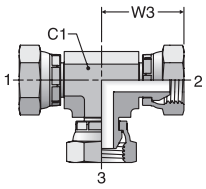
SAE 140231



TUBE FITTING PART #	END SIZE 1 NPTF	END SIZE 2 NPSM	C1 HEX (in.)	N3 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
2207-2-2	1/8-27	1/8-27	9/16	0.66	0.95	5.0		
2207-4-4	1/4-18	1/4-18	3/4	0.88	1.17	5.0	5.0	
2207-4-6	1/4-18	3/8-18	7/8	1.01	1.26		5.0	
2207-6-6	3/8-18	3/8-18	7/8	1.02	1.26	4.5	4.5	
2207-8-6	1/2-14	3/8-18	1 1/16	1.37	1.34	3.0		
2207-8-8	1/2-14	1/2-14	1 1/16	1.23	1.53	3.0	3.0	
2207-12-12	3/4-14	3/4-14	1 5/16	1.36	1.82	3.0	3.0	
2207-16-16	1-11 1/2	1-11 1/2	1 5/8	1.62	2.10	1.8	1.8	
2207-20-20	1 1/4-11 1/2	1 1/4-11 1/2	1 7/8	1.70	2.21	1.5		
2207-24-24	1 1/2-11 1/2	1 1/2-11 1/2	2 1/2	2.08	2.83	1.5		
2207-32-32	2-11 1/2	2-11 1/2	2 13/16	2.39	3.00	1.1		

077T Full Dimensions

NPSM Union Tee
NPSM Swivel (all three ends)



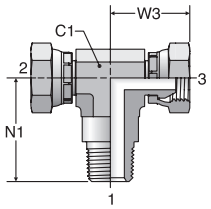
TUBE FITTING PART #	END SIZE 1 NPSM	END SIZE 2 NPSM	END SIZE 3 NPSM	C1 HEX (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
077T-2	1/8-27	1/8-27	1/8-27	7/16	0.89	6.0		
077T-4	1/4-18	1/4-18	1/4-18	9/16	1.06	6.0		
077T-6	3/8-18	3/8-18	3/8-18	3/4	1.15	6.0		
077T-8	1/2-14	1/2-14	1/2-14	3/4	1.29	5.0		
077T-12	3/4-14	3/4-14	3/4-14	1 1/16	1.65	3.0		

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217T Full Dimensions

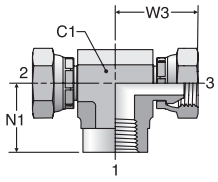
Male Pipe Branch Tee
NPTF / NPSM Swivel /
NPSM Swivel



TUBE FITTING PART #	END SIZE 1 NPTF	2 NPSM	3 NPSM	C1 HEX (in.)	N1 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
217T-2-2	1/8-27	1/8-27	1/8-27	9/16	0.97	0.92	6.0		
217T-4-4	1/4-18	1/4-18	1/4-18	9/16	1.19	1.03	6.0		
217T-6-6	3/8-18	3/8-18	3/8-18	3/4	1.50	1.15	6.0		
217T-8-6	1/2-14	3/8-18	1/2-14	3/4	1.69	1.21	6.0		
217T-8-8	1/2-14	1/2-14	1/2-14	3/4	1.81	1.35	5.0		
217T-12-12	3/4-14	3/4-14	3/4-14	1 1/16	2.00	1.60	3.0		
217T-16-16	1-11 1/2	1-11 1/2	1-11 1/2	1 1/16	2.37	1.86	2.5		

227T Full Dimensions

Female Pipe Branch Tee
NPTF / NPSM Swivel /
NPSM Swivel



TUBE FITTING PART #	END SIZE 1 NPTF	2 NPSM	3 NPSM	C1 HEX (in.)	N1 (in.)	W3 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
227T-4-4	1/4-18	1/4-18	1/4-18	3/4	0.94	1.13	5.0		
227T-6-6	3/8-18	3/8-18	3/8-18	7/8	1.00	1.20	4.5		
227T-8-8	1/2-14	1/2-14	1/2-14	1 1/16	1.17	1.46	3.0		
227T-12-12	3/4-14	3/4-14	3/4-14	1 3/16	1.44	1.60	3.0		

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3-D CAD Model
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Dimensions and pressures for reference only, subject to change.

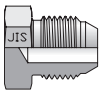
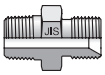
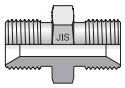
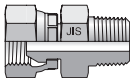
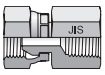
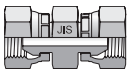
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JIS Fittings



The Fitting Authority

30° Flare	**F3T4** BSPT / 30° Flare  I5	**PNMT4** Plug  I5	**FNMT4** Cap  I5	**V3T4** BSPT / 30° Flare  I5	**C3T4** BSPT / 30° Flare  I5
60° Cone	**F3P4** BSPT / 60° Cone  I5	**HP4** Union  I6	**G3P4** BSPT / 60° Cone  I6	**PNMP4** Plug  I6	**F63P4** 60° Swivel / BSPT  I6
G63P4 60° Swivel / BSPT  I6	**HP46** Union Swivel  I6	**FNMP4** Cap  I7	**C3P4** BSPT / 60° Cone  I7	**V3P4** BSPT / 60° Cone  I7	
B2351 Port	**P47OMN** Hex Head Plug  I7				

O-Rings and Seals (Shown in Section O)

JIS O-Rings and Seals	**JIS B2351 O-Ring**  O6

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Tube Fittings Division
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Introduction

Parker introduced Japanese Industrial Standard (JIS) adapters in the early 1990s to address market requirements for OEM and replacement fittings. These fittings are typically used as hose adapters on equipment designed and/or manufactured in Japan and Korea. Parker's JIS adapters are designed with 30° flare and 60° cone connections and typically incorporate BSP threads.

Parker JIS adapters are designed with BSPP and BSPT port ends and two styles of hose ends: T4 (30° flare, BSPP threads) and P4 (60° cone, BSPP threads). Two additional Parker series of fittings, KA (Komatsu flare) and K4 (BS B5200) adapters, are similar to JIS style fittings and appear in sections J and K of this catalog.

The T4 and P4 interfaces provide end user flexibility of connecting to the most common Parker hose ends available as listed in Table I1.

Parker's JIS adapter offering that uses the BSPP port connection are manufactured in accordance with the JIS B2351 type "O" port connection which is commonly used for higher pressure systems. Fig. I2 illustrates this port connection and Table I2 shows appropriate JIS B2351 O-rings and dash sizes.

It should be noted that Parker offers two very similar cone style BSPP adapters — P4 and K4. Parker's K4 (60 cone, BSPP) fittings conform to BS5200, while Parker's JIS cone adapters meet JIS B8363 specifications. ***These fittings, while very similar, are not interchangeable.*** See the K4 section of this catalog for more specific information on interchangeability.

Design and Construction

Construction: Shaped JIS adapters are manufactured from a hot forged construction. Straight adapters are manufactured from cold drawn barstock.

Threads: The standard JIS products are manufactured with the thread forms listed below:

BSPP Threads: ISO 228-1 G, JIS B 0202,
BSPT Threads: ISO 7/1, JIS B 0203

Identification: All Parker JIS fittings are stamped with "JIS" for positive identification and differentiation from similar style fittings.

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for JIS fittings.

Materials Specifications

JIS fitting components are manufactured using state-of-the-art equipment and manufacturing technologies to assure construction integrity, highest strength, long service life and the highest quality. These materials are shown in Table I3.

Upon request, JIS fittings can be furnished in materials other than Parker's standard steel offering.



Fig. I1 – JIS T4 and P4 Interfaces

Adapter Connection End	Mating Parker Hose Fitting Series
P4 / P46	UT, GU, G1, G2
T4 / T46	FU

Table I1 – Parker JIS Fittings Hose Adaptability

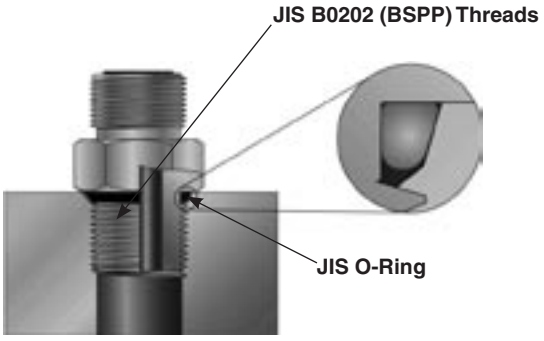


Fig. I2 – JIS B2351 Type "O" Port Connection

"G" Thread BSPP per ISO 228-1 JIS B 0202	Dash Size	Port O-Ring (See Pg. O6)
1/8-28	2	P8
1/4-19	4	P11
3/8-19	6	P14
1/2-14	8	P18
3/4-14	12	P24
1-11	16	P29

Table I2 – JIS B2351 Port Threads and O-Rings as shown in Fig. I2

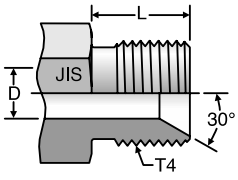
JIS Adapters	Steel	
	ASTM	Type
Forged Bodies	A576	1214/1215
Bar Stock Bodies	A108	12L14

Table I3 – Standard Material Specifications for Parker Japanese Industrial Standard (JIS) Fittings

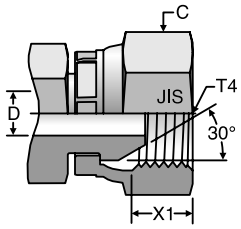
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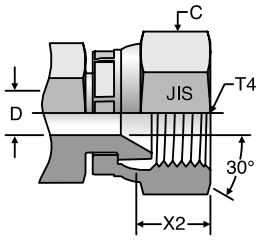
JIS Ends



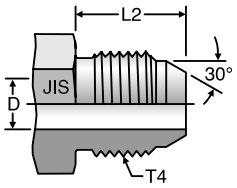
JIS Male, 60° Seat



JIS Swivel for 60° Seat



JIS Swivel for 30° Flare



JIS Male, 30° Flare

	BSPP Thread	Swivel Hex	Drill	Male Turn Back		Assembly Allowance	
Dash Size	**T4** BSPP	**C** (in)	**D** (in)	**L** (in)	**L2** (in)	**X1** (in)	**X2** (in)
4	1/4-19	.75	0.177	.570	.606	0.35	0.36
6	3/8-19	.88	0.275	.609	.684	0.29	0.38
8	1/2-14	1.06	0.433	.726	.763	0.46	0.53
12	3/4-14	1.44	0.625	.805	.842	0.55	0.56
16	1-11	1.63	0.828	.883	.881	0.53	0.58

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Visual Index

How To Order

Specs

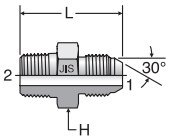
Assembly / Installation

Reference Section

F3T4 Full Dimensions

Male Connector
30° Flare / BSPT

Mates with FU Style hose fittings

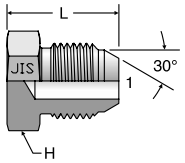


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	H HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4F3T4	1/4 - 19	1/4 - 19	0.75	1.46	5
4-6F3T4	3/8 - 19	1/4 - 19	0.88	1.51	5
6-4F3T4	1/4 - 19	3/8 - 19	0.88	1.59	5
6F3T4	3/8 - 19	3/8 - 19	0.88	1.59	5
8-6F3T4	3/8 - 19	1/2 - 14	1.06	1.70	5
8F3T4	1/2 - 14	1/2 - 14	1.06	1.89	5
12F3T4	3/4 - 14	3/4 - 14	1.44	2.10	4
16F3T4	1-11	1-11	1.63	2.30	3

PNMT4

Plug
30° Flare

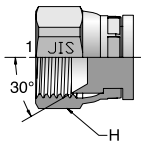
Mates with FU Style hose fittings



TUBE FITTING PART #	END SIZE 1 BSPP	H HEX (mm)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4PNMT4	1/4-19	17	0.89	5
6PNMT4	3/8-19	19	0.97	5
8PNMT4	1/2-14	22	1.11	5
12PNMT4	3/4-14	30	1.26	4
16PNMT4	1-11	36	1.30	3

FNMT4

Cap
30° Flare

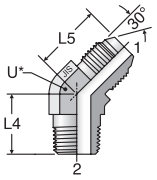


TUBE FITTING PART #	END SIZE 1 BSPP	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4FNMT4	1/4-19	0.75	5
6FNMT4	3/8-19	0.88	5
8FNMT4	1/2-14	1.06	5
12FNMT4	3/4-14	1.44	4
16FNMT4	1-11	1.63	3

V3T4 Full Dimensions

45° Male Elbow
30° Flare / BSPT

Mates with FU Style hose fittings



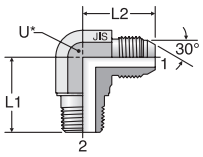
* Across wrench flats

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	L4 (in.)	L5 (in.)	U (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4V3T4	1/4 - 19	1/4 - 19	0.75	0.87	0.56	5
6V3T4	3/8 - 19	3/8 - 19	0.87	0.97	0.75	5
8V3T4	1/2 - 14	1/2 - 14	1.06	1.10	0.88	5
12V3T4	3/4 - 14	3/4 - 14	1.18	1.24	1.06	4
16V3T4	1-11	1-11	1.37	1.26	1.31	3

C3T4 Full Dimensions

Male Elbow
30° Flare / BSPT

Mates with FU Style hose fittings



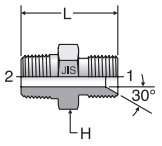
* Across wrench flats

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	L1 (in.)	L2 (in.)	U (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4C3T4	1/4 - 19	1/4 - 19	1.00	0.98	0.56	5
6C3T4	3/8 - 19	3/8 - 19	1.18	1.14	0.75	5
8C3T4	1/2 - 14	1/2 - 14	1.42	1.33	0.88	5
12C3T4	3/4 - 14	3/4 - 14	1.69	1.50	1.06	4
16C3T4	1-11	1-11	1.97	1.74	1.31	3

F3P4 Full Dimensions

Male Connector
60° Cone / BSPT

Mates with GU, G1 and G2 Style hose fittings



TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	H HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4F3P4	1/4 - 19	1/4 - 19	0.75	1.44	5
6F3P4	3/8 - 19	3/8 - 19	0.88	1.50	5
8F3P4	1/2 - 14	1/2 - 14	1.06	1.81	5
12F3P4	3/4 - 14	3/4 - 14	1.44	2.05	4
16F3P4	1-11	1-11	1.63	2.28	3

Dimensions and pressures for reference only, subject to change.

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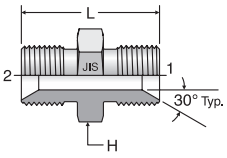
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HP4 Full Dimensions

Union
60° Cone

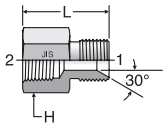


Mates with GU, G1 and G2 Style hose fittings

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	H HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4HP4	1/4 - 19	1/4 - 19	0.75	1.34	5
6HP4	3/8 - 19	3/8 - 19	0.88	1.5	5
8HP4	1/2 - 14	1/2 - 14	1.06	1.81	5
12HP4	3/4 - 14	3/4 - 14	1.44	2.05	4
16HP4	1-11	1-11	1.63	2.28	3

G3P4 Full Dimensions

Female Connector
60° Cone / BSPT

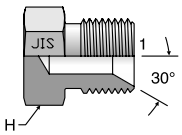


Mates with GU, G1 and G2 Style hose fittings

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	H HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4G3P4	1/4 - 19	1/4 - 19	0.75	1.22	5
6G3P4	3/8 - 19	3/8 - 19	0.88	1.34	5
8G3P4	1/2 - 14	1/2 - 14	1.06	1.58	5
12G3P4	3/4 - 14	3/4 - 14	1.44	1.73	4
16G3P4	1-11	1-11	1.63	1.93	3

PNMP4

Plug
60° Cone

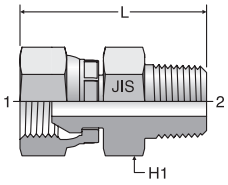


Mates with GU, G1 and G2 Style hose fittings

TUBE FITTING PART #	END SIZE 1 BSPP	H HEX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4FNMP4	1/4-19	17	5
6FNMP4	3/8-19	19	5
8FNMP4	1/2-14	22	5
12FNMP4	3/4-14	30	4
16FNMP4	1-11	36	3

F63P4 Full Dimensions

Swivel Male Connector
60° Swivel / BSPT

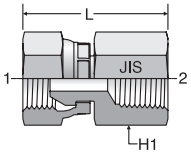


Mates with UT Style hose fittings

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	H1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4F63P4	1/4 - 19	1/4 - 19	0.75	1.73	5
6F63P4	3/8 - 19	3/8 - 19	0.88	1.94	5
8F63P4	1/2 - 14	1/2 - 14	1.06	2.25	5
12F63P4	3/4 - 14	3/4 - 14	1.44	2.55	4
16F63P4	1-11	1-11	1.63	2.77	3

G63P4 Full Dimensions

Swivel Female Connector
60° Swivel / BSPT

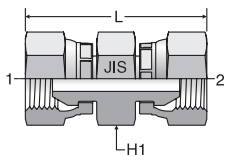


Mates with UT Style hose fittings

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	H1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4G63P4	1/4 - 19	1/4 - 19	0.75	1.61	5
6G63P4	3/8 - 19	3/8 - 19	0.88	1.78	5
8G63P4	1/2 - 14	1/2 - 14	1.06	2.02	5
12G63P4	3/4 - 14	3/4 - 14	1.44	2.20	4
16G63P4	1-11	1-11	1.63	2.52	3

HP46 Full Dimensions

Swivel Union Connector
60° Swivel



Mates with UT Style hose fittings

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	H1 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4HP46	1/4 - 19	1/4 - 19	0.75	2.12	5
6HP46	3/8 - 19	3/8 - 19	0.88	2.37	5
8HP46	1/2 - 14	1/2 - 14	1.06	2.73	5
12HP46	3/4 - 14	3/4 - 14	1.44	2.96	4
16HP46	1-11	1-11	1.63	3.24	3

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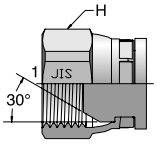
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FNMP4

Cap
60° Cone

Mates with UT Style hose fittings

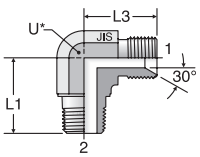


TUBE FITTING PART #	END SIZE 1 BSPP	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4FNMP4	1/4-19	0.75	5
6FNMP4	3/8-19	0.88	5
8FNMP4	1/2-14	1.06	5
12FNMP4	3/4-14	1.44	4
16FNMP4	1-11	1.63	3

C3P4 Full Dimensions

90° Male Elbow
60° Cone / BSPT

Mates with GU, G1 and G2
Style hose fittings



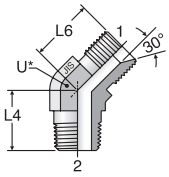
* Across wrench flats

TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	L1 (in.)	L3 (in.)	U (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4C3P4	1/4 - 19	1/4 - 19	1.00	0.96	0.56	5
6C3P4	3/8 - 19	3/8 - 19	1.18	1.14	0.75	5
8C3P4	1/2 - 14	1/2 - 14	1.42	1.28	0.88	5
12C3P4	3/4 - 14	3/4 - 14	1.69	1.56	1.06	4
16C3P4	1-11	1-11	1.97	1.74	1.31	3

V3P4 Full Dimensions

45° Male Elbow
60° Cone / BSPT

Mates with GU, G1 and G2
Style hose fittings

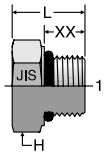


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	L4 (in.)	L6 (in.)	U (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4V3P4	1/4 - 19	1/4 - 19	0.75	0.81	0.56	5
6V3P4	3/8 - 19	3/8 - 19	0.87	0.91	0.75	5
8V3P4	1/2 - 14	1/2 - 14	1.06	1.05	0.88	5
12V3P4	3/4 - 14	3/4 - 14	1.18	1.18	1.06	4
16V3P4	1-11	1-11	1.37	1.3	1.31	3

P47OMN

Plug

Hex head plug for JIS B2351



TUBE FITTING PART #	END SIZE 1 BSPP	H HEX (mm)	L (mm)	XX (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4P47OMN	1/4-19	19	19.1	11.2	5
6P47OMN	3/8-19	22	20.0	11.2	5
8P47OMN	1/2-14	27	24.1	14.5	5
12P47OMN	3/4-14	36	26.9	14.5	4
16P47OMN	1-11	41	31.0	18.5	3

Dimensions and pressures for reference only, subject to change.

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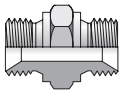
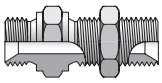
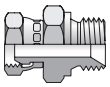
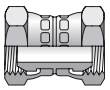
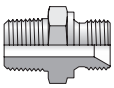
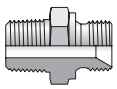
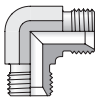
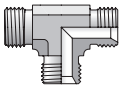
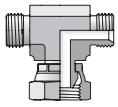
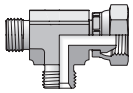
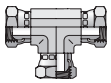
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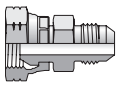
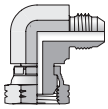
K4 BSP Adapters



The Fitting Authority

60° Cone BSP Adapters	**Straights**	**HMK4** Union  J6	**WMK4WL4NM** Bulkhead Union  J6	**F6MK4** 60° Swivel / 60° Cone  J6	**H6MK4** Swivel Union  J6
FMK4 NPTF / 60° Cone  J7	**F3MK4** BSPT / 60° Cone  J7	**G4MK4** BSPP / 60° Cone  J7	**Elbows**	**EMK4** Union Elbow  J8	**C6MK4** 60° Swivel / 60° Cone  J8
E6MK4 Swivel Union  J8	**Tees**	**JMK4** Union Tee  J9	**S6MK4** 60° Swivel Branch Tee  J9	**R6MK4** 60° Swivel Run Tee  J9	**J6MK4** Swivel Union Tee  J9
Plug Caps	**PNMK4** Hex Head Plug  J7	**FNMK4** Cap  J8			

Conversion Adapters (Shown in Section L)

K4 BSP Conversion Adapters	**XHMK46** 37° Flare / BSPP Swivel  L5	**XEMK46** 37° Flare / BSPP Swivel  L5

O-Rings and Seals (Shown in Section O)

K4 BSP O-Rings and Seals	**D9DT** BSPP Bonded Seal  O6

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Introduction

Parker introduced K4 (BSP) adapters in the late 1990s to address market requirements for OEM and replacement BSP adapters. These fittings are typically used as hose adapters on equipment designed and/or manufactured throughout Europe, especially equipment with ties to the UK, Scandinavia, the Netherlands, Spain and Italy. BSP cone adapters are similar in function to NPSM (07 Adapters) but with BSPP threads.

The metal-to-metal sealing is achieved by a single line of contact between the conical surface of the 60° cone seat and the corresponding surface of the ballnose or cone swivel, as shown in Fig. J1.

K4 adapters are manufactured in accordance with BS5200 standards. The 60° internal seat is designed for sealing with BSP hose swivel connections offered by many manufacturers. K4 adapters mate with Parker hose fitting series shown in Table J1.

Further enhancing the flexibility of the K4 adapter product line is the ability for the male BSP cone end of the straight fittings to also be used as a port adapter in ISO 1179-1 / DIN 3852 ports. This is accomplished with the addition of a bonded seal (often referred to as a "Dowty®" seal). This product feature is illustrated in Fig. J2.

It should be noted that Parker offers two very similar cone style BSPP adapters — P4 and K4. Parker's K4 (60° cone, BSPP) fittings conform to BS5200, while P4 adapters conforms to JIS B8363 specification. ***K4 Adapters, while very similar to JIS P4 cone style fittings, are not interchangeable.*** See the next page for more information regarding the interchangeability of JIS and BS fittings.



Fig. J1 – K4 Interface

Adapter Connection End	Mating Parker Hose Fitting Series
K4 / K46	D9/92, B1, B2, B4

Table J1 – Parker K4 Fittings Hose Adaptability

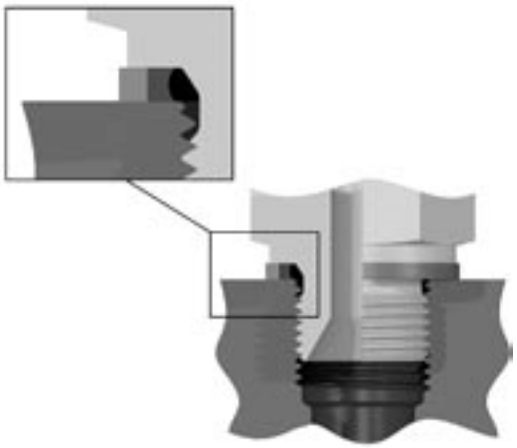


Fig. J2 – K4 End Used as a BSPP Port Adapter (in ISO 1179/ DIN 3852, Part 2 Port)

Design and Construction

Construction: Shaped K4 adapters are manufactured from a hot forged construction. Straight adapters are manufactured from cold drawn barstock.

Threads: The standard K4 products are manufactured with the thread forms listed below:

BSPP Threads: ISO 228-1 G
BSPT Threads: ISO 7/1, JIS B 0203
NPTF Threads: SAE J476, ANSI B1.20.3, FED-STD-H28/8

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for K4 fittings.

Materials Specifications

K4 adapters are manufactured using state-of-the-art equipment and manufacturing technologies to assure construction integrity, highest strength, long service life and the highest quality. These materials are shown in Table J2.

Upon request, K4 fittings can be furnished in materials other than Parker's standard steel offering.

K4 BSP Adapters	Steel	
	ASTM	Type
Forged Bodies	A576	1214/1215
Bar Stock Bodies	A108	12L14

Table J2 – Standard Material Specifications for K4 Adapters

Dimensions and pressures for reference only, subject to change.

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Visual Index

60° Cone Adapters: JIS vs. BS5200

Parker's P4 JIS 60° cone adapters are manufactured in accordance to JIS B8363 while Parker's K4 BSP adapters are manufactured in accordance to BS5200. The following are some pronounced differences that may help in distinguishing between the K4 and P4 fittings:

1. Thread length ("A" dimensions)
2. 60° angle diameter ("B" dimensions)
3. The undercut area (area between threads and hex body) on the straight K4 fittings incorporates a bonded seal "locating pilot" for bonded seal
4. Parker's JIS fittings are stamped with "JIS" on the forging body or hex of fitting

See Figs. J3 and J4 for details and see Tables J3 and J4 below for specific dimensional differences.

Size	BSPP Thread	M	A	B
2	1/8-28	0.38	0.418	0.276
4	1/4-19	0.51	0.570	0.394
6	3/8-19	0.65	0.609	0.531
8	1/2-14	0.82	0.726	0.650
12	3/4-14	1.04	0.805	0.866
16	1-11	1.30	0.883	1.102
20	1 1/4-11	1.64	0.945	1.417
24	1 1/2-11	1.87	0.962	1.654
32	2-11	2.34	1.102	2.126

Table J3 – Dimensions of JIS B8363 60° Cone Connection

Size	BSPP Thread	M	A	B
2	1/8-28	0.38	0.315	0.295
4	1/4-19	0.51	0.433	0.409
6	3/8-19	0.65	0.472	0.551
8	1/2-14	0.82	0.551	0.689
10	5/8-14	0.90	0.630	0.760
12	3/4-14	1.04	0.630	0.902
16	1-11	1.30	0.748	1.130
20	1 1/4-11	1.64	0.787	1.449
24	1 1/2-11	1.87	0.866	1.681
32	2-11	2.34	0.984	2.150

Table J4 – Dimensions of BS B5200 60° Cone Connection

While the 60° cone versions of JIS and K4 fittings utilize the same BSPP threads and seat angle, not all dimensions are consistent. Therefore, they cannot be interchanged because the differences can cause leakage problems. An example of this is illustrated in Fig. J5.

In summary, interchanging components between JIS and K4 adapters can, in some cases, lead to leakage problems and thus is not a recommended practice. The combination of matching proper components will create an effective seal as illustrated in Fig J6.

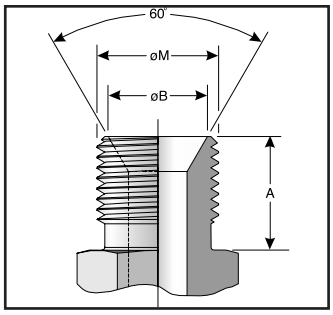


Fig. J3 – JIS B8363 60° Cone Connection (P4)

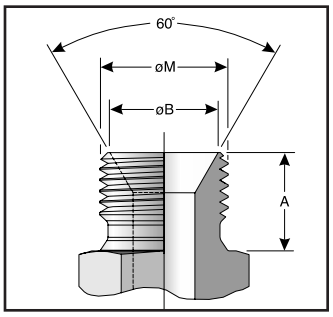


Fig. J4 – BS B5200 60° Cone Connection (K4)

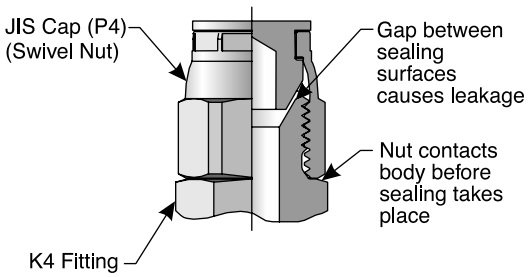


Fig. J5 – Illustration Showing Potential Leakage Problem When Mixing JIS and K4 Components

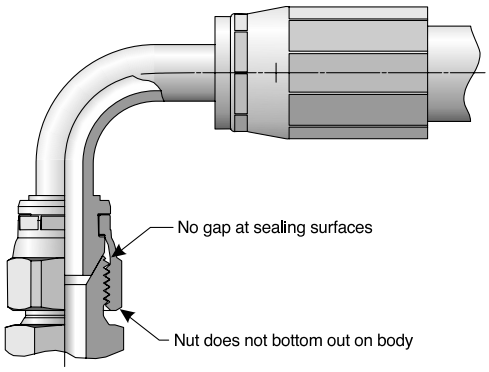
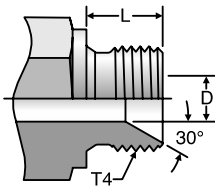


Fig. J6 – An Effective Seal Created with the Proper Combination of Components

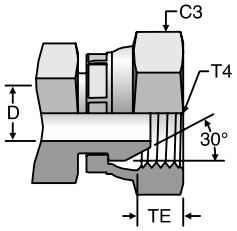
Dimensions and pressures for reference only, subject to change.

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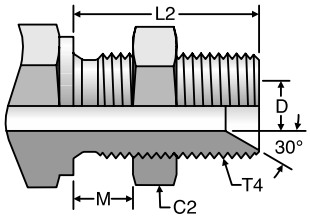
K4 BSP Ends



K4 Male



K4 Swivel



K4 Bulkhead

	BSPP Thread	Bulkhead Nut Hex	Swivel Hex	Drill	Male Turn Back	Bulkhead Length	Max Bulkhead Thickness	Assembly Allowance
Dash Size	**T4** BSPP	**C2** (mm)	**C3** (mm)	**D** (mm)	**L** (mm)	**L2** (mm)	**M** (mm)	**TE** (mm)
2	1/8-28	—	14	3.5	8	—	—	—
4	1/4-19	19	19	4.7	11	28	9.5	7.3
6	3/8-19	22	22	7.9	12	32	12.5	8.4
8	1/2-14	27	27	11.1	14	35	12.3	9.3
10	5/8-14	30	30	14.3	16	35	10.7	—
12	3/4-14	36	32	16.7	16	38	13.3	11.3
16	1-11	41	41	22.2	19	41	10.0	13.6
20	1 1/4-11	50	50	28.6	20	44	12.0	—
24	1 1/2-11	55	60	33.3	22	48	14.0	—
32	2-11	—	—	46.0	25	—	—	—

Dimensions and pressures for reference only, subject to change.

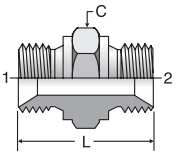
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HMK4 Full Dimensions

Union
60° Cone / 60° Cone

Mates with 92, B1, B2 and B4 style hose fitting

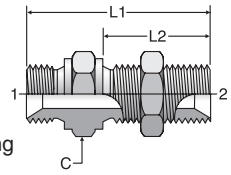


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2HMK4	1/8	1/8	14	23.5	5.1
4-2HMK4	1/4	1/8	19	28.0	5.1
4HMK4	1/4	1/4	19	31.5	5.1
6-4HMK4	3/8	1/4	22	33.2	5.1
6HMK4	3/8	3/8	22	34.7	2.9
8-4HMK4	1/2	1/4	27	36.7	2.9
8-6HMK4	1/2	3/8	27	38.2	2.9
8HMK4	1/2	1/2	27	40.7	2.9
10-8HMK4	5/8	1/2	30	43.2	2.9
10HMK4	5/8	5/8	30	45.2	2.9
12-4HMK4	3/4	1/4	32	39.2	2.9
12-6HMK4	3/4	3/8	32	40.7	2.9
12-8HMK4	3/4	1/2	32	43.2	2.9
12-10HMK4	3/4	5/8	32	45.2	2.9
12HMK4	3/4	3/4	32	45.2	2.9
16-8HMK4	1	1/2	41	46.9	1.7
16-10HMK4	1	5/8	41	48.9	1.7
16-12HMK4	1	3/4	41	48.9	1.7
16HMK4	1	1	41	51.9	1.7
20-12HMK4	1 1/4	3/4	50	57.4	1.5
20-16HMK4	1 1/4	1	50	60.4	1.5
20HMK4	1 1/4	1 1/4	50	61.4	1.5
24-16HMK4	1 1/2	1	55	64.4	1.5
24-20HMK4	1 1/2	1 1/4	55	65.4	1.5
24HMK4	1 1/2	1 1/2	55	67.4	1.5
32-24HMK4	2	1 1/2	70	72.9	1
32HMK4	2	2	70	76.4	1

WMK4WL4NM

Bulkhead Union Full Dimensions
60° Cone / 60° Cone

Mates with 92, B1, B2 and B4 style hose fitting



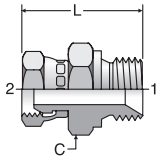
TUBE FITTING PART #	END SIZE 1 & 2 BSPP	C HEX (mm)	L1 (mm)	L2 (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4WMK4WL4NM	1/4	19	46.8	28	5.1
6WMK4WL4NM	3/8	22	52.5	32	5.1
8WMK4WL4NM	1/2	27	59.0	35	2.9
10WMK4WL4NM	5/8	30	61.5	35	2.9
12WMK4WL4NM	3/4	32	64.5	38	2.9
16WMK4WL4NM	1	41	71.2	41	1.7
20WMK4WL4NM	1 1/4	50	82.7	44	1.5
24WMK4WL4NM	1 1/2	55	90.7	48	

Includes Bulkhead nut.

F6MK4 Full Dimensions

Swivel Nut Connector
60° Swivel / 60° Cone

Mates with D9/92, B1, B2 and B4 style hose fitting

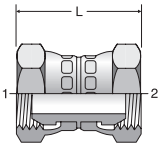


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4-4F6MK4	1/4	1/4	19	36.6	5.1
4-6F6MK4	1/4	3/8	22	38.5	5.1
4-8F6MK4	1/4	1/2	27	42.0	2.9
6-4F6MK4	3/8	1/4	22	38.3	5.1
6-6F6MK4	3/8	3/8	22	40.0	5.1
6-8F6MK4	3/8	1/2	27	43.6	2.9
8-6F6MK4	1/2	3/8	27	43.5	2.9
8-8F6MK4	1/2	1/2	27	46.1	
8-12F6MK4	1/2	3/4	32	48.0	2.9
12-8F6MK4	3/4	1/2	32	48.6	
12-12F6MK4	3/4	3/4	32	50.0	2.9
12-16F6MK4	3/4	1	41	54.3	1.7
16-16F6MK4	1	1	41	57.3	1.7

H6MK4 Full Dimensions

Swivel Nut Union
60° Swivel / 60° Swivel

Mates with D9 style hose fitting



TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4H6MK4	1/4	1/4	37.0	5.1
6-4H6MK4	3/8	1/4	38.6	5.1
6H6MK4	3/8	3/8	40.5	5.1
8-4H6MK4	1/2	1/4	41.5	2.9
8-6H6MK4	1/2	3/8	42.9	2.9
8H6MK4	1/2	1/2	45.8	2.9
10H6MK4	5/8	5/8	47.5	2.9
12-8H6MK4	3/4	1/2	48.2	2.9
12H6MK4	3/4	3/4	49.5	2.9
16H6MK4	1	1	57.5	1.7
20H6MK4	1 1/4	1 1/4	66.0	1.5
24H6MK4	1 1/2	1 1/2	70.0	1.5

Dimensions and pressures for reference only, subject to change.

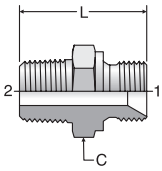
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FMK4 Full Dimensions

NPTF Male Connector
60° Cone / NPT

Mates with 92, B1, B2 and B4 style hose fitting

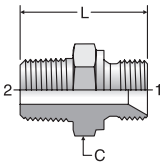


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 NPTF	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2FMK4	1/8	1/8	14	24.4	5.1
2-4FMK4	1/8	1/4	19	28.9	5.1
4FMK4	1/4	1/8	19	28.9	5.1
4-4FMK4	1/4	1/4	19	33.4	5.1
4-6FMK4	1/4	3/8	19	33.6	5.1
6FMK4	3/8	1/4	22	35.1	5.1
6-6FMK4	3/8	3/8	22	35.1	5.1
6-8FMK4	3/8	1/2	22	39.9	5.1
8FMK4	1/2	3/8	27	38.6	2.9
8-8FMK4	1/2	1/2	27	43.4	2.9
8-12FMK4	1/2	3/4	27	43.9	2.9
12-8FMK4	3/4	1/2	32	45.9	2.9
12FMK4	3/4	3/4	32	45.9	2.9
12-16FMK4	3/4	1	36	50.8	2.9
16-12FMK4	1	3/4	41	49.6	1.7
16FMK4	1	1	41	54.5	1.7

F3MK4 Full Dimensions

BSPT Male Connector
60° Cone / BSPT

Mates with 92, B1, B2 and B4 style hose fitting

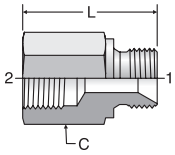


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPT	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2F3MK4	1/8	1/8	14	24.4	5.1
2-4F3MK4	1/8	1/4	14	28.9	5.1
4F3MK4	1/4	1/8	19	28.9	5.1
4-4F3MK4	1/4	1/4	19	33.4	5.1
4-6F3MK4	1/4	3/8	19	33.4	5.1
6F3MK4	3/8	1/4	22	35.1	5.1
6-6F3MK4	3/8	3/8	22	35.1	5.1
6-8F3MK4	3/8	1/2	22	39.9	2.9
8F3MK4	1/2	3/8	27	38.6	5.1
8-8F3MK4	1/2	1/2	22	43.4	2.9
10F3MK4	5/8	1/2	27	45.9	2.9
10-12F3MK4	5/8	3/4	30	45.9	2.9
12F3MK4	3/4	3/4	30	45.9	2.9
12-8F3MK4	3/4	1/2	32	46.0	1.7
12-16F3MK4	3/4	1	36	50.8	1.7
16F3MK4	1	1	41	54.5	1.7
16-12F3MK4	1	3/4	41	49.6	1.7
20F3MK4	1 1/4	1 1/4	50	63.7	1.5
24F3MK4	1 1/2	1 1/2	55	68.5	

G4MK4 Full Dimensions

BSPP Female Connector
60° Cone / BSPP

Mates with 92, B1, B2 and B4 style hose fitting

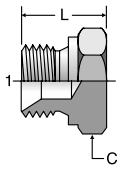


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
6G4MK4	3/8	1/4	22	37.1	5.1
6-6G4MK4	3/8	3/8	23	36.9	
8-4G4MK4	1/2	1/4	27	38.0	2.9
8G4MK4	1/2	3/8	30	45.3	2.9
12-4G4MK4	3/4	1/4	32	40.0	2.9
12-6G4MK4	3/4	3/8	32	41.6	2.9
12-8G4MK4	3/4	1/2	32	47.3	2.9
16-4G4MK4	1	1/4	41	43.0	1.7
16-6G4MK4	1	3/8	41	44.6	1.7
16-8G4MK4	1	1/2	41	50.3	1.7
16-12G4MK4	1	3/4	41	52.2	1.7

PNMK4

Hex Plug
60° Cone

Mates with 92, B1, B2 and B4 style hose fitting



TUBE FITTING PART #	END SIZE 1 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2PNMK4	1/8	14	14.3	5.1
4PNMK4	1/4	19	18.8	5.1
6PNMK4	3/8	22	20.5	5.1
8PNMK4	1/2	27	24.0	2.9
10PNMK4	5/8	30	24.0	2.9
12PNMK4	3/4	32	26.5	2.9
16PNMK4	1	41	30.2	1.7
20PNMK4	1 1/4	50	38.7	1.5
24PNMK4	1 1/2	55	42.7	1.5
32PNMK4	2	70	48.2	1

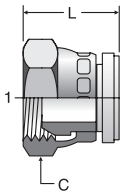
Dimensions and pressures for reference only, subject to change.

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FNMK4 Full Dimensions

Cap
60° Cone

Mates with D9 style hose fitting

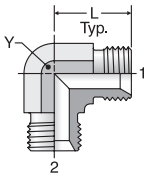


TUBE FITTING PART #	END SIZE 1 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2FNMK4	1/8	14	16.0	5.1
4FNMK4	1/4	19	20.6	5.1
6FNMK4	3/8	22	22.3	5.1
8FNMK4	1/2	27	22.7	2.9
10FNMK4	5/8	30	26.6	2.9
12FNMK4	3/4	32	28.0	2.9
16FNMK4	1	41	31.6	1.7
20FNMK4	1 1/4	50	35.9	1.5
24FNMK4	1 1/2	60	37.9	1.5

EMK4 Full Dimensions

Union Elbow
60° Cone / 60° Cone

Mates with D9/92, B1, B2 and B4 style hose fitting

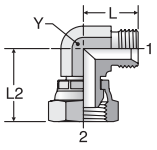


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	L (TYP.) (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2EMK4	1/8	1/8	16.6	11	5.1
4EMK4	1/4	1/4	27.8	14	5.1
6EMK4	3/8	3/8	31.7	19	5.1
8EMK4	1/2	1/2	37.0	22	2.9
10EMK4	5/8	5/8	39.0	22	2.9
12EMK4	3/4	3/4	41.6	27	2.9
16EMK4	1	1	49.7	23	1.7
20EMK4	1 1/4	1 1/4	54.4	41	1.5
24EMK4	1 1/2	1 1/2	53.7	48	1.5

C6MK4 Full Dimensions

Swivel Nut Elbow
60° Cone / 60° Swivel

Mates with D9/92, B1, B2 and B4 style hose fitting

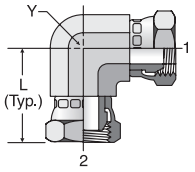


TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	L (mm)	L2 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2C6MK4	1/8	1/8	16.6	22.0	11	5.1
4C6MK4	1/4	1/4	27.8	31.2	19	5.1
6C6MK4	3/8	3/8	31.7	36.2	22	5.1
8C6MK4	1/2	1/2	37.0	41.0	27	2.9
10C6MK4	5/8	5/8	39.0	41.6	27	2.9
12C6MK4	3/4	3/4	41.6	45.3	33	2.9
16C6MK4	1	1	49.7	53.9	41	1.7
20C6MK4	1 1/4	1 1/4	54.4	60.0	48	1.5
24C6MK4	1 1/2	1 1/2	53.7	63.3	48	1.5

E6MK4 Full Dimensions

Swivel Nut Union Elbow
60° Swivel / 60° Swivel

Mates with D9 style hose fitting



TUBE FITTING PART #	END SIZE 1 BSPP	END SIZE 2 BSPP	L (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4E6MK4	1/4	1/4	30.5	14	5.1
6E6MK4	3/8	3/8	33.0	19	5.1
8E6MK4	1/2	1/2	38.8	22	2.9
10E6MK4	5/8	5/8	39.4	22	2.9
12E6MK4	3/4	3/4	42.3	27	2.9
16E6MK4	1	1	49.0	33	1.7
20E6MK4	1 1/4	1 1/4	58.2	41	1.5
24E6MK4	1 1/2	1 1/2	63.3	48	1.5

Dimensions and pressures for reference only, subject to change.

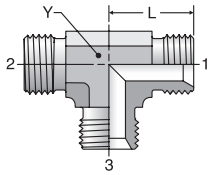
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JMK4 Full Dimensions

Union Tee
60° Cone (all three ends)

Mates with 92, B1, B2 and B4 style hose fitting

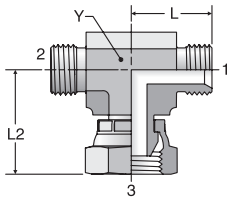


TUBE FITTING PART #	END SIZE 1 BSPP	2 BSPP	3 BSPP	L (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2JMK4	1/8	1/8	1/8	16.6	11	
4JMK4	1/4	1/4	1/4	27.8	19	5.1
6JMK4	3/8	3/8	3/8	31.7	22	5.1
8JMK4	1/2	1/2	1/2	37.0	27	2.9
10JMK4	5/8	5/8	5/8	39.0	27	2.9
12JMK4	3/4	3/4	3/4	41.9	33	2.9
16JMK4	1	1	1	49.7	41	1.7
20JMK4	1 1/4	1 1/4	1 1/4	54.4	48	1.5
24JMK4	1 1/2	1 1/2	1 1/2	53.7	48	1.5

S6MK4 Full Dimensions

Swivel Nut Branch Tee
60° Cone / 60° Cone / 60° Swivel

Mates with D9/92, B1, B2 and B4 style hose fitting

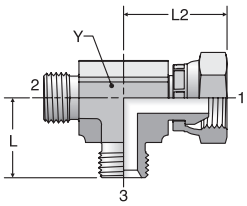


TUBE FITTING PART #	END SIZE 1 BSPP	2 BSPP	3 BSPP	L (mm)	L2 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2S6MK4	1/8	1/8	1/8	16.6	22.0	11	5.1
4S6MK4	1/4	1/4	1/4	27.8	31.2	19	5.1
6S6MK4	3/8	3/8	3/8	31.7	36.2	27	5.1
8S6MK4	1/2	1/2	1/2	37.0	41.0	27	2.9
10S6MK4	5/8	5/8	5/8	39.0	41.6	27	2.9
12S6MK4	3/4	3/4	3/4	41.6	45.3	33	2.9
16S6MK4	1	1	1	49.7	53.9	41	1.8
20S6MK4	1 1/4	1 1/4	1 1/4	54.4	60.0	48	1.5

R6MK4 Full Dimensions

Swivel Nut Run Tee
60° Cone / 60° Swivel / 60° Cone

Mates with D9/92, B1, B2 and B4 style hose fitting

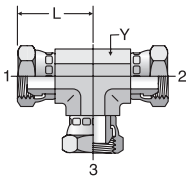


TUBE FITTING PART #	END SIZE 1 BSPP	2 BSPP	3 BSPP	L (mm)	L2 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
2R6MK4	1/8	1/8	1/8	16.6	22.0	11	5.1
4R6MK4	1/4	1/4	1/4	27.8	31.2	19	5.1
6R6MK4	3/8	3/8	3/8	31.7	36.2	27	5.1
8R6MK4	1/2	1/2	1/2	37.0	41.0	27	2.9
10R6MK4	5/8	5/8	5/8	39.0	41.6	27	2.9
12R6MK4	3/4	3/4	3/4	41.6	45.3	33	2.9
16R6MK4	1	1	1	49.7	53.9	41	1.8
20R6MK4	1 1/4	1 1/4	1 1/4	54.4	60.0	48	1.5

J6MK4 Full Dimensions

Swivel Nut Union Tee
60° Swivel (all three ends)

Mates with D9 style hose fitting



TUBE FITTING PART #	END SIZE 1 BSPP	2 BSPP	3 BSPP	L (TYP.) (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4J6MK4	1/4	1/4	1/4	30.5	14	5.1
6J6MK4	3/8	3/8	3/8	33.0	19	5.1
8J6MK4	1/2	1/2	1/2	38.8	22	2.9
10J6MK4	5/8	5/8	5/8	39.4	22	2.9
12J6MK4	3/4	3/4	3/4	42.3	27	2.9
16J6MK4	1	1	1	49.0	33	1.7
20J6MK4	1 1/4	1 1/4	1 1/4	58.2	41	1.5

Dimensions and pressures for reference only, subject to change.

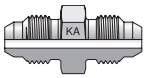
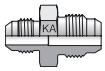
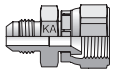
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Komatsu® Style Adapters



The Fitting Authority

30° Flare Metric Thread	PNMKA Plug	FNMKA Cap	HMKA Union	XHMKA 37° Flare / 30° Flare	XHMKA6 37° Flare / 30° Swivel
					
	K6	K6	K6	K6	K6

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Introduction

The 30° flare, metric thread interface, also known as the Komatsu style flare fitting, is one of the most common specialized OEM mobile equipment fittings in the marketplace. Parker offers a line of caps, plugs and conversion adapters to mate with this specialty connection. Parker's line of products is designated as "KA" adapters.

The Komatsu style connection is generally rated at 4000 psi (280 kg/cm^2 or 27.5 Mpa). Parker's caps, plugs and conversion adapters are rated at the full pressure rating in sizes 4-16, with slight pressure reductions in the less common sizes of -20 and -24.

Parker's offering of Komatsu style adapters allow for more aftermarket flexibility. Parker's caps and plugs enable technicians to protect critical sealing surfaces of hoses and adapters from damage and contamination. This protection is important during testing, repair and/or implement installation and removal.

Parker's line of Komatsu style conversion adapters are ideal for emergency situations, field repair, or "plumbing in" hydraulic attachments and options. Parker's exclusive swivel nut design minimizes the sealing surface damage to mating components.

Design and Construction

Parker's line of Komatsu style fitting is sold only as a hose adapter and thus tube nuts and sleeves are not available. The adapter consists of a single body. The mating hose swivel mates directly to the 30° nose of the adapter. This simple, metal-to-metal connection provides a very effective seal between the fitting nose and the hose swivel seat.

The Komatsu style adapter offers the traditional advantages of the 37° flare fitting but incorporates the following differences:

1) 30° nose flare
2) Metric threads with 1.5 mm pitch
3) Used only as a hose adapter
4) Heavy duty crimp nut for higher assembly torques

Due to the prevalent field repair needs of mobile equipment and relative simplicity of the Komatsu style fitting, several manufacturers offer a similar product line. Even though some manufacturers conform to the same dimensional standards, there are significant performance advantages to Parker's product offering due to higher integrity manufacturing methods and Parker's commitment to quality.

Materials Specifications

Komatsu style components are manufactured using state-of-the-art equipment and manufacturing technologies to assure construction integrity, highest strength, long service life and the highest quality. At the heart of the Komatsu Style product line is the finest raw materials and manufacturing technologies as outlined in Table K1 and discussed below:

Komatsu Style Adapter Bodies: Komatsu style fittings are manufactured in five configurations. All straight bodies are manufactured from cold drawn bar stock.

Komatsu Style Crimp Swivel Nuts: Komatsu style crimp nuts are machined from cold drawn barstock.



Fig. K1 – Cutaway of Komatsu Style Adapter

Komatsu Style Adapters	Steel
	Type
Bodies	12L14
Crimp Nuts	1215 or 1018

Table K1 – Standard Material Specifications for Komatsu Style Adapters

Note: On request, Komatsu style fittings can be furnished in materials other than those shown above.

Finish: Zinc with yellow chromate (being changed to zinc chromium 6 free) is used on all standard steel products.

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Product Specifications

Komatsu style fittings are offered in eight common sizes. See Table K2 below, which shows the Komatsu nominal size and the equivalent Parker TFD Dash Size. The table also shows the equivalent Parker Hose Products / Parflex Division mating hose series.

Komatsu Nominal Size	Parker TFD Equivalent Dash Size	Komatsu Thread	Parker Hose Fitting Mating Series
02	-4	M14 x 1.5	MU
03	-6	M18 x 1.5	MU
04	-8	M22 x 1.5	MU
05	-10	M24 x 1.4	XU
06	-12	M30 x 1.5	XU
10	-16	M33 x 1.5	XU
12	-20	M36 x 1.5	XU
14	-24	M42 x 1.5	XU

Table K2 – Parker equivalent dash sizes and mating hose series for Komatsu Style Fittings



Fig. K2 – Komatsu Style Caps and Plugs



Fig. K3 – Komatsu Style Conversion Adapter

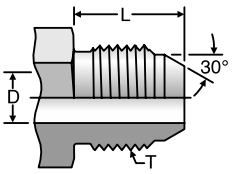
Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Komatsu® Style Adapters.

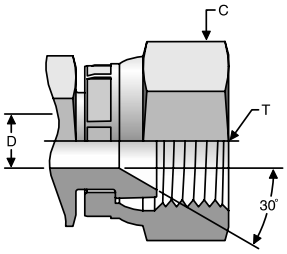
Dimensions and pressures for reference only, subject to change.

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Komatsu Ends



Komatsu Male, 30° Flare



Komatsu Swivel

	Metric Thread	Hex	Drill	Male Turn Back
Dash Size	**T** Metric	**C** (mm)	**D** (mm)	**L** (mm)
4	M14x1.5	19	0.197	16.0
6	M18x1.5	24	0.315	18.0
8	M22x1.5	27	0.394	20.0
10	M24x1.5	32	0.512	21.5
12	M30x1.5	36	0.551	26.0
16	M33x1.5	41	0.748	30.0

Dimensions and pressures for reference only, subject to change.

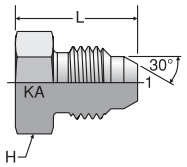
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PNMKA

Plug
30° Flare

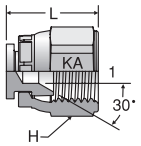
Mates with XU and MU series hose fittings



TUBE FITTING PART #	END SIZE 1 Metric Thread	H HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4PNMKA	M14 X 1.5	17	23.4	4.0
6PNMKA	M18 X 1.5	22	25.1	4.0
8PNMKA	M22 X 1.5	24	28.7	4.0
10PNMKA	M24 X 1.5	27	32.0	4.0
12PNMKA	M30 X 1.5	32	36.6	4.0
16PNMKA	M33 X 1.5	38	40.6	4.0

FNMKA

Cap
30° Flare



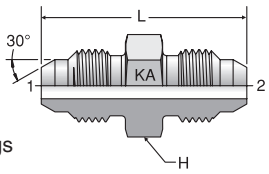
TUBE FITTING PART #	END SIZE 1 Metric Thread	H HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4FNMKA	M14 X 1.5	19	21.4	4.0
6FNMKA	M18 X 1.5	24	23.1	4.0
8FNMKA	M22 X 1.5	27	27.1	4.0
10FNMKA	M24 X 1.5	32	31.8	4.0
12FNMKA	M30 X 1.5	36	35.5	4.0
16FNMKA	M33 X 1.5	41	40.9	4.0

HMKA

Full Dimensions

Male Union
30° Flare

Mates with XU and MU series hose fittings



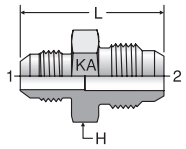
TUBE FITTING PART #	END SIZE 1&2 Metric Thread	H HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4-4HMKA	M14 X 1.5	17	39.4	4.0
6-6HMKA	M18 X 1.5	22	43.4	4.0
8-8HMKA	M22 X 1.5	24	47.5	4.0
10-10HMKA	M24 X 1.5	27	52.1	4.0
12-12HMKA	M30 X 1.5	32	63.2	4.0
16-16HMKA	M33 X 1.5	38	72.1	4.0

XHMKA

Full Dimensions

37° Conversion Adapter
30° Flare / 37° Flare

End 2 mates with XU and MU series hose fittings

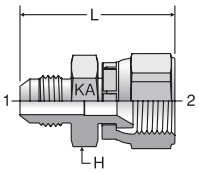


TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Metric Thread	H HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4-4XHMKA	1/4	M14 X 1.5	17	37.1	4.0
6-6XHMKA	3/8	M18 X 1.5	22	39.6	4.0
8-8XHMKA	1/2	M22 X 1.5	24	44.2	4.0
10-10XHMKA	5/8	M24 X 1.5	27	49.8	4.0
12-12XHMKA	3/4	M30 X 1.5	32	59.2	4.0
16-16XHMKA	1	M33 X 1.5	38	65.3	4.0

XHMKA6

Full Dimensions

37° Swivel Conversion Adapter
37° Flare / 30° Swivel



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Metric Thread	H HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) S
4-4XHMKA6	1/4	M14 X 1.5	17	40.6	4.0
6-6XHMKA6	3/8	M18 X 1.5	22	42.7	4.0
8-8XHMKA6	1/2	M22 X 1.5	24	49.0	4.0
10-10XHMKA6	5/8	M24 X 1.5	27	57.4	4.0
12-12XHMKA6	3/4	M30 X 1.5	32	65.8	4.0
16-16XHMKA6	1	M33 X 1.5	38	73.9	4.0

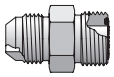
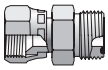
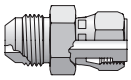
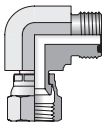
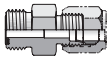
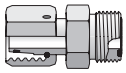
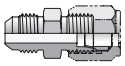
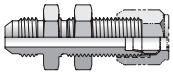
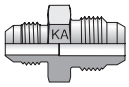
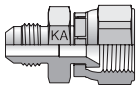
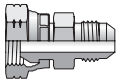
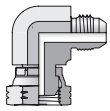
Dimensions and pressures for reference only, subject to change.

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Conversion Adapters



The Fitting Authority

ORFS to 37° Flare	**XHLO** 37° Flare / ORFS  L3	**LOHX6** 37° Swivel / ORFS  L3	**XHL6** 37° Flare / ORFS Swivel  L3	**LOEX6** Description  L3	
ORFS to 24° Flareless	**BUHLO** ORFS / 24° Flareless  L4	**ORFS to Metric 24° Flareless**	**LOHU86** Metric 24° Flareless/ORFS  L4		
37° Flare to 24° Flareless	**XHBU** 37° Flare / Flareless  L4	**XHBU2** 37° / Flareless Bulkhead  L4	**37° Flare to Komatsu Style 30° Flare**	**XHMKA** 37° Flare / 30° Flare  K6	**XHMKA6** 37° Flare / 30° Swivel  K6
37° Flare to Female BSPP Swivel (K4)	**XHMK46** 37° Flare / BSPP Swivel  L5	**XEMK46** 37° Flare / BSPP Swivel  L5	**37° Flare to Metric 24° Flareless**	**XHU86** 37° / Metric 24° Flareless  L5	

O-Rings and Seals (Shown in Section O)

O-Rings	**ORFS O-Ring**  O3	**EO O-Ring**  O8

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Visual Index

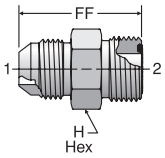
How To Order

Specs

Assembly / Installation

XHLO Full Dimensions

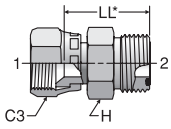
Male Adapter
37° Flare / ORFS



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	FF (in.)	H HEX (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 XHLO	1/4	1/4	1.25	5/8	7.5	
6 XHLO	3/8	3/8	1.34	3/4	6.0	
8 XHLO	1/2	1/2	1.55	7/8	6.0	7.2
10 XHLO	5/8	5/8	1.83	1 1/16	5.0	
12 XHLO	3/4	3/4	2.05	1 1/4	5.0	
16 XHLO	1	1	2.16	1 1/2	4.5	
20 XHLO	1 1/4	1 1/4	2.29	1 3/4	4.0	4.8
24 XHLO	1 1/2	1 1/2	2.48	2 1/8	3.0	

LOHX6 Full Dimensions

Swivel Adapter
37° Flare Swivel / ORFS

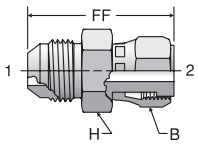


*LL – End to base of flare

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C3 HEX (in.)	H HEX (in.)	LL Ref. (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 LOHX6	1/4	1/4	9/16	5/8	0.89	7.5	
6 LOHX6	3/8	3/8	11/16	3/4	1.06	5.0	
8 LOHX6	1/2	1/2	7/8	7/8	1.21	5.0	6.0
10 LOHX6	5/8	5/8	1	1 1/16	1.40	5.0	
12 LOHX6	3/4	3/4	1 1/4	1 1/4	1.48	5.0	
16 LOHX6	1	1	1 1/2	1 1/2	1.64	3.6	
20 LOHX6	1 1/4	1 1/4	2	1 3/4	1.77	3.6	

XHL6 Full Dimensions

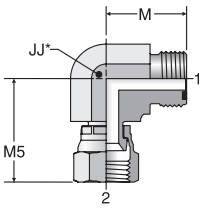
Male Swivel Adapter
ORFS Swivel / 37° Flare



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	B HEX (in.)	FF (in.)	H HEX (inch) (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 XHL6	1/4	1/4	11/16	1.50	5/8	7.5	9.2
6 XHL6	3/8	3/8	13/16	1.61	3/4	6.0	
8 XHL6	1/2	1/2	15/16	1.90	7/8	6.0	7.2
10 XHL6	5/8	5/8	1 1/8	2.20	1 1/16	5.0	
12 XHL6	3/4	3/4	1 3/8	2.50	1 1/4	5.0	
16 XHL6	1	1	1 5/8	2.66	1 1/2	4.5	
20 XHL6	1 1/4	1 1/4	1 7/8	2.80	1 11/16	4.0	

LOEX6 Full Dimensions

Swivel Elbow
ORFS / 37° Flare Swivel



* JJ – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 UN/UNF-2B	JJ (in.)	M (in.)	M5 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 LOEX6	1/4	1/4	9/16	0.85	1.08	7.5	
6 LOEX6	3/8	3/8	3/4	0.98	1.25	5.0	
8 LOEX6	1/2	1/2	3/4	1.10	1.38	5.0	
10 LOEX6	5/8	5/8	1 1/16	1.31	1.63	5.0	
12 LOEX6	3/4	3/4	1 3/16	1.47	1.80	5.0	
16 LOEX6	1	1	1 7/16	1.64	2.00		
20 LOEX6	1 1/4	1 1/4	1 5/8	1.76	2.31	3.6	
24 LOEX6	1 1/2	1 1/2	1 7/8	1.92	2.59		

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
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Visual Index

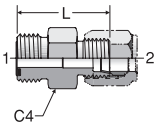
How To Order

Specs

Assembly / Installation

BUHLO Full Dimensions

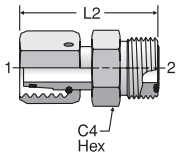
Ferulok Male Adapter
ORFS / SAE Flareless



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C4 HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
6 BUHLO	3/8	3/8	3/4	1.25	6.0	
8 BUHLO	1/2	1/2	7/8	1.45	5.0	
10 BUHLO	5/8	5/8	1 1/16	1.70	5.0	
12 BUHLO	3/4	3/4	1 1/4	1.88	4.5	
16 BUHLO	1	1	1 1/2	1.94	4.0	

LOHU86 Full Dimensions

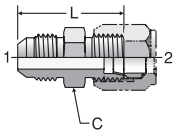
EO Swivel Adapter
24° Flareless Metric
Swivel (EO) / ORFS



TUBE FITTING PART #	END SIZE 1 EO Swivel	END SIZE 2 (in.)	C4 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
L Series						
4 -6L LOHU86	6L	1/4	5/8	1.32	4.5	
4-8L LOHU86	8L	1/4	5/8	1.32		
6-10L LOHU86	10L	3/8	3/4	1.44	4.5	
8-12L LOHU86	12L	1/2	7/8	1.53	4.5	
10-15L LOHU86	15L	5/8	1 1/16	1.82	4.5	
12-18L LOHU86	18L	3/4	1 1/4	1.89	4.5	
16-22L LOHU86	22L	1	1 1/2	2.08	2.5	
S Series						
4-6S LOHU86	6S	1/4	5/8	1.32	9.2	
4-8S LOHU86	8S	1/4	5/8	1.34	9.2	
6-10S LOHU86	10S	3/8	3/4	1.44	9.2	
8-12S LOHU86	12S	1/2	7/8	1.59	9.2	
10-14S LOHU86	14S	5/8	1 1/16	1.84	9.2	
10-16S LOHU86	16S	5/8	1 1/16	1.84	5.8	
12-20S LOHU86	20S	3/4	1 1/4	2.05	5.8	
16-25S LOHU86	25S	1	1 1/2	2.15	5.8	

XHBU Full Dimensions

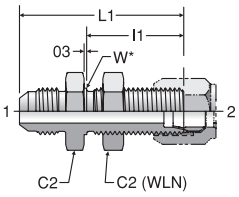
Union Adapter
SAE Flareless / 37° Flare



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C HEX (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 XHBU	1/4	1/4	1/2	1.19	5.0	7.7
6 XHBU	3/8	3/8	5/8	1.28	5.0	7.7
8 XHBU	1/2	1/2	13/16	1.47	5.0	7.7
10 XHBU	5/8	5/8	15/16	1.69	5.0	6.0
12 XHBU	3/4	3/4	1 1/8	1.94	4.5	6.0
16 XHBU	1	1	1 5/8	1.97	4.0	
20 XHBU	1 1/4	1 1/4	1 3/4	2.00	3.0	
24 XHBU	1 1/2	1 1/2	2 1/8	2.16	2.0	

XHBU2 Full Dimensions

Bulkhead Union Adapter
SAE Flareless Bulkhead /
37° Flare



*W – Bulkhead pilot dia. recommended clearance hole is +.015 over W dia.

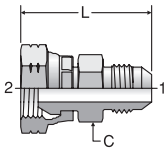
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C2 HEX (in.)	I1 (in.)	L1 (in.)	W (in.)	Max. Bulkhead Thickness	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS
4 XHBU2	1/4	1/4	11/16	1.13	1.94	0.44	0.38	5.0	7.7
6 XHBU2	3/8	3/8	13/16	1.17	2.08	0.56	0.40	5.0	7.7
8 XHBU2	1/2	1/2	1	1.31	2.31	0.75	0.40	5.0	7.7
10 XHBU2	5/8	5/8	1 1/8	1.45	2.56	0.88	0.37	5.0	
12 XHBU2	3/4	3/4	1 3/8	1.56	2.94	1.06	0.43	4.5	
16 XHBU2	1	1	1 5/8	1.56	2.95	1.31	0.43	4.0	

Dimensions and pressures for reference only, subject to change.

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XHMK46 Full Dimensions

BSPP Swivel Adapter
37° Flare / BSPP 60° Cone Swivel

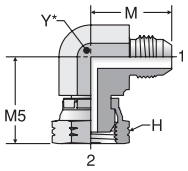


Swivel end mates with BS5200 (Parker K4) adapters and Parker D9 hose fittings.

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 BSPP	C HEX (mm)	L (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
6-4XHMK46	3/8	1/4-19	17	40.0	5.0
6XHMK46	3/8	3/8-19	17	39.2	4.0
8-6XHMK46	1/2	3/8-19	19	42.3	4.0
8XHMK46	1/2	1/2-14	19	45.0	4.0
10-8XHMK46	5/8	1/2-14	24	48.6	4.0
12XHMK46	3/4	3/4-14	30	50.0	4.0
12-16XHMK46	3/4	1-11	36	56.8	3.0
16XHMK46	1	1-11	36	58.0	3.0

XEMK46 Full Dimensions

90° BSP Swivel Adapter
37° Flare / BSPP 60° Cone Swivel



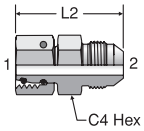
Swivel end mates with BS5200 (Parker K4) adapters and Parker D9 hose fittings.

* Y – Across wrench flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 BSPP	M (mm)	M5 (mm)	Y (mm)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
6-4XEMK46	3/8	1/4-19	26.9	33.2	19	4.0
6XEMK46	3/8	3/8-19	26.9	32.6	19	4.0
8-6XEMK46	1/2	3/8-19	31.8	32.6	19	4.0
8XEMK46	1/2	1/2-14	31.8	38.8	22	4.0
10-8XEMK46	5/8	1/2-14	36.8	38.8	22	4.0
12XEMK46	3/4	3/4-14	42.2	40.3	27	4.0
12-16XEMK46	3/4	1-11	42.2	48.8	33	3.0
16XEMK46	1	1-11	46.0	48.8	33	3.0

XHU86 Full Dimensions

EO Swivel Adapter
Metric Swivel (EO) / 37° Flare



TUBE FITTING PART #	END SIZE 1 EO Swivel	END SIZE 2 (in.)	C4 HEX (in.)	L2 (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
L Series							
4-6L XHU86	6L	1/4	1/2	1.47	4.5		
6-8L XHU86	8L	3/8	5/8	1.52	4.5		
6-10L XHU86	10L	3/8	5/8	1.57	4.5		
8-12L XHU86	12L	1/2	13/16	1.69	4.5		
10-15L XHU86	15L	5/8	15/16	1.98	4.5		
12-18L XHU86	18L	3/4	1 1/8	2.11	4.5		
16-22L XHU86	22L	1	1 3/8	2.36	2.3		
16-28L XHU86	28L	1	1 3/8	2.45	2.3		
S Series							
4-6S XHU86	6S	1/4	1/2	1.49	7.5		
6-8S XHU86	8S	3/8	5/8	1.57	7.5		
6-10S XHU86	10S	3/8	11/16	1.57	7.5		
8-12S XHU86	12S	1/2	13/16	1.75	6.0		
10-16S XHU86	16S	5/8	15/16	2.04	5.0		
12-20S XHU86	20S	3/4	1 1/8	2.29	5.0		
16-25S XHU86	25S	1	1 3/8	2.45	4.5		

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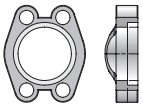
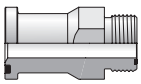
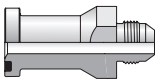
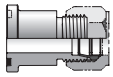
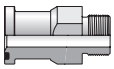
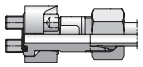
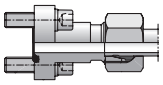
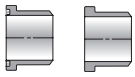
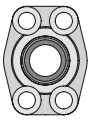
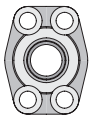
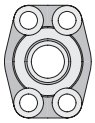
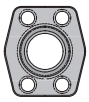
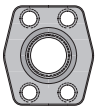
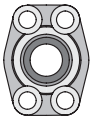
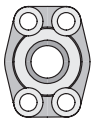
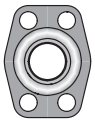
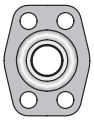
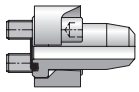
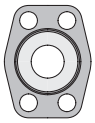
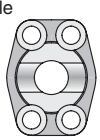
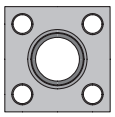
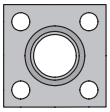
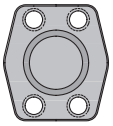
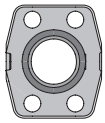
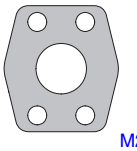
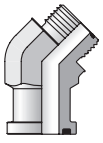
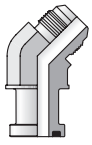
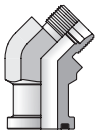
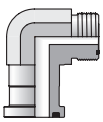
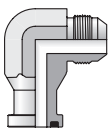
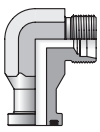
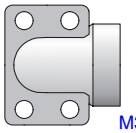
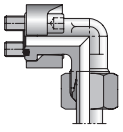
Dimensions and pressures for reference only, subject to change.

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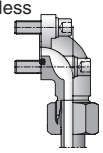
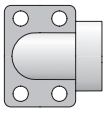
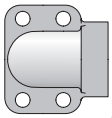
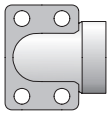
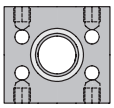
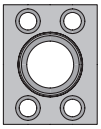
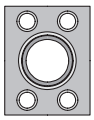
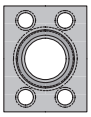
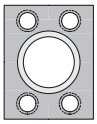
Hydraulic Flanges and Components



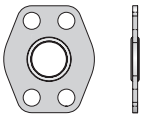
The Fitting Authority

Flange Clamps	**FCS** Flange Clamps – Split  M7	**FCC** Flange Clamp – Captive  M7	**FHS3** Code 61 Flange Clamps – Metric  M8	**FHS6** Code 62 Flange Clamps – Metric  M9	
Straight Flange Adapters / Flanges	**LOHQ** Code 61, 62 / ORFS  M10	**XHQ** Code 61, 62 / 37° Flare  M10	**BUHQ1** Code 61 / Flareless  M10	**F5OHQ** Code 61, 62 / SAE-ORB  M11	**GFS** Code 61, 62 / Metric Flareless  M12
BFG DIN Flange / Metric Flareless  M13	**B3HQ** Code 61, 62 / Flareless  M11	**P** Flange Head Plug  M13	**W7HQ** Flange Head / Pipe Socket  M14	**G5HQ** Flange Head / SAE-ORB  M14	**GHQ** Flange Head / NPT  M14
WB1/3/5HQ1 Code 61 / Weld Butt – Pipe  M15	**WB3/5/7HQ2** Code 62 / Weld Butt – Pipe  M15	**G5Q** Code 61, 62 / SAE-ORB  M16	**GQ** Code 61, 62 / NPT  M16	**G4Q** Code 61, 62 / BSPP  M17	**W5Q** Code 61, 62 / Socket – Pipe  M18
W4Q Code 61, 62 / Socket – Tube  M19	**W7Q** Code 61, 62 / Ext Socket – Pipe  M20	**W6Q** Code 61, 62 / Ext Socket – Tube  M21	**WB1/3/5Q1** Code 61 / Weld Butt – Pipe  M22	**WB3/5/7Q2** Code 62 / Weld Butt – Pipe  M23	**AS** Code 61, 62 / Weld Butt – Tube Metric  M24
WBT Code 61 / Weld Tank Adapter  M24	**WSD** Code 61, 62 / Weld Saddle  M25	**GQS** Square Flange / NPT  M25	**W5SQS** Square Flange / Weld Socket – Pipe  M26	**PQ** Code 61, 62 / Blank  M26	**SPGG5** Flange Spacer w/Gage Ports  M27
CP Flange Connector Plate  M27	**45° Flange Adapters**	**LOVQ** Code 61, 62 / ORFS  M28	**XVQ** Code 61, 62 / 37° Flare  M28	**BUVQ1** Code 61 / Flareless  M28	
90° Flange Adapters	**LOEQ** Code 61, 62 / ORFS  M29	**XEQ** Code 61, 62 / 37° Flare  M29	**BUEQ1** Code 61 / Flareless  M29	**W7EQ** Code 61, 62 / Weld Socket – Pipe  M30	**WFS** Code 61, 62 / Metric Flareless  M31

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BFW DIN Flange / Metric Flareless  M32	**90° Elbows**	**G5EQ** Code 61, 62 / SAE-ORB  M33	**GEQ** Code 61, 62 / NPT  M34	**W6EQ** Code 61, 62 / Weld Socket – Tube  M35	
Tee	**QPQPJQ** Code 61, 62 Junction Tee  M33	**Stainless Steel Flanges**	**G5Q** Code 61, 62 / SAE-ORB  M36	**GQ** Code 61, 62 / NPT  M36	**W5Q** Code 61, 62 / Weld Socket – Pipe  M37
PQ Code 61, 62 / Blank  M38					

O-Rings and Seals (Shown in Section O)

O-Rings and Seals	**Code 61/62 Flange Seal**  O9	**ORFS O-Ring**  O3	**SAE 4-Bolt Flange O-Ring**  O9

Equipment (Shown in Section S)

Flanging Tools	**Parflange 1050**  S24

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Visual Index

Introduction

The 4-bolt flange connections conforming to SAE J518 and ISO 6162-1 and -2 are proven, leak-free connections, especially suited for larger sizes, higher pressures and assembly in tight quarters. Threaded port connections such as SAE straight thread O-ring and ISO 6149 are reasonably easy to assemble and provide 6000 psi and higher pressure capability up to size 12 (M27). Beyond this size the pressure rating starts to decrease and assembly torques increase rapidly. The 4-bolt flange port connections provide ability to connect larger sizes and achieve higher-pressure capability at reasonable assembly torques. Because of the lower assembly torques compared to an equivalent size threaded port, these connections are well suited for tight quarters where wrench clearances are limited. Parker 4-bolt flange products described in this part of the catalog provide various means of connecting tubes, hoses, pipes and threaded fittings to 4-bolt flange ports. The discussion below provides an overview of some of the available flange products.

Design and Construction

Parker 4-bolt flange products are designed to provide different methods of connecting a tube, hose, pipe or another fitting to the SAE standard 4-bolt flange port.

Flange Fittings — All Parker flange fittings, except for those with square mounting hole patterns (nomenclature code QS), are designed to conform to O-ring groove, bolt holes and bolt pattern dimensions of either Code 61 or Code 62 of SAE J518 and ISO 6162-1 (Code 61) or -2 (Code 62).

The flange adapters (Code Q1 and Q2), and flange block fittings (Codes Q1B, Q2B and QSB) have O-ring grooves conforming to dimensions in SAE J518. The flange block fittings (Codes Q1B and Q2B) have through holes for the mounting bolts, again conforming to SAE J518. There is no industry standard for the bolt pattern of the square pattern block flanges with codes QSP and QSB.

The flange pad fittings (Codes Q1P, Q2P, and QSP) have a flat face (no O-ring groove) and the mounting holes are tapped. Where these fittings are used, the seal is in the mating part (flange adapter, flange hose fitting, flange block fitting, etc.) as shown in Fig. M1.

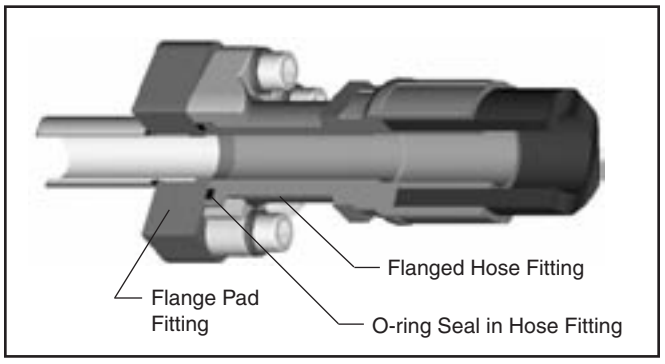


Fig. M1 – Flange Pad Fitting

Dimensions other than the O-ring groove, bolt holes, bolt pattern, and the flange foot print (for codes Q1B and Q2B only) are not governed by any industry standard. However, Parker product design follows common industry practice and sound engineering.

Flange Clamps — Clamps are used for providing the holding power to the 4-bolt flange connection. They are offered in split and captive (one-piece) versions. The captive version is also offered with either drilled or tapped bolt holes. The captive flange clamp with tapped holes is used while connecting a tube to another tube or a hose.

Parker flange clamps are forged for higher strength and durability. They meet all requirements of SAE J518. The split clamps make it easy to assemble the connection in close quarters. They also make removal of the flange head component, such as a hose assembly, easy by loosening all four bolts and removing one clamp half, as shown in Fig. M2.

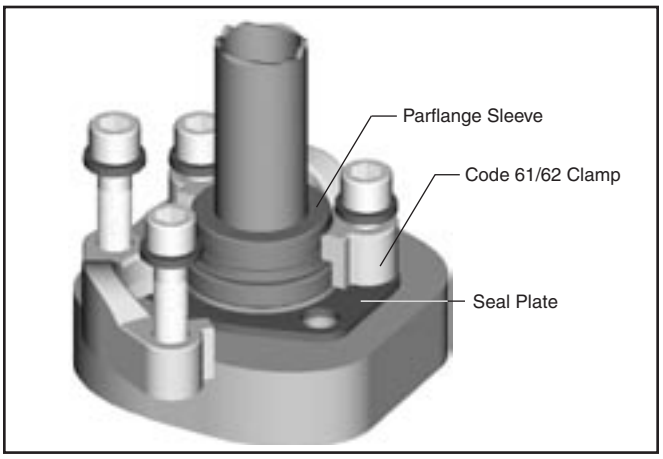


Fig. M2 – Assembly / Removal SAE J518 Connection

Junction Block Tees — These are solid block union fittings to connect two tube/hose assemblies using 4-bolt flange connection, at a junction, to SAE 4-bolt flange port, or three tube/hose assemblies to each other.

Connector Plate — Connector plate is used as a middle plate to connect two flange heads with O-ring grooves, such as two hose assemblies with flange connection ends. The flat surface of the plate provides sealing surface on each side for the O-ring housed in the hose ends.

Spacer Plate — Spacer plate provides access to the system fluid via the gage port on the side. The plate is between the flange connection to provide this access.

Plugs — Plugs provide a means to block off the 4-bolt flange port with and without clamps, and to plug the end of a pipe (via welding).

Tank Weld Adapter — Tank weld adapters provide a means of flange connection to a fabricated reservoir or tank.

Hydraulic Flanges	Steel		Stainless Steel	
	ASTM	Type	ASTM	Type
4-Bolt Flanges	A108	C1020	A240	316L
Flange Clamps	A108	C1045	A351 / A743	Nitronic 50
HHCS Bolts	SAE Grade 8		—	—
SHCS Bolts	—	—	A240	316

Table M1 – Standard Material Specifications for Hydraulic Flanges and Components

Note: Split flange clamps are zinc clear (or Cr6 free) chromate. All other steel flanges are oil dipped.

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Visual Index

How Flange Connections Work

The four-bolt flange connection (SAE J518) is a proven leak-free connection, especially suited for larger sizes. As a result, it has achieved worldwide acceptance.

The connection's success is in its simplicity. It is a static face seal using a high durometer O-ring for the seal and clamps and bolts for holding power as shown in Fig. M3. Alternatively, a bonded seal plate is between the port face and the flat face of a mechanically formed (flanged with Parflange® process) tube as shown in Fig. M4 to achieve the same results.

The (O-ring) seal is compressed between the bottom of the groove in the flange head and the flat surface of the port or flange pad, providing a reliable soft seal. The alternate seal plate has a high durometer bonded rubber seal on the inside edge, which compresses between the two flat surfaces, providing a soft seal with the same reliability. A metal-to-metal contact at the outer face of the flange with the port face keeps the seal from extruding under pressure. This metal-to-metal contact is maintained by the clamping force provided by tightening the bolts via the clamps.

This simple design provides several advantages over threaded port connections, such as NPTF, SAE, BSPP, ISO 6149, etc., in larger sizes:

- Ability to connect up to 5 inch O.D tube (Code 61 only)
- Much lower tightening torque required from the four bolts compared to that required for equivalent size threaded port
- Less tightening torque means smaller wrenches and wrench swing clearances — providing ease of assembly in tight quarters
- Up to 6000 psi capability through 2" size (Code 62 only)
- Single seal point between tube/pipe/hose assembly and the port
- Ease of disassembly through use of split clamps

The connection has one disadvantage — it requires a larger area (foot print) on the component than an equivalent threaded port.

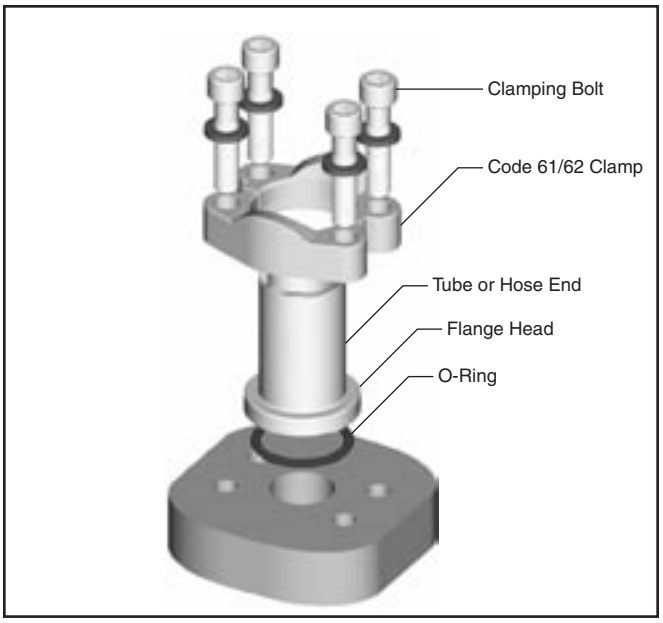


Fig. M3 – Four-Bolt Flange Connection (SAE J518)

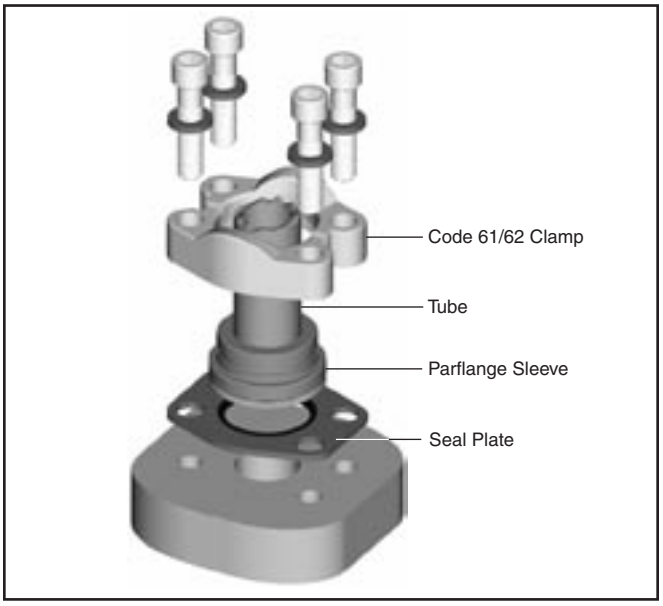


Fig. M4 – Formed Tube with ISO 6162 (SAE J518) Connection

Assembly and Installation

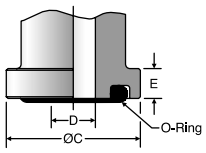
Please refer to Section T for the assembly and installation instructions for Hydraulic Flanges and Components fittings.

Feature	Advantage	Benefit
Conform to SAE J518 and ISO 6162	Controls dimensions and tolerances of code 61 and 62 port connections	Insures interchangeability and consistency
Forged Construction	Reliable, long life performance	No downtime, reduced costs
	Compact envelope size, no sharp edges	Reduced weight
Over 60 Configurations	Flexibility in plumbing, match system needs	Best solution and best value
Parflange Technology	Designed to be used with Code 61/62 fittings	Eliminates messy and time consuming brazing process
Mounting Hardware	Grade 8 bolts standard	Performs in rigorous applications for the life of the flange
Flange Kits	Flange with hardware for mounting (o-ring, bolts and lockwashers)	Reduces order and assembly error

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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Code 61 and Code 62 Port Ends



SIZE	Flange O.D. C (inch)	Drill D Max (inch)	Flange Height E (inch)
CODE 61			
8	1.19	0.50	0.265
12	1.50	0.75	0.265
16	1.75	1.00	0.315
20	2.00	1.25	0.315
24	2.38	1.50	0.315
32	2.81	2.00	0.375
CODE 62			
8	1.25	0.50	0.305
12	1.63	0.75	0.345
16	1.88	1.00	0.375
20	2.13	1.25	0.405
24	2.50	1.50	0.495
32	3.13	2.00	0.495

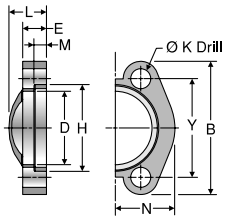
Dimensions and pressures for reference only, subject to change.

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FCS

Code 61/62 Flange Clamps, Split

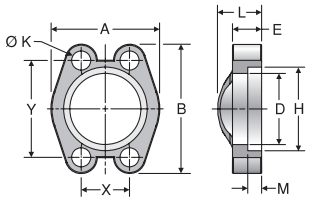


TUBE FITTING PART #	HOSE PRODUCTS PART #	HOSE PRODUCTS PART #	FLANGE SIZE	B	D	E	H	K DRILL DIA.	L	M	N	Y	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
FLANGE HALF	FLANGE HALF	KIT	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	HHCS	S	SS
CODE 61 FLANGE CLAMPS, SPLIT															
8FCS1	**51H-8**	**5151HK-8**	0.50	2.12	0.955	0.50	1.22	0.344	0.75	0.245	0.86	1.50	5/16-18 x 1.25	5.0	5.0
12FCS1	**51H-12**	**5151HK-12**	0.75	2.56	1.265	0.56	1.53	0.406	0.88	0.245	0.98	1.88	3/8-16 x 1.25	5.0	5.0
16FCS1	**51H-16**	**5151HK-16**	1.00	2.75	1.515	0.62	1.78	0.406	0.94	0.295	1.11	2.06	3/8-16 x 1.25	5.0	5.0
20FCS1	**51H-20**	**5151HK-20**	1.25	3.12	1.720	0.56	2.03	0.469	0.88	0.295	1.39	2.31	7/16-14 x 1.50	4.0	4.0
24FCS1	**51H-24**	**5151HK-24**	1.50	3.69	2.000	0.62	2.41	0.531	1.00	0.295	1.58	2.75	1/2-13 x 1.50	3.0	3.0
32FCS1	**51H-32**	**5151HK-32**	2.00	4.00	2.470	0.62	2.84	0.531	1.03	0.355	1.86	3.06	1/2-13 x 1.50	3.0	3.0
40FCS1	**51H-40**	**5151HK-40**	2.50	4.50	2.950	0.75	3.34	0.531	1.50	0.355	2.09	3.50	1/2-13 x 1.75	2.5	2.5
48FCS1	**51H-48**	**5151HK-48**	3.00	5.31	3.580	0.88	4.03	0.656	1.62	0.355	2.53	4.19	5/8-11 x 1.75	2.0	2.0
56FCS1	**51H-56**	**5151HK-56**	3.50	6.00	4.030	0.88	4.53	0.656	1.12	0.422	2.70	4.75	5/8-11 x 1.75	0.5	0.5
64FCS1	**51H-64**	**5151HK-64**	4.00	6.38	4.530	1.00	5.03	0.656	1.38	0.422	2.95	5.13	5/8-11 x 2.00	0.5	0.5
CODE 62 FLANGE CLAMPS, SPLIT															
12FCS2	**HFH-12**	**HFHFHK-12**	0.75	2.81	1.280	0.75	1.66	0.406	1.12	0.325	1.14	2.00	3/8-16 x 1.50	6.0	6.0
16FCS2	**HFH-16**	**HFHFHK-16**	1.00	3.19	1.530	0.94	1.91	0.469	1.31	0.355	1.33	2.25	7/16-14 x 1.75	6.0	6.0
20FCS2	**HFH-20**	**HFHFHK-20**	1.25	3.75	1.750	1.06	2.16	0.531	1.50	0.385	1.48	2.63	1/2-13 x 1.75	6.0	6.0
24FCS2	**HFH-24**	**HFHFHK-24**	1.50	4.44	2.030	1.19	2.53	0.656	1.69	0.475	1.83	3.13	5/8-11 x 2.25	6.0	6.0
32FCS2	**HFH-32**	**HFHFHK-32**	2.00	5.25	2.660	1.44	3.16	0.781	2.06	0.475	2.20	3.81	3/4-10 x 2.75	6.0	6.0

To order a flange clamp split kit, insert a “K” after the material designator in the Tube Fitting part number. The Kit includes two flange clamp halves, 4 HHCS bolts, 4 lock washers and an O-ring.

FCC

Code 61/62 Flange Clamp, Captive

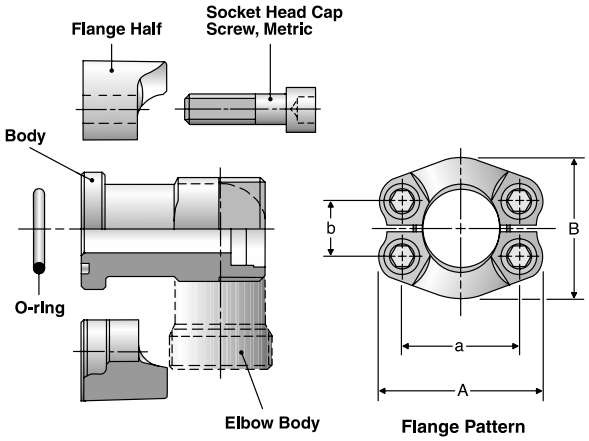


TUBE FITTING PART #		FLANGE	A	B	D	E	H	K DRILL	L	M	T TAP	X	Y	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
DRILLED HOLES	TAPPED HOLES	SIZE (in.)	(in.)	(in.)	(in.)	(in.)	(in.)	DIA. (in.)	(in.)	(in.)	UN-2B	(in.)	(in.)	HHCS	SX	SS
CODE 61 FLANGE CLAMP, CAPTIVE																
8FCC1	**8FCCT1**	0.50	1.81	2.125	0.955	0.50	1.219	0.344	0.75	0.245	5/16-18	0.688	1.500	5/16-18 x 1.25	5.0	
12FCC1	**12FCCT1**	0.75	2.06	2.560	1.265	0.56	1.531	0.406	0.88	0.245	3/8-16	0.875	1.875	3/8-16 x 1.25	5.0	
16FCC1	**16FCCT1**	1.00	2.31	2.750	1.515	0.62	1.781	0.406	0.94	0.295	3/8-16	1.031	2.062	3/8-16 x 1.25	5.0	
20FCC1	**20FCCT1**	1.25	2.88	3.125	1.720	0.56	2.031	0.469	0.88	0.295	7/16-14	1.188	2.312	7/16-14 x 1.50	4.0	
24FCC1	**24FCCT1**	1.50	3.25	3.705	2.000	0.62	2.406	0.531	1.00	0.295	1/2-13	1.406	2.750	1/2-13 x 1.50	3.0	
32FCC1	**32FCCT1**	2.00	3.81	4.000	2.470	0.62	2.844	0.531	1.03	0.355	1/2-13	1.688	3.062	1/2-13 x 1.50	3.0	
40FCC1	**40FCCT1**	2.50	4.28	4.500	2.950	0.75	3.344	0.531	1.50	0.355	1/2-13	2.000	3.500	1/2-13 x 1.75	2.5	
48FCC1	**48FCCT1**	3.00	5.16	5.315	3.580	0.88	4.031	0.656	1.62	0.355	5/8-11	2.438	4.188	5/8-11 x 1.75	2.0	
56FCC1	**56FCCT1**	3.50	5.50	6.000	4.030	0.88	4.531	0.656	1.12	0.422	5/8-11	2.750	4.750	5/8-11 x 1.75	0.5	
64FCC1	**64FCCT1**	4.00	6.00	6.375	4.530	1.00	5.031	0.656	1.38	0.422	5/8-11	3.062	5.125	5/8-11 x 2.00	0.5	
CODE 62 FLANGE CLAMP, CAPTIVE																
12FCC2	**12FCCT2**	0.75	2.38	2.810	1.280	0.75	1.656	0.406	1.12	0.325	3/8-16	0.938	2.000	3/8-16 x 1.50	6.0	
16FCC2	**16FCCT2**	1.00	2.75	3.190	1.530	0.94	1.906	0.469	1.31	0.355	7/16-14	1.094	2.250	7/16-14 x 1.75	6.0	
20FCC2	**20FCCT2**	1.25	3.06	3.750	1.750	1.06	2.156	0.531	1.50	0.385	1/2-13	1.250	2.625	1/2-13 x 1.75	6.0	
24FCC2	**24FCCT2**	1.50	3.75	4.440	2.030	1.19	2.531	0.656	1.69	0.475	5/8-11	1.438	3.125	5/8-11 x 2.25	6.0	
32FCC2	**32FCCT2**	2.00	4.50	5.250	2.660	1.44	3.156	0.781	2.06	0.475	3/4-10	1.750	3.8120	3/4-10 x 2.75	6.0	

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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FHS3
Flange Components



Code 61
For Straights and Elbows
(ISO 6162-1, Type 1)

Size	For Tube O.D. Series	Working Pressure (bar)	SAE Flange Halves	4 Socket Head Cap Screws DIN 912-8.8	O-Ring
1/2	15L	315	**FHS 32A3CX**	M8X30	OR18.64 x 3.53X
1/2	16S	350			
3/4	18L	315	**FHS 33A3CX**	M10X35	OR25.00 x 3.53X
3/4	22L	160			
3/4	20S	350			
3/4	25S	350			
1	28L	160	**FHS 34A3CX**	M10X35	OR32.92 x 3.53X
1	30S	350			
1 1/4	35L	160	**FHS 35A3CX**	M12X40*	OR37.70 x 3.53X
1 1/4	25S	280			
1 1/4	30S	280			
1 1/4	38S	280			
1 1/2	42L	160	**FHS 36A3CX**	M12X40	OR47.22 x 3.53X
1 1/2	38S	210			

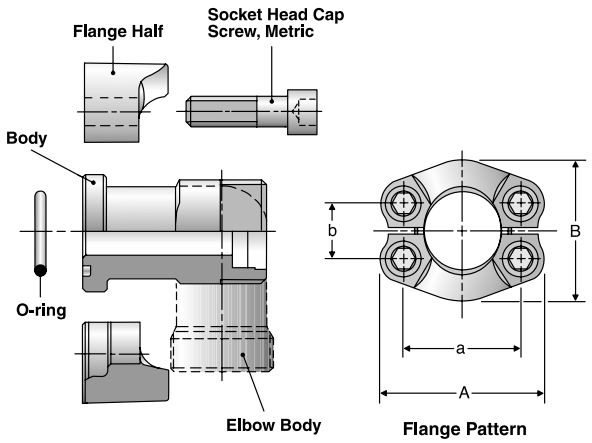
Size	For Tube O.D. Series	A ≈	B ≈	a	b
1/2	15L	54	46	38.1	17.5
1/2	16S	54	46	38.1	17.5
3/4	18L	65	52	47.6	22.2
3/4	22L	65	52	47.6	22.2
3/4	20S	65	52	47.6	22.2
3/4	25S	65	52	47.6	22.2
1	28L	70	59	52.4	26.2
1	30S	70	59	52.4	26.2
1 1/4	35L	79	73	58.7	30.2
1 1/4	25S	79	73	58.7	30.2
1 1/4	30S	79	73	58.7	30.2
1 1/4	38S	79	73	58.7	30.2
1 1/2	42L	94	83	69.9	35.7
1 1/2	38S	94	83	69.9	35.7

Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35°C up to +100°C, FPM (e.g., fluorocarbon on request) -25°C up to +120°C.

Tightening torques for socket head cap screws see Table T6.

* Does not meet ISO 6162 specification.

FHS6
Flange Components



Code 62
For Straights and Elbows
(ISO 6162-2, Type 1)

Size	For Tube O.D. Series	Working Pressure (bar)	SAE Flange Halves	4 Socket Head Cap Screws DIN 912-8.8	O-Ring
1/2	16S	400	**FHS 62A3CX**	M8X35	OR18.64 x 3.53X
3/4	16S	400	**FHS 63A3CX**	M10X35	OR25.00 x 3.53X
3/4	20S	400	**FHS 63A3CX**	M10X35	OR25.00 x 3.53X
3/4	25S	400	**FHS 63A3CX**	M10X35	OR25.00 x 3.53X
1	25S	400	**FHS 64A3CX**	M12X45	OR32.92 x 3.53X
1	30S	400	**FHS 64A3CX**	M12X45	OR32.92 x 3.53X
1 1/4	30S	400	**FHS 65A3CX**	M14X50*	OR37.70 x 3.53X
1 1/4	38S	315	**FHS 65A3CX**	M14X50*	OR37.70 x 3.53X
1 1/2	38S	315	**FHS 66A3CX**	M16X55	OR47.22 x 3.53X

Size	For Tube O.D. Series	A ≈	a	B ≈	b
1/2	16S	56	40.5	47	18.2
3/4	16S	71	50.8	60	23.8
3/4	20S	71	50.8	60	23.8
3/4	25S	71	50.8	60	23.8
1	25S	81	57.2	70	27.8
1	30S	81	57.2	70	27.8
1 1/4	30S	95	66.7	77	31.8
1 1/4	38S	95	66.7	77	31.8
1 1/2	38S	113	79.4	95	36.5

Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35° up to +100°C, FPM (e.g., fluorocarbon on request) -25° up to +120°C.

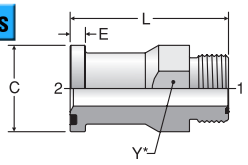
Tightening torques for socket head cap screws see Table T7.

* Does not meet ISO 6162 specification.

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LOHQ1 Full Dimensions

Code 61 Flange Connector
Code 61 / ORFS

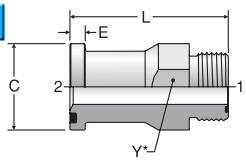


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 61	C (in.)	E (in.)	L (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 LOHQ1	3/4	3/4	1.500	0.265	2.79	1 3/8	5.0
16 LOHQ1	1	1	1.750	0.315	2.81	1 5/8	5.0
20 LOHQ1	1 1/4	1 1/4	2.000	0.315	3.21	1 7/8	4.0
24 LOHQ1	1 1/2	1 1/2	2.375	0.315	3.29	2 1/8	3.0

LOHQ2 Full Dimensions

Code 62 Flange Connector
Code 62 / ORFS

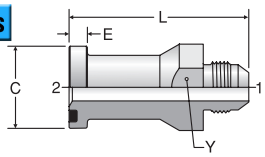


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 62	C (in.)	E (in.)	L (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 LOHQ2	3/4	3/4	1.625	0.345	3.02	1 3/8	6.0
12-16 LOHQ2	3/4	1	1.875	0.375	3.34	1 5/8	6.0
16 LOHQ2	1	1	1.875	0.375	3.36	1 5/8	6.0
20 LOHQ2	1 1/4	1 1/4	2.125	0.405	3.48	1 7/8	5.0
24 LOHQ2	1 1/2	1 1/2	2.500	0.495	4.14	2 1/8	4.5

XHQ1 Full Dimensions

Code 61 Flange Connector
Code 61 / 37° Flare

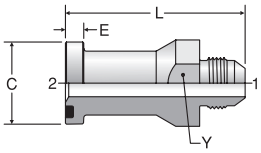


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 61	C (in.)	E (in.)	L (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 XHQ1	3/4	3/4	1.500	0.265	2.77	1 3/8	5.0
16 XHQ1	1	1	1.750	0.315	2.91	1 5/8	5.0
20 XHQ1	1 1/4	1 1/4	2.000	0.315	3.36	1 7/8	4.0
24 XHQ1	1 1/2	1 1/2	2.375	0.315	3.57	2 1/8	3.0
32 XHQ1	2	2	2.812	0.375	4.04	2 5/8	2.0

XHQ2 Full Dimensions

Code 62 Flange Connector
Code 62 / 37° Flare

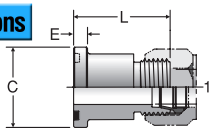


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 62	C (in.)	E (in.)	L (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 XHQ2	3/4	3/4	1.625	0.345	3.08	1 3/8	5.0
16 XHQ2	1	1	1.875	0.375	3.43	1 5/8	5.0
20 XHQ2	1 1/4	1 1/4	2.125	0.405	3.60	1 7/8	4.0
24 XHQ2	1 1/2	1 1/2	2.500	0.495	4.34	2 1/8	3.0

BUHQ1 Full Dimensions

Code 61 Connector
Code 61 / Flareless



TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 61	C (in.)	E (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 BUHQ1	3/4	3/4	1.500	0.265	1.82	
16 BUHQ1	1	1	1.750	0.315	1.88	
20 BUHQ1	1 1/4	1 1/4	2.000	0.315	1.82	
24 BUHQ1	1 1/2	1 1/2	2.375	0.315	1.94	
32 BUHQ1	2	2	2.812	0.375	1.97	

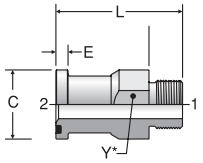
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
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F5OHQ1 Full Dimensions

Code 61 Connector
Code 61 / SAE-ORB

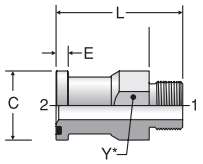


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 61	C (in.)	E (in.)	L (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 F5OHQ1	3/4	3/4	1.500	0.265	2.63	1 3/8	5.0
16 F5OHQ1	1	1	1.750	0.315	2.73	1 5/8	4.5
20 F5OHQ1	1 1/4	1 1/4	2.000	0.315	3.13	1 7/8	4.0
24 F5OHQ1	1 1/2	1 1/2	2.375	0.315	3.22	2 1/8	3.0
32 F5OHQ1	2	2	2.812	0.375	3.49	2 3/4	3.0

F5OHQ2 Full Dimensions

Code 62 Connector
Code 62 / SAE-ORB



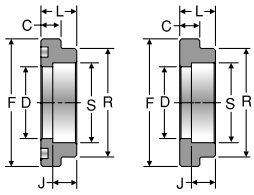
* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 Code 62	C (in.)	E (in.)	L (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 F5OHQ2	3/4	3/4	1.625	0.345	3.08	1 3/8	6.0
16 F5OHQ2	1	1	1.875	0.375	3.25	1 5/8	5.5
20 F5OHQ2	1 1/4	1 1/4	2.125	0.405	3.37	1 7/8	4.5
24 F5OHQ2	1 1/2	1 1/2	2.500	0.495	3.99	2 1/8	4.0
32 F5OHQ2	2	2	3.125	0.495	4.86	2 3/4	3.0

B3HQ

Braze Flange Head Connector, Tube
Tube Braze Socket* / Code 61/62 Flange Head

*** For clearance brazing**



O-ring Face Flat Face

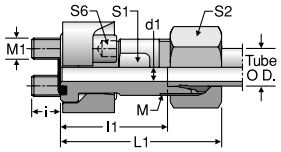
TUBE FITTING PART # O-RING FACE	TUBE FITTING PART # FLAT FACE	FLANGE SIZE (in.)	TUBE O.D. (in.)	C (in.)	D (in.)	F (in.)	J (in.)	L (in.)	R (in.)	S (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS
TUBE BRAZE SOCKET / CODE 61 FLANGE HEAD												
8B3HQ1	**8B3HQ1N**	0.50	1/2	0.265	0.406	1.188	0.312	0.50	0.940	0.502	5.0	
10-8B3HQ1	**10-8B3HQ1N**	0.50	5/8	0.265	0.500	1.188	0.312	0.50	0.940	0.625	5.0	
12B3HQ1	**12B3HQ1N**	0.75	3/4	0.265	0.656	1.500	0.375	0.56	1.250	0.752	4.5	
16-12B3HQ1	**16-12B3HQ1N**	0.75	1	0.315	0.750	1.500	0.375	0.56	1.250	1.002	4.5	
16B3HQ1	**16B3HQ1N**	1.00	1	0.315	0.906	1.750	0.375	0.56	1.500	1.002	4.5	
20-16B3HQ1	**20-16B3HQ1N**	1.00	1 1/4	0.315	1.000	1.750	0.375	0.56	1.500	1.252	4.0	
20B3HQ1	**20B3HQ1N**	1.25	1 1/4	0.315	1.125	2.000	0.375	0.56	1.700	1.252	3.5	
24-20B3HQ1	**24-20B3HQ1N**	1.25	1 1/2	0.315	1.250	2.000	0.375	0.56	1.700	1.502	3.5	
24B3HQ1	**24B3HQ1N**	1.50	1 1/2	0.315	1.375	2.380	0.438	0.62	1.980	1.502	3.0	
28-24B3HQ1	**28-24B3HQ1N**	1.50	1 3/4	0.315	1.500	2.380	0.438	0.62	1.980	1.752	2.7	
32B3HQ1	**32B3HQ1N**	2.00	2	0.375	1.875	2.810	0.500	0.62	2.450	2.002	3.0	
36-32B3HQ1	**36-32B3HQ1N**	2.00	2 1/4	0.375	2.000	2.810	0.500	0.62	2.450	2.252	3.0	
40B3HQ1	**40B3HQ1N**	2.50	2 1/2	0.375	2.375	3.312	0.562	0.68	2.921	2.502	2.2	
44-40B3HQ1	**44-40B3HQ1N**	2.50	2 3/4	0.375	2.500	3.312	0.500	0.68	2.921	2.752	2.2	
48B3HQ1	**48B3HQ1N**	3.00	3	0.375	2.875	4.000	0.562	0.75	3.546	3.002	1.7	
TUBE BRAZE SOCKET / CODE 62 FLANGE HEAD												
12B3HQ2	**12B3HQ2N**	0.75	3/4	0.345	0.656	1.625	0.500	0.69	1.250	0.752	6.0	
16-12B3HQ2	**16-12B3HQ2N**	0.75	1	0.345	0.750	1.625	0.500	0.69	1.250	1.002	6.0	
16B3HQ2	**16B3HQ2N**	1.00	1	0.375	0.810	1.875	0.625	0.81	1.500	1.002	6.0	
20-16B3HQ2	**20-16B3HQ2N**	1.00	1 1/4	0.375	1.000	1.875	0.625	0.81	1.500	1.252	6.0	
20B3HQ2	**20B3HQ2N**	1.25	1 1/4	0.405	1.010	2.125	0.812	1.00	1.718	1.252	6.0	
24-20B3HQ2	**24-20B3HQ2N**	1.25	1 1/2	0.405	1.250	2.125	0.812	1.00	1.718	1.502	5.5	
24B3HQ2	**24B3HQ2N**	1.50	1 1/2	0.495	1.250	2.500	1.000	1.19	2.000	1.502	6.0	
28-24B3HQ2	**28-24B3HQ2N**	1.50	1 3/4	0.495	1.500	2.500	1.000	1.19	2.000	1.752	4.5	
32B3HQ2	**32B3HQ2N**	2.00	2	0.495	1.750	3.125	1.375	1.50	2.620	2.002	5.5	
36-32B3HQ2	**36-32B3HQ2N**	2.00	2 1/4	0.495	2.000	3.125	1.312	1.50	2.620	2.252	4.0	

Dimensions and pressures for reference only, subject to change.

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GFS

SAE Flange Connector – Standard Series
Code 61 & 62 / Metric Flareless



TUBE FITTING PART #	SIZE (in.)	TUBE O.D. (mm)	WORKING PRESSURE (bar)	M THREAD	d1 (mm)	i (mm)	l 1 (mm)	L1 ≈ (mm)	S1 (mm)	S2 (mm)	S6 (mm)	STANDARD MATERIAL FROM STOCK A3C	STANDARD MATERIAL FROM STOCK 71	STANDARD EO-2 FROM STOCK A3C	STANDARD EO-2 FROM STOCK 71
SAE FLANGE CONNECTIONS – CODE 61 – STANDARD SERIES															
GFS32/15LA3C	1/2	15L	200	M22 x 1.5	12	11.5	41	56	24	27	6	•		•	
GFS32/16SA3C	1/2	16S	220	M24 x 1.5	12	11.5	41.5	60	24	30	6	•		•	
GFS33/18LA3C	3/4	18L	200	M26 x 1.5	15	15.5	45.5	62	30	32	8	•		•	
GFS33/22LA3C	3/4	22L	100	M30 x 2	19	15.5	45.5	62	30	36	8	•		•	
GFS33/20SA3C	3/4	20S	220	M30 x 2	16	15.5	46.5	68	30	36	8	•		•	
GFS33/25SA3C	3/4	25S	220	M36 x 2	17	15.5	45	69	30	46	8	•		•	
GFS34/28LA3C	1	28L	100	M36 x 2	24	13.5	46.5	63	36	41	8	•		•	
GFS34/30SA3C	1	30S	220	M42 x 2	24	13.5	49.5	76	36	50	8	•		•	
GFS35/35LA3C	1 1/4	35L	100	M45 x 2	30	18.5	47.5	69	41	50	8	•		•	
GFS35/25SA3C	1 1/4	25S	175	M36 x 2	20	18.5	48	72	41	46	8	•		•	
GFS35/30SA3C	1 1/4	30S	175	M42 x 2	25	18.5	48.5	75	41	50	8	•		•	
GFS35/38SA3C	1 1/4	38S	175	M52 x 2	28	18.5	50	81	46	60	8	•		•	
GFS36/42LA3C	1 1/2	42L	100	M52 x 2	36	18.5	53	76	46	60	10	•		•	
GFS36/38SA3C	1 1/2	38S	130	M52 x 2	32	18.5	54	85	46	60	10	•		•	
SAE FLANGE CONNECTIONS – CODE 62 – HIGH PRESSURE SERIES															
GFS62/16SA3C	1/2	16S	250	M24 x 1.5	12	13.5	44.5	63	24	30	6	•		•	
GFS63/16SA3C	3/4	16S	250	M24 x 1.5	12	15.5	50.5	69	30	30	8	•		•	
GFS63/20SA3C	3/4	20S	250	M30 x 2	16	15.5	50.5	72	30	36	8	•		•	
GFS63/25SA3C	3/4	25S	250	M36 x 2	17	15.5	51	75	30	46	8	•		•	
GFS64/25SA3C	1	25S	250	M36 x 2	20	20.5	60	84	36	46	10	•		•	
GFS64/30SA3C	1	30S	250	M42 x 2	24	20.5	60.5	87	36	50	10	•		•	
GFS65/30SA3C	1 1/4	30S	250	M42 x 2	25	22.5	65.5	92	41	50	10	•		•	
GFS65/38SA3C	1 1/4	38S	200	M52 x 2	30	22.5	67	98	46	60	10	•		•	
GFS66/38SA3C	1 1/2	38S	200	M52 x 2	30	24.5	73	104	46	60	14	•		•	

EO-2 Part Number example: GFS33/18ZLA3C

Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35°C up to +100°C, FPM (e.g., fluorocarbon on request) -25°C up to +120°C.

Tightening torques for socket head cap screws see Tables T6 and T7.

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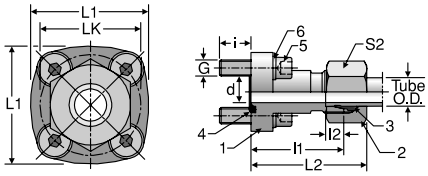
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BFG

DIN Flange / Metric Flareless

Tube connection according to DIN 2353



TUBE FITTING PART #	WORKING PRESSURE (bar)	TUBE O.D. (mm)	d (mm)	G	i (mm)	l 1 (mm)	l 2 (mm)	L1 (mm)	L2 (mm)	LK (mm)	S2 (mm)	STANDARD MATERIAL FROM STOCK A3C	STANDARD MATERIAL FROM STOCK 71	STANDARD EO-2 FROM STOCK A3C	STANDARD EO-2 FROM STOCK 71
BFG15L/LK40A3C	65	15	12	M 6	12.5	35	7	42	43	40	27	•		•	
BFG18L/LK40A3C	65	18	15	M 6	12.5	35	7.5	42	44	40	32	•		•	
BFG22L/LK40A3C	65	22	19	M 6	12.5	35	7.5	42	44.5	40	36	•		•	
BFG15L/LK35A3C	155	15	12	M 6	12.5	30	7	39	38	35	27	•		•	
BFG10L/LK35A3C	200	10	8	M 6	12.5	30	7	39	39	35	19	•		•	
BFG12L/LK35A3C	200	12	10	M 6	12.5	30	7	39	39	35	22	•		•	

Unassembled BFG Fitting Components

1 Straight Body	2 Nut	3 Progressive Ring	4 O-Ring	5 Cap Screws DIN 912-8.8 (4 pcs.)	6 Spring Washer DIN 127 (4 pcs.)
BFG15L/LK40A3CX	M15LA3CX	DPR15LA3CX	OR26X2.5X	M6X22	A6
BFG15L/LK40A3CX	M18LA3CX	DPR18LA3CX	OR26X2.5X	M6X22	A6
BFG22L/LK40A3CX	M22LA3CX	DPR22LA3CX	OR26X2.5X	M6X22	A6
BFG15L/LK35A3CX	M15LA3CX	DPR15LA3CX	OR20X2.5X	M6X22	A6
BFG10L/LK35A3CX	M10LA3CX	DPR10LA3CX	OR20X2.5X	M6X22	A6
BFG12L/LK35A3CX	M12LA3CX	DPR12LA3CX	OR20X2.5X	M6X22	A6

EO-2 Part Number example: BFG15ZL/LK40A3C

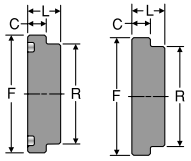
Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35°C up to +100°C, FPM (e.g., fluorocarbon on request) -25°C up to 120°C.

Tightening torques for socket head cap screws see Table T6.

P

Flange Head Plug

Code 61/62 Flange Head Plug



O-ring Face Flat Face

TUBE FITTING PART # O-RING FACE	TUBE FITTING PART # FLAT FACE	FLANGE SIZE (in.)	C (in.)	F (in.)	L (in.)	R (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	STANDARD Dynamic Pressure (x 1,000 PSI) SS
CODE 61 FLANGE HEAD PLUG								
8PQ1	**8PQ1N**	0.50	0.265	1.188	0.500	0.940	5.0	
12PQ1	**12PQ1N**	0.75	0.265	1.500	0.560	1.250	5.0	
16PQ1	**16PQ1N**	1.00	0.315	1.750	0.560	1.500	5.0	
20PQ1	**20PQ1N**	1.25	0.315	2.000	0.560	1.700	4.0	
24PQ1	**24PQ1N**	1.50	0.315	2.380	0.620	1.980	3.0	
32PQ1	**32PQ1N**	2.00	0.375	2.810	0.620	2.450	3.0	
40PQ1	**40PQ1N**	2.50	0.375	3.312	0.680	2.921	2.5	
48PQ1	**48PQ1N**	3.00	0.375	4.000	0.750	3.546	2.0	
CODE 62 FLANGE HEAD PLUG								
12PQ2	**12PQ2N**	0.75	0.345	1.625	0.687	1.250	6.0	
16PQ2	**16PQ2N**	1.00	0.375	1.875	0.812	1.500	6.0	
20PQ2	**20PQ2N**	1.25	0.405	2.125	1.000	1.718	6.0	
24PQ2	**24PQ2N**	1.50	0.495	2.500	1.187	2.000	6.0	
32PQ2	**32PQ2N**	2.00	0.495	3.125	1.500	2.620	6.0	

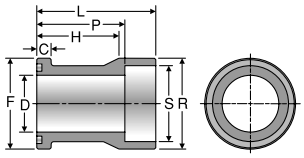
Dimensions and pressures for reference only, subject to change.

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W7HQ

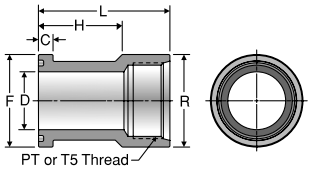
Weld Socket Flange Connector, Pipe
Extended Weld Socket, Pipe / Code 61 or 62 Flange Head



TUBE FITTING PART #	PIPE SIZE (in.)	FLANGE SIZE (in.)	C (in.)	D (in.)	F (in.)	H (in.)	L (in.)	P (in.)	R (in.)	S (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS
EXTENDED WELD SOCKET, PIPE / CODE 61 FLANGE HEAD												
12W7HQ1	3/4	0.75	0.265	0.750	1.500	1.62	2.34	1.78	1.500	1.062	3.5	
16W7HQ1	1	1.00	0.315	1.000	1.750	1.62	2.38	1.75	1.750	1.328	3.5	
20W7HQ1	1 1/4	1.25	0.315	1.250	2.000	1.81	2.62	1.94	2.000	1.672	3.5	
24W7HQ1	1 1/2	1.50	0.315	1.500	2.375	2.00	2.88	2.12	2.375	1.922	2.7	
32W7HQ1	2	2.00	0.375	2.000	2.812	2.00	3.00	2.12	2.812	2.406	2.5	
EXTENDED WELD SOCKET, PIPE / CODE 62 FLANGE HEAD												
16W7HQ2	1	1.00	0.375	1.000	1.875	2.34	3.06	2.62	2.000	1.328	5.5	
20W7HQ2	1 1/4	1.25	0.405	1.125	2.125	2.50	3.31	3.18	2.312	1.672	5.5	
24W7HQ2	1 1/2	1.50	0.495	1.375	2.500	3.06	3.93	3.18	2.750	1.922	5.5	
32W7HQ2	2	2.00	0.495	1.875	3.125	3.18	4.06	2.43	3.250	2.406	5.0	

GHQ / G5HQ

Threaded Port Flange Adapter
NPTF or SAE Port / Code 61 Flange Head



GHQ

TUBE FITTING PART #	PT PORT THREAD NPTF	FLANGE SIZE (in.)	C (in.)	D (in.)	F (in.)	H (in.)	L (in.)	R (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS
NPTF PORT / CODE 61 FLANGE HEAD										
12GHQ1	3/4-14	0.75	0.265	0.75	1.500	1.62	2.47	1.50	4.0	
16GHQ1	1-11 1/2	1.00	0.315	1.00	1.750	1.62	2.66	1.75	4.0	
20GHQ1	1 1/4-11 1/2	1.25	0.315	1.25	2.000	1.81	2.84	2.00	3.0	
24GHQ1	1 1/2-11 1/2	1.50	0.315	1.50	2.375	2.00	3.00	2.38	2.0	
32GHQ1	2-11 1/2	2.00	0.375	2.00	2.812	2.00	3.00	2.81	2.0	

G5HQ

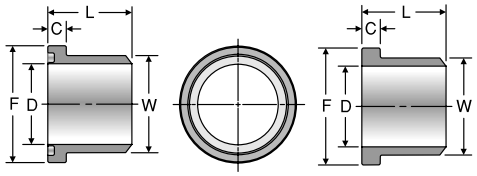
TUBE FITTING PART #	T5 PORT THREAD UN-2B	SAE PORT DASH SIZE	FLANGE SIZE (in.)	C (in.)	D (in.)	F (in.)	H (in.)	L (in.)	R (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS
SAE PORT / CODE 61 FLANGE HEAD											
12G5HQ1	1 1/6-12	12	0.75	0.265	0.75	1.500	1.62	2.47	1.50	4.0	
16G5HQ1	1 5/16-12	15	1.00	0.315	1.00	1.750	1.62	2.66	1.75	3.0	
20G5HQ1	1 5/8-12	20	1.25	0.315	1.25	2.000	1.81	2.84	2.00	2.2	
24G5HQ1	1 7/8-12	24	1.50	0.315	1.50	2.375	2.00	3.00	2.38	2.5	
32G5HQ1	2 1/2-12	32	2.00	0.375	2.00	2.812	2.00	3.00	2.81	1.2	

Dimensions and pressures for reference only, subject to change.

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WB1HQ1 / WB3HQ1 / WB5HQ1

Code 61 Weld Butt Flange
Connector, Pipe
Schedule 40, 80 or 160 Weld Butt /
Code 61 Flange Head



O-ring Face Flat Face

WELD BUTT FLANGE CONNECTION TYPE	TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	C	D	F	L	W	STANDARD Dynamic Pressure (x 1,000 PSI)	
	O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	SX	SS
SCHEDULE 40 WELD BUTT / CODE 61 FLANGE HEAD											
WB1HQ1 For Schedule 40 pipe	8WB1HQ1	8WB1HQ1N	1/2	0.50	0.265	0.622	1.188	1.06	0.840	5.3	
	12WB1HQ1	12WB1HQ1N	3/4	0.75	0.265	0.824	1.500	1.06	1.050	4.6	
	16WB1HQ1	16WB1HQ1N	1	1.00	0.315	1.049	1.750	1.25	1.315	4.0	
	20WB1HQ1	20WB1HQ1N	1 1/4	1.25	0.315	1.380	2.000	1.44	1.660	3.6	
	24WB1HQ1	24WB1HQ1N	1 1/2	1.50	0.315	1.610	2.375	1.75	1.900	3.0	
	32WB1HQ1	32WB1HQ1N	2	2.00	0.375	2.067	2.812	2.00	2.375	2.6	
	40WB1HQ1	40WB1HQ1N	2 1/2	2.50	0.375	2.469	3.312	2.31	2.875	2.6	
	48WB1HQ1	48WB1HQ1N	3	3.00	0.375	3.068	4.000	2.32	3.500	2.3	
SCHEDULE 80 WELD BUTT / CODE 61 FLANGE HEAD											
WB3HQ1 For Schedule 80 pipe	8WB3HQ1	8WB3HQ1N	1/2	0.50	0.265	0.546	1.188	1.06	0.840	5.0	
	12WB3HQ1	12WB3HQ1N	3/4	0.75	0.265	0.742	1.500	1.06	1.050	3.5	
	16WB3HQ1	16WB3HQ1N	1	1.00	0.315	0.957	1.750	1.25	1.315	4.0	
	20WB3HQ1	20WB3HQ1N	1 1/4	1.25	0.315	1.278	2.000	1.44	1.660	3.5	
	24WB3HQ1	24WB3HQ1N	1 1/2	1.50	0.315	1.500	2.375	1.75	1.900	3.0	
	32WB3HQ1	32WB3HQ1N	2	2.00	0.375	1.939	2.812	2.00	2.375	3.0	
	40WB3HQ1	40WB3HQ1N	2 1/2	2.50	0.375	2.323	3.312	2.31	2.875	2.7	
	48WB3HQ1	48WB3HQ1N	3	3.00	0.375	2.900	4.000	2.32	3.500	2.2	
SCHEDULE 160 WELD BUTT / CODE 61 FLANGE HEAD											
WB5HQ1 For Schedule 160 pipe	8WB5HQ1	8WB5HQ1N	1/2	0.50	0.265	0.464	1.188	1.06	0.840	5.0	
	12WB5HQ1	12WB5HQ1N	3/4	0.75	0.265	0.614	1.500	1.06	1.050	4.0	
	16WB5HQ1	16WB5HQ1N	1	1.00	0.315	0.815	1.750	1.25	1.315	4.5	
	20WB5HQ1	20WB5HQ1N	1 1/4	1.25	0.315	1.160	2.000	1.44	1.660	4.0	
	24WB5HQ1	24WB5HQ1N	1 1/2	1.50	0.315	1.337	2.375	1.75	1.900	3.0	
	32WB5HQ1	32WB5HQ1N	2	2.00	0.375	1.689	2.812	2.00	2.375	3.0	
	40WB5HQ1	40WB5HQ1N	2 1/2	2.50	0.375	2.125	3.312	2.31	2.875	2.5	
	48WB5HQ1	48WB5HQ1N	3	3.00	0.375	2.624	4.000	2.32	3.500	2.0	

WB3HQ2 / WB5HQ2 / WB7HQ2

Code 62 Weld Butt Flange
Connector, Pipe
Schedule 80, 160 or
XXS Weld Butt / Code 62
Flange Head

WELD BUTT FLANGE CONNECTION TYPE	TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	C	D	F	L	W	STANDARD Dynamic Pressure (x 1,000 PSI)	
	O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	SX	SS
SCHEDULE 80 WELD BUTT / CODE 62 FLANGE HEAD											
WB3HQ2 For Schedule 80 pipe	**12WB3HQ2**	**12WB3HQ2N**	**3/4**	0.75	0.345	0.742	1.625	1.42	1.050	5.0	
	16WB3HQ2	**16WB3HQ2N**	**1**	1.00	0.375	0.957	1.875	1.61	1.315	4.5	
	20WB3HQ2	**20WB3HQ2N**	**1 1/4**	1.25	0.405	1.278	2.125	1.73	1.660	3.5	
	24WB3HQ2	**24WB3HQ2N**	**1 1/2**	1.50	0.495	1.500	2.500	2.17	1.900	3.0	
	32WB3HQ2	**32WB3HQ2N**	**2**	2.00	0.495	1.939	3.125	2.48	2.375	3.0	
SCHEDULE 160 WELD BUTT / CODE 62 FLANGE HEAD											
WB5HQ2 For Schedule 160 pipe	**12WB5HQ2**	**12WB5HQ2N**	**3/4**	0.75	0.345	0.614	1.625	1.42	1.050	6.0	
	16WB5HQ2	**16WB5HQ2N**	**1**	1.00	0.375	0.815	1.875	1.61	1.315	5.5	
	20WB5HQ2	**20WB5HQ2N**	**1 1/4**	1.25	0.405	1.160	2.125	1.73	1.660	5.0	
	24WB5HQ2	**24WB5HQ2N**	**1 1/2**	1.50	0.495	1.337	2.500	2.17	1.900	5.0	
	32WB5HQ2	**32WB5HQ2N**	**2**	2.00	0.495	1.689	3.125	2.48	2.375	4.5	
SCHEDULE XXS WELD BUTT / CODE 62 FLANGE HEAD											
WB7HQ2 For Schedule XXS pipe	**12WB7HQ2**	**12WB7HQ2N**	**3/4**	0.75	0.345	0.434	1.625	1.42	1.050	6.0	
	16WB7HQ2	**16WB7HQ2N**	**1**	1.00	0.375	0.599	1.875	1.61	1.315	6.0	
	20WB7HQ2	**20WB7HQ2N**	**1 1/4**	1.25	0.405	0.896	2.125	1.73	1.660	6.0	
	24WB7HQ2	**24WB7HQ2N**	**1 1/2**	1.50	0.495	1.100	2.500	2.17	1.900	6.0	
	32WB7HQ2	**32WB7HQ2N**	**2**	2.00	0.495	1.503	3.125	2.48	2.375	6.0	

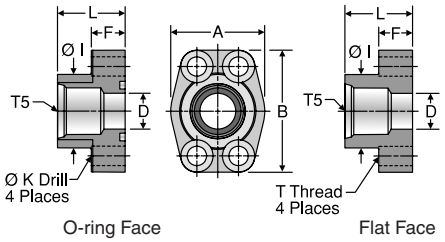
Dimensions and pressures for reference only, subject to change.

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G5Q

SAE Port Block Adapter
SAE Port / Code 61 or 62 Block Flange or Pad



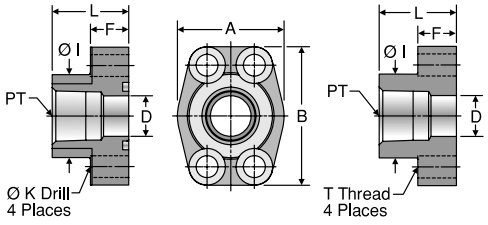
TUBE FITTING PART #		SAE PORT DASH SIZE	T5 STRAIGHT THREAD UN-2B	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	F (in.)	I (in.)	K DRILL DIA. (in.)	L (in.)	T THREAD UNC-2B	MOUNTING HARDWARE -SHCS	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS[1]
O-RING FACE	FLAT FACE														
SAE PORT / CODE 61 BLOCK FLANGE OR PAD															
8G5Q1B	8G5Q1P	8	3/4-16	0.50	1.81	2.13	0.50	0.63	1.25	0.344	1.42	5/16-18	5/16-18 x 1.25	5.0	
12G5Q1B	12G5Q1P	12	1 1/16-12	0.75	1.97	2.56	0.75	0.71	1.54	0.406	1.42	3/8-16	3/8-16 x 1.50	4.0	
16G5Q1B	16G5Q1P	16	1 5/16-12	1.00	2.17	2.75	1.00	0.71	1.81	0.406	1.50	3/8-16	3/8-16 x 1.50	3.5	
20G5Q1B	20G5Q1P	20	1 5/8-12	1.25	2.68	3.12	1.25	0.83	2.22	0.469	1.61	7/16-14	7/16-14 x 1.75	3.0	
24G5Q1B	24G5Q1P	24	1 7/8-12	1.50	3.07	3.66	1.50	0.98	2.50	0.531	1.77	1/2-13	1/2-13 x 1.75	2.5	
SAE PORT / CODE 62 BLOCK FLANGE OR PAD															
8G5Q2B	8G5Q2P	8	3/4-16	0.50	1.81	2.21	0.50	0.63	1.33	0.344	1.42	5/16-18	5/16-18 x 1.25	6.0	
12G5Q2B	12G5Q2P	12	1 1/16-12	0.75	2.17	2.80	0.75	0.83	1.65	0.406	1.38	3/8-16	3/8-16 x 1.50	5.5	
16G5Q2B	16G5Q2P	16	1 5/16-12	1.00	2.56	3.19	1.00	0.98	1.98	0.409	1.65	7/16-14	7/16-14 x 1.75	4.5	
20G5Q2B	20G5Q2P	20	1 5/8-12	1.25	3.07	3.75	1.25	1.06	2.36	0.531	1.77	1/2-13	1/2-13 x 1.75	3.0	
24G5Q2B	24G5Q2P	24	1 7/8-12	1.50	3.70	4.41	1.50	1.18	2.68	0.656	1.97	5/8-11	5/8-11 x 2.25	2.7	
32G5Q2B	32G5Q2P	32	2 1/2-12	2.00	4.50	5.28	2.00	1.46	3.38	0.781	2.56	3/4-10	3/4-10 x 2.75	2.0	

1) See page M36 for standard stainless steel sizes and dimensions.

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

GQ

NPTF Port Block Adapter
NPTF Port / Code 61 or 62 Block Flange or Pad



TUBE FITTING PART #		PT PORT THREAD NPTF	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	F (in.)	I (in.)	K DRILL DIA. (in.)	L (in.)	T THREAD UNC-2B	MOUNTING HARDWARE SHCS	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS[1]
O-RING FACE	FLAT FACE													
NPTF PORT / CODE 61 BLOCK FLANGE OR PAD														
8GQ1B	8GQ1P	1/2 - 14	0.50	1.81	2.13	0.50	0.63	1.25	0.344	1.42	5/16-18	5/16-18 x 1.25	5.0	
12GQ1B	12GQ1P	3/4 -14	0.75	1.97	2.56	0.75	0.71	1.54	0.406	1.42	3/8-16	3/8-16 x 1.50	4.5	
16GQ1B	16GQ1P	1 - 11 1/2	1.00	2.17	2.75	1.00	0.71	1.81	0.406	1.50	3/8-16	3/8-16 x 1.50	4.0	
20GQ1B	20GQ1P	1 1/4 - 11 1/2	1.25	2.68	3.12	1.25	0.83	2.22	0.469	1.61	7/16-14	7/16-14 x 1.75	3.5	
24GQ1B	24GQ1P	1 1/2 - 11 1/2	1.50	3.07	3.66	1.50	0.98	2.50	0.531	1.77	1/2-13	1/2-13 x 1.75	2.7	
32GQ1B	32GQ1P	2 - 11 1/2	2.00	3.54	4.00	2.00	0.98	3.12	0.531	1.77	1/2-13	1/2-13 x 1.75	2.2	
40GQ1B	40GQ1P	2 1/2 - 8	2.50	4.09	4.49	2.50	0.98	3.62	0.531	1.97	1/2-13	1/2-13 x 1.75	2.0	
48GQ1B	48GQ1P	3 1/2 - 8	3.00	4.88	5.28	3.00	1.06	4.47	0.656	1.97	5/8-11	5/8-11 x 2.00	1.1	
NPTF PORT / CODE 62 BLOCK FLANGE OR PAD														
8GQ2B	8GQ2P	1/2 - 14	0.50	1.81	2.21	0.50	0.63	1.33	0.344	1.42	5/16-18	5/16-18 x 1.25	6.0	
12GQ2B	12GQ2P	3/4 - 14	0.75	2.17	2.80	0.75	0.83	1.65	0.406	1.38	3/8-16	3/8-16 x 1.50	5.0	
16GQ2B	16GQ2P	1 - 11 1/2	1.00	2.56	3.19	1.00	0.98	1.98	0.469	1.65	7/16-14	7/16-14 x 1.75	4.0	
20GQ2B	20Q2P	1 1/4 - 11 1/2	1.25	3.07	3.75	1.25	1.06	2.36	0.531	1.77	1/2-13	1/2-13 x 1.75	3.5	
24GQ2B	24GQ2P	1 1/2 - 11 1/2	1.50	3.70	4.41	1.50	1.18	2.68	0.656	1.97	5/8-11	5/8-11 x 2.25	3.0	
32GQ2B	32GQ2P	2 - 11 1/2	2.00	4.50	5.28	2.00	1.46	3.38	0.781	2.56	3/4-10	3/4-10 x 2.75	2.5	

1) See page M36 for standard stainless steel sizes and dimensions.

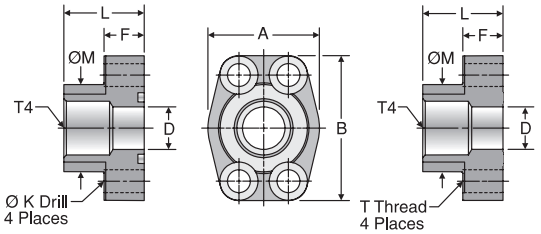
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

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G4Q

BSPP Port Block Adapter
BSPP Port / Code 61 or 62
Block Flange or Pad



O-ring Face Flat Face

TUBE FITTING PART #		T4 THREAD	FLANGE SIZE	A	B	D	F	K DRILL DIA.	L	M	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	BSPP	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
BSPP PORT / CODE 61 BLOCK FLANGE OR PAD														
8G4Q1B	**8G4Q1P**	1/2-14	0.50	1.81	2.13	0.500	0.63	0.344	1.42	1.25	5/16-18	5/16-18 x 1.25	5.0	
12G4Q1B	**12G4Q1P**	3/4-14	0.75	1.97	2.56	0.750	0.71	0.406	1.42	1.54	3/8-16	3/8-16 x 1.50	4.0	
16G4Q1B	**16G4Q1P**	1-11	1.00	2.17	2.75	1.000	0.71	0.406	1.50	1.81	3/8-16	3/8-16 x 1.50	3.0	
20G4Q1B	**20G4Q1P**	1 1/4-11	1.25	2.68	3.12	1.250	0.83	0.469	1.61	2.22	7/16-14	7/16-14 x 1.75	2.5	
24G4Q1B	**24G4Q1P**	1 1/2-11	1.50	3.07	3.66	1.500	0.98	0.531	1.77	2.50	1/2-13	1/2-13 x 1.75	2.2	
32G4Q1B	**32G4Q1P**	2-11	2.00	3.54	4.00	2.000	0.98	0.531	1.77	3.12	1/2-13	1/2-13 x 1.75	1.7	
BSPP PORT / CODE 62 BLOCK FLANGE OR PAD														
8G4Q2B	**8G4Q2P**	1/2-14	0.50	1.81	2.21	0.500	0.63	0.344	1.42	1.33	5/16-18	5/16-18 x 1.25	6.0	
12G4Q2B	**12G4Q2P**	3/4-14	0.75	2.17	2.80	0.750	0.83	0.406	1.38	1.65	3/8-16	3/8-16 x 1.50	5.0	
16G4Q2B	**16G4Q2P**	1-11	1.00	2.56	3.19	1.000	0.98	0.469	1.65	1.98	7/16-14	7/16-14 x 1.75	4.0	
20G4Q2B	**20G4Q2P**	1 1/4-11	1.25	3.07	3.75	1.250	1.06	0.531	1.77	2.36	1/2-13	1/2-13 x 1.75	3.0	
24G4Q2B	**24G4Q2P**	1 1/2-11	1.50	3.70	4.41	1.500	1.18	0.656	1.97	2.68	5/8-11	5/8-11 x 2.25	2.5	
32G4Q2B	**32G4Q2P**	2-11	2.00	4.50	5.28	2.000	1.46	0.781	2.56	3.35	3/4-10	3/4-10 x 2.75	2.0	

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

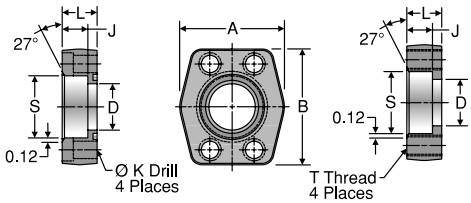
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W5Q

Flat Weld Socket Block Connector, Pipe
Flat Weld Socket, Pipe / Code 61 or 62
Block Flange or Pad



O-ring Face Flat Face

TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	D	J	K DRILL DIA.	L	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS[1]
FLAT WELD SOCKET, PIPE / CODE 61 BLOCK FLANGE OR PAD														
8W5Q1B	**8W5Q1P**	1/2	0.50	1.813	2.125	0.500	0.560	0.344	0.750	0.855	5/16-18	5/16-18 x 1.50	5.0	
12W5Q1B	**12W5Q1P**	3/4	0.75	2.063	2.563	0.750	0.560	0.406	0.750	1.062	3/8-16	3/8-16 x 1.50	5.0	
16W5Q1B	**16W5Q1P**	1	1.00	2.313	2.750	1.000	0.630	0.406	0.880	1.326	3/8-16	3/8-16 x 1.75	5.0	
20W5Q1B	**20W5Q1P**	1 1/4	1.25	2.875	3.125	1.250	0.690	0.469	0.940	1.672	7/16-14	7/16-14 x 1.75	4.0	
24W5Q1B	**24W5Q1P**	1 1/2	1.50	3.250	3.688	1.500	0.750	0.531	1.190	1.922	1/2-13	1/2-13 x 2.25	3.0	
32W5Q1B	**32W5Q1P**	2	2.00	3.813	4.000	2.000	0.875	0.531	1.380	2.406	1/2-13	1/2-13 x 2.50	3.0	
40W5Q1B	**40W5Q1P**	2 1/2	2.50	4.281	4.500	2.500	1.000	0.531	1.750	2.906	1/2-13	1/2-13 x 2.75	2.5	
48W5Q1B	**48W5Q1P**	3	3.00	5.156	5.313	3.000	1.250	0.656	2.120	3.547	5/8-11	5/8-11 x 3.50	2.0	
56W5Q1B	**56W5Q1P**	3 1/2	3.50	5.500	6.000	3.500	1.190	0.656	1.440	4.047	5/8-11	5/8-11 x 2.75	0.5	
64W5Q1B	**64W5Q1P**	4	4.00	6.000	6.380	4.000	1.250	0.656	1.500	4.578	5/8-11	5/8-11 x 2.75	0.5	
80W5Q1B	**80W5Q1P**	5	5.00	7.120	7.250	4.500	1.380	0.656	1.750	5.641	5/8-11	5/8-11 x 3.00	0.5	
FLAT WELD SOCKET, PIPE / CODE 62 BLOCK FLANGE OR PAD														
8W5Q2B	**8W5Q2P**	1/2	0.50	1.940	2.300	0.500	0.560	0.344	1.250	0.855	5/16-18	5/16-18 x 2.00	6.0	
12W5Q2B	**12W5Q2P**	3/4	0.75	2.500	2.950	0.750	0.560	0.406	1.250	1.062	3/8-16	3/8-16 x 2.00	6.0	
16W5Q2B	**16W5Q2P**	1	1.00	2.750	3.190	1.000	0.630	0.469	1.500	1.326	7/16-14	7/16-14 x 2.50	6.0	
20W5Q2B	**20W5Q2P**	1 1/4	1.25	3.060	3.750	1.250	0.690	0.531	1.500	1.672	1/2-13	1/2-13 x 2.50	6.0	
24W5Q2B	**24W5Q2P**	1 1/2	1.50	3.750	4.440	1.500	0.750	0.656	1.750	1.922	5/8-11	5/8-11 x 3.00	6.0	
32W5Q2B	**32W5Q2P**	2	2.00	4.500	5.250	2.000	0.875	0.781	1.750	2.406	3/4-10	3/4-10 x 3.00	6.0	
40W5Q2B[2]	**40W5Q2P[2]**	2 1/2	2.50	5.870	6.870	2.500	1.000	0.906	2.060	2.906	7/8-9	7/8-9 x 3.50	6.0	
48W5Q2B[2]	**48W5Q2P[2]**	3	3.00	7.000	8.500	3.000	1.250	1.156	2.620	3.547	1 1/8-7	1 1/8-7 x 4.50	6.0	

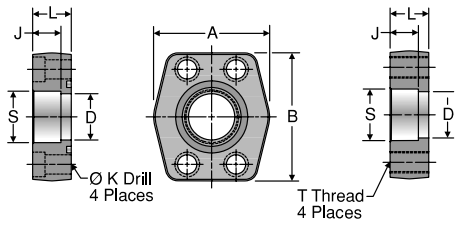
1) See page M37 for standard stainless steel sizes and dimensions.
2) Not covered in SAE J518. Bolt hole centerline dimensions are: 2.312" x 4.875" for 40W5Q2 and 2.812" x 6.000" for 48W5Q2.

To receive mounting hardware with flange, insert a "K" after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

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Flat Weld Socket Block Connector, Tube
Flat Weld Socket, Tube / Code 61 or 62
Block Flange or Pad



O-ring Face Flat Face

TUBE FITTING PART #		TUBE O.D.	FLANGE SIZE	A	B	D	J	K DRILL DIA.	L	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
FLAT WELD SOCKET, TUBE / CODE 61 BLOCK FLANGE OR PAD														
12W4Q1B	**12W4Q1P**	3/4	0.75	2.06	2.56	0.625	0.560	0.406	0.750	0.752	3/8-16	3/8-16 x 1.50	5.0	
16-12W4Q1B	**16-12W4Q1P**	1	0.75	2.06	2.56	0.750	0.560	0.406	0.750	1.002	3/8-16	3/8-16 x 1.50	5.0	
16W4Q1B	**16W4Q1P**	1	1.00	2.31	2.75	0.875	0.630	0.406	0.880	1.002	3/8-16	3/8-16 x 1.75	5.0	
20-16W4Q1B	**20-16W4Q1P**	1 1/4	1.00	2.31	2.75	1.000	0.630	0.406	0.880	1.252	3/8-16	3/8-16 x 1.75	5.0	
20W4Q1B	**20W4Q1P**	1 1/4	1.25	2.88	3.12	1.125	0.690	0.469	0.940	1.252	7/16-14	7/16-14 x 1.75	4.0	
24-20W4Q1B	**24-20W4Q1P**	1 1/2	1.25	2.88	3.12	1.250	0.690	0.469	0.940	1.502	7/16-14	7/16-14 x 1.75	4.0	
24W4Q1B	**24W4Q1P**	1 1/2	1.50	3.25	3.69	1.375	0.750	0.531	1.190	1.502	1/2-13	1/2-13 x 2.25	3.0	
28-24W4Q1B	**28-24W4Q1P**	1 3/4	1.50	3.25	3.69	1.500	0.750	0.531	1.190	1.752	1/2-13	1/2-13 x 2.25	3.0	
32W4Q1B	**32W4Q1P**	2	2.00	3.81	4.00	1.875	0.875	0.531	1.375	2.002	1/2-13	1/2-13 x 2.50	3.0	
36-32W4Q1B	**36-32W4Q1P**	2 1/4	2.00	3.81	4.00	2.000	0.875	0.531	1.375	2.252	1/2-13	1/2-13 x 2.50	3.0	
FLAT WELD SOCKET, TUBE / CODE 62 BLOCK FLANGE OR PAD														
12W4Q2B	**12W4Q2P**	3/4	0.75	2.38	2.81	0.625	0.560	0.406	1.250	0.752	3/8-16	3/8-16 x 2.00	6.0	
16-12W4Q2B	**16-12W4Q2P**	1	0.75	2.38	2.81	0.750	0.560	0.406	1.250	1.002	3/8-16	3/8-16 x 2.00	6.0	
16W4Q2B	**16W4Q2P**	1	1.00	2.75	3.19	0.875	0.630	0.469	1.500	1.002	7/16-14	7/16-14 x 2.25	6.0	
20-16W4Q2B	**20-16W4Q2P**	1 1/4	1.00	2.75	3.19	1.000	0.630	0.469	1.500	1.252	7/16-14	7/16-14 x 2.25	6.0	
20W4Q2B	**20W4Q2P**	1 1/4	1.25	3.06	3.75	1.125	0.690	0.531	1.500	1.252	1/2-13	1/2-13 x 2.50	6.0	
24-20W4Q2B	**24-20W4Q2P**	1 1/5	1.25	3.06	3.75	1.250	0.690	0.531	1.500	1.502	1/2-13	1/2-13 x 2.50	6.0	
24W4Q2B	**24W4Q2P**	1 1/2	1.50	3.75	4.44	1.375	0.750	0.656	1.750	1.502	5/8-11	5/8-11 x 2.75	6.0	
28-24W4Q2B	**28-24W4Q2P**	1 3/4	1.50	3.75	4.44	1.500	0.750	0.656	1.750	1.752	5/8-11	5/8-11 x 2.75	6.0	
32W4Q2B1[1]	**32W4Q2P1**[1]	2	2.00	4.50	5.25	1.875	0.875	0.781	1.750	2.002	3/4-10	3/4-10 x 3.00	6.0	
36-32W4Q2B1[1]	**36-32W4Q2P1**[1]	2 1/4	2.00	4.50	5.25	2.000	0.875	0.781	1.750	2.252	3/4-10	3/4-10 x 3.00	6.0	

1) Not covered in SAE J518.

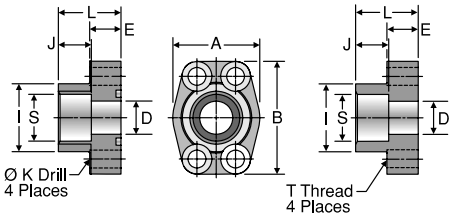
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

W7Q

Extended Weld Socket Block Connector, Pipe
Deep Weld Socket, Pipe / Code 61 or 62
Block Flange or Pad



O-ring Face Flat Face

TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	D	E	I	J	K DRILL DIA.	L	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
EXTENDED WELD SOCKET, PIPE / CODE 61 BLOCK FLANGE OR PAD																
12W7Q1B	**12W7Q1P**	3/4	0.75	1.97	2.56	0.75	0.710	1.54	0.750	0.406	1.420	1.062	3/8-16	3/8-16 x 1.50	5.0	
16W7Q1B	**16W7Q1P**	1	1.00	2.17	2.75	1.00	0.710	1.81	0.750	0.406	1.500	1.328	3/8-16	3/8-16 x 1.50	4.5	
20W7Q1B	**20W7Q1P**	1 1/4	1.25	2.68	3.12	1.25	0.830	2.22	0.870	0.469	1.610	1.672	7/16-14	7/16-14 x 1.75	2.7	
24W7Q1B	**24W7Q1P**	1 1/2	1.50	3.07	3.66	1.50	0.980	2.50	0.940	0.531	1.770	1.922	1/2-13	1/2-13 x 1.75	3.0	
32W7Q1B	**32W7Q1P**	2	2.00	3.54	4.00	2.00	0.980	3.12	1.020	0.531	1.770	2.406	1/2-13	1/2-13 x 1.75	2.5	
40W7Q1B	**40W7Q1P**	2 1/2	2.50	4.09	4.49	2.50	0.980	3.62	1.180	0.531	1.970	2.906	1/2-13	1/2-13 x 1.75	2.2	
EXTENDED WELD SOCKET, PIPE / C ODE 62 BLOCK FLANGE OR PAD																
12W7Q2B	**12W7Q2P**	3/4	0.75	2.17	2.80	0.75	0.830	1.65	0.870	0.406	1.380	1.062	3/8-16	3/8-16 x 1.50	6.0	
16W7Q2B	**16W7Q2P**	1	1.00	2.56	3.19	1.00	0.980	1.98	0.870	0.469	1.650	1.328	7/16-14	7/16-14 x 1.75	6.0	
20W7Q2B	**20W7Q2P**	1 1/4	1.25	3.07	3.75	1.25	1.060	2.36	0.980	0.531	1.770	1.672	1/2-13	1/2-13 x 1.75	5.5	
24W7Q2B	**24W7Q2P**	1 1/2	1.50	3.7	4.41	1.50	1.180	2.68	1.100	0.656	1.970	1.922	5/8-11	5/8-11 x 2.25	5.5	
32W7Q2B	**32W7Q2P**	2	2.00	4.5	5.28	2.00	1.460	3.35	0.940	0.781	2.560	2.406	3/4-10	3/4-10 x 2.75	5.0	

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

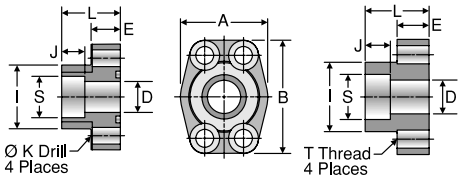
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Parker Hannifin Corporation
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W6Q

Extended Weld Socket Block Connector, Tube
Deep Weld Socket, Tube / Code 61 or 62
Block Flange or Pad



O-ring Face Flat Face

TUBE FITTING PART #		TUBE O.D.	FLANGE SIZE	A	B	D	E	I	J	K DRILL DIA.	L	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
EXTENDED WELD SOCKET, TUBE / CODE 61 BLOCK FLANGE OR PAD																
12W6Q1B	**12W6Q1P**	3/4	0.75	1.97	2.56	0.625	0.71	1.54	0.560	0.406	1.420	0.752	3/8-16	3/8-16 x 1.50	5.0	
16-12W6Q1B	**16-12W6Q1P**	1	0.75	1.97	2.56	0.750	0.71	1.54	0.560	0.406	1.420	1.002	3/8-16	3/8-16 x 1.50	5.0	
16W6Q1B	**16W6Q1P**	1	1.00	2.17	2.75	0.875	0.71	1.81	0.630	0.406	1.500	1.002	3/8-16	3/8-16 x 1.50	5.0	
20-16W6Q1B	**20-16W6Q1P**	1 1/4	1.00	2.17	2.75	1.000	0.71	1.81	0.630	0.406	1.500	1.252	3/8-16	3/8-16 x 1.50	5.0	
20W6Q1B	**20W6Q1P**	1 1/4	1.25	2.68	3.12	1.125	0.83	2.22	0.690	0.469	1.610	1.252	7/16-14	7/16-14 x 1.75	4.0	
24-20W6Q1B	**24-20W6Q1P**	1 1/2	1.25	2.68	3.12	1.250	0.83	2.22	0.690	0.469	1.610	1.502	7/16-14	7/16-14 x 1.75	4.0	
24W6Q1B	**24W6Q1P**	1 1/2	1.50	3.07	3.66	1.375	0.98	2.50	0.750	0.531	1.770	1.502	1/2-13	1/2-13 x 1.75	3.0	
28-24W6Q1B	**28-24W6Q1P**	1 3/4	1.50	3.07	3.66	1.500	0.98	2.50	0.750	0.531	1.770	1.752	1/2-13	1/2-13 x 1.75	3.0	
32W6Q1B	**32W6Q1P**	2	2.00	3.54	4.00	1.875	0.98	3.12	0.870	0.531	1.770	2.002	1/2-13	1/2-13 x 1.75	3.0	
36-32W6Q1B	**36-32W6Q1P**	2 1/4	2.00	3.54	4.00	2.000	0.98	3.12	0.870	0.531	1.770	2.252	1/2-13	1/2-13 x 1.75	3.0	
40W6Q1B	**40W6Q1P**	2 1/2	2.50	4.09	4.49	2.375	0.98	3.62	1.000	0.531	1.970	2.502	1/2-13	1/2-13 x 1.75	2.5	
44-40W6Q1B	**44-40W6Q1P**	2 3/4	2.50	4.09	4.49	2.500	0.98	3.62	1.000	0.531	1.970	2.752	1/2-13	1/2-13 x 1.75	2.2	
EXTENDED WELD SOCKET, TUBE / CODE 62 BLOCK FLANGE OR PAD																
12W6Q2B	**12W6Q2P**	3/4	0.75	2.17	2.80	0.625	0.83	1.65	0.560	0.406	1.380	0.752	3/8-16	3/8-16 x 1.50	6.0	
16-12W6Q2B	**16-12W6Q2P**	1	0.75	2.17	2.80	0.750	0.83	1.65	0.560	0.406	1.380	1.002	3/8-16	3/8-16 x 1.50	6.0	
16W6Q2B	**16W6Q2P**	1	1.00	2.56	3.19	0.875	0.98	1.98	0.630	0.469	1.650	1.002	7/16-14	7/16-14 x 1.75	6.0	
20-16W6Q2B	**20-16W6Q2P**	1 1/4	1.00	2.56	3.19	1.000	0.98	1.98	0.630	0.469	1.650	1.252	7/16-14	7/16-14 x 1.75	6.0	
20W6Q2B	**20W6Q2P**	1 1/4	1.25	3.07	3.75	1.125	1.06	2.36	0.690	0.531	1.770	1.252	1/2-13	1/2-13 x 1.75	6.0	
24-20W6Q2B	**24-20W6Q2P**	1 1/2	1.25	3.07	3.75	1.250	1.06	2.36	0.690	0.531	1.770	1.502	1/2-13	1/2-13 x 1.75	6.0	
24W6Q2B	**24W6Q2P**	1 1/2	1.50	3.70	4.41	1.375	1.18	2.68	0.750	0.656	1.970	1.502	5/8-11	5/8-11 x 2.25	6.0	
28-24W6Q2B	**28-24W6Q2P**	1 3/4	1.50	3.70	4.41	1.500	1.18	2.68	0.750	0.656	1.970	1.752	5/8-11	5/8-11 x 2.25	6.0	
32W6Q2B	**32W6Q2P**	2	2.00	4.50	5.28	1.875	1.46	3.35	0.870	0.781	2.560	2.002	3/4-10	3/4-10 x 2.75	6.0	
36-32W6Q2B	**36-32W6Q2P**	2 1/4	2.00	4.50	5.28	2.000	1.46	3.35	0.870	0.781	2.560	2.252	3/4-10	3/4-10 x 2.75	5.5	

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

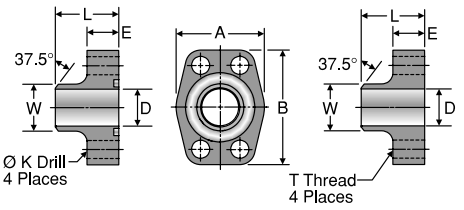
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Parker Hannifin Corporation
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WB1Q1 / WB3Q1 / WB5Q1

Code 61 Weld Butt Block Connector, Pipe
Schedule 40, 80 or 160 Weld Butt /
Code 61 Block Flange or Pad



O-ring Face Flat Face

WELD BUTT BLOCK CONNECTION TYPE	TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	D PIPE I.D.	E	K DRILL DIA.	L	T THREAD	W PIPE O.D.	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
	O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	(in.)	SHCS	SX	SS
SCHEDULE 40 WELD BUTT / CODE 61 BLOCK FLANGE OR PAD															
WB1Q1 For Schedule 40 pipe	**12WB1Q1B**	**12WB1Q1P**	3/4	0.75	1.97	2.56	0.826	0.710	0.406	1.420	3/8-16	1.050	3/8-16 x 1.50	3.5	
	16WB1Q1B	**16WB1Q1P**	1	1.00	2.17	2.75	1.051	0.710	0.406	1.500	3/8-16	1.315	3/8-16 x 1.50	3.0	
	20WB1Q1B	**20WB1Q1P**	1 1/4	1.25	2.68	3.12	1.382	0.830	0.469	1.610	7/16-14	1.660	7/16-14 x 1.75	2.7	
	24WB1Q1B	**24WB1Q1P**	1 1/2	1.50	3.07	3.66	1.612	0.980	0.531	1.730	1/2-13	1.900	1/2-13 x 1.75	2.2	
	32WB1Q1B	**32WB1Q1P**	2	2.00	3.54	4.00	2.069	0.980	0.531	1.770	1/2-13	2.375	1/2-13 x 1.75	2.0	
	40WB1Q1B	**40WB1Q1P**	2 1/2	2.50	4.09	4.49	2.471	0.980	0.531	1.970	1/2-13	2.875	1/2-13 x 1.75	2.0	
	48WB1Q1B	**48WB1Q1P**	3	3.00	4.88	5.28	3.070	1.060	0.656	1.970	5/8-11	3.500	5/8-11 x 2.00	1.7	
SCHEDULE 80 WELD BUTT / CODE 61 BLOCK FLANGE OR PAD															
WB3Q1 For Schedule 80 pipe	**12WB3Q1B**	**12WB3Q1P**	3/4	0.75	1.97	2.56	0.744	0.710	0.406	1.420	3/8-16	1.050	3/8-16 x 1.50	5.0	
	16WB3Q1B	**16WB3Q1P**	1	1.00	2.17	2.75	0.959	0.710	0.406	1.500	3/8-16	1.315	3/8-16 x 1.50	4.5	
	20WB3Q1B	**20WB3Q1P**	1 1/4	1.25	2.68	3.12	1.280	0.830	0.469	1.610	7/16-14	1.660	7/16-14 x 1.75	4.0	
	24WB3Q1B	**24WB3Q1P**	1 1/2	1.50	3.07	3.66	1.502	0.980	0.531	1.730	1/2-13	1.900	1/2-13 x 1.75	3.0	
	32WB3Q1B	**32WB3Q1P**	2	2.00	3.54	4.00	1.941	0.980	0.531	1.770	1/2-13	2.375	1/2-13 x 1.75	3.0	
	40WB3Q1B	**40WB3Q1P**	2 1/2	2.50	4.09	4.49	2.325	0.980	0.531	1.970	1/2-13	2.875	1/2-13 x 1.75	2.5	
	48WB3Q1B	**48WB3Q1P**	3	3.00	4.88	5.28	2.902	1.060	0.656	1.970	5/8-11	3.500	5/8-11 x 2.00	2.0	
SCHEDULE 160 WELD BUTT / CODE 61 BLOCK FLANGE OR PAD															
WB5Q1 For Schedule 160 pipe	**12WB5Q1B**	**12WB5Q1P**	3/4	0.75	1.97	2.56	0.614	0.710	0.406	1.420	3/8-16	1.050	3/8-16 x 1.50	5.0	
	16WB5Q1B	**16WB5Q1P**	1	1.00	2.17	2.75	0.817	0.710	0.406	1.500	3/8-16	1.315	3/8-16 x 1.50	5.0	
	20WB5Q1B	**20WB5Q1P**	1 1/4	1.25	2.68	3.12	1.162	0.830	0.469	1.610	7/16-14	1.660	7/16-14 x 1.75	4.0	
	24WB5Q1B	**24WB5Q1P**	1 1/2	1.50	3.07	3.66	1.340	0.980	0.531	1.730	1/2-13	1.900	1/2-13 x 1.75	3.0	
	32WB5Q1B	**32WB5Q1P**	2	2.00	3.54	4.00	1.689	0.980	0.531	1.770	1/2-13	2.375	1/2-13 x 1.75	3.0	
	40WB5Q1B	**40WB5Q1P**	2 1/2	2.50	4.09	4.49	2.127	0.980	0.531	1.970	1/2-13	2.875	1/2-13 x 1.75	2.5	
	48WB5Q1B	**48WB5Q1P**	3	3.00	4.88	5.28	2.626	1.060	0.656	1.970	5/8-11	3.500	5/8-11 x 2.00	2.0	

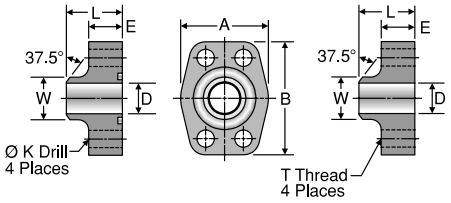
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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

WB3Q2 / WB5Q2 / WB7Q2

Code 62 Weld Butt Block Connector, Pipe Schedule 80, 160 or XXS Weld Butt / Code 62 Block Flange or Pad



O-ring Face Flat Face

WELD BUTT BLOCK CONNECTION TYPE	TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	D PIPE I.D.	E	K DRILL DIA.	L	T THREAD	W PIPE O.D.	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
	O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	(in.)	SHCS	SX	SS
SCHEDULE 80 WELD BUTT / CODE 62 BLOCK FLANGE OR PAD															
WB3Q2 For Schedule 80 pipe	**12WB3Q2B**	**12WB3Q2P**	3/4	0.75	2.17	2.80	0.744	0.83	0.406	1.38	3/8-16	1.050	3/8-16 x 1.50	5.0	
	16WB3Q2B	**16WB3Q2P**	1	1.00	2.56	3.19	0.959	0.83	0.469	1.61	7/16-14	1.315	7/16-14 x 1.75	4.5	
	20WB3Q2B	**20WB3Q2P**	1 1/4	1.25	3.07	3.75	1.280	0.98	0.531	1.73	1/2-13	1.660	1/2-13 x 1.75	3.5	
	24WB3Q2B	**24WB3Q2P**	1 1/2	1.50	3.70	4.41	1.502	1.18	0.656	2.17	5/8-11	1.900	5/8-11 x 2.25	3.0	
	32WB3Q2B	**32WB3Q2P**	2	2.00	4.50	5.28	1.941	1.46	0.781	2.56	3/4-10	2.375	3/4-10 x 2.75	3.0	
SCHEDULE 160 WELD BUTT / CODE 62 BLOCK FLANGE OR PAD															
WB5Q2 For Schedule 160 pipe	**12WB5Q2B**	**12WB5Q2P**	3/4	0.75	2.17	2.80	0.614	0.83	0.406	1.38	3/8-16	1.050	3/8-16 x 1.50	6.0	
	16WB5Q2B	**16WB5Q2P**	1	1.00	2.56	3.19	0.817	0.83	0.469	1.61	7/16-14	1.315	7/16-14 x 1.75	6.0	
	20WB5Q2B	**20WB5Q2P**	1 1/4	1.25	3.07	3.75	1.162	0.98	0.531	1.73	1/2-13	1.660	1/2-13 x 1.75	5.0	
	24WB5Q2B	**24WB5Q2P**	1 1/2	1.50	3.70	4.41	1.340	1.18	0.656	2.17	5/8-11	1.900	5/8-11 x 2.25	5.0	
	32WB5Q2B	**32WB5Q2P**	2	2.00	4.50	5.28	1.689	1.46	0.781	2.56	3/4-10	2.375	3/4-10 x 2.75	6.0	
SCHEDULE XXS WELD BUTT / CODE 62 BLOCK FLANGE OR PAD															
WB7Q2 For Schedule XXS pipe	**12WB7Q2B**	**12WB7Q2P**	3/4	0.75	2.17	2.80	0.436	0.83	0.406	1.38	3/8-16	1.050	3/8-16 x 1.50	6.0	
	16WB7Q2B	**16WB7Q2P**	1	1.00	2.56	3.19	0.601	0.83	0.469	1.61	7/16-14	1.315	7/16-14 x 1.75	6.0	
	20WB7Q2B	**20WB7Q2P**	1 1/4	1.25	3.07	3.75	0.898	0.98	0.531	1.73	1/2-13	1.660	1/2-13 x 1.75	6.0	
	24WB7Q2B	**24WB7Q2P**	1 1/2	1.50	3.70	4.41	1.102	1.18	0.656	2.17	5/8-11	1.900	5/8-11 x 2.25	6.0	
	32WB7Q2B	**32WB7Q2P**	2	2.00	4.50	5.28	1.505	1.46	0.781	2.56	3/4-10	2.375	3/4-10 x 2.75	6.0	

1) SAE J518 does not cover these sizes in Code 62.

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

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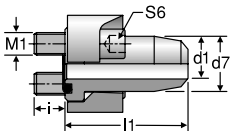
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AS3 / AS6

SAE-Flange / Weld Butt

For metric tube welded connection



TUBE FITTING PART #	SIZE (in.)	TUBE O.D. x WALL THICKNESS (mm)	WORKING PRESSURE (bar)	d1 (mm)	d7 (mm)	l (mm)	l 1 (mm)	S6 (mm)	WELD NIPPLE BODY	STANDARD FROM STOCK A3C	71
SAE FLANGE CONNECTION – CODE 61 – STANDARD SERIES											
AS32/15X2	1/2	15 x 2	200	11	23.9	11.5	38	6	AS32/15X2X		
AS32/16X3	1/2	16 x 3	220	10	23.9	11.5	38	6	AS32/16X3X		
AS33/18X1.5	3/4	18 x 1.5	130	15	31.8	15.5	50	8	AS33/18X1.5X		
AS33/22X2	3/4	22 x 2	140	18	31.8	15.5	50	8	AS33/22X2X		
AS33/20X3	3/4	20 x 3	220	14	31.8	15.5	50	8	AS33/20X3X		
AS33/25X4	3/4	25 x 4	220	17	31.8	15.5	50	8	AS33/25X4X		
AS34/28X2	1	28 x 2	115	24	38	13.5	50	8	AS34/28X2X		
AS34/30X4.5	1	30 x 4.5	220	21	38	13.5	50	8	AS34/30X4.5X		
AS35/35X2	1 1/4	35 x 2	90	31	43	18.5	55	8	AS35/35X2X		
AS35/25X3	1 1/4	25 x 3	175	19	43	18.5	55	8	AS35/25X3X		
AS35/30X4	1 1/4	30 x 4	175	22	43	18.5	55	8	AS35/30X4X		
AS35/38X5	1 1/4	38 x 5	175	28	43	18.5	55	8	AS35/38X5X		
AS36/42X3	1 1/2	42 x 3	115	36	50	18.5	57	10	AS36/42X3X		
AS36/38X4	1 1/2	38 x 4	130	30	50	18.5	57	10	AS36/38X4X		
AS38/50X6	2	50 x 6	130	38	62	24	62	12	AS38/50X6X		
AS38/65X8	2	65 x 8	130	49	65	24	62	12	AS38/65X8X		
SAE FLANGE CONNECTION – CODE 62 – HIGH PRESSURE SERIES											
AS62/16X3	1/2	16 x 3	260	10	23.9	13.5	41	6	AS62/16X3X		
AS63/25X5	3/4	25 x 5	260	15	31.8	15.5	55	8	AS63/25X5X		
AS64/25X5	1	25 x 5	260	15	38	20.5	67	10	AS64/25X5X		
AS64/30X4	1	30 x 4	200	22	38	20.5	67	10	AS64/30X4X		
AS65/30X4*	1 1/4	30 x 4	200	22	43.7	17.5	78	10	AS65/30X4X		
AS65/38X5	1 1/4	38 x 5	200	28	43.7	17.5	78	10	AS65/38X5X		
AS65/38X8*	1 1/4	38 x 8	260	22	43.7	17.5	78	10	AS65/38X8X		
AS66/38X5	1 1/2	38 x 5	200	28	50.8	24.5	85	14	AS66/38X5X		
AS66/38X8	1 1/2	38 x 8	260	22	50.8	24.5	85	14	AS66/38X8X		
AS68/50X9	2	50 x 9	260	32	66.6	32.5	116	17	AS68/50X9X		
AS68/65X9	2	65 x 8	190	49	66.6	32.5	116	17	AS68/65X8X		

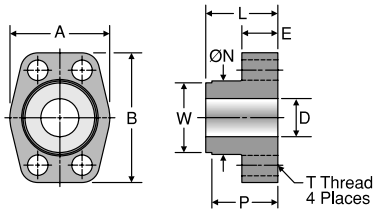
* Identical types.

Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35°C up to +100°C, FPM (e.g., fluorocarbon on request) -25°C up to +120°C.

Tightening torques for socket head cap screws see Tables T6 and T7.

WBT

Code 61 Weld Butt Tank Adapter
Weld Butt with Pilot / Code 61 Block Flange Pad



TUBE FITTING PART #	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	E (in.)	L (in.)	P (in.)	T THREAD UNC-2B	W (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) S	SS
12WBTQ1P	0.75	1.97	2.56	0.75	0.71	1.42	1.30	3/8-16	1.375	0.5	
16WBTQ1P	1.00	2.17	2.75	1.00	0.71	1.50	1.37	3/8-16	1.500	0.5	
20WBTQ1P	1.25	2.68	3.12	1.25	0.83	1.61	1.49	7/16-14	1.750	0.5	
24WBTQ1P	1.50	3.07	3.66	1.50	0.98	1.77	1.64	1/2-13	2.125	0.5	
32WBTQ1P	2.00	3.54	4.00	2.00	0.98	1.77	1.65	1/2-13	2.500	0.5	
40WBTQ1P	2.50	4.09	4.50	2.50	0.98	1.97	1.85	1/2-13	3.250	0.5	

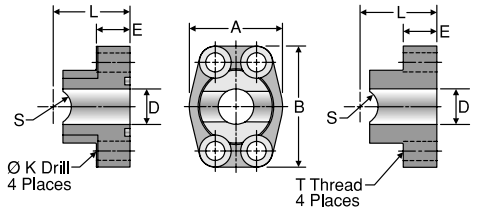
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WSD

Code 61 Weld Saddle Block Connector
Pipe or Tube Weld Saddle /
Code 61 Block Flange or Pad

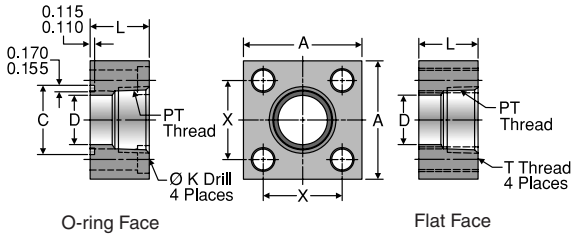


TUBE FITTING PART #		PIPE OR TUBE SIZE	FLANGE SIZE	A	B	D	E	K DRILL DIA.	L	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
PIPE WELD SADDLE / CODE 61 BLOCK FLANGE OR PAD														
12WSD1Q1B	12WSD1Q1P	3/4	0.75	1.97	2.56	0.75	0.710	0.406	1.42	0.532	3/8-16	3/8-16 x 1.50	5.0	
16WSD1Q1B	16WSD1Q1P	1	1.00	2.17	2.75	1.00	0.710	0.406	1.50	0.665	3/8-16	3/8-16 x 1.50	5.0	
20WSD1Q1B	20WSD1Q1P	1 1/4	1.25	2.68	3.12	1.25	0.830	0.469	1.61	0.837	7/16-14	7/16-14 x 1.75	4.0	
24WSD1Q1B	24WSD1Q1P	1 1/2	1.50	3.07	3.66	1.50	0.980	0.531	1.77	0.957	1/2-13	1/2-13 x 1.75	3.0	
32WSD1Q1B	32WSD1Q1P	2	2.00	3.54	4.00	2.00	0.980	0.531	1.77	1.200	1/2-13	1/2-13 x 1.75	3.0	
TUBE WELD SADDLE / CODE 61 BLOCK FLANGE OR PAD														
12WSD2Q1B	12WSD2Q1P	3/4	0.75	1.97	2.56	0.75	0.710	0.406	1.42	0.382	3/8-16	3/8-16 x 1.50	5.0	
16-12WSD2Q1B	16-12WSD2Q1P	1	0.75	1.97	2.56	0.75	0.710	0.406	1.42	0.507	3/8-16	3/8-16 x 1.50	5.0	
16WSD2Q1B	16WSD2Q1P	1	1.00	2.17	2.75	1.00	0.710	0.406	1.50	0.507	3/8-16	3/8-16 x 1.50	5.0	
20-16WSD2Q1B	20-16WSD2Q1P	1 1/4	1.00	2.17	2.75	1.00	0.710	0.406	1.50	0.632	3/8-16	3/8-16 x 1.50	5.0	
20WSD2Q1B	20WSD2Q1P	1 1/4	1.25	2.68	3.12	1.25	0.830	0.469	1.61	0.632	7/16-14	7/16-14 x 1.75	4.0	
24-20WSD2Q1B	24-20WSD2Q1P	1 1/2	1.25	2.68	3.12	1.25	0.830	0.469	1.61	0.757	7/16-14	7/16-14 x 1.75	4.0	
24WSD2Q1B	24WSD2Q1P	1 1/2	1.50	3.07	3.66	1.50	0.980	0.531	1.77	0.757	1/2-13	1/2-13 x 1.75	3.0	
28-24WSD2Q1B	28-24WSD2Q1P	1 3/4	1.50	3.07	3.66	1.50	0.980	0.531	1.77	0.882	1/2-13	1/2-13 x 1.75	3.0	
32WSD2Q1B	32WSD2Q1P	2	2.00	3.54	4.00	2.00	0.980	0.531	1.77	1.007	1/2-13	1/2-13 x 1.75	3.0	
36-32WSD2Q1B	36-32WSD2Q1P	2 1/4	2.00	3.54	4.00	2.00	0.980	0.531	1.77	1.132	1/2-13	1/2-13 x 1.75	3.0	

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

GQS

NPTF Port Square Block Flange Adapter
NPTF Port / Square Block Flange or Pad



TUBE FITTING PART #		PT THREAD	FLANGE SIZE	A	B	C MIN.	D	K DRILL DIA.	L	T THREAD	X		MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	NPTF	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	(in.)	O-RING	SHCS	SX	SS
12GQSB	12GQSP	3/4-14	0.75	2.25	1.12	1.250	0.75	0.406	1.25	3/8-16	1.438	2-214	3/8-16 x 2.00	5.0	
16GQSB	16GQSP	1-11 1/2	1.00	3.00	1.50	1.560	1.00	0.531	1.50	1/2-13	2.000	2-219	1/2-13 x 2.25	5.0	
20GQSB	20GQSP	1 1/4-11 1/2	1.25	3.00	1.50	1.750	1.25	0.531	1.50	1/2-13	2.000	2-222	1/2-13 x 2.25	4.0	
24GQSB	24GQSP	1 1/2-11 1/2	1.50	4.00	2.00	2.115	1.50	0.656	1.75	5/8-11	2.750	2-225	5/8-11 x 2.75	3.0	
32GQSB	32GQSP	2-11 1/2	2.00	4.00	2.00	2.490	2.00	0.656	1.75	5/8-11	2.750	2-228	5/8-11 x 2.75	2.7	
40GQSB	40GQSP	2 1/2-8	2.50	5.50	2.75	2.995	2.50	0.906	2.25	7/8-9	3.750	2-232	7/8-9 x 3.50	2.5	
48GQSB	48GQSP	3-8	3.00	5.50	2.75	3.615	3.00	0.906	2.25	7/8-9	3.750	2-237	7/8-9 x 3.50	1.2	

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

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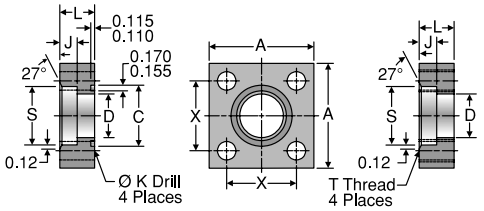
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W5SQS

Weld Socket Square Block Connector, Pipe
Pipe Weld Socket / Square Block Flange or Pad



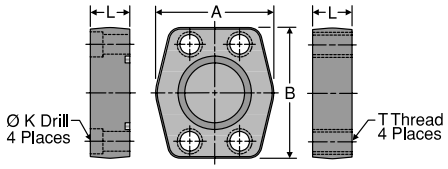
O-ring Face Flat Face

TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	C MIN.	D	J	K DRILL DIA.	L	S	T THREAD	X		MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	(in.)	O-RING	SHCS	SX	SS
12W5SQSB	12W5SQSP	3/4	0.75	2.25	1.12	1.250	0.75	0.50	0.406	1.00	1.062	3/8-16	1.438	2-214	3/8-16 x 1.75	5.0	
16W5SQSB	16W5SQSP	1	1.00	3.00	1.50	1.560	1.00	0.50	0.531	1.00	1.328	1/2-13	2.000	2-219	1/2-13 x 1.75	5.0	
20W5SQSB	20W5SQSP	1 1/4	1.25	3.00	1.50	1.750	1.25	0.50	0.531	1.00	1.672	1/2-13	2.000	2-222	1/2-13 x 1.75	4.0	
24W5SQSB	24W5SQSP	1 1/2	1.50	4.00	2.00	2.115	1.50	0.62	0.656	1.25	1.922	5/8-11	2.750	2-225	5/8-11 x 2.25	3.0	
32W5SQSB	32W5SQSP	2	2.00	4.00	2.00	2.490	2.00	0.62	0.656	1.25	2.406	5/8-11	2.750	2-228	5/8-11 x 2.25	3.0	
40W5SQSB	40W5SQSP	2 1/2	2.50	5.50	2.75	2.995	2.50	0.75	0.906	1.50	2.906	7/8-9	3.750	2-232	7/8-9 x 2.75	2.5	
48W5SQSB	48W5SQSP	3	3.00	5.50	2.75	3.615	3.00	0.75	0.906	1.50	3.547	7/8-9	3.750	2-237	7/8-9 x 2.75	2.0	

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

PQ

Block Plug
Code 61/62 Block Flange or Pad Plug



O-ring Face Flat Face

TUBE FITTING PART #		FLANGE SIZE	A	B	K DRILL DIA.	L	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS[1]
CODE 61 BLOCK FLANGE OR PAD PLUG										
8PQ1B	8PQ1P	0.50	1.813	2.125	0.344	0.750	5/16-18	5/16-18 x 1.50	5.0	
12PQ1B	12PQ1P	0.75	2.063	2.563	0.406	0.750	3/8-16	3/8-16 x 1.50	5.0	
16PQ1B	16PQ1P	1.00	2.313	2.750	0.406	0.880	3/8-16	3/8-16 x 1.75	5.0	
20PQ1B	20PQ1P	1.25	2.875	3.125	0.469	0.940	7/15-14	7/16-14 x 1.75	4.0	
24PQ1B	24PQ1P	1.50	3.250	3.688	0.531	1.190	1/2-13	1/2-13 x 2.25	3.0	
32PQ1B	32PQ1P	2.00	3.813	4.000	0.531	1.440	1/2-13	1/2-13 x 2.50	3.0	
40PQ1B	40PQ1P	2.50	4.281	4.500	0.531	1.815	1/2-13	1/2-13 x 2.75	2.5	
48PQ1B	48PQ1P	3.00	5.156	5.313	0.656	2.190	5/8-11	5/8-11 x 3.50	2.0	
56PQIB	56PQ1P	3.50	5.500	6.000	0.656	1.440	5/8-11	5/8-11 x 2.75	0.5	
64PQIB	64PQIP	4.00	6.000	6.380	0.656	1.440	5/8-11	5/8-11 x 2.75	0.5	
CODE 62 BLOCK FLANGE OR PAD PLUG										
8PQ2B	8PQ2P	0.50	1.940	2.300	0.344	1.250	5/16-18	5/16-18 x 2.00	6.0	
12PQ2B	12PQ2P	0.75	2.500	2.950	0.406	1.250	3/8-16	3/8-16 x 2.00	6.0	
16PQ2B	16PQ2P	1.00	2.750	3.190	0.469	1.500	7/16-14	7/16-14 x 2.50	6.0	
20PQ2B	20PQ2P	1.25	3.060	3.750	0.531	1.430	1/2-13	1/2-13 x 2.50	6.0	
24PQ2B	24PQ2P	1.50	3.750	4.440	0.656	1.815	5/8-11	5/8-11 x 3.00	6.0	
32PQ2B	32PQ2P	2.00	4.500	5.250	0.781	1.815	3/4-10	3/4-10 x 3.00	6.0	
40PQ2B[2]	40PQ2P[2]	2.50	5.870	6.870	0.940	1.930	7/8-9	7/8-9 x 3.50	6.0	
48PQ2B[2]	48PQ2P[2]	3.00	7.000	8.500	1.190	2.690	1 1/8-7	1 1/8-7 x 4.50	6.0	

1) See page M38 for standard stainless steel sizes and dimensions.

2) SAE J518 does not cover these sizes in Code 62. Bolt hole centerline dimensions are: 2.312” x 4.875” for 4OPQ2 and 2.812” x 6.000” for 48PQ2.

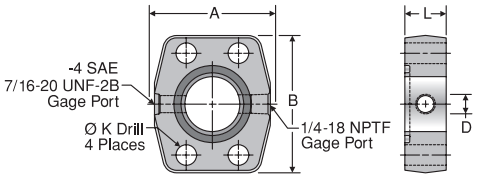
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

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SPGG5

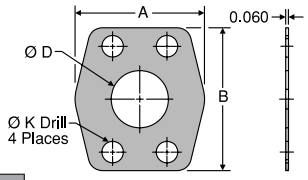
Flange Spacer with Gage Ports
Code 61/62 Spacer with Side Gage Ports



TUBE FITTING PART #	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	K DRILL DIA. (in.)	L (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS
CODE 61 O-RING SPACER								
8SPGG5Q1B	0.50	1.813	2.125	0.500	0.344	1.25	5.0	
12SPGG5Q1B	0.75	2.063	2.563	0.750	0.406	1.25	5.0	
16SPGG5Q1B	1.00	2.313	2.750	1.000	0.406	0.88	5.0	
20SPGG5Q1B	1.25	2.875	3.125	1.250	0.469	0.94	4.0	
24SPGG5Q1B	1.50	3.250	3.688	1.500	0.531	1.19	3.0	
32SPGG5Q1B	2.00	3.813	4.000	2.000	0.531	1.38	3.0	
40SPGG5Q1B	2.50	4.281	4.500	2.500	0.531	1.75	2.5	
48SPGG5Q1B	3.00	5.156	5.313	3.000	0.656	2.12	2.0	
CODE 62 O-RING SPACER								
8SPGG5Q2B	0.50	1.940	2.300	0.500	0.344	1.25	6.0	
12SPGG5Q2B	0.75	2.500	2.950	0.750	0.406	1.25	6.0	
16SPGG5Q2B	1.00	2.750	3.190	1.000	0.469	1.50	6.0	
20SPGG5Q2B	1.25	3.060	3.750	1.250	0.531	1.50	6.0	
24SPGG5Q2B	1.50	3.750	4.440	1.500	0.656	1.75	6.0	
32SPGG5Q2B	2.00	4.500	5.250	2.000	0.781	1.75	6.0	

CP

Flange Connector Plate
Code 61/62 Flange Connector Plate



TUBE FITTING PART #	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	K DRILL DIA. (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) SX	SS
CODE 61 FLANGE CONNECTOR PLATE							
8CP1	0.50	1.81	2.12	0.50	0.344	5.0	
12CP1	0.75	2.06	2.56	0.75	0.406	5.0	
16CP1	1.00	2.31	2.75	1.00	0.406	5.0	
20CP1	1.25	2.88	3.12	1.25	0.469	4.0	
24CP1	1.50	3.25	3.69	1.50	0.531	3.0	
32CP1	2.00	3.81	4.00	2.00	0.531	3.0	
40CP1	2.50	4.12	4.44	2.50	0.531	2.5	
48CP1	3.00	5.16	5.31	3.00	0.656	2.5	
CODE 62 FLANGE CONNECTOR PLATE							
12CP2	0.75	2.38	2.81	0.75	0.406	6.0	
16CP2	1.00	2.75	3.19	1.00	0.469	6.0	
20CP2	1.25	3.06	3.75	1.25	0.531	6.0	
24CP2	1.50	3.75	4.44	1.50	0.656	6.0	
32CP2	2.00	4.50	5.25	2.00	0.781	6.0	

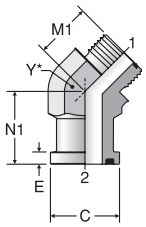
Dimensions and pressures for reference only, subject to change.

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LOVQ1 Full Dimensions

Code 61 Flange 45° Elbow
Code 61 / ORFS

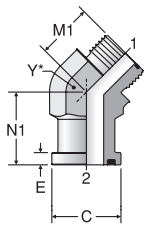


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M1 (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 LOVQ1	3/4	3/4	1.500	0.265	1.20	1.58	1 7/16	5.0
16 LOVQ1	1	1	1.750	0.315	1.26	1.85	1 5/8	5.0
20 LOVQ1	1 1/4	1 1/4	2.000	0.315	1.29	2.40	1 7/8	4.0
24 LOVQ1	1 1/2	1 1/2	2.375	0.315	1.45	2.90	2 1/2	3.0

LOVQ2 Full Dimensions

Code 62 Flange 45° Elbow
Code 62 / ORFS

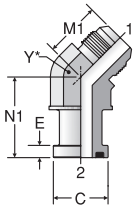


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M1 (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 LOVQ2	3/4	3/4	1.625	0.345	1.20	1.83	1 7/16	6.0
16 LOVQ2	1	1	1.875	0.375	1.25	2.07	1 5/8	6.0
20 LOVQ2	1 1/4	1 1/4	2.125	0.405	1.29	2.40	1 7/8	5.0
24 LOVQ2	1 1/2	1 1/2	2.500	0.495	1.45	2.90	2 1/2	4.5

XVQ1 Full Dimensions

Code 61 Flange 45° Elbow
Code 61 / 37° Flare

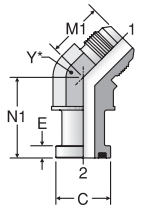


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M1 (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 XVQ1	3/4	3/4	1.500	0.265	1.27	1.58	1 7/16	5.0
16 XVQ1	1	1	1.750	0.315	1.47	1.85	1 5/8	5.0
20 XVQ1	1 1/4	1 1/4	2.000	0.315	1.59	2.40	1 7/8	4.0
24 XVQ1	1 1/2	1 1/2	2.375	0.315	1.78	2.90	2 1/2	3.0
32 XVQ1	2	2	2.812	0.375	2.22	3.00	2 1/2	2.0

XVQ2 Full Dimensions

Code 62 Flange 45° Elbow
Code 62 / 37° Flare

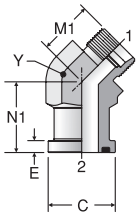


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M1 (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 XVQ2	3/4	3/4	1.625	0.345	1.27	1.83	1 7/16	5.0
16 XVQ2	1	1	1.875	0.375	1.47	2.07	1 5/8	5.0
20 XVQ2	1 1/4	1 1/4	2.125	0.405	1.59	2.40	1 7/8	4.0
24 XVQ2	1 1/2	1 1/2	2.500	0.495	1.78	2.90	2 1/2	3.0

BUVQ1 Full Dimensions

Code 61 45° Elbow
Code 61 / Flareless



* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M1 (in.)	N1 (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 BUVQ1	3/4	3/4	1.500	0.265	1.27	1.58	1 7/16	
16 BUVQ1	1	1	1.750	0.315	1.36	1.85	1 5/8	
20 BUVQ1	1 1/4	1 1/4	2.000	0.315	1.45	2.40	1 7/8	
24 BUVQ1	1 1/2	1 1/2	2.375	0.315	1.52	2.90	2 1/2	
32 BUVQ1	2	2	2.812	0.375	1.83	3.00	2 1/2	

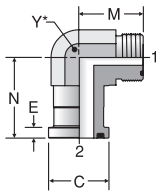
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LOEQ1 Full Dimensions

Code 61 Flange 90° Elbow
Code 61 / ORFS

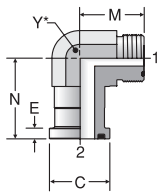


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 LOEQ1	3/4	3/4	1.500	0.265	1.95	1.81	1 3/16	5.0
16 LOEQ1	1	1	1.750	0.315	2.05	2.13	1 7/16	5.0
20 LOEQ1	1 1/4	1 1/4	2.000	0.315	2.22	2.26	1 5/8	4.0
24 LOEQ1	1 1/2	1 1/2	2.375	0.315	2.54	2.64	2	3.0

LOEQ2 Full Dimensions

Code 62 Flange 90° Elbow
Code 62 / ORFS

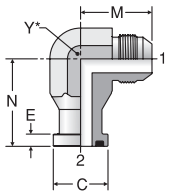


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S
12 LOEQ2	3/4	3/4	1.625	0.345	2.01	2.01	1 3/16	6.0
16 LOEQ2	1	1	1.875	0.375	2.17	2.42	1 7/16	6.0
20 LOEQ2	1 1/4	1 1/4	2.125	0.405	2.50	2.68	1 5/8	5.0
24 LOEQ2	1 1/2	1 1/2	2.500	0.495	2.87	3.13	2	4.5

XEQ1 Full Dimensions

Code 61 Flange 90° Elbow
Code 61 / 37° Flare

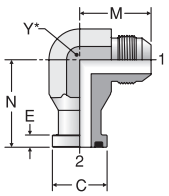


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
12 XEQ1	3/4	3/4	1.500	0.265	1.91	1.81	1 3/16	5.0		
16 XEQ1	1	1	1.750	0.315	2.07	2.13	1 7/16	5.0		
20 XEQ1	1 1/4	1 1/4	2.000	0.315	2.26	2.26	1 5/8	4.0		
24 XEQ1	1 1/2	1 1/2	2.375	0.315	2.72	2.64	2	3.0		
32 XEQ1	2	2	2.812	0.375	3.06	4.25	2 1/2	2.0		

XEQ2 Full Dimensions

Code 62 Flange 90° Elbow
Code 62 / 37° Flare

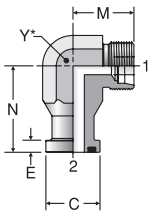


* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
12 XEQ2	3/4	3/4	1.625	0.345	1.97	2.04	1 3/16	5.0		
16 XEQ2	1	1	1.875	0.375	2.19	2.42	1 7/16	5.0		
20 XEQ2	1 1/4	1 1/4	2.125	0.405	2.56	2.68	1 5/8	4.0		
24 XEQ2	1 1/2	1 1/2	2.500	0.495	3.03	3.13	2	3.0		

BUEQ1 Full Dimensions

Code 61 90° Elbow
Code 61 / Flareless



* Y – Across Wrench Flats

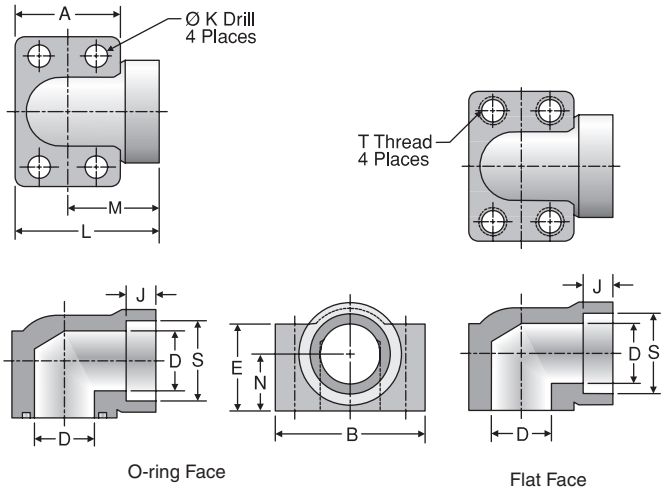
TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 (in.)	C (in.)	E (in.)	M (in.)	N (in.)	Y (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
12 BUEQ1	3/4	3/4	1.500	0.265	1.73	1.81	1 3/16			
16 BUEQ1	1	1	1.750	0.315	1.99	2.13	1 7/16			
20 BUEQ1	1 1/4	1 1/4	2.000	0.315	1.99	2.26	1 5/8			
24 BUEQ1	1 1/2	1 1/2	2.375	0.315	2.33	2.64	2			
32 BUEQ1	2	2	2.812	0.375	2.45	4.25	2 1/2			

Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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W7EQ

Weld Socket Block Elbow Connector, Pipe
Weld Socket, Pipe / Code 61 or 62
Block Flange or Pad



TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	D	E	J	K DRILL DIA.	L	M	N	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
WELD SOCKET, PIPE / CODE 61 BLOCK FLANGE OR PAD																	
12W7EQ1B	**12W7EQ1P**	3/4	0.75	1.69	2.56	0.75	1.25	0.56	0.406	2.28	1.44	0.875	1.062	3/8-16	3/8-16 x 2.00	5.0	
16W7EQ1B	**16W7EQ1P**	1	1.00	1.94	2.75	1.00	1.50	0.56	0.406	2.62	1.66	1.062	1.328	3/8-16	3/8-16 x 2.25	4.5	
20W7EQ1B	**20W7EQ1P**	1 1/4	1.25	2.19	3.12	1.25	1.81	0.62	0.469	3.00	1.91	1.188	1.672	7/16-14	7/16-14 x 2.75	3.5	
24W7EQ1B	**24W7EQ1P**	1 1/2	1.50	2.56	3.69	1.50	2.00	0.69	0.531	3.33	2.05	1.312	1.922	1/2-13	1/2-13 x 3.00	3.0	
32W7EQ1B	**32W7EQ1P**	2	2.00	3.06	4.33	2.00	2.50	0.75	0.531	3.81	2.28	1.656	2.406	1/2-13	1/2-13 x 3.50	3.0	
WELD SOCKET, PIPE / CODE 62 BLOCK FLANGE OR PAD																	
12W7EQ2B	**12W7EQ2P**	3/4	0.75	1.94	2.75	0.75	1.50	0.56	0.406	2.62	1.66	1.062	1.062	3/8-16	3/8-16 x 2.25	6.0	
16W7EQ2B	**16W7EQ2P**	1	1.00	2.19	3.12	1.00	1.81	0.62	0.469	3.00	1.91	1.188	1.328	7/16-14	7/16-14 x 2.50	6.0	
20W7EQ2B	**20W7EQ2P**	1 1/4	1.25	2.56	3.69	1.25	2.00	0.69	0.531	3.32	2.05	1.312	1.672	1/2-13	1/2-13 x 3.00	5.0	
24W7EQ2B	**24W7EQ2P**	1 1/2	1.50	3.06	4.33	1.50	2.50	0.75	0.656	3.81	2.28	1.656	1.922	5/8-11	5/8-11 x 3.50	5.0	

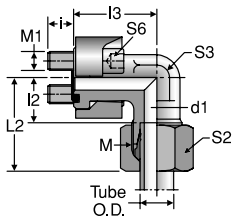
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

WFS

SAE Flange Connection
Code 61 & 62 / Metric Flareless



TUBE FITTING PART #	SIZE (in.)	END SIZE (mm)	WORKING PRESSURE (bar)	M THREAD	d1 (mm)	l (mm)	l 1 (mm)	l 2 (mm)	l 3 (mm)	L1 ≈ (mm)	L2 ≈ (mm)	S1 (mm)	S2 (mm)	S3 (mm)	S6 (mm)	STANDARD FROM STOCK A3C	STANDARD FROM STOCK 71	STANDARD FROM STOCK A3C	STANDARD FROM STOCK 71
SAE FLANGE CONNECTIONS – CODE 61 – STANDARD SERIES																			
WFS32/15LA3C	1/2	15L	200	M22 x 1.5	12	11.5	41	29	36	56	44	24	27	24	6	•		•	
WFS32/16SA3C	1/2	16S	220	M24 x 1.5	12	11.5	41.5	29.5	36	60	48	24	30	24	6	•		•	
WFS33/18LA3C	3/4	18L	200	M26 x 1.5	15	15.5	45.5	31.5	42	62	48	30	32	30	8	•		•	
WFS33/22LA3C	3/4	22L	100	M30 x 2	19	15.5	45.5	33.5	42	62	50	30	36	30	8	•		•	
WFS33/20SA3C	3/4	20S	220	M30 x 2	16	15.5	46.5	32.5	42	68	54	30	36	30	8	•		•	
WFS33/25SA3C	3/4	25S	220	M36 x 2	17	15.5	45	33	42	69	57	30	46	30	8	•		•	
WFS34/28LA3C	1	28L	100	M36 x 2	24	13.5	46.5	36.5	45	63	53	36	41	36	8	•		•	
WFS34/30SA3C	1	30S	220	M42 x 2	24	13.5	49.5	36.5	45	76	63	36	50	36	8	•		•	
WFS35/35LA3C	1 1/4	35L	100	M45 x 2	30	18.5	47.5	46.5	50	69	68	41	50	41	8	•		•	
WFS35/25SA3C	1 1/4	25S	175	M36 x 2	20	18.5	48	43	50	72	67	41	46	41	8	•		•	
WFS35/30SA3C	1 1/4	30S	175	M42 x 2	25	18.5	48.5	43.5	50	75	70	41	50	41	8	•		•	
WFS35/38SA3C	1 1/4	38S	175	M52 x 2	28	18.5	50	43	50	81	74	46	60	41	8	•		•	
WFS36/42LA3C	1 1/2	42L	100	M52 x 2	36	18.5	53	47	55	76	70	46	60	50	10	•		•	
WFS36/38SA3C	1 1/2	38S	130	M52 x 2	32	18.5	54	48	55	85	79	46	60	50	10	•		•	
SAE FLANGE CONNECTIONS – CODE 62 – HIGH PRESSURE SERIES																			
WFS62/16SA3C	1/2	16S	250	M24 x 1.5	12	13.5	44.5	29.5	39	63	48	24	30	24	6	•		•	
WFS63/16SA3C	3/4	16S	250	M24 x 1.5	12	15.5	50.5	36.5	48	69	55	30	30	32	8	•		•	
WFS63/20SA3C	3/4	20S	250	M30 x 2	16	15.5	50.5	35.5	48	72	57	30	36	32	8	•		•	
WFS63/25SA3C	3/4	25S	250	M36 x 2	17	15.5	51	36	48	75	60	30	46	32	8	•		•	
WFS64/25SA3C	1	25S	250	M36 x 2	20	20.5	60	44	60	84	65	36	46	41	10	•		•	
WFS64/30SA3C	1	30S	250	M42 x 2	24	20.5	60.5	41.5	60	87	68	36	50	41	10	•		•	
WFS65/30SA3C	1 1/4	30S	250	M42 x 2	25	22.5	65.5	44.5	68	92	71	41	50	46	10	•		•	
WFS65/38SA3C	1 1/4	38S	200	M52 x 2	30	22.5	67	45	68	98	76	46	60	46	10	•		•	
WFS66/38SA3C	1 1/2	38S	200	M52 x 2	30	24.5	73	56	76	104	87	46	60	50	14	•		•	

EO-2 Part Number example: WFS33/18ZLA3C

Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35°C up to +100°C, FPM (e.g., fluorocarbon on request) -25°C up to +120°C.

Tightening torques for socket head cap screws see Tables T6 and T7.

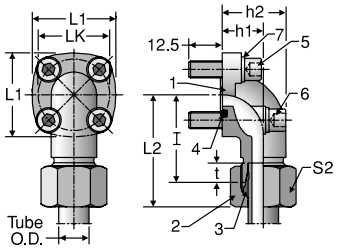
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BFW

Hydraulic Flange Elbow
DIN Flange / Metric Flareless



TUBE FITTING PART #	WORKING PRESSURE (bar)	END SIZE (mm)	h1 (mm)	h1 (mm)	I (mm)	L1 (mm)	L2 (mm)	LK (mm)	S2 (mm)	t (mm)	STANDARD MATERIAL FROM STOCK A3C	STANDARD MATERIAL FROM STOCK 71	STANDARD EO-2 FROM STOCK A3C	STANDARD EO-2 FROM STOCK 71
BFW15L/LK40A3C	65	15	22.5	36.5	38	42	46	40	27	7	•		•	
BFW18L/LK40A3C	65	18	22.5	36.5	38	42	47	40	32	7.5	•		•	
BFW22L/LK40A3C	65	22	22.5	36.5	38	42	47.5	40	36	7.5	•		•	
BFW28L/LK40A3C	65	28	28	43	40	42	49	40	41	7.5	•		•	
BFW35L/LK40A3C	65	35	32	55	41	42	52	40	50	10.5	•		•	
BFW35L/LK55A3C	65	35	32	51.5	49	58	62	55	50	10.5	•		•	
BFW42L/LK55A3C	65	42	40	64.5	49	58	61	55	60	11	•		•	
BFW15L/LK35A3C	155	15	16.5	26.5	38	39	46	35	27	7	•		•	
BFW20S/LK55A3C	155	20	24	38	45	58	56	55	36	10.5	•		•	
BFW20S/LK40A3C	155	20	22.5	35.5	40	42	50	40	36	10.5	•		•	
BFW25S/LK55A3C	155	25	30	46	49	58	61	55	46	12	•		•	
BFW30S/LK55A3C	155	30	32	50	49	58	62	55	50	13.5	•		•	
BFW10L/LK35A3C	200	10	16.5	26.5	38	39	47	35	19	7	•		•	
BFW12L/LK35A3C	200	12	16.5	26.5	38	39	47	35	22	7	•		•	
BFW16S/LK35A3C	200	16	20	31	38	39	48	35	30	8.5	•		•	

Unassembled BFW Fitting Components

1 Elbow Body	2 Nut	3 Progressive Ring	4 O-Ring	5 2 Cap Screws DIN 912-8.8	6 2 Cap Screws DIN 912-8.8	7 4 Spr. Washers DIN 127
BFW15L/LK40A3CX	M15LA3CX	DPR15LA3CX	OR26X2.5X	M6X22	M6X22	A6
BFW18L/LK40A3CX	M18LA3CX	DPR18LA3CX	OR26X2.5X	M6X22	M6X22	A6
BFW22L/LK40A3CX	M22LA3CX	DPR22LA3CX	OR26X2.5X	M6X22	M6X22	A6
BFW28L/LK40A3CX	M28LA3CX	DPR28LA3CX	OR26X2.5X	M6X20	M6X50	A6
BFW35L/LK40A3CX	M35LA3CX	DPR35LA3CX	OR26X2.5X	M6X22	M6X60	A6
BFW35L/LK55A3CX	M35LA3CX	DPR35LA3CX	OR33X2.5X	M8X25	M8X60	A8
BFW42L/LK55A3CX	M42LA3CX	DPR42LA3CX	OR33X2.5X	M8X25	M8X70	A8
BFW15L/LK35A3CX	M15LA3CX	DPR15LA3CX	OR20X2.5X	M6X22	M6X35	A6
BFW20S/LK55A3CX	M20SA3CX	DPR20SA3CX	OR33X2.5X	M8X25	M8X50	A8
BFW20S/LK40A3CX	M20SA3CX	DPR20SA3CX	OR26X2.5X	M6X22	M6X45	A6
BFW25S/LK55A3CX	M25SA3CX	DPR25SA3CX	OR33X2.5X	M8X25	M8X55	A8
BFW30S/LK55A3CX	M30SA3CX	DPR20SA3CX	OR33X2.5X	M8X25	M8X55	A8
BFW10L/LK35A3CX	M10LA3CX	DRP10LA3CX	OR20X2.5X	M6X22	M6X35	A6
BFW12L/LK35A3CX	M12LA3CX	DPR12LA3CX	OR20X2.5X	M6X22	M6X35	A6
BFW16S/LK35A3CX	M16SA3CX	DPR16SA3CX	OR20X2.5X	M6X22	M6X40	A6
BFW20S/LK35A3CX	M20SA3CX	DPR20SA3CX	OR20X2.5X	M6X22	M6X45	A6

EO-2 Part Number example: BFW15ZL/LK40A3C

Temperature range without pressure reductions for fittings with O-ring sealing of NBR (e.g., buna N series) -35°C up to +100°C, FPM (e.g., fluorocarbon on request) -25°C up to +120°C.

Tightening torques for socket head cap screws see Table T6.

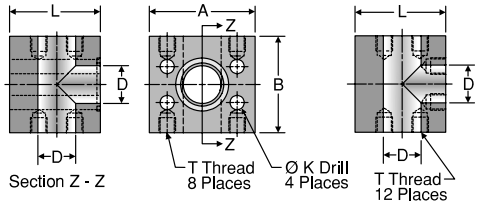
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QPQPJQ

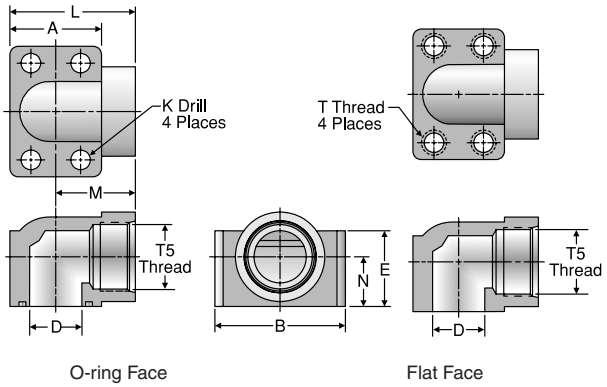
Block Junction Tee
Code 61 or 62 Block Pads / Block Flange or Pad



TUBE FITTING PART #		FLANGE SIZE	A	B	D	K DRILL DIA.	L	T THREAD	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SX	SS
CODE 61 BLOCK PADS / BLOCK FLANGE OR PAD										
12Q1PQ1PJQ1B	12Q1PQ1PJQ1P	0.75	2.62	2.75	0.75	0.406	2.25	3/8-16	5.0	
16Q1PQ1PJQ1B	16Q1PQ1PJQ1P	1.00	2.82	3.00	1.00	0.406	2.50	3/8-16	5.0	
20Q1PQ1PJQ1B	20Q1PQ1PJQ1P	1.25	3.19	3.50	1.25	0.469	3.00	7/16-14	4.0	
24Q1PQ1PJQ1B	24Q1PQ1PJQ1P	1.50	3.75	4.00	1.50	0.531	3.50	1/2-13	3.0	
32Q1PQ1PJQ1B	32Q1PQ1PJQ1P	2.00	4.00	4.25	2.00	0.531	4.00	1/2-13	3.0	
CODE 62 BLOCK PADS / BLOCK FLANGE OR PAD										
12Q2PQ2PJQ2B	12Q2PQ2PJQ2P	0.75	2.81	3.00	0.75	0.406	2.50	3/8-16	6.0	
16Q2PQ2PJQ2B	16Q2PQ2PJQ2P	1.00	3.19	3.50	1.00	0.469	3.00	7/16-14	6.0	
20Q2PQ2PJQ2B	20Q2PQ2PJQ2P	1.25	3.75	4.00	1.25	0.531	3.50	1/2-13	6.0	
24Q2PQ2PJQ2B	24Q2PQ2PJQ2P	1.50	4.50	4.50	1.50	0.656	4.00	5/8-11	6.0	
32Q2PQ2PJQ2B	32Q2PQ2PJQ2P	2.00	5.25	5.00	1.94	0.781	5.00	3/4-10	6.0	

G5EQ

SAE Port Block Elbow
SAE Port / Code 61 or 62 Block Flange or Pad



TUBE FITTING PART #		T5 STRAIGHT THREAD	SAE PORT DASH	FLANGE SIZE	A	B	D	E	K DRILL DIA.	L	M	N	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	UN-2B	SIZE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
SAE PORT / CODE 61 BLOCK FLANGE OR PAD																
12G5EQ1B	12G5EQ1P	1-1/16-12	12	0.75	1.69	2.56	0.75	1.25	0.406	2.28	1.440	0.875	3/8-16	3/8-16 x 2.00	4.0	
16G5EQ1B	16G5EQ1P	1-5/16-12	16	1.00	1.94	2.75	1.00	1.50	0.406	2.62	1.660	1.062	3/8-16	3/8-16 x 2.25	3.0	
20G5EQ1B	20G5EQ1P	1-5/8-12	20	1.25	2.19	3.12	1.25	1.81	0.469	3.00	1.910	1.188	7/16-14	7/16-14 x 2.75	2.5	
24G5EQ1B	24G5EQ1P	1-7/8-12	24	1.50	2.56	3.69	1.50	2.00	0.531	3.33	2.050	1.312	1/2-13	1/2-13 x 3.00	2.0	
32G5EQ1B	32G5EQ1P	2-1/2-12	32	2.00	3.06	4.33	2.00	2.50	0.531	3.81	2.280	1.656	1/2-13	1/2-13 x 3.50	1.5	
SAE PORT / CODE 62 BLOCK FLANGE OR PAD																
12G5EQ2B	12G5EQ2P	1-1/16-12	12	0.75	1.94	2.75	0.75	1.50	0.406	2.62	1.660	1.062	3/8-16	3/8-16 x 2.25	5.0	
16G5EQ2B	16G5EQ2P	1-5/16-12	16	1.00	2.19	3.12	1.00	1.81	0.469	3.00	1.910	1.188	7/16-14	7/16-14 x 2.50	4.0	
20G5EQ2B	20G5EQ2P	1-5/8-12	20	1.25	2.56	3.69	1.25	2.00	0.531	3.32	2.050	1.312	1/2-13	1/2-13 x 3.00	3.5	
24G5EQ2B	24G5EQ2P	1-7/8-12	24	1.50	3.06	4.33	1.50	2.50	0.656	3.81	2.280	1.656	5/8-11	5/8-11 x 3.50	3.5	

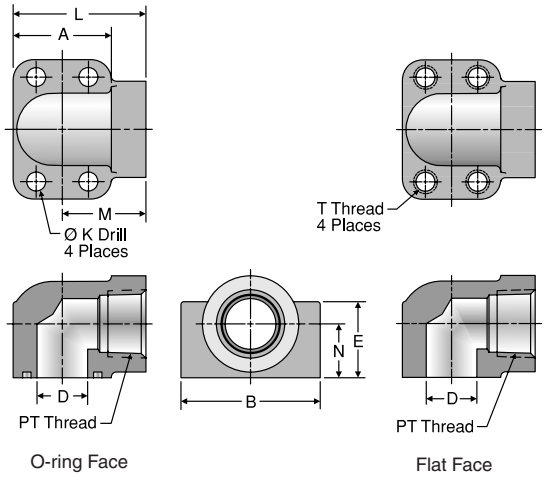
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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GEQ

NPTF Port Block Elbow Adapter
NPTF / Code 61 or 62 Block Flange or Pad



TUBE FITTING PART #		PT THREAD	FLANGE SIZE	A	B	D	E	K DRILL DIA.	L	M	N	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	NPTF	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
NPTF PORT / CODE 61 BLOCK FLANGE OR PAD															
12GEQ1B	**12GEQ1P**	3/4 - 14	0.75	1.69	2.56	0.75	1.25	0.406	2.28	1.440	0.875	3/8-16	3/8-16 x 2.00	4.0	
16GEQ1B	**16GEQ1P**	1 - 11 1/2	1.00	1.94	2.75	1.00	1.50	0.406	2.62	1.660	1.062	3/8-16	3/8-16 x 2.25	4.0	
20GEQ1B	**20GEQ1P**	1 1/4 - 11 1/2	1.25	2.19	3.12	1.25	1.81	0.469	3.00	1.910	1.188	7/16-14	7/16-14 x 2.75	2.7	
24GEQ1B	**24GEQ1P**	1 1/2 - 11 1/2	1.50	2.56	3.69	1.50	2.00	0.531	3.33	2.050	1.312	1/2-13	1/2-13 x 3.00	2.5	
32GEQ1B	**32GEQ1P**	2 - 11 1/2	2.00	3.06	4.33	2.00	2.50	0.531	3.81	2.280	1.656	1/2-13	1/2-13 x 3.50	1.7	
NPTF PORT / CODE 62 BLOCK FLANGE OR PAD															
12GEQ2B	**12GEQ2P**	3/4 - 14	0.75	1.94	2.75	0.75	1.50	0.406	2.62	1.660	1.062	3/8-16	3/8-16 x 2.25	5.5	
16GEQ2B	**16GEQ2P**	1 - 11 1/2	1.00	2.19	3.12	1.00	1.81	0.469	3.00	1.910	1.188	7/16-14	7/16-14 x 2.50	5.0	
20GEQ2B	**20GEQ2P**	1 1/4 - 11 1/2	1.25	2.56	3.69	1.25	2.00	0.531	3.32	2.050	1.312	1/2-13	1/2-13 x 3.00	3.5	
24GEQ2B	**24GEQ2P**	1 1/2 - 11 1/2	1.50	3.06	4.33	1.50	2.50	0.656	3.81	2.280	1.656	5/8-11	5/8-11 x 3.50	3.0	

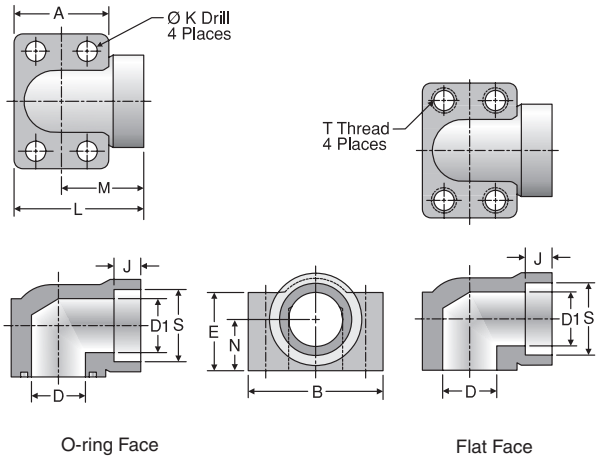
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

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W6EQ

Weld Socket Block Elbow Connector, Tube
Weld Socket, Tube / Code 61 or 62 Block Flange or Pad



O-ring Face

Flat Face

TUBE FITTING PART #		TUBE O.D.	FLANGE SIZE	A	B	D	D1	E	J	K DRILL DIA.	L	M	N	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)	
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SX	SS
WELD SOCKET, TUBE / CODE 61 BLOCK FLANGE OR PAD																		
12W6EQ1B	**12W6EQ1P**	3/4	0.75	1.69	2.56	0.75	0.63	1.25	0.312	0.406	2.280	1.44	0.875	0.752	3/8-16	3/8-16 x 2.00	5.0	
16-12W6EQ1B	**16-12W6EQ1P**	1	0.75	1.69	2.56	0.75	0.75	1.25	0.438	0.406	2.280	1.44	0.875	1.002	3/8-16	3/8-16 x 2.00	5.0	
16W6EQ1B	**16W6EQ1P**	1	1.00	1.94	2.75	1.00	0.88	1.50	0.438	0.406	2.620	1.66	1.062	1.002	3/8-16	3/8-16 x 2.25	5.0	
20-16W6EQ1B	**20-16W6EQ1P**	1 1/4	1.00	1.94	2.75	1.00	1.00	1.50	0.500	0.406	2.620	1.66	1.062	1.252	3/8-16	3/8-16 x 2.25	5.0	
20W6EQ1B	**20W6EQ1P**	1 1/4	1.25	2.19	3.12	1.25	1.13	1.81	0.500	0.469	3.000	1.91	1.188	1.252	7/16-14	7/16-14 x 2.75	4.0	
24-20W6EQ1B	**24-20W6EQ1P**	1 1/2	1.25	2.19	3.12	1.25	1.25	1.81	0.562	0.469	3.000	1.91	1.188	1.502	7/16-14	7/16-14 x 2.75	4.0	
24W6EQ1B	**24W6EQ1P**	1 1/2	1.50	2.56	3.69	1.50	1.38	2.00	0.562	0.531	3.328	2.05	1.312	1.502	1/2-13	1/2-13 x 3.00	3.0	
28-24W6EQ1B	**28-24W6EQ1P**	1 3/4	1.50	2.56	3.69	1.50	1.50	2.00	0.562	0.531	3.328	2.05	1.312	1.752	1/2-13	1/2-13 x 3.00	3.0	
32W6EQ1B	**32W6EQ1P**	2	2.00	3.06	4.33	2.00	1.88	2.50	0.625	0.531	3.812	2.28	1.656	2.002	1/2-13	1/2-13 x 3.50	3.0	
36-32W6EQ1B	**36-32W6EQ1P**	2 1/4	2.00	3.06	4.33	2.00	2.00	2.50	0.625	0.531	3.812	2.28	1.656	2.252	1/2-13	1/2-13 x 3.50	3.0	
WELD SOCKET, TUBE / CODE 62 BLOCK FLANGE OR PAD																		
12W6EQ2B	**12W6EQ2P**	3/4	0.75	1.94	2.75	0.75	0.63	1.50	0.560	0.406	2.620	1.66	1.062	0.752	3/8-16	3/8-16 x 2.25	6.0	
16-12W6EQ2B	**16-12W6EQ2P**	1	0.75	1.94	2.75	0.75	0.75	1.50	0.620	0.406	2.620	1.66	1.062	1.002	3/8-16	3/8-16 x 2.25	6.0	
16W6EQ2B	**16W6EQ2P**	1	1.00	2.19	3.12	1.00	0.88	1.81	0.620	0.469	3.000	1.91	1.188	1.002	7/16-14	7/16-14 x 2.50	6.0	
20-16W6EQ2B	**20-16W6EQ2P**	1 1/4	1.00	2.19	3.12	1.00	1.00	1.81	0.690	0.469	3.000	1.91	1.188	1.252	7/16-14	7/16-14 x 2.50	6.0	
20W6EQ2B	**20W6EQ2P**	1 1/4	1.25	2.56	3.69	1.25	1.13	2.00	0.690	0.531	3.320	2.05	1.312	1.252	1/2-13	1/2-13 x 3.00	6.0	
24-20W6EQ2B	**24-20W6EQ2P**	1 1/2	1.25	2.56	3.69	1.25	1.25	2.00	0.750	0.531	3.320	2.05	1.312	1.502	1/2-13	1/2-13 x 3.00	6.0	
24W6EQ2B	**24W6EQ2P**	1 1/2	1.50	3.06	4.33	1.50	1.38	2.50	0.750	0.656	3.810	2.28	1.656	1.502	5/8-11	5/8-11 x 3.50	6.0	
28-24W6EQ2B	**28-24W6EQ2P**	1 3/4	1.50	3.06	4.33	1.50	1.50	2.50	0.750	0.656	3.810	2.28	1.656	1.752	5/8-11	5/8-11 x 3.50	6.0	

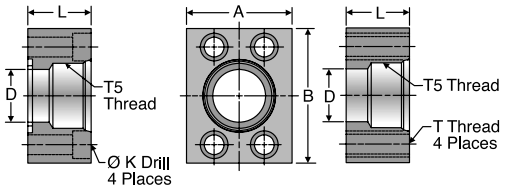
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

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G5Q – Stainless Steel

SAE Port Block Flange Adapter
SAE Port / Code 61 or 62 Block Flange



O-ring Face Flat Face

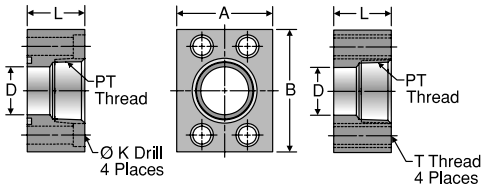
TUBE FITTING PART #		SAE PORT DASH SIZE	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	K DRILL DIA. (in.)	L (in.)	T5 STRAIGHT THREAD UN-2B	MOUNTING HARDWARE SHCS	STANDARD Dynamic Pressure (x 1,000 PSI) SS
O-RING FACE	FLAT FACE										
SAE PORT / CODE 61 FLANGE BLOCK											
8G5Q1B	*	8	0.50	1.50	2.12	0.50	0.344	1.20	3/4-16	5/16-18 x 1.25	5.0
12G5Q1B	*	12	0.75	1.75	2.62	0.75	0.406	1.20	1 1/16-12	3/8-16 x 1.50	5.0
16G5Q1B	*	16	1.00	2.00	2.82	1.00	0.406	1.45	1 5/16-12	3/8-16 x 1.50	5.0
20G5Q1B	*	20	1.25	2.50	3.19	1.25	0.469	1.45	1 5/8-12	7/16-14 x 1.75	4.0
24G5Q1B	*	24	1.50	2.75	3.75	1.50	0.531	1.70	1 7/8-12	1/2-13 x 2.00	3.0
32G5Q1B	*	32	2.00	3.25	4.00	2.00	0.531	1.70	1 7/8-12	1/2-13 x 2.00	
SAE PORT / CODE 62 FLANGE BLOCK											
8G5Q2B	*	8	0.50	1.75	2.22	0.50	0.344	0.95	3/4-16	5/16-18 x 1.25	6.0
12G5Q2B	*	12	0.75	2.00	2.81	0.75	0.406	1.20	1 1/16-12	3/8-16 x 1.50	6.0
16G5Q2B	*	16	1.00	2.25	3.19	1.00	0.469	1.45	1 5/16-12	7/16-14 x 1.75	6.0
20G5Q2B	*	20	1.25	2.75	3.75	1.25	0.531	1.45	1 5/8-12	1/2-13 x 1.75	6.0
24G5Q2B	*	24	1.50	3.25	4.50	1.50	0.656	1.70	1 7/8-12	5/8-11 x 2.00	5.0
32G5Q2B	*	32	2.00	4.00	5.25	2.00	0.781	1.70	2 1/2-12	3/4-10 x 2.25	3.0

* Consult factory.

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

GQ – Stainless Steel

NPTF Port Block Flange Adapter
NPTF Port / Code 61 or 62 Block Flange



O-ring Face Flat Face

TUBE FITTING PART #		PT THREAD NPTF	FLANGE SIZE (in.)	A (in.)	B (in.)	D (in.)	K DRILL DIA. (in.)	L (in.)	MOUNTING HARDWARE SHCS	STANDARD Dynamic Pressure (x 1,000 PSI) SS
O-RING FACE	FLAT FACE									
NPTF PORT / CODE 61 BLOCK FLANGE										
8GQ1B	*	1/2-14	0.50	1.50	2.12	0.50	0.344	1.25	5/16-18 x 1.75	5.0
12GQ1B	*	3/4-14	0.75	1.75	2.62	0.75	0.406	1.25	3/8-16 x 2.00	5.0
16GQ1B	*	1-11 1/2	1.00	2.00	2.82	1.00	0.406	1.50	3/8-16 x 2.25	5.0
20GQ1B	*	1 1/4-11 1/2	1.25	2.50	3.19	1.25	0.469	1.50	7/16-14 x 2.25	4.0
24GQ1B	*	1 1/2-11 1/2	1.50	2.75	3.75	1.50	0.531	1.75	1/2-13 x 2.50	3.0
32GQ1B	*	2-11 1/2	2.00	3.25	4.00	2.00	0.531	1.75	1/2-13 x 2.50	2.7
40GQ1B	*	2 1/2-8	2.50	4.00	4.50	2.50	0.531	2.00	1/2-13 x 2.75	2.5
48GQ1B	*	3-8	3.00	4.50	5.31	3.00	0.656	2.25	5/8-11 x 3.00	1.2
NPTF PORT / CODE 62 BLOCK FLANGE										
12GQ2B	*	3/4-14	0.75	2.00	2.81	0.75	0.406	1.20	3/8-16 x 2.00	6.0
16GQ2B	*	1-11 1/2	1.00	2.25	3.19	1.00	0.469	1.45	7/16-14 x 2.50	5.0
20GQ2B	*	1 1/4-11 1/2	1.25	2.75	3.75	1.25	0.531	1.45	1/2-13 x 2.50	4.0
24GQ2B	*	1 1/2-11 1/2	1.50	3.25	4.50	1.50	0.656	1.70	5/8-11 x 2.75	3.5
32GQ2B	*	2-11 1/2	2.00	4.00	5.25	2.00	0.781	1.70	3/4-10 x 3.00	3.0

* Consult factory.

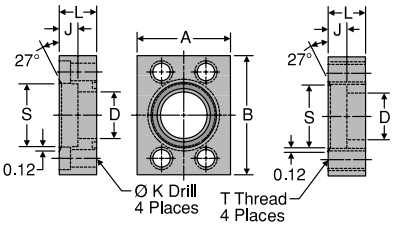
To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

W5Q – Stainless Steel

Flat Weld Socket Block Flange Connector, Pipe
Flat Weld Socket, Pipe / Code 61 or 62
Block Flange or Pad



TUBE FITTING PART #		PIPE SIZE	FLANGE SIZE	A	B	D	J	K DRILL DIA.	L	S	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SS
FLAT WELD SOCKET, PIPE / CODE 61 BLOCK FLANGE OR PAD													
8W5Q1B	**8W5Q1P**	1/2	0.50	1.50	2.12	0.500	0.380	0.344	0.69	0.860	5/16-18	5/16-18 x 1.25	5.0
12W5Q1B	**12W5Q1P**	3/4	0.75	1.75	2.62	0.750	0.500	0.406	0.94	1.070	3/8-16	3/8-16 x 1.75	5.0
16W5Q1B	**16W5Q1P**	1	1.00	2.00	2.82	1.000	0.500	0.406	0.94	1.335	3/8-16	3/8-16 x 1.75	5.0
20W5Q1B	**20W5Q1P**	1 1/4	1.25	2.50	3.19	1.250	0.500	0.469	0.94	1.680	7/16-14	7/16-14 x 1.75	4.0
24W5Q1B	**24W5Q1P**	1 1/2	1.50	2.75	3.75	1.500	0.500	0.531	1.19	1.920	1/2-13	1/2-13 x 2.25	3.0
32W5Q1B	**32W5Q1P**	2	2.00	3.25	4.00	2.000	0.620	0.531	1.44	2.411	1/2-13	1/2-13 x 2.50	3.0
40W5Q1B	**40W5Q1P**	2 1/2	2.50	4.00	4.50	2.500	0.750	0.531	1.69	2.911	1/2-13	1/2-13 x 2.75	2.5
48W5Q1B	**48W5Q1P**	3	3.00	4.50	5.31	3.000	1.240	0.656	2.12	3.540	5/8-11	5/8-11 x 3.50	2.0
FLAT WELD SOCKET, PIPE / CODE 62 BLOCK FLANGE OR PAD													
8W5Q2B	**8W5Q2P**	1/2	0.50	1.75	2.22	0.500	0.500	0.344	0.94	0.860	5/16-18	5/16-18 x 1.50	6.0
12W5Q2B	**12W5Q2P**	3/4	0.75	2.00	2.81	0.750	0.500	0.406	0.94	1.070	3/8-16	3/8-16 x 1.75	6.0
16W5Q2B	**16W5Q2P**	1	1.00	2.25	3.19	1.000	0.500	0.469	0.94	1.335	7/16-14	7/16-14 x 1.75	6.0
20W5Q2B	**20W5Q2P**	1 1/4	1.25	2.75	3.75	1.250	0.500	0.531	1.19	1.672	1/2-13	1/2-13 x 2.25	6.0
24W5Q2B	**24W5Q2P**	1 1/2	1.50	3.25	4.50	1.500	0.500	0.656	1.44	1.920	5/8-11	5/8-11 x 2.75	6.0
32W5Q2B	**32W5Q2P**	2	2.00	4.00	5.25	2.000	0.620	0.781	1.69	2.411	3/4-10	3/4-10 x 3.00	6.0
40W5Q2B	**40W5Q2P**	2 1/2	2.50	5.00	6.88	2.500	0.620	0.906	1.94	2.911	7/8-9	7/8-9 x 3.50	6.0
48W5Q2B	**48W5Q2P**	3	3.00	6.00	8.50	3.000	0.620	1.156	2.44	3.540	1 1/8-7	1 1/8-7 x 4.50	6.0

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

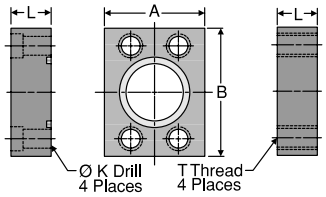
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Columbus, Ohio
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PQ – Stainless Steel

Block Plug
Code 61/62 Block Flange or Pad Plug



O-ring Face Flat Face

TUBE FITTING PART #		FLANGE SIZE	A	B	K DRILL DIA.	L	T THREAD	MOUNTING HARDWARE	STANDARD Dynamic Pressure (x 1,000 PSI)
O-RING FACE	FLAT FACE	(in.)	(in.)	(in.)	(in.)	(in.)	UNC-2B	SHCS	SS
CODE 61 BLOCK FLANGE OR PAD PLUG									
8PQ1B	**8PQ1P**	0.50	1.500	2.120	0.344	1.20	5/16-18	5/16-18 x 2.00	5.0
12PQ1B	**12PQ1P**	0.75	1.750	2.620	0.406	1.20	3/8-16	3/8-16 x 2.00	5.0
16PQ1B	**16PQ1P**	1.00	2.000	2.820	0.406	1.45	3/8-16	3/8-16 x 2.25	5.0
20PQ1B	**20PQ1P**	1.25	2.500	3.190	0.469	1.45	7/16-14	7/16-14 x 2.25	4.0
24PQ1B	**24PQ1P**	1.50	2.750	3.750	0.531	1.70	1/2-13	1/2-13 x 2.50	3.0
32PQ1B	**32PQ1P**	2.00	3.250	4.000	0.531	1.70	1/2-13	1/2-13 x 2.50	3.0
40PQ1B	**40PQ1P**	2.50	4.000	4.500	0.531	1.95	1/2-13	1/2-13 x 2.75	2.5
48PQ1B	**48PQ1P**	3.00	4.500	5.310	0.656	2.20	5/8-11	5/8-11 x 3.00	2.0
CODE 62 BLOCK FLANGE OR PAD PLUG									
8PQ2B	**8PQ2P**	0.50	1.750	2.220	0.344	0.94	5/16-18	5/16-18 x 1.50	6.0
12PQ2B	**12PQ2P**	0.75	2.000	2.810	0.406	1.19	3/8-16	3/8-16 x 2.00	6.0
16PQ2B	**16PQ2P**	1.00	2.250	3.190	0.492	1.44	7/16-14	7/16-14 x 2.25	6.0
20PQ2B	**20PQ2P**	1.25	2.750	3.750	0.531	1.44	1/2-13	1/2-13 x 2.50	6.0
24PQ2B	**24PQ2P**	1.50	3.250	4.500	0.656	1.69	5/8-11	5/8-11 x 2.75	6.0
32PQ2B	**32PQ2P**	2.00	4.000	5.250	0.781	1.69	3/4-10	3/4-10 x 3.00	6.0
40PQ2B	**40PQ2P**	2.50	5.000	6.880	0.906	1.94	7/8-9	7/8-9 x 3.50	6.0
48PQ2B	**48PQ2P**	3.00	6.000	8.500	1.190	2.44	1 1/8-7	1 1/8-7 x 3.75	6.0

To receive mounting hardware with flange, insert a “K” after the material designator. Mounting hardware kits are available for O-ring Face part numbers and include 4 bolts, 4 lock washers and an O-ring.

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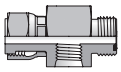
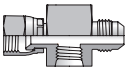
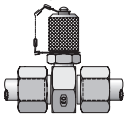
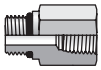
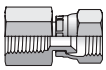
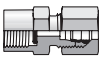
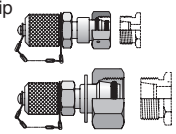
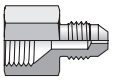
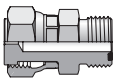
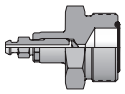
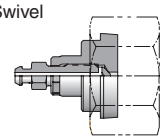
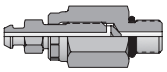
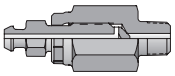
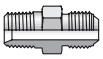
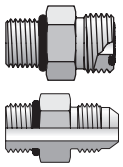
Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Diagnostic, Orifice, Bleed Adapters, Screen and Specialty Fittings



The Fitting Authority

Diagnostic Tees	**LOHL6G5TP** ORFS Swivel / ORFS / SAE-ORB  N5	**XHX6G5TP** 37° Swivel / 37° Flare / SAE-ORB  N5	**GMA3** EO Tube / EO Tube / EMA-3 Diagnostic Tip  N5	**Diagnostic Tee Port Adapters and Plugs**	**F5OG** SAE-ORB / NPTF  G13
P5ON Hex Head Plug  G23	**HP5ON** Hollow Hex Plug  G24	**NPT / SAE-ORB Pressure Gauge Adapters**	**G5L** SAE-ORB Gauge / ORFS  N7	**G65L** SAE-ORB Gauge / ORFS Swivel  N7	**GLO** NPT Gauge / ORFS  N7
G6L NPT Gauge / ORFS Swivel  N7	**GTX** NPT Gauge / 37° Flare  N7	**G6X** NPT Gauge / 37° Swivel  N7	**BSP Pressure Gauge Adapters**	**MAVE** BSPP Gauge / EO Swivel  N6	**MAV** BSPP Gauge / EO  N6
G4MXSMO BSPP Gauge / 37° Flare  N6	**G4MLOSMO** BSPP Gauge / ORFS  N6	**Swivel Tube Adapters**	**VKA3** EO Swivel / Diagnostic Tip  N8	**Orifice Fittings**	**XHX7** 37° Seat / 37° Flare with Orifice  N9
LOHL6 ORFS Swivel with Orifice / ORFS  N9	**ORFS / Port Bleed Adapters**	**PNLOBA** Bleed Screw / ORFS  N10	**FNLBA** Bleed Screw / ORFS Swivel  N10	**P5ONBA** Bleed Screw / SAE-ORB  N10	**HPBA** Bleed Screw / NPT  N10
Parker Triple Thread Fitting	**0109** NPTF / PTT 30° Flare  N11	**Screen Fittings**	Screen Fittings  N12		

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Introduction

Parker offers a line of specialty-type adapters specifically designed for diagnostic, fixed flow control and bleeding applications.

Diagnostic products consist of a line of in-line diagnostic tees, pressure gauge connectors and diagnostic tips. These products have been developed to work in conjunction with electronic diagnostic products available from Parker's Quick Coupling Division and other mechanical pressure and temperature sensing equipment. Some products can be used for fluid sampling and bleeding purposes as well.

Parker offers a standard and custom line of fixed flow control orifice fittings. These products are available as standard in two Parker product series — ORFS and 37° flare, and as a custom option in virtually any orifice size, fitting series, size, material and configuration.

Parker's bleed adapters are designed to remove entrapped air from a hydraulic system. A common problem in hydraulic systems is trapped air and the subsequent spillage of hydraulic oil while removing components to bleed air from lines under pressure. Parker's bleed adapters provide a quick, clean, and simple method of bleeding entrapped air from hydraulic systems.

Lastly, Parker offers a limited line of PTT (Parker Triple Thread) 30° flare adapters for transportation markets.



Fig. N1 — Parker offers a full line of diagnostic, orifice, bleed adapters and specialty fittings

Diagnostic Fittings and Adapters

In-Line Diagnostic Tees

Features

- Designed around the two most common hydraulic tube/hose interfaces: ORFS (Seal-Lok) and 37° flare (JIC / Triple-Lok) (see A)
- ORFS and 37° flare swivel feature offers unlimited positioning without displacing port adapter (see B)
- Uses elastomeric sealing: SAE –4 (7/16-20 UNF) port as universal diagnostic port per SAE J1926-1 / ISO 11926 (see C)
- Enlarged and lengthened body hex ensures that diagnostic port offers full thread engagement and pressure capability (see D)
- Adaptable to Parker's line of diagnostic and fluid sampling tips including: EMA3, PD and PDFS, as well as various direct connecting electronic/mechanical pressure gauges*
- Designed to complement Parker's line of Senso-Control® electronic diagnostic equipment

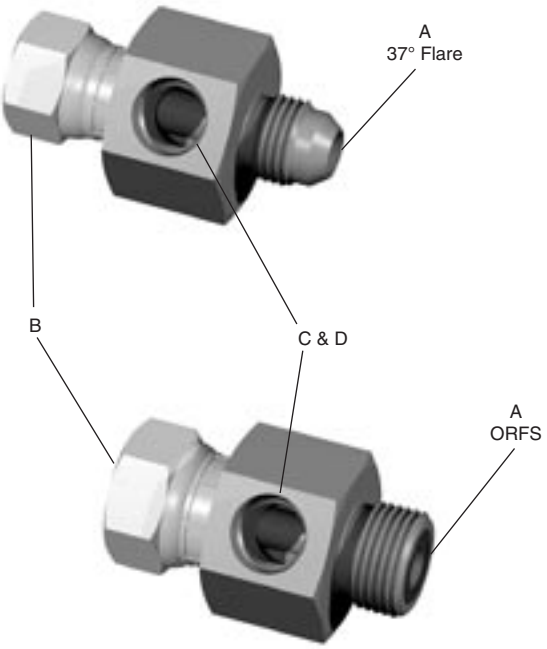


Fig. N2 — Parker's XHX6G5TP (top) and LOHL6G5TP (bottom) in-line diagnostic tees

***Diagnostic and sampling tips EMA3, PD and PDFS series are available from Parker's Quick Coupling Division (tel. 763-544-7781 and/or www.parker.com/quickcouplings**

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Applications

- In-line pressure and temperature measurements
- In-line oil sampling to evaluate hydraulic contamination, caused by problems with filtration or internal components
- In-field diagnostics without removal of port adapters. Simply remove hose swivel and insert in-line tee.
- Permanent or temporary OEM and MRO diagnostic applications:
  - Where traditional in-port diagnostic tips cannot be located or easily accessed
  - Where OEM diagnostic tips have not been installed• Non-traditional diagnostic locations (portable)
  - Where port threads are not compatible with standard diagnostic tips
- To eliminate reducer bushings and couplings typically required to neck down from larger size connections to smaller connections; e.g. reductions required for a gauge, diagnostic tip, bleed adapter, or tube/hose connection.

Assembly Instructions

The body of the diagnostic tee can be used repeatedly for 10-20 remakes at full rated pressure and assembly torque. See Tables N1 and N2 for recommended swivel nut assembly torques.

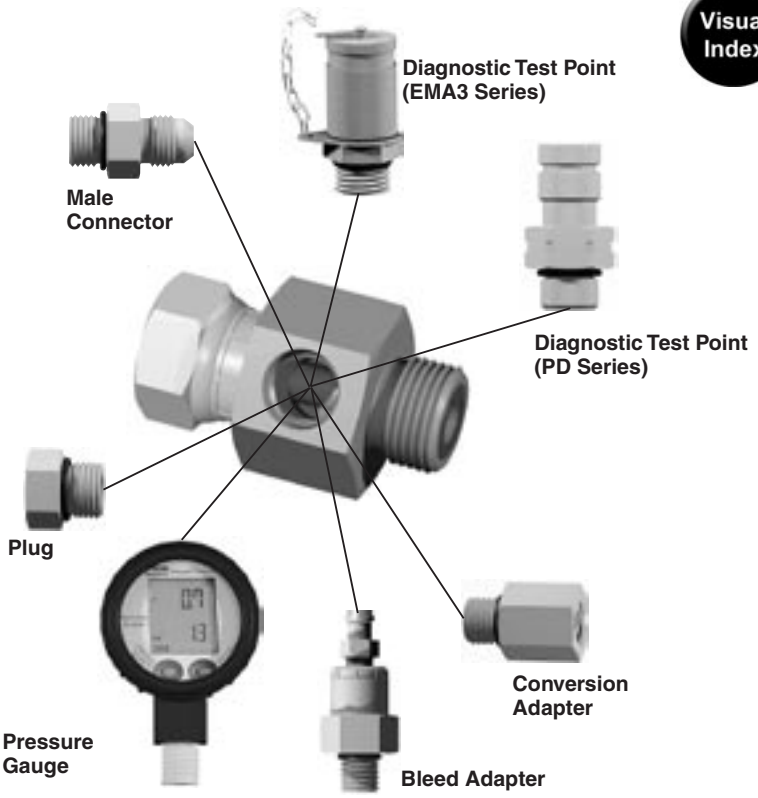


Fig. N3 — Illustration showing the versatility of Parker's diagnostic tee product line

Part Number	Assembly Torque (+10%-0)	
	in.-lb.	ft.-lb.
4-4 XHX6G5TP	130	11
6-4 XHX6G5TP	235	20
8-4 XHX6G5TP	525	43
10-4 XHX6G5TP	—	55
12-4 XHX6G5TP	—	80
16-4 XHX6G5TP	—	115
20-4 XHX6G5TP	—	160
24-4 XHX6G5TP	—	185

Note: Assembly values are for dry, unlubricated swivel nut connections

Table N1 — Assembly Torques (Swivel nut) for Diagnostic Tees

Part Number	Assembly Torque (+10%-0)	
	in.-lb.	ft.-lb.
4-4 LHL6G5TP	220	18
6-4 LHL6G5TP	360	30
8-4 LHL6G5TP	480	40
10-4 LHL6G5TP	—	60
12-4 LHL6G5TP	—	85
14-4 LHL6G5TP	—	100
16-4 LHL6G5TP	—	110
20-4 LHL6G5TP	—	150
24-4 LHL6G5TP	—	230
32-4 LHL6G5TP	—	360

Table N2 — Assembly Torques (Swivel nut) for Diagnostic Tees

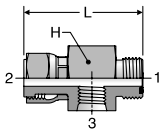
Dimensions and pressures for reference only, subject to change.

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Visual Index

LOHL6G5TP

Gauge Port Tee
ORFS / ORFS Swivel /
SAE-ORB

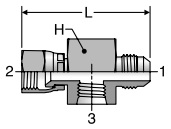


TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 UN/UNF	H (in.)	L (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4-4 LOHL6G5TP	1/4	1/4	7/16-20	1-1/16	1.83	10.0	6.0
6-4 LOHL6G5TP	3/8	3/8	7/16-20	1-1/16	1.95	10.0	6.0
8-4 LOHL6G5TP	1/2	1/2	7/16-20	1-1/16	2.18	10.0	6.0
10-4 LOHL6G5TP	5/8	5/8	7/16-20	1-1/8	2.40	10.0	6.0
12-4 LOHL6G5TP	3/4	3/4	7/16-20	1-1/4	2.59	10.0	6.0
16-4 LOHL6G5TP	1	1	7/16-20	1-1/2	2.85	9.5	6.0
20-4 LOHL6G5TP	1 1/4	1 1/4	7/16-20	1-3/4	3.07	6.5	5.0
24-4 LOHL6G5TP	1 1/2	1 1/2	7/16-20	2-1/8	3.22	5.0	4.0

Note: Fluorocarbon O-rings are available upon request.

XHX6G5TP

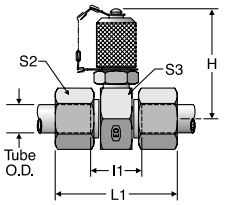
Gauge Port Tee
37° Flare / 37° Swivel /
SAE-ORB



TUBE FITTING PART #	END SIZE 1 (in.)	2 (in.)	3 UN/UNF	H (in.)	L (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4-4 XHX6G5TP	1/4	1/4	7/16-20	1-1/16	1.99	10.0	6.0
6-4 XHX6G5TP	3/8	3/8	7/16-20	1-1/16	2.08	6.5	5.0
8-4 XHX6G5TP	1/2	1/2	7/16-20	1-1/16	2.30	6.5	5.0
10-4 XHX6G5TP	5/8	5/8	7/16-20	1-1/8	2.49	6.5	5.0
12-4 XHX6G5TP	3/4	3/4	7/16-20	1-1/4	2.66	6.5	5.0
16-4 XHX6G5TP	1	1	7/16-20	1-1/2	2.99	6.0	4.5
20-4 XHX6G5TP	1 1/4	1 1/4	7/16-20	1-3/4	3.33	6.0	4.5
24-4 XHX6G5TP	1 1/2	1 1/2	7/16-20	2	3.71	5.5	4.0

GMA3

Diagnostic Tip
EO Tube / EO Tube /
M16 x 2.0 Integrated Tip



TUBE FITTING PART #	END SIZE (mm)	H (mm)	l 1 (mm)	L1 (mm)	S2 (mm)	S3 (mm)	STANDARD Pressure (x 1,000 PSI) Static A3C	Dynamic A3C
GMA3/06L	6	49	21	51	14	24	7.2	4.5
GMA3/08L	8	49	21	51	17	24	7.2	4.5
GMA3/10L	10	49	23	53	19	24	7.2	4.5
GMA3/12L	12	50	23	53	22	27	5.8	4.5
GMA3/15L	15	52	25	55	27	30	5.8	4.5
GMA3/18L	18	53	24	57	32	32	5.8	4.5
GMA3/22L	22	55	28	61	36	36	3.6	2.3
GMA3/28L	28	57	28	61	41	41	3.6	2.3
GMA3/35L	35	60	26	69	50	46	3.6	2.3
GMA3/42L	42	64	25	71	60	55	3.6	2.3
GMA3/06S	6	49	25	55	17	24	10.1	9.1
GMA3/08S	8	49	25	55	19	24	10.1	9.1
GMA3/10S	10	49	24	57	22	24	10.1	9.1
GMA3/12S	12	49	24	57	24	24	10.1	9.1
GMA3/14S	14	50	27	63	27	27	10.1	9.1
GMA3/16S	16	52	26	63	30	30	9.1	5.8
GMA3/20S	20	55	26	69	36	36	9.1	5.8
GMA3/25S	25	57	27	75	46	41	9.1	5.8
GMA3/30S	30	60	28	81	50	46	6.1	5.8
GMA3/38S	38	64	29	91	60	55	6.1	4.5

To specify EO-2, add "Z" between tube size and series.
Example: GMA3/28ZLA3C

Dimensions and pressures for reference only, subject to change.

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Visual Index

BSPP Diagnostic Pressure Gauge Adapters

Parker's BSPP direct-connect pressure gauge adapters are available in the most common tube/hose connections — ORFS, 37° Flare (JIC) and 24° Metric Flareless (DIN 2353). European pressure gauges often utilize BSPP threads on the pressure gauges (manometers). Sealing is achieved at the bottom of the port with a sealing washer as shown in the illustration on the right.

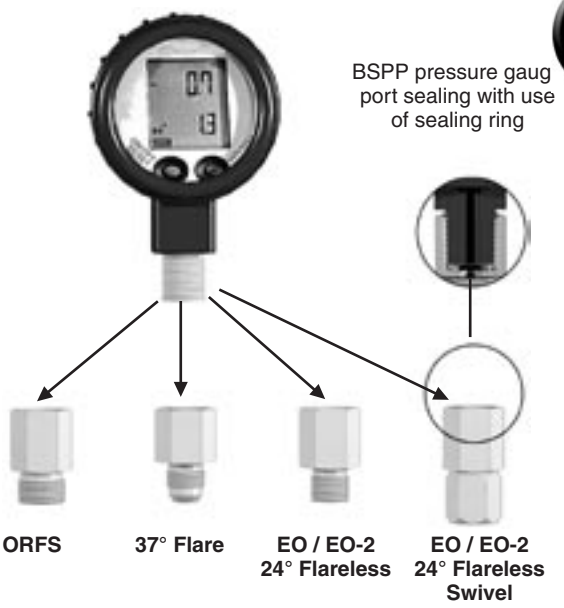
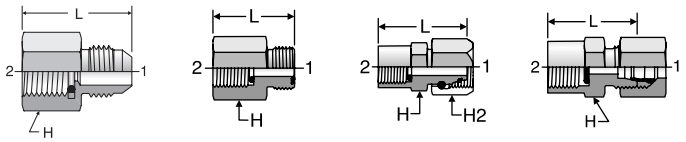


Fig. N4 — BSPP pressure gauge connections

BSPP Pressure Gauge Adapters



G4MXSMO (Type A) | **G4MLOSMO** (Type B) | **MAVE** (Type C) | **MAV** (Type D)

TUBE FITTING PART #	TYPE	END SIZE 1 (in.)	END SIZE 2 BSPP	L (mm)	H BODY HEX (mm)	H2 NUT HEX (mm)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4-4G4MXSMO	A	1/4	1/4-19	31.0	17	—	5.0	5.0
6G4MXSMO	A	3/8	1/4-19	28.0	17	—	5.0	5.0
8-4G4MXSMO	A	1/2	1/4-19	31.0	19	—	5.0	5.0
4-4G4MLOSMO	B	1/4	1/4-19	26.8	17	—	5.0	5.0
6G4MLOSMO	B	3/8	1/4-19	28.2	19	—	5.0	5.0
8-4G4MLOSMO	B	1/2	1/4-19	29.8	22	—	5.0	5.0
		1 (mm)	**2** BSPP				**Static A3C**	**Dynamic A3C**
MAVE06LRA3C	C	6	1/4-19	35.5	19	14	4.6	4.6
MAVE08LRA3C	C	8	1/4-19	35.5	19	17	4.6	4.6
MAVE10LRA3C	C	10	1/4-19	36.0	19	19	4.6	4.6
MAVE06SRA3C	C	6	1/2-14	42.5	27	17	9.1	9.1
MAVE08SRA3C	C	8	1/2-14	43.0	27	19	9.1	9.1
MAVE10SRA3C	C	10	1/2-14	43.5	27	22	9.1	9.1
MAVE12SRA3C	C	12	1/2-14	45.0	27	24	9.1	9.1
MAVE06SR1/4A3C	C	6	1/4-19	35.5	19	17	9.1	9.1
MAVE08SR1/4A3C	C	8	1/4-19	35.5	19	19	9.1	9.1
MAVE10SR1/4A3C	C	10	1/4-19	39.0	19	22	9.1	9.1
MAVE12SR1/4A3C	C	12	1/4-19	39.0	19	24	9.1	9.1
MAV04LLRA3C	D	4	1/4-19	33.0	19	10	1.4	1.4
MAV06LRA3C	D	6	1/4-19	37.0	19	14	4.5	4.5
MAV08LRA3C	D	8	1/4-19	37.0	19	17	4.5	4.5
MAV10LRA3C	D	10	1/4-19	38.0	19	19	4.5	4.5
MAV12LRA3C	D	12	1/4-19	38.0	19	22	4.5	4.5
MAV06SRA3C	D	6	1/2-14	46.0	27	17	9.1	9.1
MAV08SRA3C	D	8	1/2-14	46.0	27	19	9.1	9.1
MAV10SRA3C	D	10	1/2-14	47.0	27	22	9.1	9.1
MAV12SRA3C	D	12	1/2-14	47.0	27	24	9.1	9.1

Note: MAV supplied as standard with DPR +M nut (EO assembled)

* BSPP Pressure Gauge Connection requires seal. 1/4" replacement seal P/N: M25180.

** BSPP Pressure Gauge Connection requires seal. 1/4" replacement seal P/N: DKI1/4A3CX, 1/2" replacement seal P/N: DKI1/2A3CX.

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NPT and SAE-ORB Diagnostic Pressure Gauge Adapters

Parker's NPT and SAE-ORB direct-connect pressure gauge adapters are available in the most common North American tube/hose connections — ORFS and 37° Flare (JIC). North American pressure gauge manufacturers offer gauges primarily with NPT and some with SAE-ORB port stud options. These 37° flare and ORFS connectors are designed to attach pressure gauges to hose swivel ends or directly to run / branch tees for in-line diagnostic applications as shown on the right.

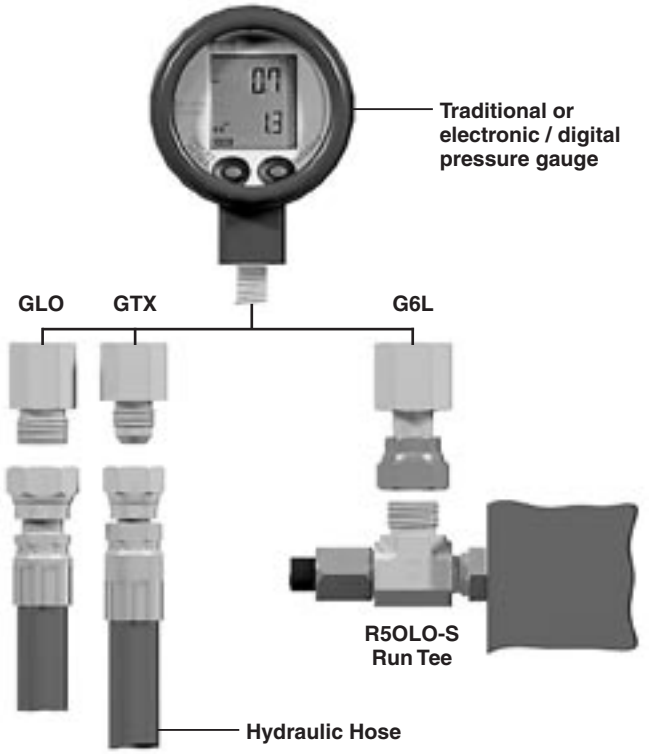
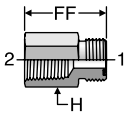
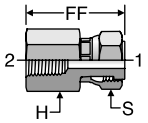


Fig. N5 — Typical applications for NPT pressure gauge adapters. Illustrations show direct hose connections and Run Tee connection.

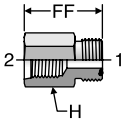
NPT / SAE Pressure Gauge Adapters



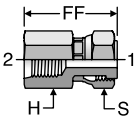
GLO
(Type A)



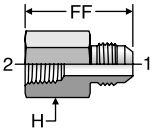
G6L
(Type B)



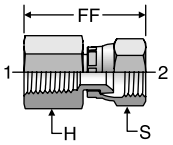
G5L
(Type C)



G65L
(Type D)



GTX
(Type E)



G6X
(Type F)

TUBE FITTING PART #	TYPE	END SIZE 1 (in.)	END SIZE 2 NPT	FF (in.)	H BODY HEX (in.)	S SWIVEL NUT HEX (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	STANDARD Pressure (x 1,000 PSI) Dynamic -S
4-4 GLO	A	1/4	1/4-18	1.25	3/4	—	9.5	6.0
6 GLO	A	3/8	1/4-18	1.30	3/4	—	8.0	6.0
8-4 GLO	A	1/2	1/4-18	1.20	7/8	—	9.5	6.0
4-4 G6L	B	1/4	1/4-18	1.48	3/4	11/16	9.5	6.0
6 G6L	B	3/8	1/4-18	1.60	7/8	13/16	8.0	6.0
8-4 G6L	B	1/2	1/4-18	1.75	7/8	15/16	9.5	6.0
			UN/UNF					
4 G5LO	C	1/4	7/16-20	1.10	3/4	—	6.0	5.0
6-4 G5LO	C	3/8	7/16-20	1.08	3/4	—	6.0	5.0
8-4 G5LO	C	1/2	7/16-20	0.78	7/8	—	6.0	5.0
4 G65L	D	1/4	7/16-20	1.38	11/16	11/16	6.0	5.0
6-4 G65L	D	3/8	7/16-20	1.51	3/4	13/16	6.0	5.0
8-4 G65L	D	1/2	7/16-20	1.57	7/8	15/16	6.0	5.0
			NPT					
2 GTX	E	1/8	1/8-27	1.13	9/16	—	10.0	5.0
3 GTX	E	3/16	1/8-27	1.13	9/16	—	10.0	5.0
4-4 GTX	E	1/4	1/4-18	1.39	3/4	—	10.0	5.0
4 GTX	E	1/4	1/8-27	1.19	9/16	—	10.0	5.0
6-2 GTX	E	3/8	1/8-27	1.13	5/8	—	10.0	5.0
6 GTX	E	3/8	1/4-18	1.41	3/4	—	10.0	5.0
8-4 GTX	E	1/2	1/4-18	1.41	13/16	—	8.0	5.0
4-4 G6X	F	1/4	1/4-18	9/16	3/4	9/16	9.5	6.0
4 G6X	F	1/4	1/8-27	9/16	9/16	9/16	10.0	7.5
6 G6X	F	3/8	1/4-18	11/16	3/4	11/16	6.0	5.0

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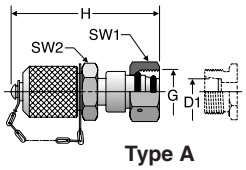
Visual Index

EO Diagnostic Swivels

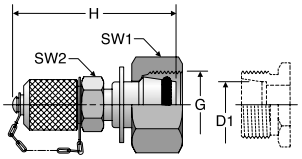
EO Diagnostic Swivels are commonly used on EO tees (24˚ flareless - DIN 2353) where periodic pressure and temperature checks are required. The M16 x 2 diagnostic tip mates with the SMA3 diagnostic nose offered by Parker's Quick Coupling Division.

VKA3

M16 x 2.0 Diagnostic
Tip / EO Swivel



Type A



Type B

TUBE FITTING PART # STEEL	TYPE	D1 TUBE O.D. (mm)	G Metric	H REF. (mm)	SW1 (mm)	SW2 (mm)	STANDARD Pressure (x 1,000 PSI) Static A3C	STANDARD Pressure (x 1,000 PSI) Dynamic A3C
VKA3/06LA3C	A	6	M12 x 1.5	55	17	17	7.2	4.5
VKA3/08LA3C	A	8	M14 x 1.5	51	17	17	7.2	4.5
VKA3/10LA3C	A	10	M16 x 1.5	53	17	19	7.2	4.5
VKA3/12LA3C	A	12	M18 x 1.5	53	17	22	5.8	4.5
VKA3/15LA3C	B	15	M22 x 1.5	59	17	27	5.8	4.5
VKA3/18LA3C	B	18	M26 x 1.5	59	17	32	5.8	4.5
VKA3/22LA3C	B	22	M30 x 2	60	17	39	3.6	2.3
VKA3/28LA3C	B	28	M36 x 2	64	17	41	3.6	2.3
VKA3/35LA3C	B	35	M45 x 2	71	17	50	3.6	2.3
VKA3/42LA3C	B	42	M52 x 2	72	17	60	3.6	2.3
VKA3/06SA3C	A	6	M14 x 1.5	50	17	17	10.1	9.1
VKA3/08SA3C	A	8	M16 x 1.5	52	17	19	10.1	9.1
VKA3/10SA3C	A	10	M18 x 1.5	53	17	22	10.1	9.1
VKA3/12SA3C	A	12	M20 x 1.5	54	19	24	10.1	9.1
VKA3/14SA3C	B	14	M22 x 1.5	59	17	27	10.1	9.1
VKA3/16SA3C	B	16	M24 x 1.5	58	17	30	9.1	5.8
VKA3/20SA3C	B	20	M30 x 2	65	17	36	9.1	5.8
VKA3/25SA3C	B	25	M36 x 2	68	17	46	9.1	5.8
VKA3/30SA3C	B	30	M42 x 2	74	17	50	6.0	5.8
VKA3/38SA3C	B	38	M52 x 2	81	17	60	6.0	4.5

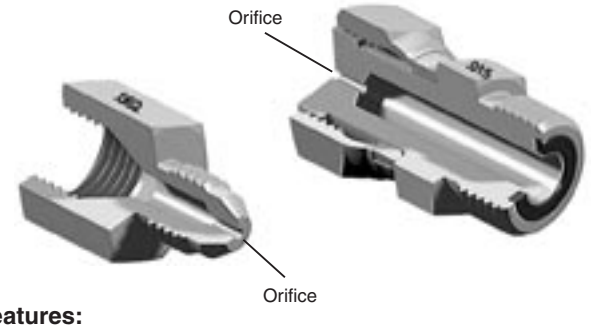
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Visual Index

Orifice Fittings

These compact and cost effective orifice adapters allow OEMs to pre-set, at the factory, a specified orifice in specific hydraulic tube or hose lines. Costly flow control valves can be eliminated or minimized in a system by selecting the proper orifice sizes at the factory. OEMs can also be assured that end users are not adjusting the factory established flow and speed characteristics of the hydraulic system.



Features:

- 37° flare and ORFS configurations as standard
- Three standard body sizes available: 1/4" 3/8", and 1/2"
- Available in commonly accepted pre-set orifice sizes as shown on accompanying tables
- Designed for permanent or temporary installation
- Can be installed in-line into hydraulic system by simply connecting between hose swivel and adapter
- Orifice size is permanently stamped on body
- Can eliminate costly flow control valves

Applications:

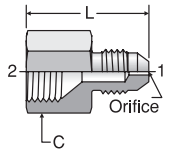
- Fixed rotation speed for hydraulic motors
- Fixed speed on cylinder extend or retract

Direct Port Orifice Fittings:

Available as a custom product, Parker also offers a line of orifice adapters that will replace a traditional port adapter.

XHX7 Orifice

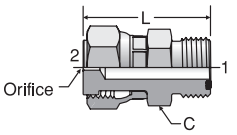
In-Line Orifice Connector
37° Flare / Female 37° Seat



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C HEX (in.)	ORIFICE (in.)	L (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4 XHX7-S .015 Orifice	1/4	9/16	.015	1.10	10.0	5.0
4 XHX7-S .031 Orifice	1/4	9/16	.031	1.10	10.0	5.0
4 XHX7-S .047 Orifice	1/4	9/16	.047	1.10	10.0	5.0
4 XHX7-S .062 Orifice	1/4	9/16	.062	1.10	10.0	5.0
4 XHX7-S .078 Orifice	1/4	9/16	.078	1.10	10.0	5.0
4 XHX7-S .094 Orifice	1/4	9/16	.094	1.10	10.0	5.0
6 XHX7-S .015 Orifice	3/8	11/16	.015	1.18	10.0	5.0
6 XHX7-S .031 Orifice	3/8	11/16	.031	1.18	10.0	5.0
6 XHX7-S .047 Orifice	3/8	11/16	.047	1.18	10.0	5.0
6 XHX7-S .062 Orifice	3/8	11/16	.062	1.18	10.0	5.0
6 XHX7-S .078 Orifice	3/8	11/16	.078	1.18	10.0	5.0
6 XHX7-S .094 Orifice	3/8	11/16	.094	1.18	10.0	5.0
8 XHX7-S .015 Orifice	1/2	7/8	.015	1.32	8.5	5.0
8 XHX7-S .031 Orifice	1/2	7/8	.031	1.32	8.5	5.0
8 XHX7-S .047 Orifice	1/2	7/8	.047	1.32	8.5	5.0
8 XHX7-S .062 Orifice	1/2	7/8	.062	1.32	8.5	5.0
8 XHX7-S .078 Orifice	1/2	7/8	.078	1.32	8.5	5.0
8 XHX7-S .094 Orifice	1/2	7/8	.094	1.32	8.5	5.0

LOHL6 Orifice

In-Line Orifice Connector
ORFS Swivel / ORFS



TUBE FITTING PART #	END SIZE 1 & 2 (in.)	C HEX (in.)	ORIFICE (in.)	L (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4 LOHL6-S .015 Orifice	1/4	5/8	.015	1.33	12.0	9.2
4 LOHL6-S .031 Orifice	1/4	5/8	.031	1.33	12.0	9.2
4 LOHL6-S .047 Orifice	1/4	5/8	.047	1.33	12.0	9.2
4 LOHL6-S .062 Orifice	1/4	5/8	.062	1.33	12.0	9.2
4 LOHL6-S .078 Orifice	1/4	5/8	.078	1.33	12.0	9.2
4 LOHL6-S .094 Orifice	1/4	5/8	.094	1.33	12.0	9.2
6 LOHL6-S .015 Orifice	3/8	3/4	.015	1.44	12.0	9.2
6 LOHL6-S .031 Orifice	3/8	3/4	.031	1.44	12.0	9.2
6 LOHL6-S .047 Orifice	3/8	3/4	.047	1.44	12.0	9.2
6 LOHL6-S .062 Orifice	3/8	3/4	.062	1.44	12.0	9.2
6 LOHL6-S .078 Orifice	3/8	3/4	.078	1.44	12.0	9.2
6 LOHL6-S .094 Orifice	3/8	3/4	.094	1.44	12.0	9.2
8 LOHL6-S .015 Orifice	1/2	7/8	.015	1.67	12.0	9.2
8 LOHL6-S .031 Orifice	1/2	7/8	.031	1.67	12.0	9.2
8 LOHL6-S .047 Orifice	1/2	7/8	.047	1.67	12.0	9.2
8 LOHL6-S .062 Orifice	1/2	7/8	.062	1.67	12.0	9.2
8 LOHL6-S .078 Orifice	1/2	7/8	.078	1.67	12.0	9.2
8 LOHL6-S .094 Orifice	1/2	7/8	.094	1.67	12.0	9.2

Dimensions and pressures for reference only, subject to change.

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Visual Index

Bleed Adapters

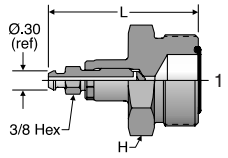
Entrapped air is a major contributor to inefficient operation. Typically, bleeding hydraulic systems is done by "cracking" a connection to "bleed off" the entrapped air. This practice is not recommended, especially in larger size fittings where high forces can exist. Parker's bleed adapters are especially beneficial in applications where elastomeric seals (O-rings) can be extruded and/or damaged during bleeding such as with Parker's Seal-Lok fittings.

Parker's bleed adapters are designed specifically for installation directly to ORFS (O-Ring Face Seal) type fittings or into SAE/NPT manifolds and valves where bleeding is often required.

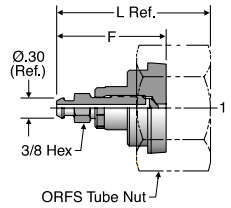
Features

- Bleed hydraulic systems without "cracking" hydraulic connections
- Uses standard automotive bleed screw design
- Bleed screw is permanently crimped into body housing, for blowout prevention
- In-port options with SAE and NPT male studs
- Tube/hose connection options to male and female ORFS

ORFS Bleed Adapters



PNLOBA



FNLBA
ORFS Tube Nut sold separately

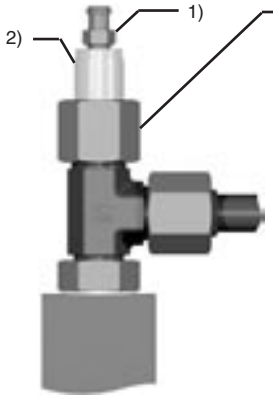
TUBE FITTING PART #	END SIZE 1 (in.)	F (in.)	H (in.)	L (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4 PNLOBA	1/4	-	11/16	1.90	12.0	9.2
6 PNLOBA	3/8	-	3/4	1.97	12.0	9.2
8 PNLOBA	1/2	-	7/8	2.07	12.0	9.2
10 PNLOBA	5/8	-	1 1/16	2.19	11.0	6.0
12 PNLOBA	3/4	-	1 1/4	2.27	11.0	6.0
16 PNLOBA	1	-	1 1/2	2.35	9.5	6.0
20 PNLOBA	1 1/4	-	1 3/4	2.41	8.0	6.0
24 PNLOBA	1 1/2	-	2 1/8	2.48	6.5	5.0
8 FNLBA	1/2	1.63	15/16	2.07	12.0	9.2
10 FNLBA	5/8	1.63	1 1/8	2.17	11.0	6.0
12 FNLBA	3/4	1.63	1 3/8	2.21	11.0	6.0
16 FNLBA	1	1.63	1 5/8	2.21	9.5	6.0
20 FNLBA	1 1/4	1.63	1 7/8	2.21	8.0	6.0
24 FNLBA	1 1/2	1.63	2 1/4	2.21	6.5	5.0

Bleeding Hydraulic Systems with Parker Bleed Adapters

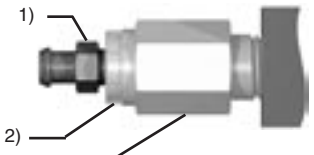
Whenever possible, the bleed adapter should be mounted at the highest point within the hydraulic system. The trapped air can be relieved while the system is running at low pressure. To bleed, loosen the bleed screw 1/2 turn counterclockwise. After the hydraulic fluid begins to run freely from the bleed screw, the bleed screw should be re-tightened.

Bleed Screw Tightening Torque: 35-40 in.-lbs.

Warning: When bleeding hydraulic fluid, operate the system below 500 psi. To avoid injury, ensure that all persons are clear of the path of discharge. Another recommended practice is to attach a section of hose over the bleed screw/adapter to direct oil away from the area and to reduce oil spillage.



Seal-Lok Bleed Adapter
(Sizes -8 thru -24)
For use with
Seal-Lok Fittings

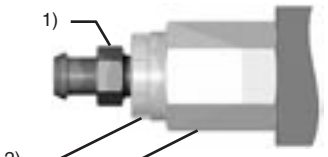


Pipe Thread Bleed Adapter
1/4 NPT
For use with Pipe Thread
Ports

Notes:

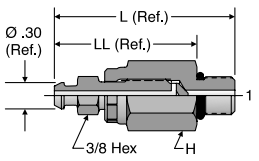
1) Standard automotive bleedscrew.

2) Locking crimp prevents screw from being completely unthreaded.

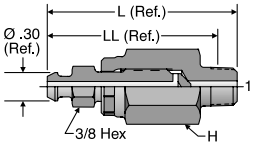


Straight Thread Bleed Adapter
Size 4 (7/16-20 UNF)
For use with SAE Straight
Thread Ports

Port Bleed Adapters



4 P5ONBA



1/4 HPBA

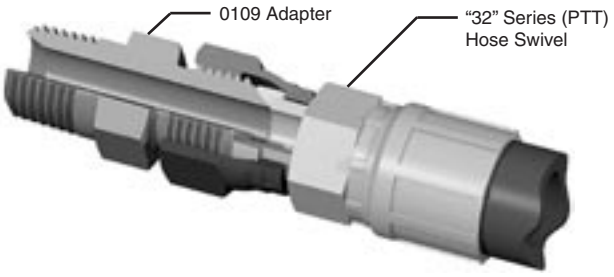
TUBE FITTING PART #	END SIZE 1	BODY HEX (in.)	H (in.)	L REF. (in.)	LL REF. (in.)	STANDARD Pressure (x 1,000 PSI) Static -S	Dynamic -S
4 P5ONBA	7/16-20 UN/UNF-2A	11/16	11/16	2.05	1.62	10.0	6.0
1/4 HPBA	1/4-18 NPTF	11/16	11/16	2.20	1.86	10.0	6.0

Dimensions and pressures for reference only, subject to change.

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Parker Triple Thread (PTT) Adapters



Parker Triple Thread (PTT) adapters are considered the original three-piece hydraulic flared fittings. As an improved fitting design over traditional two-piece flared fittings. Its use was widespread as a primary hydraulic connection for various aircraft, industrial and mobile applications. The PTT 30° flare three-piece design paved the progress towards the standardized 37° connection (through the Joint Industrial Council – JIC) and later to current standardization initiatives of SAE and ISO. Its popularity has been diminished by the more common and standardized 37° flare connection, but even today certain transportation customers utilize PTT hose adapters for OEM and MRO applications.

Features:

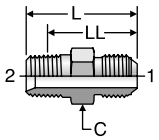
- 30° flare connection
- Hose adapter connection only (no sleeve for tube connections)
- Metal-to-metal seal
- Custom sizes, configurations, and materials available upon request

Applications:

- Diesel engine manufacturers
- Transportation air conditioning lines

0109

Parker Triple Thread Fitting
NPTF / PTT



Mates with 32 style hose fittings.

TUBE FITTING PART #	END SIZE 1 (in.)	END SIZE 2 NPTF	C HEX (in.)	L (in.)	LL AFTER ASSY (in.)	STANDARD Dynamic Pressure (x 1,000 PSI) -S	-SS	-B
0109-12-16	1 (1 5/16-14)	3/4-14	1 3/8	1.84	1.36	3.0		
0109-16-16	1 (1 5/16-14)	1-11 1/2	1 3/8	2.03	1.46	3.0		
0109-20-20	1 1/4 (1 5/8-14)	1 1/4-11 1/2	1 3/4	2.22	1.63	3.0		
0109-24-24	1 1/2 (1 7/8-14)	1 1/2-11 1/2	2	2.50	1.91	3.0		

Dimensions and pressures for reference only, subject to change.

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Screen Fittings

Introduction

Parker screen fittings ensure the final measure of protection against particles that find their way into a system (even a properly filtrated one) during installation, maintenance, failure of components or by other means. Screen fittings provide a vital safeguard for critical components against damage due to contamination. They are intended to work in conjunction with a good filtration system and are available with screens that retain particle sizes from 480 to 65 micron.

Parker screen fittings are ideal for protecting:

- Gauges and instrumentation
- Critical hydraulic components such as pump compensator load sensing controls, proportional valves, relief valves, etc.
- Precision orifices from clogging
- Expensive components in test bench circuits (against particle contamination created by failed components)



Fig. N6 — Screen Fittings.

Design and Construction

Fitting Body. Parker screen fittings utilize standard Seal-Lok O-ring face seal and Triple-Lok 37° fitting bodies located in Section B and C respectively in this catalog. (Refer to the "How to Order" paragraph, later in this section, for a listing of configurations for screen fittings that are offered as standard). All screen fittings are manufactured with the micron rating stamped on the fitting body.

Screen. Screen fittings are constructed with stainless-steel screen elements. Sizes -6 through -12 fittings are manufactured with a dome-style screen, while size -4 fittings are made with a basket-style screen (see Fig. N7 and N8). Table N3 displays the various micron ratings for available screens. Additionally, Parker screen fittings have bi-directional flow capacity and can be installed in either the tube or port end of the fitting.



Fig. N7 — Six dome-style screens and one basket-style screen.

Square Mesh Number	Nominal Micron Rating
40	480*
60	320*
80	230
100	165*
150	125
200	100
325	65

**These micron ratings are not available as standard from stock*

Table N3 — Micron Ratings for available screens



Fig. N8 — Fitting cutaway with dome-style screen.

Pressure Ratings

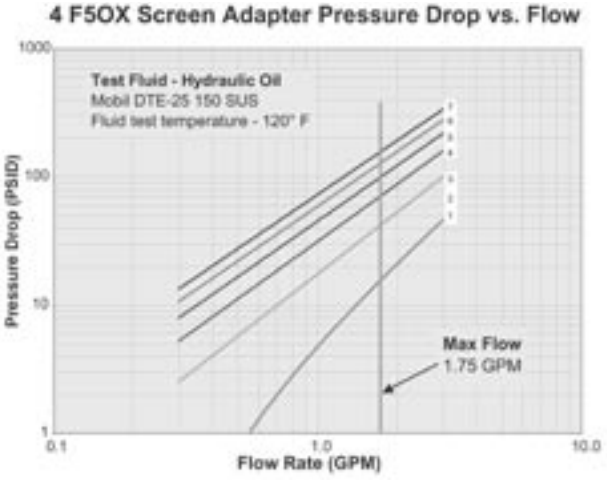
Parker screen fittings have the same dynamic pressure ratings as the equivalent fitting body (without the screen). Refer to sections B and C for the pressure ratings for Seal-Lok O-ring face seal and Triple-Lok 37° flare fittings.

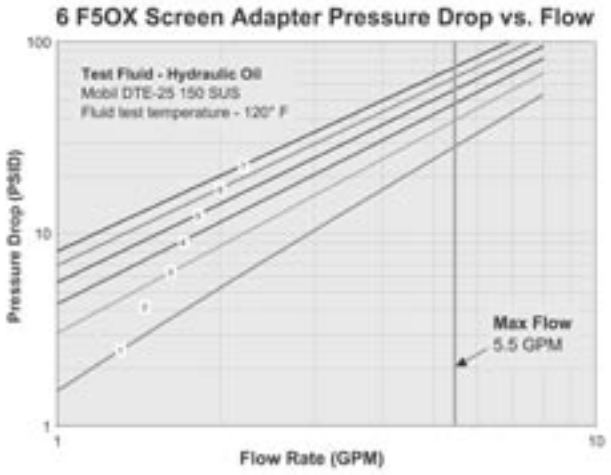
reference only, subject to change.

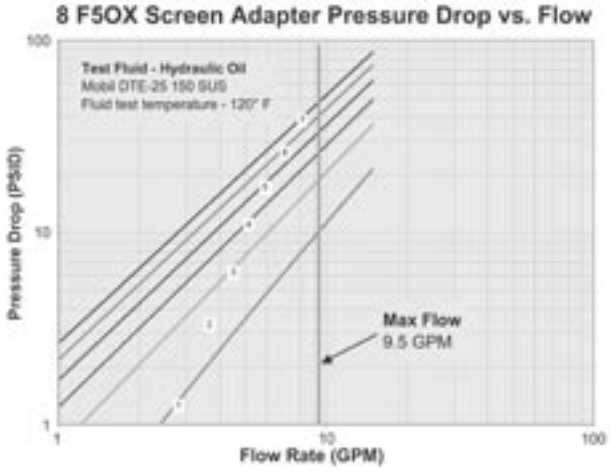
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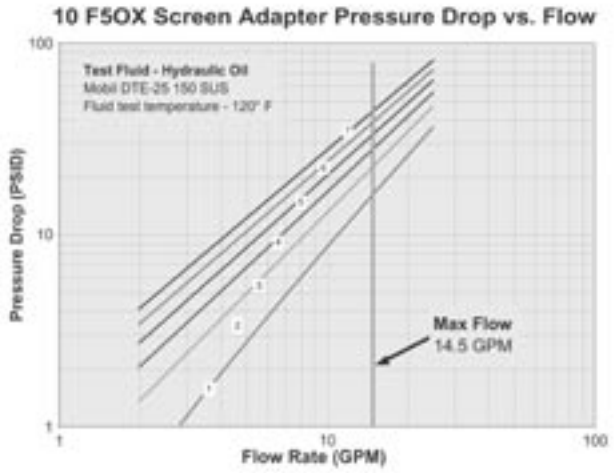
Pressure Drop

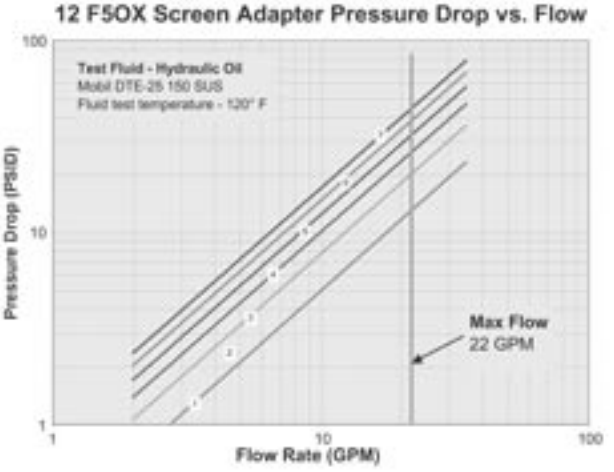
All screen fittings have been tested to determine the maximum pressure drop and screen retention. The following "Pressure Drop vs. Flow" charts were derived from actual test data and may be used as a guide in determining pressure drop at various flow rates through screen fittings for the fluid indicated.

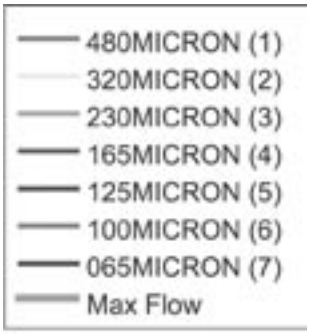












Refer to the General Technical Section for pressure drop data through standard fitting without screen.

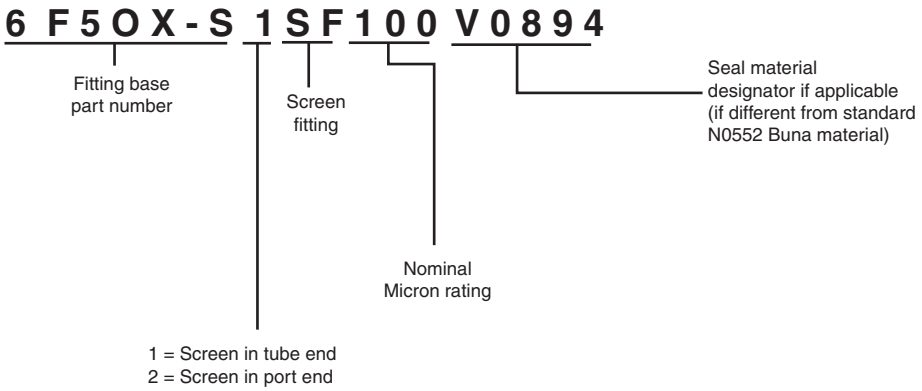
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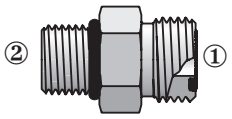
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How to Order

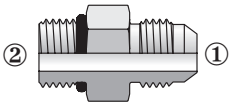
The following number system is used for our standard offering of screen fittings.



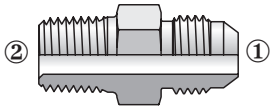
Screen fittings are being offered as standard in sizes -4, -6, -8, -10 and -12 and in the following configurations.



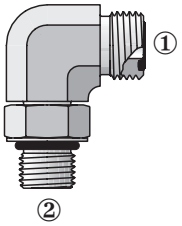
F5OLO



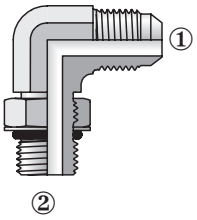
F5OX



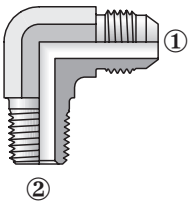
FTX



C5OLO



C5OX



CTX

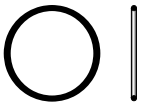
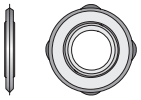
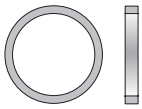
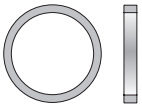
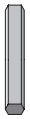
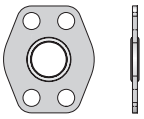
Dimensions and pressures for reference only, subject to change.

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O-Rings and Seals



The Fitting Authority

O-Ring Face Seal	**ORFS O-Ring**  O3	**XO O-Ring**  O3	**PLS Bonded Seal**  O3	**Port Ends – SAE, Metric, BSPP, JIS, K4**	**SAE O-Ring**  O3
ISO 6149 O-Ring  O4	**Metric O-Ring**  O4	**Metric Retaining Ring**  O4	**BSPP O-Ring**  O5	**BSPP Retaining Ring**  O5	**EOlastic Seal Ring**  O5
JIS B2351 O-Ring  O6	**BSPP Bonded Seal**  O6	**EO/EO-2**	**EO-2 Sealing Ring**  O6	**Bonded Seal for Banjo Fittings**  O7	**Metal Seal for Banjo Fittings**  O7
Pressure Gauge Sealing Ring  O8	**EO O-Ring**  O8	**4-Bolt Flanges**	**Code 61/62 Flange Seal**  O9	**SAE 4-Bolt Flange O-Ring**  O9	

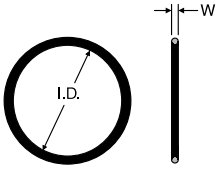
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Visual Index

ORFS O-Ring

ORFS Tube End O-ring

Specify size and compound
Example: 2-018 N0552 (standard NBR)



TUBE FITTING PART #	FITTING DASH SIZE	END SIZE (in.)	END SIZE (mm)	I.D. (in.)	I.D. (mm)	W (in.)	W (mm)	STANDARD From Stock N0552*	V0894**	N0756***
2-011	4	1/4	6	0.30	7.7	0.07	1.78	•	•	•
2-012	6	3/8	8, 10	0.36	9.3	0.07	1.78	•	•	•
2-014	8	1/2	12	0.49	12.4	0.07	1.78	•	•	•
2-016	10	5/8	14, 15, 16	0.61	15.6	0.07	1.78	•	•	
2-018	12	3/4	18, 20	0.74	18.8	0.07	1.78	•	•	
2-020	14	7/8	22	0.86	21.8	0.07	1.78			
2-021	16	1	25	0.93	23.5	0.07	1.78	•	•	
2-025	20	1 1/4	28, 30, 32	1.18	29.9	0.07	1.78	•	•	
2-029	24	1 1/2	35, 38	1.49	37.8	0.07	1.78	•	•	
2-135	32	2	50	1.93	49.0	0.10	2.54	•	•	

* N0552 is the standard compound — 90-durometer Nitrile (NBR).

** V0894 is an optional 90-durometer fluorocarbon compound.

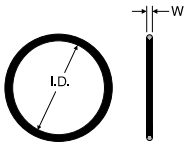
*** N0756 is an optional 75-durometer Nitrile compound for CNG applications.

See page U13 for O-ring Material Selection and data.

XO O-Ring

Triple-Lok 2 O-Ring

Specify size and compound
Example: 2-019 N0552 (standard NBR)

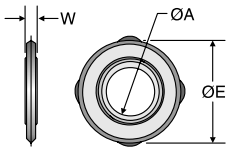


TUBE FITTING PART #	TUBE O.D. (in.)	I.D. (in.)	W (in.)	STANDARD FROM STOCK N0552	V0894	N0756
5-193	1/4	0.18	0.04	•		
5-179	5/16	0.24	0.04	•		
5-056	3/8	0.30	0.04	•		
5-058	1/2	0.43	0.05	•		
2-013	5/8	0.43	0.07	•		
2-016	3/4	0.61	0.07	•		
2-017	7/8	0.68	0.07	•		
2-019	1	0.80	0.07	•		
2-023	1 1/4	1.05	0.07	•		
2-026	1 1/2	1.24	0.07	•		
2-133	2	1.80	0.10	•		

PLS Bonded Seal

ORFS Flange-Seal

Specify size and compound
Example: 8PLS N0702 (standard NBR)



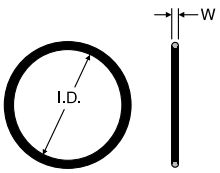
TUBE FITTING PART #	FITTING DASH SIZE	END SIZE (in.)	A DIA. (in.)	E DIA. (in.)	W (in.)	STANDARD From Stock N0702*
4PLS	4	1/4	0.23	0.46	0.08	•
6PLS	6	3/8	0.34	0.61	0.08	•
8PLS	8	1/2	0.46	0.74	0.08	•
10PLS	10	5/8	0.61	0.91	0.08	•
12PLS	12	3/4	0.78	1.09	0.08	•
16PLS	16	1	1.00	1.34	0.08	•

* N0702 is the standard compound — 90-durometer Nitrile (NBR).

SAE O-Ring

SAE Straight Thread Port O-Ring

Specify size and compound
Example: 3-906 N0552 (standard NBR)



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

* N0552 is the standard compound — 90-durometer Nitrile (NBR).

** V0894 is an optional 90-durometer fluorocarbon compound.

*** N0756 is an optional 75-durometer Nitrile compound for CNG applications.

See page U13 for O-ring Material Selection and data.

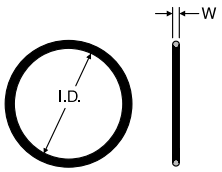
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Visual Index

ISO 6149 O-Ring

Metric Straight Thread
Port O-Ring



Specify size and compound (for option compound only)
Example: M-12 ISO O-RING (standard NBR)
M-12 ISO VITON O-RING (optional FKM)

TUBE FITTING PART #	PORT THREAD	I.D. (mm)	W (mm)	STANDARD From Stock NBR**	STANDARD From Stock FKM***
M-8 ISO O-Ring	M8 x 1	6.1	1.6	•	
M-10 ISO O-Ring	M10 x 1	8.1	1.6	•	
M-12 ISO O-Ring	M12 x 1.5	9.3	2.2	•	•
M-14 ISO O-Ring	M14 x 1.5	11.3	2.2	•	•
M-16 ISO O-Ring	M16 x 1.5	13.3	2.2	•	•
M-18 ISO O-Ring	M18 x 1.5	15.3	2.2	•	•
M-22 ISO O-Ring	M22 x 1.5	19.3	2.2	•	•
M-27 ISO O-Ring	M27 x 2	23.6	2.9	•	•
***M-30 ISO O-Ring**	M30 x 2	26.6	2.9	•	
M-33 ISO O-Ring	M33 x 2	29.6	2.9	•	•
M-38 ISO O-Ring	M38 x 2	34.6	2.9	•	
M-42 ISO O-Ring	M42 x 2	38.6	2.9	•	•
M-48 ISO O-Ring	M48 x 2	44.6	2.9	•	•
M-60 ISO O-Ring	M60 x 2	56.6	2.9	•	

* M30X2 is not a standard ISO 6149 size.

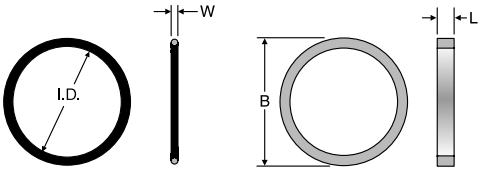
** NBR is the standard compound — 90-durometer peroxide-cured Nitrile.

*** FKM is an optional 90-durometer fluorocarbon compound (for part number, VITON is used eg. M-8 ISO VITON O-RING).

See page U13 for O-ring Material Selection and data.

Metric O-Ring & Retaining Ring

For ISO 9974-1 / DIN 3852-1Port



Specify size and compound
Example: 2-012 N0552 (standard NBR O-ring)
M12RR (standard steel retaining ring)

TUBE FITTING PART #	METRIC THREAD SIZE	I.D. (mm)	W (mm)	STANDARD From Stock N0552*	STANDARD From Stock V0894**	TUBE FITTING PART #	B (mm)	L (mm)	STANDARD From Stock -S	STANDARD From Stock -SS
3-902	M8 x 1	6.07	1.63	•	•	**M8RR**	13.15	1.00	•	
6-074	M10 x 1	8.00	1.50	•	•	**M10RR**	14.75	1.00	•	
2-012	M12 x 1.5	9.25	1.78	•	•	**M12RR**	17.75	1.30	•	
2-013	M14 x 1.5	10.82	1.78	•	•	**M14RR**	19.75	1.30	•	
3-907	M16 x 1.5	13.46	2.08	•	•	**M16RR**	21.75	1.50	•	
2-114	M18 x 1.5	15.54	2.62	•	•	**M18RR**	23.75	2.00	•	
2-017	M20 x 1.5	17.17	1.78	•		**M20RR**	25.75	1.30	•	
2-018	M22 x 1.5	18.77	1.78	•	•	**M22RR**	27.75	1.30	•	
2-019	M24 x 1.5	20.35	1.78	•		**M24RR**	29.75	1.30	•	
2-118	M26 x 1.5	21.89	2.62	•		**M26RR**	31.75	2.00	•	
2-119	M27 x 2	23.47	2.62	•	•	**M27RR**	32.75	2.00	•	
2-121	M30 x 2	26.64	2.62	•		**M30RR**	36.32	2.00	•	
2-122	M33 x 2	28.24	2.62	•		**M33RR**	39.75	2.00	•	
2-124	M36 x 2	31.42	2.62	•		**M36RR**	42.75	2.00	•	
2-128	M42 x 2	37.77	2.62	•		**M42RR**	49.75	2.00	•	
2-130	M45 x 2	40.94	2.62	•		**M45RR**	52.75	2.00	•	
2-132	M48 x 2	44.12	2.62	•		**M48RR**	54.95	2.00	•	
2-133	M50 x 2	45.69	2.62	•		**M50RR**	56.31	2.00	•	

* N0552 is the standard compound — 90-durometer Nitrile (NBR).

** V0894 is an optional 90-durometer fluorocarbon compound.

See page U13 for O-ring Material Selection and data.

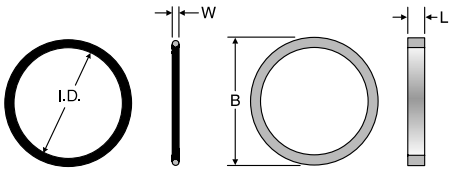
Dimensions for reference only, subject to change.

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Visual Index

BSPP O-Ring & Retaining Ring

For ISO 1179-1 / DIN 3852-2 Port



Specify size and compound (for O-ring only)
Example: 2-113 N0552 (standard NBR O-ring)
3/8 RETAINING RING (standard steel retaining ring)

TUBE FITTING PART #	BSPP THREAD SIZE	I.D. (mm)	W (mm)	STANDARD From Stock		TUBE FITTING PART #	B (mm)	L (mm)	STANDARD From Stock	
				N0552*	V0894**				-S	-SS
OR8X2X	1/8-28	8	2	•	•	**1/8 Retaining Ring**	15.0	1.4	•	
2-111	1/4-19	10.77	2.62	•	•	**1/4 Retaining Ring**	19.5	1.9	•	
2-113	3/8-19	13.94	2.62	•	•	**3/8 Retaining Ring**	23.5	1.9	•	
5-256	1/2-14	17.96	2.62	•	•	**1/2 Retaining Ring**	28.5	1.9	•	
2-119	3/4-14	23.47	2.62	•	•	**3/4 Retaining Ring**	34.5	2.6	•	
2-217	1-11	29.74	3.53	•	•	**1 Retaining Ring**	43.5	2.6	•	
2-222	1 1/4-11	37.69	3.53	•		**1 1/4 Retaining Ring**	52.5	2.6	•	
2-224	1 1/2-11	44.04	3.53	•		**1 1/2 Retaining Ring**	60.0	2.6	•	
2-227	2-11	53.57	3.53			**2 Retaining Ring**	75.0	2.6		

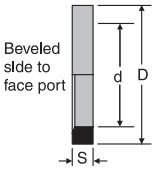
* N0552 is the standard compound — 90-durometer Nitrile (NBR).

** V0894 is an optional 90-durometer fluorocarbon compound.

See page U13 for O-ring Material Selection and data.

EOlastic Seal Ring

EOlastic Soft Seal for
BSPP & Metric Threads



Specify size and compound
(for optional compound only)
Example: ED8X1X (standard NBR)
ED8X1VITX (optional FPM)

TUBE FITTING PART #	For Male Metric Thread	For Male Thread BSPP	D (mm)	d (mm)	S (mm)	STANDARD From Stock	
						NBR*	FPM**
ED8X1X	M8 x 1		9.9	6.5	1.0	•	•
ED10X1X	M10 x 1	G 1/8 A	11.9	8.4	1.0	•	•
ED12X1.5X	M12 x 1.5		14.4	9.8	1.5	•	•
ED14X1.5X	M14 x 1.5	G 1/4 A	16.5	11.6	1.5	•	•
ED16X1.5X	M16 x 1.5		18.9	13.8	1.5	•	•
ED3/8X		G 3/8 A	18.9	14.7	1.5	•	•
ED18X1.5X	M18 x 1.5		20.9	15.7	1.5	•	•
ED20X1.5X	M20 x 1.5		22.9	17.8	1.5	•	•
ED1/2X		G 1/2 A	23.9	18.5	1.5	•	•
ED22X1.5X	M22 x 1.5		24.3	19.6	1.5	•	•
ED26X1.5X	M26 x 1.5	G 3/4 A	29.2	23.9	1.5	•	•
ED27X2X	M27 x 2	G 3/4 A	29.2	23.9	1.5	•	•
ED33X2X	M33 x 2	G 1 A	35.7	29.7	2.0	•	•
ED42X2X	M42 x 2	G 1 1/4 A	45.8	38.8	2.0	•	•
ED48X2X	M48 x 2	G 1 1/2 A	50.7	44.7	2.0	•	•

* NBR is the standard compound — 90-durometer Nitrile.

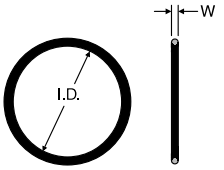
** FPM is an optional 90-durometer fluorocarbon compound (for part number VIT is used as suffix). Example: ED8X1VITX

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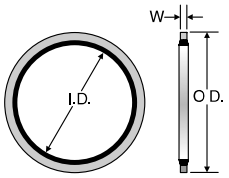
JIS B2351 O-Ring



TUBE FITTING PART #	JIS DASH SIZE	T4 THREAD BSPP	I.D. (mm)	W (mm)	JIS B 2401 Description
P8 O-RING	2	1/8-28	7.8	1.9	O-RING CLASS 1 B P 8
P11 O-RING	4	1/4-19	10.8	2.4	O-RING CLASS 1 B P 11
P14 O-RING	6	3/8-19	13.8	2.4	O-RING CLASS 1 B P 14
P18 O-RING	8	1/2-14	17.8	2.4	O-RING CLASS 1 B P 18
P24 O-RING	12	3/4-14	23.7	3.5	O-RING CLASS 1 B P 24
P29 O-RING	16	1-11	28.7	3.5	O-RING CLASS 1 B P 29

* NBR is the standard compound — 90-durometer Nitrile.

BSPP Bonded Seal

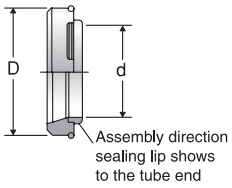


Used on K4 Style Straight Fittings
as a Port Seal
For use in ISO 1179 / DIN 3852-2 port

TUBE FITTING PART #	BSPP THREAD SIZE	O.D. (mm)	I.D. (mm)	W (mm)	STANDARD From Stock -S*	-SS	-B
D9DT-2	1/8-28	15.9	10.4	2.0	•		
D9DT-4	1/4-19	20.6	13.7	2.0	•		
D9DT-6	3/8-19	23.8	17.3	2.0	•		
D9DT-8	1/2-14	28.6	21.5	2.3	•		
D9DT-10	5/8-14	31.8	23.5	2.3	•		
D9DT-12	3/4-14	34.9	27.1	2.3	•		
D9DT-16	1-11	42.8	33.9	2.3	•		
D9DT-20	1 1/4-11	52.4	42.9	3.3	•		
D9DT-24	1 1/2-11	58.6	48.4	3.3	•		

* NBR is the standard elastomer compound — 90-durometer Nitrile
Zinc plated steel ring

EO-2 Sealing Ring



Specify size and material
Examples:
DOZ10S (standard steel with NBR)
DOZ10SVIT (optional steel with FPM)
DOZ10S71 (standard stainless steel with FPM)

TUBE FITTING PART #	SERIES	TUBE O.D. (mm)	D (mm)	d (mm)	STANDARD from stock -S NBR*	-S FPM**	-SS FPM***
DOZ04LL	LL	4	6.8	4	•		
DOZ06LL	very light	6	8.8	6	•		
DOZ06L	L	6	10.3	6	•	•	•
DOZ08L	light	8	12.3	8	•	•	•
DOZ10L		10	14.3	10	•	•	•
DOZ12L		12	16.3	12	•	•	•
DOZ15L		15	20.3	15	•	•	•
DOZ18L		18	24.3	18	•	•	•
DOZ22L		22	27.7	22	•	•	•
DOZ28L		28	33.7	38	•	•	•
DOZ35L		35	42.7	35	•	•	•
DOZ42L		42	49.7	42	•	•	•
DOZ06S	S	6	12.3	6	•	•	•
DOZ08S	heavy	8	14.3	8	•	•	•
DOZ10S		10	16.3	10	•	•	•
DOZ12S		12	18.3	12	•	•	•
DOZ14S		14	20.3	14	•	•	•
DOZ16S		16	22.3	16	•	•	•
DOZ20S		20	27.7	20	•	•	•
DOZ25S		25	33.7	25	•	•	•
DOZ30S		30	39.7	30	•	•	•
DOZ38S		38	49.7	38	•	•	•

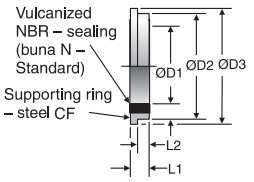
* Steel black zinc plated with NBR 90-durometer Nitrile compound.
** Steel black zinc plated with FPM 90-durometer fluorocarbon compound.
*** Stainless steel with FPM 90-durometer fluorocarbon compound.

Dimensions for reference only, subject to change.

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Visual Index

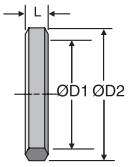
Bonded Seal for Banjo Fittings



TUBE FITTING PART #	FOR USE WITH WH & TH BANJOS	THREAD	D1 (mm)	D2 (mm)	D3 (mm)	L1 (mm)	L2 (mm)	STANDARD From Stock CFX	71	MS
KDS10	6-LM/LR	M10 x 1/G1/8A	10.3	14.9	16.0	2.5	1.1	•		
KDS12	6-SM/8-LM	M12 x 1.5	12.3	17.0	18.0	3.0	1.6	•		
KDS14	6-SR, 8-LR/SM/SR, 10-LM/LR	M14 x 1.5/G1/4A	14.3	18.9	20.0	3.0	1.6	•		
KDS16	10-SM/SR, 12-LM/LR/SR	M16 x 1.5/G3/8A	17	21.9	24.0	3.0	2.1	•		
KDS18	12-SM/15-LM	M18 x 1.5	18.3	23.9	23.9	3.0	—	•		
KDS22	15-LR, 16-SM/SR, 18-LM/LR	M22 x 1.5/G1/2A	22.3	26.9	30.0	4.5	2.6	•		
KDS26	22-LM	M26 x 1.5	26.3	31.9	35.0	3.5	2.6	•		
KDS27	20-SM/SR, 22-LR	M27 x 2/G3/4A	27.3	32.9	38.0	3.5	2.6	•		
KDS33	25-SM/SR, 28-LM/LR	M33 x 2/G1A	33.6	39.9	42.0	3.5	2.6	•		
KDS42	30-SM/SR, 35-LM/LR	M42 x 2/G1 1/4A	42.4	49.9	49.9	3.5	—	•		
KDS48	38-SM/SR, 42-LM/LR	M48 x 2/G1 1/2A	48.4	55.9	60.0	3.5	2.6	•		

For stainless steel part number use KD
Example: KD1/871

Metal Seal for Banjo Fittings



Specify size and material
Examples: DKA1/8CFX (steel)
DKA1/871X (stainless steel)

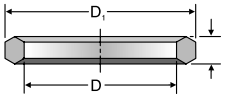
TUBE FITTING PART #	FOR APPLICATION IN BANJOS: WH / TH		SWVE		THREAD	D1 (mm)	D2 (mm)	L (mm)	STANDARD From Stock CFX	71X
British										
DKA1/8	6LR		4/6/8 LLR	6LR	G 1/8 A	9.8	14	2.5	•	•
DKA1/4	8LR	6SR	8LR	6SR	G 1/4 A	13.3	18	3.0	•	•
DKA1/4	10LR	8SR	10LR	8SR	G 1/4 A	13.3	18	3.0	•	•
DKA3/8	12LR	10SR	12LR	10SR	G 3/8 A	16.8	22	3.0	•	•
DKA3/8		12SR			G 3/8 A	16.8	22	3.0	•	•
DKA1/2			15/18LR	14/16SR	G 1/2 A	21.1	26	3.0	•	
DKA1/2X4.5	15LR	14SR			G 1/2 A	21.1	26	4.5	•	•
DKA1/2X4.5	18LR	16SR			G 1/2 A	21.1	26	4.5	•	•
DKA3/4	22LR	20SR	22LR	20SR	G 3/4 A	26.6	32	3.5	•	•
DKA1	28LR	25SR			G 1 A	33.4	39	3.5	•	•
DKA11/4	35LR	30SR			G 11/4 A	42.1	49	3.5	•	•
DKA11/2	42LR	38SR			G 11/2 A	48.1	55	3.5	•	•
Metric										
DKA10	6LM		6/8LLM	6LM	M10 x 1	10.1	14	2.5	•	•
DKA12	8LM	6SM	8LM	6SM	M12 x 1.5	12.1	17	3.0	•	•
DKA14	10LM	8SM	10LM	8SM	M14 x 1.5	14.1	19	3.0	•	•
DKA16	12LM	10SM	12LM	10SM	M16 x 1.5	16.1	21	3.0	•	•
DKA18	15LM	12SM	15LM	12SM	M18 x 1.5	18.1	23	3.0	•	•
DKA20		14SM		14SM	M20 x 1.5	20.1	25	3.0	•	•
DKA22			18LM	16SM	M22 x 1.5	22.1	27	3.0	•	•
DKA22X4.5	18LM	16SM			M22 x 1.5	22.1	27	4.5	•	
DKA26			22LM		M26 x 1.5	26.1	31	3.0	•	
DKA26X3.5	22LM				M26 x 1.5	26.1	31	3.5	•	•
DKA27		20SM		20SM	M27 x 2	27.1	32	3.5	•	•
DKA33	28LM	25SM			M33 x 2	33.1	39	3.5	•	•
DKA11/4	35LM	30SM			M42 x 2	42.1	49	3.5	•	•
DKA11/2	42LM	38SM			M48 x 2	48.1	55	3.5	•	•

Dimensions for reference only, subject to change.

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Visual Index

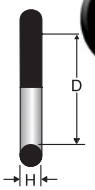
Pressure Gauge Sealing Ring



Specify size and material
Examples: DKI1/2CFX (steel)
DKI1/271X (stainless steel)

TUBE FITTING PART #	FOR INTERNAL THREAD	D (mm)	D1 (mm)	H (mm)	STANDARD From Stock		
					CFX	71	MS
DKI1/4	G 1/4	6	11.3	4.5	•		
DKI1/2	G 1/2	12	18.5	5.0	•	•	

EO O-Ring



Specify size and compound
Examples: OR4.5X1.5X (standard NBR)
OR4.5X1.5VITX (optional FPM)

Application range see following identification numbers 1 to 4

Application:
1=Weld nipples, swivel nuts e.g, SKA, EW, EV, EL, ET, VKA, RED
2=WH/TH
3=DVGE/DVWE
4=Hydr. flanges BFG/BFW

TUBE FITTING PART #	D (mm)	H (mm)	APPLICATION		STANDARD From Stock	
			#	Size	NBR*	FPM**
OR4.5X1.5X	4.5	1.5	1	6L, 6S	•	•
OR6.5X1.5X	6.5	1.5	1	8L, 8S	•	•
OR8X1.5X	8.0	1.5	1	10L, 10S	•	•
OR9.3X1.5X	9.3	1.5	2	G 1/8, M12, M14	•	•
OR10X1.5X	10.0	1.5	1	12L, 12S	•	•
OR11X2X	11.0	2.0	1	14S	•	•
OR12.5X1.5X	12.5	1.5	2	G 1/4, M12, M14	•	•
OR13X2X	13.0	2.0	1	16S	•	•
OR15X2X	15.0	2.0	1	18L	•	•
OR16X1.5X	16.0	1.5	2	G 3/8, M16	•	•
OR16.3X2.4X	16.3	2.4	1	20S	•	•
OR17X3X	17.0	3.0	3		•	
OR18X1.5X	18.0	1.5	2	M18	•	•
OR20X1.5X	20.0	1.5	2	G 1/2, M20	•	•
OR20X2X	20.0	2.0	1	22L	•	•
OR20X2.5X	20.0	2.5	4	LK 35	•	
OR20.3X2.4X	20.3	2.4	1	25S	•	•
OR23.4X3.56X	23.4	3.6	3		•	
OR25X2X	25.0	2.0	2	G 3/4, M26, M27	•	•
OR25.3X2.4X	25.3	2.4	1	30S	•	•
OR26X2X	26.0	2.0	1	28L	•	•
OR26X2.5X	26.0	2.5	4	LK40	•	
OR31X4X	31.0	4.0	3		•	
OR32X2.5X	32.0	2.5	1	35L	•	•
OR33X2.5X	33.0	2.5	2, 4	G1, M33, LK55	•	•
OR33.3X2.4X	33.3	2.4	1	38S	•	•
OR34.5X3.53X	34.5	3.5	3		•	
OR38X2.5X	38.0	2.5	1	42L	•	•
OR41X2.5X	41.0	2.5	2	G 1 1/4, M42	•	•
OR46X3X	46.0	3.0	2	G 1 1/2, M48	•	•

* NBR is standard compound — 90-durometer Nitrile.

** FPM is optional 90-durometer fluorocarbon compound.

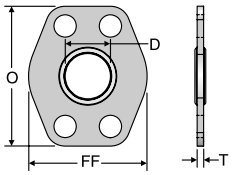
For relating the O-ring sizes to the different fittings, see the EO/EO-2 Section (Section F).

Dimensions for reference only, subject to change.

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Visual Index

Code 61 and 62 Flange Seal



Parker has designed this flange seal plate which incorporates a bonded elastomer seal for Leak Free connections. It is used for sealing two flat surface SAE/ISO Code 61 and 62 Flange.

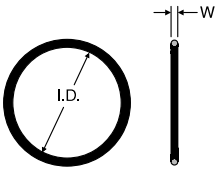
TUBE FITTING PART #	FITTING DASH SIZE	CODE 61 SEALS T (in.)	O (in.)	FF (in.)	D (in.)	STANDARD From Stock N0702*
12Q1S N0702	12	0.10	2.56	2.06	1.0	•
16Q1S N0702	16	0.10	2.75	2.32	1.3	•
20Q1S N0702	20	0.10	3.12	2.86	1.5	•
24Q1S N0702	24	0.10	3.69	3.24	1.9	•
32Q1S N0702	32	0.10	4.00	3.82	2.2	•
40Q1S N0702	40	0.10	4.50	4.28	2.7	•
48Q1S N0702	48	0.10	5.32	5.16	2.4	•

TUBE FITTING PART #	FITTING DASH SIZE	CODE 62 SEALS T (in.)	O (in.)	FF (in.)	D (in.)	STANDARD From Stock N0702*
12Q2S N0702	12	0.10	2.81	2.38	1.0	•
16Q2S N0702	16	0.10	3.19	2.75	1.3	•
20Q2S N0702	20	0.10	3.75	3.06	1.5	•
24Q2S N0702	24	0.10	4.44	3.75	1.9	•
32Q2S N0702	32	0.10	5.25	4.50	2.2	•

* All seal plates are zinc plated steel with a bonded 90 durometer nitrile elastomer, N0702.

SAE 4-Bolt Flange O-Ring

Code 61 and Code 62 Flanges



Specify size and compound
Examples: 2-210 N0552

TUBE FITTING PART #	HOSE PRODUCTS DIVISION PART # 1)	FITTING DASH SIZE	W (in.)	I.D. (in.)	STANDARD From Stock N0552*
2-210	711510-6	8	0.139	0.734	•
2-214	711510-5	12	0.139	0.984	•
2-219	711510-4	16	0.139	1.296	•
2-222	711510-3	20	0.139	1.484	•
2-225	711510-2	24	0.139	1.859	•
2-228	711510-1	32	0.139	2.234	•

* N0552 is the standard compound — 90-durometer Nitrile.

1) Code 61, Code 62 Flange Kits and O-Rings may be purchased from the Hose Products Division (440) 943-5700.

See page U13 for O-ring Material Selection and data.

Dimensions for reference only, subject to change.

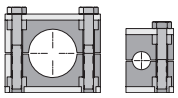
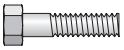
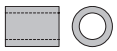
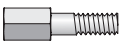
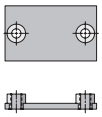
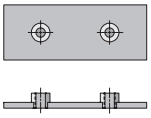
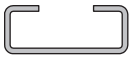
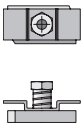
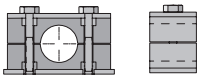
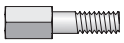
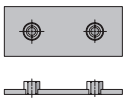
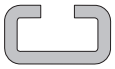
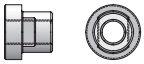
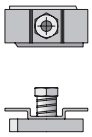
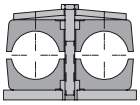
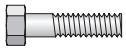
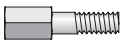
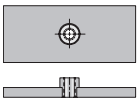
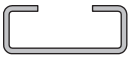
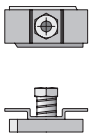
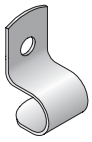
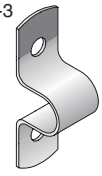
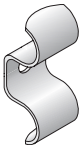
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ParKlamp Inch Tube Clamps



The Fitting Authority

Standard Series	**Clamp Halves**  P6	**CP** Cover Plate  P7	**BCP** Hexagon Head Bolt for Cover Plate  P7	**IPS** Insert  P7	**BIP** Hexagon Head Bolt for Insert  P7
LP Locking Plate  P7	**SB** Stacking Bolt  P7	**WP** Weld Plate  P8	**WPE** Weld Plate Elongated  P8	**R** Mounting Rail  P8	**HRN** Hexagon Rail Nut  P8
CRA Channel Rail Adapter  P8	**Heavy Series**	**Clamp Halves** Heavy  P9	**CPH** Cover Plate Heavy  P10	**BCPH** Hexagon Head Bolt for Cover Plate  P10	**LPH** Locking Plate Heavy  P10
SBH Stacking Bolt Heavy  P10	**WPH** Weld Plate Heavy  P10	**RH** Mounting Rail Heavy  P11	**RNH** Mounting Rail Nut Heavy  P11	**CRA** Channel Rail Adatper  P11	
Twin Series	**Clamp Halves**  P12	**CPT** Cover Plate  P13	**BCPT** Hexagon Head Bolt for Cover Plate  P13	**LPT** Locking Plate  P13	**SBT** Stacking Bolt  P13
WPT Weld Plate Twin  P14	**R** Mounting Rail  P14	**RNT** Mounting Rail Nut Twin  P14	**CRA** Channel Rail Adapter  P14	**Tube Clips**	**Tube Clip** 3121-1  P15
Tube Clip 3121-3  P15	**Tube Clip** 3121-4  P15				

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Introduction

The ParKlamp system is designed for restraining tube, pipe and hose assemblies against unwanted and potentially harmful effects of mechanical shock and vibration forces that are common in fluid power systems.

The clamping system is the most commonly overlooked aspect of fluid power system design. Failure to properly restrain the fluid conductors can result in leakage, downtime and system malfunction, as well as significantly reduce the life of tube, pipe and hose assemblies. With the ParKlamp system, the risk of problems resulting from mechanical shock and vibration can be significantly reduced.

Design and Construction

Designed to meet the basic envelope dimensions of DIN 3015, Part 1, the ParKlamp plastic clamp halves are interchangeable with the Parker metric clamp system. The primary difference between these two clamping systems is the utilization of inch, as opposed to metric, thread hardware in the ParKlamp system. All plastic clamp halves in the ParKlamp system are manufactured from Polypropylene material. The hardware portion of the ParKlamp system is available in plated steel and stainless steel.

For convenience, the ParKlamp system is divided into three different series: Standard, Heavy and Twin. Each series has corresponding components, physical dimensions and mechanical properties. Within each series, there are a number of groups, each with specific envelope dimensions. Components from different series and/or groups can not be intermixed. However, the standard and twin series can be mounting on the same mounting rail.

How It Works

The ParKlamp system has two primary methods for mounting: weld plates and mounting rails.

Clamps should be mounted to a rigid structure for optimum performance. Clamping tube, pipe or hose assemblies together without mounting them to a rigid structure, often called "floating clamps," does not provide adequate support.

Proper design of a clamping system requires that the clamps be positioned appropriately on the tube, pipe or hose assemblies. See the Assembly and Installation section of this catalog for more information on clamp location and spacing.

Weld Plate Mounting (Fig. P1)

The weld plate mounting system allows the user to attach a single clamp assembly to a structure of similar material (steel to steel, etc) by welding the components together. Once the weld plate is attached to a structure, one clamp halve can be placed onto the weld plate, followed by the tube, pipe or hose assembly. Next, the second plastic clamp halve can be placed on the tube, pipe or hose assembly, followed by the cover plate (or Insert). To complete the assembly, the Hex Head attachment bolts are inserted into the assembly and tightened to the torque shown in the Assembly section of this catalog.

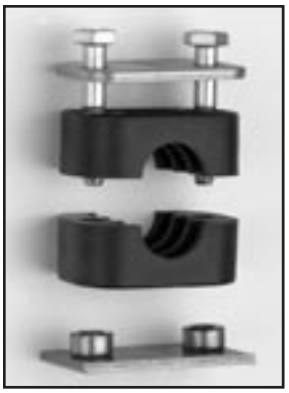


Fig. P1 – Weld Plate Assembly



Fig. P2 – Mounting Rail Assembly

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for ParKlamp Inch Tube Clamps.

Mounting Rail Mounting (Fig. P2)

Use of a mounting rail is another way to assemble the clamping system components onto a support structure. Using a mounting rail allows multiple clamps to be mounted side-by-side for restraining a group of tube, pipe, or hose assemblies. The mounting rail also provides the ability to move the location of the clamps in one direction for easier alignment. The rail can be attached to a support structure by welding or bolting. Once the mounting rail is in place, rail nuts can be slid into the rail. The first clamp halve, followed by the tube, pipe or hose assembly, can then be installed over the corresponding rail nuts. After this, the second clamp half, the cover plate (or Insert) and the hex head attachment bolts can be installed to complete the assembly.

Stacking (Fig. P3)

A primary feature of the ParKlamp system is its ability to accommodate stacking of a series of clamps to various heights, thus requiring a smaller footprint for mounting. To do this, simply use the stacking bolts to mount the first clamp assembly, then install a stacking plate over the first clamp and stacking bolts. The second clamp assembly can then be placed over the first clamp assembly. Complete the mounting by assembling a cover plate and using the hex head bolts to tighten the upper clamp assembly. **Note: When stacking, the clamps must be from the same series and group.**



Fig. P3 – Stacked Assembly

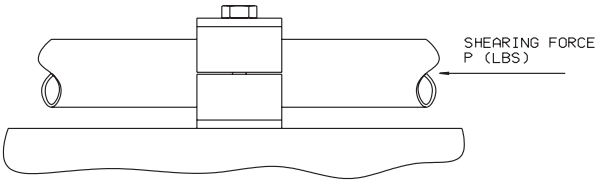
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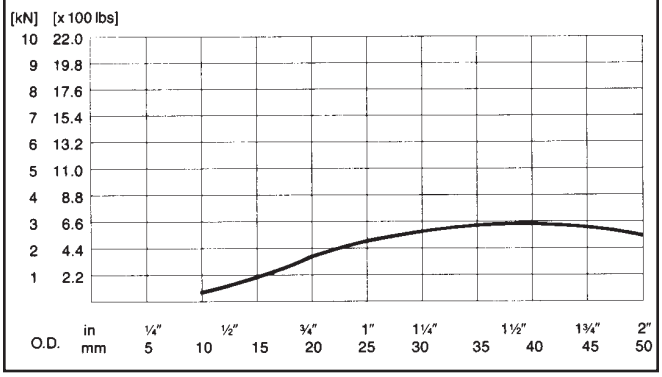
Shearing Force Diagram

The forces shown in these diagrams represent the resistance to sliding provided by the clamps in the axial direction.

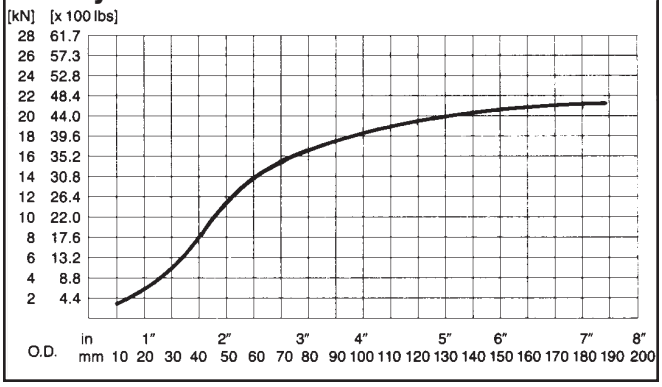
The sliding starts when the shown values are reached.



Standard Series



Heavy Series



Clamp Body Material Properties

	Polypropylene PP
MECHANICAL PROPERTIES	
Density	.901g/cc
Tensile Strength	28 MPa
	(4,000 psi)
Flexural Modulus	1150 MPa
Compressive	
Strength	90MPa
(Resistance)	(23,050 psi)
Notched	
IZOD Impact Strength	14 ft-lb/in

	Polypropylene PP
THERMAL PROPERTIES	
Max. Temperature	-30° to +90° C
Resistance	-22° to +194°F
ELECTRICAL PROPERTIES	
Specific Volume	
Resistivity Ohm x Inch	3.9×10^{17}
CHEMICAL PROPERTIES	
Light Acids, Solvents	Stable
Fuels, Mineral Oils	Stable
Alcohol, Paints, Saltwater	Stable

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How to Order ParKlamp Kits

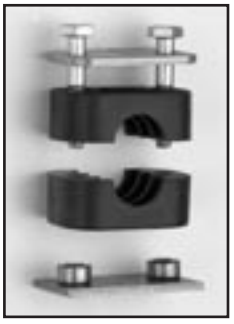
Visual Index

Select a symbol from Box 1 and pair it with a symbol from Box 2 to create a part number for the kit.

Example: Weld Plate Kit – Twin Series for 3/4" tube.

Box 1	Box 2
WPT	3190

Box 1 : Mounting – Assembly Type	
Symbol	**Description**
WP	Weld Plate Kit – Standard Series
WPH	Weld Plate Kit – Heavy Series
WPE	Elongated Weld Plate Kit – Standard Series
WPT	Weld Plate Kit – Twin Series
RN	Rail Nut Kit – Standard Series
RNH	Rail Nut Kit – Heavy Series
RNT	Rail Nut Kit – Twin Series
SA	Stacked Assembly Kit – Standard Series
SAH	Stacked Assembly Kit – Heavy Series
SAT	Stacked Assembly Kit – Twin Series



Weld Plate Kit



Mounting Rail Kit



Stacked Assembly Kit

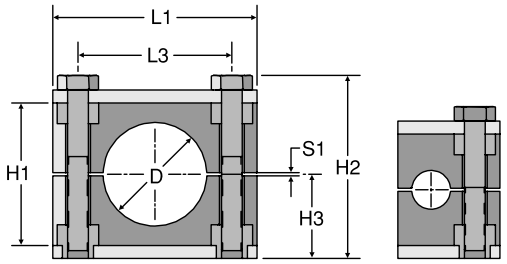
Box 2: Clamp Half – Size/Type Designation			
Symbol	**Size**	**Type**	**Series**
1064	1/4"	Tube	Standard – Twin
1064A	1/4"	Tube	Standard
3134H	1/4"	100R1 Hose	Standard
4150H	1/4"	100R2 Hose	Heavy
1095	3/8"	Tube	Standard – Twin
3095	3/8"	Tube	Heavy
1095A	3/8"	Tube	Standard
3174H	3/8"	100R1 Hose	Standard
4198H	3/8"	100R2 Hose	Heavy
2127	1/2"	Tube	Standard
3127	1/2"	Tube	Heavy
3205H	1/2"	100R1 Hose	Standard
4221H	1/2"	100R2 Hose	Heavy
3213	1/2"	Pipe	Standard
4213	1/2"	Pipe	Heavy
2160	5/8"	Tube	Standard – Twin
3160	5/8"	Tube	Heavy
3239H	5/8"	100R1 Hose	Standard
4251H	5/8"	100R2 Hose	Heavy
3190	3/4"	Tube	Standard – Twin
4190	3/4"	Tube	Heavy
5278H	3/4"	100R1 Hose	Standard
4292H	3/4"	100R2 Hose	Heavy
4266	3/4"	Pipe	Standard – Twin
4267	3/4"	Pipe	Heavy
3254	1"	Tube	Standard – Twin
4254	1"	Tube	Heavy
5357H	1"	100R1 Hose	Standard
6378H	1"	100R2 Hose	Heavy
5334	1"	Pipe	Standard – Heavy – Twin
5320	1 1/4"	Tube	Standard – Heavy – Twin
5438H	1 1/4"	100R1 Hose	Standard
6484H	1 1/4"	100R2 Hose	Heavy
5422	1 1/4"	Pipe	Heavy
5381	1 1/2"	Tube	Standard – Heavy – Twin
6498H	1 1/2"	100R1 Hose	Standard
6544H	1 1/2"	100R2 Hose	Heavy
6483	1 1/2"	Pipe	Standard – Heavy
6508	2"	Tube	Standard – Heavy
6603	2"	Pipe	Heavy
6635	2 1/2"	Tube	Heavy
7762	3"	Tube	Heavy

Dimensions and pressures for reference only, subject to change.

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Clamp Halves

Standard Series



Groups 1A, 2, 3, 4, 5 and 6 Group 1

See note below

TUBE CLAMP HALVES											
PART #	TUBE SIZE	GROUP #	D		H1	H2	H3	L1	L3	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
1064-PP	1/4	1	0.25	6.4	1.06	1.45	0.65	1.02	NA	0.01	•
1095-PP	3/8	1	0.38	9.5	1.06	1.45	0.65	1.02	NA	0.01	•
1064A-PP	1/4	1A	0.25	6.4	1.06	1.45	0.65	1.45	0.78	0.01	•
1095A-PP	3/8	1A	0.38	9.5	1.06	1.45	0.65	1.45	0.78	0.01	•
2127-PP	1/2	2	0.50	12.7	1.29	1.69	0.77	1.65	1.02	0.01	•
2160-PP	5/8	2	0.63	16.0	1.29	1.69	0.77	1.65	1.02	0.01	•
3190-PP	3/4	3	0.75	19.0	1.41	1.77	0.80	1.96	1.29	0.01	•
3254-PP	1	3	1.00	25.4	1.41	1.77	0.80	1.96	1.29	0.01	•
5320-PP	1 1/4	5	1.25	32.0	2.28	2.72	1.28	2.79	2.04	0.03	•
5381-PP	1 1/2	5	1.50	38.1	2.28	2.72	1.28	2.79	2.04	0.03	•
6508-PP	2	6	2.00	50.8	2.59	3.00	1.42	3.38	2.59	0.03	•

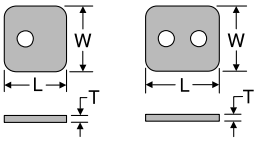
PIPE CLAMP HALVES											
PART #	PIPE SIZE	GROUP #	D		H1	H2	H3	L1	L3	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
3213-PP	1/2	3	0.84	21.3	1.41	1.77	0.80	1.96	1.29	0.01	•
4266-PP	3/4	4	1.05	26.6	1.65	2.09	0.96	2.32	1.57	0.01	•
5334-PP	1	5	1.31	33.4	2.28	2.72	1.28	2.79	2.04	0.03	•
6483-PP	1 1/2	6	1.90	48.3	2.59	3.00	1.42	3.38	2.59	0.03	•

100R1 HOSE CLAMP HALVES											
PART #	HOSE SIZE	GROUP #	D		H1	H2	H3	L1	L3	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
H3134PP	1/4	3	0.53	13.4	1.41	1.77	0.80	1.96	1.29	0.01	•
H3174PP	3/8	3	0.69	17.4	1.41	1.77	0.80	1.96	1.29	0.01	•
H3205PP	1/2	3	0.81	20.5	1.41	1.77	0.80	1.96	1.29	0.01	•
H3239PP	5/8	3	0.94	23.9	1.41	1.77	0.80	1.96	1.29	0.01	•
H5278PP	3/4	5	1.09	27.8	2.28	2.72	1.28	2.79	2.04	0.03	•
H5357PP	1	5	1.41	35.7	2.28	2.72	1.28	2.79	2.04	0.03	•
H5438PP	1 1/4	5	1.72	43.8	2.28	2.72	1.28	2.79	2.04	0.03	•
H6498PP	1 1/2	6	1.96	49.8	2.59	3.00	1.42	3.38	2.59	0.03	•

Note: One clamp set includes two identical halves of polypropylene. Tube and pipe clamp halves are black in color. Hose clamp halves are green in color. Hardware shown in the illustrations above is **not** included.

Visual Index
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Assembly / Installation

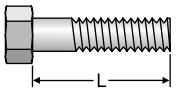
CP
Cover Plate



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	W WIDTH (in.)	T THICKNESS (in.)	STANDARD FROM STOCK -S	-SS
CP-1	1	1.10	1.18	0.11	•	•
CP-1A	1A	1.33	1.18	0.11	•	•
CP-2	2	1.59	1.18	0.11	•	•
CP-3	3	1.88	1.18	0.11	•	•
CP-4	4	2.24	1.18	0.11	•	•
CP-5	5	2.75	1.18	0.11	•	•
CP-6	6	3.38	1.18	0.11	•	•

Material: Steel: Zinc gold chromate plated
SS: 316 stainless steel

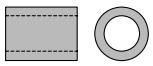
BCP
Hexagon Head Bolt for Cover Plate
(2 required for Groups 1A-6)



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	STANDARD FROM STOCK -S	-SS
BCP-1	1	1.25	•	•
BCP-1A	1A	1.25	•	•
BCP-2	2	1.38	•	•
BCP-3	3	1.50	•	•
BCP-4	4	1.88	•	•
BCP-5	5	2.38	•	•
BCP-6	6	2.75	•	•

Note: Bolt threads are 1/4 - 20 UNC, Grade 5, zinc clear chromate plated
Material: SS: 316 stainless steel

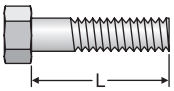
IPS
Insert



TUBE FITTING PART #	STANDARD FROM STOCK
IPS	•

Material: Plastic
One size fits all groups (2 required for Groups 1A - 6).
(Use when not using a cover plate.)

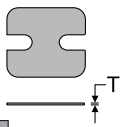
BIP
Hexagon Head Bolt for Insert



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	STANDARD FROM STOCK
BIP-1	1	1.13	•
BIP-1A	1A	1.13	•
BIP-2	2	1.38	•
BIP-3	3	1.38	•
BIP-4	4	1.63	•
BIP-5	5	2.38	•
BIP-6	6	2.75	•

Note: Bolt threads are 1/4 - 20 UNC, Grade 5, zinc clear chromate plated

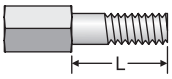
LP
Locking Plate



TUBE FITTING PART #	GROUP #	T THICKNESS (in.)	STANDARD FROM STOCK
LP-1	1	0.03	•
LP-1A	1A	0.03	•
LP-2	2	0.03	•
LP-3	3	0.03	•
LP-4	4	0.03	•
LP-5	5	0.03	•
LP-6	6	0.03	•

Material: Steel, zinc gold chromate plated

SB
Stacking Bolt
(2 required for Groups 1A-6)



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	STANDARD FROM STOCK
SB-1	1	0.78	•
SB-1A	1A	0.78	•
SB-2	2	1.00	•
SB-3	3	1.18	•
SB-4	4	1.38	•
SB-5	5	1.96	•
SB-6	6	2.36	•

Note: Bolt threads are 1/4 - 20 UNC, 1010 steel, zinc clear chromate plated

Dimensions and pressures for reference only, subject to change.

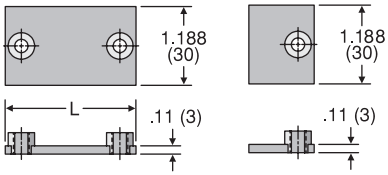
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Assembly / Installation

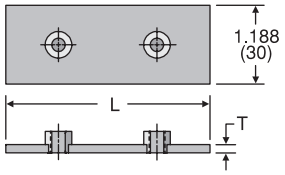
WP
Weld Plate



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	L LENGTH (mm)	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
WP-1	1	1.25	31.5	•	•
WP-1A	1A	1.41	36	•	•
WP-2	2	1.65	42	•	•
WP-3	3	1.96	50	•	•
WP-4	4	2.36	60	•	•
WP-5	5	2.79	71	•	•
WP-6	6	3.46	88	•	•

Material: Steel: 1020 steel, zinc-phosphate plated
SS: 316 stainless steel

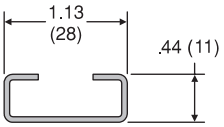
WPE
Weld Plate Elongated



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	L LENGTH (mm)	T THICKNESS (in.)	STANDARD FROM STOCK
WPE-1	1	2.28	58	0.11	•
WPE-1A	1A	2.51	64	0.11	•
WPE-2	2	2.75	70	0.11	•
WPE-3	3	3.07	78	0.11	•
WPE-4	4	3.42	87	0.11	•
WPE-5	5	3.93	100	0.11	•
WPE-6	6	4.52	115	0.11	•

Material: 1020 steel, zinc-phosphate plated

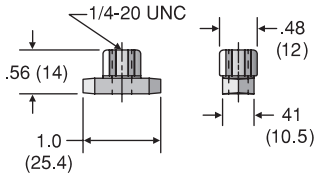
R
Mounting Rail



TUBE FITTING PART #	LENGTH	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
R-1	3.28 ft. (1 meter)	•	•
R-2	6.56 ft. (2 meters)	•	•

Material: Steel: Unplated
SS: 316 stainless steel

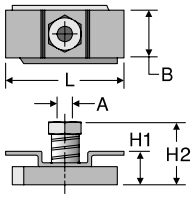
HRN
Hexagon Rail Nut



TUBE FITTING PART #	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
HRN	•	•

Material: Steel: Zinc-phosphate plated
SS: 316 stainless steel

CRA
Channel Rail Adapter



TUBE FITTING PART #	THREAD "A" UNC	L in. (mm)	B in. (mm)	H1 in. (mm)	H2 in. (mm)	STANDARD FROM STOCK
CRA 1-8	1/4-20	1.37 (35)	0.74 (19)	0.51 (13)	0.77 (19.5)	•

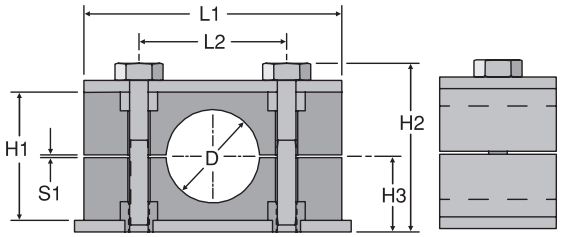
Material: Steel, zinc plated

Dimensions and pressures for reference only, subject to change.

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Clamp Halves

Heavy Series



See note below

TUBE CLAMP HALVES											
PART #	TUBE SIZE	GROUP #	D		H1	H2	H3	L1	L2	S1	STANDARD FROM STOCK
			(in.)	(mm)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	
3095-HPP	3/8	H3	0.37	9.5	1.25	2.17	0.94	2.16	1.29	0.02	•
3127-HPP	1/2	H3	0.50	12.7	1.25	2.17	0.94	2.16	1.29	0.02	•
3160-HPP	5/8	H3	0.63	16.0	1.25	2.17	0.94	2.16	1.29	0.02	•
4190-HPP	3/4	H4	0.75	19.0	1.88	2.80	1.26	2.75	1.77	0.02	•
4254-HPP	1	H4	1.00	25.4	1.88	2.80	1.26	2.75	1.77	0.02	•
5320-HPP	1 1/4	H5	1.25	32.0	2.36	3.27	1.50	3.34	2.36	0.02	•
5381-HPP	1 1/2	H5	1.50	38.1	2.36	3.27	1.50	3.34	2.36	0.02	•
6508-HPP	2	H6	2.00	50.8	3.50	4.61	2.17	4.52	3.54	0.07	•
6635-HHP	2 1/2	H6	2.50	63.5	3.50	4.61	2.17	4.52	3.54	0.07	•
7762-HHP	3	H7	3.00	76.2	4.72	5.74	2.75	5.98	4.80	0.07	•

PIPE CLAMP HALVES											
PART #	PIPE SIZE	GROUP #	D		H1	H2	H3	L1	L2	S1	STANDARD FROM STOCK
			(in.)	(mm)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	
4213-HPP	1/2	H4	0.84	21.3	1.88	2.80	1.26	2.75	1.77	0.02	•
4267-HPP	3/4	H4	1.05	26.7	1.88	2.80	1.26	2.75	1.77	0.02	•
5334-HPP	1	H5	1.31	33.4	2.36	3.27	1.50	3.34	2.36	0.02	•
5422-HPP	1 1/4	H5	1.66	42.2	2.36	3.27	1.50	3.34	2.36	0.02	•
6483-HPP	1 1/2	H6	1.90	48.3	3.50	4.61	2.17	4.52	3.54	0.07	•
6603-HPP	2	H6	2.37	60.3	3.50	4.61	2.17	4.52	3.54	0.07	•

100R2 HOSE CLAMP HALVES											
PART #	HOSE SIZE	GROUP #	D		H1	H2	H3	L1	L2	S1	STANDARD FROM STOCK
			(in.)	(mm)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	
H4150HPP	1/4	H4	0.59	15.0	1.83	2.80	1.26	2.75	1.77	0.02	•
H4198HPP	3/8	H4	0.78	19.8	1.83	2.80	1.26	2.75	1.77	0.02	•
H4221HPP	1/2	H4	0.87	22.1	1.83	2.80	1.26	2.75	1.77	0.02	•
H4251HPP	5/8	H4	0.99	25.1	1.83	2.80	1.26	2.75	1.77	0.02	•
H4292HPP	3/4	H4	1.15	29.2	1.83	2.80	1.26	2.75	1.77	0.02	•
H6378HPP	1	H6	1.49	37.8	3.42	4.61	2.17	4.52	3.54	0.07	•
H6484HPP	1 1/4	H6	1.91	48.4	3.42	4.61	2.17	4.52	3.54	0.07	•
H6544HPP	1 1/2	H6	2.14	54.4	3.42	4.61	2.17	4.52	3.54	0.07	•

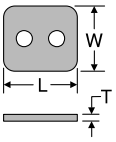
Note: One clamp set includes two identical halves of polypropylene. Tube and pipe clamps are black in color. Hose clamp halves are green in color. Hardware shown in the illustration above is **not** included.

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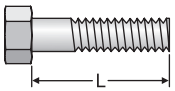
CPH
Cover Plate Heavy



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	W WIDTH (in.)	T THICKNESS (in.)	T THICKNESS (mm)	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
CPH-3	H3	2.16	1.18	0.31	8	•	•
CPH-4	H4	2.75	1.18	0.31	8	•	•
CPH-5	H5	3.34	1.18	0.31	8	•	•
CPH-6	H6	4.52	1.77	0.39	10	•	•
CPH-7	H7	5.98	2.36	0.39	10	•	•

Material: Steel: Zinc gold chromate plated
SS: 316 stainless steel

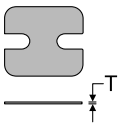
BCPH
Hexagon Head Bolt for Cover Plate
(2 required per clamp set)



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	UNC THREAD	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
BCPH-3	H3	1.75	3/8 - 16	•	•
BCPH-4	H4	2.25	3/8 - 16	•	•
BCPH-5	H5	2.75	3/8 - 16	•	•
BCPH-6	H6	4.00	7/16 - 14	•	•
BCPH-7	H7	5.25	5/8 - 11	•	•

Material: Steel: Zinc clear chromate plated, Grade 5 bolt
SS: 316 stainless steel

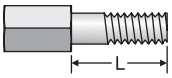
LPH
Locking Plate Heavy



TUBE FITTING PART #	GROUP #	T THICKNESS (in.)	STANDARD FROM STOCK
LPH-3	H3	0.31	•
LPH-4	H4	0.31	•
LPH-5	H5	0.31	•
LPH-6	H6	0.39	•
LPH-7	H7	0.39	•

Material: Steel, zinc gold chromate plated

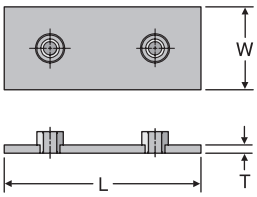
SBH
Stacking Bolt Heavy
(2 required per clamp set)



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	STANDARD FROM STOCK
SBH-3	H3	1.02	•
SBH-4	H4	1.61	•
SBH-5	H5	2.01	•
SBH-6	H6	3.27	•
SBH-7	H7	4.33	•

Material: 1010 steel, zinc clear chromate plated

WPH
Weld Plate Heavy



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	L LENGTH (mm)	W WIDTH (in.)	W WIDTH (mm)	T THICKNESS (in.)	T THICKNESS (mm)	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
WPH-3	H3	2.88	73	1.18	30	0.31	8	•	•
WPH-4	H4	3.34	85	1.18	30	0.31	8	•	•
WPH-5	H5	3.94	100	1.18	30	0.31	8	•	•
WPH-6	H6	5.51	140	1.79	45	0.39	10	•	•
WPH-7	H7	7.09	180	2.36	60	0.39	10	•	•

Material: Steel: 1020 steel, zinc-phosphate plated
SS: 316 stainless steel

Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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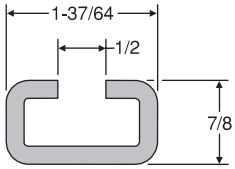
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RH

Mounting Rail Heavy

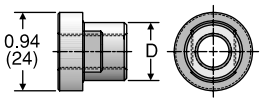


TUBE FITTING PART #	LENGTH	STANDARD FROM STOCK -S	-SS
R1H	3.28 ft. (1 meter)	•	•
R2H	6.56 ft. (2 meters)	•	•

Material: Steel: Unplated
SS: 316 stainless steel

RNH

Mounting Rail Nut Heavy

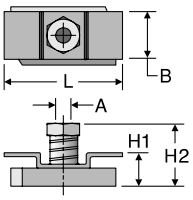


TUBE FITTING PART #	GROUP #	D DIAMETER (in.)	(mm)	THREAD	STANDARD FROM STOCK -S	-SS
RNH-10	H3	0.70	18	3/8 - 16 UNC	•	•
RNH-12	H4	0.78	20	7/16 - 14 UNC	•	•

Material: Steel: Zinc-phosphate plated
SS: 316 stainless steel

CRA

Channel Rail Adapter



TUBE FITTING PART #	THREAD "A" UNC	L in. (mm)	B in. (mm)	H1 in. (mm)	H2 in. (mm)	STANDARD FROM STOCK
CRA 3-5	3/8-16	1.37 (35)	0.86 (22)	0.73 (18.5)	1.08 (27.5)	•
CRA 6	7/16-14	1.77 (45)	0.98 (25)	0.67 (17)	1.08 (27.5)	•

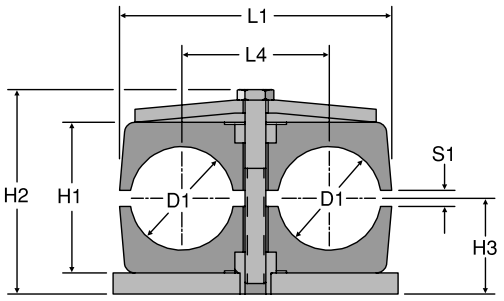
Material: Steel, zinc plated

Dimensions and pressures for reference only, subject to change.

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Clamp Halves

Twin Series



See note below

TUBE CLAMP HALVES											
PART #	TUBE SIZE	GROUP #	D1		H1	H2	H3	L1	L4	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
1064/64-PP	1/4	T1	0.25	6.4	0.79	1.18	0.59	1.41	0.78	0.02	•
1095/95-PP	3/8	T1	0.38	9.5	0.79	1.18	0.59	1.41	0.78	0.02	•
2127/127-PP	1/2	T2	0.50	12.7	1.06	1.73	0.71	2.08	1.14	0.03	•
2160/160-PP	5/8	T2	0.63	16.0	1.06	1.73	0.71	2.08	1.14	0.03	•
3190/190-PP	3/4	T3	0.75	19.0	1.45	2.17	0.93	2.63	1.41	0.03	•
3254/254-PP	1	T3	1.00	25.4	1.45	2.17	0.93	2.63	1.41	0.03	•
5320/320-PP	1 1/4	T5	1.25	32.0	2.09	2.83	1.26	4.17	2.20	0.03	•
5381/381-PP	1 1/2	T5	1.50	38.1	2.09	2.83	1.26	4.17	2.20	0.03	•

PIPE CLAMP HALVES										
PART #	PIPE SIZE	GROUP #	D1		H1	H2	H3	L1	L4	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
4266/266-PP	3/4	T4	1.05	26.6	1.77	2.36	1.02	3.14	1.77	0.03	•
5334/334-PP	1	T5	1.31	33.4	2.08	2.83	1.26	4.17	2.20	0.03	•

FOR USE WITH 100R1 HOSE											
PART #	HOSE SIZE	GROUP #	D1		H1	H2	H3	L1	L2	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
H3206/206-PP	1/2	T3	0.81	20.6	1.45	2.17	0.93	2.63	1.41	0.03	•
H5205/205-PP	1/2	T5	0.81	20.5	2.09	2.83	1.26	4.17	2.20	0.03	•
H5230/230-PP	5/8	T5	0.91	23.0	2.09	2.83	1.26	4.17	2.20	0.03	•
H5280/280-PP	3/4	T5	1.10	28.0	2.09	2.83	1.26	4.17	2.20	0.03	•

FOR USE WITH 100R2 HOSE											
PART #	HOSE SIZE	GROUP #	D 1		H1	H2	H3	L1	L2	S1	STANDARD FROM STOCK
			in.	mm	in.	in.	in.	in.	in.	in.	
H3190/190-PP	3/8	T3	0.75	19.0	1.45	2.17	0.93	2.63	1.41	0.03	•
H3222/222-PP	1/2	T3	0.87	22.2	1.45	2.17	0.93	2.63	1.41	0.03	•
H3250/250-PP	5/8	T3	0.98	25.0	1.45	2.17	0.93	2.63	1.41	0.03	•
H5295/295-PP	3/4	T5	1.16	29.5	2.09	2.83	1.26	4.17	2.20	0.03	•
H5372/372-PP	1	T5	1.46	37.2	2.09	2.83	1.26	4.17	2.20	0.03	•

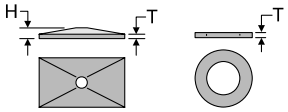
Note: One clamp set includes two identical halves of polypropylene. Tube and pipe clamp halves are black in color. Hose clamp halves are green. Hardware shown in the illustration above is **not** included.

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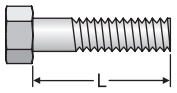
CPT
Cover Plate



TUBE FITTING PART #	GROUP #	T THICKNESS (in.)	T THICKNESS (mm)	H HEIGHT (in.)	H HEIGHT (mm)	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
CPT-1	T1	0.06	1.5	—	–	•	•
CPT-2	T2	0.13	3.0	0.28	7.0	•	•
CPT-3	T3	0.13	3.0	0.28	7.0	•	•
CPT-4	T4	0.13	3.0	0.31	8.0	•	•
CPT-5	T5	0.13	3.0	0.31	8.0	•	•

Material: Steel: Zinc gold chromate plated
SS: 316 stainless steel

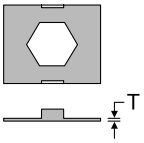
BCPT
Hexagon Head Bolt for Cover Plate



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	UNC THREAD	STANDARD FROM STOCK -S	STANDARD FROM STOCK -SS
BCPT-1	T1	1.00	1/4 - 20	•	•
BCPT-2	T2	1.38	5/16 - 18	•	•
BCPT-3	T3	1.75	5/16 - 18	•	•
BCPT-4	T4	2.00	5/16 - 18	•	•
BCPT-5	T5	2.50	5/16 - 18	•	•

Material: Steel: Zinc clear chromate plated, Grade 5 material
SS: 316 stainless steel

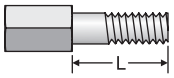
LPT
Locking Plate



TUBE FITTING PART #	GROUP #	T THICKNESS (in.)	STANDARD FROM STOCK
LPT-1	T1	0.02	•
LPT-2	T2	0.02	•
LPT-3	T3	0.02	•
LPT-4	T4	0.02	•
LPT-5	T5	0.02	•

Material: Steel, zinc gold chromate plated

SBT
Stacking Bolt



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	UNC THREAD	STANDARD FROM STOCK
SBT-1	T1	0.59	1/4 - 20	•
SBT-2	T2	0.78	5/16 - 18	•
SBT-3	T3	1.13	5/16 - 18	•
SBT-4	T4	1.69	5/16 - 18	•
SBT-5	T5	1.78	5/16 - 18	•

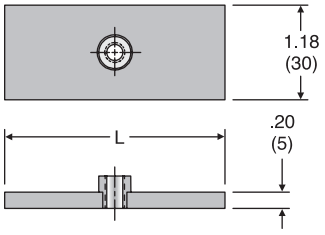
Material: Zinc clear chromate plated, 1010 steel

Dimensions and pressures for reference only, subject to change.

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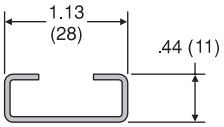
WPT
Weld Plate Twin



TUBE FITTING PART #	GROUP #	L LENGTH (in.)	(mm)	STANDARD FROM STOCK -S	-SS
WPT-1	T1	1.47	37	•	•
WPT-2	T2	2.31	55	•	•
WPT-3	T3	2.75	70	•	•
WPT-4	T4	3.34	85	•	•
WPT-5	T5	4.34	110	•	•

Material: Steel: Zinc-phosphate plated
SS: 316 stainless steel

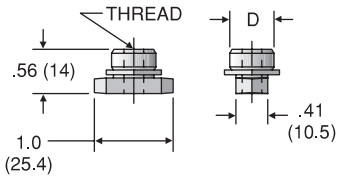
R
Mounting Rail



TUBE FITTING PART #	LENGTH	STANDARD FROM STOCK -S	-SS
R-1	3.28 ft. (1 meter)	•	•
R-2	6.56 ft. (2 meters)	•	•

Material: Steel: Unplated
SS: 316 stainless steel

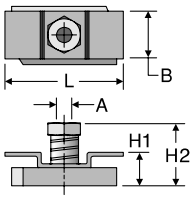
RNT
Mounting Rail Nut Twin



TUBE FITTING PART #	GROUP #	D DIAMETER (in.)	(mm)	THREAD	STANDARD FROM STOCK -S	-SS
RNT-1	T1	0.39	10	1/4 - 20 UNC	•	•
RNT-2-5	T2-T5	0.56	14	5/16 - 18 UNC	•	•

Material: Steel: Zinc-phosphate plated
SS: 316 stainless steel

CRA
Channel Rail Adapter



TUBE FITTING PART #	THREAD "A" UNC	L in. (mm)	B in. (mm)	H1 in. (mm)	H2 in. (mm)	STANDARD FROM STOCK
CRA 2-3D	5/16-18	1.49 (38)	2.55 (65)	0.73 (18.5)	1.08 (27.5)	•

Material: Steel, zinc plated

Dimensions and pressures for reference only, subject to change.

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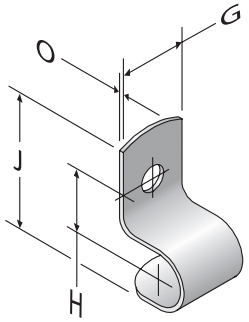
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3121-1
Tube Clip

PART # BRASS	END SIZE (in.)	G (in.)	H (in.)	J (in.)	O (in.)	HOLE DIA. (in.)	STANDARD FROM STOCK
3121-1-3	3/16	5/16	9/32	17/32	1/32	5/32	•
3121-1-4	1/4	3/8	11/32	21/32	1/32	3/16	•
3121-1-5	5/16	7/16	13/32	13/16	1/32	3/16	•
3121-1-6	3/8	1/2	15/32	15/16	1/32	3/16	•
3121-1-8	1/2	1/2	35/64	1 1/16	3/64	7/32	•
3121-1-10	5/8	5/8	11/16	1 5/16	1/16	1/4	•
3121-1-12	3/4	3/4	13/16	1 9/16	1/16	9/32	•

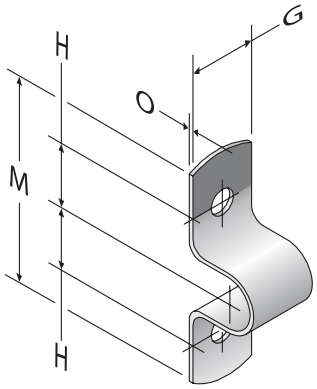
Material: Brass



3121-3
Tube Clip

PART # BRASS	END SIZE (in.)	G (in.)	H (in.)	J (in.)	O (in.)	HOLE DIA. (in.)	STANDARD FROM STOCK
3121-3-3	3/16	5/16	9/32	7/8	1/32	5/32	•
3121-3-4	1/4	3/8	11/32	1 1/16	1/32	3/16	•
3121-3-5	5/16	7/16	13/32	1 1/4	1/32	3/16	•
3121-3-6	3/8	1/2	15/32	1 7/16	1/32	3/16	•
3121-3-8	1/2	1/2	35/64	1 19/32	3/64	7/32	•
3121-3-10	5/8	5/8	11/16	2	1/16	1/4	•
3121-3-12	3/4	3/4	13/16	2 3/8	1/16	9/32	•

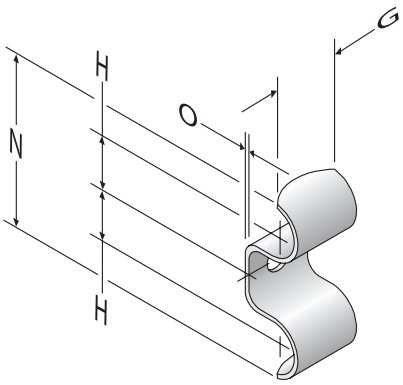
Material: Brass



3121-4
Tube Clip

PART # BRASS	END SIZE (in.)	G (in.)	H (in.)	J (in.)	O (in.)	HOLE DIA. (in.)	STANDARD FROM STOCK
3121-4-3	3/16	5/16	9/32	13/16	1/32	5/32	•
3121-4-4	1/4	3/8	11/32	1	1/32	3/16	•
3121-4-5	5/16	7/16	13/32	1 3/16	1/32	3/16	•
3121-4-6	3/8	1/2	15/32	1 3/8	1/32	3/16	•
3121-4-8	1/2	1/2	35/64	1 11/16	3/64	7/32	•
3121-4-10	5/8	5/8	11/16	2 1/8	1/16	1/4	•
3121-4-12	3/4	3/4	13/16	2 1/2	1/16	9/32	•

Material: Brass



Dimensions and pressures for reference only, subject to change.

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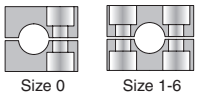
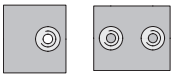
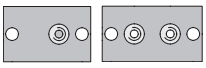
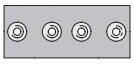
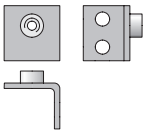
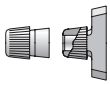
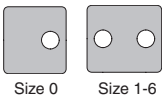
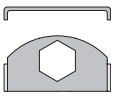
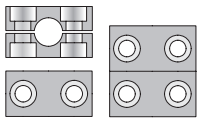
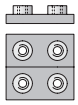
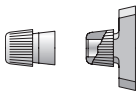
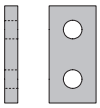
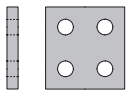
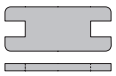
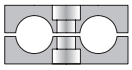
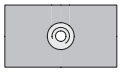
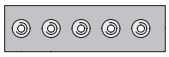
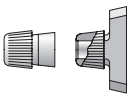
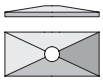
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Metric Clamps



The Fitting Authority

Metric Clamps

Standard Series Normal Mechanical Stress	**RAP** Clamp Halves  Size 0 Size 1-6 Q4	**SLA** Slotted Screws  Q5	**SSLA** Hex Head Bolt  Q5	**ISA** Cap Screws  Q5	**ASA** Stacking Bolts  Q6
APKA Weld Plate-Short  Size 0 Size 1-6 Q5	**APLA** Weld Plate-Long  Size 0 Size 1-6 Q5	**APDA** Double Weld Plate  Q5	**APRA** Weld Plate-Strip  Q6	**APWA** Weld Plate Angled  Q6	**TS** Mounting Rail  Q6
TMA Lock Nut  Q6	**DPA** Top Plate  Size 0 Size 1-6 Q6	**SBA** Locking Plate  Q6	**USA** Locking Washer  Q6	**Heavy Series High Mechanical Stress**	**RCP/RCPD** Clamp Halves  Q7
SSC Hex Head Bolts  Q8	**ASC** Stacking Bolts  Q8	**ISC** Cap Screws  Q8	**APC** Weld Plate  Q8	**APDC** Double Weld Plate  Q8	**APLC** Weld/Screw Plate  Q8
TSC Mounting Rail  Q9	**TMC** Lock Nut  Q9	**DPC** Top Plate  Q9	**DPDC** Double Top Plate  Q9	**SPC** Locking Plate  Q9	**USC** Locking Washer  Q9
Twin Series Normal Mechanical Stress	**RBP** Clamp Halves  Q10	**SSB** Hex Head Bolt  Q10	**ISB** Cap Screws  Q10	**ASB** Stacking Bolts  Q11	**APB** Weld Plate  Q11
APRB Strip Weld Plate  Q11	**TS** Mounting Rail  Q11	**TMB** Lock Nut  Q11	**SBB** Locking Plate  Q11	**DPB** Top Plate  Q11	**US** Locking Washer  Q11

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Visual Index

Introduction

The Parker Metric Clamp system is designed for restraining tube, pipe and hose assemblies against unwanted, and potentially harmful effects of mechanical shock and vibration forces that are common in fluid power systems.

The clamping system is the most commonly overlooked aspect of fluid power system design. Failure to properly restrain the fluid conducting system can result in leakage, downtime and system malfunction, as well as significantly reduced life of tube, pipe and hose assemblies. With the Parker Metric Clamp system, the risk of problems resulting from mechanical shock and vibration can be significantly reduced.

Design and Construction

Designed to meet the basic envelope dimensions of DIN 3015, Part 1, the plastic clamp halves are interchangeable with the ParKlamp system. The primary difference between these two clamping systems is the utilization of inch thread hardware in the Parklamp system, while the Metric Clamp system utilizes metric hardware.

For convenience, the Metric Clamp system is divided into three different series, Standard, Heavy and Twin. Each series has corresponding components, physical dimensions and mechanical properties. Within each series, there are a number of groups, each with specific envelope dimensions. Components from different series and/or groups can not be intermixed. However, the standard and twin series can be mounted on the same mounted rail.

How It Works

The Metric Clamp system has two primary methods for mounting: weld plates and mounting rails. Clamps may be mounted to secure a single layer of tube or stacked for securing multiple layers.

Clamps should be mounted to a rigid structure for optimum performance. Clamping tube, pipe or hose assemblies together without mounting them to a rigid structure, often called “floating clamps,” does not provide adequate support.

Proper design of a clamping system requires that the clamps be positioned appropriately on the tube, pipe or hose assemblies. See the Assembly and Installation section of the catalog for more information on clamp location and spacing.

Weld Plate Mounting (Fig. Q1)

The weld plate mounting system allows the user to attach a single clamp assembly to a structure of similar material (steel to steel, etc) by welding the components together. Once the weld plate is attached to a structure, one clamp half can be placed onto the weld plate, followed by the tube, pipe or hose assembly. Next, the second plastic clamp half can be placed on the tube, pipe or hose assembly, followed by the cover plate. To complete the assembly, the Hex Head attachment bolts are inserted into the assembly and tightened.

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Metric Clamps.

Mounting Rail Mounting (Fig. Q2)

Use of a mounting rail is another way to assemble the clamping system components onto a support structure. Using a mounting rail allows multiple clamps to be mounted side-by-side for restraining a group of tube, pipe, or hose assemblies. The mounting rail also provides the ability to move the location of the clamps in one direction for easier alignment. The rail can be attached to a support structure by welding or bolting. Once the mounting rail is in place, rail nuts can be slid into the rail. The first clamp half, followed by the tube, pipe or hose assembly, can then be installed over the corresponding rail nuts. After this, the second clamp half, the cover plate and the hex head attachment bolts can be installed to complete the assembly.

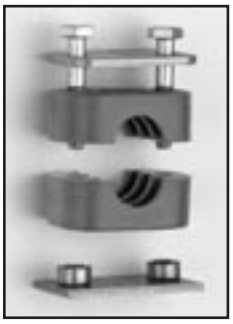


Fig. Q1 – Weld Plate Assembly



Fig. Q2 – Mounting Rail Assembly

Stacking (Fig. Q3)

A primary feature of the Metric Clamp system is its ability to accommodate stacking of a series of clamps to various heights, thus requiring a smaller footprint for mounting. To do this, simply use the stacking bolts to mount the first clamp assembly, then install a stacking plate over the first clamp and stacking bolts. The second clamp assembly can then be placed over the first clamp assembly. Complete the mounting by assembling a cover plate and using the hex head bolts to tighten the upper clamp assembly. **Note: When stacking, the clamps must be from the same series and group.**



Fig. Q3 – Stacked Assembly

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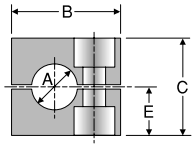
Visual Index

Assembly / Installation

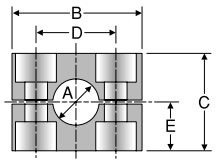
RAP

Clamp Halves

TUBE FITTING PART #	GROUP #	A Metric Tube Size	A Inch Pipe Size	A Inch Tube Size	B (mm)	C (mm)	D (mm)	E (mm)	STANDARD FROM STOCK
RAP006X		6							•
RAP008X		8							•
RAP010X		10	1/8						•
RAP012X	0	12			28	27	—	13.5	•
RAP006.4X		6.4		1/4					•
RAP008X		8		5/16					•
RAP009.5X		9.5		3/8					•
RAP106X		6							•
RAP108X		8		5/16					•
RAP110X		10	1/8						•
RAP112X	1	12			34	27	20	13.5	•
RAP106.4X		6.4		1/4					•
RAP109.5X		9.5		3/8					•
RAP214X		14							•
RAP215X		15							•
RAP216X		16		5/8					•
RAP218X	2	18			40	33	26	16.5	•
RAP213.5X		13.5	1/4						•
RAP217.2X		17.2	3/8						•
RAP212.7X		12.7		1/2					•
RAP320X		20							•
RAP322X		22							•
RAP323X		23							•
RAP325X	3	25		1	48	35	33	17.5	•
RAP321.3X		21.3	1/2						•
RAP319X		19		3/4					•
RAP428X		28							•
RAP430X	4	30			57	42	40	21	•
RAP426.9X		26.9	3/4						•
RAP532X		32		1 1/4					•
RAP535X		35							•
RAP538X		38		1 1/2					•
RAP540X		40							•
RAP542X	5	42	1 1/4		70	58	52	29	•
RAP533.7X		33.7	1						•
RAP645X		45							•
RAP648X		48	1 1/2						•
RAP650X		50							•
RAP652X		52							•
RAP655X	6	55			86	66	66	33	•
RAP644.5X		44.45		1 3/4					•
RAP650.8X		50.8		2					•
RAP657X		57		2 1/4					•



Group 0



Groups 1-6

Material codes for clamp halves:

Polypropylene	- **RAP**
inside plain	- **RAPG (for hose)**
Polyamide 6	- **RAN (Nylon)**
inside plain	- **RANG (Nylon) (for hose)**
Aluminum	- **RAA**

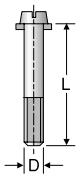
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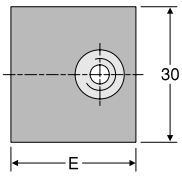
Assembly / Installation

SLA
Slotted Screws

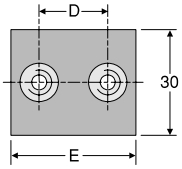


TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
SLA0X	0	M6 x 1	20	•
SLA2X	2	M6 x 1	25	•
SLA3X	3	M6 x 1	30	•
SLA4X	4	M6 x 1	35	•
SLA5X	5	M6 x 1	50	•
SLA6X	6	M6 x 1	60	•

APKA
Weld Plate – Short



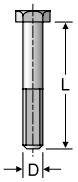
Group 0



Groups 1-6

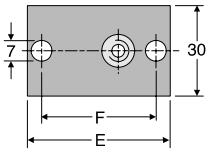
TUBE FITTING PART #	GROUP #	D (mm)	E (mm)	STANDARD FROM STOCK
APKA0X	0	—	30	•
APKA1X	1	20	34	•
APKA2X	2	26	42	•
APKA3X	3	33	50	•
APKA4X	4	40	50	•
APKA5X	5	52	72	•
APKA6X	6	66	88	•

SSLA
Hex Head Bolt

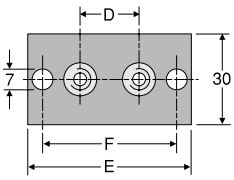


TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
SSLA0X	0	M6 x 1	30	•
SSLA2/SSB1X	2	M6 x 1	35	•
SSLA3X	3	M6 x 1	40	•
SSLA4X	4	M6 x 1	45	•
SSLA5X	5	M6 x 1	60	•
SSLA6X	6	M6 x 1	70	•

APLA
Weld Plate – Long



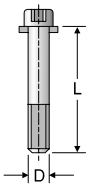
Group 0



Groups 1-6

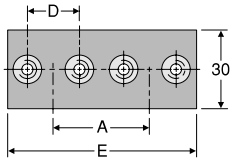
TUBE FITTING PART #	GROUP #	D (mm)	E (mm)	F (mm)	STANDARD FROM STOCK
APLA0X	0	—	58	44	•
APLA1X	1	20	64	50	•
APLA2X	2	26	70	56	•
APLA3X	3	33	78	64	•
APLA4X	4	40	87	73	•
APLA5X	5	52	100	86	•
APLA6X	6	66	116	100	•

ISA
Cap Screws



TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
ISA0X	0	M6 x 1	20	•
ISA2X	2	M6 x 1	25	•
ISA3X	3	M6 x 1	30	•
ISA4X	4	M6 x 1	35	•
ISA5X	5	M6 x 1	50	•
ISA6X	6	M6 x 1	60	•

APDA
Double Weld Plate



TUBE FITTING PART #	GROUP #	A (mm)	D (mm)	E (mm)	STANDARD FROM STOCK
APDA0X	0	30	—	61	
APDA1X	1	35	20	69	•
APDA2X	2	43	26	86	•
APDA3X	3	52	33	104	•
APDA4X	4	60	40	120	•
APDA5X	5	75	52	145	•
APDA6X	6	90	66	176	

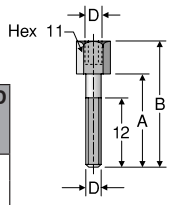
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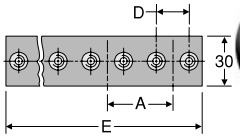
Assembly / Installation

ASA
Stacking Bolts



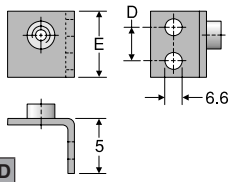
TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	D (mm)	STANDARD FROM STOCK
ASA0X	0	20	34	M6 x 1	•
ASA2X	2	25	39	M6 x 1	•
ASA3X	3	30	44	M6 x 1	•
ASA4X	4	35	49	M6 x 1	•
ASA5X	5	50	64	M6 x 1	•
ASA6X	6	60	74	M6 x 1	•

APRA
Weld Plate – Strip



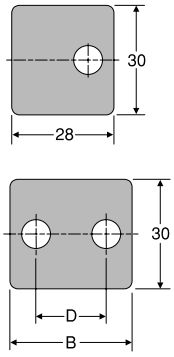
TUBE FITTING PART #	GROUP #	D (mm)	A (mm)	E (mm)	STANDARD FROM STOCK
APRA0X	0	—	30	298	•
APRA1X	1	20	35	394	•
APRA2X	2	26	43	427	•
APRA3X	3	33	52	516	•
APRA4X	4	40	60	297	•
APRA5X	5	52	75	370	•
APRA6X	6	66	90	446	•

APWA
Weld Plate – Angled



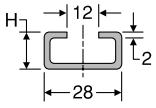
TUBE FITTING PART #	GROUP #	D (mm)	E (mm)	STANDARD FROM STOCK
APWA0X	0	14	30	
APWA1X	1	20	36	
APWA2X	2	26	42	
APWA3X	3	33	50	
APWA4X	4	40	59	
APWA5X	5	52	72	
APWA6X	6	66	88	

DPA
Top Plate



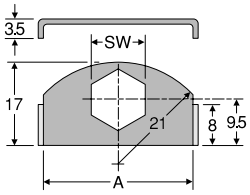
TUBE FITTING PART #	GROUP #	B (mm)	D (mm)	STANDARD FROM STOCK
DPA0X	0	28	—	•
DPA1X	1	34	20	•
DPA2X	2	40	26	•
DPA3X	3	48	33	•
DPA4X	4	57	40	•
DPA5X	5	70	52	•
DPA6X	6	86	66	•

TS
Mounting Rail



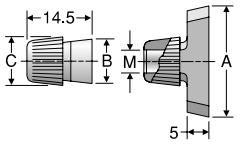
TUBE FITTING PART #	GROUP #	H (mm)	LENGTH (meter)	STANDARD FROM STOCK
TS11A/B1X	ALL	11	1	•
TS14A/B1X	ALL	14	1	•
TS30A/B1X	ALL	30	1	•
TS11A/B2X	ALL	11	2	•
TS14A/B2X	ALL	14	2	•
TS30A/B2X	ALL	30	2	•

SBA
Locking Plate



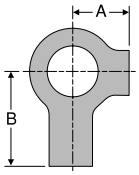
TUBE FITTING PART #	GROUP #	A (mm)	SW (mm)	STANDARD FROM STOCK
SBAX	ALL	30	11	•

TMA
Lock Nut



TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	C (mm)	M (mm)	STANDARD FROM STOCK
TMA/TMB1VERZX	ALL	26	11	12	M6 X 1	•

USA
Locking Washer



TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	STANDARD FROM STOCK
USA/IS1X	ALL	9	10	•

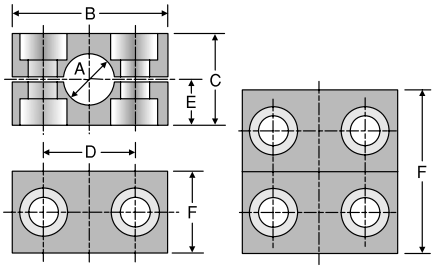
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RCP / RCPD

Clamp Halves

TUBE FITTING PART #	GROUP #	A Metric Tube Size	A Inch Pipe Size	A Inch Tube Size	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	STANDARD FROM STOCK
RCP108X		8		5/16						•
RCP110X		10								•
RCP112X		12								•
RCP113.5X		13.5	1/4							•
RCP114X	1	14			55	32	33	16	30	•
RCP115X		15								•
RCP116X		16		5/8						•
RCP117.2X		17.2	3/8							•
RCP118X		18								•
RCP220X		20								•
RCP221.3X		21.3	1/2							•
RCP222X		22								•
RCP223X	2	23			70	48	45	24	30	•
RCP225X		25		1						•
RCP226.9X		26.9	3/4							•
RCP228X		28								•
RCP330X		30								•
RCP332X		32		1 1/4						•
RCP333.7X		33.7	1							•
RCP335X	3	35			85	60	60	30	30	•
RCP338X		38		1 1/2						•
RCP340X		40								•
RCP342X		42	1 1/4							•
RCP438X		38		1 1/2						•
RCP440X		40								•
RCP442X		42	1 1/4							•
RCP445X		45								•
RCP448.3X		48.3	1 1/2							•
RCP450X	4	50			115	90	90	45	45	•
RCP451X		51		2						•
RCP452X		52								•
RCP455X		55								•
RCP457X		57		2 1/4						•
RCP460.3X		60.3	2							•
RCP463X		63		2 1/2						•
RCP465X		65								•
RCP470X		70								•
RCP570X		70								•
RCP576.1X		76.1	2 1/2	3						•
RCP580X	5	80			152	120	122	60	60	•
RCP582.5X		82.5		3 1/4						•
RCP588.9X		88.9	3	3 1/2						•
RCP690X		90								•
RCP6101.6X		101.6		4						•
RCP6108X	6	108		4 1/4	205	170	168	85	80	•
RCP6114.3X		114.3		4 1/2						•
RCP6127X		127		5						•
RCP7127X		127		5						•
RCP7133X		133		5 1/4						•
RCP7140X		140	5	5 1/2						
RCP7152.4X	7	152.4	5 1/2	6	250	200	205	100	90	•
RCP7159X		159		6 1/4						•
RCP7165.1X		165.1	6	6 1/2						•
RCP7168.3X		168.3		6 5/8						•
RCP8168.3X		168.3		6 5/8						
RCP8177.8X	8	177.8		7	320	270	265	135	120	•
RCP8193.7X		193.7		7 5/8						•
RCP8219.1X		219.1	8	8 5/8						•



RCP RCPD

Material codes for clamp halves:

Polypropylene - **RCP**
inside plain - **RCPG (for hose)**
Polyamide 6 - **RCN**
inside plain - **RCNG (for hose)**
Aluminum - **RCA**

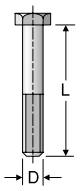
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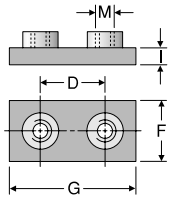
Assembly / Installation

SSC
Hex Head Bolts



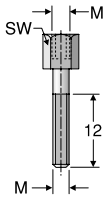
TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
SSC1X	1	M10 x 1	45	•
SSC2X	2	M10 x 1	60	•
SSC3X	3	M10 x 1	70	•
SSC4X	4	M12 x 1.5	100	•
SSC5X	5	M16 x 2	130	•
SSC6X	6	M20 x 2	190	•
SSC7X	7	M24 x 2	220	•
SSC8X	8	M30 x 2	300	•

APC
Weld Plate



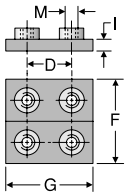
TUBE FITTING PART #	GROUP #	D (mm)	F (mm)	G (mm)	I (mm)	M (mm)	STANDARD FROM STOCK
APC1X	1	33	30	73	8	M10 x 1	•
APC2X	2	45	30	85	8	M10 x 1	•
APC3X	3	60	30	100	8	M10 x 1	•
APC4X	4	90	45	140	10	M12 x 1.5	•
APC5X	5	122	60	180	10	M16 x 2	•
APC6X	6	168	80	225	15	M20 x 2	•
APC7X	7	205	90	270	15	M24 x 2	•
APC8X	8	265	120	340	25	M30 x 2	•

ASC
Stacking Bolts



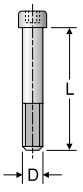
TUBE FITTING PART #	GROUP #	M (mm)	SW (mm)	STANDARD FROM STOCK
ASC1X	1	M10 x 1	15	•
ASC2X	2	M10 x 1	15	•
ASC3X	3	M10 x 1	15	•
ASC4X	4	M12 x 1.5	17	•
ASC5X	5	M16 x 2	21	•
ASC6X	6	M20 x 2	27	•
ASC7X	7	M24 x 2	29	•
ASC8X	8	M30 x 2	35	•

APDC
Double Weld Plate



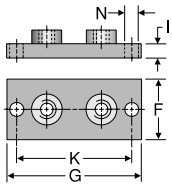
TUBE FITTING PART #	GROUP #	D (mm)	F (mm)	G (mm)	I (mm)	M (mm)	STANDARD FROM STOCK
APDC1X	1	33	60	73	8	M10 x 1	
APDC2X	2	45	60	85	8	M10 x 1	•
APDC3X	3	60	60	100	8	M10 x 1	•
APDC4X	4	90	90	140	10	M12 x 1.5	•
APDC5X	5	152	120	180	10	M16 x 2	
APDC6X	6	168	160	225	15	M20 x 2	
APDC7X	7	205	180	270	15	M24 x 2	
APDC8X	8	265	240	340	25	M30 x 2	

ISC
Cap Screws



TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
ISC1X	1	M10 x 1	45	•
ISC2X	2	M10 x 1	60	•
ISC3X	3	M10 x 1	70	•
ISC4X	4	M12 x 1.5	100	•
ISC5X	5	M16 x 2	130	•
ISC6X	6	M20 x 2	190	•
ISC7X	7	M24 x 2	220	•
ISC8X	8	M30 x 2	300	•

APLC
Weld / Screw Plate



TUBE FITTING PART #	GROUP #	F (mm)	G (mm)	I (mm)	K (mm)	N (mm)	STANDARD FROM STOCK
APLC1X	1	30	113	8	85	11	
APLC2X	2	30	125	8	97	11	
APLC3X	3	30	140	8	112	11	
APLC4X	4	45	190	10	160	14	
APLC5X	5	60	240	10	205	18	
APLC6X	6	80	310	15	270	22	
APLC7X	7	90	370	15	320	26	
APLC8X	8	120	450	25	390	33	

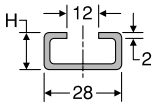
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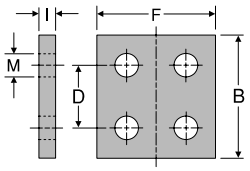
Assembly / Installation

TSC
Mounting Rail



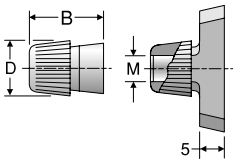
TUBE FITTING PART #	GROUP #	B (mm)	H (mm)	LENGTH (meter)	STANDARD FROM STOCK
TSC1X	ALL	40	22	1	•
TSC2X	ALL	40	22	2	•

DPDC
Double Top Plate



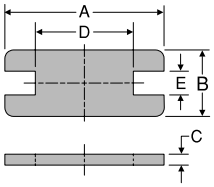
TUBE FITTING PART #	GROUP #	B (mm)	D (mm)	F (mm)	I (mm)	M (mm)	STANDARD FROM STOCK
DPDC1X	1	55	33	60	8	11	•
DPDC2X	2	70	45	60	8	11	•
DPDC3X	3	85	60	60	8	11	•
DPDC4X	4	115	90	90	10	14	•
DPDC5X	5	152	122	120	10	18	•
DPDC6X	6	205	168	160	15	22	•
DPDC7X	7	250	205	180	15	26	•
DPDC8X	8	320	365	240	25	33	•

TMC
Lock Nut



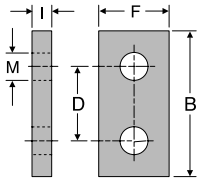
TUBE FITTING PART #	GROUP #	B (mm)	D (mm)	M (mm)	STANDARD FROM STOCK
TMC1X	1-3	20	17.9	M10 x 1	•
TMC4X	4	20	19.8	M12 x 1.5	•

SPC
Locking Plate



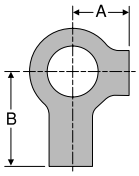
TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	STANDARD FROM STOCK
SPC1X	1	55	30	8	14	15.5	•
SPC2X	2	70	30	8	26	15.5	•
SPC3X	3	85	30	8	41	15.5	•
SPC4X	4	115	45	10	69	17.5	•
SPC5X	5	152	60	10	97	21.5	•
SPC6X	6	205	80	15	137	27.5	•
SPC7X	7	250	90	15	169	29.5	•
SPC8X	8	320	120	25	219	35.5	•

DPC
Top Plate



TUBE FITTING PART #	GROUP #	B (mm)	D (mm)	F (mm)	I (mm)	M (mm)	STANDARD FROM STOCK
DPC1X	1	55	33	30	8	11	•
DPC2X	2	70	45	30	8	11	•
DPC3X	3	85	60	30	8	11	•
DPC4X	4	115	90	45	10	14	•
DPC5X	5	152	122	60	10	18	•
DPC6X	6	205	168	80	15	22	•
DPC7X	7	250	205	90	15	26	•
DPC8X	8	320	365	120	25	33	•

USC
Locking Washer



TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	STANDARD FROM STOCK
USC1X	1	13	22	
USC2X	2	13	22	
USC3X	3	13	22	
USC4X	4	15	28	•
USC5X	5	18	32	
USC6X	6	21	36	
USC7X	7	25	42	
USC8X	8	32	52	

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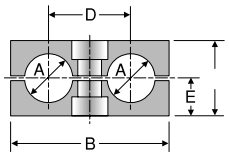
Visual Index

Assembly / Installation

RBP

Clamp Halves

TUBE FITTING PART #	GROUP #	A Metric Tube Size	A Inch Pipe Size	A Inch Tube Size	B (mm)	C (mm)	D (mm)	E (mm)	STANDARD FROM STOCK
RBP106X		6							•
RBP106.4X		6.4		1/4					
RBP108X	1	8			36	27	20	13.5	•
RBP109.5X		9.5		3/8					•
RBP110X		10							•
RBP112X		12							•
RBP212.7X		12.7							•
RBP213.5X		13.5	R1/4						•
RBP214X		14							•
RBP215X	2	15		1/2	53	26	29	13	•
RBP216X		16							•
RBP217.2X		17.2	R3/8						•
RBP218X		18							•
RBP319X		19							•
RBP320X		20							•
RBP321.3X	3	21.3	R1/2		67	37	36	18.5	•
RBP322X		22							•
RBP325X		25							•
RBP426.9X		26.9	R3/4						•
RBP428X	4	28			82	42	45	21	•
RBP430X		30							•
RBP532X		32							•
RBP533.7X		33.7	R1						•
RBP535X	5	35			106	54	56	27	•
RBP538X		38							•
RBP542X		42							•



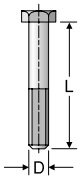
Material codes for clamp halves:

Polypropylene - **RBP**
inside plain - **RBPG (for hose)**
Polyamide 6 - **RBN**
inside plain - **RBNG (for hose)**

SSB

Hex Head Bolt

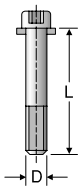
TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
SSLA2/SSB1X	1	M6 x 1	35	•
SSB2X	2	M8 x 1	35	•
SSB3X	3	M8 x 1	45	•
SSB4X	4	M8 x 1	50	•
SSB5X	5	M8 x 1	60	•



ISB

Cap Screws

TUBE FITTING PART #	GROUP #	D (mm)	L (mm)	STANDARD FROM STOCK
ISB1X	1	M6 x 1	35	•
ISB2X	2	M8 x 1	35	•
ISB3X	3	M8 x 1	45	•
ISB4X	4	M8 x 1	50	•
ISB5X	5	M8 x 1	60	•



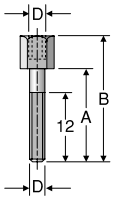
Dimensions and pressures for reference only, subject to change.

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Visual Index

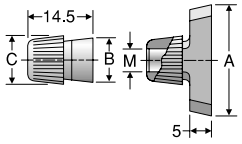
Assembly / Installation

ASB
Stacking Bolts



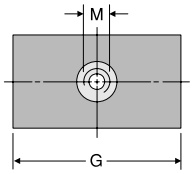
TUBE FITTING PART #	GROUP #	D (mm)	A (mm)	B (mm)	STANDARD FROM STOCK
ASB1X	1	M6 x 1	20	34	•
ASB2X	2	M8 x 1	20	33	•
ASB3X	3	M8 x 1	29	44	•
ASB4X	4	M8 x 1	34	49	•
ASB5X	5	M8 x 1	47	62	•

TMB
Lock Nut



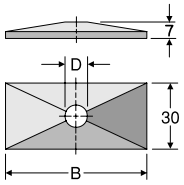
TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	C (mm)	M (mm)	STANDARD FROM STOCK
TMB1/TMAVERZX	1	26	11	12	M6 x 1	•
TMB2X	2-5	26	11	14	M8 x 1	•

APB
Weld Plate



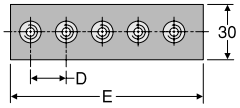
TUBE FITTING PART #	GROUP #	G (mm)	M (mm)	STANDARD FROM STOCK
APB1X	1	37	M6 x 1	•
APB2X	2	55	M8 x 1	•
APB3X	3	70	M8 x 1	•
APB4X	4	85	M8 x 1	•
APB5X	5	110	M8 x 1	•

DPB
Top Plate



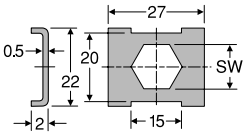
TUBE FITTING PART #	GROUP #	B (mm)	D (mm)	STANDARD FROM STOCK
DPB1X	1	34	6.6	•
DPB2X	2	51	8.6	•
DPB3X	3	64	8.6	•
DPB4X	4	78	8.6	
DPB5X	5	102	8.6	•

APRB
Weld Plate – Strip



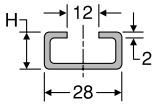
TUBE FITTING PART #	GROUP #	D (mm)	E (mm)	STANDARD FROM STOCK
APRB1X	1	40	196	•
APRB2X	2	58	288	•
APRB3X	3	72	358	•
APRB4X	4	90	446	
APRB5X	5	112	558	•

SBB
Locking Plate



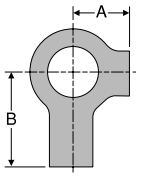
TUBE FITTING PART #	GROUP #	SW (mm)	STANDARD FROM STOCK
SBB1X	1	11	•
SBB2X	2-5	12	•

TS
Mounting Rail



TUBE FITTING PART #	GROUP #	B (mm)	H (mm)	LENGTH (meter)	STANDARD FROM STOCK
TS11A/B1X	ALL	28	11	1	•
TS14A/B1X	ALL	28	14	1	•
TS30A/B1X	ALL	28	30	1	•
TS11A/B2X	ALL	28	11	2	•
TS14A/B2X	ALL	28	14	2	•
TS30A/B2X	ALL	28	30	2	•

US
Locking Washer



TUBE FITTING PART #	GROUP #	A (mm)	B (mm)	STANDARD FROM STOCK
USA/USB1XX	1	9	18	•
USB2X	2-5	11	20	•

Dimensions and pressures for reference only, subject to change.

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Metric Tube



The Fitting Authority

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Introduction

Parker offers three types of seamless metric tubes for hydraulic, pneumatic and instrumentation applications:

- Steel seamless cold drawn tube, phosphate and oil dipped for corrosion resistance
- Steel seamless cold drawn tube, zinc Chromium-6 free plating for corrosion resistance
- Stainless steel cold drawn tube

Conformance and Material Specifications

Tests and Certificates

All tubes are subjected to a non-destructive leak test and marked accordingly. This marking is used in lieu of a works certificate DIN 50 049-2-2. Test Class 1 DIN 17458 Table 7 applies for tubes made of 1.4571 material.

Materials and Mechanical Properties

Steel Types, mechanical properties and conditions are listed in Table R1.

Welding Suitability and Weldability:

- Steel tubes of St. 37.4, R Series, are weldable according to usual techniques.
- Not recommended to weld St. 37.4, R-VZ series, Zinc Chromium-6 Free plated tubes.

Stainless steel tubes of 1.4571 are suitable for arc welding. The welding filler should be selected in accordance with DIN 8556 part 1 taking into account the type of application and the welding technique.

Assembly and Installation

Please refer to Section T for the assembly and installation instructions for Metric Tube fittings.

Applications

Recommended Bend Radius

A bend radius of 3 times the tube O.D. or greater is recommended for cold bending of Parker tubes with hand, mechanical and power bending equipment.

Use of Tube Supports

The use of VH tube supports for EO and EO-2 fittings is required in certain thinner wall tubes to ensure proper assembly. Consult the tube charts.

Temperature Range

- Parker steel (St. 37.4) metric seamless tube can be used at the full rated working pressures without pressure rating reductions within the following temperature range: -40°C to +120°C. Maximum allowable operating temperature of +250°C.
- Parker stainless steel (1.4571) metric seamless tube can be used at full rated working pressures with-out pressure reductions within the following temperature ranges: -200°C to 350°C (-60 to +20). Maximum allowable operating temperature of +400°C. Elevated temperature pressure reductions are as listed in Table R2.

As Delivered Conditions:

Standard Tube Lengths: 6 meters (approx. 20 ft)

Surface Finish:

- Steel (St. 37.4): Phosphated and oiled
  - I.D. dimensions 1.5 – 5 mm, outside and inside oiled
  - I.D. dimensions 6 mm and higher, outside and inside phosphated and oiled
- Steel (St. 37.4) R-VZ Series: Zinc Chromium-6 Free

Parker Series	Material	Tensile Strength	Yield Strength	% Elongation	Condition
R Series	Steel, fine grain quality (RR) St 37.4 per DIN 1630	340 N/mm² min. 49,000 PSI	235 N/mm² min. 34,000 PSI	25% min.	Seamless, cold drawn under inert gas, normal annealed, abbreviation NBK DIN 2391C, Part 2
R-71 Series	1.4571 X6CrNiMoTi17122	500 N/mm² min. 72,500 PSI	245 N/mm² min. 35,500 PSI	35% min.	Seamless, cold drawn free of scale, heat treated in accordance with DIN 17458 tab. 6

Table R1 — Parker Steel tubes mechanical properties and conditions

Temperature	Material	-60° up to +20° C	50° C	100° C	200° C	300° C	400° C
Pressure reductions in %	1.45	—	4.5	11	20	29	33

Note: Interpolation is acceptable for intermediate temperautre level.

Table R2 — Parker stainless tube elevated temperature derating factors

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Seamless EO Steel Tubes

Material St. 37.4

St. 37.4 Phosphated & Oiled Part No.	St. 37.4 Zinc Plated & Chromium-6 Free Part No.	End Size (mm)	Toler-ance	Wall Thickness (mm)	Tube I.D. (mm)	Design Pressure (bar) DIN 2413 I Static	Design Pressure (bar) DIN 2413 III Dynamic	Burst Pressure (bar)	Weight (kg/m)	STANDARD FROM STOCK Phos & Oil	STANDARD FROM STOCK CF
R04x0.5	**R04x0.5VZ**	4		0.5	3	313	274	1160	0.047	•	
R04x0.75	**R04x0.75VZ**	4	±0.1	0.75	2.5	409	393	1820	0.063		
R04x1	**R04x1VZ**	4		1	2	522	502	2850	0.074	•	•
R05x1	**R05x1VZ**	5	±0.1	1	3	432	416	2120	0.099		•
R06x0.75	**R06x0.75VZ**	6		0.75*	4.5	333	289	1230	0.103		
R06x1	**R06x1VZ**	6		1	4	389	374	1680	0.123	•	•
R06x1.5	**R06x1.5VZ**	6	±0.1	1.5	3	549	528	3050	0.166	•	•
R06x2	**R06x2VZ**	6		2	2	692	665		0.197	•	
R06x2.25	**R06x2.25VZ**	6		2.25	1.5	757	728		0.208		
R08x1	**R08x1VZ**	8		1	6	333	289	1190	0.172	•	•
R08x1.5	**R08x1.5VZ**	8	±0.1	1.5	5	431	414	1860	0.240	•	•
R08x2	**R08x2VZ**	8		2	4	549	528	3020	0.296	•	•
R08x2.5	**R08x2.5VZ**	8		2.5	3	658	632		0.339		
R10x1	**R10x1VZ**	10		1	8	282	249	870	0.222	•	•
R10x1.5	**R10x1.5VZ**	10		1.5	7	373	358	1380	0.314	•	•
R10x2	**R10x2VZ**	10	±0.1	2	6	478	460	2100	0.395	•	•
R10x2.5	**R10x2.5VZ**	10		2.5	5	576	553	3180	0.462		
R10x3	**R10x3VZ**	10		3	4	666	641		0.518	•	
R12x1	**R12x1VZ**	12		1	10	235	210	760	0.271	•	•
R12x1.5	**R12x1.5VZ**	12		1.5	9	353	305	1150	0.388	•	•
R12x2	**R12x2VZ**	12	±0.08	2	8	409	393	1580	0.493	•	•
R12x2.5	**R12x2.5VZ**	12		2.5	7	495	476	2600	0.586	•	
R12x3	**R12x3VZ**	12		3	6	576	553	3200	0.666		
R12x3.5	**R12x3.5VZ**	12		3.5	5	651	627		0.734		
R14x1	**R14x1VZ**	14		1*	12	201	182	620	0.321		
R14x1.5	**R14x1.5VZ**	14		1.5	11	302	265	940	0.462	•	
R14x2	**R14x2VZ**	14		2	10	403	343	1340	0.592	•	•
R14x2.5	**R14x2.5VZ**	14	±0.08	2.5	9	434	417	1760	0.709		
R14x3	**R14x3VZ**	14		3	8	507	487	2400	0.814		
R14x3.5	**R14x3.5VZ**	14		3.5	7	576	553	3220	0.906		
R14x4	**R14x4VZ**	14		4	6	641	616		0.986		
R15x1	**R15x1VZ**	15		1*	13	188	171	590	0.345	•	•
R15x1.5	**R15x1.5VZ**	15		1.5	12	282	249	980	0.499	•	•
R15x2	**R15x2VZ**	15	±0.08	2	11	376	323	1250	0.641	•	•
R15x2.5	**R15x2.5VZ**	15		2.5	10	409	393	1690	0.771		
R15x3	**R15x3VZ**	15		3	9	478	460	2120	0.888		
R16x1	**R16x1VZ**	16		1*	14	176	160	540	0.370		
R16x1.5	**R16x1.5VZ**	16		1.5	13	264	234	820	0.536	•	•
R16x2	**R16x2VZ**	16	±0.08	2	12	353	305	1170	0.691	•	•
R16x2.5	**R16x2.5VZ**	16		2.5	11	386	372	1470	0.832	•	•
R16x3	**R16x3VZ**	16		3	10	452	435	1920	0.962	•	•
R18x1	**R18x1VZ**	18		1*	16	157	143	510	0.419	•	
R18x1.5	**R18x1.5VZ**	18		1.5	15	235	210	780	0.610	•	•
R18x2	**R18x2VZ**	18	±0.08	2	14	313	274	1040	0.789	•	•
R18x2.5	**R18x2.5VZ**	18		2.5	13	392	335	1320	0.956	•	
R18x3	**R18x3VZ**	18		3	12	409	393	1830	1.111		

* Tubes which need a support sleeve (VH) for assembly in EO and EO-2 fittings.

Table R3 — Seamless EO steel tubes

Pressure Calculations:

Calculation pressures given are according to DIN 2413 Part 1 for **static stress**

$$P = \frac{20 \cdot K \cdot s \cdot c \text{ (bar)}}{S \cdot d_a}$$

Material characteristic value K=235 N/mm²

and

DIN 2413 part III for **dynamic stress**

$$P = \frac{20 \cdot K \cdot s \cdot c \text{ (bar)}}{S \cdot (da + s \cdot c)}$$

Material characteristic value K=226 N/mm² (permanent fatigue strength)

Safety correction value S=1.5 for static and dynamic stress.

Factor “c” for consideration of wall thickness **divergence for static and dynamic stress** =0.8 for tube o.d. 4 and 5; 0.85 for tube o.d. 6 and 8; 0.9 for larger tube o.d.

d_a = Tube O.D. in mm

s = Wall thickness in mm

Standard Tube Length:

• 6 m (19.7 ft.)

Conversion Factors:

• Bar x 14.5 = psig
• kg/m x 0.672 = lbs/ft
• N/mm² x 145 = lb/in²

See Remarks on page R5.

Dimensions and pressures for reference only, subject to change.

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Seamless EO Steel Tubes (cont'd.)

Material St. 37.4

St. 37.4 Phosphated & Oiled Part No.	St. 37.4 Zinc Plated & Chromium-6 Free Part No.	End Size (mm)	Toler-ance	Wall Thickness (mm)	Tube I.D. (mm)	Design Pressure (bar) DIN 2413 I Static	Design Pressure (bar) DIN 2413 III Dynamic	Burst Pressure (bar)	Weight (kg/m)	STANDARD FROM STOCK Phos & Oil	STANDARD FROM STOCK CF
R20x1.5	**R20x1.5VZ**	20		1.5*	17	212	191	570	0.684	•	
R20x2	**R20x2VZ**	20		2	16	282	249	920	0.888	•	•
R20x2.5	**R20x2.5VZ**	20	±0.08	2.5	15	353	305	1220	1.079	•	•
R20x3	**R20x3VZ**	20		3	14	373	358	1450	1.258	•	•
R20x3.5	**R20x3.5VZ**	20		3.5	13	426	410	1720	1.424		
R20x4	**R20x4VZ**	20		4	12	478	460	2080	1.578	•	
R22x1.5	**R22x1.5VZ**	22		1.5	19	192	174	590	0.758	•	•
R22x2	**R22x2VZ**	22	±0.08	2	18	256	228	850	0.986	•	•
R22x2.5	**R22x2.5VZ**	22		2.5	17	320	280	1040	1.202	•	
R22x3	**R22x3VZ**	22		3	16	385	329		1.406		
R25x2	**R25x2VZ**	25		2	21	226	202	670	1.134	•	•
R25x2.5	**R25x2.5VZ**	25		2.5	20	282	249	920	1.387	•	•
R25x3	**R25x3VZ**	25	±0.08	3	19	338	294	1050	1.628	•	•
R25x4	**R25x4VZ**	25		4	17	394	379	1520	2.072	•	
R25x4.5	**R25x4.5VZ**	25		4.5	16	437	420	1780	2.275		
R25x5	**R25x5VZ**	25		5	15	478	460	2120	2.466		
R28x1.5	**R28x1.5VZ**	28		1.5	25	151	139	450	0.980		
R28x2	**R28x2VZ**	28		2	24	201	182	620	1.282	•	•
R28x2.5	**R28x2.5VZ**	28	±0.08	2.5	23	252	224	770	1.572	•	
R28x3	**R28x3VZ**	28		3	22	302	265	920	1.850	•	
R28x4	**R28x4VZ**	28		4	20	403	343		2.368		
R28x5	**R28x5VZ**	28		5	18	434	417		2.836		
R30x2	**R30x2VZ**	30		2*	26	188	171	620	1.381	•	
R30x2.5	**R30x2.5VZ**	30		2.5	25	235	210	770	1.695	•	
R30x3	**R30x3VZ**	30	±0.08	3	24	282	249	920	1.998	•	•
R30x4	**R30x4VZ**	30		4	22	376	323	1250	2.565	•	•
R30x5	**R30x5VZ**	30		5	20	409	393	1580	3.083		
R35x2	**R35x2VZ**	35		2	31	161	147	470	1.628	•	•
R35x2.5	**R35x2.5VZ**	35		2.5	30	201	182	620	2.004		
R35x3	**R35x3VZ**	35	±0.15	3	29	242	216	720	2.367	•	•
R35x4	**R35x4VZ**	35		4	27	322	281	960	3.058	•	
R35x5	**R35x5VZ**	35		5	25	403	343		3.699		
R35x6	**R35x6VZ**	35		6	23	419	403		4.291		
R38x2.5	**R38x2.5VZ**	38		2.5*	33	186	168	550	2.189		
R38x3	**R38x3VZ**	38		3	32	223	200	660	2.589	•	
R38x4	**R38x4VZ**	38	±0.15	4	30	297	261	970	3.354	•	•
R38x5	**R38x5VZ**	38		5	28	371	319	1350	4.069	•	•
R38x6	**R38x6VZ**	38		6	26	390	375		4.735	•	
R38x7	**R38x7VZ**	38		7	24	446	429		5.352	•	
R42x2	**R42x2VZ**	42		2*	38	134	124	390	1.973	•	•
R42x3	**R42x3VZ**	42	±0.2	3	36	201	182	580	2.885	•	•
R42x4	**R42x4VZ**	42		4	34	269	238	850	3.749	•	
R50x6	**R50x6VZ**	50	±0.2	6	38	338			6.511		
R50x9	**R50x9VZ**	50		9	32	437			9.100		
R65x8	**R65x8VZ**	65	±0.3	8	49	347			11.246		
R80x10	**R80x10VZ**	80	±0.35	10	60	353			17.263		

* Tubes which need a support sleeve (VH) for assembly in EO and EO-2 fittings.

Table R3 — Seamless EO steel tubes (cont'd.)

Remarks:

Corrosion — Additional allowances are not considered for the calaculation of pressures

$$\frac{\text{da (bar)}}{\text{di max.}} \geq 1.35$$

are calculated for static stress in accordance with DIN 2413 Part III, but with K = 235 N/mm^2

When a specific factor of safety is required, calculations should be based upon the burst pressures shown in the above tables.

Temperature range: -40°C up to 120°C without pressure reductions.

Surface finish:

Tubes with I.D. 1.5 to 5 mm: outside and inside oiled.

Tubes from 6 mm I.D. and above: outside and inside phosphated and oiled.

Dimensions and pressures for reference only, subject to change.

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Seamless EO Stainless Steel Tubes

Material-No.: 1.4571

Part No.	End Size (mm)	Toler-ance	Wall Thickness (mm)	Tube I.D. (mm)	Design Pressure (bar) DIN 2413-1 Static	Design Pressure (bar) DIN 2413-1 Dynamic	1.4571 Burst Pressure (bar)	Weight (kg/m)	STANDARD FROM STOCK Stainless Steel (71)
R6x171	6	±0.1	1	4	426	330	2340	0.125	•
R8x171	8	±0.1	1	6	368	256	1660	0.175	•
R8x1.571	8		1.5	5	472	366	2800	0.244	•
R10x171	10		1	8	294	209	1290	0.225	•
R10x1.571	10	±0.1	1.5	7	389	301	1930	0.319	•
R10x271	10		2	6	498	386	3100	0.401	•
R12x171	12		1	10	245	177	1220	0.275	•
R12x1.571	12	±0.08	1.5	9	368	256	1580	0.394	•
R12x271	12		2	8	426	330	2380	0.501	•
R14x1.571	14		1.5	11	315	223	1550	0.469	•
R14x271	14	±0.08	2	10	420	289	2180	0.601	•
R14x2.571	14		2.5	9	452	351	2800	0.720	
R15x171	15		1*	13	196	143	860	0.351	•
R15x1.571	15	±0.08	1.5	12	294	209	1140	0.507	•
R15x271	15		2	11	392	271	1750	0.651	
R16x271	16		2	12	368	256	1800	0.701	•
R16x2.571	16	±0.08	2.5	11	403	312	2120	0.845	
R16x371	16		3	10	472	366	2800	0.977	
R18x1.571	18	±0.08	1.5	15	245	177	1050	0.620	•
R18x271	18		2	14	327	230	1520	0.801	•
R20x271	20		2	16	294	209	1250	0.901	•
R20x2.571	20	±0.08	2.5	15	368	256	1550	1.095	
R20x371	20		3	14	389	301	1960	1.277	•
R22x1.571	22	±0.08	1.5	19	200	146	720	0.770	•
R22x271	22		2	18	267	192	1020	1.002	
R25x2.571	25	±0.08	2.5	20	294	209	1190	1.408	•
R25x371	25		3	19	353	247	1520	1.653	
R28x1.571	28	±0.08	1.5	25	158	117	620	0.995	
R28x271	28		2	24	210	153	880	1.302	•
R30x371	30	±0.08	3	24	294	209	1140	2.028	
R30x471	30		4	22	392	271	1650	2.605	•
R35x271	35	±0.15	2	31	168	124	670	1.653	•
R38x471	38	±0.15	4	30	309	219	1240	3.405	
R38x571	38		5	28	387	268	1680	4.131	
R42x271	42	±0.2	2*	38	140	104	520	2.003	•
R42x371	42		3	36	210	153	860	2.930	

* Tubes which need a support sleeve (VH) for assembly in EO and EO-2 fittings.

Table R4 — Seamless EO stainless steel tubes

Pressure Calculation:

Pressure calculation given are according to DIN 2413 part I for **static stress**

$$P = \frac{20 \cdot K \cdot s \cdot c \text{ (bar)}}{S \cdot d_a}$$

Material characteristic value K=235 N/mm² (1.4571), K=235 N/mm² (1.4571) (1% proof stress)

Safety factor S = 1.5

Factor “c” for consideration of wall thickness divergence: 0.9

d_a = Tube O.D. in mm

s = Wall thickness in mm

Remarks:

Corrosion — Additional allowances are not considered for the calculation of pressures.

Tubes with a diameter ratio da/di ≥ 1.35 are calculated according to DIN 2413 part III (formula see page R4) with above characteristic K value.

Conversion Factors:

- Bar x 14.5 = psig
- kg/m x 0.672 = lbs/ft
- N/mm² x 145 = lb/in²

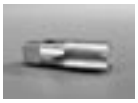
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Equipment



The Fitting Authority

Benders	**Hand Tube Benders**  S4 – S5	**Adjustable Handle Hand Benders**  S4	**Ratchet Hand Tube Bender**  S4	**1" Hand Tube Bender**  S5	**BV06/12** Combined Tube Bending & Cutting Tool  S6
BV06/18, BV20/25 Tube Bending Tools  S6	**BVP06/181** Tube Bending Tool  S6	**Bender Capacity Guides** S7	**Exactol Benders** 412 & 424  S8 – S11	**HB632** Hydraulic Bender  S12 – S16	**Mandrel Bending Components**  S16 – S18
CP432 Tube and Pipe Bender Kit  S19	**Brazing Equipment**	**Braze Flux**  S21	**Post Braze Cleaner**  S21	**Cutting & Deburring Tools**	**Kloskut** Medium (Sizes 2 to 18)  S22
Kloskut Large (Sizes 12 to 32)  S22	**Tru-Kut** Sawing Vise (Sizes 3-32)  S22	**Cut-Off Saw** 974250  S22	**In-Ex** Deburring Tool (Sizes 2-26)  S23	**Power Deburr Tool**  S23	
Flanging Tools	**Parflange 1050**  S24	**Parflange 1025**  S25	**Flanging Pin and Die Sets**  S25	**Flaring Tools**	**210A Combination Tool** (Sizes 2 to 10)  S28
Vise Block and Flaring Pin (Sizes 4 to 24 and 6-38mm)  S27-S28	**Rolo-Flair Rotary, Manual** (Sizes 2 to 12)  S28	**Hydra-Tool** Hydraulic Flaring & Pre-Setting Tool  S29 – S31	**Karryflare**  S32	**Flaring Tooling for Parflange**  S33	
Porting Tools	**Straight Thread Port Tap** (Sizes 2 to 32)  S34	**SAE Straight Thread Port Counterbore** (Sizes 2 to 32)  S34	**BSPP Counterbores**  S35	**BSPP/BSPT Taps**  S35	**NPTF Taps**  S36
ISO 6149-1 Port Tap  S36	**ISO 6149-1** Port Counterbore  S36	**ISO 6149-1** Port Counterbore with ID Groove  S36	**Pre-Setting Tools**	**Ferulset Ferrule Pre-Setter** (Sizes 2 to 32)  S38	**VOMO** Pre-Assembly Bodies  S39

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Hyferset Ferrule Pre-Setter
(Sizes 4 to 32)



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Hydra-Tool



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Pre-Setting Tooling for Hydra-Tool



S43-S44

EO-Karrymat



S45

EOMAT III



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O-Ring Assembly Tools

O-Ring Pick



S48

Captive O-Ring Installation Tool



S48

Sealants, Lubricants, & Cleaners

LB 2000 & MPG-2



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STP



S49

EO Lubricants



S49

Loctite Anti-Seize Lubricant



S49

Super-Lube PTFE Grease



S50

Loctite Penetrating Oil



S50

O-Lube



S50

Super O-Lube



S50

Threadmate



S51

Loctite Thread Sealant 567



S51

Loctite Thread Sealant 545



S51

Pipe Sealing Cord



S52

PTFE Tape



S52

Loctite 7649 Primer N



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Loctite Threadlocker 242



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Loctite Threadlocker 271



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Loctite Fast Orange Hand Cleaner



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Loctite Natural Blue Degreaser



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Loctite Parts Cleaner



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Loctite Rack



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Tube Preparation Centers

Modular Preparation Centers



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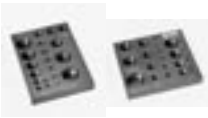
Thread Identification

Thread Identification Kit



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Portboards



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ITK
International Thread Kit



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Wrenches

Par-Lok Wrenches



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Weights

Tube Fabricating Equipment Weight Chart

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Hand Tube Benders – Inch

These are sturdy, easy-to-use hand tools for fast and accurate bending without kinks or visible flattening. Twelve individual sizes from -2 (1/8" O.D.) to -16 (1" O.D.) are available.

Medium Duty Inch Hand Tube Benders

Designed and built for fast, accurate bends and long service life.

These are individual benders for eight inch tube sizes (1/8", 3/16", 1/4", 5/16", 3/8", 1/2" 5/8", 3/4"). All of these benders will bend copper, aluminum, annealed steel and stainless steel. These can be used in hands or mounted in a bench vise.



Fig. S1 — Medium Duty Inch Hand Tube Bender

HOW TO USE: Simply align marks of the pressure arm and radius block, then bend to the desired angle (up to 180°) by pulling steadily on the slide block handle. Bend angles are indicated on the radius block, both front and back. (Detailed instructions are included with each bender.) See the table below for technical data and part numbers.

Size	Tube O.D. (in.)	Radius to Tube Centerline (in.)	Min. Wall Without Flattening (in.)	Recommended Max. Wall Thickness Copper, Aluminum (in.)	Recommended Max. Wall Thickness Steel, Stainless Steel (in.)	Part No.
2	1/8	7/16	0.012	Any	0.032.....	**2-2829S**
3	3/16	9/16	0.020	Any	0.032.....	**3-2829S**
4	1/4	9/16	0.028	Any	0.083.....	**4-2829S**
5	5/16	15/16	0.032	Any	0.083.....	**5-2829S**
6	3/8	15/16	0.032	Any	0.083.....	**6-2829S**
8	1/2	1 1/2	0.042	Any	0.083.....	**8-2829S**
10	5/8	3	0.042	Any	0.049.....	**10-2829S**
12	3/4	3 3/4	0.049	Any	0.065.....	**12-2829S**

Ratchet Hand Tube Benders

These are individual benders for three tube sizes, 5/8", 3/4" and 7/8", in copper, aluminum, annealed steel and stainless steel. They can be used in hands or mounted in a bench vise.



Fig. S2 — Ratchet Hand Tube Bender

HOW TO USE: Position the tube in the bender, close the latch and pull the ratchet handle away from radius block handle until the desired angle (up to 180°) is formed. Bend angles are indicated on the radius block. (Detailed instructions are included with each bender.) See the table below for technical data and part numbers.

Size	Tube O.D. (in.)	Radius to Tube Centerline (in.)	Min. Wall Without Flattening (in.)	Recommended Max. Wall Thickness Copper, Aluminum (in.)	Recommended Max. Wall Thickness Steel, Stainless Steel (in.)	Part No.
10	5/8	3	0.042	Any	0.049.....	**10-2829**
12	3/4	3 3/4	0.049	Any	0.065.....	**12-2829**
14	7/8	3 3/4	0.049	Any	0.065.....	**14-2829**

Adjustable Handle Hand Benders

These are individual benders for three tube sizes (1/4, 3/8, 1/2). All of these benders can form accurate bends up to 180° in aluminum, copper, steel & stainless steel materials.* These benders include rollers in the bending handle to reduce effort required for bending and they can be mounted in a bench vice.



Fig. S3 — Adjustable Handle Hand Benders

HOW TO USE: Simply align marks on the slide block end of the pressure arm and radius block, then bend to the desired angle. For angles greater than 90°, the adjust-

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able handle can be used for reduced hand interference that occurs at the end of the bending operation.

*Refer to max. wall/min. wall recommendations specified for medium duty inch benders.

Size	Tube O.D. (in.)	Radius to Tube Centerline (in.)	Min. Wall Without Flattening (in.)	Recommended Max. Wall Thickness Copper, Aluminum (in.)	Steel, Stainless Steel (in.)	Part No.
4	1/4	9/16	0.028	Any	0.083	**4-2829AH**
6	3/8	5/16	0.032	Any	0.083	**6-2829AH**
8	1/2	1 1/2	0.042	Any	0.083	**8-2829AH**

1" Hand Tube Bender

Part No. 16-2829

For 1" O.D. tube in soft copper and aluminum materials. This bender can be used in hands, but mounting in a bench vise is suggested, especially for heavier wall thickness tube.

HOW TO USE: Align marks and bend the tube to the desired angle (up to 180°) by pulling steadily on the operating handle. The handle may be re-positioned for maximum leverage. Bend angles are indicated on the radius block. (Detailed instructions are included with the bender.) See the table below for technical data and part numbers.



Fig. S4 — 1" Hand Tube Bender

Size	Tube O.D. (in.)	Radius to Tube Centerline (in.)	Min. Wall Without Flattening (in.)	Recommended Max. Wall Thickness Copper, Aluminum (in.)	Steel, Stainless Steel (in.)	Part No.
16	1	3 1/2	0.065	Any	Not Recommended	**16-2829**

Hand Tube Benders – Metric

These are sturdy, easy-to-use hand tools for fast and accurate bending without kinks or visible flattening. Individual sizes in ten models from size 5mm to 25mm are available.

Medium Duty Metric Hand Tube Benders

Designed and built for fast, accurate bends and long service life.

These are individual benders for six metric tube sizes (5mm, 6mm, 8mm, 10mm, 12mm and 14mm). All of these benders will bend copper, aluminum, annealed steel and stainless steel. These can be used in hands or mounted in a bench vise.



Fig. S5 — Medium Duty Metric Hand Tube Bender

HOW TO USE: Simply align the marks on the slide block and radius block, then bend to the desired angle (up to 180°) by pulling steadily on the slide block handle. Bend angles are indicated on the radius block, both front and back. (Detailed instructions are included with each bender.) See the table below for technical data and part numbers.

Tube O.D. (mm)	Radius to Tube Centerline (mm)	Min. Tube Wall Thickness (mm)	Recommended Max. Wall Thickness Copper, Aluminum (mm)	Steel, Stainless Steel (mm)	Part No.
5	14.3	0.5	Any	1.0	**2829-5mm**
6	14.3	1.0	Any	1.5	**2829-6mm**
8	23.8	1.0	Any	1.5	**2829-8mm**
10	23.8	1.0	Any	2.0	**2829-10mm**
12	38.1	1.0	Any	2.0	**2829-12mm**
14	38.1	1.0	Any	2.0	**2829-14mm**

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Bench Mount Metric Hand Bender and Cutting Guide

This bender combines a tube cutting guide with the bender for sizes 6mm, 8mm, 10mm, and 12mm. There are three bender rollers that cover all sizes. The bender mounts easily to a work bench or table.

Part Description	Part No.
Bench Mount Tube Bender (6mm, 8mm, 10mm, 12mm)	**BAV06/12KPLX**



Fig. S6 — BAV06/12KPLX

Vise Mount Metric Hand Benders

Vise Mount Metric Bender – 6/18mm

This bender has six interchangeable rollers to cover tube sizes 6mm, 8mm, 10mm, 12mm, 14mm, 15mm, 16mm, and 18mm.

Part Description	Part No.
Vise Mount Tube Bender (6mm, 8mm, 10mm, 12mm, 14mm, 15mm, 16mm, 18mm)	**BV06/18KPLX**



Fig. S7 — BV06/18KPLX

Tube O.D. (mm)	Bend Radius (mm)	Max. Wall Thickness (mm)
6	33	2.5
8	34	2.5
10	36	2.5
12	37	2.5
14	37	2.0
15	44	2.0
16	44	2.0
18	52	2.0

Vise Mount Metric Bender – 20/25mm

This bender has three interchangeable rollers to cover tube sizes 20mm, 22mm, and 25mm. All bend radii are 86.5mm. Pressure arm is not included with the BV20/25KPLX, however it can be manufactured on site with a piece of tube, or it can be ordered separately with part number BV20/2510X. Maximum wall thickness for all sizes is 2.0mm.

Part Description	Part No.
Vise Mount Tube Bender (20mm, 22mm, 25mm)	**BV20/25KPLX**
Pressure Arm	**BV20/2510X**



Fig. S8 — BV20/25KPLX

Programmable Vise Mount Metric Bender – 6/18mm

This bender has 6 interchangeable rollers which cover tube sizes 6mm, 8mm, 10mm, 12mm, 14mm, 15mm, 16mm, and 18mm. Also standard with the bender is the program rail, guide rail and dimension rail in either one or two meter lengths. The BVP can be manually programmed to offer repeatability of bends. For bend radii and maximum wall thichness, see BV06/18KPLX above.

Part Description	Part No.
Programmable Vise Mount Tube Bender (6mm, 8mm, 10mm, 12mm, 14mm, 15mm, 16mm, 18mm)	**BVP06/181**



Fig. S9 — BVP 06/181

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Visual Index

Hand Crank & Hydraulic Tube Bender Capacity Guides

All benders listed in Tables S1 through S3 are capable of bending 1/2" O.D. and under fully annealed steel and stainless steel tube with no limit on wall thickness. For HARD copper and HIGH STRENGTH aluminum, use the wall thickness shown for stainless steel. Observe that VERY HARD materials may not be ductile enough to bend without fracture.

Inch Tube Sizes

Tube O.D.	Material	Tube Wall Thickness (in.)											
		0.035	0.049	0.058	0.065	0.072	0.083	0.095	0.109	0.120	0.134	0.156	0.188
		Bender Code*											
3/4"	S	ABCD	ABCD	ABCD	ABCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
	SS	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
1"	S	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
	SS	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	CD	CD
1 1/4"	S	BCD	BCD	BCD	BCD	BCD	BCD	CD	CD	CD	CD	CD	CD
	SS	BCD	BCD	BCD	BCD	BCD	CD	CD	CD	CD	CD	C	C
1 1/2"	S	BCD	BCD	BCD	BCD	BCD	CD	CD	CD	CD	CD	CD	CD
	SS	BCD	BCD	CD	CD	CD	CD	CD	CD	CD	CD	C	C
2"	S	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
	SS	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	—	—

Table S1 — Hand Crank and Hydraulic Tube Benders Maximum Capacity Guide – Inch Sizes

Inch Pipe Sizes

Pipe Size	Material	Inch Pipe Schedule (IPS)	
		40	80
		Bender Code*	
1/2"	S	CD	CD
	SS	CD	CD
3/4"	S	CD	CD
	SS	CD	CD
1"	S	CD	CD
	SS	CD	CD
1 1/4"	S	CD	CD
	SS	CD	CD
1 1/2"	S	CD	CD
	SS	CD	CD
2"	S	D	D
	SS	D	—

Table S2 — Hand Crank and Hydraulic Benders Maximum Capacity Guide – Inch Pipe Sizes

Metric Tube Sizes

Tube O.D. (mm)	Material	Tube Wall Thickness (mm)						
		1.5	2	2.5	3	3.5	4	5
		Bender Code*						
18	S	ABCD	ABCD	ABCD	ABCD	BCD	BCD	CD
	SS	BCD	BCD	BCD	BCD	BCD	BCD	CD
20	S	ABCD	ABCD	ABCD	BCD	BCD	BCD	CD
	SS	BCD	BCD	BCD	BCD	BCD	BCD	CD
22	S	BCD	BCD	BCD	BCD	BCD	BCD	CD
	SS	BCD	BCD	BCD	BCD	BCD	CD	CD
25	S	BCD	BCD	BCD	BCD	BCD	CD	CD
	SS	BCD	BCD	BCD	BCD	CD	CD	CD
28	S	BCD	BCD	BCD	BCD	CD	CD	CD
	SS	BCD	BCD	CD	CD	CD	CD	CD
30	S	BCD	BCD	BCD	BCD	CD	CD	CD
	SS	BCD	BCD	CD	CD	CD	CD	CD
32	S	BCD	BCD	CD	CD	CD	CD	CD
	SS	BCD	BCD	CD	CD	CD	CD	CD
35	S	BCD	CD	CD	CD	CD	CD	CD
	SS	BCD	CD	CD	CD	CD	CD	CD
38	S	BCD	CD	CD	CD	CD	CD	CD
	SS	CD	CD	CD	CD	CD	CD	CD
42	S	CD	CD	CD	CD	CD	CD	CD
	SS	CD	CD	CD	CD	CD	CD	—
50	S	CD	CD	CD	CD	CD	CD	—
	SS	CD	CD	CD	CD	CD	—	—

Table S3 — Hand Crank and Hydraulic Tube Benders Maximum Capacity Guide – Metric Tube Sizes

***Codes:**

(A) Model 412 — Tube (1/4" thru 3/4" and 6mm thru 20mm) — Worm & Gear
(B) Model 424 — Tube (1/4" thru 1 1/2" and 6mm thru 38mm) — Worm & Gear
(C) Model HB632 — Tubeg (3/8" thru 2" and 10mm thru 50mm) — Hydraulic
(D) Model CP432 — Tube (1/4" thru 2") — Hydraulic

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Visual Index

Exactol® Crank-Operated Benders

Models 412/424

These portable benders are vise or bench mountable for easy action and fast accurate bending to 180°. Two models are available to bend tube sizes 4 (1/4") through 24 (1 1/2"). Exactol benders are designed with a worm-gear drive with a 60 to 1 gear ratio to allow accurate bending with minimum effort. They bend aluminum, copper, annealed steel and annealed stainless steel without kinks or wrinkles. Easy crank operation permits continuous production without excessive operator fatigue; for use in tube fabrication shops, in the field, or in factory maintenance departments.

A video (on DVD) is included to provide proper instructions for use.



Fig. S10 — 412 Bender

Exactol® Model 412

The Exactol Model 412 will bend tube from size 4 (1/4") through size 12 (3/4") and 6mm through 20mm inclusive and is completely portable. Accessories include a sturdy metal carrying case, which accommodates the 412 bender, slide block, and selected radius blocks. See page S7 for wall thickness capabilities. May be held in a vise or bench mounted using the bench mounting adapter. Bulletin 4391-B400S and DVD are included with bender, which describe the operation in detail.

NOTE: The 412 must be bench mounted if mandrels are used.



Fig. S11 — Slide Block

COMPONENTS REQUIRED

The minimum components required are a Model 412 Bender with a slide block and a radius block which match the tube O.D. to be bent.

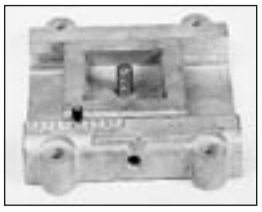


Fig. S12 — Bench Mount Adapter

Part Name	Part No.
Exactol Model 412 Bender (for 1/4" through 3/4" O.D.)	**560569**
Slide Block (for sizes 4-5-6-8-10-12)	**550585**
Slide Block (for sizes 6mm-8mm-12mm-12mm-14mm)	**820091**
Slide Block (for sizes 15mm-16mm-18mm-20mm)	**820092**
Radius Blocks (for sizes 4-5-6-8-10-12 and 6mm thru 38mm)	See pages S10 – S11

OPTIONAL ACCESSORIES

Carrying Case (for bender, slide block and selected radius blocks)	**550572**
Bench Mounting Adapter	**550570**

Mandrel Bending Components

for 412 and 424 Benders ..... See pages S16 – S18

Visual Index

Exactol® Model 412 Kit

This 412 kit contains all the basic tool requirements for bending tube from 1/4" through 3/4".

	Part No.
	412 KIT

The following part numbers are included in the kit:

Part Name	Part No.
Exactol Model 412 Bender	560569
Carrying Case	550572
Slide Block for 1/4" through 3/4" tube	550585
Radius Block – 1/4" O.D. tube	550579
Radius Block – 3/8" O.D. tube	550581
Radius Block – 1/2" O.D. tube	550582
Radius Block – 5/8" O.D. tube	550583
Radius Block – 3/4" O.D. tube	550584



Fig. S13 — 412 Kit

Exactol® Model 424

The Exactol Model 424 will bend tube from size 4 (1/4" O.D.) through size 24 (1 1/2" O.D.) and 6mm through 38mm inclusive. See page S7 for wall thickness capabilities. It is completely portable and may be vise or bench mounted. Bulletin 4391-B400S and video are included with the bender, which describe the operation in detail.

NOTE: The 424 must be bench mounted if mandrels are used.

A video (on DVD) is included to provide proper instructions for use.

COMPONENTS REQUIRED

The minimum components required are a Model 424 Bender with a slide block and a radius block that match the tube O.D. to be bent.

Part Name	Part No.
Exactol Model 424 bender (for 1/4" through 1 1/2" O.D.)	621044
Slide Block (for sizes 4-5-6-8-10-12)	550585
Slide Block (for sizes 14-16-18-20)	621045
Slide Block (for size 24)	870150
Slide Block (for sizes 6mm-8mm-10mm-12mm-14mm)	820091
Slide Block (for sizes 15mm-16mm-18mm-20mm)	820092
Slide Block (for sizes 22mm-25mm-28mm-30mm)	820093
Slide Block (for size 35mm)	820094
Slide Block (for size 38mm)	870150
Radius Blocks (for sizes -4 thru -24 and 6mm thru 38mm)	See pages S10 – S11

OPTIONAL ACCESSORIES

Bench Mounting Adapter	631156
Mandrel Bending Components for 412 and 424 Benders	See pages S16 – S18



Fig. S14 — 424 Bender



Fig. S15 — Slide Block

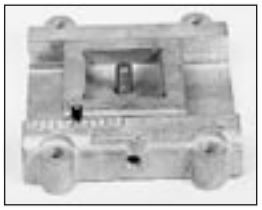


Fig. S16 — Bench Mount Adapter

Exactol® Model 424 Kit

Part No. 424 Kit

This 424 Kit contains all the basic tool requirements for bending tube from 1/4" through 1 1/2". The following part numbers are included in the kit:

Part Name	Part No.
Exactol Model 424 bender (for 1/4" through 1 1/2" O.D.)	**621044**
Slide Block (for sizes 4-5-6-8-10-12)	**550585**
Slide Block (for sizes 14-16-18-20)	**621045**
Slide Block (for size 24)*	**870150**
Radius Blocks – 1/4" O.D. Tube*	**550579**
Radius Block – 3/8" O.D. Tube	**550581**
Radius Block – 1/2" O.D. Tube	**550582**
Radius Block – 5/8" O.D. Tube	**550583**
Radius Block – 3/4" O.D. Tube	**550584**
Radius Block – 1" O.D. Tube	**621047**
Radius Block – 1 1/4" O.D. Tube	**621049**
Radius Block – 1 1/2" O.D. Tube*	**870149**

* Items not shown in the photo, but which are included in the 424 Kit.



Fig. S17 — 424 Kit

Radius Blocks

For use with Exactol Models 412/424 benders.

The 412 and 424 bender radius blocks have built in tube clamps, therefore separate clamp blocks are not required. The radius blocks are interchangeable within bender size ranges. Close bend radius blocks utilize the small bend radii, but also allow the bend to begin closer to the end connection.

412 and 424 Bender – Small Radius Blocks

Size	Tube O.D. (in.)	Bend Radius (in.)	Part No.
4	1/4	9/16	**550573**
5	5/16	11/16	**550574**
6	3/8	15/16	**550575**
8	1/2	1 1/4	**550576**
10	5/8	1 1/2	**550577**
12	3/4	1 3/4	**550578**



Fig. S18 — Small Radius Block

412 and 424 Bender – Large Radius Blocks

Size	Tube O.D. (in.)	Bend Radius (in.)	Part No.
4	1/4	3/4	**550579**
5	5/16	1	**550580**
6	3/8	1 1/4	**550581**
8	1/2	2	**550582**
10	5/8	2 1/2	**550583**
12	3/4	3	**550584**
14	7/8	3 1/2	**621046**
16	1	4	**621047**
18	1 1/8	4 1/2	**621048**
20	1 1/4	5	**621049**
24	1 1/2	5	**870149**



Fig. S19 — Large Radius Block

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412 and 424 Bender – Close Bend Radius Blocks

Size	Tube O.D. (in.)	Bend Radius (in.)	Part No.
8	1/2	1 1/4	**590533**
10	5/8	1 1/2	**590535**
12	3/4	1 3/4	**590537**



Fig. S20 — Close Bend Radius Block

412 and 424 Bender – Metric Radius Blocks

Tube O.D. (mm)	Bend Radius (mm)	Part No.
6	14	**820090-6mm**
8	18	**820090-8mm**
10	24	**820090-10mm**
12	32	**820090-12mm**
14	38	**820090-14mm**
15	38	**820090-15mm**
16	38	**820090-16mm**
18	44	**820090-18mm**
20	44	**820090-20mm**
22	89	**820090-22mm**
25	102	**820090-25mm**
28	102	**820090-28mm**
30	127	**820090-30mm**
32	127	**820090-32mm**
35	127	**820090-35mm**
38	127	**870419**



Fig. S21 — Radius Block

Close Bend Adapters for Seal-Lok

These adapters are used when bends are needed close to the end of the tube after the flange has been made or the sleeve has been brazed onto the end of the tube.

HOW TO USE: Screw the Seal-Lok adapter into the internal thread* of the threaded pin on the radius block. Then attach the flanged or brazed tube by threading the tube nut to the Seal-Lok adapter on the radius block threaded pin.

* If the threaded pin does not have an internal thread, a new threaded pin is required.

Tube O.D. (in.)	Description	Part No.
1/2	Seal-Lok Adapter	**930421-8**
5/8	Seal-Lok Adapter	**930421-10**
3/4	Seal-Lok Adapter	**930421-12**
1	Seal-Lok Adapter	**930421-16**
1 1/4	Seal-Lok Adapter	**930421-20**
1 1/2	Seal-Lok Adapter	**930421-24**
1/2	Threaded Pin (for Close Bend Radius Blocks)	**930420-8**
5/8	Threaded Pin (for Close Bend Radius Blocks)	**930420-10**
3/4	Threaded Pin (for Close Bend Radius Blocks)	**930420-12**
1	Threaded Pin (for Close Bend Radius Blocks)	**930420-16**
1 1/4	Threaded Pin (for Close Bend Radius Blocks)	**930420-20**
1 1/2	Threaded Pin (for Close Bend Radius Blocks)	**930420-24**



Fig. S22 — Seal-Lok Close Bend Adapter

Dimensions and pressures for reference only, subject to change.

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Hydraulic Tube Bender Model HB632

Hydraulic power does the work in bending tube of all materials in sizes from 6 (3/8" O.D.) through size 32 (2" O.D.), 10mm through 50mm, with wall thicknesses as great as .188 for annealed steel, and pipe sizes from 3/8" through 1-1/2". See page S7 for wall thickness capabilities. The radius block, around which the tube is bent, is driven by a roller chain and sprocket powered by a cylinder and a separate hydraulic power unit.

Maximum bend angle is 180° with radii from 1 1/4" to 8". Close second bends can be performed in either direction. An adjustable stop controls the degree of bend to a maximum of 180° and is graduated in 1° increments. After the bend is completed and pressure is released, a spring returns the clamp arm to the zero starting position.

The clamp vise arm features a quick release speed screw for positioning the required clamp block. Each size of tube requires the proper sized radius block, clamp block and slide block.

Written instructions, a DVD and Bulletin 4391-B26 are included with each bender.

HB632 radius blocks, slide blocks and clamp blocks will work with the following benders as well: 624, 824, 832 and 848.

NOTE: For size 28 (1 3/4" O.D. tube) through 32 (2" O.D. tube) radius blocks, an adapter plate is required.

DIMENSIONS: L – 40" W – 11" H – 12"

COMPONENTS REQUIRED
Minimum components required are a Model HB632 Bender, hose assembly, hydraulic pump and a radius, slide and clamp block which match the tube/pipe O.D. to be bent.

Part Name	Part No.
Hydraulic Bender Model HB632 (without pump)	**631050**
Hydraulic Pump (10,000 psi, 110V AC)	**900085**
High Flow Hydraulic Pump (10,000 psi, 110V)	**974691**
Hose Assembly (3' long)	**910004**

One each of the following is required per tube O.D.:
Radius Block, Clamp Block, Slide Block.

Radius Block ..... See pages S13 – S15

INCH TUBE SIZES

Clamp Block (for -6)	**864266**
Clamp Block (for -8, -12, -16, -24)	**631092**
Clamp Block (for -10, -14, -18, -20)	**631093**
Clamp Block (for -28)	**027418-28**
Clamp Block (for -32)	**027418-32**
Slide Block (for -6)	**864276**
Slide Block (for -8, -12, -16, -24)	**520516**
Slide Block (for -10, -14, -18, -20)	**520518**
Slide Block (for -28)	**631063**
Slide Block (for -32)	**631066**

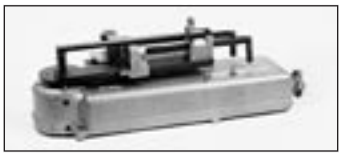


Fig. S23 — HB632



Fig. S24 — 900085 Pump



Fig. S25 — High Flow Pum



Fig. S26 — Clamp Block



Fig. S27 — Slide Block

Dimensions and pressures for reference only, subject to change.

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METRIC TUBE SIZES	Part No.
Clamp Block (for 10mm, 12mm, 14mm, 16mm)	**790017**
Clamp Block (for 15mm, 16mm, 18mm, 20mm)	**780195**
Clamp Block (for 22mm, 25mm, 30mm, 32mm)	**780196**
Clamp Block (for 35mm)	**974346**
Clamp Block (for 38mm)	**631092**
Clamp Block (for 42mm)	**974349**
Clamp Block (for 50mm)	**974352**
Slide Block (for 10mm, 12mm, 14mm, 16mm)	**790016**
Slide Block (for 15mm, 16mm, 18mm, 20mm)	**780192**
Slide Block (for 22mm, 25mm, 30mm, 32mm)	**780193**
Slide Block (for 35mm)	**974345**
Slide Block (for 38mm)	**520516**
Slide Block (for 42mm)	**974348**
Slide Block (for 50mm)	**974351**

INCH PIPE SIZES	
Clamp Block (for 3/8”, 1/2”, 3/4”)	**974332**
Clamp Block (for 1”)	**974338**
Clamp Block (for 1 1/4”)	**974341**
Clamp Block (for 1 1/2”)	**974343**
Slide Block (for 3/8”, 1/2”, 3/4”)	**974331**
Slide Block (for 1”)	**974336**
Slide Block (for 1 1/4”)	**974340**
Slide Block (for 1 1/2”)	**974342**

OPTIONAL ACCESSORIES

Radius Block Adapter Plate
(for sizes 1 1/2”, 38mm, 1 1/4 IPS and larger) **660221**

Mandrel Bending Components for HB632 ..... See pages S16 – S18

A video (on DVD) is included to provide proper instructions for use.



Fig. S28 — Radius Block Adapter Plate

Radius Blocks

For use with HB632 Bender

Radius blocks for every standard tube size from size 6 (3/8” O.D.) to size 32 (2” O.D.), 10mm through 50mm, and inch pipe sizes 3/8” through 1-1/2” are available.

AND10111 Standard Radius Blocks – Inch Sizes

Size	Tube O.D. (in.)	Radius (in.)	Part No.
6	3/8	1 1/4	**540502**
8	1/2	1 1/4	**530763**
10	5/8	1 1/2	**530764**
12	3/4	1 3/4	**530765**
14	7/8	2	**530766**
18	1 1/8	3 1/2	**530768**
24	1 1/2	5	**530770**
28	1 3/4	7	**631057-112***
32	2	8	**631060-128***

* Requires the use of Radius Block Adapter Plate, Part No. 660221.



Fig. S29 — Radius Block for use with HB632 Bender

MS33611 Standard Radius Blocks – Inch Sizes

Size	Tube O.D. (in.)	Radius (in.)	Part No.
6	3/8	1 1/8	**590512-18**
8	1/2	1 1/2	**590515-24**
10	5/8	1 7/8	**590518-30**
12	3/4	2 1/4	**590521-36**
14	7/8	2 5/8	**590523-42**
16	1	3	**590524-48**
18	1 1/8	3 3/8	**590526-54**
20	1 1/4	3 3/4	**590527-60**
24	1 1/2	4 1/2	**590530-72**

Radius Blocks – Metric Sizes

Tube O.D./ Size (mm)	Radius (mm)	Part No.
10	32	**810023**
12	32	**780175**
14	38	**780176**
15	38	**780177**
16	38	**780178**
18	44	**780179**
20	44	**780180**
22	89	**780181**
25	100	**780182**
30	128	**780183**
32	128	**780184**
35	105	**974344**
38	114	**590530-72**
42	128	**974347***

* Requires the use of Radius Block Adapter Plate, Part No. 660221.



Fig. S30 — Radius Block for use with HB632 Bender

Radius Blocks – Inch Pipe Sizes

Inch Pipe Size (in.)	Bend Radius (in.)	Part No.
3/8	2 1/4	**974325**
1/2	2 5/8	**974326**
3/4	3 1/4	**974327**
1	4	**974328**
1 1/4	5	**974329**
1 1/2	6	**974330***

* Requires the use of Radius Block Adapter Plate, Part No. 660221.

Close Bend Radius Blocks for HB632

These adapters are used when bends are needed close to the end of the tube after the flare has been made, ferrule has been pre-set, or flange has been made. For flared or Ferulok fittings, attach tube end by threading tube nut onto the radius block threaded pin. To use this block with Seal-Lok fittings, Close Bend Adapters for Seal-Lok must be used to attach the tube to the radius block.



Fig. S31 — Close Bend Radius Block

Close Bend Radius Blocks – Inch Sizes

Size (in.)	Tube O.D. (in.)	Radius (in.)	Part No.
8	1/2	1 1/4	**530597**
10	5/8	1 1/2	**530601**
12	3/4	1 3/4	**530605**
14	7/8	2	**530609**
16	1	3	**530613**
20	1 1/4	3 3/4	**530621**
24	1 1/2	5	**530625**

Close Bend Radius Blocks – Metric Sizes

Tube O.D./ Size (mm)	Radius (mm)	Thread Size	Part No.
12	32	3/4-16	**780185**
14	38	7/8-14	**780186**
15	38	7/8-14	**780187**
16	38	7/8-14	**780188**
18	44	1 1/16-12	**780189**
20	44	1 1/16-12	**780190**
38	127	1 7/8-12	**530625**

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Bender Table (With Locking Casters) for HB632

Sturdy, heavy all steel construction, strongly braced to keep bender, mandrel rod, and mandrel rod stop assembly rigidly aligned. All holes are pre-drilled at factory to accommodate the HB632 bender and rod stop assembly.

DIMENSION: H – 36” W – 30” L – 10’

NOTE: Table is supplied with locking casters for ease of mobility.



Fig. S32 — Bender Table (equipment not included)

Part No.
520515

Mandrel Bending Components

When bending thin wall tube it may be necessary to insert a mandrel into the tube to prevent excessive distortion or flattening. To accomplish such bending, a Mandrel, Mandrel Rod, and a Mandrel Rod Stop Assembly are required. The Rod Stop Assembly holds the end of the Mandrel Rod in proper alignment with the tube while the Mandrel, which is threaded onto the other end of the Mandel Rod, supports the tube on its I.D., thus preventing tube kinking or flattening during bending.

The following parts are required for mandrel bending with the 412 and 424 bender:

Part Name	Part No.
Mandrel Rod Stop Assembly	**550571**
Stop Assembly Adapter Riser (424 only)	**631154**
Mandrel Rods	See page S18
Mandrel	See page S18

The following parts are required for mandrel bending with the 632 bender:

Part Name	Part No.
Mandrel Rod Stop Assembly	**631141**
Mandrel Rods	See page S18
Mandrel	See page S18

Example:
Tube O.D.: 2”
Wall Thickness: 0.095”
Centerline Radius: 8”

Vertical Axis = $\frac{8”}{2”} = 4$

Horizontal Axis = $\frac{2”}{.095”} \approx 21$

Answer: Plug Mandrel required

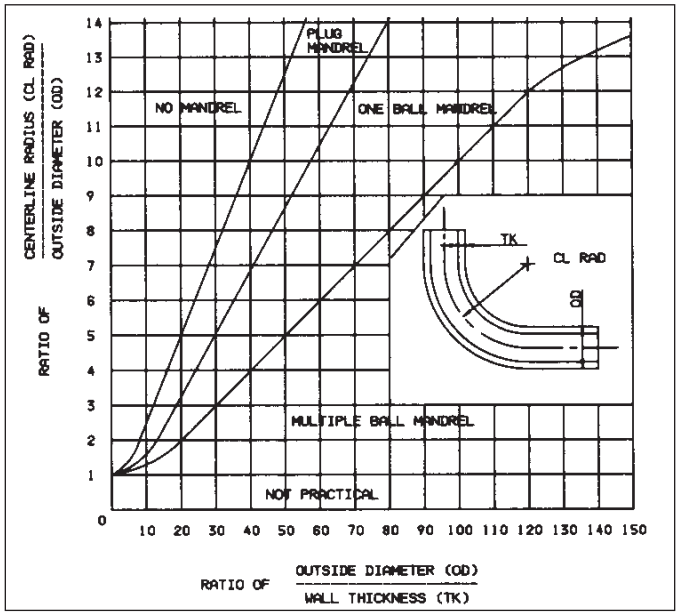


Fig. S33 — Mandrel Graph Chart

Dimensions and pressures for reference only, subject to change.

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Mandrels (Plug Type)

For use with Exactol Models 412, 424 and the HB632 benders. Mandrels ensure smooth bends without kinking, or wrinkling when bending thin-walled tube, or when making short-radius bends. Mandrels support the tube wall from the inside to keep it fully open for a smooth bend.

A rule that is generally followed to determine whether or not a mandrel is necessary is as follows: When the wall thickness of the tube to be bent is 7 percent or more of the tube O.D., a mandrel is usually not necessary. On wall thicknesses that range between 4-6 percent of the tube O.D., it is necessary to use a mandrel to avoid wrinkling and flattening in the bend area. This rule is based on a bend radii of between three and four times the tube O.D.

* See Fig. S33 for mandrel usage.

To order mandrel, specify tube O.D. and wall thickness.



Fig. S34 — Mandrel

Part Number Example: 924417-Size X Wall Thickness = **924417-12X058**

Size	END SIZE (in.)	Wall Thickness (in.)	(in.)	(in.)	(in.)	(in.)
6	3/8	—	0.035	0.042	—	—
8	1/2	—	0.035	0.042	0.049	—
10	5/8	0.035	0.042	0.049	—	—
12	3/4	0.035	0.042	0.049	0.058	0.065
14	7/8	0.035	—	0.049	0.058	0.065
16	1	0.035	0.042	0.049	0.058	0.065
18	1 1/8	—	0.042	0.049	—	0.065
20	1 1/4	—	0.049	—	0.065	0.095
24	1 1/2	0.049	0.058	0.065	0.083	—

Table S4 — Mandrel Sizes

Mandrel Rods

For use with the HB632 Model Bender and Exactol Models 412/424 benders. Mandrel rods (as well as a mandrel rod stop assembly) are required when using mandrels. Mandrel rod diameters are determined by tube I.D.

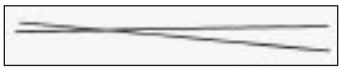


Fig. S35 — Mandrel Rods

Mandrel Rod Sizes

Mandrel Rod Dia. (in.)	Tube I.D. (in.)	Part No.
1/4	.283 to .362	**520506**
5/16	.363 to .484	**520507**
13/32	.485 to 1.489	**520508**
5/8	1.49 to 1.87	**520509**

Mandrel Rod Stop Assembly

For use with Model HB632 bender.

The Mandrel Rod Stop Assembly, when bolted to the end of a table opposite of the bender, keeps the mandrel rod in alignment with the tube when mandrel bending.

Part Name	Part No.
Mandrel Rod Stop Assembly (for bender Model HB632).....	**631141**



Fig. S36 — Mandrel Rod Stop Assembly /632

Mandrel Rod Stop Assembly

For use with Exactol 412/424 Model benders.

Part Name	Part No.
Mandrel Rod Stop Assembly	**550571**



Fig. S37 — Mandrel Rod Stop Assembly 412/424

Part Name	Part No.
Stop Assembly Adapter/Riser for 424.....	**631154**

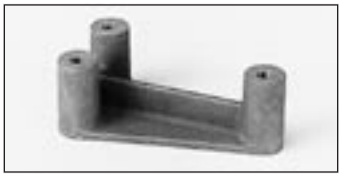


Fig. S38 — Stop Assembly Adapter/Riser

Universal Side Angle Indicator

For use with Model HB632 bender.

Accurately determines angle between tube bends in different planes. Keeps out of plane angles accurate, when making repeated bends. Large, easy-to-read vernier dial. Maximum 3/4" O.D. tube can be used if the tube must be extended through the indicator. Maximum 1 1/2" O.D. tube can be used if end of tube is held in clamp jaw.

Part No.
520520



Fig. S39 — Universal Side Angle Indicator

Visual Index

CP432 Tube and Pipe Bender

A 90 psi air supply does all the work for bending steel and stainless steel tube. This bender utilizes a center push bending method which is easy to master. Offered in an all inclusive kit. See Bulletin 4390-CP432 for more information. A separate accessory kit of tooling for bending 10mm through 50mm tube is also available. See page S20 for part number information.

	Part No.
	CP432



Fig. S40 — Bender Kit

REPLACEMENT COMPONENTS

Part Name	Part No.
Air/Hydraulic Pump	**PAT-1102N**
Hose Assembly	**975222**
Quick Coupler, Receptacle	**3050-3**
Quick Coupler, Nipple	**3010-3**
Hydraulic Cylinder	**RC-1010**
Radius Blocks	See below
Slide Blocks	See below



Fig. S41 — Pump

Radius Blocks for CP432 – Inch Sizes

Tube O.D. (in.)	Bend Radius (in.)	Part No.
1/4	9/16	**975179**
3/8	1 1/4	**975179**
1/2	1 1/2	**975179**
5/8	1 7/8	**975180**
3/4	2 1/4	**975180**
1	3	**975181**
1 1/4	3 3/4	**975182**
1 1/2	4 1/2	**975183**
2	8	**975184**



Fig. S42 — Multi-Size Tube Radius Block

Slide Blocks for CP432 (2 required) – Inch Sizes

Tube O.D. (in.)	Part No.
1/4	**975185**
3/8	**975185**
1/2	**975185**
5/8	**975186**
3/4	**975186**
1	**975187**
1 1/4	**975187**
1 1/2	**975188**
2	**975188**



Fig. S43 — Multi-Size Tube Slide Block

Radius Blocks for CP432 – Metric Tube Sizes

Tube O.D. (mm)	Bend Radius (mm)	Part No.
10	34	**976503-Block**
12	34	**976503-Block**
14	38	**976503-Block**
15	38	**976505**
16	38	**976505**
18	42	**976508**
20	42	**976508**
22	89	**976510**
25	100	**976510**
30	100	**976512**
32	100	**976515**
35	105	**976516**
38	114	**976517**
42	128	**976518**
50	200	**976519**



Fig. S44 — Typical Radius Block

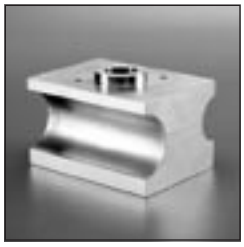


Fig. S45 — Typical Slide Block

Slide Blocks for CP432 (2 required) – Metric Tube Sizes

Tube O.D. (mm)	Part No.
10	**976504**
12	**976504**
14	**976504**
15	**976506**
16	**976506**
18	**976509**
20	**976509**
22	**976511**
25	**976511**
30	**976513**
32	**976513**
35	**976520**
38	**976520**
42	**976521**
50	**976521**

ACCESSORIES

Part Name	Part No.
Metric Tooling Kit (10-50mm)	**CP432-MM TOOL KIT**

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Braze Flux

Black braze flux can be used for brazing either steel or stainless steel components. When applied liberally this flux helps the flow of the silver braze alloy and prevents oxidation.

Part Name	Part No.
Black Flux	**Black Flux 1/2 lb**
Black Flux	**Black Flux 1 lb**



Fig. S46 — Braze Flux

Post Braze Cleaner

This cleaner is used to clean the assembly after brazing. Once the silver braze alloy has solidified, immediately immerse the joint into the braze cleaner solution. The cleaner combined with the sudden change in temperature removes the flux from the assembly. Braze cleaner does not provide corrosion protection. See "Corrosion Protection After Brazing" in the Assembly / Installation section, page T17.

Available in sizes 2 1/2 lb. and 5 lb. jars. When ordering simply denote quantity after Braze Cleaner.

Part Name	Part No.
Braze Cleaner	**Braze Cleaner 2 1/2 lb**
Braze Cleaner	**Braze Cleaner 5 lb**



Fig. S47 — Post Braze Cleaner

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Kloskut® Tube Cutters

These adjustable tube cutters are designed to produce square cut ends with no external burr and minimum internal burr when used on fully annealed copper, brass, aluminum, and steel tube. Both feature a hardened and burnished tool-steel cutting wheel, flare cut-off grooves in rollers for removal of old flares and a swing-away reamer for removing internal burrs. The handle feeds and adjusts the cutting wheel to uniformly cut tube as the cutter is rotated.

NOTE: Tube cutters are **not recommended** for use with stainless steel tube because of the work hardening effect. The use of a hacksaw with a "Tru-Kut" Sawing Vise or a rotary teeth saw is recommended for stainless steel.



Fig. S48 — 218B Medium Kloskut Tube Cutter

Medium Kloskut

Part Description	Part No.
Tube cutter for 1/8" to 1 1/8" O.D.	**218B**
Cutter Wheel for 218B	**218B Wheel**
Tube Reamer for 218B	**218B Reamer**
	218B Shaft



Fig. S49 — 1232 Large Kloskut Tube Cutter

Large Kloskut

Part Description	Part No.
Tube Cutter for 3/4" to 2" O.D.	**1232**
Cutter Wheel for 1232	**1232 Wheel**

Tru-Kut® Sawing Vise

This hacksaw guide will accommodate tube, pipe and hose from sizes 3 (3/16" O.D.) to 32 (2" O.D.), assuring square cut-offs within ± 1°. For use with a fine tooth hacksaw blade for smooth cuts.

HOW TO USE: Mount in a vise or bolt to a bench. Clamp tube, pipe or hose into the Tru-Kut vise and cut off; guide ensures accurate square cuts.

Part Description	Part No.
Tru-Kut Sawing Vise	**710439**



Fig. S50 — Sawing Vise

Cut-Off Saw

The 974250 Cut-Off Saw is designed to operate at low speed to prevent work hardening the tube end. The saw will assure a square cut on the tube with minimum burrs. The saw will cut 1/4" through 2 3/4" copper, brass, aluminum, steel and stainless steel tube. An adequate supply of cutting fluid is provided by an internal recirculating pump. The unit is designed for bench or stand mounting and operates on 110V, 15 amp power supply.

Part Description	Part No.
Cut-Off Saw	**974250**
Accessories	
Saw Base	**AGC10070**
Replacement Parts	
Cutting Lubricant (Approx. 1 gal. container)	**Saw Lube**
Saw Blade – 250 mm x 2.0 mm thick (all purpose)	**987036**
Saw Blade – 200 mm x 2.0 mm thick (all purpose)	**987037**



Fig. S51 — Cut-Off Saw (shown on Saw Base)

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

In-Ex® Tube Deburring Tool 226A

A quick twist of the wrist will deburr either the O.D. or the I.D. of the tube end. Parker's In-Ex deburrer can be used on annealed steel, stainless steel, copper and aluminum, for tube sizes 1/8" to 1 5/8" O.D.

Part Description	Part No.
In-Ex Deburring Tool	**226A**
Blades for 226A Tube Deburr Tool	**226A Blades**



Fig. S52 — 226A In-Ex Deburr Tool

Power Deburr Tool

The Parker Power Deburr Tool is designed for deburring the I.D. and O.D. of 1/4" through 2" steel, stainless steel, copper and aluminum tube. The lightweight unit incorporates a modular design which allows Parker's Cut-Off Saw, part number 974250, to be easily mounted on the top. The Power Deburr Tool requires 110V/10A power supply.

Dimensions: L – 20", W – 18", H – 9".

Part Description	Part No.
Power Deburr Tool	**972125**

Replacement Parts

I.D. Deburr Cone	**971816**
O.D. Deburr Blades (six blade set)	**910485**



Fig. S53 — Power Deburr Tool

Visual Index

Parflange® 1050

High-Speed Seal-Lok Flanging (ORFS) and 37° Flaring System

- Eliminates braze joint
- Minimum cleaning prior to and after flanging
- Flanges in only 20% of brazing time (5-8 sec, 15-20 sec full cycle time)
- Meets SAE J1453 performance requirements

Electrical Power: 440 volt / 3 phase, 60 Hz / 5.1 kw

Air Supply: 80 to 120 psi shop air

Dimensions: Height: 42 inches (1035mm)
Width: 28 inches (700mm)
Depth: 34 inches (840mm)

Weight: Basic Unit: 838 lbs. (380 kg.)
Automatic Sleeve Loader: 40 lbs. (18.1 kg.)
Individual Die: 4 lbs. (1.8 kg.)

Sleeve Loader Machine - also available - contact the division for details.

A DVD is included to provide instructions for proper use.
6 language instruction manual.



Fig. S54 — Parflange® 1050 Machine



Fig. S55 — Die



Fig. S56 — Pin

COMPONENTS REQUIRED

Part Name	Part No.
Parflange 1050	**1050**
Flanging Pin	See page S26
Flanging Die Set	See page S26
Flaring Pin	See page S33
Flaring Die Set	See page S33
Lubrication Fluid	**LB 2000**

OPTIONAL ACCESSORIES

Die Adjustment Shims	**Shim Kit**
1050 Machine with Automatic Sleeve Loader	**Contact Division for more information**

*Automatic Sleeve Loader is not available as an accessory

Some Key Features

- Flange/Flare 1/4”-1 1/2”, 6mm-38mm (dep. on wall thickness)
- Work Center Setup (Holds 10 die & pin sets)
- Uses Same Tooling as Parflange 1040
- 5-8 Sec. Flange/Flare time (15-20 Full Cycle)
- Transportation options - on wheels, by forklift, lifting attachments

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index

Parflange® 1025

Bench-Top Flanging and 37° Flaring System

Tooling must be ordered separately

- Eliminates braze joint
- Compact, lightweight design
- Bench mountable
- Easy to operate
- Uses same tooling as Parflange 1050
- Available in 110-volt single-phase or 440-volt 3-phase (please specify by ordering 1025/110 or 1025/440)
- Flanges or flares tube in less than 20 seconds
- For tube sizes 1/4" O.D. thru 1" O.D. (steel); and 1/4" O.D. thru 1" O.D. (stainless steel) – Flanging/flaring of tube sizes 1" & greater results in heavy machine vibration. Therefore, this machine is only recommended for occasional use for preparing tube ends 1" or larger. For efficient production of larger tube ends, use the Parflange 1050.

  Tooling is also available for comparable metric tube sizes.

Electrical Power: 110V/20A single-phase, or 440V/3-phase/2.1A

Power Cable Length: 8 feet long (2.5 meters)

Dimensions: Height: 18 1/8 inches (460mm)
Width: 15 3/8 inches (390mm)
Depth: 26 3/8 inches (670mm)

Weight: Basic Unit: 175 lbs. (80 kg.)
Each Die (typical): 4 lbs. (1.8 kg.)

Flanging Pin Lubrication Fluid: **LB2000**

See Bulletin 4390-1025A, 4390-1025 or 4390-B5-USA for more details.

A DVD is included to provide instructions for proper use.



Fig. S57 — Parflange® 1025 Machine

CAUTION: Extension cords are ***not*** recommended and could cause damage to the machine due to a lack of power supply.



Fig. S58 — Flanging Pin



Fig. S59 — Flanging Die Set



Fig. S60 — LB 2000

COMPONENTS REQUIRED

Part Name	Part No.
Parflange 1025	**1025/110**
Parflange 1025	**1025/440**
Flanging Pin	See page S26
Flanging Die Set	See page S26
Flaring Pin	See page S33
Flaring Die Set	See page S33
Lubrication Fluid	**LB 2000**
Die Adjustment Shims	**Shim Kit**

REPLACEMENT PART

Part Name	Part No.
Tube Stop	**1025/0281014**

OPTIONAL ACCESSORIES

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index

Inch and Metric Flanging Tooling for 1025 and 1050 Parflange Machines

Tube Size O.D. x Wall Thickness (in.)	Tooling for 90°/180° Tube Flanging			Available Flanging Tooling			
	Flange Pin and Die Set Part Number	Pin Part Number	Die Part Number	1040		1025	
				-S	-SS	-S	-SS
1/4 x .028	4004X028180	B4004X028180	M4004X028180	•		•	
1/4 x .035	4004X035180	B4004X035180	M4004X035180	•	•	•	•
1/4 x .049	4004X049180	B4004X049180	M4004X049180	•		•	
3/8 x .035	4006X035180	B4006X035180	M4006X035180	•	•	•	•
3/8 x .049	4006X049180	B4006X049180	M4006X049180	•	•	•	•
3/8 x .065	4006X065180	B4006X065180	M4006X065180	•	•	•	•
1/2 x .035	4008X035180	B4008X035180	M4008X035180	•	•	•	•
1/2 x .049	4008X049180	B4008X049180	M4008X049180	•	•	•	•
1/2 x .065	4008X065180	B4008X065180	M4008X065180	•	•	•	•
1/2 x .083	4008X083180	B4008X083180	M4008X083180	•	•	•	•
5/8 x .049	4010X049180	B4010X049180	M4010X049180	•	•	•	•
5/8 x .065	4010X065180	B4010X065180	M4010X065180	•	•	•	•
5/8 x .083	4010X083180	B4010X083180	M4010X083180	•	•	•	•
5/8 x .095	4010X095180	B4010X095180	M4010X095180	•	•	•	•
5/8 x .109	4010X109180	B4010X109180	M4010X109180	•		•	
5/8 x .120	4010X120180	B4010X120180	M4010X120180	•		•	
3/4 x .049	4012X049180	B4012X049180	M4012X049180	•	•	•	•
3/4 x .065	4012X065180	B4012X065180	M4012X065180	•	•	•	•
3/4 x .083	4012X083180	B4012X083180	M4012X083180	•	•	•	•
3/4 x .095	4012X095180	B4012X095180	M4012X095180	•	•	•	•
3/4 x .109	4012X109180	B4012X109180	M4012X109180	•	•	•	•
3/4 x .120	4012X120180	B4012X120180	M4012X120180	•	•	•	•
1 x .065	4016X065180	B4016X065180	M4016X065180	•	•	•	•
1 x .083	4016X083180	B4016X083180	M4016X083180	•	•	•	•
1 x .095	4016X095180	B4016X095180	M4016X095180	•	•	•	•
1 x .109	4016X109180	B4016X109180	M4016X109180	•	•	•	
1 x .120	4016X120180	B4016X120180	M4016X120180	•	•	•	
1 x .134	4016X134180	B4016X134180	M4016X134180	•	•	•	
1 x .148	4016X148180	B4016X148180	M4016X148180	•			
1 x .156	4016X156180	B4016X156180	M4016X156180	•			
1 x .188	4016X188180	B4016X188180	M4016X188180	•			
1 1/4 x .065	4020X065180	B4020X065180	M4020X065180	•		•	
1 1/4 x .083	4020X083180	B4020X083180	M4020X083180	•	•	•	
1 1/4 x .095	4020X095180	B4020X095180	M4020X095180	•	•	•	
1 1/4 x .109	4020X109180	B4020X109180	M4020X109180	•	•	•	
1 1/4 x .120	4020X120180	B4020X120180	M4020X120180	•	•	•	
1 1/4 x .134	4020X134180	B4020X134180	M4020X134180	•			
1 1/4 x .148	4020X148180	B4020X148180	M4020X148180	•			
1 1/4 x .156	4020X156180	B4020X156180	M4020X156180	•			
1 1/4 x .188	4020X188180	B4020X188180	M4020X188180	•			
1 1/2 x .065	4024X065180	B4024X065180	M4024X065180	•		•	
1 1/2 x .083	4024X083180	B4024X083180	M4024X083180	•		•	
1 1/2 x .095	4024X095180	B4024X095180	M4024X095180	•	•		
1 1/2 x .109	4024X109180	B4024X109180	M4024X109180	•			
1 1/2 x .120	4024X120180	B4024X120180	M4024X120180	•	•		
1 1/2 x .134	4024X134180	B4024X134180	M4024X134180	•			
1 1/2 x .148	4024X148180	B4024X148180	M4024X148180	•		•	
1 1/2 x .156	4024X156180	B4024X156180	M4024X156180	•			
1 1/2 x .188	4024X188180	B4024X188180	M4024X188180	•			
2 x .083	4032X083180	B4032X083180	M4032X083180	•			
2 x .095	4032X095180	B4032X095180	M4032X095180	•			
2 x .120	4032X120180	B4032X120180	M4032X120180	•			

Note: Use "-SS" suffix after part number for flanging tools for stainless steel tube. Contact the Tube Fittings Division for sizes and/or materials not listed, or for additional SS sizes released for limited use.

Table S5 — Pin & Die Part Numbers for Inch Sizes

Tube Size O.D. x Wall Thickness (mm)	Tooling for 90°/180° Tube Flanging		Available Flanging Tooling			
	Pin Part Number	Die Part Number	1040		1025	
			-S	-SS	-S	-SS
6 x 1	B4018006X1M	M4018006X1M	•		•	
6 x 1.5	B4018006X1.5M	M4018006X1.5M	•		•	
8 x 1	B4018008X1M	M4018008X1M	•		•	
8 x 1.5	B4018008X1.5M	M4018008X1.5M	•		•	
10 x 1	B4018010X1M	M4018010X1M	•		•	
10 x 1.5	B4018010X1.5M	M4018010X1.5M	•		•	
10 x 2	B4018010X2M	M4018010X2M	•		•	
12 x 1	B4018012X1M	M4018012X1M	•		•	
12 x 1.5	B4018012X1.5M	M4018012X1.5M	•	•	•	•
12 x 2	B4018012X2M	M4018012X2M	•		•	
15 x 1.5	B4018015X1.5M	M4018015X1.5M	•		•	
15 x 2	B4018015X2M	M4018015X2M	•		•	
16 x 1	B4018016X1M	M4018016X1M	•		•	
16 x 1.5	B4018016X1.5M	M4018016X1.5M	•		•	
16 x 2	B4018016X2M	M4018016X2M	•	•	•	•
16 x 2.5	B4018016X.5M	M4018016X2.5M	•		•	
18 x 1	B4018018X1M	M4018018X1M	•		•	
18 x 1.5	B4018018X1.5M	M4018018X1.5M	•		•	
18 x 2	B4018018X2M	M4018018X2M	•		•	
20 x 2	B4018020X2M	M4018020X2M	•	•	•	•
20 x 2.5	B4018020X2.5M	M4018020X2.5M	•		•	
20 x 3	B4018020X3M	M4018020X3M	•		•	
22 x 1.5	B4018022X1.5M	M4018022X1.5M	•		•	
22 x 2	B4018022X2M	M4018022X2M	•		•	
22 x 2.5	B4018022X2.5M	M4018022X2.5M	•		•	
22 x 3	B4018022X3M	M4018022X3M	•		•	
25 x 2	B4018025X2M	M4018025X2M	•		•	
25 x 2.5	B4018028X2.5M	M4018028X2.5M	•		•	
25 x 3	B4018030X2M	M4018030X2M	•		•	
25 x 3.5	B4018025X3.5M	M4018025X3.5M	•		•	
25 x 4	B4018025X4M	M4018025X4M	•			
28 x 2	B4018028X2M	M4018028X2M	•		•	
28 x 2.5	B4018028X2.5M	M4018028X2.5M	•		•	
30 x 2	B4018030X2M	M4018030X2M	•		•	
30 x 3	B4018030X3M	M4018030X3M	•		•	
30 x 3.5	B4018030X3.5M	M4018030X3.5M	•			
30 x 4	B4018030X4M	M4018030X4M	•			
32 x 3	B4018032X3M	M4018032X3M	•		•	
32 x 4	B4018032X4M	M4018032X4M	•			
35 x 3	B4018035X3M	M4018035X3M	•		•	
38 x 3	B4018038X3M	M4018038X3M	•			
38 x 4	B4018038X4M	M4018038X4M	•			
38 x 5	B4018038X5M	M4018038X5M	•			

1) Flanging tools (90°/180°) listed are for carbon steel tube. Contact the Tube Fittings Division for metric flanging tools for tube materials other than corbon steel or for sizes not listed.

Table S6 — Pin & Die Part Numbers for Metric Sizes

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index

Manual Flaring Tool Vise Block and Flaring Pin — Metric Tube

These 37° flaring tools are designed for use in a vise when flaring metric tube from 6mm O.D. to 38mm O.D.

From 20mm size tube and upward it is necessary to use a pre-flaring pin to start the flare.

- **Clamp tube flush in black halves**
- **Flare tube by hammering the flaring pin.**

A separate block and pin set is used for each tube size.



Fig. S61 — Vise Block

Pre-Flaring Pins

Tube O.D. (mm)	Part No.
20	PIE
25	PIE
30	PIE
32	PIE
38	PIE



Fig. S62 — Pre-Flaring Pins

Flaring Pins

Tube O.D. (mm)	Part No.
6	P17408
8	P17408
10	P17408
12	P17414
14	P17414
15	P17414
16	P17414
18	P17418
20	P17418
25	P17422
30	P17432
32	P17432
38	P17438



Fig. S63 — Flaring Pin

Vise Blocks

Tube O.D. (mm)	Part No.
6	M27406
8	M27408
10	M27410
12	M27412
14	M27414
15	M27415
16	M27416
18	M27418
20	M27420
25	M27425
30	M27430
32	M27432
38	M27438

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Rolo-Flair®

Manual Rotary Flaring Tool

(For soft metal tube)

Precision burnished 37° and 45° flares in tube sizes from 2 (1/8" O.D.) to 12 (3/4" O.D.) with an easy turn of the handle. For use with copper and aluminum alloys. A depth gauge allows proper positioning of tube for consistent flaring.

HOW TO USE: Open die, insert tube up to the gauge and clamp the tube in the die. Turn drive handle clockwise to flare, then counterclockwise for retracting flaring cone. Open clamping die by loosening wing nut and remove flared tube.



Fig. S64 — Rolo-Flair

Part Name	Part No.
Rolo-Flair for 37° flares (for 1/8", 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", O.D.)	**212FB**
Rolo-Flair for 45° flares (for 1/8", 3/16", 1/4", 5/16", 3/8", 1/2",5/8", 3/4", O.D.)	**945TH**

Combination Flarer

Part No. 210A

For 1/8", 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", O.D. tube.

The combination flarer is a 7-in-1 impact tool for flaring (37°) soft copper, aluminum and fully annealed steel tube, sizes 2 (1/8" O.D.) through 10 (5/8" O.D.). Maximum wall thickness: 1/8" to 3/8" is 15% of tube O.D., 1/2" and larger is 10% of tube O.D.

HOW TO USE: Insert tube into proper flare hole and fasten with clamping screw. Set hardened-steel flaring punch in tube and form flare with a few **sharp** hammer blows. (Tube should not project more than 1/16" above top of block.)



Fig. S65 — 210A Combination Flarer

Vise Block with Flaring Pin

These impact 37° flaring tools are for use with copper, aluminum alloy, and thin wall steel or stainless steel. Separate tool-ing set for each tube size 4 (1/4" O.D.) through 24 (1 1/2" O.D.). Maximum wall thickness: 1/8" to 3/8" is 15% of tube O.D., 1/2" and larger is 10% of tube O.D.

HOW TO USE: Clamp tube flush in matching halves of block in a bench vise. Give hardened steel flaring pin a few **sharp** blows with a hammer to form the flare.



Fig. S66 — Vise Block with Flaring Pin

Size	Tube O.D. (in.)	Part No.
4	1/4	**4-2866**
5	5/16	**5-2866**
6	3/8	**6-2866**
8	1/2	**8-2866**
10	5/8	**10-2866**
12	3/4	**12-2866**
14	7/8	**14-2866**
16	1	**16-2866**
20	1 1/4	**20-2866**
24	1 1/2	**24-2866**

Order vise block with flaring pin using part numbers above. The block and pin may be ordered separately by suffixing the part number with either Pin or Block.

Part Number Example:
4-2866 Block

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Visual Index

Hydra-Tool

Hydraulic Flaring And Pre-Setting Tool

Flaring

An efficient dependable device for 37° and 45° flaring of steel, stainless steel and copper tube. This task is made easy through hydraulic power provided by a hand or electric pump. The equipment is portable and easy to use.

This tool accommodates dies for tubes ranging in inch sizes from 4 through 32 (1/4" through 2" outside diameters) with wall thicknesses as great as .134", and metric sizes from 6mm through 50mm. The hydraulic "push" of the Hydra-Tool flares the tube to a 37° flare angle. A gauge can be provided to enable the operator to determine the pressure required to adequately flare any given material and wall thickness of the tube. Complete instructions are included with the Hydra-Tool. See bulletin 4392-B10. See the following for Hydra-Tool basic unit or kit, and choice of power sources and necessary tooling.

NOTE: Flaring die sets and other tooling are available in non-standard sizes upon request from the factory.

See Appendix for flaring pressures.

A video (on DVD) is included to provide instructions for proper use.



Fig. S67 — Hydra-Tool



Fig. S68 — Electric Pump



Fig. S69 — Hand Pump



Fig. S70 — Flaring Cone



Fig. S71 — Die Ring



Fig. S72 — Die Retainer



Fig. S73 — Carrying Case

COMPONENTS REQUIRED

Part Name	Part No.
Hydra-Tool (basic unit)	**710400B**
Hydra-Tool Male Adapter	**6-8 F5OLO-S**
"T" Adapter for Gauge	**6 R6LO-S**
Hose Assembly (for hand or electric pumps)	**910004**
Adapter for Gauge	**6 G6L-S**
Pressure Gauge (0 - 10,000 psi)	**900044**
Electric Hydraulic Pump (10,000 psi; 1/2 hp; 40-125 volt)	**900085**
Hand Hydraulic Pump (10,000 psi; 2 speed)	**900086**
Die Ring (1/4" - 1 1/4") (6mm - 32mm)	**710416A**
Die Ring (1 1/2" - 2") (35mm - 50mm)	**710412**
37° Flaring Cone (1/4" - 1 1/4") (6mm - 32mm)	**710419**
37° Flaring Cone (1 1/2" - 2") (35mm - 50mm)	**710411**
Die Retainer Assembly (1/4" - 1 1/4") (6mm - 32mm)	**710424-1**
Die Retainer Assembly (1 1/2" - 2") (35mm - 50mm)	**710424-2**
Flaring Die Sets	See pages S30 – S31
Lubricant	**STP***
45° Flaring Cone (1/4" - 1")	**910312**

*STP Lubricant is the only lubricant recommended for use with Hydra-Tool.

REPLACEMENT PART

Part Name	Part No.
Tube Stop Assembly	**710420B**

OPTIONAL ACCESSORIES

Part Name	Part No.
Hydra-Tool Carrying Case Sturdy wood case for Hydra-Tool and tooling. (Hydra-Tool kit is shipped in this carrying case.)	**720377**

Dimensions and pressures for reference only, subject to change.

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Hydra-Tool 37° Flaring Die Sets for Steel – Inch

Size	Tube O.D. (in.)	Part No.
4	1/4	**710417-4**
5	5/16	**710417-5**
6	3/8	**710417-6**
8	1/2	**710417-8**
10	5/8	**710417-10**
12	3/4	**710417-12**
14	7/8	**710417-14**
16	1	**710417-16**
20	1 1/4	**710417-20**
24	1 1/2	**710415-24**
32	2	**710415-32**



Fig. S74 — Flaring Die Set

Hydra-Tool 37° Flaring Die Sets for Stainless Steel – Inch

Size	Tube O.D. (in.)	Part No.
4	1/4	**710417-4 SS**
5	5/16	**710417-5 SS***
6	3/8	**710417-6 SS**
8	1/2	**710417-8 SS**
10	5/8	**710417-10 SS**
12	3/4	**710417-12 SS**
14	7/8	**710417-14 SS***
16	1	**710417-16 SS**
20	1 1/4	**710417-20 SS**
24	1 1/2	**710415-24 SS**
32	2	**710415-32 SS**

* Non-standard.

Hydra-Tool 37° Flaring Die Sets – Metric

Tube O.D./ Size (mm)	Part No.
6	**770106-6**
8	**770106-8**
10	**770106-10**
12	**770106-12**
15	**770106-15**
16	**770106-16**
18	**770106-18**
20	**770106-20**
22	**770106-22**
25	**770106-25**
28	**770106-28**
30	**770106-30**
32	**770106-32**
35	**770095-35**
38	**770095-38**
42	**770095-42**
50	**770095-50**

Hydra-Tool 45° Flaring Die Sets – Inch

Size	Tube O.D. (in.)	Part No.
4	1/4	**977420-4**
6	3/8	**977420-6**
8	1/2	**977420-8**
10	5/8	**977420-10**
12	3/4	**977420-12**
14	7/8	**977420-14**
16	1	**977420-16**

Hydra-Tool Kit

Part Name	Part No.
Hydra-Tool Kit (for use with electric or hand pump) Includes basic unit, gauge, Hydra-Tool connector, lubricant, adapter, carrying case, hose assembly, operation manual and video.	**720370B-3**



Fig. S75— Hydra-Tool Kit

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Karryflare Portable Flaring Machine

The Karryfare is a portable flaring machine that is designed for fabricating 37 degree tube flares. It's lightweight, portable, and is capable of flaring 1/4" through 1-1/2" (6mm-38mm) steel & stainless steel tubing. It's telescopic handle and wheeled carrying case allows it to be easily transported from one work site location to another.

Part Name	Part No.
Karry Flare	**KarryFlare**

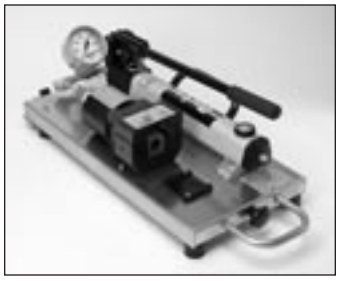


Fig. S76 — KarryFlare

Hydraulic power is generated by a hand operated pump. A pressure gauge is provided which enables the operator to review the necessary pressure requirements for proper flaring of their specific tubing requirements (operating pressures are specific to the tubes O.D. and wall thickness). The complete unit is mounted on a wheeled base plate, with telescopic handle, and includes 37° cone and case cover.

Dimensions: H – 10" W – 14" L – 30"

Application range

The Karryflare machine is capable of flaring tube from 1/4" O.D. to 1 1/2" O.D. or from 6mm O.D. to 38mm O.D.



Fig. S77 — Flaring Die Set

FLARING COMPONENTS

Part Name	Part No.
Replacement 37° Flaring Cone	**Karryflare/FPIN**
37° Flaring Die Sets	See below

Tube Die Sets – Inch

Tube O.D. (in.)	Part No.
1/4	**M 047415-1**
5/16	**M 157408-1**
3/8	**M 067415-1**
1/2	**M 087415**
5/8	**M 107415**
3/4	**M 127415**
1	**M 167415**
1 1/4	**M 207415**
1 1/2	**M 157438**

Tube Die Sets – Metric

Tube O.D. (mm)	Part No.
6	**M 157406-1**
8	**M 157408-1**
10	**M 157410-1**
12	**M 157412**
14	**M 157414**
15	**M 157415**
16	**M 157416**
18	**M 157418**
20	**M 157420**
25	**M 157425**
30	**M 157430**
32	**M 157432**
38	**M 157438**



Fig. S78 — Parflange 1025

Parflange® 1025 and Parflange® 1050 37° Flaring and Flanging Systems

Parker's Parflange 1025 and 1050 machines are designed to create 37° flared tube ends. For more detailed information, refer to pages S24 and S25. See page S33 for flaring tool part numbers.



Fig. S79 — Parflange 1050

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Inch and Metric Flaring Tooling for 1025 and 1050 Parflange Machines

Tube Size O.D. x Wall Thickness (in.)	Tooling for 37°/74° Tube Flaring		Available Flaring Tooling			
	Pin Part Number	Die Part Number	1040 -S	1040 -SS	1025 -S	1025 -SS
1/4 x .020	B4004X020074	M4004074	•	•	•	•
1/4 x .028	B4004X028074	M4004074	•	•	•	•
1/4 x .035	B4004X035074	M4004074	•	•	•	•
1/4 x .049	B4004X049074	M4004074	•	•	•	•
1/4 x .065	B4004X065074	M4004074	•	•	•	•
3/8 x .020	B4006X020074	M4006074	•	•	•	•
3/8 x .028	B4006X028074	M4006074	•	•	•	•
3/8 x .035	B4006X035074	M4006074	•	•	•	•
3/8 x .049	B4006X049074	M4006074	•	•	•	•
3/8 x .065	B4006X065074	M4006074	•	•	•	•
1/2 x .028	B4008X028074	M4008074	•	•	•	•
1/2 x .035	B4008X035074	M4008074	•	•	•	•
1/2 x .049	B4008X049074	M4008074	•	•	•	•
1/2 x .065	B4008X065074	M4008074	•	•	•	•
1/2 x .083	B4008X083074	M4008074	•	•	•	•
5/8 x .035	B4010X035074	M4010074	•	•	•	•
5/8 x .049	B4010X049074	M4010074	•	•	•	•
5/8 x .065	B4010X065074	M4010074	•	•	•	•
5/8 x .083	B4010X083074	M4010074	•	•	•	•
5/8 x .095	B4010X095074	M4010074	•	•	•	•
3/4 x .035	B4012X035074	M4012074	•	•	•	•
3/4 x .049	B4012X049074	M4012074	•	•	•	•
3/4 x .065	B4012X065074	M4012074	•	•	•	•
3/4 x .083	B4012X083074	M4012074	•	•	•	•
3/4 x .095	B4012X095074	M4012074	•	•	•	•
3/4 x .109	B4012X109074	M4012074	•	•	•	•
1 x .035	B4016X035074	M4016074	•	•	•	•
1 x .049	B4016X049074	M4016074	•	•	•	•
1 x .065	B4016X065074	M4016074	•	•	•	•
1 x .083	B4016X083074	M4016074	•	•	•	•
1 x .095	B4016X095074	M4016074	•	•	•	•
1 x .109	B4016X109074	M4016074	•	•	•	•
1 x .120	B4016X120074	M4016074	•	•	•	•
1 1/4 x .049	B4020X049074	M4020074	•	•	•	•
1 1/4 x .065	B4020X065074	M4020074	•	•	•	•
1 1/4 x .083	B4020X083074	M4020074	•	•	•	•
1 1/4 x .095	B4020X095074	M4020074	•	•	•	•
1 1/4 x .109	B4020X109074	M4020074	•	•	•	•
1 1/4 x .120	B4020X120074	M4020074	•	•	•	•
1 1/2 x .065	B4024X065074	M4024074	•	•	•	•
1 1/2 x .083	B4024X083074	M4024074	•	•	•	•
1 1/2 x .095	B4024X095074	M4024074	•	•	•	•
1 1/2 x .109	B4024X109074	M4024074	•	•	•	•
1 1/2 x .120	B4024X120074	M4024074	•	•	•	•

Tooling suitable for 37°/74° flaring of steel, stainless steel, aluminum, monel, copper, and cupro-nickel tube materials. For 37°/74° flaring, one die covers each tube O.D.; a different pin is required for each tube wall. Setscrews in flaring dies may require slight adjustment for different tube materials and/or tube walls.

Table S7 — Parflange Flaring Tooling for Inch Sizes

Tube Size O.D. x Wall Thickness (mm)	Tooling for 37°/74° Tube Flaring		Available Flaring Tooling			
	Pin Part Number	Die Part Number	1040 -S	1040 -SS	1025 -S	1025 -SS
6 x 1	B4007406X1M	M4007406M	•	•	•	•
6 x 1.5	B4007406X1.5M	M4007406M	•	•	•	•
8 x 1	B4007408X1M	M4007408M	•	•	•	•
8 x 1.5	B4007408X1.5M	M4007408M	•	•	•	•
10 x 1	B4007410X1M	M4007410M	•	•	•	•
10 x 1.5	B4007410X1.5M	M4007410M	•	•	•	•
12 x 1.5	B4007412X1.5M	M4007412M	•	•	•	•
12 x 2	B4007412X2M	M4007412M	•	•	•	•
15 x 1.5	B4007415X1.5M	M4007415M	•	•	•	•
15 x 2	B4007415X2M	M4007415M	•	•	•	•
16 x 1.5	B4007416X1.5M	M4007416M	•	•	•	•
16 x 2	B4007416X2M	M4007416M	•	•	•	•
18 x 2	B4007418X2M	M4007418M	•	•	•	•
20 x 2	B4007420X2M	M4007420M	•	•	•	•
20 x 2.5	B4007420X2.5M	M4007420M	•	•	•	•
25 x 2	B4007425X2M	M4007425M	•	•	•	•
25 x 2.5	B4007425X2.5M	M4007425M	•	•	•	•
25 x 3	B4007425X3M	M4007425M	•	•	•	•
30 x 2.5	B4007430X2.5M	M4007430M	•	•	•	•
30 x 3	B4007430X3M	M4007430M	•	•	•	•
32 x 3	B4007432X3M	M4007432M	•	•	•	•
38 x 3	B4007438X3M	M4007438M	•	•		•
38 x 4	B4007438X4M	M4007438M	•	•		

Tooling suitable for 37°/74° flaring of steel, stainless steel, aluminum, monel, copper, and cupro-nickel tube materials. Apply LB 2000 lube to flaring pin. Setscrews in flaring dies may require slight adjustment for different tube materials and/or tube walls.

Table S8 — Parflange Flaring Tooling for Metric Sizes



Fig. S80 — Flaring Pin



Fig. S81— Flaring Die

Dimensions and pressures for reference only, subject to change.

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SAE Straight Thread Port Tapping Tools

Taps are available for SAE J1926-1 female straight thread ports in sizes 2 through 32. Taps are bottoming type and made from high speed tool steel.



Fig. S82 — SAE Straight Thread Port Tapping Tool

SAE Dash Size	Overall Length (in.)	Shank Dia. (in.)	Wrench Flat Size (in.)	Part No.
2	2 23/32	0.318	0.238	**5/16X24 UNF-2B**
3	2 15/16	0.381	0.286	**3/8X24 UNF-2B**
4	3 5/16	0.323	0.242	**7/16X20 UNF-2B**
5	3 3/8	0.367	0.275	**1/2X20 UNF-2B**
6	3 19/32	0.429	0.322	**9/16X18 UNF-2B**
8	4 1/4	0.590	0.442	**3/4X16 UNF-2B**
10	4 11/16	0.697	0.523	**7/8X14 UNF-2B**
12	5 1/8	0.896	0.672	**1 1/16X12 UNF-2B**
14	5 7/16	1.021	0.766	**1 3/16X12 UNF-2B**
16	5 3/4	1.108	0.831	**1 5/16X12 UNF-2B**
20	6 11/16	1.305	0.979	**1 5/8X12 UNF-2B**
24	7 5/16	1.519	1.139	**1 7/8X12 UNF-2B**
32	8 3/4	2.100	1.575	**2 1/2X12 UNF-2B**

SAE Straight Thread Port Counterboring Tools

Parker offers counterboring tools for SAE J1926-1 female straight thread ports in sizes 2 through 32. Counterbores are 4-fluted high speed tool steel.



Fig. S83 — SAE Straight Thread Port Counterboring Tool

SAE Dash Size	Shank Dia. (in.)	Shank Length (in.)	Overall Length (in.)	Recommended Pilot Drill or Bore Size (in.)	Part No.
2	1/2	1 1/2	2 1/2	0.266	**Y-34730**
3	1/2	1 1/2	2 1/2	0.328	**Y-34731**
4	1/2	1 1/2	2 41/64	0.377	**Y-34732**
5	1/2	1 1/2	2 41/64	0.438	**Y-34733**
6	3/4	1 1/2	2 47/64	0.500	**Y-34734**
8	3/4	1 1/2	2 53/64	0.672	**Y-34735**
10	1	2	3 29/64	0.797	**Y-34736**
12	1	2	3 19/32	0.969	**Y-34737**
14	1	2	3 41/64	1.095	**Y-34738**
16	1	2	3 41/64	1.220	**Y-34739**
20	1 1/2	2	3 37/64	1.530	**Y-34740**
24	1 1/2	2	3 37/64	1.780	**Y-34741**
32	1 1/2	2	3 49/64	2.405	**Y-34743**

*** See Appendix for recommended use of port tools.**

Dimensions and pressures for reference only, subject to change.

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BSPP Straight Thread Port Counterboring Tools*

Parker offers counterboring/spotfacing tools for DIN 3852-1 female straight thread port connections in sizes 1/8" through 2". Counterbores are carbide tipped.

Size	Shank Dia. (in.)	Shank Length (in.)	Overall Length (in.)	Part No.
G1/8	1/2	1 1/2	2 1/2	**974094-G1/8**
G1/4	1/2	1 1/2	2 1/2	**974094-G1/4**
G3/8	3/4	1 1/2	2 1/2	**974094-G3/8**
G1/2	3/4	2	3	**974094-G1/2**
G3/4	1	2	3	**974094-G3/4**
G1	1	2	3 1/2	**974094-G1**
G1-1/4	1 1/2	2	3 1/2	**974094-G1-1/4**
G1-1/2	1 1/2	2	3 1/2	**974094-G1-1/2**



Fig. S84 — BSPP Straight Thread Port Counterboring Tool

BSPP Straight Thread Tapping Tools*

BSPP taps are available for ISO 228-1 threaded connections in sizes 1/8" through 1 1/2". All taps are bottoming type manufactured from high speed steel.

Size	Shank Dia. (in.)	Overall Length (in.)	Thread Size	Part No.
G1/8	0.438	2 1/8	1/8-28	**974242-G1/8**
G1/4	0.563	2 7/16	1/4-19	**974242-G1/4**
G3/8	0.700	2 9/16	3/8-19	**974242-G3/8**
G1/2	0.688	3 1/8	1/2-14	**974242-G1/2**
G3/4	0.906	3 1/4	3/4-14	**974242-G3/4**
G1	1.125	3 3/4	1-11	**974242-G1**
G1-1/4	1.313	4	1 1/4-11	**974242-G1-1/4**
G1-1/2	1.500	4 1/4	1 1/2-11	**974242-G1-1/2**



Fig. S85 — BSPP Straight Thread Tapping Tool

BSPT Taper Pipe Thread Tapping Tools*

BSPT taps are available for ISO 7-1 taper thread connections in sizes 1/8" through 1 1/2". All taps are bottoming type manufactured from high speed steel.

Size	Shank Dia. (in.)	Overall Length (in.)	Thread Size	Part No.
R1/8	0.438	2 1/8	1/8-28	**974243-R1/8**
R1/4	0.563	2 7/16	1/4-19	**974243-R1/4**
R3/8	0.700	2 9/16	3/8-19	**974243-R3/8**
R1/2	0.688	3 1/8	1/2-14	**974243-R1/2**
R3/4	0.906	3 1/4	3/4-14	**974243-R3/4**
R1	1.125	3 3/4	1-11	**974243-R1**
R1-1/4	1.313	4	1 1/4-11	**974243-R1-1/4**
R1-1/2	1.500	4 1/4	1 1/2-11	**974243-R1-1/2**



Fig. S86 — BSPT Taper Pipe Thread Tapping Tool

*** See Appendix for recommended use of port tools.**

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NPTF Thread Tapping Tools*

NPTF taps are available for taper pipe thread connections in sizes 1/8" through 1 1/2". All taps are bottoming type manufactured from high speed steel.



Fig. S87 — NPTF Port Tap

Shank Dia. (in.)	Overall Length (in.)	Thread Size	Part No.
0.438	2 1/8	1/8-27	**974244-1/8**
0.563	2 7/16	1/4-18	**974244-1/4**
0.700	2 9/16	3/8-18	**974244-3/8**
0.688	3 1/8	1/2-14	**974244-1/2**
0.906	3 1/4	3/4-14	**974244-3/4**
1.125	3 3/4	1-11 1/2	**974244-1**
1.313	4	1 1/4-11 1/2	**974244-1-1/4**
1.500	4 1/4	1 1/2-11 1/2	**974244-1-1/2**

ISO 6149-1 Straight Thread Port Tapping Tools*

ISO 6149-1 female straight thread port taps are available for M8 to M48 port sizes. Taps are bottoming type and made from high speed steel.



Fig. S88 — ISO 6149-1 Straight Thread Port Tap

Overall Length (in.)	Shank Dia. (in.)	Wrench Flat Size (in.)	Thread Size	Part No.
2 23/32	0.318	0.238	M8x1	**M8X1**
2 15/16	0.381	0.286	M10x1	**M10X1-6H**
3 3/8	0.367	0.275	M12x1.5	**M12X1.5-6H TAP**
3 19/32	0.429	0.322	M14x1.5	**M14X1.5-6H-TAP**
3 13/16	0.400	0.360	M16x1.5	**M16X1.5-6H-TAP**
4 1/32	0.542	0.406	M18x1.5	**M18X1.5-6H-TAP**
4 11/16	0.697	0.523	M22x1.5	**M22X1.5-6H-TAP**
5 1/8	0.896	0.672	M27x2	**M27X2-6H-TAP**
5 3/4	1.108	0.831	M33x2	**M33X2-6H-TAP**
7	1.430	1.072	M42x2	**M42X2-6H-TAP**
7 5/8	1.644	1.233	M48x2	**M48X2-6H-TAP**

ISO 6149-1 Straight Thread Port Counterbore* Tool

See page (S37)

ISO 6149-1 Straight Thread Port Counterbore* Tool w/I.D. Groove

See page (S37)

*** See Appendix for recommended use of port tools.**

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ISO 6149-1 Straight Thread Port Counterboring Tools — Small Spotface

ISO 6149-1 female straight thread port counterboring tools are available with small spotface for M8 to M48 port sizes. Counterbores are 4-fluted*, carbide-tipped.



Fig. S89 — ISO 6149-1 Straight Thread Port Counterboring Tool — Small Spotface

Shank Dia. (in.)	Shank Length (in.)	Overall Length (in.)	Recommended Pilot Drill or Bore Size (in.)	Use with Thread Size	Part No.
1/2	2	4 1/8	0.272	M8x1*	**R1449B**
1/2	2	4 1/8	0.348	M10x1*	**R1450B**
1/2	2	4 1/8	0.406	M12x1.5	**R 1451B-S**
1/2	2	4 1/8	0.484	M14x1.5	**R 1452B-S**
1/2	2	4 1/8	0.563	M16x1.5	**R 1453B-S**
1/2	2	4 1/8	0.641	M18x1.5	**R 1454B-S**
1/2	2	4 1/8	0.797	M22x1.5	**R 1455B-S**
3/4	2 1/2	5	0.969	M27x2	**R 1456B-S**
3/4	2 1/2	5	1.210	M33x2	**R 1457B-S**
3/4	2 1/2	5	1.565	M42x2	**R 1458B-S**
3/4	2 1/2	5	1.801	M48x2	**R1459B**

* M8 and M10 are 3-fluted

ISO 6149-1 Straight Thread Port Counterboring Tools with ID Groove

ISO 6149-1 female straight thread port counterboring tools are available with identification groove for M8 to M48 port sizes. Counterbores are 4-fluted*, carbide-tipped.



Fig. S90 — ISO 6149-1 Straight Thread Port Counterboring Tool with ID Groove

Shank Dia. (in.)	Shank Length (in.)	Overall Length (in.)	Recommended Pilot Drill or Bore Size (in.)	Use with Thread Size	Part No.
1/2	2	4 1/8	0.348	M10x1*	**R1450A**
1/2	2	4 1/8	0.406	M12x1.5	**R1451A**
1/2	2	4 1/8	0.484	M14x1.5	**R1452A**
1/2	2	4 1/8	0.563	M16x1.5	**R1453A**
1/2	2	4 1/8	0.641	M18x1.5	**R1454A**
1/2	2	4 1/8	0.797	M22x1.5	**R1455A**
3/4	2 1/2	5	0.969	M27x2	**R1456A**
3/4	2 1/2	5	1.210	M33x2	**R1457A**

* M10 are 3-fluted

*** See Appendix for recommended use of port tools.**

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Ferulset® Pre-Setting Tool

For Ferulok® flareless tube fittings.

Ferulset provides a fast and easy way to manually pre-set the ferrule onto steel and stainless steel tube with the famous Ferulok “bite.” Ferulset bodies are manufactured from hardened steel for withstanding repeated pre-sets. A separate tool is required for each size tube; size 2 (1/8” O.D.) through size 32 (2” O.D.).

HOW TO USE: Lubricate threads on tool, threads on nut, as well as tail and lead ends of ferrule with a suitable lubricant such as STP. Insert tube end with ferrule into tool until it bottoms against shoulder and thread the nut down until finger tight. Light wrenching may be required to get to a consistent starting position, especially with larger sizes. Hold tube steady against internal shoulder and tighten nut 1-3/4 turns. Loosen nut and inspect bite using inspection criteria outlined for Ferulok in the Assembly / Installation section.



Fig. S91 — Ferulset®

Size	Tube O.D. (in.)	Part No.
2	1/8	**560576**
3	3/16	**560577**
4	1/4	**560578**
5	5/16	**560579**
6	3/8	**560580**
8	1/2	**560581**
10	5/8	**560582**
12	3/4	**560583**
14	7/8	**560584**
16	1	**560585**
20	1 1/4	**560586**
24	1 1/2	**560587**
32	2	**560589**

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VOMO Pre-Assembly Bodies

For "EO" and "EO-2" Flareless Metric Tube Fittings

VOMO tools are made of hardened tool-steel, for standard assembly of steel fittings, stainless steel fittings and hose standpipes (BE).

Refer to the EO/EO2 Assembly and Installation section for use information

NOTE: It is strongly recommended that a hydraulic tool be used to preset EO-2 fittings in sizes 30S, 35L, 38S and 42L.



Fig. S92 — VOMO Pre-Assembly Tool

Series	Tube O.D. (mm)	Part No.
LL	4	**VOMO04LLX**
LL	6	**VOMO06LLX**
LL	8	**VOMO08LLX**
LL	10	**VOMO10LLX**
LL	12	**VOMO12LLX**
L	6	**VOMO06LX**
L	8	**VOMO08LX**
L	10	**VOMO10LX**
L	12	**VOMO12LX**
L	15	**VOMO15LX**
L	18	**VOMO18LX**
L	22	**VOMO22LX**
L	28	**VOMO28LX**
L	35	**VOMO35LX**
L	42	**VOMO42LX**
S	6	**VOMO06SX**
S	8	**VOMO08SX**
S	10	**VOMO10SX**
S	12	**VOMO12SX**
S	14	**VOMO14SX**
S	16	**VOMO16SX**
S	20	**VOMO20SX**
S	25	**VOMO25SX**
S	30	**VOMO30SX**
S	38	**VOMO38SX**

User instructions located on page T28.

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Hyferset

Parker Hydraulic Ferrule Pre-Setting Tool for Ferulok® Fittings and EO/EO-2 Metric Fittings

PORTABLE...EFFICIENT...EASY TO USE

The Hyferset is an efficient, dependable device for pre-setting Parker ferrules on tube of steel and stainless steel. This task is made easy through hydraulic power provided by a hand or electric pump. The equipment is portable, and has an optional sturdy wood carrying case.

In hydraulic pre-setting, little physical strength is required by the operator to set ferrules properly. Although the amount of force needed increases as the ferrule size increases, the pressure can be easily achieved.

This tool accommodates pre-setting dies for tubes ranging in size from 4 through 32 (1/4" through 2" outside diameter) and 6mm to 28mm O.D. metric sizes. The tube, with tube nut and ferrule, is positioned in the die. The hydraulic "push" of the Hyferset pre-sets the ferrule onto the tube — producing a visible ridge of metal, in front of the sleeve bite edge, that can be easily inspected.

Positive Stop Body Dies (For Ferulok Fittings Only)

The positive stop body die design eliminates the need for predetermined relief valve settings, pressure gauges or chart reading. Positive stop feature allows for uniform assemblies to be made on tube from 1/4" thru 2". One set of dies can be used on both steel and stainless steel tube. When used in conjunction with the Ferulok visible bite ferrules, the entire system is the most reliable method available for assembling a fitting to a piece of tube.

See Appendix for pre-setting pressures for EO and EO-2 steel fittings.

A video (on DVD) is included to provide instructions for proper use.



Fig. S93 — Hyferset



Fig. S94 — Electric Pump



Fig. S95 — Hand Pump

COMPONENTS REQUIRED

Part Name	Part No.
Hyferset (basic unit, no accessories)	**611011A**
Hyferset Adapter	**6 FLO-S**
Gauge "T" Adapter	**6 R6LO-S**
Hose Assembly	**910004**
Gauge Swivel Adapter	**6 G6L-S**
Pressure Gauge (0 - 10,000 psi)	**900044**
Hand pump (10,000 psi, 2 speed)	**900086**
Electric pump (10,000 psi, 1/2 HP, 40-125 volt)	**900085**
Nut die set (1/4" to 2" O.D.)	See page S41
Positive Stop body die (1/4" to 2" O.D.)	See page S41
Nut Die Set (6mm to 28mm)	See page S42
Body Die (6mm to 28mm)	See page S42

Dimensions and pressures for reference only, subject to change.

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OPTIONAL ACCESSORIES

Part Name	Part No.
Wooden carrying case	**651085**



Fig. S96 — Hyferset Wood Carrying Case

Part Name	Part No.
Hyferset Kit Includes basic unit, hand hydraulic pump, hose assembly, 1 adapter (6 FLO-S), wooden carrying case, operation manual and video.	**611049C**



Fig. S97 — Hyferset Kit

Hyferset Body Dies for Ferulok Fittings

Size	Tube O.D. (in.)	Part No.
4	1/4	**720105-4**
6	3/8	**720105-6**
8	1/2	**720105-8**
10	5/8	**720105-10**
12	3/4	**720105-12**
14	7/8	**720105-14**
16	1	**720105-16**
20	1 1/4	**720105-20**
24	1 1/2	**720105-24**
32	2	**720105-32**



Fig. S98 — Body Die

Hyferset Nut Dies for Ferulok Fittings

Size	Tube O.D. (in.)	Part No.
4	1/4	**680370-4**
6	3/8	**680370-6**
8	1/2	**680370-8**
10	5/8	**680370-10**
12	3/4	**680370-12**
14	7/8	**680370-14**
16	1	**680370-16**
20	1 1/4	**680370-20**
24	1 1/2	**680370-24**
32	2	**680370-32**



Fig. S99 — Nut Die

Hyferset Body Dies for EO / EO-2 Fittings

Series	Tube O.D. Size (mm)	Part No.
L	6	**910290-6L**
L	8	**910290-8L**
L	10	**910290-10L**
L	12	**910290-12L**
L	15	**910290-15L**
L	18	**910290-18L**
L	22	**910290-22L**
L	28	**910290-28L**
L	35	**910290-35L**
L	42	**910290-42L**
S	6	**910289-6S**
S	8	**910289-8S**
S	10	**910289-10S**
S	12	**910289-12S**
S	14	**910289-14S**
S	16	**910289-16S**
S	20	**910289-20S**
S	25	**910289-25S**
S	30	**910289-30S**
S	38	**910289-38S**



Fig. 100 — Body Die

Hyferset Nut Dies for EO / EO-2 Fittings

Tube O.D. Size (mm)	Part No.
6	**910291-6 mm**
8	**910291-8 mm**
10	**910291-10 mm**
12	**910291-12 mm**
14	**910291-14 mm**
15	**910291-15 mm**
16	**910291-16 mm**
18	**910291-18 mm**
20	**910291-20 mm**
22	**910291-22 mm**
25	**910291-25 mm**
28	**910291-28 mm**



Fig. S101 — Nut Die

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Hydra-Tool

Pre-Setting Components

COMPONENTS REQUIRED

Part Name	Part No.
Hydra-Tool (basic unit) (Fig. S102)	**710400B**
Hand pump (10,000 psi, 2 speed)	**900086**
Electric pump (10,000 PSI, 1/2 HP, 40-125 volt)	**900085**
Hose Assembly	**910004**
Back-up Plate (sizes -4 to -32 and 6mm to 28mm)	**770102**
Back-up Plate (sizes 30 to 42mm)	See page S46
Ram Insert (sizes -4 to -32)	**770101**
Small Ram Insert (EO & EO-2 only)	**971108**
Large Piston Stop Adapter (EO & EO-2 only)	**971107**
Nut die set (1/4" to 2" O.D.)	See below
Positive Stop body die (1/4" to 2" O.D.)	See below
Nut Die Set (6mm to 42mm)	See page S46
Body Die (6mm to 42mm)	See page S46
Pressure Gauge (0 - 10,000 psi)	**900044**
Male Adapter	**6-8 F5OLO-S**
Adapter	**6 G6L-S**
Hydra-Tool Gauge Adapter	**6 R6LO-S**

See Appendix for pre-setting pressures.



Fig. S102 — Hydra Tool



Fig. S103 — Ram Insert (Ferulok Only)

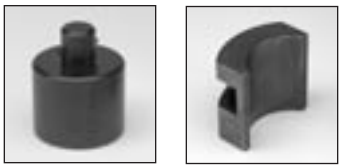


Fig. S104 — Small Ram Insert and Stop Adapter (EO and EO-2 only)

Hydra-Tool Body Dies for Ferulok Fittings

Size	Tube O.D. (in.)	Part No.
4	1/4	**720105-4**
6	3/8	**720105-6**
8	1/2	**720105-8**
10	5/8	**720105-10**
12	3/4	**720105-12**
14	7/8	**720105-14**
16	1	**720105-16**
20	1 1/4	**720105-20**
24	1 1/2	**720105-24**
32	2	**720105-32**



Fig. S105 — Body Die

Hydra-Tool Nut Dies for Ferulok Fittings

Size	Tube O.D. (in.)	Part No.
4	1/4	**680370-4**
6	3/8	**680370-6**
8	1/2	**680370-8**
10	5/8	**680370-10**
12	3/4	**680370-12**
14	7/8	**680370-14**
16	1	**680370-16**
20	1 1/4	**680370-20**
24	1 1/2	**680370-24**
32	2	**680370-32**



Fig. S106— Nut Die Set

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Hydra-Tool Body Dies for EO / EO-2 Fittings

Series	Tube O.D. Size (mm)	Part No.
L	6	910290-6L
L	8	910290-8L
L	10	910290-10L
L	12	910290-12L
L	15	910290-15L
L	18	910290-18L
L	22	910290-22L
L	28	910290-28L
L	35	910290-35L
L	42	910290-42L
S	6	910289-6S
S	8	910289-8S
S	10	910289-10S
S	12	910289-12S
S	14	910289-14S
S	16	910289-16S
S	20	910289-20S
S	25	910289-25S
S	30	910289-30S
S	38	910289-38S



Fig. S107 — Body Die



Fig. S108 — Back up Plate

Hydra-Tool Nut Die / Split Back-up Plate Sets for EO / EO-2 Fittings

Tube O.D. Size (mm)	Part No.
6	910291-6 mm
8	910291-8 mm
10	910291-10 mm
12	910291-12 mm
14	910291-14 mm
15	910291-15 mm
16	910291-16 mm
18	910291-18 mm
20	910291-20 mm
22	910291-22 mm
25	910291-25 mm
28	910291-28 mm
30	970135-30 mm
35	970135-35 mm
38	970135-38 mm
42	970135-42 mm



Fig. S109 — Split Nut Dies



Fig. S110— Nut Die

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EO-Karrymat

	Part No.
EO-Karrymat	

The EO-Karrymat is a dependable device for safe and efficient bite-type pre-setting. It allows pre-assembly of all sizes of EO, EO-2 and Ferulok fittings without the need for electric power.

The EO-Karrymat consists of a hydraulic drive, Handpump and pressure gauge, all firmly attached to a carrying case.



Fig. S111— EO-Karrymat

EO-Karrymat Body Dies for EO / EO-2 Fittings

Series	Tube O.D. (mm)	Part No.
LL	4	**MOK04LLX**
LL	6	**MOK06LLX**
LL	8	**MOK08LLX**
LL	10	**MOK10LLX**
LL	12	**MOK12LLX**
L	6	**MOK06LX**
L	8	**MOK08LX**
L	10	**MOK10LX**
L	12	**MOK12LX**
L	15	**MOK15LX**
L	18	**MOK18LX**
L	22	**MOK22LX**
L	28	**MOK28LX**
L	35	**MOK35LX**
L	42	**MOK42LX**
S	6	**MOK06SX**
S	8	**MOK08SX**
S	10	**MOK10SX**
S	12	**MOK12SX**
S	14	**MOK14SX**
S	16	**MOK16SX**
S	20	**MOK20SX**
S	25	**MOK25SX**
S	30	**MOK30SX**
S	38	**MOK38SX**



Fig. S112 — MOK Body Die

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EO-Karrymat Nut Dies for EO / EO-2 Fittings

Series	Tube O.D. (mm)	Part No.
LL	4	**GHP04X**
LL	6	**GHP06X***
LL	8	**GHP08X***
LL	10	**GHP10X***
LL	12	**GHP12X***
L	6	**GHP06X***
L	8	**GHP08X***
L	10	**GHP10X***
L	12	**GHP12X***
L	15	**GHP15X**
L	18	**GHP18X**
L	22	**GHP22X**
L	28	**GHP28X**
L	35	**GHP35X**
L	42	**GHP42X**
S	6	**GHP06X***
S	8	**GHP08X***
S	10	**GHP10X***
S	12	**GHP12X***
S	14	**GHP14X**
S	16	**GHP16X**
S	20	**GHP20X**
S	25	**GHP25X**
S	30	**GHP30X**
S	38	**GHP38X**

* Nut Dies for 6-12mm are identical in LL, L and S series.



Fig. S113 — GHP Nut Die

EO-Karrymat Body Dies for Ferulok Fittings

Tube Size (in.)	Part No.
1/4	**976521-4**
3/8	**976521-6**
1/2	**976521-8**
5/8	**976521-10**
3/4	**976521-12**
7/8	**976521-14**
1	**976521-16**
1 1/4	**976521-20**
1 1/2	**976521-24**
2	**976521-32**



Fig. S114 — EO-Karrymat Body Die for Ferulok

EO-Karrymat Back-up Plates for Ferulok Fittings

Tube Size (in.)	Part No.
1/4	**975867-4**
3/8	**975867-6**
1/2	**975867-8**
5/8	**975867-10**
3/4	**975867-12**
7/8	**975867-14**
1	**975867-16**
1 1/4	**975867-20**
1 1/2	**975867-24**
2	**975867-32**



Fig. S115 — EO-Karrymat Back-up Plates for Ferulok

Dimensions and pressures for reference only, subject to change.

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EOMAT III

Pre-Setting Machine for EO and EO-2 Fittings

The EOMAT III is an electronically controlled hydraulic drive unit for pre-assembly of cutting rings for both EO and EO-2 fittings. It can be utilized with steel and stainless steel tube with an outer diameter of 6mm through 42mm. The required operating pressure depends on the tube type, material and tube dimensions, and is automatically selected by a microprocessor. The EOMAT III is available with 440V/60Hz.

For additional technical information, please see Catalog 4303-GB.

DIMENSIONS: W – 27.17" H – 12.6" D – 20.87"

COMPONENTS REQUIRED

Part Name	Part No.
EOMAT III	**EOMATIII/A440V60HZX**
Assembly Fixture (pre-setting)	**EOMATSCHNEIDRX**
Fixture for Flaring	**EOMATBOERDELBX**
Body Die	See page S47
Nut Die	See page S47

OPTIONAL ACCESSORIES

Part Name	Part No.
Foot Pedal Switch	**EOMATIIIFUSSX**
Tool Compartment	**EOMATWERKZGAUFN.X**



Fig. S116 — EOMAT IIIA

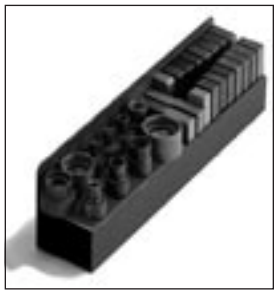


Fig. S117 — Tool Compartment (tooling shown, but not included)



Fig. S118 — Assembly Fixture



Fig. S119 — Foot Pedal Switch

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O-Ring Pick

Part No.
O-Ring Pick

Plastic O-ring pick allows for easy removal of O-rings without causing damage to the fitting.



Fig. S120 — O-Ring Pick

Captive O-Ring Assembly Tool

The captive O-ring (CORG) assembly tool utilizes a Parker patented method for inserting O-rings in ORFS fittings, such as Seal-Lok, without causing O-ring damage. These tools can be used both as a hand tool and a bench-mounted tool. All CORG tools have a #8-32 tapped hole to allow easy mounting.

Fitting Size	L (in.)	D1 (in.)	D2 (in.)	O-Ring Size	Part No.
-4	1.4	0.8	0.6	2-011	**CORG-4**
-6	1.5	0.9	0.6	2-012	**CORG-6**
-8	1.5	1.1	0.8	2-014	**CORG-8**
-10	1.6	1.3	0.9	2-016	**CORG-10**
-12	1.9	1.4	1.1	2-018	**CORG-12**
-16	1.9	1.7	1.3	2-021	**CORG-16**
-20	2.1	1.9	1.6	2-025	**CORG-20**
-24	2.1	2.3	1.9	2-029	**CORG-24**
-32	2.2	2.8	2.4	2-135	**CORG-32**



Fig. S121 — Captive O-Ring Assembly Tool

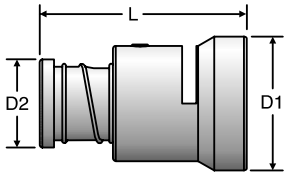


Fig. S122 — Captive O-Ring Assembly Tool dimensions

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Lubricants

Lubricants act as friction reducers to ease forming processes, fitting assembly and prevent galling, corrosion and seizing of components. The use of the correct lubricant for various purposes is critical to achieve maximum tool life during forming processes and performance of threaded connections.

Parflange® Lubricants

Lubricants are used to maximize tool life during the flanging process. Selection of the appropriate lubricant for the type of Parflange machine is critical to its proper operation.

Part Description	Part No.
Recommended for use with steel or stainless steel	**LB 2000** (8 oz.)
Recommended for use with carbon steel only	**MPG-2 Grease/1030**



Fig. S123 — Parflange Lubricants, LB 2000 and MPG-2

Flaring and Presetting Lubricants

High pressure lubricant is necessary to maximize tool life and assure flare/preset quality during the associated processes. STP lubricant is recommended for lubrication of all presetting tools and for the flaring tooling associated with the Hydra-Tool and Karryflare machines.

Part Description	Part No.
Flaring and Presetting Lubricant	**STP**



Fig. S124 — STP Lubricant

EO / EO-2 Fitting Lubricants

EO Niromont lubricants are specifically developed for lubrication of threads prior to assembly of EO and EO-2 fittings.

Part Description	Part No.
EO Niromont – Liquid 250cc bottle	**Niromont-Liquid**
EO Niromont – Paste 130 g. tin	**Niromont-Paste**



Fig. S125 — EO Niromont

Loctite Anti-Seize Lubricant

This highly refined blend of aluminum, copper and graphite lubricant is designed for use during assembly of threaded components to prevent galling, corrosion and seizing in temperatures of -65°F to +1600°F. This lubricant also assures easier assembly. The lubricant is salt-, corrosion- and moisture-resistant. Applications: Stainless steel threads for reduced chance of galling.

Part Description	Part No.
4 oz. Tube, Brush Top	**80209**
8 oz. Bottle, Brush Top	**76732**
13 oz. Aerosol	**76759**
8 oz. Bottle, Marine Grade	**34395**
16 oz. Bottle, Marine Grade	**34026**



Fig. S126 — Loctite Anti-Seize Lubricant

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Super-Lube® PTFE Grease

Super-Lube® is developed for lubricating against friction and wear of mating components. It withstands temperatures ranging from -45°F to +450°F.

Part Description	Part No.
Super-Lube® 11 oz. Aerosol	**20029**



Fig. S127 — Super-Lube

Loctite Penetrating Oil

This product penetrates, lubricates and displaces moisture in mating components. Loctite Penetrating Oil also protects against rust and corrosion.

Part Description	Part No.
16 oz. Aerosol	**51221**



Fig. S128 — Loctite Penetrating Oil

O-Ring Lubricants

Parker O-Lube

O-Lube is an outstanding general-purpose grease intended for use with O-rings and other seals in hydraulic and pneumatic systems. The temperature range is from -29°C to +82°C (-20°F to +180°F).

Part Description	Part No.
O-ring Lubricant	**OLUBE-884-4-TFD**



Fig. S129 — Parker O-Lube

Parker Super O-Lube

Super O-Lube is an all-purpose O-ring lubricant. It is not a grease, but rather a high-viscosity silicone oil. The temperature range is -54°C to +204°C (-65°F to +400°F).

Part Description	Part No.
O-ring Lubricant	**SLUBE-884-2-TFD**



Fig. S130 — Parker Super O-Lube

Dimensions and pressures for reference only, subject to change.

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Thread Sealants

Thread sealants seal and secure metal pipes and fittings by filling the space between the threaded metal parts. Thread sealants harden to prevent leakage caused by vibration loosening, solvent evaporation, damaged threads and temperature cycling. Designed for low and high pressure applications, thread sealants seal quickly for on-line low pressure testing. When fully cured, they seal to the burst strength of most systems. Thread sealants are easily remove with basic hand tools. Thread sealants can be used on pipe thread fittings.

Threadmate™ Sealant/Lubricant

Threadmate™ is an extreme-duty lubricant developed to reduce galling during the assembly of pipe thread fittings. Threadmate™ promotes reliable sealing of pipe threads, even at high pressure. Recommended for use on stainless steel pipe threads.

Size available	Part No.
4 oz. tube	**MTM04T-TFD**



Fig. S131 — Threadmate Sealant/Lubricant

Loctite Thread Sealant 567

Formulated specifically for metal tapered pipe thread fittings. PST 567 cures rapidly to provide immediate low pressure sealing. Its controlled lubricity prevents galling and it protects mated thread areas from rust and corrosion. Performs in temperatures ranging from -65°F to +44°F. Application: Stainless steel tapered pipe threads.

Part Description	Part No.
6 ml Tube	**56707**
50 ml Tube	**56747**



Fig. S132 — Loctite Thread Sealant 567

Loctite Thread Sealant 545

Designed for both hydraulic and pneumatic systems, 545 contains no fillers or particles which could contaminate system fluids, foul valves, or clog fine filters and screens. Applications: Steel and brass tapered pipe threads. Temperature range: -65°F to +300°F.

Part Description	Part No.
.5 ml Capsule	**54505**
50 ml Bottle	**54531**



Fig. S133 — Loctite Thread Sealant 545

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Pipe Thread Sealing Cord

Loctite 55 Pipe Sealing Cord is a general purpose threaded pipe sealant. It is a non-curing, coated multifilament cord that seals fluids and gases in pipe threads up to 4". Sealant temperature ranges from -65°F to +300°F.

Part Description	Part No.
Pipe Thread Sealing Cord, 5,700 in.	**35082**



Fig. S134 — Pipe Thread Sealing Cord

Thread Sealant Tape

Part Description	Part No.
1/2" x 520" Spools	**PTFE Tape**



Fig. S135 — PTFE Tape

Threadlockers

Thread lockers perform by filling the space between threaded metal parts and hardening to form a tough, adhesive bond and seal. Threadlockers seal the threads against leakage and prevent rust and corrosion. Threadlockers can be used on fasteners. Some threadlockers require extra effort or special tools for removal.

Loctite Primer N

Loctite 7649 Primer N decreases the set-up time of Loctite threadlockers and increases breakaway torque on most fastener surfaces. It allows for cold weather application. Applications: Use with Loctite threadlockers, thread sealants and retaining compounds.

Part Description	Part No.
25 g Aerosol	**21347**
4.5 oz. Aeorosol	**21348**



Fig. S136 — Loctite 7649 Primer N

Threadlocker 242

All-purpose, medium strength threadlocker is ideal for all nut and bolt applications. It eliminates the need for stocking expensive locknuts and washers. Its other advantages include locking and sealing while preventing parts loosening during vibration, protecting threads from corrosion, and easy disassembly with hand tools. Applications: All fastener applications. Temperature range: -65°F to +300°F.

Part Description	Part No.
10 ml Tube	**24221**
50 ml Tube	**24231**



Fig. S137 — Loctite Threadlocker 242

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Loctite High Strength Threadlocker 271

High strength threadlocker for heavy-duty applications is especially well-suited for permanently locking studs and press fits. It replaces set screw and snap rings and locks against vibration loosening. Applications: Permanent fastener requirements. Temperature range: -65°F to +300°F. DO NOT USE THIS PRODUCT WITH PARKER TUBE FITTINGS. RECOMMENDED ONLY FOR FASTENER APPLICATIONS.

Part Description	Part No.
10 ml Tube	**27121**
50 ml Tube	**27131**



Fig. S138 — Loctite High Strength Threadlocker 271

Cleaners

Loctite cleaners and degreasers are designed for various applications to remove grease, grime, paint, adhesives and other soils your working hands get into. Fast Orange hand cleaners have aded conditioners to prevent your hands from cracking and drying out.

Loctite Fast Orange Hand Cleaner

Fast Orange is the #1 selling biodegradable, waterless petroleum solvent-free hand cleaner that contains no harsh chemicals, mineral oils or ammonia that can sting cuts and abrasions. Pure, fresh smelling natural citrus power does the cleaning. With aloe, lanolin, jojoba, and now Corn Huskers Lotion® for added skin conditioning and protection, its smooth formula gently deep cleans the toughest dirt. Applications: Clean-up of resins, oil, grease, tar, ink, epoxies, paint and various adhesives.

Part Description	Part No.
Industrial Hand Wipes, 75 count	**34943**
15 oz. bottle	**25116**
1 gal. with pump	**25218**



Fig. S139 — Loctite Fast Orange Hand Cleaner

Loctite Natural Blue® Degreaser

This biodegradable, all-purpose, industrial strength, concentrated cleaner and degreaser can be easily diluted with water for use in a variety of cleaning applications. Non-flammable and non-toxic.

Part Description	Part No.
24 oz. Spray Bottle	**82249**
1 Gallon Concentrate	**82251**



Fig. S140 — Loctite Natural Blue® Degreaser

Loctite Pro Strength Parts Cleaner

This product was developed to aggressively penetrate, dissolve and remove oil and grease from parts. Dries quickly with no residue.

Part Description	Part No.
19 oz. Aerosol	**30548**



Fig. S141 — Loctite Pro Strength Parts Cleaner

Loctite Rack

Parker's Loctite Rack makes a convenient counter top display for Loctite products. No supplies included.

Part Description	Part No.
Loctite Product Rack	**RACK**



Fig. S142 — Loctite Rack (Supplies not included)

Visual Index

Tube Preparation Centers

Parker offers five different styles of tube preparation centers to meet various user's needs, from the basic TP-1 unit which includes a cabinet and deburr unit, to the TP1025 which offers the ability to cut, deburr, Parflange and flare tube.

Utilizing a sturdy steel cabinet with bins for fitting storage, tooling shelves and heavy duty casters to ease mobility, Parker Tube Preparation Centers cover almost every tube preparation need. All machines require 110V, 20A power supply.



Fig. S143 — Tube Preparation Center TP1025

Part Description	**Part No.**
Tube Prep Center with Deburr Unit	**TP-1**
Tube Prep Center with Deburr and Saw	**TP-974250**
Tube Prep Center with Deburr, Saw and Hydratool	**TP432**
Tube Prep Center with Deburr, Saw and Hyferset	**TP-611011A**
Tube Prep Center with Deburr, Saw and Karryflare Tool	**TP-Karryflare**
Tube Prep Center with Deburr, Saw and 1025 Parflange	**TP1025**

Replacement Parts	**Part No.**
I.D. Deburr Cone	**971816**
O.D. Deburr Blades (set of 6)	**910485**
Cutting Lubricant	**Saw Lube**
Saw Blade – 250 mm x 2.0 mm thick (all purpose)	**987036**
Saw Blade – 200 mm x 2.0 mm thick (all purpose)	**987037**
Flaring tooling for TP432	See page S29 - S31
Presetting tooling for TP432 and TP-Hyferset	See page S40 - S42
Karryflare Flaring tooling	See page S32
Flanging tooling for TP1025	See page S26
Flaring tooling for TP1025	See page S26
Lubricant for TP432 / TP-Hyferset	**STP**
Lubricant for TP1025	**LB 2000**

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Thread Identification Kit

Part No.
MIK-1

The Thread Identification Kit can be used to identify metric, BSP, SAE and NPT threads, as well as SAE flanges. It contains thread gauges, calipers, thread profiles, and an instruction booklet that details most thread forms and connection styles found in fluidpower systems worldwide.



Fig. S144 — Thread Identification Kit

Portboards

The Portboards can be used for identification of ISO, SAE, BSP and NPT ports and port threads. They are machined with female threads for quick and easy identification by screwing in the male port end.

Part No.
Portboard A

Portboard A (SAE Straight Thread -2 through -32 and NPT 1/8 through 1 1/2).



Fig. S145— Portboard A

Part No.
Portboard B

Portboard B (Metric 8mm through 48mm and BSP 1/8 through 1 1/2).



Fig. S146 — Portboard B

Part No. ITK

Parker's International Thread Kit offers the necessary tools to identify almost any thread you may encounter. The new ITK has LL, L and S series plugs to identify female DIN threads such as EO style hose ends. It also includes the MIK-1 and BSPP plugs in order to identify BSPP hose ends from 1/8" to 2".



Fig. S147 — International Thread Kit (ITK)

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Par-Lok® Wrench

360° Snap-action ratchet wrench for hex sizes from 3/8" to 2 1/4" across the flats and metric from 10mm to 50mm. Inch sizes meet government specifications and are listed as NSN-5120-00-474-7227. Wrenches are covered by a limited lifetime warranty. Damage due to over-torque is not covered by warranty.

Install Tube Fittings Faster

Easy access ratchet wrench speeds fittings installation in tight locations. Rugged, snap-action jaws can be opened over tube lines, locked onto fitting hex and ratcheted within 1/8 turn. Full six point contact prevents fitting distortion common with wrench slippage. Ideal for tube line installations where compact runs require multiple fittings make-up, disassembly and remakes.

Specifications

Par-Lok wrenches are available individually or in six different kit combinations. Par-Lok jaws are constructed from drop-forged, high carbon steel material with a black conversion coat finish. Par-Lok handles are made from heavy gauge steel material, heat treated and with a corrosion resistant black finish. Solid stainless steel rivets and tempered jaw springs are designed into every wrench for maximum strength.



Fig. S148 — Par-Lok Wrench



Fig. S149 — Par-Lok Wrench Kit

Inch Hex Size Par-Lok Wrenches

Hex Size (in.)	Max. Torque (ft.-lbs.)	Part No.
3/8	24	**860062-6**
7/16	27	**860062-7**
1/2	32	**860062-8**
9/16	43	**860062-9**
5/8	65	**860062-10**
11/16	81	**860062-11**
3/4	92	**860062-12**
13/16	108	**860062-13**
7/8	135	**860062-14**
15/16	152	**860062-15**
1	162	**860062-16**
1 1/8	206	**860062-18**
1 1/4	238	**860062-20**
1 3/8	282	**860062-22**
1 1/2	314	**860062-24**
1 5/8	346	**860062-26**
1 7/8	364	**860062-30**
2	373	**860062-32**
2 1/4	391	**860062-36**



Fig. S150 — Par-Lok Wrench

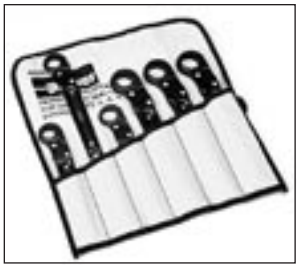


Fig. S151 — Seal-Lok Wrench Kit

Part Description	Part No.
Full kit of sizes 3/8" to 1"	**860062-KIT**
Full kit of sizes 1 1/8" to 2 1/4"	**860062-KIT2**
Seal-Lok Wrench Kit (5/8", 11/16", 3/4", 13/16", 7/8", 15/16")	**860062-LKIT**
Triple-Lok and Ferulok Wrench Kit (9/16", 11/16", 7/8", 1", 1 1/4")	**860062XUKIT**

Dimensions and pressures for reference only, subject to change.

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Columbus, Ohio
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Metric Hex Size Par-Lok Wrenches

Hex Size (mm)	Max. Torque (ft.-lbs.)	Max. Torque (N-m)	Part No.
10	26	35	**860063-10**
11	27	37	**860063-11**
12	31	42	**860063-12**
13	33	45	**860063-13**
14	42	57	**860063-14**
16	65	88	**860063-16**
17	79	107	**860063-17**
19	92	125	**860063-19**
21	110	149	**860063-21**
22	131	178	**860063-22**
24	154	209	**860063-24**
27	74	100	**860063-27**
30	74	100	**860063-30**
32	125	170	**860063-32**
36	125	170	**860063-36**
41	229	310	**860063-41**
46	243	330	**860063-46**
50	243	330	**860063-50**



Fig. S152 — Triple-Lok and Ferulok Wrench Kit



Fig. S153 — Par-Lok Wrench Kit

Part Description	Part No.
Full kit of sizes 10mm to 22mm	**860063-KIT**
Full kit of sizes 27mm to 50mm	**860063-KIT2**

Tube Fabricating Equipment Weights	
Part No.	**Approx. Ship Weight (lbs.)**
Vise Block with Flaring Pin	
4-2866	2
5-2866	2
6-2866	3
8-2866	3.5
10-2866	4
12-2866	12
14-2866	15
16-2866	18
20-2866	18
24-2866	20
Combination Flaring Tool	
210A	3
Rolo-Flare Tool	
945 TH	4
212FB	4
Hydra-Tool	
710400B	62
720370B-3	85
Accessories (Hydra-Tool)	
900044	1
910004	1.5
720377	16
710416	4
710412	3
710419	2
710411	2
710424-1	4
710424-2	4
710417-4	2
710417-5	2
710417-6	2
710417-8	2
710417-10	2
710417-12	2
710417-14	2
710417-16	2
710417-20	2
710417-24	2
710417-32	2
Power Source (Pumps)	
900085	30
900086	10
Flaring Dies - Metric (Hydra-Tool)	
770106-6	2
770106-8	2
770106-10	2
770106-12	2
770106-16	2
770106-18	2
770106-20	2
770106-25	2
770106-30	2
770106-32	2
Hydra-Tool Ferulok Pre-Set Tooling	
770101	5
770102	3

Tube Fabricating Equipment Weights	
Part No.	**Approx. Ship Weight (lbs.)**
Ferulset Tools (Ferulok Pre-Set Tool)	
560576	0.5
560577	0.5
560578	0.5
560579	0.5
560580	0.5
560581	0.5
560582	0.5
560583	0.5
560584	0.5
560585	0.5
560586	0.5
560587	1
560589	1
Hyferset (Ferulok Pre-Set Tool)	
611011A	35
Hyferset Accessories	
900086	10
910004	2
651085	15
Hyferset and Tooling	
611049C	53
680370-4	3.5
720105-4	0.5
680370-6	3
720105-6	0.5
680370-8	3
720105-8	0.5
680370-10	2.5
720105-10	0.5
680370-12	2.5
720105-12	0.5
680370-14	2.5
720105-14	0.5
680370-16	1.5
720105-16	1
680370-20	2
720105-20	1
680370-24	1.5
720105-24	1
680370-32	1.5
720105-32	1
Straight Thread Taps and Counterbores	
7/16-20 UNF-2B	1
9/16-18 UNF-2B	1
3/4-16 UNF-2B	1
7/8-14 UNF-2B	1.5
1 1/16-12 UN-2B	1.75
1 3/16-12 UN-2B	2
1 5/16-12 UN-2B	2
1 5/8-12 UN-2B	2.5
1 7/8-12 UN-2B	2.5
2 1/2-12 UN-2B	3

Tube Fabricating Equipment Weights	
Part No.	**Approx. Ship Weight (lbs.)**
Straight Thread Taps and Counterbores (Cont'd)	
Y-34730	0.5
Y-34731	0.5
Y-34732	0.5
Y-34733	0.75
Y-34734	1
Y-34735	1
Y-34736	1.5
Y-34737	1.5
Y-34738	1.75
Y-34739	2
Y-34740	2
Y-34741	2.5
Y-34743	2.5
Par-Lok Wrenches	
860062-Kit	4.5
860062-Kit 2	28
860063-Kit	4
Tube Cutters	
218B	1
1232	3
Parker Tru-Kut Sawing Vise	
710439	9
974250	198
Deburring Tools	
226A	1
972125	90
Hand Tube Benders	
2-2829S	2
3-2829S	2
4-2829S	2.5
5-2829S	2.5
6-2829S	3
8-2829S	3
10-2829	8
12-2829	15
14-2829	15
16-2829	16
4-2829AH	1.2
6-2829AH	3.7
8-2829AH	7.6
Exactol Tube Benders (412, 420 & 424)	
560569 (412)	18.5
550570	5
550572	25.5
621044 (420)	68
631156	10
890127 (424)	73
412 Kit	42
424 Kit	—
Slide Blocks (412, 420 & 424)	
550585	3.5
621045	5
870150	5

(Continued on next page)

Table N9 — Tube Fabricating Equipment Weight Chart

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
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Tube Fabricating Equipment Weights	
Part No.	**Approx. Ship Weight (lbs.)**
Radius Blocks (412, 420 & 424)	
550579	1
550580	1
550581	2.5
50582	3
50583	4
550584	5
621046	7
621047	9
621048	9.5
621049	10
870149	11
Small Radius Blocks (412, 420 & 424)	
550573	2
550574	2
550575	2.5
550576	2.5
550577	3
550578	4
Close Bend Radius Blocks	
590533	2
590535	3
590537	3
Metric Slide Blocks (412, 420 & 424)	
820091	3
820092	5
820093	5
Metric Radius Blocks (412, 420 & 424)	
820090-6mm	1
820090-8mm	2
820090-10mm	2
820090-12mm	3
820090-14mm	3
820090-15mm	4
820090-16mm	4.5
820090-18mm	6.5
820090-20mm	7
820090-22mm	9
820090-25mm	9.5
820090-28mm	10
820090-30mm	10.5
820090-32mm	11
Tube Preparation Centers	
TP432	560
TP1025	880
EO Presetting Tooling	
EOMAT-IIIA	221
Nut Die	1.75
Body Die	.75
Foot Pedal Switch	9.5
EO-Karrymat	55

Tube Fabricating Equipment Weights	
Part No.	**Approx. Ship Weight (lbs.)**
HB632 Hydraulic Tube Bender	
631050 (632)	245
660221	8
900085	30
Radius Blocks (HB632)	
540502	3
530763	3.5
530764	4
530765	6
530766	10
530768	14
530770	54
590512-18	35
590515-24	4
590518-30	6
590521-36	7
590523-42	8
590524-48	10
590526-54	12
590630-72	16
631060-128	50
Close Bend Radius Blocks for HB632	
530597	3.5
530601	5
530605	6
530609	8
530613	10.5
530621	12
530625	13
Metric Radius Blocks for HB632	
810023	3
780175	3.5
780176	4
780177	4
780178	5
780179	6
780180	8
780181	9
780182	10.5
780183	12
780184	13
CP432 Parflange Machines	225
1050	840
1025	175
Metric Close Bend Radius Blocks for HB632	
780185	3.5
780186	3.5
780187	4
780188	5
780189	6
780190	6.5

Tube Fabricating Equipment Weights	
Part No.	**Approx. Ship Weight (lbs.)**
Clamp Blocks for HB632	
864266	4
631092	3
631093	3
027418-28	5
027418-32	5
Metric Clamp Blocks for HB632	
790017	3
780194	4
780195	3
780186	4
Metric Slide Blocks for HB632	
790016	8
780191	11
780192	9
780193	8
Bender Table	
520515	470
Mandrel Rod Stop Assemblies	
550571	5
631141	20
Universal Side Angle Indicator	
520520	25
Karryflare	116
Inch Flaring Dies for Karryflare	
M 047415-1	4
M 157408-1	4
M 067415-1	4
M 087415	4
M 107415	3.5
M 127415	3.5
M 167415	3.5
M 207415	3
M 157438	3
Parflange Tooling	
Pin and Die Set (1025)	4.5
Pin (1025)	.75
Die (1025)	3.75

Table N9 — Tube Fabricating Equipment Weight Chart (cont'd.)

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Assembly / Installation

The Fitting Authority

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Port End Assembly

The three common types of port ends used in the United States with tube fittings, pipe fittings and hose fittings are:

1) Parallel thread
2) Tapered Thread
3) Flanges

Parallel Thread Ports

Unlike tapered threads, parallel thread ports do not require sealing by the threads. The seal is obtained by other means, typically an elastomeric seal. When assembled properly, parallel thread ports provide the best leak-free port connection available.

Parker tube fittings are available with several types of parallel thread port studs (ends):

- SAE straight threads (SAE J1926 / ISO 11926)
- ISO (ISO 6149)
- JIS (JIS B2351)
- BSPP flat face (ISO 1179)
- DIN Metric flat face (ISO 9974).

The SAE straight thread, ISO 6149 and JIS B2351 ports are all of similar design. The male end is fitted with an O-ring. On assembly, the O-ring is firmly sandwiched between the angular sealing surface of the female port, the male end undercut, and the shoulder or back-up washer of the male end. Sealing is thus made possible and maintained by the O-ring compression, which results from the sandwiching of the O-ring in the cavity as shown in Fig. T1. The straight threads do not offer sealing action; they provide the resistance (holding power) for service pressure. Port dimensions for SAE and ISO 6149 ports are given on pages U25 and U26 respectively. For JIS B2351 dimensions, please contact the Tube Fittings Division.



Fig. T1 – SAE / ISO / JIS B2351 Straight Thread Port O-Ring Upon Assembly

The SAE straight thread port is the same as MS 16142. **It is also similar to, but dimensionally not the same as, MS 33649 and AND 10050, and thus not interchangeable with them.** Therefore, it is not recommended to use fittings designed for SAE straight thread ports in MS 33649 and AND 10050 ports.

With the BSPP and metric flat face port ends, the sealing actually takes place on the top surface (spot face) of the port. Port dimensions can be found on pages U29 and U30 respectively. There are several sealing methods available for these ports. Port studs with type "E" sealing utilize Parker's EOlastic seal (ED) (see Fig. T2) and are recommended for higher pressures than the other types. Types "G" and "H" use an O-ring that is supported on the outside by a removable retaining ring (see Fig. T3). Type B (cutting face) is designed with a relatively sharp ridge of material that seals by coining the flat face of the female port (see Fig. T4). A fourth sealing method uses a bonded seal which consists of a metal ring with an elastomer bonded to the inside surface (often referred to as Dowty® seal) (see Fig. T5).



Fig. T2 – EOlastic Seal, Type E

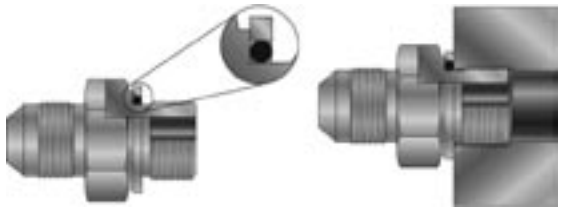


Fig. T3 – O-Ring with Retaining Ring, Types G & H



Fig. T4 – Cutting Face, Type B



Fig. T5 – Bonded Seal

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Counterbores and taps used to machine the various parallel thread ports can be found in section S.

For assembly purposes, there are two main categories of parallel port ends: adjustable and non-adjustable. Adjustable port ends are commonly found on shaped fittings to allow for proper orientation of the fitting. Besides the elastomeric seal, adjustable port ends are assembled with a locknut and a back-up washer as shown in Fig. T6. Non-adjustable port ends are found on straight fittings.

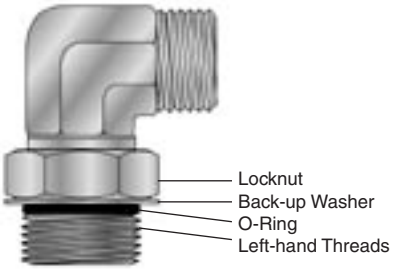


Fig. T6 – Adjustable Port End Assembly

The general assembly procedure for all adjustable parallel thread port ends is the same. Likewise, the assembly procedure is the same for all non-adjustable parallel thread port ends.

Adjustable Port End Assembly

1. Inspect components to ensure that male and female port threads and sealing surfaces are free of burrs, nicks and scratches, or any foreign material.
2. If O-ring or seal is not pre-installed to fitting male port end, install proper size O-ring or seal, taking care not to damage it.
3. Lubricate O-ring with light coat of system fluid or a compatible lubricant to help the O-ring slide smoothly into the port and avoid damage.
4. Back off lock nut as far as possible. Make sure back-up washer is not loose and is pushed up as far as possible.



Step 4

5. Screw fitting into port until the back-up washer or the retaining ring contacts face of the port. Light wrenching may be necessary. **Over tightening may damage washer.**

   (This potential damage was eliminated with Parker's Robust Port)



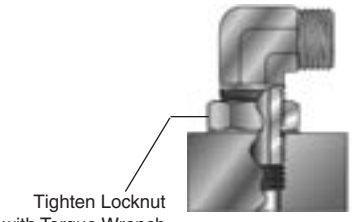
Step 5

6. To align the tube end of the fitting to accept incoming tube or hose assembly, unscrew the fitting by the required amount, but not more than one full turn.



Step 6

7. Using two wrenches, hold fitting in desired position and tighten locknut to the proper torque value from the appropriate table located on pages T5 - T6.
8. Inspect to ensure that O-ring is not pinched and that washer is seated flat on face of port.



Steps 7 and 8

Non-adjustable Port End Assembly

1. Inspect components to ensure that male and female port threads and sealing surfaces are free of burrs, nicks, and scratches, or any foreign material.
2. If O-ring or seal is not pre-installed to fitting male port end, install proper size O-ring or seal, taking care not to damage it.
3. Lubricate O-ring with light coating of system fluid or a compatible lubricant to help the O-ring slide past the port entrance corner and avoid damaging it. "ED" seal does not need lubrication.
4. Screw fitting into port and tighten to proper torque from the appropriate table located on pages T5 - T6.



Fig. T7 — Non-Adjustable Port End Assembly

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SAE Straight Thread Port Assembly (SAE J1926)

SAE Dash Size	Thread Size UN/UNF	Assembly Torque (+10% -0)															
		Non-Adjustable						Adjustable						Plugs			
		Seal-Lok		Triple-Lok Ferulok Pipe Fittings		Seal-Lok Lite		Seal-Lok		Triple-Lok Ferulok		Seal-Lok Lite		Hollow Hex HP5ON-S		Hex Head P5ON-S	
		ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m	ft.lbs. (in. lbs)	N-m
2	5/16-24			(85)	10					(60)	7			(30)	3.5	(85)	10
3	3/8-24			(155)	18					(100)	11			(55)	6	(155)	18
4	7/16-20	(310)	35	(260)	29			(180)	20	(180)	20			(120)	13.5	(260)	29
5	1/2-20	(360)	40	(280)	32			(360)	40	(250)	28			(170)	19	(280)	32
6	9/16-18	(420)	46	(350)	40	(260)	29	(420)	46	(350)	40	(260)	30	(410)	46	(350)	40
8	3/4-16	60	80	(620)	70	(350)	40	60	80	(620)	70	(350)	40	60	80	(620)	70
10	7/8-14	100	135	85	115			100	135	85	115			100	135	85	115
12	1 1/16-12	135	185	135	183	65	85	135	185	135	183	65	85	135	185	135	183
14	1 3/16-12	175	235	175	237			175	235	175	237			175	235	175	237
16	1 5/16-12	200	270	200	271	80	110	200	270	200	271	80	110	200	270	200	271
20	1 5/8-12	250	340	250	339			250	340	250	339			250	340	250	339
24	1 7/8-12	305	415	305	414			305	415	305	414			305	415	305	414
32	2 1/2-12	375	510	375	509			375	510	375	509			375	510	375	509

Note: Lubricate threads before assembly! Values in chart are for steel fittings in steel ports. For stainless steel fittings, please use the upper limit of torque range. For brass (and other soft metals), decrease torque value by 35%.

Table T1 – SAE J1926 Straight Thread Port Assembly Torques

BSPP (Thread G) Port Assembly (ISO 1179 / DIN 3852-2)

Series	Tube O.D.	BSPP Thread G Size	Assembly Torque Nm +10% -0							
			Straight Male Stud Fittings			Non-Return Valves RHV / RHZ	Banjo Fittings		Plugs VSTI-ED	Straight and Adjustable Fittings
			Form A for Sealing Washer	Form B with Cutting Face	Form E with ED-Sealing	Form E with ED-Sealing	WH / TH	SWVE	Form E with ED-Sealing	O-Ring with Retaining Ring and Bonded Washer
	6	G 1/8A	9	18	18	18	18	18	13	18
	8	G 1/4A	35	35	35	35	45	40	30	35
	10	G 1/4A	35	35	35	35	45	40	30	35
	12	G 3/8A	45	70	70	50	70	65	60	70
L	15	G 1/2A	65	140	90	85	120	90	80	90
	18	G 1/2A	65	100	90	65	120	90	80	90
	22	G 3/4A	90	180	180	140	230	125	140	180
	28	G 1A	150	330	310	190	320		200	310
	35	G 1 1/4A	240	540	450	360	540		450	450
	42	G 1 1/2A	290	630	540	540	700		450	540
	6	G 1/4A	35	55	55	45	45	40		35
	8	G 1/4A	35	55	55	45	45	40		35
	10	G 3/8A	45	90	80	60	70	65		70
	12	G 3/8A	45	90	80	60	70	65		70
S	14	G 1/2A	65	150	115	145	120	90		90
	16	G 1/2A	65	130	115	100	120	90		90
	20	G 3/4A	90	270	180	145	230	125		180
	25	G 1A	150	340	310	260	320			310
	30	G 1 1/4A	240	540	450	360	540			450
	38	G 1 1/2A	290	700	540	540	700			540

Note: Lubricate threads before assembly! Tightening torques are for steel fittings assembled in steel components. Values in chart are for steel fittings in steel ports. For stainless steel fittings, please use the upper limit of torque range. For brass (and other soft metals), decrease torque value by 35%.

Table T2 – Assembly Torques for ISO 1179-1 / DIN 3852-2 Port

Metric (ISO Thread M) Port Assembly (ISO 9974-1 / DIN 3852-1)

Series	Tube O.D.	Metric Thread M Size	Assembly Torque Nm +10% -0							
			Straight Male Stud Fittings			Non-Return Valves RHV / RHZ	Banjo Fittings		Plugs VSTI-ED	Straight and Adjustable Fittings
			Form A for Sealing Washer	Form B with Cutting Face	Form E with ED-Sealing	Form E with ED-Sealing	WH / TH	SWVE	Form E with ED-Sealing	O-Ring with Retaining Ring
	6	M 10 x 1	9	18	18	18	18	18	12	15
	8	M 12 x 1.5	20	30	25	25	45	35	25	25
	10	M 14 x 1.5	35	45	45	35	55	50	35	35
	12	M 16 x 1.5	45	65	55	50	80	60	55	40
L	15	M 18 x 1.5	55	80	70	70	100	80	65	45
	18	M 22 x 1.5	65	140	125	125	140	120	90	60
	22	M 27 x 2	90	190	180	145	320	130	135	100
	28	M 33 x 2	150	340	310	210	360		225	160
	35	M 42 x 2	240	500	450	360	540		360	210
	42	M 48 x 2	290	630	540	540	700		360	260
	6	M 12 x 1.5	20	35	35	35	45	35		35
	8	M 14 x 1.5	35	55	55	45	55	50		55
	10	M 16 x 1.5	45	70	70	55	80	60		70
	12	M 18 x 1.5	55	110	90	70	100	80		90
S	14	M 20 x 1.5	55	150	125	100	125	110	80	125
	16	M 22 x 1.5	65	170	135	125	135	120		135
	20	M 27 x 2	90	270	180	135	320	135		180
	25	M 33 x 2	150	410	310	210	360			310
	30	M 42 x 2	240	540	450	360	540			450
	38	M 48 x 2	290	700	540	540	700			540

Note: Lubricate threads before assembly! Values in chart are for steel fittings in steel ports. For stainless steel fittings, please use the upper limit of torque range. For brass (and other soft metals), decrease torque value by 35%.

Table T3 – Assembly Torques for ISO 9974-1 / DIN 3852-1 Port

Metric ISO Port Assembly (ISO 6149/DIN 3852-3)

Metric Thread M Size	Assembly Torque (+10% -0)[3]			
	ISO 6149-2 Stud Ends (S-Series) (Seal-Lok, EO & VSTI-OR Plugs)		ISO 6149-3 Stud Ends (L-Series) (Triple-Lok, EO, Ferulok & Pipe Adapters)	
	N.m.	ft. lbs.	N.m.	ft. lbs.
M8x1	10	7.5	8	6
M10x1	20	15	15	11
M12x1.5	35	26	25	18
M14x1.5	45	33	35	26
M16x1.5	55	41	40	30
M18x1.5	70	52	45	33
M20x1.5[4]	80	59	—	—
M22x1.5	100	74	60	44
M27x2	170	125	100	74
M30x2[1]	235	175	130	95
M33x2	310	230	160	120
M38x2[2]	320	235	185	135
M42x2	330	245	210	155
M48x2	420	310	260	190
M60x2	500	370	315	230

1) M30X2 will be added to ISO 6149 standards at next revision.
2) M38X2 is not covered in ISO 6149 standards.
3) These torques are for steel fittings, assembled lubricated, for brass (and other soft metals), decrease torque value by 35%.
4) For cartridge valves only.

Table T4 – ISO 6149 / DIN 3852-3 Port Assembly Torques

Tapered Thread Ports

Tapered thread ports include NPTF, BSPT and metric taper. The tapered threads in these ports serve two functions: 1) to hold the fitting in place while under pressure and 2) to serve as the primary seal. The seal for NPTF threads is created by the metal-to-metal contact between the mating roots and crests of the male and female threads. With all other tapered threads, there is not always a contact at the roots and crests, but the spiral gap there is small enough for a sealant to fill and provide a seal.

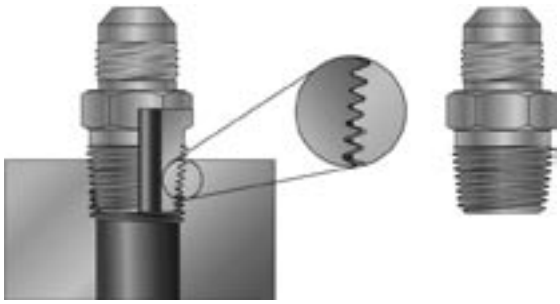


Fig. T8 – Tapered Thread Port

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The variety of thread forms available under taper threads include:

NPT – American Standard Taper Pipe Thread (ANSI B1.20.1).

NPTF – Dryseal American Standard Taper Pipe Thread (SAE J476, ANSI B1.20.3).

BSPT or JIS "PT" – British Standard Pipe, Tapered (BS21, JIS B 0203, ISO 7), also known as "R" for male and "Rc" for female.

M-Keg – Metric taper threads (DIN 158).

The vast majority of Parker Tube Fittings Division's standard pipe thread fittings are machined with the NPTF thread form. NPTF thread is also referred to as Dryseal Pipe Thread.

The full thread profile contact of NPTF threads is designed to give the tapered threads self-sealing ability without thread sealant. However, variations in condition of mating threads, fitting and port materials, assembly procedures and operating conditions make self-sealing highly improbable. Some type of thread sealant is, therefore, required to achieve proper seal and, in some cases, additional lubricity to prevent galling.

Types of Sealant/Lubricant

Sealant/Lubricants assist in sealing and provide lubrication during assembly, reducing the potential for galling. Pipe thread sealants are available in various forms such as dry pre-applied, tape, paste and anaerobic liquid.

Pre-applied sealants, such as "Vibraseal" (registered trade-mark of Loctite Corporation) and powdered PTFE are usually applied to connectors by the manufacturer. Connectors with some of these sealants may be remade a few times without needing additional sealant. Vibraseal may also help reduce loosening due to vibration.

PTFE tape, if not applied properly, can contribute to system contamination during assembly and installation. In addition, because of PTFE's high lubricity, fittings can be more easily over tightened; and it does not offer much resistance to loosening due to vibration.

Paste sealants can also contribute to system contamination, if not applied properly. They are also messy to work with; and some types require a cure period after component installation, prior to system start up.

Anaerobic liquids are available from several manufacturers and perform sealing as well as thread locking functions. They are applied to the connectors by the user and require a cure period prior to system start up. Some are soluble in common hydraulic fluids and will not contaminate the system. For proper performance they need to be applied to clean and dry components, carefully following the manufacturer's directions.

Tapered Thread Port Assembly

The proper method of assembling tapered threaded connectors is to assemble them finger tight and then wrench tighten further to the specified number of turns from finger tight (T.F.F.T.) given in Table T5. The following assembly procedure is recommended to minimize the risk of leakage and/or damage to components.

1. Inspect components to ensure that male and female port threads and sealing surfaces are free of burrs, nicks and scratches, or any foreign material.
2. Apply sealant/lubricant to male pipe threads if not pre-applied. For stainless steel fittings, the use of Parker Threadmate sealant/lubricant is strongly recommended. (Pre-applied dry sealants are preferred over other sealants). With any sealant, the first one to two threads should be left uncovered to avoid system contamination. If PTFE tape is used it should be wrapped 1-1/2 to 2 turns in clockwise direction when viewed from the pipe thread end.

   Caution: More than two turns of tape may cause distortion or cracking of the port.
3. Screw the connector into the port to the finger tight position.
4. Wrench tighten the connector to the appropriate T.F.F.T. values shown in Table T5, making sure that the tube end of a shaped connector is aligned to receive the incoming tube or hose assembly. **Never back off (loosen) pipe threaded connectors to achieve alignment.**
5. If leakage persists after following the above steps, check for damaged threads and total number of threads engaged.

If threads on the fitting are badly nicked or galled, replace the fitting. If port threads are damaged, re-tap, if possible, or replace the component. If the port is cracked, replace the component.

Normally, the total number of tapered threads engaged should be between 3-1/2 and 6. Any number outside of this range may indicate either under or over tightening of the joint or out of tolerance threads. If the joint is under tightened, tighten it further but no more than one full turn. If it is over tightened, check both threads, and replace the part which has out-of-tolerance threads.

As a general rule, pipe fittings with tapered threads should not be assembled to a specific torque because the torque required for a reliable joint varies with thread quality, port and fitting materials, sealant used, and other factors. Where many of these factors are well-controlled, such as particular jobs on an assembly floor, a torque range that produces the desired results may be determined by test and used in lieu of turns count for proper joint assembly.

Tapered Pipe Thread Size		T.F.F.T.
BSPT	NPTF	
1/8-28	1/8-27	2 - 3
1/4-19	1/4-18	2 - 3
3/8-19	3/8-18	2 - 3
1/2-14	1/2-14	2 - 3
3/4-14	3/4-14	2 - 3
1-11	1-11 1/2	1.5 - 2.5
1 1/4-11	1 1/4-11 1/2	1.5 - 2.5
1 1/2-11	1 1/2-11 1/2	1.5 - 2.5
2-11	2-11 1/2	1.5 - 2.5

Table T5 – Assembly Turns From Finger Tight (T.F.F.T) Values For Steel, Stainless Steel and Brass Pipe Fittings

Flange Ports

Large threaded port connections, such as SAE straight thread, require very high torque to assemble. This makes assembly very difficult, especially where wrench clearance is limited. Split flange connections solve this problem by dividing the hydraulic load among four bolts each requiring much less torque, smaller wrenches and smaller wrench clearance.

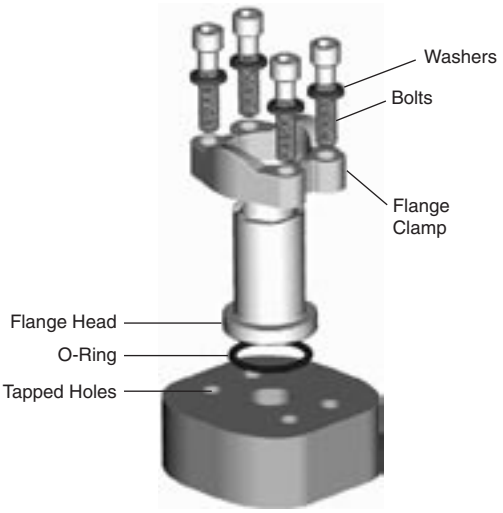


Fig. T9 – 4-Bolt Split Flange Components

There are two types of flange port connections:

- ISO 6162, Type 2
  - SAE Code 61 4-bolt split flange
  - SAE Code 62 4-bolt split flange
- ISO 6164

The 4-Bolt Split Flange consists of four main components:

- A body (flange head)
- An O-ring
- One “captive” or two “split” flange clamps
- Four bolts and washer

The four-bolt port is simply a circular opening (flow passage) surrounded by four tapped holes in a certain pattern for acceptance of the flange clamping bolts. The flat surface of the port compresses the O-ring contained in the groove in the flange head when the clamp bolts are torqued. In some instances, the groove is in the port and not in the flange head. The bolts, through the clamp halves, clamp down the flange head onto the flat surface of the port compressing and trapping the O-ring in the groove and leaving no gap for it to extrude under pressure. The hydraulic pressure is thus sealed by the compressed O-ring as long as the bolts are tightened enough to maintain solid metal to metal contact between the flange head at the outside diameter of the O-ring and the top of the port.

Flange Port Assembly

The steps to properly assemble the flange port clamping bolts are:

1. Inspect components to ensure that male and female port threads and sealing surfaces are free of burrs, nicks and scratches, or any foreign material.
2. Lubricate the O-ring.
3. Position flange and clamp halves.
4. Place lock washers on bolts and insert through clamp halves.
5. Hand tighten bolts.
6. Torque bolts in diagonal sequence (see Fig. T10) in small increments to the appropriate torque level listed in Table T6 or T7 below.

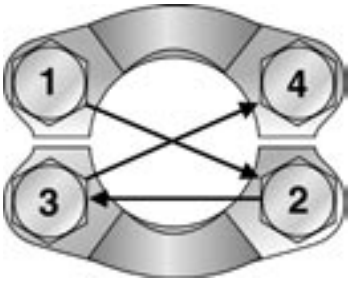


Fig. T10 – Flange Bolt Tightening Sequence

Dash Size	Flange Size	Inch Bolt (J518)	Torque ft. lbs.	Metric Bolt (ISO 6162)	Torque N-m
8	1/2	5/16-18	17 ± 2	M8	25
12	3/4	3/8-16	25 ± 4.5	M10	49
16	1	3/8-16	31 ± 4.5	M10	49
20	1-1/4	7/16-14	41 ± 5	M12*	85
24	1-1/2	1/2-13	52 ± 6	M12	85
32	2	1/2-13	60 ± 6	M12*	135
40	2-1/2	1/2-13	85 ± 9	M12	95
48	3	5/8-11	144 ± 15	M16	220
56	3-1/2	5/8-11	125 ± 8	M16	220
64	4	5/8-11	125 ± 8	M16	220
80	5	5/8-11	125 ± 8	M16	220

* Does not meet ISO 6162 specification.

Table T6 – Code 61 Flange Recommended Bolt Torque

Dash Size	Flange Size	Inch Bolt (J518)	Torque ft. lbs.	Metric Bolt (ISO 6162)	Torque N-m
8	1/2	5/16-18	17 ± 2	M8	25
12	3/4	3/8-16	30 ± 4.5	M10	49
16	1	7/16-14	46 ± 4.5	M12	85
20	1-1/4	1/2-13	69 ± 6	M14*	135
24	1-1/2	5/8-11	125 ± 8	M16	210
32	2	3/4-10	208 ± 20	M20	425

* Does not meet ISO 6162 specification.

Table T7 – Code 62 Flange Recommended Bolt Torque

Socket Screw Bolt Circle (LK)	Socket Head Cap Screws	Tightening Torques N-m
LK35	M6	10
LK40	M6	10
LK55	M8	25

Table T8 – Hydraulic Flange Recommended Bolt Torque

* In general, variances of torque for soft metal ports/manifolds (ie: aluminum block - 66% of specified torque)

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Troubleshooting Port End Connections

60° Cone (Metric, BSPP and NPSM)

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
End of swivel nut contacts hex shoulder of adapter before cone and ball nose tightens	• Wrong combination of swivel nut and adapter	• Ensure that components are to the same specification (even with the same type, there are different designs for 60° cone fittings)
Thread engagement seems adequate and swivel nut is tight but leakage still occurs	• Scratches or nicks on sealing surface • Chatter marks on sealing surface	• Replace components. These fittings depend on metal-to-metal seal and require smooth mating surfaces to seal
There is leakage from the joint and the swivel nut is loose	• Inadequate make-up torque	• Use proper torque to create a seal as well as prevent vibration loosening
Swivel nut tightens, cone is tight but connection still leaks	• Inadequate or no chamfer in adapter	• Use components with proper chamfer (very common occurrence with NPTF/ NPSM 60° cone fittings). Male pipe end must have chamfer for proper sealing. Not all male pipe ends have chamfer as standard

Tapered Thread (including BSPT, NPT and metric taper)

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Thread galling	• Most common in stainless steel, caused by friction and lack of lubricant	• Replace fitting and apply proper thread sealant/lubricant to replacement fitting and tighten to appropriate TFFT
Fitting leaks, even after proper tightening	• Sealant omitted or inadequately applied • Damaged or cracked threads • Cracked port • Thread mixing of BSPT and NPT threads	• Re-apply sealant to appropriate TFFT and re-tighten • Replace fitting • Replace component • Determine port thread type and replace fitting with matching thread type
Insufficient thread engagement (3 to 6 threads of engagement required)	• Quality problem with port or adapter • Too much thread sealant (tape)	• Have port and adapter thread inspected; replace faulty parts • Remove all thread sealant and re-apply 1 to 2 layers of tape
Too much thread engagement (more than recommended 3 to 6 threads)	• Typically port or adapter machining or wear problem, or port could be cracked due to excessive torque	• Inspect port and adapter for proper tolerance or wear, replace faulty parts, retighten to appropriate TFFT
Poor-quality threads or damaged/nicked threads	• Larger sizes are more prone to having nicked threads due to handling damage	• Replace fitting with threads that are free of scratches and nicks

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Troubleshooting Port End Connections

Parallel (SAE, BSPP and metric)

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Washer is too loose (moves by its own weight or rocks too much on the undercut)	• Washer damaged	• Replace fitting
Fitting threads are distorted	• Over-torqued • Mixed threads	• Replace fitting and tighten to proper torque • Determine correct thread type
Several scratches or nicks on the port face	• Port face contaminated (dirty)	• Reface the port
Spot face of port is smaller than washer diameter	• Improper port tool was used • Wrong fitting selected for port	• Reface the port • Select a proper fitting
Port threads are distorted (yielded)	• Fitting over-torqued	• Replace component
Leakage persists after locknut has been torqued	• Damaged O-ring • Damaged washer • Improper assembly	• Replace O-ring with new quality O-ring (90 durometer) and reconnect fitting to proper torque • Replace fitting • Follow proper assembly procedure
Washer distorted, allowing opportunity for O-ring to extrude	• Exposed upper thread forced washer into port during assembly (over-torquing makes this more prevalent)	• Replace fitting, using proper installation techniques for adjustable port ends

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Troubleshooting Port End Connections

Flange (i.e., ISO 6162 4-Bolt)

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Missing or improper O-ring	• Assembly/re-assembly oversight	• Replace with proper O-ring and re-tighten connection using incremental alternating tightening procedure
O-ring pinched or extruded	• Improper tightening procedure	• Replace O-ring and re-tighten connection using incremental alternating tightening procedure
Evidence of yielded or cracked flange head, tube or hose end	• Misaligned tube or hose connection	• Re-bend or re-route hose/tube lines to eliminate misalignment
Components do not mate or gap is too large	• Proprietary flange or pressure series matching problem	• Properly identify all components—most proprietary flanges use standard Code 61/62 bolt patterns and threads but are not usually interchangeable
Port has severe scratches or nicks in seal area	• Mishandling or abuse	• Resurface the port to remove scratches and nicks
Clamp halves are bent	• Over-pressurization or over-torque	• Replace clamp halves and tighten to proper torque
Bolts are bent	• Bolts are too weak or over-torqued	• Replace bolts with grade 5 or better; retighten to proper torque

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Tube End Assembly

The assembly of the tube end consists of the following two steps:

1. Tube end preparation (cutting, deburring and cleaning)
2. Assembly and installation

Tube End Preparation

Tube end preparation is a very critical step to assure the integrity of a tube assembly. Failure to properly perform this function can result in leakage. The three steps in proper tube end preparation are: cutting, deburring and cleaning.

Cutting

Cut tube reasonably square (within +/- 1°) using a circular toothed cut-off saw (see Fig. T10), or a hacksaw with a fine tooth blade guided by a Tru-Cut Saw Guide (shown in Fig. T11) or other mitre-type saw guide.

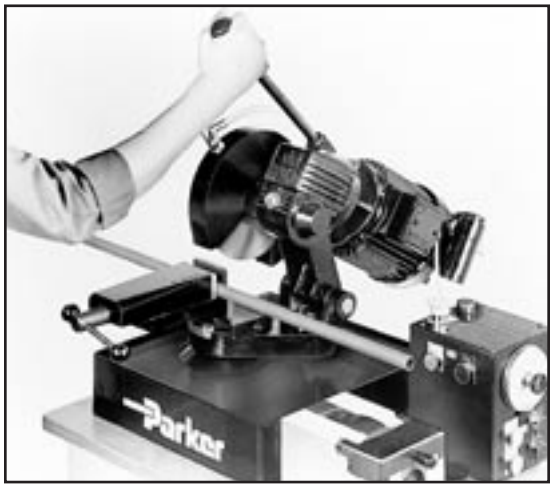


Fig. T10 – Cut-off Saw on Parker's TP432 or TP1025 Tube Preparation Center

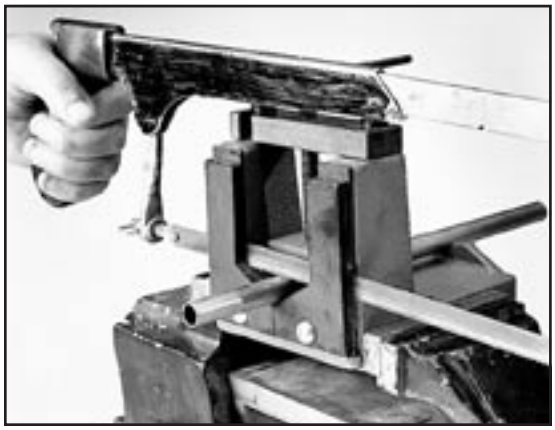


Fig. T11– Parker's Tru-Kut Sawing Vise used with hacksaw

A tube cutter may be used with soft tube such as copper and aluminum. It is not recommended for steel and stainless steel tube because it creates a large burr on the I.D., which is difficult to remove and creates flow restriction. For a steel or stainless steel tube application, Fig. T12 illustrates a proper cut and an improper cut (the improper cut was performed by a tube cutter).

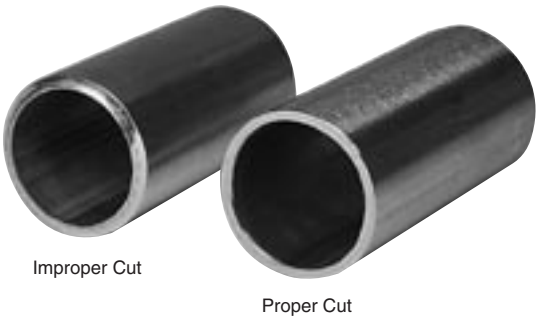


Fig. T12 – Samples of improper and proper cuts on steel tube

A square cut is essential to assure a leak-free connection. The following illustrations depict what will result from an uneven cut.

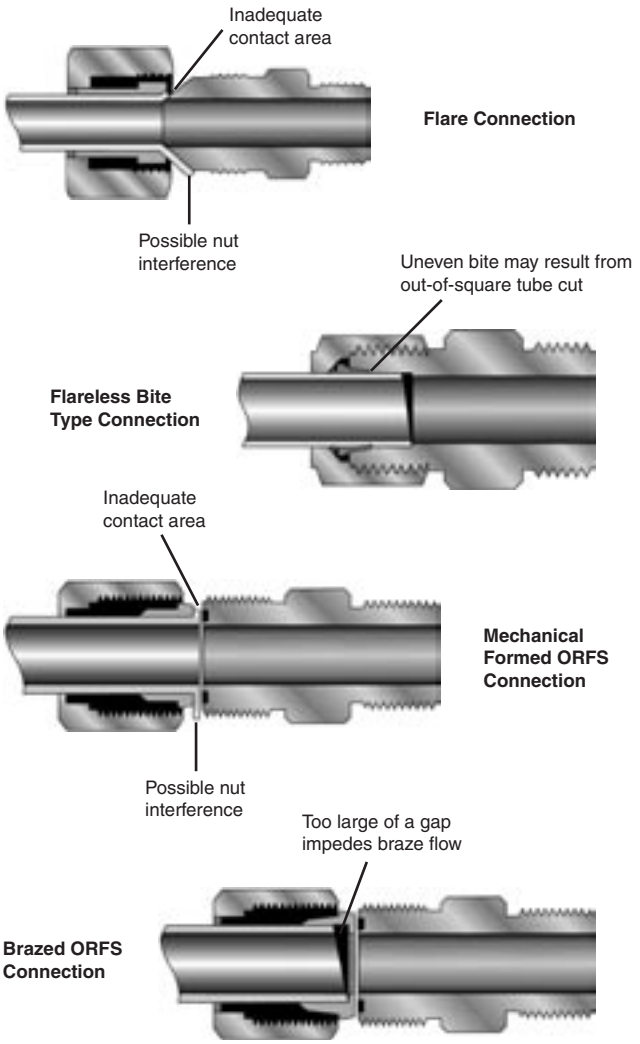


Fig. T13– Results of Uneven Tube Cuts

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Deburring

Lightly deburr the I.D. and O.D. of the tube end to remove burrs and sharp edges. Use the In-Ex deburring tool or power deburring tool (shown on page S23), or emery paper if using tube cutter (for soft tube) or hacksaw. Use front mounted deburring tools if using TP432 or TP1025 tube preparation center found on page S55.

Note: Point tube end downward during deburring to keep chips from entering the tube.

Cleaning

Remove metal chips from I.D. with a brush or compressed air. Wipe the I.D. and the O.D. of the deburred tube end with a clean rag. Debris present in the tube end can result in system contamination or can get embedded into the flange or flare, causing imperfections that are potential leak paths.

Seal-Lok and Seal-Lok Lite Assembly

The proper assembly of the Seal-Lok fitting requires several steps, each important in guaranteeing a leak-free connection and a long service life:

1. Cutting, deburring and cleaning the tube
2. Sleeve Attachment
3. Inspection of sleeve attachment
4. Final installation

The first step of cutting, deburring and cleaning has been covered in a previous section (see page T12).

For recommended minimum and maximum tube wall thickness for Seal-Lok fittings, please refer to Table A2 and A3 on page A7.

Sleeve Attachment

Attaching the sleeve to the tube end is the next critical assembly step. This can be accomplished by two methods: flanging or brazing.

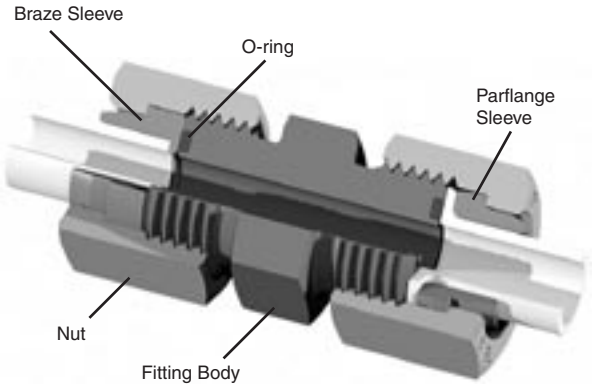


Fig. T14 – Seal-Lok Union cutaway with flanged and brazed assemblies

Flanging

The flanging method requires the use of an appropriate forming machine to create the flange or flat face on the tube end. Since the flat face of the flanged tube seals against the O-ring within the fitting groove, it is important that this surface be relatively smooth. Proper tube end preparation (cutting, deburring and cleaning) will help accomplish this goal

The Parker Parflange® machines utilize an orbital cold forming process to produce a flat, smooth, rigidly supported 90° sealing surface on the tube end.

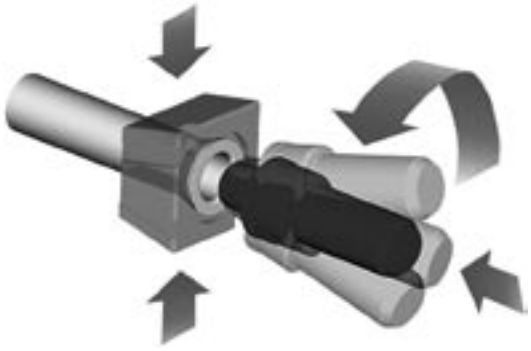


Fig. T15 – Parker's exclusive orbital spindle motion produces a perfect flange every time

Parker offers a bench mount model known as the Parflange 1025, shown in Fig. T16, as well as a more versatile, fully automated high speed model, Parflange 1050. For additional information on the Parflange machines and tooling, refer to section S of this catalog.



Fig. T16 – Parflange 1025 machine

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Flanging Steps:

1. Determine the extra cut-off length required for the Parflange process by referring to Tables T9 and T10. (Each table is only a guide. Variations in tube wall thickness and inconsistency in quality of tube cut-off may affect actual dimensions. User should verify actual extra tube cut-off length with one or two flanges prior to large scale flanging.)
2. Select the proper tooling for the tube size. The tube OD, wall thickness and material must be known for proper selection. Refer to Table S5 on page S26 for flanging capability by Parflange machine and availability of tooling
3. With the sleeve properly positioned within the die set, place the set into the die holder of the machine.
4. Insert the tube through the die opening until it comes in contact with the tube stop. Do not forget to position the tube nut over the tube in the proper orientation, especially if the other tube end has already been flanged, or the tube has sharp bends.
5. Flange the tube as shown in Figure T16.

Note: For more information on Parflange procedures, machines, etc., Contact Parker.

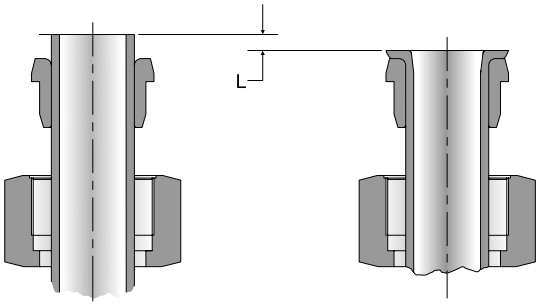


Fig. T17 – Extra cut-off length

Tube O.D. (in.)	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	5/32	1/8	7/64	9/64	5/32	11/64		
1		9/64*	9/64*	9/64	9/64	7/64	11/64	11/64	316		
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

*For Seal-Lok Lite only.
**For both Seal-Lok and Seal-Lok Lite.

Table T9 – Extra tube cut-off length guide for inch tube

Tube O.D. (in.)	Metric Tube Outside Diameter (mm)															
	6	8	10	12	14	15	16	18	20	22	25	28	30	32	35	38
1.0	4.5 11/64	5.5** 7/32	2.5** 3/32	3.5** 9/64	—	5.0 13/64										
1.5	5.5 7/32	5.0 13/64	4.0 5/32	4.5** 11/64	4.5 11/64	4.5 11/64	3.0 1/8	6.0 15/64								
2.0			3.5 9/64	4.5 11/64	6.0 15/64	5.0 13/64	3.0 1/8	5.5 7/32	4.0 5/32	6.5 1/4	4.5 11/64	6.0 15/64	5.0 13/64	—	—	5.5 7/32
2.5				4.5 11/64	5.5 7/32	5.0 13/64	3.5 9/64	6.5 1/4	4.0 5/32	7.0 9/32	4.5 11/64	7.5 19/64	5.5 7/32	—	—	—
3.0							3.0 1/8	6.0 15/64	4.0 5/32	7.0 9/32	4.5 11/64	7.0 9/32	5.0 13/64	4.0 5/32	7.0 9/32	5.0 13/64
3.5									4.0 5/32	—	4.5 11/64	—	—	—	—	—
4.0									3.5 9/64	—	4.5 11/64	—	5.5 7/32	4.0 5/32	—	5.0 13/64
5.0											4.0 5/32	—	—	—	—	5.0 13/64

*For Seal-Lok Lite only.
**For both Seal-Lok and Seal-Lok Lite.

Table T10 – Extra tube cut-off length guide for metric tube

Dimensions and pressures for reference only, subject to change.

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Another consideration prior to flanging is the minimum straight length to the start of a 90° bend. Table T11 provides this information.

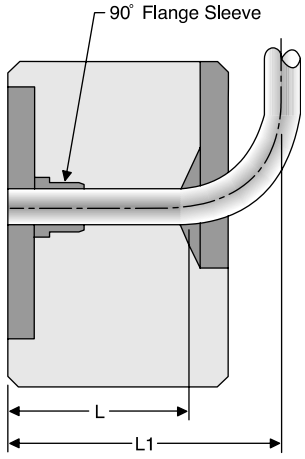


Fig. T18 – Minimum straight length to start of bend for 90° flanging

Tube O.D. Inch Sizes	Tube O.D. Metric Sizes	L* (in.)	L* (mm)	L1** (in.)	L1** (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 T11 – Minimum straight length to start of bend for 90° flanging

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.

Flange Inspection

The flange should be inspected for proper diameter and sealing surface quality. Table T12 provides the flange diameters for the different sizes. The sleeve can also be used as a quick gauge of the flange diameter. Visually compare the flange diameter to the tapered surface located at the front end of the sleeve (right behind the flange). The large diameter and small diameters at each end of this surface serve as the maximum and minimum flange diameter limits, respectively.

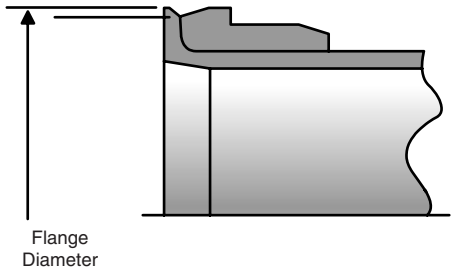


Fig. T19 — Flange diameter

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 T12 – Flange dimensions

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Over-flanging will result in tube nut interference, as well as thinning of the flange tube end. Under-flanging reduces the contact area for sealing against the O-ring in the fitting.

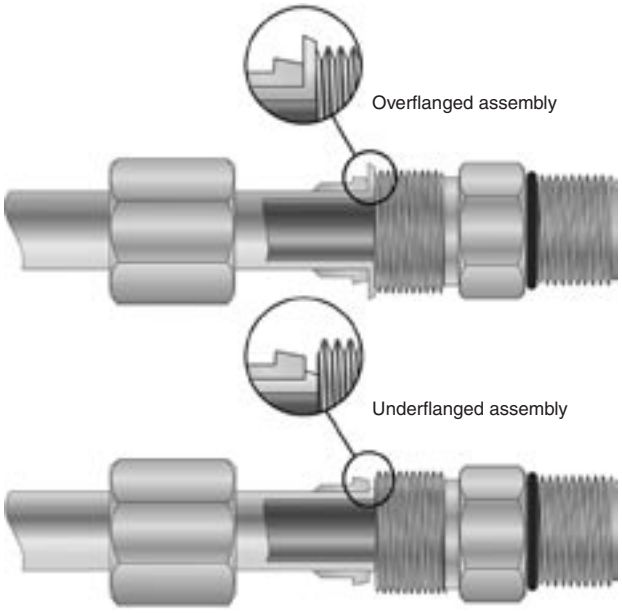


Fig. T20 – Overflanging and Underflanging

Advantages of Parflange process

There are numerous advantages to using the Parflange process over the braze or weld process:

- The Parflange process is several times faster than the brazing or welding 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 inherently 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 components (i.e., tube and sleeve), thus eliminating the need to electroplate assemblies after fabrication.
- The Parflange process eliminates the potential for leaks 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.

Brazing

Brazing is the other method of attaching the sleeve to the tube end. This process can be accomplished by using a multi-flame torch, as shown in Fig. T21, or an induction brazing unit. During the heating process, the pre-formed braze ring or wire-fed filler material is melted between the tube O.D. and the sleeve I.D., creating a strong bond between the two.



Fig. T21 – Multi-flame torch brazing

Brazing Steps:

1. Determine the tube length allowance using Table T13.

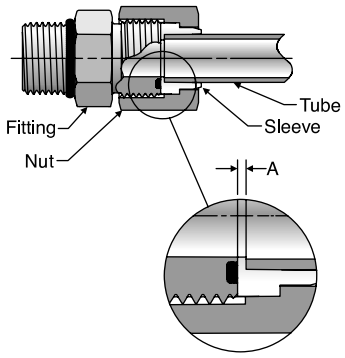


Fig. T22 – Tube length allowance

Nominal Tube O.D.		A
Inch	Metric	(in.)
1/4	6	0.04
3/8	8, 10	0.04
1/2	12	0.04
5/8	14, 15, 16	0.06
3/4	18, 20	0.06
1	22, 25	0.06
1 1/4	28, 30, 32	0.06
1 1/2	35, 38	0.06

Table T13 – Tube length allowance

2. **Cleaning the tube end:** All oil and oxide buid-up must be removed from the tube end 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.
3. **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 nudge to seat the sleeve on the tube.
4. **Applying flux:** Apply proper flux to tube end (about 1½ sleeve lengths) and sleeve's face and outside surface. Insert appropriate braze ring in the sleeve and place the sleeve on end of the tube. The flux helps protect the parts from oxidizing and promotes braze flow.
5. **Heating the part:** Apply heat uniformly to the joint by using a multi-flame torch as shown in Fig. T21 or with an induction braze unit. 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 sleeve. 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.
6. **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.
7. **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 45[1] 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 136[2] (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-40[3] or SP-350[4] 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, Warminister, PA 18974 (215) 674-4300

Inspection of Brazing

Inspect the 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.

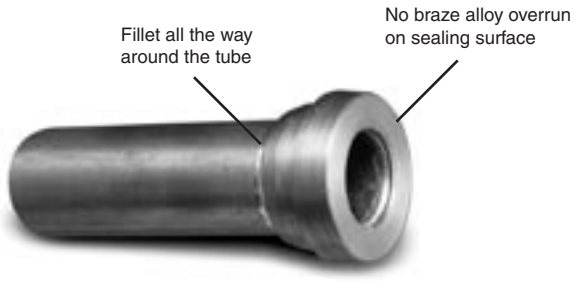


Fig. T23 – Brazed fitting

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

Final Installation

The following steps are required for final installation of the Seal-Lok fitting:

1. Ensure that the correct O-ring is properly installed in the groove of the fitting, if not already pre-installed by the fitting manufacturer (Parker provides Seal-Lok fittings with pre-installed O-rings). Since Seal-Lok is machined with the captive O-ring groove (CORG), it is recommended that a CORG assembly tool be utilized, as shown in Fig. T24. To properly use the assembly tool, follow these steps

- Position the O-ring inside the CORG assembly tool against the pusher.
- Position the tool over the Seal-Lok tube end until the end is bottomed in the tool.
- Push the plunger of the tool until the O-ring is inserted and seated into the groove.



Fig. T24 – O-Ring installation using the CORG assembly tool

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2. Place the tube assembly against the fitting body so that the flat face of the flange tube (or braze sleeve) comes in full contact with the O-ring. Thread the nut onto the fitting body by hand and tighten it to the recommended torque: Seal-Lok (Table T14) and Seal-Lok Lite (Table T15). 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 light wrench resistance is reached. Tighten further to the appropriate F.F.W.R. value.

   Note: A second wrench may be required to prevent the fitting from moving during assembly.

Caution: The torque method of assembly is the preferred method of assembly for Seal-Lok and Seal-Lok Lite fittings. 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.

O.D.		SAE Dash Size	Tube Side Thread Size (UN/UNF)	Tube Side Assembly Torque (+10% -0%)			Flats from Wrench Resistance (F.F.W.R.)	
(in.)	(mm)			in.-lb.	ft.-lb.	N-m	Tube Nuts	Swivel & Hose Ends
1/4	6	-4	9/16-18	220	18	25	1/4 to 1/2	1/2 to 3/4
3/8	8, 10	-6	11/16-16	360	30	40	1/4 to 1/2	1/2 to 3/4
1/2	12	-8	13/16-16	480	40	55	1/4 to 1/2	1/2 to 3/4
5/8	14, 15, 16	-10	1-14	—	60	80	1/4 to 1/2	1/2 to 3/4
3/4	18, 20	-12	1 3/16-12	—	85	115	1/4 to 1/2	1/3 to 1/2
1	22, 25	-16	1 7/16-12	—	110	150	1/4 to 1/2	1/3 to 1/2
1 1/4	28, 30, 32	-20	1 11/16-12	—	150	205	1/4 to 1/2	1/3 to 1/2
1 1/2	35, 38	-24	2-12	—	230	315	1/4 to 1/2	1/3 to 1/2

Table T14 – Seal-Lok assembly torque and F.F.W.R.

O.D.		SAE Dash Size	Tube Side Thread Size	Tube Side Assembly Torque (+10% -0%)		
(in.)	(mm)			in.-lb.	ft.-lb.	N-m
3/8	8, 10	-6	M18X1.5	240	20	40
1/2	12	-8	M22X1.5	320	30	55
3/4	18, 20	-12	M30X1.5	680	60	115
1	22, 25	-16	M36X1.5	880	75	150

Table T15 – Seal-Lok Lite Assembly Torque

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Seal-Lok Troubleshooting Guide

O-Ring Face Seal

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Immediate leakage when system is pressurized	• Improper tightening of joint	• Check for O-ring damage and re-tighten connection to the recommended torque value
Under-flanged assembly	• Undersized tube diameter resulting in tube slippage during flanging • Die gripping surface is worn or dirty	• Verify that the O.D. is correct; if undersized, replace tube. • Inspect die gripping surface; if clogged or excessively worn, clean or replace.
Over-flanged assembly	• Sleeve is positioned incorrectly in die	• Check for proper positioning of sleeve in die; if over-flanged, replace tubing
Flange out-of-round	• Tubing was not cut properly • Tube was not properly supported during flanging • Tubing is eccentric	• Cut tubing within 90° ±1° • Support tubing so that tube end is perpendicular to tube stop during flanging • Replace with quality tubing • Replace out-of-round flanges
Cracked flange	• Tubing too hard	• Replace tubing using recommended quality tube
Scored, pitted flange	• Improper deburring and cleaning of tube prior to flanging • Flange pin not cleaned and lubricated properly	• Replace flange using proper deburring and cleaning recommendations • Keep flanging pin clean and working surfaces well lubricated.
Leakage at braze joint	• Poor braze joint/improper joint clearance • Mixing of sleeve and tube material • Improper/inadequate flux, braze alloy overrun, or buildup on face • Improper/inadequate braze temperature	• Flux and reheat the joint, remove and replace with new sleeve • Always use steel sleeves with steel tubing and stainless sleeves with stainless tubing • Apply flux liberally to sleeve and tube end prior to brazing. Use recommended flux, braze alloy and brazing temperature.
Leakage at face-seal end	• Misalignment or improper fit • Damaged, pinched, improper, or missing O-ring • Extruded O-ring • Damaged fitting • Braze overflow on sealing surface	• Align tube end and connecting fitting properly before tightening tube nut, holding the flat face of the mating fitting against O-ring while tightening • Replace O-ring, properly installing it in the face seal groove • Replace O-ring and check for proper alignment and pressure surges exceeding rated pressure of fitting; tighten the nut to recommended torque or replace fitting if threads or sealing surface is grossly damaged. • Remove and replace sleeve which has braze overflow on its sealing surface.

Table T16 – Seal-Lok Troubleshooting guide

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Triple-Lok/Triple-Lok 2 Assembly

For leak-free performance, the Triple-Lok fitting requires the following steps:

1. Cutting, deburring and cleaning of the tube
2. Flaring
3. Flare inspection
4. Installation

> **Caution:** Use only seamless or welded and drawn tube that is fully annealed for flaring and bending. (See page U14 for tube/fitting material compatibility information.)

Step 1 has been covered in a previous section (see page T12).

For the recommended minimum and maximum tube wall thickness for Triple-Lok fittings, please refer to Table C3 on page C8.

Flaring

Several flaring methods, ranging from simple hand flaring to hydraulic/electric power flaring, are available. Various tools for flaring are shown on pages S27 through S32. Power flaring is quicker and produces more accurate and consistent flares compared to hand flaring. Therefore, it is a preferred method of flaring. Hand flaring should be limited to places where power flaring tools are not readily available. The Parflange machines shown on pages S24-S25 also flare tube with an orbital flaring process and provide the best flare for stainless steel tube.

Prior to flaring, determine the tube length allowance using Table T17. This tube length allowance should be added to the cut tube length to allow for the "loss" of tube caused by flaring.

Nominal Tube O.D.		A
Inch	Metric	
1/8	—	0.07
3/16	—	0.08
1/4	6	0.09
5/16	8	0.08
3/8	10	0.08
1/2	12	0.12
5/8	14, 15, 16	0.13
3/4	18, 20	0.15
7/8	22	0.15
1	25	0.15
1 1/4	30, 32	0.20
1 1/2	38	0.18
2	42	0.28

Table T17 — Tube length allowance

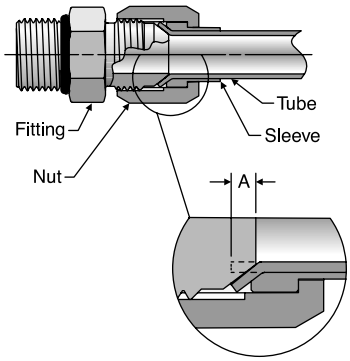


Fig. T25 — Tube length allowance

Flare tube end using one of the flaring tools and following its operating instructions. Fig. T26 shows flaring with Hydra-Tool.

> **Note:** Be sure to insert a nut and a sleeve in proper sequence and orientation before flaring either end of a bent tube, or second end of a straight tube (see Fig. T27).



Fig. T26 – Flaring with Hydra-Tool



Fig. T27 – Nuts and sleeves assembled before flaring

Flare Inspection

Inspect flare for dimensions and surface quality. Table T18 shows the proper flare dimensions. The sleeve can also be used for a quick check of the flare dimensions as shown in Fig. T28.

Inch Tube O.D. (in.)	Metric Tube O.D. (mm)	37° Flare Diameter ØA (in.)
1/4	6	.340/.360
5/16	8	.400/.430
3/8	10	.460/.490
1/2	12	.630/.660
5/8	15 & 16	.760/.790
3/4	18 & 20	.920/.950
1	25	1.170/1.200
1 1/4	30 & 32	1.480/1.510
1 1/2	38	1.700/1.730

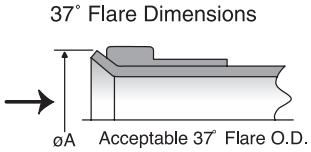


Table T18 — 37° Flare Dimensions

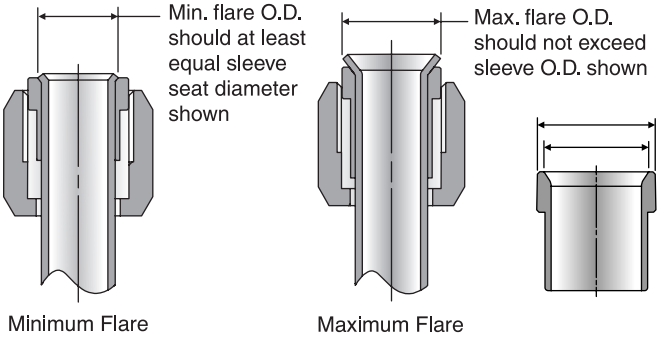


Fig. T28 – Comparing flare O.D. with sleeve seat and O.D.

Underflaring (see Fig. T29) reduces contact area causing excessive nose collapse and leakage; or, in extreme cases, tube pull out under pressure.

Overflaring (see Fig. T29) causes tube nut thread interference, either preventing assembly altogether, or giving a false sense of joint tightness resulting in leakage.

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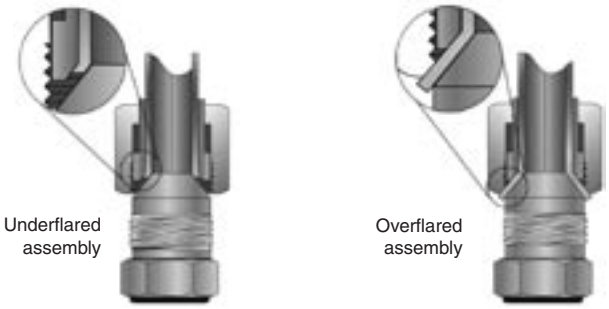


Fig. T29 – Underflaring and overflaring

The flare must be reasonably square and concentric with the tube O.D.; and its surface must be smooth, free of rust, scratches, splits, weld beads, draw marks, embedded chips, burrs or dirt. If the flare does not meet the above requirements, cut it off, determine the probable cause from the troubleshooting guide shown in Table T21, take corrective action and re-flare.

Installation

Improper flaring or installation causes over half of the leakage with flared fittings. Thus, proper installation is critical for a trouble free operation.

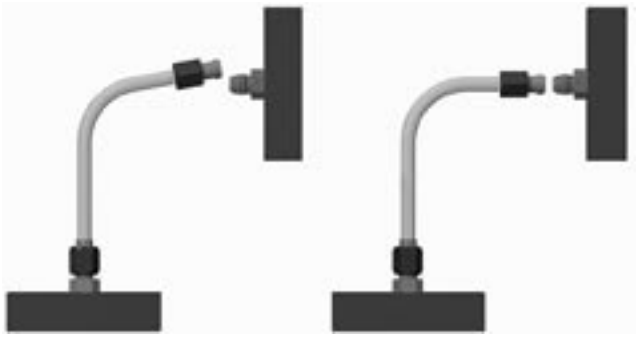


Fig. T30 – Improper bend and short tube

Align the tube on the flare (nose) of the fitting body and tighten the nut using one of two methods described below.

1. Flats from Wrench Resistance (FFWR) or "Flats" method
2. Torque method

> **Note:** Do not force an improperly bent tube into alignment (Fig. T30) or draw-in too short a tube using the nut. It puts undesirable strain on the joint leading, eventually, to leakage.

Flats Method

Tighten the nut lightly with a wrench (approximately 30 in.lb.), clamping the tube flare between the fitting nose and the sleeve. This is considered the Wrench Resistance (WR) position. Starting from this position, tighten the nut further by the number of flats from Table T20. A flat is referred to as one side of the hexagonal tube nut and equates to 1/6 of a turn.

This Flats method is more forgiving of the two. It circumvents the effects of differences in plating, lubrication, surface finishes, etc., that greatly influence the torque required to achieve proper joint tightness or clamping load. Therefore, it is recommended to use this method wherever possible, and especially where the plating combination of components is not known, and during maintenance and repair where the components may be oily. Use Table T19 as a guide for proper tightening method.

Condition	Recommended Tightening Method
1. Plating of all components is the same.	Either method is acceptable. Use Table T20.
2. Plating is mixed.	Use FFWR method.
3. Plating of nut and sleeve or hose end is unknown.	Use FFWR method.
4. Parts are oily.	Use FFWR method.
5. Stainless or brass components.	Use FFWR method.

Table T19 – Joint tightening method guide

Parker also recommends that wherever possible, the step of marking the nut position relative to the body should be done. This step serves as a quick quality assurance check for joint tightening. To do this, at the initial wrench resistance position, make a longitudinal mark on one of the flats of the nut and continue it on to the body hex with a permanent type ink marker as shown in Fig. T31. Then, at the properly tightened position, mark the body hex opposite the previous mark on the nut hex.



Fig. T31 – Make reference mark on nut and tube body

These marks serve two important functions:

1. The displaced marks serve as a quick quality assurance check that the joint has been tightened.
2. The second mark on the body serves as a proper tightening position after a joint has been loosened.

The flats method is slower than the torque method, but it has the two distinct advantages described earlier, namely, circumvention of plating differences and a quick visual check for proper joint tightening.

Torque Method

With proper tube flare alignment with the nose of the fitting, tighten the nut to appropriate torque value in Table T20. This method is fast and accurate when preset torque wrenches are used. Consistent component selection is recommended so that the effects of dissimilar plating is not an adverse factor in joint integrity. This makes it desirable for high production assembly lines. However, a joint assembled using the torque method can only be checked for proper tightening by torquing it again.

> **Note:** This method should not be used if the type of plating on the fitting and mating parts (sleeve + nut or hose swivel) is not known. The torque method should not be used for lubricated or oily parts as improper clamping forces may result. Over-tightening and fitting damage may occur as a result.

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SAE Dash Size	Thread Size	Assembly Torque* (+10% -0) in. lb.	Assembly Torque* (+10% -0) ft. lb.	Tube Connection FFWR	Swivel Nut or Hose Connection FFWR
-2	5/16-24	35	2	—	—
-3	3/8-24	65	5	—	—
-4	7/16-20	130	11	2 1/2	2
-5	1/2-20	165	14	2 1/2	2
-6	9/16-18	235	20	2 1/2	2
-8	3/4-16	525	43	2 1/2	2
-10	7/8-14	650	55	1 1/2	1 1/2
-12	1 1/16-12	950	80	1 1/2	1 1/2
-14	1 3/16-12	1200	100	1 1/2	1 1/2
-16	1 5/16-12	1400	115	1	1 1/2
-20	1 5/8-12	1900	160	1	1
-24	1 7/8-12	2250	185	1	1
-32	2 1/2-12	3000	250	1	1
-40	3-12	—	—	1	1

Table T20 – Triple-Lok assembly torques and FFWR
For brass fittings, use approximately 65% of the torque values shown, unlubricated.

Notes:

1. Assembly Torque: Torque values are for unlubricated carbon steel components and properly lubricated stainless steel components. For stainless steel, a lubricant such as Permatex Anti-Seize Lubricant is recommended to prevent galling.
2. FFWR: The Flats From Wrench Resistance or “Flats” method is recommended for steel, stainless steel and brass components.
3. Torque and FFWR: Torques and FFWR shown in the chart are for use with the tube materials, wall thickness, etc. recommended by Parker Hannifin Tube Fittings Division for use with Parker Triple-Lok fittings.

Triple-Lok Troubleshooting Guide

37° Flare

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Tube nut binds to tube flare Tube nut cannot engage the fitting body	• Flare too large or tube wall too heavy	• Flare new tube end using proper flare diameters
Flare is out-of-round (lopsided)	• Tube cut at an angle	• Re-cut tube, reasonably square, to 90° ± 1° and flare new tube end
Nicks, scratches, pock marks on tube flare of fitting	• Contaminants on tube ID or flaring cone/pin prior to flaring • Worn/damaged flaring cone/pin • Poor-quality tube	• Flare new tube end using proper tube preparation techniques • Assure that flare cone is clean • Replace poor-quality tube
Tube crack on flare	• Poor-quality welded tube; work-hardened tube; tube not annealed (too hard)	• Flare new tube end using appropriate tube (e.g.,fully annealed) and tube cutting methods
Tube nut bottoms out before seats are mated properly	• Unintentional use of 45° flare tube nut, or tube sleeve was omitted	• Use appropriate 37° flare components (body, nut and sleeve)
Immediate leakage from tube nut	• Connection may not be tightened properly (if at all)	• Check joint for appropriate FFWR or torque; retighten as appropriate
Tube nut continues to back off or loosen	• Damaged Fitting • Excessive vibration • Improper assembly torque	• Replace damaged fitting • Re-route or clamp properly • Assemble to appropriate torque
Damaged fitting and/or nose collapse, flow reduction	• Frequent assembly and disassembly or over-tightening	• Fitting should be replaced and tightened properly; avoid frequent assembly/disassembly

Table T21 — Triple-Lok Troubleshooting guide

Dimensions and pressures for reference only, subject to change.

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Ferulok Assembly

Ferulok fitting assembly consists of the following steps:

1) Cutting, deburring and cleaning of the tube
2) Ferrule pre-set
3) Pre-set inspection
4) Installation

Step 1 (cutting, deburring and cleaning of the tube) has been previously covered (see page T12).

For the recommended minimum and maximum tube wall thickness for Ferulok fittings, please refer to Table D2 on page D5.

Ferrule Pre-set

Prior to final installation, the Ferulok fitting requires a pre-setting operation that creates a bite by the ferrule into the outer surface of the tubing. Pre-setting can be accomplished by two different methods: hydraulically using a Hyferset Tool or a Hydra-Tool, or manually using a hardened Ferulset tool or the fitting body.

Prior to pre-setting, determine the tube length allowance "A" using Table T22.

Pre-setting using Ferulset Tool or Fitting Body

Nominal Tube O.D.	A
1/8	0.19
3/16	0.23
1/4	0.23
5/16	0.25
3/8	0.25
1/2	0.31
5/8	0.35
3/4	0.35
7/8	0.35
1	0.42
1 1/4	0.42
1 1/2	0.49
2	0.49

Table T22 — Tube length allowance

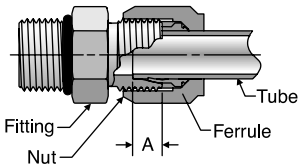


Fig. T32 — Tube length allowance

Ferulset pre-setting tools made from hardened steel are available for sizes 2 through 32. (See page S38.) They are recommended over the fitting body because they can be used repeatedly to perform the pre-set operation. The fitting body can be used only once for pre-setting and should be used during final installation with the pre-set tube line. The following steps are required for proper pre-set of the ferrule using the Ferulset tool or fitting body.



Step 1 – Lubricate thread and cone of Ferulset Tool (or fitting body).



Step 2 – Slip nut and ferrule over deburred tube end. Be sure the long, straight end of the ferrule points toward tube end.



Step 3 – Lubricate ferrule with system fluid or a compatible lubricant.



Step 4 – Bottom tube end firmly on internal shoulder of Ferulset Tool (or fitting body).



Step 5 – Manually screw nut onto Ferulset Tool or fitting body until finger tight.



Step 6 – Make reference mark on nut and tube.



Step 7 – Hold tube steady against internal shoulder of Ferulset Tool or fitting body and tighten nut an additional 1-3/4 turns.



Step 8 – Loosen nut and check for proper pre-set. Use the following inspection criteria.

*No additional lubrication is required with stainless steel fittings as the nuts are pre-lubricated.

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Pre-Set Inspection

All Ferulok fitting presets must be disassembled and inspected for proper ferrule pre-set before final installation for service. The following detailed inspection procedures must be followed regardless of the method used to pre-set the ferrule to the tube. (Refer to Fig. T33 for the five inspection points discussed below).

1. A ridge of metal (A) has been raised above the tube surface to a height of at least 50% of the thickness of the ferrule's leading edge, completely around the tube.
2. While the leading edge of the ferrule may be coined flat (B) there is a slight bow to the balance of the pilot section (C).
3. The tail or back end of the ferrule is snug against the tube (D).
4. There is a slight indentation around the end of the tube (E) that indicates the tube was bottomed in the tool or fitting during pre-setting (if evidence of this complete contact is not visible the ferrule may not be properly pre-set).
5. Avoid rotating the ferrule. Steel ferrules should not be capable of moving back and forth along the tube beyond the bite area (a stainless steel ferrule will move more than steel because of it's spring back characteristics).

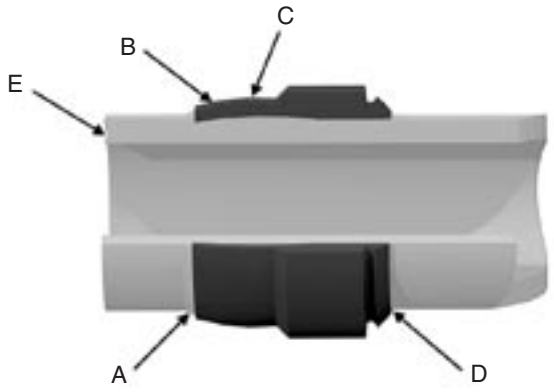


Fig. T33 – Ferulok preset inspection points

Caution: Wrench torque should never be used as the gauge for reliable Ferulok pre-set and/or assembly. The reliability of the pre-set and assembly of bite type fittings is dependent on the ferrule traveling a prescribed distance into the tapered fitting throat in order to bite into the tube and effect a strong grip and seal.

Pre-setting with Hyferset Tool or Hydra-Tool

Pre-setting with hydraulic equipment (Hyferset or Hydra-Tool) is preferred for fittings larger than size 8 or large production quantities in any sizes.

For full instruction on the use of the Hyferset Tool (see Fig. T34), please refer to Bulletin 4393-B1, which is included with each shipment of the Hyferset Kit #611049C.

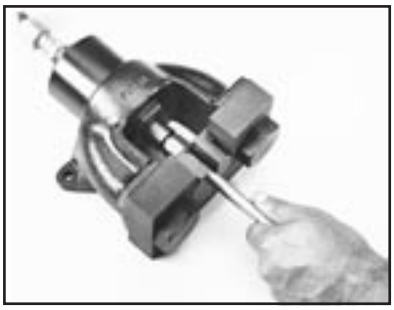


Fig. T34 – Hyferset tool

Installation

Use one of the following installation procedures, depending on the tooling used earlier to pre-set the ferrule to the tubing.

1. **Fitting body used to pre-set ferrule** – If the fitting body was used for ferrule pre-set, re-tighten the nut to the **same** fitting body used earlier in the pre-set. Tighten the nut until a sudden and noticeable wrench resistance is evident. **From this point, tighten the nut an additional 1/6 to 1/4 turn.** (An alternative method is to take the nut to the finger-tight position, then wrench-tighten another 1/3 to 1/2 turn). FNU caps follow this tightening procedure also.
2. **Hyferset, Hydra-Tool or Ferulset Tool used to Pre-set Ferrule** – If one of these tools was used for ferrule pre-set, select any appropriate fitting body and lubricate its threads. Conduct re-tightening following any one of the two methods described in procedure 1 above.
3. **Swivel nut assembly procedure (R6BU, C6BU and S6BU)** – For final assembly of swivel nut, a 3/4 turn from finger tight is required for all sizes.

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Ferulok Troubleshooting Guide

Problems with bite type hydraulic fittings are most often traced to faulty Pre-Set/Assembly procedure.

Problem / Probable Cause	Remedy
Tube not bottomed	Check for the indentation on the tube end or compare the length from the end of the tube to the front end of the ferrule of a known good assembly to that of the assembly in question. This assembly should be scrapped. (Fig. T35)
Shallow bite	Inspect for turned up ridge of material. A failure to achieve this ridge can be traced either to the nut not being tightened enough or the tube not being bottomed against the stop which allowed the tube to travel forward with the ferrule. In some instances this assembly may be re-worked. (Fig. T36)
Over-set ferrule	Too much pressure or more than 1 3/4 turns from finger tight were used to pre-set ferrule, or the nut was severely over-tightened in final assembly. This assembly should be scrapped. (Fig. T37)
Ferrule cocked on tube	The ferrule may become cocked on the tube when the tube end is not properly lined up with the body. Generally, this condition is caused by faulty tube bending. All bent tube assemblies should drop into the fitting body prior to make up. This assembly should be scrapped. (Fig. T38)
No bite	If all of the prior checks have been made and the ferrule still shows no sign of biting the tube, it may be that the tube is too hard. This assembly should be scrapped. (Fig. T39)

Table T23 – Ferulok fitting troubleshooting guide

Caution: Pre-set tools such as the Ferulset and Hyferset are preferred for pre-setting ferrules prior to final assembly. However, when an actual fitting body is used to pre-set the ferrule, that body should be connected only to the specific ferrule it was used to pre-set.

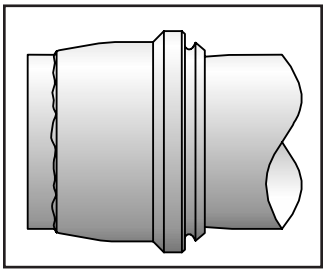


Fig. T35 – Tube not bottomed

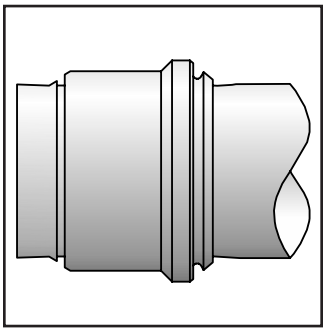


Fig. T36 – Shallow bite

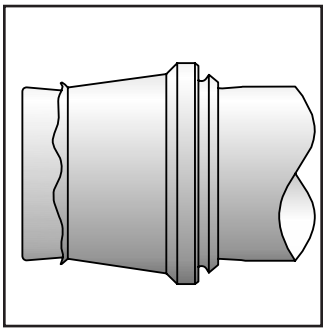


Fig. T37 – Over-set ferrule

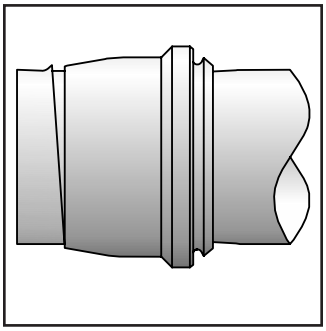


Fig. T38 – Ferrule cocked on tube

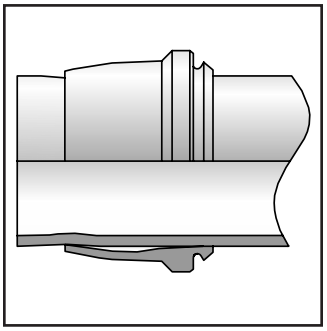


Fig. T39 – No bite

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24° Flareless Bite

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Immediate leakage when system is pressurized	• Improper ferrule/bite ring orientation	• Reset ferrule to ensure that the leading edge of ferrule/bite ring is pointing towards end of tube and seat of the mating fitting
Additional/excessive stress apparent on bite	• Non-square tube cut; tube not being properly supported in seat of adapter	• Re-cut tube to 90° ± 1°
Flexural stresses allow tube to"rock" back and forth	• Tube not fully supported in fitting's body seat	• Reset tube end. This time ensure that the tube is bottomed in the presetting tool or fitting body
Poor ferrule/bite ring pre-set and/or tube collapse	• Tube may be too hard; or preset pressure or torque might be too high • Tube is too thin	• Use fully annealed tube max hardness R_B 72 for steel, R_B 90 for stainless steel • Consult manufacturer's minimum tube wall thickness requirements; tube supports must be used with certain thin-walled steel or stainless-steel tube. Review preset requirements
Tube not bottoming out in fitting body	• Improper preset or wrong tool used for presetting	• In the presetting process, it is important to exert axial force on the tube to keep it fully bottomed in the tool. Check for indentation on end of the tube
Shallow bite of ferrule or cut ring into tube	• Worn preset tool • Too low preset pressure or torque • Tube too hard • Tube not bottomed against stop initially in preset	• Replace preset tool • Observe manufacturer's recommendation for proper preset • Ensure that tube is of correct hardness or material • Hold tube against stop in preset
Tube pulls out of fitting in application and ferrule skives end of tube	• Improper preset • Tube too hard • Excessive internal pressure • Excessive axial load on tube • Inadequate make up	• Preset must be inspected for evidence of proper preset, such as raised ridge of metal in front of leading edge • Ensure that tube is of proper hardness and material • Ensure that internal pressure is within rating of fitting (tube might be of a higher rating) • Avoid additional axial load than that caused by internal pressure • Follow proper presetting and assembly procedures
Fitting nut is tight but leakage still occurs	• Overset ferrule • Cracked tube • Damaged components	• Excessive force used in presetting of ferrule can cause it not to spring back and effect a seal. Follow manufacturer's recommendation for preset • Check tube for circumferential crack due to fatigue • Check components for damage such as nicks, scratches and cracks

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Intru-Lok Assembly

The steps to properly assemble the Intru-Lok fitting are:

1. Cutting, deburring and cleaning of the tube
2. Installation

Cutting, Deburring and Cleaning

Cut soft metal tube with tube cutter, circular toothed cut-off saw, or hacksaw with a fine tooth saw blade. A square cut can be attained with a hacksaw using Parker's Tru-Kut Sawing Vise. With a Parker 226 In-Ex deburring tool (see page S23), lightly deburr the inside and outside corner of the tube end.

Plastic tube can be cut with a plastic tube cutter, Parker part number PTC-001 (available from the Parflex Division).

After cutting and deburring, remove loose burrs or dirt with a brush or compressed air.

Installation

Intru-Lok fittings are designed to permit tube entry and fitting make-up without removal of the nut and ferrule from the fitting body. The following steps are required for proper installation.

1. Insert the tube through the nut and ferrule until it bottoms on the seat within the fitting body.
2. Tighten the nut to the finger tight position, then wrench tighten 1 1/4 turns. (For low pressure instrument air service, 1 turn from finger tight is sufficient. This will also allow for the maximum number of remakes.)

   Note: When using the BIP knurled nut and TIP insert for plastic tube, tighten the nut an additional 1 turn from the finger tight position.

Remake

The nut should be wrenched down until a sudden resistance to wrench force is evident. From this point wrench the nut 1/6 turn more to cause the ferrule to spring into its seal against the tube and fitting body.

Intru-Lok Troubleshooting Guide

Problems associated with bite type fittings are most often traced to faulty Pre-Set/Assembly procedure.

Problem / Probable Cause	Remedy
Tube not bottomed	On soft metal tubing, check for the indentation on the tube end. For plastic tubing or soft metal, compare the length from the end of the tube to the front end of the ferrule of a known good assembly to that of the assembly in question. This assembly should be scrapped.
Shallow bite	Inspect for turned up ridge of material at the front of the ferrule. A failure to achieve this ridge can be traced either to the nut not being tightened enough or the tube not being bottomed against the stop which allowed the tube to travel forward with the ferrule. In some instances this assembly may be re-worked.
Over-set ferrule	More than 1 1/4 turns from finger tight were used to pre-set ferrule, or the nut was severely over-tightened in final assembly. This assembly should be scrapped.
Ferrule cocked on the tube	The ferrule may become cocked on the tube when the tube end is not properly lined up with the body. Generally this condition is caused by faulty tube bending. All bent tube assemblies should fit into the fitting body prior to make up. This assembly should be scrapped.

Table T24 – Intru-Lok troubleshooting guide

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EO Assembly

The proper make-up and assembly of EO bite type fittings, as with other fittings, is critical to their proper functioning. Proper assembly consists of the following steps:

1. Cutting, deburring and cleaning of the tube
2. Pre-set of progressive ring
3. Pre-set inspection
4. Installation

Step 1 (cutting, deburring and cleaning of the tube) has been previously covered on pages T12-T13.

Pre-set of Progressive Ring

The EO fitting requires a pre-set operation that creates a bite by the progressive ring into the outer surface of the tube. There are two methods of achieving the pre-set:

- Manually with the fitting body or hardened pre-assembly tool
- Hydraulically with the EO-Karrymat, EOMAT III, Hydra Tool or Hyferset

Pre-set Using the Fitting Body or Hardened Pre-assembly Tool

Pre-setting with the fitting body is only recommended for steel and copper tubes. For frequent pre-setting, stainless steel tube and hose standpipe fittings, a hardened pre-assembly tool (VOMO) is strongly recommended (see Fig. T40).

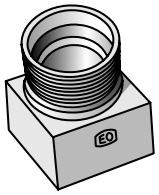
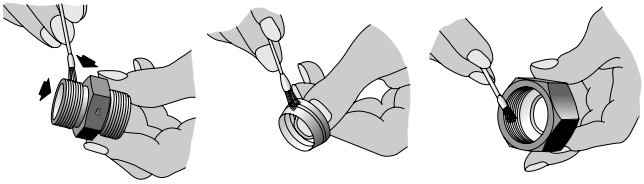


Fig. T40 – VOMO pre-assembly tool

Steps for pre-set using the fitting body or the hardened pre-assembly tool.

1. Lubricate thread and cone of fitting body or hardened pre-assembly tool, as well as the progressive ring and nut threads.



2. Slip nut and progressive ring over tube, assuring that they are in the proper orientation.

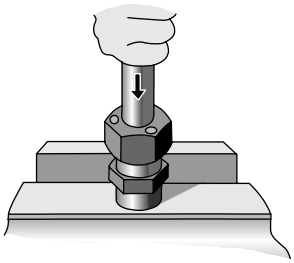
Correct



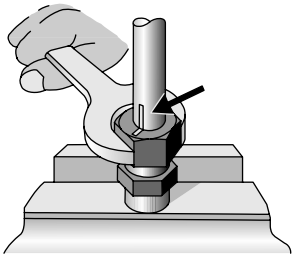
Incorrect



3. Screw nut onto fitting body or hardened pre-assembly tool until finger-tight or light wrench resistance. Hold tube against the shoulder in the cone of the fitting body or hardened pre-assembly tool.

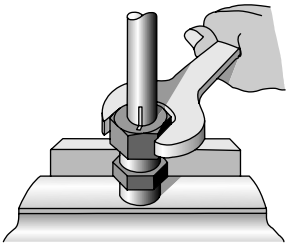


4. Mark nut and tube in the finger-tight or light wrench-resistant position.



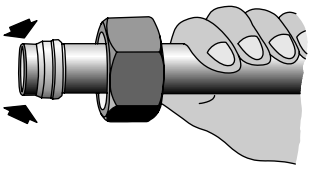
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5. Tighten nut 1 ½ turns if using the fitting body (1 ¼ turns if using the hardened pre-assembly tool). The tube must not turn with the nut. The stop edge in the progressive ring limits over tightening by sharply increasing the tightening torque.



Pre-set Inspection

To inspect the pre-set, remove the nut and tube from the fitting and check if a visible collar fills the space completely in front of first cutting edge. If not, tighten slightly more. It does not matter if ring can be rotated on tube end.



Pre-set Using EO-Karrymat, EOMAT III, Hydra-Tool or Hyferset

When pre-setting EO fittings larger than sizes 18 mm, it is recommended that a hydraulic tool be used. The EO-Karrymat, Hydra-Tool or the Hyferset (shown in Fig. T41) are recommended for low to medium volume production.



Fig. T41 – Hyferset tool

For high volume production, it is recommended that the EOMAT III, shown in Fig. T42, be used for pre-setting. The required operating pressure depends on the tube type, material and tube dimensions, and is automatically selected by a microprocessor.



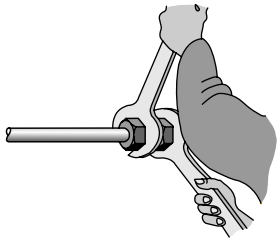
Fig. T42 – EOMAT III

For full instruction on the use of these hydraulic tools, please refer to the Bulletins indicated below:

- EO-Karrymat – Bulletin 4044-T1/UK/DE/FR/T
- EOMAT III – Bulletin 4043-1/GB
- Hyferset - Bulletin 4393-B1
- Hydra-Tool – Bulletin 4392-B10

Installation

To install the pre-set tube assembly to the fitting body, wrench-tighten nut to wrench resistance (light wrenching). From this position, tighten nut another 1/4 turn or 1 1/2 flats of the nut. Another wrench must be used to prevent movement of the fitting body.



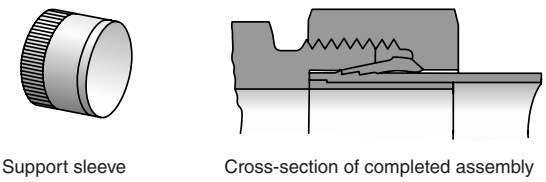
Assembly with Support Sleeve (VH)

If the tube wall thickness is small relative to the tube O.D., this may lead to tube collapse. As a rule, the tube collapse (reduction in diameter) should not exceed 0.3 mm for tubes up to 16 mm O.D. and 0.4 mm for tubes from 18 mm O.D. and above.

When assembling thin walled tube, there is insufficient cross sectional rigidity where the progressive ring cuts. This will have a detrimental effect on the sealing efficiency. For this, internal support sleeves (VH) are available which are inserted in the tube to prevent tube collapse and also increase the cross-sectional rigidity.

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The shape of the tube supports allows them to be inserted easily in the tube. One end of the EO support sleeve is enlarged on its external diameter by a knurl. On insertion, this knurl forces itself into the interior wall of the tube and secures the sleeve against shifting or falling out during assembly and without widening the tube end.



Support sleeve — Cross-section of completed assembly

Fig. T43 — EO fitting completely assembled with support sleeve

Steel tubes made of St 35.4 or 37.4 or soft metal tubes can be checked in accordance with Figs. T44 and T45, respectively, to see if they require support sleeves; for plastic tubes, (support) sleeves are always necessary (see Page F15 for E type sleeves).

For stainless steel tubes of material 1.4571/1.4541, refer to Fig. T46 to determine the need for a support tube.

For thin-walled steel tube of material St.35.4

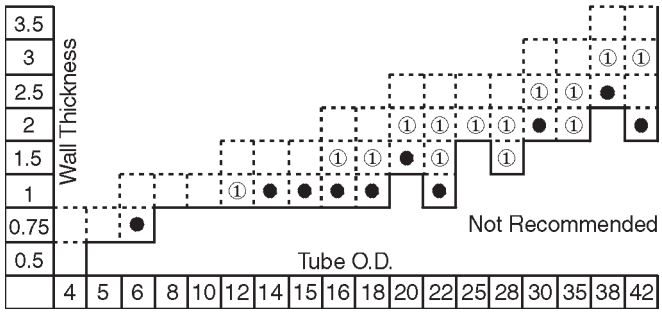


Fig. T44 — Recommended Tube Wall Thicknesses, Steel

● Use of VH necessary

① Use of VH is recommended especially in case of frequent loosening and with heavy-duty tubes (vibrations)

For soft metal tubes

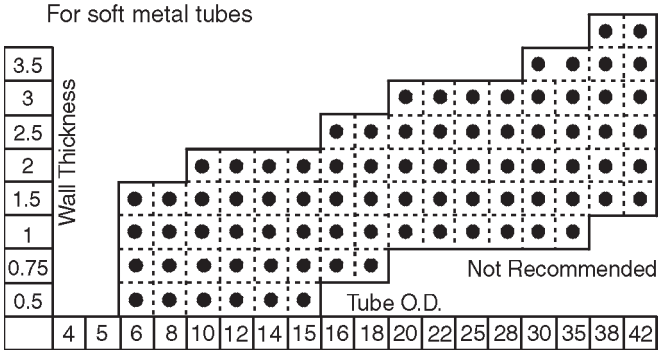


Fig. T45 — Recommended Tube Wall Thicknesses, Soft Metal Tubing

● Use of VH necessary

① Use of VH is recommended especially in case of frequent loosening and with heavy-duty tubes (vibrations)

For thin-walled stainless steel tubes of material 1.4571/1.4541

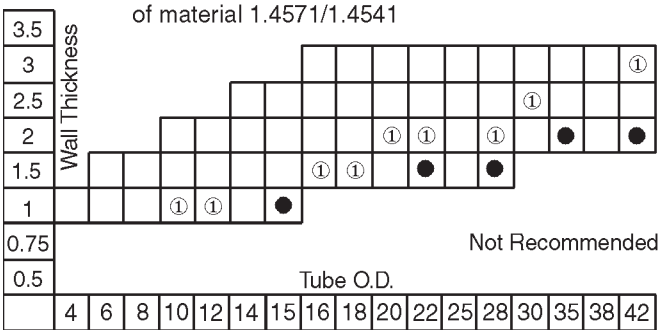


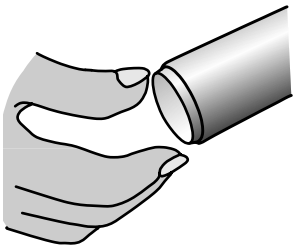
Fig. T46 — Recommended Tube Wall Thicknesses, Stainless Steel

● Use of VH necessary

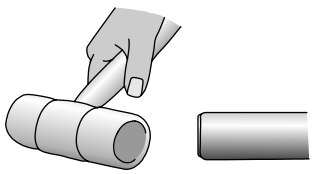
① Use of VH is recommended especially in case of frequent loosening and with heavy-duty tubes (vibrations)

Steps for Proper Assembly of Support Sleeve (VH)

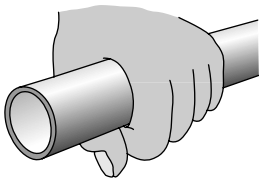
Step 1 – Insert support sleeve up to knurl.



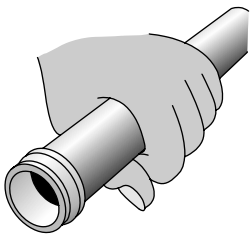
Step 2 – Drive knurled end of support into tube.



Step 3 – Ensure that support sleeve is flush with tube end.



Step 4 – Pre-set progressive ring following one of the pre-setting methods covered earlier (page T24). The support sleeve prevents collapse of tube.



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EO Troubleshooting Guide

Problems with bite type hydraulic fittings are most often traced to faulty pre-set/assembly procedure.

Problem	Solution
Tube not bottomed	Check for a visible mark on the tube end with EO fitting. (Fig. T47)
Shallow bite	Inspect for turned up ridge of material (collar). A failure to achieve this ridge can be traced either to the nut not being tightened enough or the tube not being bottomed against the stop which allowed the tube to travel forward with the ferrule. In some instances this assembly may be re-worked. (Fig. T48)
Over-set ferrule	Too much pressure or more than recommended turns from finger tight were used to pre-set ferrule, or the nut was severely over-tightened in final assembly. This assembly should be scrapped. (Fig. T49)
Ferrule cocked on tube	The ferrule may become cocked on the tube when the tube end is not properly lined up with the body. Generally, this condition is caused by faulty tube bending. All bent tube assemblies should drop into the fitting body prior to make up. This assembly should be scrapped. (Fig. T50)
No bite	If all of the prior checks have been made and the ferrule still shows no sign of biting the tube, it may be that the tube is too hard. This assembly should be scrapped. (Fig. T51)

Table T25 — EO Fitting troubleshooting guide

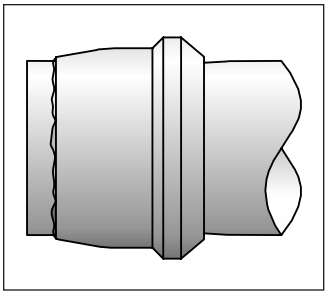


Fig. T47 — Tube not bottomed

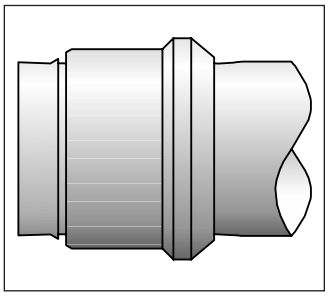


Fig. T48 — Shallow bite

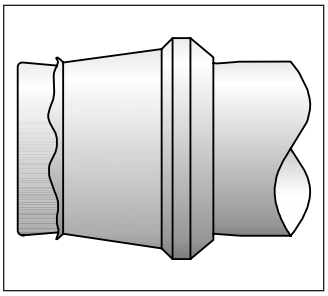


Fig. T49 — Over-set ferrule

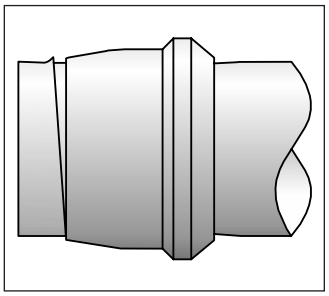


Fig. T50 — Ferrule cocked on tube

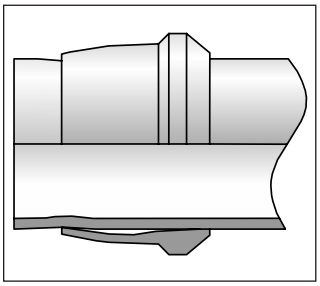


Fig. T51 — No bite

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EO-2 Assembly

The steps for the proper assembly of the EO-2 fittings are similar to those of the EO fitting:

1. Cutting, deburring and cleaning of the tube
2. Pre-set of the retaining ring
3. Inspection of the pre-set
4. Installation

For step 1 (cutting, deburring and cleaning of the tube) please refer to page T12.

Pre-set of the Retaining Ring

The EO-2 functional nut consists of the nut, the sealing ring and the retaining ring. Unlike the EO fitting, the sealing and holding functions are performed by two separate components: the sealing ring and the retaining ring. The retaining ring must be pre-set to create the necessary bite on the tube O.D. The two methods to pre-set the retaining ring are:

- Manually with the fitting body or hardened pre-assembly tool (VOMO)
- Hydraulically with the EO-Karrymat, EOMAT III, Hydra Tool or Hyferset

Pre-set Using the Fitting Body or Hardened Pre-Assembly Tool

1. Prepare the fitting or hardened pre-assembly tool by lubricating the threads of the following sizes:

   Steel Fittings:
   20, 22, 25, 28 *Lubrication is recommended for ease in assembly

   Stainless Steel Fitting:
   For all sizes, lubrication is recommended for ease in assembly

   High quality Niromont (liquid or paste) is recommended for lubrication of the fitting body threads.

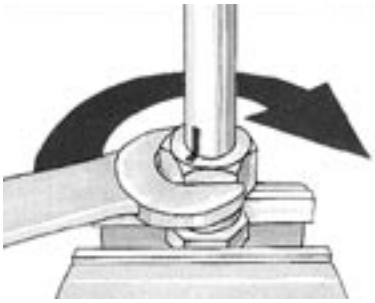
   It is strongly recommended that a hydraulic tool be used to preset EO-2 fittings in sizes 30S, 35L, 38S and 42L.

2. Insert tube into the EO-2 fitting body or hardened pre-assembled tool and press hard against the stop in the inner cone.

   Note: A faulty assembly will result if the tube is not against the tube stop in the fitting body or hardened pre-assembly tool. To achieve the necessary assembling force, an additional wrench leverage may be necessary for tube O.D.'s 20mm and larger.

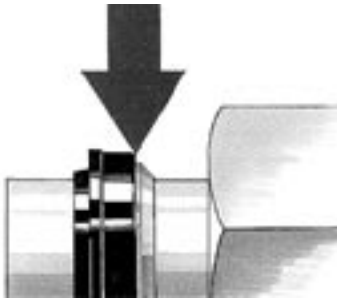


3. Turn nut until wrench resistance is felt. Tighten nut further 1 to 1-1/2 turns. As a recommended process control, mark the position of the nut relative to the fitting body.



Pre-set Inspection

Loosen the nut and check that the gap between the sealing ring and retaining ring is fully closed. A slight gap (up to 0.2mm) due to spring back is acceptable.



Pre-set Using EO-Karrymat, Hyferset, Hydra-Tool and EOMAT III

EO-Karrymat: Recommended for use with EO-2 fittings from 6mm through to 42mm.

Hyferset: Recommended for use with EO-2 fittings from 6mm through to 28mm.

Hydra-Tool: Recommended for use with EO-2 fittings from 6mm through to 42mm.

EOMAT III: Recommended for use with EO-2 fittings from 6mm through to 42mm.

For instructions on operating one of these machines, refer to the following bulletins:

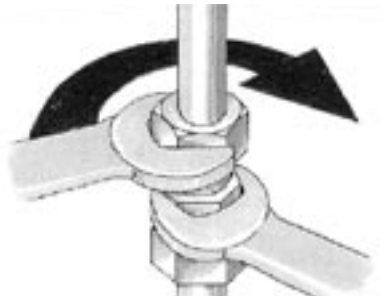
- EO-Karrymat – Bulletin 4044-T1/UK/DE/FR/IT
- Hyferset – Bulletin 4393-B1
- Hydra-Tool – Bulletin 4392-B10
- EOMAT III – Catalogue 4043-1/GB

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Installation

Connect tube and nut to fitting body. Holding the body rigid, tighten nut with a wrench until resistance is felt. Continue turning the nut approximately 1/6 to ¼ turns (= 1 to 1 1/2 flats) to the same position as it was prior to disassembly.

If the assembled position was marked, reassemble until the marks match. To achieve the necessary assembling force, use an additional wrench leverage for tube O.D.'s 20 mm and larger.



Caution: Improper tightening may reduce the seal reliability, pressure capability and the vibration resistance of the connection.

Re-Assembly with Replacement of Sealing Ring (DOZ)

1. After the nut has been loosened, the sealing ring can be pulled off the tube end. It must be checked for damage and replaced if necessary.
2. Push new sealing ring onto the tube, with metal inner cone facing the retaining ring.
3. Re-install using the installation procedures previously covered in this section.



Step 1



Step 2

EO-2 Troubleshooting Guide

Problems with bite type hydraulic fittings are most often traced to faulty pre-set/assembly procedure.

Problem/ Probable Cause	Remedy
Tube not bottomed	The tube end is not in firm contact with the fitting body at assembly. The tubing was not completely inserted into the throat of the fitting body until it bottomed out. Failure to bottom out the tubing against the tube stop of the fitting body during the presetting procedure will allow the tube to travel forward with the ferrule resulting in a shallow bite. This assembly should be scrapped.
Shallow bite	After presetting, inspect to see that the gap between the bite ring and the sealing ring is closed. A failure to achieve a closed gap can be traced to the nut not being tightened enough. This assembly can be reworked by completing the assembly instructions as indicated in the catalog. Utilization of lubrication and wrench elongation may be necessary for larger sizes.
Damaged Seals	Check sealing area for contamination such as chips, zinc particles or other dirt. Also check the inner cone of the fitting body and tubing for damage. Replace DOZ sealing ring if necessary.
Fatigue Crack at Bite	Ensure proper assembly techniques are utilized. Utilize lubrication and wrench elongation for larger sizes. Check that the gap between the sealing ring and bite ring are closed.
Fatigue Crack at Rear Shoulder of Bite Ring	Check that the application does not have excessive vibration. Utilize rigid clamping, tension piping or hose assemblies if relative movements are evident.
Distorted FM Functional Nut at Hydraulic Pre-Assembly	Utilize a split die nut back up plate for presetting of 35L and 42L functional nuts.

Table T26 — EO-2 troubleshooting guide

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24° Flareless Bite

CONDITION	PROBABLE CAUSE(S)	RECOMMENDATION
Immediate leakage when system is pressurized	• Improper ferrule/bite ring orientation	• Reset ferrule to ensure that the leading edge of ferrule/bite ring is pointing towards end of tube and seat of the mating fitting
Additional/excessive stress apparent on bite	• Non-square tube cut; tube not being properly supported in seat of adapter	• Re-cut tube to 90° ± 1°
Flexural stresses allow tube to"rock" back and forth	• Tube not fully supported in fitting's body seat	• Reset tube end. This time ensure that the tube is bottomed in the presetting tool or fitting body
Poor ferrule/bite ring pre-set and/or tube collapse	• Tube may be too hard; or preset pressure or torque might be too high • Tube is too thin	• Use fully annealed tube max hardness R_B 72 for steel, R_B 90 for stainless steel • Consult manufacturer's minimum tube wall thickness requirements; tube supports must be used with certain thin-walled steel or stainless-steel tube. Review preset requirements
Tube not bottoming out in fitting body	• Improper preset or wrong tool used for presetting	• In the presetting process, it is important to exert axial force on the tube to keep it fully bottomed in the tool. Check for indentation on end of the tube
Shallow bite of ferrule or cut ring into tube	• Worn preset tool • Too low preset pressure or torque • Tube too hard • Tube not bottomed against stop initially in preset	• Replace preset tool • Observe manufacturer's recommendation for proper preset • Ensure that tube is of correct hardness or material • Hold tube against stop in preset
Tube pulls out of fitting in application and ferrule skives end of tube	• Improper preset • Tube too hard • Excessive internal pressure • Excessive axial load on tube • Inadequate make up	• Preset must be inspected for evidence of proper preset, such as raised ridge of metal in front of leading edge • Ensure that tube is of proper hardness and material • Ensure that internal pressure is within rating of fitting (tube might be of a higher rating) • Avoid additional axial load than that caused by internal pressure • Follow proper presetting and assembly procedures
Fitting nut is tight but leakage still occurs	• Overset ferrule • Cracked tube • Damaged components	• Excessive force used in presetting of ferrule can cause it not to spring back and effect a seal. Follow manufacturer's recommendation for preset • Check tube for circumferential crack due to fatigue • Check components for damage such as nicks, scratches and cracks

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Bulkhead Locknut Assembly

A bulkhead fitting allows one to connect tube or hose through a panel. This panel, often referred to as bulkhead, may be a structural element of the equipment, or an additional plate which is joined to the equipment, to facilitate convenient routing of hose and tube. Bulkhead fittings are also used as a transition point in a hydraulic system, such as connection of tube lines to hose lines or to a quick disconnect coupling.

The following steps are recommended for the proper assembly of the locknut for Triple-Lok, Ferulok and Seal-Lok bulkhead fittings.

1. Drill a pilot hole to dimension W + 0.015" (where W is shown in Tables T27 and T28).
2. Insert the bulkhead end of the fitting (without the locknut assembled) through the bulkhead opening and attach the locknut to the bulkhead end.
3. Finger tighten the locknut and wrench tighten further to the recommended torque shown in Table T27 for Seal-Lok fittings or Table T28 for Triple-Lok and Ferulok fittings.

TUBE FITTING PART #	THREAD SIZE UN/UNF	W*	ASSEMBLY TORQUE +10% - 0		
			in.-lb.	ft.-lb.	N-m
4 WLNL	9/16-18	0.56	180	15	20
6 WLNL	11/16-16	0.69	300	25	34
8 WLNL	13/16-16	0.81	—	55	75
10 WLNL	1-14	1.00	—	85	115
12 WLNL	1 3/16-12	1.19	—	135	180
14 WLNL	1 5/16-12	1.31	—	170	230
16 WLNL	1 7/16-12	1.44	—	200	270
20 WLNL	1 11/16-12	1.69	—	245	330
24 WLNL	2-12	2.00		270	365

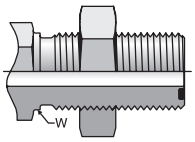
* Recommended clearance hole is W + 0.015"

Table T27 – Torque for Seal-Lok Bulkhead Fittings

TUBE FITTING PART #	THREAD SIZE UN/UNF	W*	ASSEMBLY TORQUE (+10 - 0)		
			in.-lb.	ft-lb	N-m
3 WLN	3/8-24	0.38	100	—	11
4 WLN	7/16-20	0.44	155	13	18
5 WLN	1/2-18	0.50	250	20	28
6 WLN	9/16-18	0.56	300	25	35
8 WLN	3/4-16	0.75	600	50	65
10 WLN	7/8-14	0.88		85	115
12 WLN	1 1/16-12	1.06		135	180
14 WLN	1 3/16-12	1.19		170	230
16 WLN	1 5/16-12	1.31		200	270
20 WLN	1 5/8-12	1.63		245	330
24 WLN	1 7/8-12	1.88		270	365
32 WLN	2 1/2-12	2.50		310	420

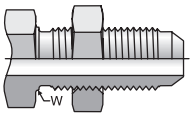
* Recommended clearance hole is W + 0.015"

Table T28 – Torque for Triple-Lok and Ferulok Bulkhead Fittings



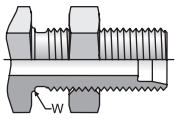
Seal-Lok Bulkhead Assembly

See page A9 for maximum bulkhead thickness.



Triple-Lok Straight Bulkhead

See page C13 for maximum bulkhead thickness.



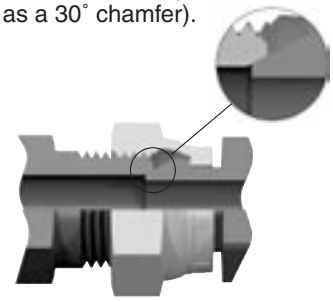
Ferulok Straight Bulkhead

See page D7 for maximum bulkhead thickness.

Pipe Swivel Assembly (NPSM)

Unlike traditional pipe thread, these connections seal on the nose of the swivel end. The nose has a 60° inclusive angle that mates against a chamfer of the same angle on the male pipe thread end (also known as a 30˚ chamfer).

Fig. T51A - Illustration showing how swivel adapters seal on mating chamfer in male pipe thread end (Also Fig. H2.)



NPSM Pipe Swivels **Fig. T51A**

NPSM Pipe swivels, also known as Parker 07 Adapters, must connect with a male NPT/NPTF pipe thread with a 30˚ machined seat per SAE J514.

NPSM Size in.	Steel Assembly TORQUE (+10% - 0%)		
	in.-lb.	ft.-lb.	F.F.F.T.
1/8	106	9	1.0 - 1.5
1/4	156	13	1.0 - 1.5
3/8	192	16	1.0 - 1.5
1/2	396	33	1.0 - 1.5
3/4	580	48	2.0 - 2.5
1	1140	95	2.0 - 2.5
1 1/4	1420	118	2.0 - 2.5
1 1/2	2840	237	2.0 - 2.5
2	3720	310	2.0 - 2.5

Table T29 – NPSM Pipe Swivel Torques

Steps:

1. Finger tight
2. Wrench tighten to torque specs in Table (T29)

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Routing and Clamping

Most hydraulic, pneumatic and lubrication system requires some form of tube line fabrication and fitting installation for completion. Proper fabrication and installation are essential for the overall efficiency, leak free performance, and general appearance of any system.

The following factors should be considered early in the design process, after sizing the tube lines and selecting the appropriate style of fitting:

1. Proper routing of tube lines
2. Adequate tube line support (clamping)

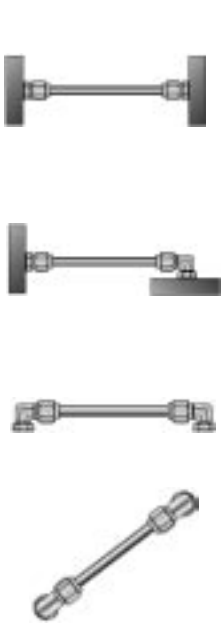
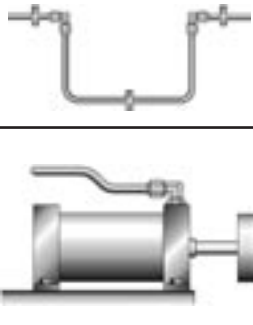
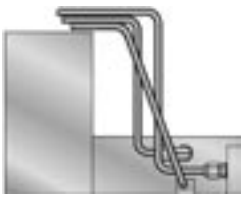
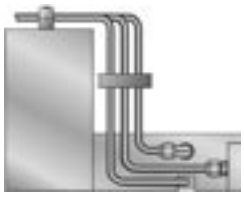
Routing of Lines

Routing of lines is one of the most difficult, yet most significant of these system design considerations. Proper routing involves getting a connecting line from one point to another through the most logical path, while considering other factors as discussed below.

The most logical path is not always the direct path and should have the following characteristics:

- **Avoid excessive strain on joint —** A strained joint will eventually leak. A straight line tube assembly (with no bends) or a joint that is forced into position are common examples of strain applied to tube assemblies.
- **Allow for expansion and contraction —** Use a "U" bend or a hose in long lines to allow for expansion and contraction due to pressure or temperature fluctuations.
- **Allow for motion under load —** Even some apparently rigid systems do move under load. Use an offset ("S") bend.
- **Get around obstructions without using excessive amount of 90° bends —** Pressure drop due to one 90° bend is greater than that due to two 45° bends.
- **Keep tube lines away from components that require regular maintenance**.
- **Leave fitting joints as accessible as possible —** Inaccessible joints are more difficult to assemble and tighten properly, and more time consuming to service.
- **Have a neat appearance and allow for easy trouble-shooting, maintenance and repair**.

The following illustrations provide several examples of typical routing situations. The graphics show the preferred and non-preferred path along with an explanation.

Non-preferred Routing	Preferred Routing	Explanation
		Avoid straight tube lines. There is no margin for error on a straight line, resulting in excess joint strain.
		Allow for expansion and contraction of lines by utilizing "U" bend.
		Offset ("S") bend allows for motion under load.
		Avoid excessive pressure drop by getting around obstructions without using 90° bends. One 90° bend causes more pressure drop than two 45° bends.
		Avoid creating an obstruction by routing lines around areas that require service. Leave adequate clearance for wrenches.
		Route lines to allow for proper clamping. When done properly, several lines can typically be clamped together. Route lines to allow for trouble-shooting. Lines that cross and are not in logical order tend to be difficult to work with during maintenance.

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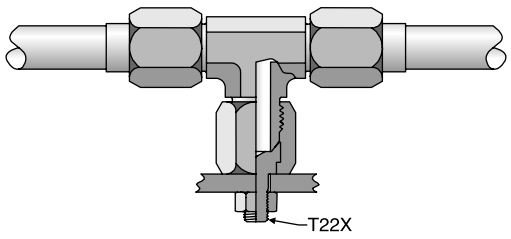
Tube Clamping

Tube line supports (clamps) serve two primary purposes in tube line systems; mounting and vibration dampening. Fatigue failure due to mechanical vibration accounts for the majority of tube line failures. Proper clamping of the tube also reduces system noise.

Use a clamping system such as Parker's ParKlamp along with proper clamp spacing provided in Table T30.

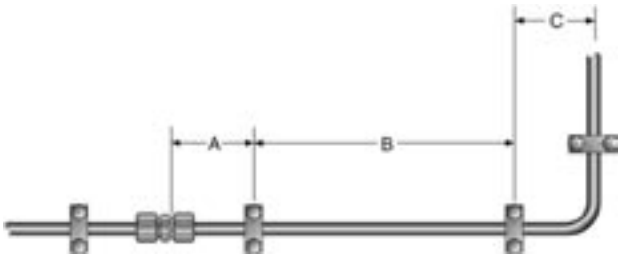
For tube clamps to dampen vibration effectively, they need to be anchored to a rigid structure. Clamping several tubes together, without rigid structural anchoring, does not provide effective dampening.

A mountie can be used in lieu of clamps in certain product lines by anchoring a tee fitting to the equipment's structure (see Fig. T52).



The Mountie Caps the End and Provides an Anchor

Fig. T52 — Mountie cap used with Triple-Lok for anchoring tube lines



Tube O.D. (in.)	Tube O.D. (mm)	A (in.)	B (ft.)	C (in.)
1/4	6	2	3	4
5/16	8			
3/8	10			
1/2	12	4	5	8
5/8	14			
3/4	18			
7/8	22			
1	25			
1-1/4	30	6	7	12
1-1/2	38			
2	50			

Table T30 — Recommended tube clamp spacing

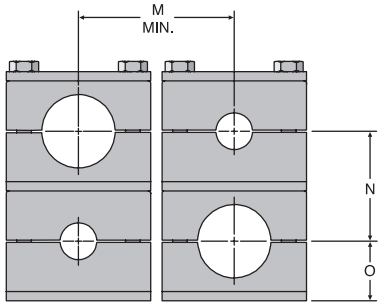
Layout Data for Tube, Pipe and Hose Clamps: Standard (Inch) and Series A (Metric)

Group #		Installation Dimensions M	P	N	O	R
1	in.	1 5/16	1 3/16	1 3/16	5/8	15/16
	mm	33	30	30	16.5	24.5
1a	in.	1 7/16		1 1/8	5/8	15/16
	mm	36		29	16	24
2	in.	1 11/16		1 7/16	3/4	1 1/16
	mm	42		36	19.5	27.5
3	in.	2		1 1/2	13/16	1 1/8
	mm	50		38	20.5	28.5
4	in.	2 3/8		1 3/4	15/16	1 1/4
	mm	60		45	24	32
5	in.	2 13/16		2 3/8	1 1/4	1 9/16
	mm	70		61	32	40
6	in.	3 1/2		2 11/16	1 7/16	1 3/4
	mm	88		69	36	44

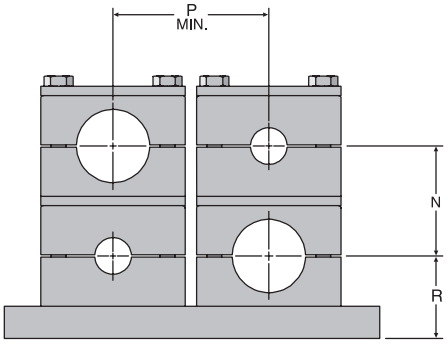
Table T32 — ParKlamp Standard Series Installation Dimensions

Bolt Thread	Torque in.-lbs.	Torque Nm
1/4 - 20 UNC	70	8

Table T33 — ParKlamp Standard Series maximum tightening torque



With Weld Plate



Rail Mounting

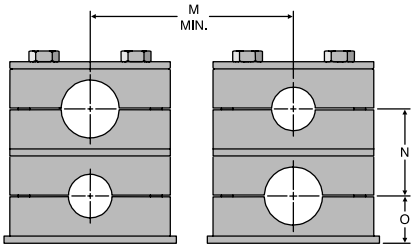
Dimensions and pressures for reference only, subject to change.

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Layout Data for Tube, Pipe and Hose Clamps: Heavy Series (Inch) and Series C (Metric)

Group #		Installation Dimensions				
		M	N	O	P	R
H3	in.	2 15/16	1 9/16	15/16	2 5/16	1 1/2
	mm	74	40	24	58	38
H4	in.	3 1/2	2 3/16	1 1/4	2 7/8	1 13/16
	mm	89	56	32	73	46
H5	in.	4 1/16	2 11/16	1 1/2	3 7/16	2 1/16
	mm	103	68	38	87	52
H6	in.	5 7/8	3 7/8	2 1/8	4 5/8	2 5/8
	mm	150	98	54	118	66
H7	in.	7 1/8	5 1/16	2 3/4	N/A	N/A
	mm	180	129	69	N/A	N/A

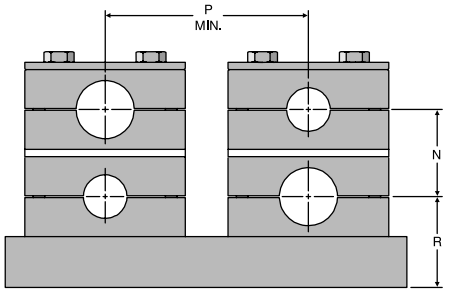
Table T33 — ParKlamp Heavy Series installation dimensions



With Weld Plate

Group #	Bolt Thread	Torque	
		in-Lb	Nm
H3, H4	3/8 - 16 UNC	106	12
H5	3/8 - 16 UNC	133	15
H6	7/16 - 14 UNC	265	30
H7	5/8 - 11 UNC	398	45

Table T34 — ParKlamp Heavy Series maximum tightening torque

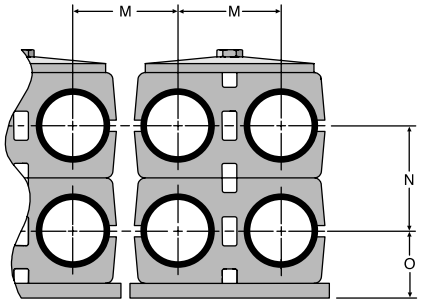


Rail Mounting

Layout Data for Tube, Pipe and Hose Clamps: Twin Series (Inch) and Series B (Metric)

Group #		Installation Dimensions			
		M	N	O	R
T1	in.	13/16	13/16	9/16	13/16
	mm	20	20	15	21
T2	in.	1 1/8	1	11/16	15/16
	mm	29	26	18	24
T3	in.	1 7/16	1 7/16	15/16	1 3/16
	mm	36	37	23.5	29.5
T4	in.	1 3/4	1 11/16	1	1 1/4
	mm	45	42	26	32
T5	in.	2 3/16	2 1/8	1 1/4	1 1/2
	mm	56	54	32	38

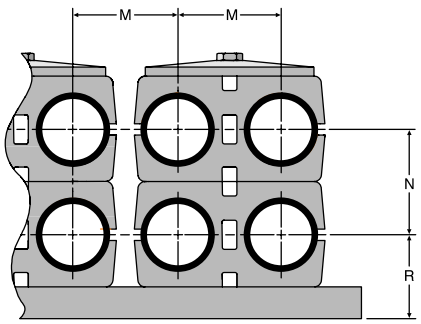
Table T35 — ParKlamp Twin Series installation dimensions



With Weld Plate

Group #	Bolt Thread	Torque	
		in.-lbs.	Nm
T1	1/4 - 20 UNC	45	5
T2 - T4	5/16 - 18 UNC	104	12
T5	5/16 - 18 UNC	70	8

Table T36 — ParKlamp Twin Series maximum tightening torque



Rail Mounting

Dimensions and pressures for reference only, subject to change.

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Tools for Tube Bending

For smooth, wrinkle free tube bending without excessive flattening, there are a number of benders that can be selected. Consult the specific bender's instruction bulletins for CLR (centerline radius), wall thickness, and tube material recommendations and limitations. For crank and hydraulic benders, utilize both the mandrel bending determination chart (Fig. T56) and the Parker Bender Capacity Guides on page S7.

1. **Hand held lever type benders** (see pages S4-S6). Individually sized for tube sizes 1/8" through 1" and 6mm through 25mm.

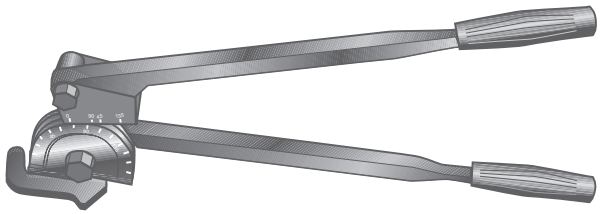


Fig. T53 — Hand held tube bender

2. **Manual crank, table mount or vise mount benders:**
   1) Model 412 (page S8). For bending 1/4" through 3/4" O.D. tube or 6mm through 20mm.
   2) Model 424 (page S9). For bending 1/4" through 1 1/2" O.D. tube or 6mm through 38mm.

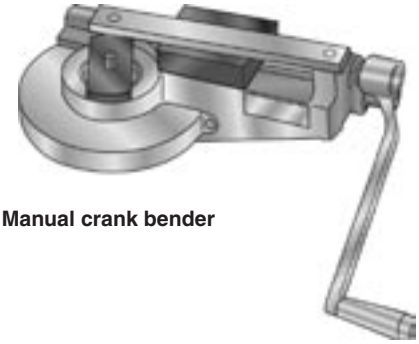


Fig. T54 — Manual crank bender

3. **Hydraulically powered bender**

   Model 632 (page S12). For bending 3/8" through 2" O.D. tube or 10mm through 50mm.



Fig. T55 — Hydraulic bender with portable table for mandrel bending

Mandrel Bending Tools

When bending thin wall tube it may be necessary to insert a mandrel into the tube to prevent excessive distortion, flattening or wrinkling. To determine whether mandrel bending is required, see the Mandrel Bending Requirements Chart and example below.

To accomplish such bending, a mandrel, mandrel rod, and a mandrel rod stop assembly are required. The rod stop assembly holds the end of the mandrel rod in proper alignment with the tube while the mandrel, which is threaded onto the other end of the mandrel rod, supports the tube on its I.D., thus preventing tube kinking or flattening during bending.

Mandrel Bending Requirements Chart

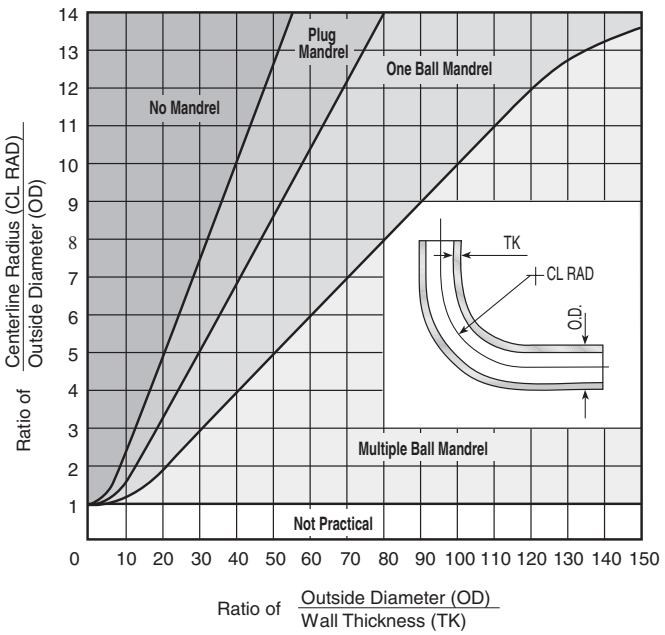


Fig. T56 — Mandrel bending requirements chart

Example: Determine if it's necessary to use mandrel for bending 3/4 x .049 steel tube through a 3" bend radius without excessive flattening.

Centerline Radius/Tube Outside Diameter = 3 / .75 = 4

Outside Diameter / Wall Thickness = .75/.049 = 15.3

Intersection of these two ratios on the graph falls within the area indicating that no mandrel is required. Note, however, that for the same tube O.D. at a smaller bend radius (e.g. 2") or with a thinner wall thickness (e.g. .035"), a mandrel would be required for preventing excessive flattening.

If the tube wall is very thin, then a plug mandrel alone may not be adequate to prevent wrinkling. In such cases, special ball type mandrels and wiper shoes may be necessary (See Fig. T57 for illustrations of plug and ball type mandrels). As a rule of thumb, if the tube wall thickness is less than 7% of the tube O.D. then mandrel bending is recommended.

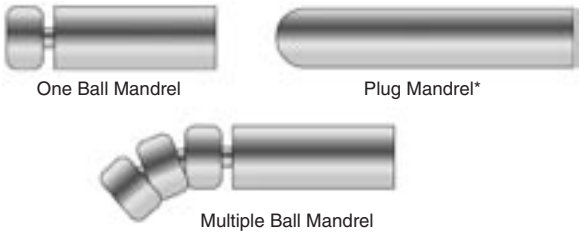


Fig. T57 — Types of mandrels

*Parker Tube Fittings Division offers only the plug mandrel.

Refer to Bulletin 4306-B5 for detailed bending instructions.

Plumbing and Assembly Hints

Even after choosing the appropriate type of fitting for your application, there are certain instances when a particular style has advantages over others.

1. Straight thread adjustable elbows and tees have several advantages over similar shaped fittings using tapered pipe threads:

Adjustable straight thread connections:

- Permit exact positioning
- Provide leak free joint
- Eliminate distortion and cracking of boss due to over-tightening
- Are easier to maintain

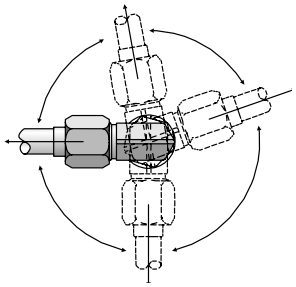


Fig. T58 — Top view of adjustable straight thread connection – allows for 360° positioning of fitting without losing its sealing capability

2. Swivel nut fitting should be used with a straight connector to allow for connections in tight spaces, where an elbow or tee fitting cannot be fully rotated (see Fig. T59).

This same combination of fittings, shown in Fig. T59, can also be used to stack tube lines or provide clearance for ports that are relatively close and within the same plane (see Fig. T60).

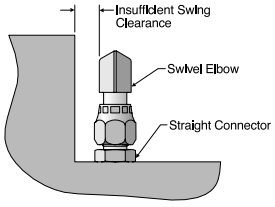


Fig. T59 — Swivel nut fitting used with straight connector in tight space

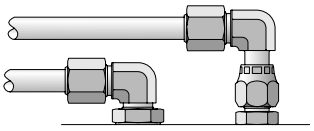


Fig. T60 — Swivel end fitting with straight connector provides clearance above regular elbow

3. Use reducers/expanders and jump size fittings.

   There are some instances when it becomes necessary to connect tube lines of different sizes or tube lines to ports of different sizes. This can be accomplished by using either tube reducers, port expanders, port reducers, or jump size fittings. Achieving the reduction or enlargement is the main concern, but this should be accomplished by using the minimum number of connections (potential leak points and wrenching requirements) possible.

4. Use conversion fittings and adapters.

   There are instances when it becomes necessary to use conversion adapters for connecting a fitting to a port with different style threads, for example, UNF thread fitting to a metric thread port. There are also some instances when it is necessary to connect tube ends or hose ends with different style terminations to one another or to a fitting. This can be achieved by using conversion fittings.

5. Use of other adapters and fittings for special applications are shown below.



Fig. T61 — Cutaway of LHP (Flange-Seal) shows how it simplifies tube-to-tube connection for face seal O-ring fittings

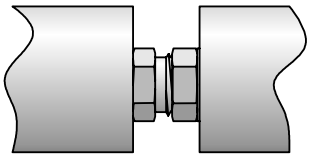


Fig. T62 — F5OHAO for close coupling of components with two SAE Straight thread ports

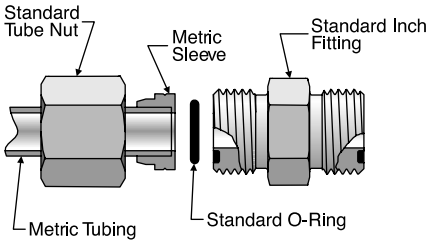


Fig. T63 — Metric sleeve adapts metric tube to standard Seal-Lok

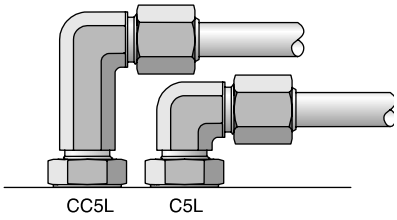


Fig. T64 — Long elbow (CC5L) stacks above regular elbow (C5L)

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Assembly Heights and Clearance

There are dimensions given on the product drawings in the individual product and reference sections that can be used for calculating assembly heights and minimum clearances.

For example:

Take a C6LO (90° swivel elbow) and connect it to a F5OLO (straight thread connector) which is threaded into an SAE straight thread port. The centerline distance above the manifold to the connecting tube may be calculated as **HH + AAA** from product drawings and reference section.

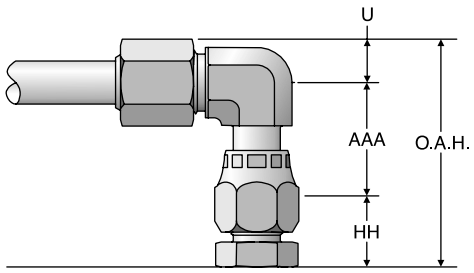


Fig. T65 — Assembly dimensions

The minimum clearance required between the manifold surface and the top of the fitting may be calculated by adding **HH** for the connector to **AAA** for the 90° elbow to **U** which is half the distance across the hex points on the tube nut. The **U** dimension can be calculated by multiplying the nut hex size by 1.17.

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General Technical



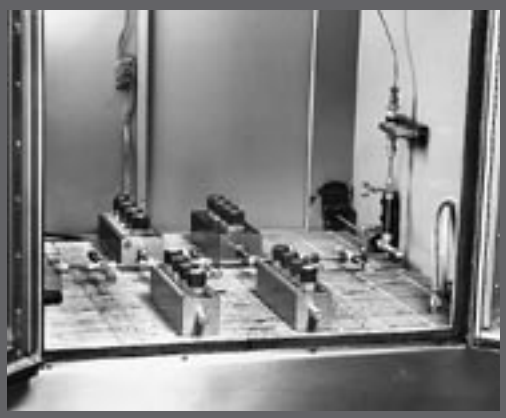
Burst Test



Leak Test



Hardness Test



Impulse Test



Vibration Test

The Fitting Authority

How To Order U3
Standard Nomenclature (Seal-Lok, Triple-Lok, Ferulok, Intru-Lok, JIS and K4) U3
Hydraulic Flange Nomenclature U4
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How to Order Seal-Lok, Triple-Lok, Ferulok, Intru-Lok, JIS and K4

TFD Standard Nomenclature Construction

Box 1	Box 2	Box 3	Box 4	–	Box 5
Size	Shape or Style	Sub-Style	Type		Material
1 to 4 sets of numbers from Box 1	Letter code from Box 2	Number/Letter code from Box 3	Number/Letter code from Box 4		Letter code from Box 5

Example: Steel Seal-Lok Adjustable Elbow Connector – 3/8" O.D. (-6) Tube to 7/16-20 UNF (-4) ORB =

6-4 C5L-S

(See the shading in the boxes below for the construction of this example)

Box 1 – Paired Tube and Port End Size Code Table

Tube End		Port End		Port End	
Dash Size	Tube O.D.	Dash Size	SAE Straight Thread	Dash Size	NPTF Pipe Thread
-2	1/8	-2	5/16-24	-2	1/8
-3	3/16	-3	3/8-24	-2	1/8
-4	1/4	-4	7/16-20	-2	1/8
-5	5/16	-5	1/2-20	-2	1/8
-6	3/8	-6	9/16-18	-4	1/4
-8	1/2	-8	3/4-16	-6	3/8
-10	5/8	-10	7/8-14	-8	1/2
-12	3/4	-12	1 1/16-12	-12	3/4
-14	7/8	-14	1 3/16-12	-12	3/4
-16	1	-16	1 5/16-12	-16	1
-20	1 1/4	-20	1 5/8-12	-20	1 1/4
-24	1 1/2	-24	1 7/8-12	-24	1 1/2
-32	2	-32	2 1/2-12	-32	2

Box 2 – Shape or Style

Straights	
B	Nut
F*	Male Connector
FF*	Long Male Connector or Pipe Nipple
FFF*	Extra Long Connector or Long Pipe Nipple
FN	Cap
G*	Female Connector
H	Union
HH	Long Union
HPN*	Plug, Straight Thread, Hollow Hex
LH	Large Hex Union
PN*	Plug, Straight Thread, Hex Head
T	Sleeve or Ferrule
TP	Sleeve, Parflange
TR	Tube Reducer
T22	Mountie
W	Bulkhead Union
WF	Bulkhead Male
WG	Bulkhead Female
WLN	Bulkhead Locknut for Triple-Lok, Ferulok and Intru-Lok
WLNL	Bulkhead Locknut for Seal-Lok
90° Elbows	
C*	Male Elbow Connector
CC*	Long Male Elbow
CCC*	Extra Long Male Elbow
D	Female Elbow
E	Union Elbow
WE	Bulkhead Union Elbow
45° Elbows	
N	Union Elbow
V*	Male Elbow Connector
WN	Bulhead Union Elbow
Tees	
J	Union Tee
M	Female Run Tee
O	Female Branch Tee
R*	Male Run Tee
S*	Male Branch Tee
WJ	Bulkhead Branch Tee
WJJ	Bulhead Run Tee
Cross	
K	Union Cross

Box 3 – Sub-Style Modifiers (Connectors, Swivels and Plugs)

Connectors (a)	
3	BSPT Port End
4**	BSPP Port End, O-ring & RR
5**	SAE Straight Thread Port End
8**	Metric Port End, O-ring & RR
9	SAE-ORB with Metal Seal
42	BSPP Port End, "ED" Seal
47**	BSPP O-ring Port, B2351
82	Metric Port End, "ED" Seal
87**	ISO 6149 Port End
J4 (e)	Banjo Connection, BSPP, Soft Seal
J8 (e)	Banjo Connection, Metric, Soft Seal
Swivel Unions (b)	
6	Female Swivel
Swivel Connectors (c)	
63	BSPT Port, Swivel Connector
64**	BSPP Port, Swivel Connector
642	BSPP, "ED" Seal, Swivel Connector
65**	SAE-ORB, Swivel Connector
68**	Metric Port, Swivel Connector
682	Metric Port, Swivel Connector
687**	ISO 6149, Swivel Connector
Straight Thread Plugs (d) (Modifiers for P)	
4, 5, 8, 9 and 87 as in Connectors above.	
Notes	
a. Modifiers for Connectors as noted with asterisk in Box 2.	
b. Modifier for C, V, R, S, H, E and J in Box 2.	
c. Modifiers for F only in Box 2.	
d. Modifiers for P only in PN and HPN in Box 2.	
e. Applies to 90° elbows and tees only.	

Box 4 – Fitting Type

I	Intru-Lok
K4	60° Cone BSPP
L**	Seal-Lok
P4	JIS 60° Cone
T4	JIS 30° Flare
U	Ferulok
X	Triple-Lok

Box 5 – Material Code

B	Brass
CUNI	Cupro-Nickel (ex. CUNI 70/30)
D	Dural (Aluminum)
M	Monel
S	Steel w/zinc plating
SS	Stainless Steel, 316/316L passivated

** Placing the letter "O" after these sub-style modifiers and fitting types will indicate that you would like an O-ring on that corresponding end.

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How to Order 4-Bolt Hydraulic Flanges

TFD Standard Nomenclature Construction

Box 1	Box 2	Box 3	Box 4	Box 5	Box 6	Box 7
Flange Size	Connection Description	Shape	Flange Connection Type	Mounting Style	Material	Kit Designation

Box 1 – Port / Tube / Pipe Flange Size

Symbol	Description
One- to two-digit codes	Size in inches x 16

One code is required if end connections are the same size. Two codes are required if they are different sizes (e.g., 16-12).

Box 2 – Port / Tube / Pipe Connection Description

Symbol	Description
B3	Braze Socket – silver braze
CP1	Connector Plate – Code 61
CP2	Connector Plate – Code 62
FCC1	Flange Clamp, Captive – Code 61
FCC2	Flange Clamp, Captive – Code 62
FCCT1	Flange Clamp, Captive with Tapped Holes – Code 61
FCCT2	Flange Clamp, Captive with Tapped Holes – Code 62
FCS1	Flange Clamp, Split – Code 61
FCS2	Flange Clamp, Split – Code 62
G	NPTF Port
G3	BSPT Port
G4	BSPP Port
G5	SAE Port
P	Plug (blanking end)
SP	Spacer w/o Gage Ports
SPG	Spacer w/ 1/4-18 NPTF Gage Port
SPG5	Spacer w/ 7/16-20 UNF Gage Port
SPGG5	Spacer w/ 1/4-18 NPTF & 7/16-20 UNF Ports
WSD1	Weld Sadle – Pipe
WSD2	Weld Saddle – Tube
W4	Flat Weld Socket – Tube
W4S	Flat Weld Socket – Tube (shallow)
W5	Flat Weld Socket – Pipe
W5S	Flat Weld Socket – Pipe (shallow)
W6	Extended Weld Socket – Tube
W6S	Extended Weld Socket – Tube (shallow)
W7	Extended Weld Socket – Pipe
W7S	Extended Weld Socket – Pipe (shallow)
WB1	Weld Butt – Schedule 40
WB3	Weld Butt – Schedule 80
WB5	Weld Butt – Schedule 160
WB7	Weld Butt – Schedule XXS
WBT	Weld Butt – Tank Pilot
WPL	Weld Plate
W	Weld Socket
W2	Weld Nipple
W3 or WB	Weld Nipple – Weld Butt, Tube

Box 3 – Shape Description

Symbol	Description
None	Block and Pad, Straight*
E	Elbow 90°
H	Barstock, Straight
J	Tee

* The “Block” has O-ring and drilled mounting holes, while the “Pad” has no O-ring groove and tapped mounting holes.

Box 4 – Flange Connection Type

Symbol	Description
Q1	Code 61 Flange Head w/ O-ring Groove
Q1N	Code 61 Flange Head w/o O-ring Groove
Q2	Code 62 Flange Head w/ O-ring Groove
Q2N	Code 62 Flange Head w/o O-ring Groove
Q1B	Code 61 Flange Block w/ O-ring Groove and Drilled Mounting Holes
Q1P	Code 61 Flange Block w/o O-ring Groove and Drilled Mounting Holes
Q2B	Code 62 Flange Block w/ O-ring Groove and Drilled Mounting Holes
Q2P	Code 62 Flange Pad w/o O-ring Groove and Tapped Mounting Holes
QSB	Square Flange Block w/ O-ring Groove and Drilled Mounting Holes
QSP	Square Flange Pad w/o O-ring Groove and Tapped Mounting Holes

Box 5 – Mounting Style

Symbol	Description
Omit	Inch Mounting Bolts (screws)
M	Metric Mounting Bolts (screws)

Box 6 – Material

Symbol	Description
S	Steel, Zinc Plated (braze or weld parts may not be plated)
SX	Steel, Oil Dipped
SS	Stainless Steel

Box 7 – Kit Designation

Symbol	Description
Omit	Flange Only
K	Kit (O-ring, 4 bolts and washers)

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How to Order EO and EO-2 Fittings and Accessories

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TFD Standard Nomenclature Construction

Box 1	Box 2	Box 3	Box 4	Box 5	Box 6	Box 7	Box 8	Box 9
Shape / Style	Tube Size (mm)	EO-2 Designator	Pressure Series	Port Size / Designator	Port Sealing Method Modifier	Modifier 1	Material	Modifier 2

Box 1 - Shape/Style Code			
Straights		**Tees**	
AS	Weld Connector	EL	Swivel Nut Run
AS__/	Weld Flange	ET	Swivel Nut Branch
BFG	Square Flange Connector	GMA1/	Union w/ Test Point, Pin
DA	Distance Adapter	GMA3/	Union w/ Test Point, M16x2
DG101/	Rotary Union	LEE	Adjustable Run
DG102/	Rotary Connector	T	Union
DG107/	Rotary Bulkhead Union	TEE	Adjustable Branch
DVGE	Plain Bearing Rotary	TH	High Pressure Banjo
EGE	Swivel Nut Connector	TR	Reducer Union
EGEO	ISO 6149 Swivel Nut Connector	WV	Alternating Valve
ESV	Weld Bulkhead Union	**Cross**	
G	Union	K	Union
GAI	Female Connector	**Accessories**	
GE	Male Connector	D	Cutting Ring
GEO	ISO 6149 Connector	DKA	Metal Seal Ring
GFS__/	Flange Connector	DKI	Pressure Gage Seal
GR	Reducer Union	DOZ	EO-2 Seal Ring
GZ	Swivel Union	DPR	Progressive Ring
GZR	Reducer Swivel Union	E	Insert
MAV	Gage Connector	ED	EOlastic Seal
MAVE	Swivel Nut Gage Connector	FM	EO-2 Functional Nut
RED	Tube End Reducer	GM	Bulkhead Locknut
SKA	Weld Adapter	KD	Plastic Seal
SV	Bulkhead Union	KDS	Elastomeric Seal
VKA1/	Test Point Connector, Pin	M	Tube Nut
VKA3/	Test Point Connector, M16x2	OR	O-ring
90° Elbows		PSR	Progressive Ring (new)
BFW	Square Flange Connector	R	Tube
DG103/	Rotary Union	ROV	Plug
DG104/	Rotary Connector	VH	Insert
DG108/	Rotary Bulkhead Union	VKA	Cap
DVWE	Plain Bearing Rotary	VSTI	Hollow Hex Plug
EW	Swivel Nut	**Valves**	
SWVE	Banjo	RHD	Union Check
W	Union	RHV	Connector Check
WAS	Weld Connector	RHZ	Connector Check
WE	Male Connector	RHDI	Female Check
WEE	Adjustable	RVP	Cartridge Check
WFS__/	Flange Connector	DV	Low Pressure Shut Off
WH	High Pressure Banjo	LD	Medium Pressure Shut Off
WSV	Bulkhead Union	VDHA	High Pressure Shut Off
Double 90° Elbows		VDHB	High Pressure Shut Off
DG105/	Rotary Union	KH	2-way Ball Valve
DG106/	Rotary Connector	KH3/2-	3-way Ball Valve
45° Elbows		WV	Alternating Union Tee
EV	Swivel Nut		
VEE	Adjustable		

Box 2 – Tube Size (mm)
04
05
06
08
10
12
14
15
16
18
20
22
25
28
30
35
38
42

Box 3 – EO-2 Designator	
Z	EO-2 Assy.

Box 4 – Pressure Series	
LL	Very light
L	Light
S	Heavy

Box 5 – Port Size / Designator (optional)	
Metric	
M_	Metric Parallel
M_X_	Metric Parallel (Jump Size)
M_X_keg	Metric Taper
NPT – Inch	
1/8NPT	NPT Thread
1/4NPT	NPT Thread
3/8NPT	NPT Thread
1/2NPT	NPT Thread
3/4NPT	NPT Thread
1NPT	NPT Thread
1 1/4NPT	NPT Thread
1 1/2NPT	NPT Thread
SAE-ORB	
7/16UNF	Inch Parallel Thread
9/16UNF	Inch Parallel Thread
3/4UNF	Inch Parallel Thread
3/4UNF	Inch Parallel Thread
7/8UNF	Inch Parallel Thread
11/16UN	Inch Parallel Thread
15/16UN	Inch Parallel Thread
1 5/8UN	Inch Parallel Thread
1 7/8UN	
BSPP/BSPT	
R_	BSPP
R_/_keg	BSPT

Box 6 – Port Sealing Method Modifier (optional)	
ED	EOlastic Seal
OR	ISO 6149 O-ring
KDS	Banjo Seal-Ring

Box 7 – Modifier 1 (optional)	
OMD	Without Nut and Sleeve
VIT	FPM (omitted for Stainless)
NBR	Nitrile Seals (omitted for Steel and Brass)
_ _ B	Special Cracking Pressure (check valve)

Box 8 – Material	
CF	Chromium 6 Free
A3K	Steel, Zinc Clear Plated
MS	Brass
71	Stainless Steel
VZ	Zinc Plated (tube only)

Box 9 – Modifier 2 (optional)	
X	Unassembled

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Connectors For World Class Products

Connector Proliferation:

Today many different types of connectors are being used around the world. Most of these have come about through historical use and local preference for a certain design concept. Some connections of the North American origin such as four bolt flange, SAE straight thread and 37° flare have found some degree of acceptance and use in Europe and Japan as a result of the exports of U.S. machinery to the regions after World War II. But, large majority of usage is made up of a variety of indigenous port and tube connections. A quick review of the commonly used connections around the world reveals that there are eight different port connections and eleven different tube/hose connections.

Port Connections:

NPTF
SAE Straight Thread (UN/UNF)
4-Bolt Flange
ISO 1179 (BSPP)
ISO 9974 (Metric)
ISO 6149 (Metric Straight Thread O-ring Port)
JIS-PT (BSPT)
JIS-B2351 (BSPP similar to SAE)

Tube/Hose Connections:

37° Flare (SAE)
24° Flareless, Inch Threads (SAE)
60° Cone Swivel, NPSM (SAE)
O-Ring Face Seal (SAE)
24° Cone, Metric (DIN)
60° Cone, BSPP (BSi)
30° Flare, BSPP (JIS)
24° Flareless, Metric (JIS)
60° Cone, BSPP (JIS)
60° Cone, Metric (JIS)
37° Flare, Metric (Russia)

The Challenge:

Leakage is no longer acceptable in world class products. Above proliferation, besides limiting availability and increasing cost, increases leakage potential through misapplications. Therefore, the challenge facing the fluid power industry is two fold — eliminate leakage and minimize proliferation.

Meeting The Challenge:

This challenge has been met through a very intensive and cooperative effort by the member nations of sub-committee 4 of the ISO Technical Committee 131 (ISO/TC131). The subcommittee started this effort in 1989 and has completed development of performance based standards for the most widely used ports and tube/hose connections to limit proliferation, and strongly endorsing those with elastomeric seals to eliminate leakage in hydraulic systems.

Five ports, four threaded and the four bolt flange, and four tube/hose connections as shown on the following page (Fig. U1) have been standardized. The threaded ports and tube/hose connections are paired in the ISO 8434 series of fitting standards as defined in the table below.

To minimize proliferation in port usage and promote leak free connections, the sub-committee strongly endorses use of ISO 6149 port for all new designs by including the following statement in all port standards:

> ***"For threaded ports and stud ends specified in new designs in hydraulic fluid power applications, only ISO 6149 shall be used. Threaded ports and stud ends in accordance with ISO 1179, ISO 9974 and ISO 11926 shall not be used for new designs in hydraulic fluid power applications."***

On the tube/hose connection side, only ISO 8434-3 (O-ring Face Seal) and ISO 8434-4 (24° cone with weld nipple) feature elastomeric seal for zero leak performance. Combining these with the ISO 6149 for the port connection leads to two (2) combinations (complete fittings) for use in leak-free world class products. They are:

ISO 8434-3	O-ring Face Seal and ISO 6149 Port
ISO 8434-4	24° Cone With Soft Seal and ISO 6149 Port

For large port connections, the four bolt flange connection per ISO 6162 (SAE J518 is included in ISO 6162) remains widely used and the recommended connection.

Application	Port	Tube/Hose Connection			
		24° Cone Flareless (DIN) (Bite Type)	37° Flare (Inch Threads)	ORFS	24° Cone Weld Nipple
For All Designs	Metric ISO 6149 (SAE J2244)	ISO 8434-1	ISO 8434-2	ISO 8434-3	ISO 8434-4*
Not for New Designs in Hydraulic Fluid Power	BSPP ISO 1179 (DIN 3852-2)	ISO 8434-1	ISO 8434-2	—	ISO 8434-4*
	Metric ISO 9974 (DIN 3852-1)	ISO 8434-1	—	—	ISO 8434-4*
	UN/UNF ISO 11926 (SAE J1926)	—	ISO 8434-2	—	—

Table U1 — ISO Standard Port and Tube/Hose Connection Combinations

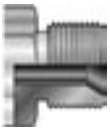
***** Will be included in ISO 8434-1 at the next revision.

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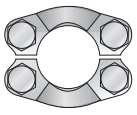
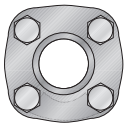
Tube / Hose End Summary

Tube / Hose End Type	Illustration	Pressure – Dynamic	Pressure – Static	Seal Reliability	Vibration Resistance (in Rigid Systems)	Ease of Installation	Ease of Maintenance	Reusability	Temperature
Seal-Lok O-Ring Face Seal		Excellent	Excellent	Excellent	Very Good	Excellent	Excellent	Excellent	Limited by Seal
Triple-Lok 37° Flare		Very Good	Very Good	Good	Good	Good	Very Good	Good	Excellent
Ferulok Inch Bite Type		Very Good	Very Good	Very Good	Very Good	Good	Good	Very Good	Excellent
EO Metric Bite Type		Excellent	Excellent	Very Good	Very Good	Good	Good	Very Good	Excellent
EO-2 Soft Seal Metric Bite Type		Excellent	Excellent	Excellent	Very Good	Very Good	Good	Excellent	Limited by Seal
Intru-Lok Brass Flareless		Fair (Low)	Fair (Low)	Very Good	Good	Good	Good	Good	Excellent
JIS 30° Flare		Good	Good	Very Good	Not Applicable	Very Good	Very Good	Very Good	Limited by Seal
JIS 60° Cone B8363		Good	Good	Very Good	Not Applicable	Very Good	Very Good	Very Good	Limited by Seal
Komatsu 30° Flare		Good	Good	Very Good	Not Applicable	Very Good	Very Good	Very Good	Limited by Seal
K4 BSP Adapters		Good	Good	Very Good	Not Applicable	Very Good	Very Good	Very Good	Limited by Seal
NPSM (Swivel)		Good	Good	Very Good	Not Applicable	Good	Very Good	Very Good	Limited by Seal

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Port End Summary

Port End Type and Seal Style	Illustration	Pressure – Dynamic	Pressure – Static	Temper-ature	Positioning	Contami-nation	Seal Reliability	Reusability	Fluid Compatibility
Tapered (NPT, NPTF, BSPT and Metric Taper)		Poor	Good	Excellent	Poor	Poor	Poor	Poor	Excellent
O-Ring in Chamfer (SAE J1926, ISO 6149 and JIS B2351)		Excellent	Excellent	Limited by Seal	Excellent	Very Good	Excellent	Excellent	Limited by Seal
Spot Face with ED Seal (ISO 1179-2 and ISO 9974-2)		Excellent	Excellent	Limited by Seal	Not Applicable	Very Good	Excellent	Excellent	Limited by Seal
Spot Face with Bonded Seal (ISO 1179 and ISO 9974)		Good	Good	Good	Not Applicable	Very Good	Good	Excellent	Limited by Seal
Spot Face with Cutting Face (ISO 1179-4 and ISO 9974-3)		Poor	Fair	Excellent	Not Applicable	Fair	Poor	Poor	Excellent
Spot Face with O-Ring and Retaining Ring (ISO 1179-3)		Good	Good	Good	Excellent	Very Good	Good	Excellent	Limited by Seal
Spot Face with Hard Metal Seal (ISO 1179 and ISO 9974)		Poor	Fair	Excellent	Not Applicable	Fair	Poor	Poor	Excellent
Spot Face with Soft Metal Seal (ISO 1179 and Iso 9974 with copper gasket)		Poor	Fair	Good	Not Applicable	Very Good	Poor	Fair	Excellent
4 Bolt Flange (SAE J518 and ISO 6162)		Excellent	Excellent	Good	Good	Very Good	Good	Excellent	Limited by Seal
4 Bolt Flange (ISO 6164)		Excellent	Excellent	Good	Good	Good	Good	Excellent	Limited by Seal

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Conformance to Applicable Specifications and Approvals for TFD Products

By Product Type or Subject

Fittings	Specifications	Approvals
Seal-Lok	SAE J1453	DNV - cert. #P-9538 TUV - For CHG fuel cell applications - stainless AGA/CGA - Eng. Report #125-AGA1-85 American Bureau of Shipping (ABS) - cert. # 98-C12949-X
Metric Seal-Lok	ISO 8434-3	
Triple-Lok	SAE J514	Bureau Veritas cert. #2190 1907D00H (steel only)
	MIL-F-18866, MS Sheets	DNV cert. # P-9085/792-22
	MS51500 - MS51534	Germanischer Lloyd cert. # 9672890HH
	BS43687, part 4	U.S. Coast Guard cert.#16703/46 CFR 56.60
	ISO 8434-2	U.S.S.R. Register of Shipping cert. #93.017.260
Ferulok	SAE J514	
	MIL-F-18866 MS Sheets MS51811 - MS51843*	
	U.S. Coast Guard - meet applicable requirements of ASTM F1387	
EO/EO-2	DIN 3861	Germanischer Lloyd
		Lloyd's Register of Shipping
	ISO 8434-1-4, ISO 8434-4	DNV
		ABS
		Russian Maritime Register of Shipping
		China Classification Society
		DVGW
	DIN 3865	TUV
	DIN 3859	
Flange Adapters	SAE J518	
	ISO 6162-1	
	ISO 6162-2	
	ISO 6164	
JIS Adapters*	JIS B8363 (with some exceptions)	
K4 Adapters	BS 5200, ISO 8434-6**	
Pipe Fittings	SAE J514	
Pipe Plugs	SAE J531	
Straight Thread Plugs	SAE J514	
Pipe Swivel Adapters	SAE J514	
All catalog products	Canadian Registration	CRN: OA9941.5

Plating	Specification
Carbon Steel – Chromium 6 Free Zinc	ASTM B633 Type II FE/ZN8* *Clear/Silver Color
	MIL-STD-171E
	JIS 8610 Class 1 Grade 3
Stainless Steel Passivation	QQ-P35 Type VI
	ASTM A380
Carbon Steel – Zinc Phosphate	DOD-P-16232, Class 1

Design	Specification	Comment
All Products	ASME / ANSI B31.1	All products meet the design factor requirements of this specification.

Test Methods	Specification
Leak, Burst, Impulse, Over-Torque and Repeated Assembly	SAE J1644
	ISO 19879
Vibration	NFPA T3.8.3, ISO 7257

Table U2 — Conformance Standards

***** Some parts do not meet dimensional requirements.

Dimensions and pressures for reference only, subject to change.

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Fluid Compatibility

The fluid compatibility chart on the following page is intended as a guide only and is not to be considered as a sole selection criteria to use Parker Tube Fittings in a specific application or with a specific fluid. Other factors that must be considered include, but are not limited to: Fluid temperature, ambient temperature, system pressure (both operating and peak) and applicable standards or regulations. For media not listed, please contact your Parker representative or the Tube Fittings Division.

Protective Coatings on Steel

Protective coatings such as electroplated zinc and cadmium[1)] and zinc phosphate are usually applied to steel fittings for extending their useful service life in corrosive environments. Cadmium and zinc corrode sacrificially, protecting the steel substrate from normal atmospheric rusting due to the common presence of oxygen, moisture and acidic gases. They are, however, rapidly attacked by many fluids including those containing acidic hydrogen and reactive fluorine, chlorine, bromine, iodine, and nitrogen. Zinc plating will further be attacked by strong bases or water with pH > 12. **Zinc reacts with glycol based fire resistant fluids and forms a gelatinous compound that can plug up filters and be harmful otherwise, in a system with many zinc plated tube and hose fittings.** Steel fittings with zinc phosphate coating or stainless steel fittings, along with brass fittings in low pressure applications, are viable options.

The other option is to run the fluid through the system, without components with moving parts in it, with an auxiliary power source, to generate and flush the gelatinous compound. Then re-connect all components, change filters and charge the system with new fluid.

The corrosion resistance of the Chromium-6 Free standard surface treatment is a minimum of 25% improved over traditional zinc gold (hexavalent) chromate surface. Additionally, the Chromium-6 Free surface meets the EU end of life vehicle directive and ROHS compliance.

Zinc phosphate coatings protect steel by covering its surface and will retard rusting as long as the inhibiting barrier is not broken.

Caution: Where low toxicity and low corrosion are required, as in food or beverage applications, steel coated with any form of zinc or other protective coatings is not recommended.

Notes:

1) Cadmium is not allowed by SAE and ISO stardards for general industrial and commercial use. Some military applications still require cadmium plating. These requirements are met with special (non-standard) processing at extra cost.

Choosing the Tube Material and Type

Selection of tube material depends on the fluid, corrosive nature of the service environment, the operating temperature range and the maximum operating pressure. The tube O.D. and wall thickness selection depends on these four parameters.

A simple method of selecting the proper tube type and material is described below.

Table U7 lists several common tube types with their recommended operating temperature ranges, general application, and fitting compatibility. Based on the fluid system parameters and media, select the appropriate tube type and material.

If media and/or service environment is different from the commonly used ones listed in the general application column, please consult the Fluid Compatibility chart on the following page or contact the Tube Fittings Division.

For selecting proper tube O.D. and wall thickness use the procedure given on page U15.

Caution: When working with highly corrosive media, always consult the Tube Fittings Division.

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	Fitting Material			Seal Material			
Media	Brass	Steel	316 SS	BUNA-N	Ethylene Propylene	Fluorocarbon	Neoprene
Acetylene	NR	F	S	S	S	S	F
Air (oil free) @ 190° F	S	F	S	S	S	S	S
Air (oil free) @ 300° F	S	F	S	F	F	S	F
Air (oil free) @ 400° F	S	F	S	NR	NR	S	NR
Alcohol, Ethyl	S	NR	NR	NR	S	NR	S
Animal Oils (Lard Oil)	F	F	F	S	F	S	F
Aromatic Fuel - 50%	ID	ID	ID	F	NR	S	NR
Aromatic Solvents	ID	ID	F	F	ID	S	NR
Asphalt	NR	NR	S	F	NR	S	F
ASTM Oil #1	S	S	S	S	NR	S	S
ASTM Oil #2	S	S	S	S	NR	S	F
ASTM Oil #3	S	S	S	S	NR	S	NR
ASTM Oil #4	S	S	S	F	NR	S	NR
ATF Oil	S	S	S	S	NR	S	F
Automotive Brake Fluid	ID	ID	ID	NR	S	NR	F
Benzene	NR	F	NR	NR	NR	S	NR
Brine (Sodium Chloride)	NR	NR	S	S	S	S	S
Butane	NR	S	S	S	NR	S	S
Carbon Dioxide	S	F	S	S	S	S	S
Carbon Monoxide	S	S	S	S	S	S	F
Chlorine (Dry)	F	F	NR	NR	ID	F	F
Compressed Air	S	F	S	S	S	S	S
Crude Oil	NR	F	S	F	NR	S	NR
Cutting Oil	ID	S	S	S	NR	S	F
Diesel Fuel	S	S	S	S	NR	S	NR
Ethanol	S	NR	NR	NR	S	NR	S
Ethers	S	S	S	NR	F	F	NR
Freon 11	S	ID	ID	F	NR	F	NR
Freon 12	S	S	NR	F	NR	S	S
Freon 22	S	NR	S	NR	NR	NR	S
Fuel Oil	NR	S	S	S	NR	S	F
Gasoline	S	F	S	S	NR	S	NR
Gas, Liquid Propane (LPG)	S	S	S	S	NR	S	F
Gas, Natural	F	S	S	S	NR	S	S
Helium	S	S	S	S	S	S	S
Hydraulic Oil, Petroleum Base	S	S	S	S	NR	S	S
Hydraulic Oil, Water Base	ID	S	S	F	S	NR	F
Hydrogen Gas	S	S	S	S	S	S	S
Jet Fuel	S	S	S	S	NR	S	NR
Kerosene	S	S	S	S	NR	S	F
Lubricating Oil SAE 10, 20, 30, 40, 50	S	S	S	S	NR	S	F
Methanol	S	S	S	S	S	NR	S
MIL-F-8192 (JP-9)	S	S	S	NR	NR	S	NR
MIL-H-5606	S	S	S	S	NR	S	F
MIL-H-6083	S	S	S	S	NR	S	S
MIL-H-7083	S	S	S	S	S	F	F
MIL-H-8446 (MLO-8515)	F	S	S	F	NR	S	S
Mil-L-2104 & 2104B	S	S	S	S	NR	S	F
MIL-L-7808	NR	F	S	F	NR	S	NR
Mineral Oil	S	S	S	S	NR	S	F
Nitrogen	S	S	S	S	S	S	S
Petrolatum	S	S	S	S	NR	S	F
Petroleum Oil (<250° F)	S	S	S	S	NR	S	F
Propane	S	S	S	S	NR	S	F
R134A	S	S	S	NR	S	NR	NR
Sea Water	F	NR	S	S	S	S	F
Skydrol 500, Type 2	NR	S	S	NR	S	NR	NR
Skydrol 7000, Type 2	NR	S	S	NR	S	F	NR
Soap Solutions	NR	NR	S	S	S	S	F
Steam (<400° F)	F	S	S	NR	S	NR	NR
Stoddard Solvent	F	S	S	S	NR	S	F
Transmission Fluid (Type A)	S	S	S	S	NR	S	F
Trichloroethane	ID	F	S	NR	NR	S	NR
Water	S	F	S	S	S	F	F

Table U4 — Fluid Compatibility Chart

Codes:
S = Satisfactory F = Fair
NR = Not recommended ID = Insufficient data

Dimensions and pressures for reference only, subject to change.

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Corrosion of Base Metals in Contact

The susceptibility of different base metals to corrosion while in contact, depends upon the difference between the contact potentials, or the electromotive voltages of the metals involved. The greater the potential difference is, the greater is the tendency for corrosion. The metal with the higher potential forms the anode and is corroded. In other words, the larger the separation distance in the electromotive chart between the two metals in contact, the higher the contact potential and chances for corrosion. For example, zinc and aluminum are very short distance apart in the chart; therefore potential for corrosion when these two metals are in contact is very low. On the other hand, aluminum and passivated 316 stainless steel are far apart; hence, when in contact, the potential for corrosion is very high. Aluminum, being more anodic metal, will corrode in this combination.

As a general guideline, if the metals are half the length of the chart or more apart, the combination should be avoided. Also, it is not a good idea to combine an anodic metal part with thin cross section, such as thin wall tubing, with a cathodic or less anodic metal part of a heavy cross section, such as a fitting.

Example: A thin wall brass tube with steel fitting is a better, although not ideal, combination than a thin wall steel tube with brass fitting.

Electromotive or Galvanic Series for Metals	
+ Anodic (least noble) corroded	Magnesium
	Magnesium alloys
	Zinc **(Parker steel fittings are zinc plated)**
	Berillium
	Aluminum 5052, 3004, 3003, 1100, 6053
	Cadmium
	Aluminum 2117, 2017, 2024 T4
	Mild steel (1018), wrought iron, **free machining steel (12L14)**
	Low alloy high strength steel, cast iron
	Chrome iron (active)
	430 Stainless (active)
	302, 303, 321, 347, 410, 416, stainless steel (active)
	Ni-resist
	316, 317 stainless steel (active)
	Carpenter 20Cb-3 stainless (active)
	Aluminum bronze (CA 687)
	Hastelloy C (active) Inconnel 625 (active) Titanium (active)
	Lead/Tin solder
	Lead
	Tin
	Inconnel 600 (active)
	Nickel (active)
	60 Ni-15 Cr (active)
	80 Ni-20 Cr (active)
	Hastelloy B (active)
	Naval brass (CA 464), Yellow brass (CA 268), **Brass (CA360)**
	Red brass (CA 230), Admiralty brass (CA 443)
	Copper (CA 102)
	Maganese bronze (CA 675), Tin bronze (CA 903, 905)
	410, 416 Stainless (passive) Phospher bronze (CA 521, 524)
	Silicon bronze (CA 651, 655)
	Nickel silver (CA 732, 735, 745, 752, 754, 757, 764, 770, 794)
	Cupro Ni 90-10
	Cupro Ni 80-20
	430 Stainless steel (passive)
	Cupro Ni 70-30
	Nickel aluminum bronze (CA 630, 632)
	Monel 400, K500
	Silver solder
	Nickel (passive)
	60 Ni 15 Cr (passive)
	Inconnel 600 (passive)
	80 Ni 20 Cr (passive)
	Chrome iron (passive)
	302, 303, 304, 321, 347 stainless stainless steel (passive)
	316, 317 stainless steel (passive) **(Parker stainless steel fittings are passivated)**
	Carpenter 20 Cb-3 stainless (passive), Incoloy 825
	Silver
	Titanium (passive), Hastelloy C & C276 (passive), Inconnel 625 (passive)
	Graphic
- Cathodic (most noble) protected	Zirconium
	Gold
	Platinum

Electric current flows from plus to minus

Direction of attack

Table U5 — Electromotive or Galvanic Series for Metals

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O-Ring Material Selection

Standard O-rings supplied with Parker tube fittings and adapters are 90 durometer hard nitrile (Buna-N) Parker compound #N0552. These O-rings are well suited for most industrial hydraulic and pneumatic systems. They have high extrusion resistance making them suitable for very high pressure static applications. Optional high temperature fluorocarbon, Parker compound #V0894, is also available for higher temperature specifications.

O-rings for other than normal hydraulic media or higher temperature applications can be selected from the following chart. The chart should be used only as a general guide. Before making final selection for a given application, it is recommended that appropriate tests be conducted to assure compatibility with the fluid, temperature, pressure and other environmental conditions.

For fluids not shown in the chart, please contact the Tube Fittings Division.

Polymer	Abbreviated Name	Parker Compound No.	Color	SAE J515 Type	Hardness Shore "A"7)	Temperature Range	Recommended For	Not Recommended For
Nitrile-Butadiene	NBR	N0552	Black	CH[2)]	90[6)]	-30° to 250° F	Petroleum base oils and	Phosphate ester base
Nitrile-Butadiene	NBR	N0674	Black	–	70	-30° to 250° F	fluids, mineral oils, ethylene	hydraulic fluids, auto-
Nitrile-Butadiene	NBR	N0103	Black	–	70	-65° to 225° F	glycol base fluids, silicone	motive brake fluids,
Nitrile-Butadiene (Low compression set)	NBR	N1059	Black	CH[2)]	90	-30° to 275° F	and di-ester base lubricants, air, water under 150°F, and natural gas.	strong acids, ozone, freons, ketones, halogenated hydrocarbons,
Nitrile-Butadiene	NBR	N0507	Black	–	90	-65° to 180° F	Hydrogen fuel cells.	and methanol.
Nitrile-Butadiene	NBR	N0 304	Black	–	75	-65° to 225° F	Hydrogen fuel cells.	
Nitrile-Butadiene	NBR	N0508	Black	–	75	-35° to 250° F	Meets FDA requirements for food products.	
Nitrile-Butadiene	NBR	N0756	Black	–	75[6)]	-65° to 275°F	CNG Applications	
Ethylene-Propylene	EPDM	E0540	Black	CA[3)]	80	-65° to 275° F	Phosphate ester base	Petroleum base oils
Ethylene-Propylene	EPDM	E0893	Purple[1)]	CA[3)]	80	-65° to 275° F	hydraulic fluids, hot water, steam to 400°F, silicone oils and greases, dilute acids	and di-ester base lubricants.
							and alkalis, ketones, alcohols and automotive brake fluids.	
Ethylene-Propylene	EPDM	E0962	Black	–	90	-65° to 275° F	CO_2 climate control systems.	
Neoprene	CR	C0873	Black	–	70	-45° to 250° F	Refrigerants (freons,	Phosphate ester fluids
Neoprene	CR	C0944	Red[1)]	–	70	-45° to 250° F	ammonia), high aniline point	and ketones.
							petroleum oils, mild acids, and silicate ester lubricants.	
Fluorocarbon	FKM[5)]	V0747	Black	–	75	-15° to 400° F	Petroleum base oils and	Ketones, skydrol fluids,
	or	V0884	Brown[1)]	–	75	-15° to 400° F	fluids, some phosphate	amines (VDMH),
	FPM	V0894	Brown[1)]	HK[4)]	90[6)]	-15° to 400° F	ester base fluids, silicone and silicate ester base	anhydrous ammonia, low molecular weight
							lubricants, di-ester base lubricants, acids and halogenated hydrocarbons.	esters and ethers, and hot hydrofluoric or chlorosulfonic acids.
Silicone	Si	S0604	Rust[1)]	–	70	-65° to 450° F	Dry heat (air to 400°F) and high aniline point oils.	Most petroleum fluids, ketones, water and steam.

Table U6 — O-Ring Selection

1) These Parker “Chromassure” color assurance O-rings are available from the Parker Hannifin O-Ring Division. They help eliminate assembly errors, reduce warranty costs and liability risks, and assure safety in aftermarket business.
2) Formerly SAE Type I.
3) Formerly SAE Type II.
4) Formerly SAE Type III.
5) “FKM” is the ASTM designation for fluorocarbon. Its ISO designation is “FPM”.
6) Standard compounds available from stock.
7) Use 90 durometer hard O-rings for applications with 1500 psi or higher pressures.

Dimensions and pressures for reference only, subject to change.

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Tube and Fitting Material Compatibility

As a general rule, tube and fitting materials should be the same. If different materials must be considered, the following chart can be used as a general guide. Since operating conditions differ with applications, this chart should be used only as a guide and not a firm recommendation. Before making a final decision on material combination, it should be sufficiently tested under appropriate conditions to assure suitability for the intended application. For additional material combinations, contact the Tube Fittings Division.

Tube Material	Specification	Construction	Condition	Max. Hardness	Temperature Range (7)	Application	Tube Material to Fitting & Material Compatibility										
							Seal-Lok ORFS (SAE J1453)			Triple-Lok 37° Flare (SAE J514)				Ferulok Flareless (SAE J514)			Intru-Lok Flareless	EO / EO-2 Flareless (ISO 8434-1)
							S	SS	B	S	SS	B	M	S	SS	M	B	S, SS, B, M
Carbon Steel C-1010	SAE J524 (ASTM A179) (8)	Seamless	Fully Annealed	HRB 72	-65° to 500°F -55° to 260°C	High pressure hydraulic, air, & some specialty chemicals	E	NR	(6)	G	NR	(6)	NR	E	NR	NR	NR	NR
	SAE J525 (ASTM A178) (8)	Welded & Drawn					E	NR	(6)	E	NR	(6)	NR	E	NR	NR	NR	NR
	SAE J356	Welded & Flash Controlled					G	NR	(6)	NR	NR	(6)	NR	G	NR	NR	NR	NR
Carbon Steel C-1021	SAE J2467	Welded & Flash Controlled	Fully Annealed	HRB 75	-65° to 500°F -55° to 260°C	High pressure hydraulic	E	NR	(6)	NR	NR	(6)	NR	E	NR	NR	NR	NR
	SAE J2435	Welded & Drawn					E	NR	(6)	E	NR	(6)	NR	E	NR	NR	NR	NR
Carbon Steel High Strength Low Alloy (HSLA)	SAE 2613	Welded & Flash Controlled	Sub-critically annealed	HRB 90	-65° to 500°F -55° to 260°C	High pressure hydraulic	E (10)	NR	(6)	NR	NR	NR	NR	NR	NR	NR	NR	NR
	SAE J2614	Welded & Drawn					E	NR	(6)	NR	NR	NR	NR	NR	NR	NR	NR	NR
Alloy Steel 4130	ASTM A519	Seamless			-65° to 500°F -55° to 260°C	High pressure hydraulics	E (4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
St 37.4 (Carbon Steel)	DIN 2391 Part 2 (Metric)	Seamless	Fully Annealed	HRB 72	-65° to 500°F -55° to 260°C	High pressure hydraulic, air, & some specialty chemicals	E	NR	NR	G	NR	NR	NR	NR	NR	NR	NR	E
Stainless Steel 304 & 316	ASTM A213 ASTM A269	Seamless	Fully Annealed	HRB 90	-425° to 1200°F -255° to 650°C (3)	High pressure, high temperature, or generally corrosive media (1)	(6)	E	(6)	(6)	G	(6)	NR	(6)	E	NR	NR	NR
	ASTM A249 ASTM A269	Welded & Drawn					(6)	E	(6)	(6)	E	(6)	NR	(6)	E	NR	NR	NR
1.4571 1.4541 Stainless Steel	DIN 17458 Tab 8 (Metric)	Seamless	Fully Annealed	HRB 90	-425° to 1200° -255° to 650°C (3)	High pressure, high temperature, or generally corrosive media (1)	(6)	E	NR	(6)	G	NR	NR	NR	E	NR	NR	E
Copper	SAE J528 (ASTM B-75) (8)	Seamless	Soft Annealed Temper 0	60 Max. Rockwell 15T	-325° to 400°F -200° to 205°C	Low pressure, low temperature, water, oil & air	E	(6)	E	G	(6)	E	NR	G (2)	NR	NR	E	E
Aluminum 6061	ASTM-B210	Seamless	T6 Temper	HRB 56	-325° to 400°F -200° to 205°C	Low pressure, low temperature, water, oil, air & some specialty chemicals	NR	NR	NR	G	NR	NR	NR	E (2)	NR	NR	(6)	NR
			0 & T4 Temper	HRB 30			E (5)	NR	NR	G	NR	NR	NR	E (2)	NR	NR	(6)	NR
Monel 400	ASTM-B165	Seamless	Fully Annealed	HRB 70	-400° to 800°F -240° to 425°C	Sour gas, marine & general chemical processing media	NR	(6)	NR	NR	(6)	NR	E	NR	(6)	E	NR	NR
Nylon		Extruded	Flexible & Semi-Rigid		-60° to 200°F -50° to 95°C	Lube lines, chemcial process controls & air	NR	NR	NR	NR	NR	NR	NR	G (2)	G (2)	G (2)	E	G (2), (9)
Polyethylene	ASTM D-1248	Extruded	Instrument Grade		-80° to 150°F -60° to 65°C	Instrumentation lines	NR	NR	NR	NR	NR	NR	NR	G (2)	G (2)	G (2)	E	G (2), (9)
PVC		Extruded	Instrument & Laboratory Grade		0° to 140°F -20° to 60°C	General purpose laboratory use	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	G	NR
PTFE		Extruded & Cintered			-65° to 400°F -55° to 205°C	Very low pressure, high temperature, fuel, lube, chemical & air applications	NR	NR	NR	NR	NR	NR	NR	G (2)	G (2)	G (2)	G	G (2), (9)

Table U7 — Tube and Fitting Material Compatibility

Ratings Key:

NR Not Recommended
F Fair
G Good
E Excellent

Fitting Materials Code:

S Steel
SS Stainless Steel
B Brass
M Monel

Notes:

1) For highly corrosive media or service environment, contact the Tube Fittings Division.
2) Requires different assembly procedure. Contact the Tube Fittings Division.
3) Low temperature limit for stainless steel Ferulok fittings is -20°F (-30°C).
4) For brazing only. Grade 4130 not recommended with Parflange process.
5) For use with Parflange process only. Not recommended with brazing.
6) Use depends on specific application. Contact the Tube Fittings Division.
7) Applies to tube material.
8) Comparable specifications to SAE.
9) With metric version of tubing.
10) Not tested with Parflange. Contact the Tube Fittings Division.

Dimensions and pressures for reference only, subject to change.

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Determining Tube Size for Hydraulic Systems

Proper tube material, type and size for a given application and type of fitting is critical for efficient and trouble free operation of the fluid system. Selection of proper tubing involves choosing the right tube material, and determining the optimum tube size (O.D. and wall thickness).

Proper sizing of the tube for various parts of a hydraulic system results in an optimum combination of efficient and cost effective performance.

A tube that is too small causes high fluid velocity, which has many detrimental effects. In suction lines, it causes cavitation which starves and damages pumps. In pressure lines, it causes high friction losses and turbulence, both resulting in high pressure drops and heat generation. High heat accelerates wear in moving parts and rapid aging of seals and hoses, all resulting in reduced component life. High heat generation also means wasted energy, and hence, low efficiency.

Too large of a tube increases system cost. Thus, optimum tube sizing is very critical. The following is a simple procedure for sizing the tubes.

Step 1: Determine Required Flow Diameter

Use Tables U13 and U14 to determine recommended flow diameter for the required flow rate and type of line.

The table is based on the following recommended flow velocities:

Pressure lines — 25 ft./sec. or 7.62 meters/sec.
Return lines — 10 ft./sec. or 3.05 meters/sec.
Suction lines — 4 ft./sec. or 1.22 meters/sec.

If you desire to use different velocities than the above, use one of the following formulae to determine the required flow diameter.

$$\text{Tube I.D. (in.)} = 0.64 \sqrt{\frac{\text{Flow in GPM}}{\text{Velocity in ft./sec.}}}$$

OR

$$\text{Tube I.D. (mm)} = 4.61 \sqrt{\frac{\text{Flow in liters per minute}}{\text{Velocity in meters/sec.}}}$$

Step 2: Determine Tube O.D. and Wall Thickness

Using Tables U15 and U16, determine the tube O.D. and wall thickness combination that satisfies the following two conditions:

A. Has recommended design pressure equal to or higher than maximum operating pressure.

B. Provides tube I.D. equal to or greater than required flow diameter determined earlier.

Design pressure values in Tables U15 and U16 are based on the severity of service rating “A” (design factor of 4) in Table U10, and temperature derating factor of 1 in Table U11.

If more severe operating conditions are involved, the values in Tables U15 and U16 should be multiplied by appropriate derating factors from Tables U10 and U11 before determining the tube O.D. and wall thickness combination. Contact the Tube Fittings Division when in doubt.

Allowable design stress levels and formula used to arrive at the design pressure values are given in the following chart. Values in Table U8 are for fully annealed tubing.

Material and Type	Allowable Design Stress fo Design Factor of 4 at 72°F	Tube Specification
Steel C-1010	12,500 PSI	SAE J356, J524, J525
Steel C-1021	15,000 PSI	SAE J2435, J2467
Steel, High Strength Low Alloy (HSLA)	18,000 PSI	SAE J2613, J2614
Stainless Steel 304 & 316	18,800 PSI	ASTM A213, A249, A269
Alloy Steel C-4130	18,800 PSI	ASTM A519
Copper, K or Y	6,000 PSI	SAE J528, ASTM B75
Aluminum 6061-T6	10,500 PSI	ASTM B210
Monel, 400	17,500 PSI	ASTM B165

Table U8 — Design Stress Values

Design Pressure Formula (LAME’S)

$$P = S\left(\frac{D^2 - d^2}{D^2 + d^2}\right) \quad \text{where:}$$

D = Outside diameter of tube, in
d = Inside diameter of tube (D-2T), in
P = Recommended design pressure, psi
S = Allowable stress for design factor of 4, psi
T = Tube wall thickness, in.

Table U9 — Design Pressure Formula

For thin wall tubes ($D/T \geq 10$) the following formula may be Used: **P = 2ST/D**

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Severity of Service	Description	Design Factor	Derating Factor
A (Normal)	Moderate mechanical and hydraulic shocks.	4.00	1.00
B (Severe)	Severe hydraulic shocks and mechanical strain.	6.00	0.67
C (Hazardous)	Hazardous application with severe service conditions.	8.00	0.50

Table U10 — Severity of Service Design and Derating Factors

The design factor is generally applied to ultimate strength of material (or burst pressure of tubing) to provide a measure of safety against the unknowns in material and operating conditions. The derating factors listed here should be applied directly to the design pressure values in Tables U15 and U16 to arrive at maximum recommended working pressures (i.e., multiply values in Tables U15 and U16 by these derating factors).

Besides severity of service, high operating temperature also reduces allowable working pressure of the tubing. Temperature derating factors for various tube materials are given in Table U11. Where applicable, derating factors for severity of service and temperature should be applied to the design pressure values in Tables U15 and U16 to arrive at the maximum recommended working pressure.

Example:

Combined derating factor for 316SS tubing for B (severe) service and 500° F. operation is .67 x .9 = .603

Tube Selection Example:

Maximum Operating Temperature (degrees F)	Steel C-1010 and C-4130	Stainless Steel		Copper	Aluminum 6061-T6	Monel Type 400
		304	316			
100	1.00	1.00	1.00	1.00	1.00	1.00
150	1.00	0.91	1.00	0.85	1.00	0.97
200	1.00	0.84	1.00	0.80	1.00	0.94
250	1.00	0.79	1.00	0.80	0.94	0.91
300	1.00	0.75	1.00	0.78	0.80	0.88
350	0.99	0.72	0.99	0.67	0.60	0.86
400	0.98	0.69	0.97	0.50	0.43	0.85
500	0.96	0.65	0.90			0.84
600		0.61	0.85			0.84
700		0.59	0.82			0.84
800		0.57	0.80			0.83
900		0.54	0.78			
1000		0.52	0.77			
1100		0.47	0.62			
1200		0.32	0.37			

Table U11 — Temperature Derating Factors* for Tubes

* The derating factors are based on allowable design stress values at various temperatures per ASME B31.1 code for pressure piping (1986).

To select tube material and tube sizes for pressure, return and suction lines for a hydraulic power unit with the following operating parameters known:

Type of fluid: Petroleum base hydraulic fluid

Operating temperature range: -20°F to +140°F.

Maximum operating pressure: 3500 psi

Maximum flow rate through each line: 10 GPM

Severity of service: A (normal)

1. **Selecting Tube Material:** Table U7 indicates that carbon steel, C-1010, tubing would meet the media, operating temperature range, and maximum operating pressure (high) requirements.
2. **Sizing the Tube:** From Table U13, the recommended flow diameters for various lines for 10 GPM flow rate are: 0.405 for pressure line, 0.639 for return line, and 1.012 for suction line.

   Now, using Tables U15 and U16, we need to find tubes with inside diameters (I.D.) equal to or larger than the above flow diameters, and wall thicknesses appropriate for design pressures of 3500 psi minimum for the pressure line and about 500 psi for return and suction lines. Since derating factors for Severity of Service (Table U10) and Max. Operating Temperature (Table U11) are both 1, design pressure values in Tables U15 and U16 do not need to be reduced.

   Matching tube I.D.s and design pressures in Tables U15 and U16 for above conditions, we find:

   A) For the pressure line, we would choose 5/8" O.D. x .083" wall tubing. The .095" and .109" wall tubes would also be satisfactory if .083" wall is not readily available.

   B) For the return line, either 3/4" x .035" or 3/4" x .049" would meet the requirements. If Ferulok fittings are being used, we will need to go to 3/4" x .065" because .065" is the smallest wall thickness recommended for 3/4" O.D. tubing used with Ferulok fittings in Table U14. This reduces the flow diameter about 3% below the recommended value, but is still in the acceptable range. The alternative is to go to 7/8" O.D. x .072" wall tubing, which is way too large.

Tube Material / Size			Steel St. Steel Copper Aluminum	Steel St. Steel Monel	Steel Alloy Steel St. Steel Copper Monel	Copper Aluminum Plastics	Steel St. Steel
O.D. (in.)	O.D. (mm)	Dash Number	SAE 37° Flare Triple-Lok	SAE Flareless Ferulok	SAE O-ring Face Seal Seal-Lok [1]	Intru-Lok	Metric Flareless
1/8	4	-2	.010 - .035	.010 - .035	—	.012 - .028	0.5 - 1
3/16	6	-3	.010 - .035	.020 - .049	—	.012 - .035	1 - 2
1/4	8	-4	.020 - .065	.028 - .065	.020 - .083	.020 - .049	1 - 2.5
5/16	10	-5	.020 - .065	.028 - .065	.020 - .095	.020 - .065	1 - 3
3/8	12	-6	.020 - .065	.035 - .095	.020 - .109	.028 - .065	1.5 - 3.5
1/2	14	-8	.028 - .083	.049 - .120	.028 - .148	.035 - .083	1.5 - 4
5/8	15	-10	.035 - .095	.058 - .120	.035 - .134	.035 - .083	1.5 - 4
3/4	16	-12	.035 - .109	.065 - .120	.035 - .148	.035 - .095	2 - 4
7/8	18	-14	.035 - .109	.072 - .120	—	.049 - .095	2 - 4
1	20	-16	.035 - .120	.083 - .148	.035 - .188	.049 - .120	2.5 - 4
1 1/4	22	-20	.049 - .120	.095 - .188	.049 - .220		2.5 - 4
1 1/2	25	-24	.049 - .120	.095 - .220	.049 - .250		2.5 - 4.5
2	28	-32	.058 - .134	.095 - .220	.065 - .220		2.5 - 4.5
	30						2.5 - 5
	35						3 - 5
	38						3 - 6
	42						3.5 - 7

1) Brazing to attach sleeve can be used for all wall thicknesses. For flanging tool availability, see page S26.

Table U12 — Recommended "Min./Max" Tube Wall Thickness for Common Fittings

C) For the suction line, we can use any one of the following tubes: 1-1/4" O.D. x .049" to .083" wall tube for Triple-Lok or Seal-Lok fittings and 1-1/4" O.D. x .095" wall tube for Ferulok fittings.

One final consideration in choosing the right wall thickness for tubing is bending. If bending without the use of a mandrel is desired, then wall thickness of less than 7% of tube O.D. should not be used.

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
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Recommended Flow Diameters – In Inches

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Maximum Flow Rate GPM	Recommended Flow Diameter in Inches		
	Pressure Lines	Return Lines	Suction Lines
0.25	0.064	0.101	0.160
0.50	0.091	0.143	0.226
0.75	0.111	0.175	0.277
1.00	0.128	0.202	0.320
1.25	0.143	0.226	0.358
1.50	0.157	0.247	0.392
1.75	0.169	0.267	0.423
2.00	0.181	0.286	0.453
2.50	0.202	0.319	0.506
3.00	0.222	0.350	0.554
3.50	0.239	0.378	0.599
4.00	0.256	0.404	0.640
4.50	0.272	0.429	0.679
5.00	0.286	0.452	0.716
5.50	0.300	0.474	0.750
6.00	0.314	0.495	0.784
6.50	0.326	0.515	0.816
7.00	0.339	0.534	0.847
7.50	0.351	0.553	0.876
8.00	0.362	0.571	0.905
8.50	0.373	0.589	0.933
9.00	0.384	0.606	0.960
9.50	0.395	0.623	0.986
10.00	0.405	0.639	1.012
11.00	0.425	0.670	1.061
12.00	0.443	0.700	1.109
13.00	0.462	0.728	1.154
14.00	0.479	0.756	1.197
15.00	0.496	0.782	1.239
16.00	0.512	0.808	1.280
17.00	0.528	0.833	1.319
18.00	0.543	0.857	1.358
19.00	0.558	0.880	1.395
20.00	0.572	0.903	1.431
22.00	0.600	0.947	1.501
24.00	0.627	0.990	1.568
26.00	0.653	1.030	1.632
28.00	0.677	1.069	1.693
30.00	0.701	1.106	1.753
32.00	0.724	1.143	1.810
34.00	0.746	1.178	1.866
36.00	0.768	1.212	1.920
38.00	0.789	1.245	1.973
40.00	0.810	1.278	2.024
42.00	0.830	1.309	2.074
44.00	0.849	1.340	2.123
46.00	0.868	1.370	2.170
48.00	0.887	1.399	2.217
50.00	0.905	1.428	2.263
55.00	0.949	1.498	2.373
60.00	0.991	1.565	2.479

Maximum Flow Rate GPM	Recommended Flow Diameter in Inches		
	Pressure Lines	Return Lines	Suction Lines
65.00	1.032	1.629	2.580
70.00	1.071	1.690	2.677
75.00	1.109	1.749	2.771
80.00	1.145	1.807	2.862
85.00	1.180	1.862	2.950
90.00	1.214	1.916	3.036
95.00	1.248	1.969	3.119
100.00	1.280	2.020	3.200
110.00	1.342	2.119	3.356
120.00	1.402	2.213	3.505
130.00	1.459	2.303	3.649
140.00	1.515	2.390	3.786
150.00	1.568	2.474	3.919
160.00	1.619	2.555	4.048
170.00	1.669	2.634	4.172
180.00	1.717	2.710	4.293
190.00	1.764	2.784	4.411
200.00	1.810	2.857	4.525

Table U13 — Recommended Flow Diameters, in Inches

Recommended Flow Diameters – In Millimeters

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Maximum Flow Rate LPM*	Recommended Flow Diameter in Millimeters		
	Pressure Lines	Return Lines	Suction Lines
1	1.670	2.640	4.180
2	2.362	3.734	5.911
3	2.893	4.573	7.240
4	3.340	5.280	8.360
5	3.734	5.903	9.347
6	4.091	6.467	10.239
7	4.418	6.985	11.059
8	4.723	7.467	11.823
9	5.010	7.920	12.540
10	5.281	8.348	13.218
12	5.785	9.145	14.480
14	6.249	9.878	15.640
16	6.680	10.560	16.720
18	7.085	11.201	17.734
20	7.468	11.806	18.694
22	7.833	12.383	19.606
24	8.181	12.933	20.478
26	8.515	13.461	21.314
28	8.837	13.970	22.118
30	9.147	14.460	22.895
32	9.447	14.934	23.646
34	9.738	15.394	24.373
36	10.020	15.840	25.080
38	10.295	16.274	25.767
40	10.562	16.697	26.437
45	11.203	17.710	28.040
50	11.809	18.668	29.557
55	12.385	19.579	31.000
60	12.936	20.449	32.378
65	13.464	21.284	33.700
70	13.972	22.088	34.972
75	14.463	22.863	36.200
80	14.937	23.613	37.387
85	15.397	24.340	38.538
90	15.843	25.045	39.655
95	16.277	25.732	40.742
100	16.700	26.400	41.800
110	17.515	27.689	43.840
120	18.294	28.920	45.790
130	19.041	30.101	47.659
140	19.760	31.237	49.458
150	20.453	32.333	51.194
160	21.124	33.394	52.873
170	21.774	34.421	54.501
180	22.405	35.419	56.081
190	23.019	36.390	57.617
200	23.617	37.335	59.114
220	24.770	39.158	61.999
240	25.872	40.899	64.756
260	26.928	42.569	67.400
280	27.944	44.176	69.945
300	28.925	45.726	72.400
320	29.874	47.226	74.774
340	30.793	48.679	77.075
360	31.686	50.090	79.310
380	32.554	51.463	81.483
400	33.400	52.800	83.600
450	35.426	56.003	88.671
500	37.342	59.032	93.468
550	39.165	61.913	98.030
600	40.906	64.667	102.389
650	42.577	67.307	106.570
700	44.184	69.848	110.592
750	45.735	72.299	114.474
800	47.235	74.670	118.228

Table U14 — Recommended Flow Diameters, in Millimeters

* LPM = Liters Per Minute

Dimensions and pressures for reference only, subject to change.

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Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Inch Tube Pressure Ratings

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Inch Tubes*						
			Design Pressure (4:1 Design Factor), PSI			
Tube O.D. (in.)	Wall Thick. (in.)	Tube I.D. (in.)	Steel 1010	Steel 1021	Stainless Steel 304 & 316, 4130, HSLA	Copper
0.125	0.010	0.105	2150	2600	3250	1050
0.125	0.020	0.085	4600	5500	6900	2200
0.125	0.028	0.069	6650	8000	10000	3200
0.125	0.035	0.055	8450	10150	12700	4050
0.188	0.010	0.168	1400	1700	2100	650
0.188	0.020	0.148	2950	3550	4450	1400
0.188	0.028	0.132	4250	5100	6400	2050
0.188	0.035	0.118	5450	6550	8200	2600
0.188	0.049	0.090	7850	9400	11800	3750
0.250	0.020	0.210	2150	2600	3250	1050
0.250	0.028	0.194	3100	3700	4650	1500
0.250	0.035	0.180	3950	4750	5950	1900
0.250	0.049	0.152	5750	6900	8650	2750
0.250	0.058	0.134	6900	8300	10400	3300
0.250	0.065	0.120	7800	9350	11750	3750
0.250	0.083	0.084	9950	11950	15000	4800
0.313	0.020	0.273	1700	2050	2550	800
0.313	0.028	0.257	2450	2950	3650	1150
0.313	0.035	0.243	3100	3700	4650	1500
0.313	0.049	0.215	4500	5400	6750	2150
0.313	0.058	0.197	5400	6500	8150	2600
0.313	0.065	0.183	6150	7400	9250	2950
0.313	0.072	0.169	6850	8200	10350	3300
0.313	0.083	0.147	8000	9600	12050	3850
0.313	0.095	0.123	9150	11000	13800	4400
0.375	0.020	0.335	1400	1700	2100	650
0.375	0.028	0.319	2000	2400	3000	950
0.375	0.035	0.305	2550	3050	3850	1200
0.375	0.049	0.277	3650	4400	5550	1750
0.375	0.058	0.259	4450	5350	6650	2100
0.375	0.065	0.245	5000	6000	7550	2400
0.375	0.072	0.231	5600	6700	8450	2700
0.375	0.083	0.209	6550	7900	9900	3150
0.375	0.095	0.185	7600	9100	11450	3650
0.375	0.109	0.157	8750	10500	13200	4200
0.500	0.028	0.444	1500	1800	2200	700
0.500	0.035	0.430	1850	2200	2800	900
0.500	0.049	0.402	2700	3250	4050	1300
0.500	0.058	0.384	3250	3900	4850	1550
0.500	0.065	0.370	3650	4400	5500	1750
0.500	0.072	0.356	4100	4900	6150	1950
0.500	0.083	0.334	4800	5750	7200	2300
0.500	0.095	0.310	5550	6650	8350	2650
0.500	0.109	0.282	6450	7750	9750	3100
0.500	0.120	0.260	7200	8650	10800	3450
0.500	0.134	0.232	8050	9650	12150	3850
0.500	0.148	0.204	8950	10750	13450	4300
0.500	0.188	0.124	11050	13250	16600	5300

Inch Tubes*						
			Design Pressure (4:1 Design Factor), PSI			
Tube O.D. (in.)	Wall Thick. (in.)	Tube I.D. (in.)	Steel 1010	Steel 1021	Stainless Steel 304 & 316, 4130, HSLA	Copper
0.625	0.028	0.569	1150	1400	1750	550
0.625	0.035	0.555	1500	1800	2200	700
0.625	0.049	0.527	2100	2500	3200	1000
0.625	0.058	0.509	2550	3050	3800	1200
0.625	0.065	0.495	2850	3400	4300	1350
0.625	0.072	0.481	3200	3850	4800	1550
0.625	0.083	0.459	3750	4500	5650	1800
0.625	0.095	0.435	4350	5200	6550	2100
0.625	0.109	0.407	5050	6050	7600	2450
0.625	0.120	0.385	5600	6700	8450	2700
0.625	0.134	0.357	6350	7600	9550	3050
0.750	0.035	0.680	1200	1450	1850	600
0.750	0.049	0.652	1750	2100	2600	850
0.750	0.058	0.634	2100	2500	3150	1000
0.750	0.065	0.620	2350	2800	3550	1150
0.750	0.072	0.606	2650	3200	3950	1250
0.750	0.083	0.584	3050	3650	4600	1450
0.750	0.095	0.560	3550	4250	5350	1700
0.750	0.109	0.532	4150	5000	6200	2000
0.750	0.120	0.510	4600	5500	6900	2200
0.750	0.134	0.482	5200	6250	7800	2500
0.750	0.148	0.454	5800	7000	8700	2800
0.750	0.188	0.374	7500	9000	11300	3600
0.875	0.035	0.805	1050	1250	1550	500
0.875	0.049	0.777	1500	1800	2200	700
0.875	0.058	0.759	1750	2100	2650	850
0.875	0.065	0.745	2000	2400	3000	950
0.875	0.072	0.731	2200	2650	3350	1050
0.875	0.083	0.709	2600	3100	3900	1250
0.875	0.095	0.685	3000	3600	4500	1450
0.875	0.109	0.657	3500	4200	5250	1650
0.875	0.120	0.635	3900	4700	5850	1850
0.875	0.134	0.607	4400	5300	6600	2100
0.875	0.148	0.579	4900	5900	7350	2350
1.000	0.035	0.930	900	1100	1350	450
1.000	0.049	0.902	1300	1550	1950	600
1.000	0.058	0.884	1550	1850	2300	750
1.000	0.065	0.870	1750	2100	2600	850
1.000	0.072	0.856	1950	2350	2900	950
1.000	0.083	0.834	2250	2700	3400	1100
1.000	0.095	0.810	2600	3100	3900	1250
1.000	0.109	0.782	3000	3600	4550	1450
1.000	0.120	0.760	3350	4000	5050	1600
1.000	0.134	0.732	3800	4550	5700	1800
1.000	0.148	0.704	4200	5050	6350	2000
1.000	0.156	0.688	4450	5350	6700	2150
1.000	0.188	0.624	5500	6600	8250	2650
1.000	0.220	0.560	6550	7850	9800	3150

* See Table U8 for tube specifications.

Table U15 — Inch Tube Pressure Ratings

Dimensions and pressures for reference only, subject to change.

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Inch Tube Pressure Ratings (cont'd.)

Inch Tubes*						
			Design Pressure (4:1 Design Factor), PSI			
Tube O.D. (in.)	Wall Thick. (in.)	Tube I.D. (in.)	Steel 1010	Steel 1021	Stainless Steel 304 & 316, 4130, HSLA	Copper
1.250	0.049	1.152	1000	1200	1550	500
1.250	0.058	1.134	1200	1450	1850	600
1.250	0.065	1.120	1350	1600	2050	650
1.250	0.072	1.106	1500	1800	2300	750
1.250	0.083	1.084	1750	2100	2650	850
1.250	0.095	1.060	2050	2450	3050	1000
1.250	0.109	1.032	2350	2800	3550	1150
1.250	0.120	1.010	2650	3200	3950	1250
1.250	0.134	0.982	2950	3550	4450	1400
1.250	0.148	0.954	3300	3950	4950	1600
1.250	0.156	0.938	3500	4200	5250	1700
1.250	0.188	0.874	4300	5150	6450	2050
1.250	0.22	0.810	5100	6100	7700	2450
1.500	0.065	1.370	1150	1400	1700	550
1.500	0.072	1.356	1250	1500	1900	600
1.500	0.083	1.334	1450	1750	2200	700
1.500	0.095	1.310	1700	2050	2550	800
1.500	0.109	1.282	1950	2350	2950	950
1.500	0.120	1.260	2150	2600	3250	1050
1.500	0.134	1.232	2450	2950	3650	1150
1.500	0.148	1.204	2700	3250	4050	1300
1.500	0.156	1.188	2850	3400	4300	1350
1.500	0.188	1.124	3500	4200	5300	1700
1.500	0.220	1.060	4150	5000	6300	2000
1.500	0.250	1.000	4800	5750	7250	2300
2.000	0.065	1.870	850	1000	1250	400
2.000	0.072	1.856	950	1150	1400	450
2.000	0.083	1.834	1100	1300	1600	500
2.000	0.095	1.810	1250	1500	1850	600
2.000	0.109	1.782	1450	1750	2150	700
2.000	0.120	1.760	1600	1900	2400	750
2.000	0.134	1.732	1800	2150	2700	850
2.000	0.148	1.704	2000	2400	3000	950
2.000	0.156	1.688	2100	2500	3150	1000
2.000	0.188	1.624	2550	3050	3850	1250
2.000	0.220	1.560	3050	3650	4600	1450
2.000	0.250	1.500	3500	4200	5250	1700
2.000	0.281	1.438	4000	4800	6000	1900

* See Table U8 for tube specifications.

Table U15 — Inch Tube Pressure Ratings, cont'd.

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Metric Tube Pressure Ratings

Metric Tubes				
			Static Design Pressure (Bar)	
Tube O.D. (mm)	Wall Thick. (mm)	Tube I.D. (mm)	Steel Low-Carbon St. 37-4	Stainless Steel 1.4571
4	0.5	3.0	313	
4	0.75	2.5	409	
4	1.0	2.0	522	600
5	1.0	3.0	432	
6	0.75	4.5	333	
6	1.0	4.0	389	426
6	1.5	3.0	549	600
6	2.0	2.0	692	
6	2.25	1.5	757	
8	1.0	6.0	333	368
8	1.5	5.0	431	472
8	2.0	4.0	549	
8	2.5	3.0	658	
10	1.0	8.0	282	294
10	1.5	7.0	373	389
10	2.0	6.0	478	498
10	2.5	5.0	576	
10	3.0	4.0	666	
12	1.0	10.0	235	245
12	1.5	9.0	353	368
12	2.0	8.0	409	426
12	2.5	7.0	495	
12	3.0	6.0	576	
12	3.5	5.0	651	
14	1.5	11.0	302	315
14	2.0	10.0	357	420
14	2.5	9.0	434	452
14	3.0	8.0	507	
14	3.5	7.0	576	
14	4.0	6.0	641	
15	1.0	13.0	188	196
15	1.5	12.0	282	294
15	2.0	11.0	336	392
15	3.0	9.0	478	
16	1.5	13.0	264	276
16	2.0	12.0	353	368
16	2.5	11.0	386	403
16	3.0	10.0	452	472
18	1.0	16.0	157	
18	1.5	15.0	235	245
18	2.0	14.0	313	327
18	2.5	13.0	392	
18	3.0	12.0	409	
20	1.5	17.0	212	
20	2.0	16.0	282	294
20	2.5	15.0	353	368
20	3.0	14.0	373	389
20	3.5	13.0	426	
20	4.0	12.0	478	
22	1.5	19.0	192	200
22	2.0	18.0	256	267
22	2.5	17.0	320	
22	3.0	16.0	343	
25	2.0	21.0	226	
25	2.5	20.0	282	294
25	3.0	19.0	338	353
25	4.0	17.0	394	
25	4.5	16.0	437	
25	5.0	15.0	478	
28	1.5	25.0	151	158
28	2.0	24.0	201	210
28	2.5	23.0	252	
28	3.0	22.0	302	
30	2.0	26.0	188	
30	2.5	25.0	235	245
30	3.0	24.0	282	294
30	4.0	22.0	336	392
30	5.0	20.0	409	
35	2.0	31.0	161	168
35	2.5	30.0	201	
35	3.0	29.0	242	
35	4.0	27.0	322	
38	2.5	33.0	186	
38	3.0	32.0	223	
38	4.0	30.0	297	309
38	5.0	28.0	332	
38	6.0	26.0	390	
38	7.0	24.0	446	
42	2.0	38.0	134	140
42	3.0	36.0	201	210
42	4.0	34.0	269	
50	6.0	38.0	338	
50	9.0	32.0	437	
65	8.0	49.0	347	

Table U16 — Metric Tube Pressure Ratings

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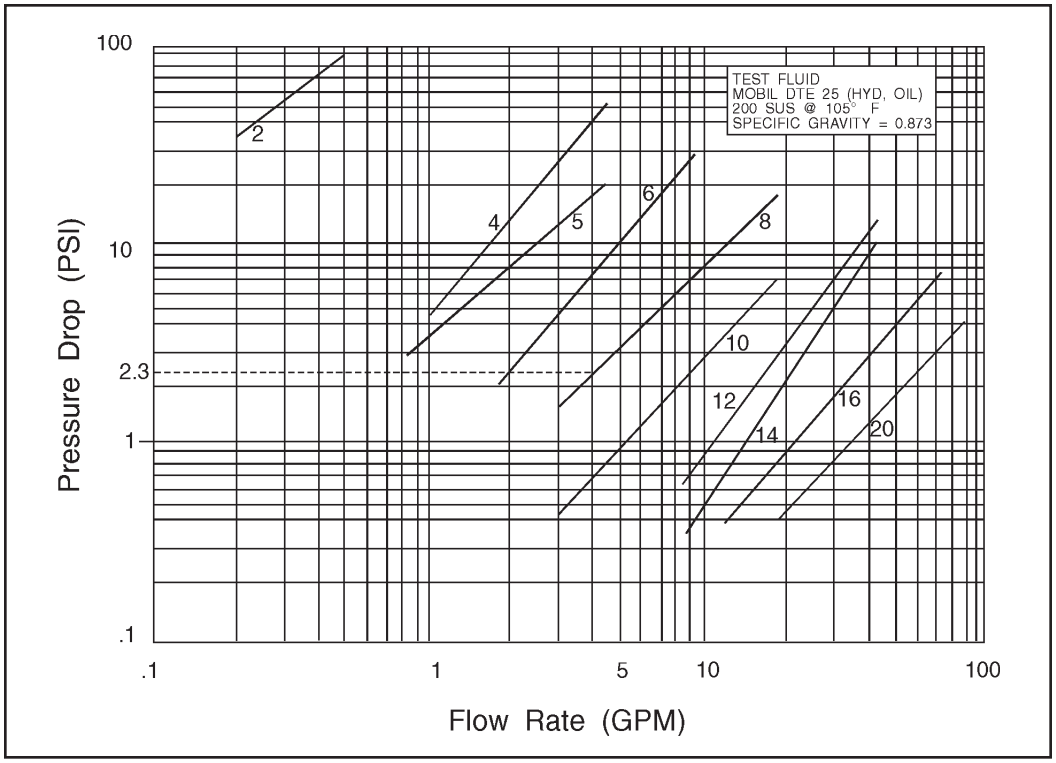
Tube Fittings Pressure Drop

In hydraulic systems, pressure drop represents loss of energy and therefore should be kept to a minimum. Pressure loss in straight tubing and hose is mainly caused by the frictional resistance of the walls, while in fittings it is mainly caused by changes in the magnitude or direction of the fluid velocity. Mathematical analysis of pressure drop, even though possible, may not be exact because of the interrelationship of factors such as fluid density, velocity, flow area and frictional co-efficients.

The following pressure drop charts were derived from actual test data and may be used as a guide for determining pressure drops at various flow rates through fittings for fluid indicated. To determine pressure drop for a given flow, trace a vertical line up from the flow axis to the desired size line then trace a horizontal line from this intersection over to the pressure drop axis.

Example: A size 8 CTX, with oil, similar to the test fluid, flowing through it at 4 gallons per minute, would cause a pressure drop of approximately 2.3 psi. Conversions will have to be made for fluids which are not similar to test fluid.

The Tube Fittings part numbers are listed below the Pressure Drop Chart to which they apply.



Examples:

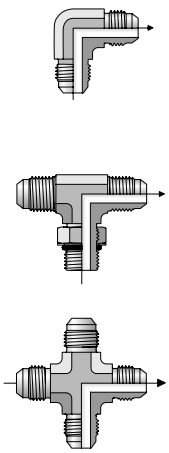


Fig. U2 — Pressure Drop Chart for 90° Fittings or Branch Path Through a Tee or Cross Fitting (Triple-Lok)

Pressure Drops for Other Fitting:

*These pressure drop curves were established with Triple-Lok fittings. The pressure drop values can be adjusted for other fittings of the same size by multiplying the value from the chart by the ratio of Triple-Lok flow diameter to that of the other fitting, raised to the 4^{th} power.

Example: Find pressure drop for 6C5L at 5 gallons per minute flow rate:
From the chart, the pressure drop for 6C5X is 10 psi.
Also, the ratio of 6C5X to 6C5L flow diameters is 0.297/0.264, or 1.125.
Therefore, the pressure drop for Seal-Lok = 10 x $(1.125)^4$ = 16 psi.

Pressure Drops for Other Fluids:

Pressure drop through a fitting is mainly caused by change in direction and velocity of the fluid. Therefore, it is directly proportional to the specific gravity of the fluid. The drop due to friction, which is dependent on the viscosity of the fluid, is so small in this case that it can be ignored. Thus, the pressure drop with a different fluid can be calculated by multiplying the value from the graph above by the ratio of specific gravity of the two fluids, or:

$$\text{New Drop} = \text{Value from the graph} \times \frac{\text{Specific Gravity of New Fluid}}{\text{Specific Gravity of Test Fluid (0.873)}}$$

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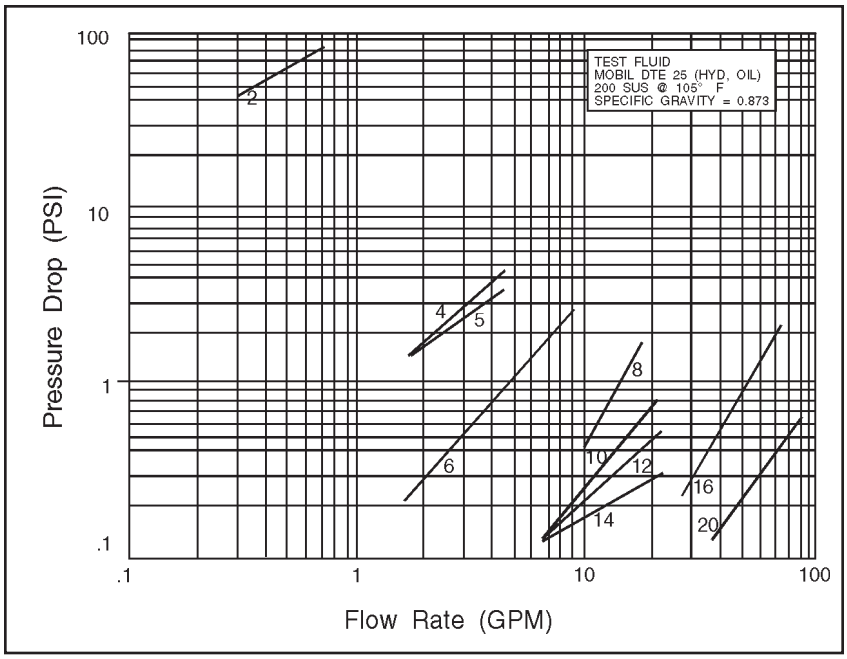
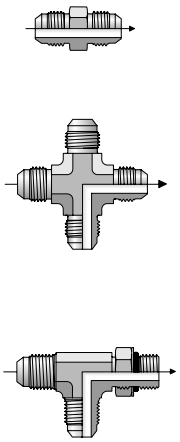


Fig. U3 — Pressure Drop Chart for Straight Fittings and Run Legs of Tees and Crosses (Triple-Lok)

Examples:



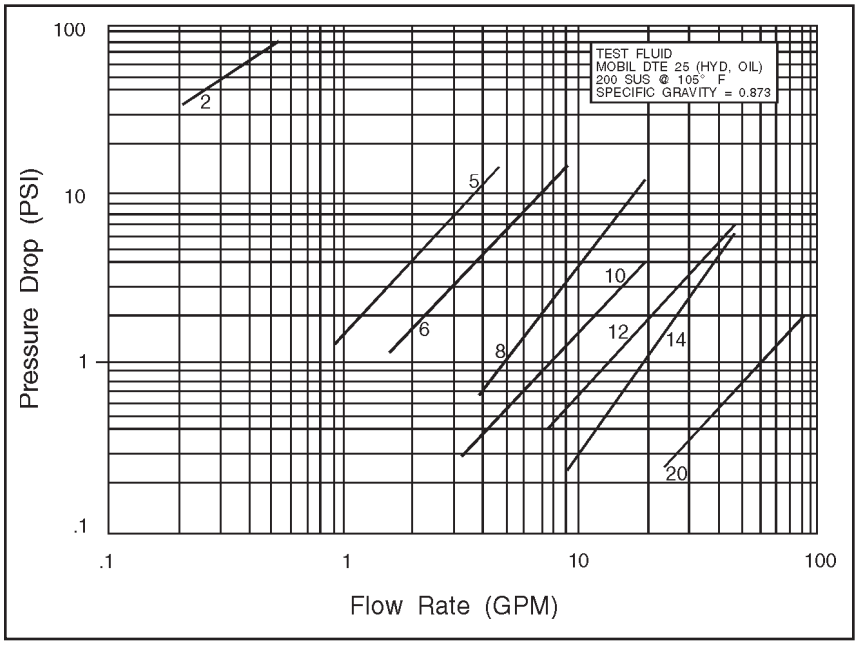
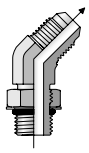


Fig. U4 — Pressure Drop Chart for 45° Elbow Fittings (Triple-Lok)

Example:



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Fitting and Adapter Pressure Ratings

Pressure Ratings

Pressure ratings shown on the product pages of this catalog are for dynamic systems. A vast majority of systems where our fittings are used fall in this category. However, there are applications, such as hydraulic jacks, where the system pressure is essentially static once it is pressurized. For this type of an application the fittings can be used at higher pressures.

The dynamic and static systems can be defined as follows:

Dynamic: A system in which the operating pressure fluctuates, in accordance with load, up to a maximum pressure limited by the relief valve. In addition, the system may also experience shocks, vibration and temperature excursions. Example: A backhoe.

Static: A system, once pressurized, is essentially free of pressure fluctuations, shock, vibration and temperature excursions, with such pressurizations not exceeding 30,000 in the life of the system. Example: A hydraulic jack.

The dynamic pressure ratings are based on a minimum design factor of 4. In other words, the fitting is capable of holding a pressure equal to 4 times the rated pressure before leakage or failure. For static applications, the design factor can be 3. Hence, the static rating can be determined by multiplying the dynamic rating by 1.33.

Static pressure rating = 1.33 x Dynamic pressure rating

Example: Static pressure rating for a fitting rated at 6000 psi = 1.33 x 6000 = 8000 psi

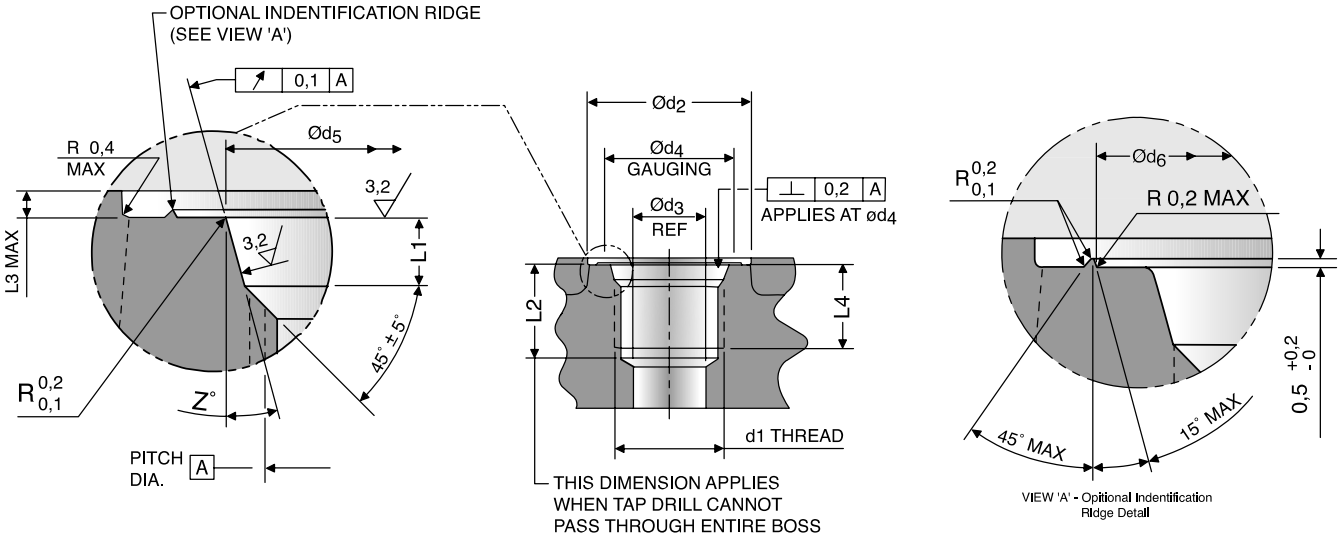
Higher (dynamic) Ratings

Some parts are capable of performing at higher pressures than those shown on the product pages. For information on higher ratings, contact Tube Fittings Division.

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ISO 6149-1 — Metric Straight Thread O-Ring Port

(SAE 2244-1/DIN 3852, Part 3) Metric ISO 261, "M" Thread



Thread Size d1[1]	Large d2[2] min	Small d2[3] min	d3[4] ref.	d4	d5 +0.1 0	d6 +0.5 0	L1 +0.4 0	L2[5] min	L3 max	L4 min full thread	Z° ±1°	Parker O-ring Size[8]
M8 X 1	17	14	3	12.5	9.1	14	1.6	11.5	1	10	12°	M8 ISO O-ring
M10 X 1	20	16	4.5	14.5	11.1	16	1.6	11.5	1	10	12°	M10 ISO O-ring
M12 X 1.5	23	19	6	17.5	13.8	19	2.4	14	1.5	11.5	15°	M12 ISO O-ring
M14 X 1.5[6]	25	21	7.5	19.5	15.8	21	2.4	14	1.5	11.5	15°	M14 ISO O-ring
M16 X 1.5	28	24	9	22.5	17.8	24	2.4	15.5	1.5	13	15°	M16 ISO O-ring
M18 X 1.5	30	26	11	24.5	19.8	26	2.4	17	2	14.5	15°	M18 ISO O-ring
M22 X 1.5	33	29	14	27.5	23.8	29	2.4	18	2	15.5	15°	M22 ISO O-ring
M27 X 2	40	34	18	32.5	29.4	34	3.1	22	2	19	15°	M27 ISO O-ring
M30 X 2	44	38	21	36.5	32.4	38	3.1	22	2	19	15°	M30 ISO O-ring
M33 X 2	49	43	23	41.5	35.4	43	3.1	22	2.5	19	15°	M33 ISO O-ring
M42 X 2	58	52	30	50.5	44.4	52	3.1	22.5	2.5	19.5	15°	M42 ISO O-ring
M48 X 2	63	57	36	55.5	50.4	57	3.1	25	2.5	22	15°	M48 ISO O-ring
M60 X 2	74	67	44	65.5	62.4	67	3.1	27.5	2.5	24.5	15°	M60 ISO O-ring

FOR CARTRIDGE VALVE CAVITIES ONLY (SEE ISO 7789)

M20X1.5[7]	32	27	—	25.5	21.8	27	2.4	—	2	14.5	15°	M20 ISO O-ring

Table U17— Port Detail — ISO 6149-1

1) Per ISO 261 tolerance class 6H. Tap drill per ISO 2306 class 6H.
2) Spotface diameter with the optional identification ridge.
3) Spotface diameter without identification ridge. Port to be identified by marking "metric" next to it or "ISO 6149-1 Metric" on component name plate.
4) Reference only. Connecting hole application may require a different size.
5) Tap drill depths given require use of a bottoming tap to produce the specified full thread lengths. Where standard taps are used, increase tap drill depths accordingly.
6) Preferred for diagnostic port applications.
7) For cartridge valve cavity applications only.
8) 90 durometer nitrile is standard for hydraulic applications.

NOTE: For port tapping tools, see pages S34 and S35. See page T6 for assembly torques.

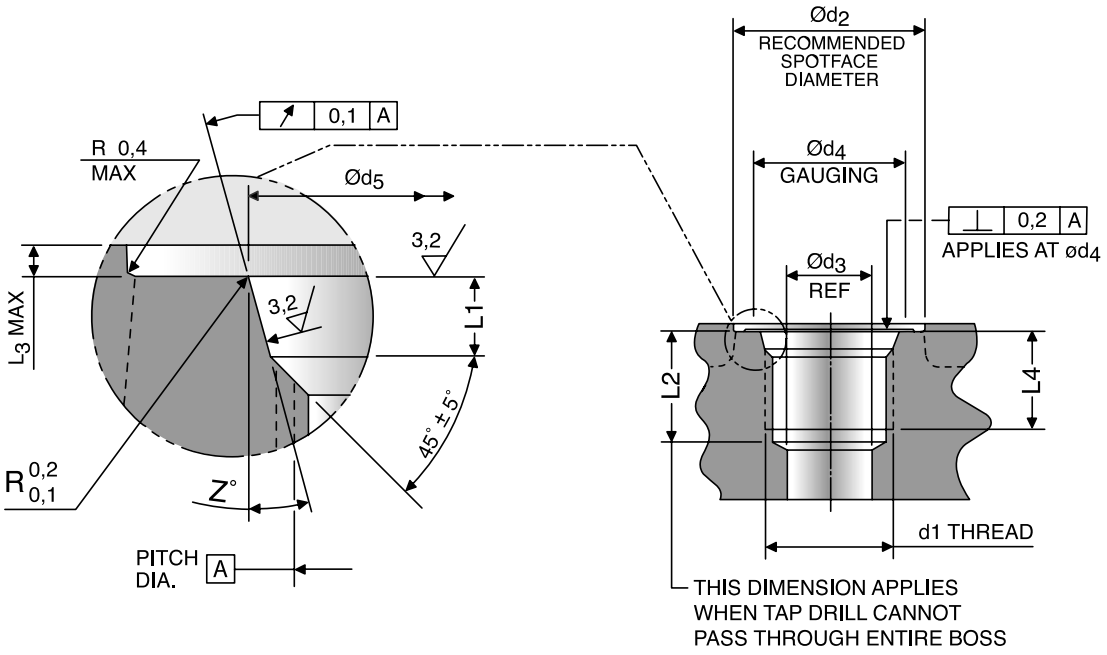
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SAE J1926-1 — SAE Straight Thread O-ring Port (ISO 11926-1)

(Conforms to MS16142. Does NOT conform to MS33649(8).)

UN/UNF Threads



Nominal Tube OD[1]			Thread Size	d2 dia.[3]	d3 dia.	d4 dia.	d5 dia.[4]	L1	L2[5]	L3[3], [6]	L4	Z	
Nom[2] SAE Dash Size	Inch (in)	Metric (mm)	ANSI B1.1 (ISO 263) (in)	(mm)	min. (mm)	min. (mm)	+0.13 -0.00 (mm)	+0.4 -0.0 (mm)	min. (mm)	max. (mm)	Full Thread min. (mm)	±1° deg	Parker O-ring Size[7]
-2	1/8	—-	5/16-24 UNF-2B	17	1.6	11	9.1	1.9	12.0	1.6	10.0	12°	3-902
-3	3/16	4	3/8-24 UNF-2B	19	3.2	13	10.7	1.9	12.0	1.6	10.0	12°	3-903
-4	1/4	6	7/16-20 UNF-2B	21	4.4	15	12.4	2.4	14.0	1.6	11.5	12°	3-904
-5	5/16	8	1/2-20 UNF-2B	23	6.0	16	14.0	2.4	14.0	1.6	11.5	12°	3-905
-6	3/8	10	9/16-18 UNF-2B	25	7.5	18	15.6	2.5	15.5	1.6	12.7	12°	3-906
-8	1/2	12	3/4-16 UNF-2B	30	10.0	22	20.6	2.5	17.5	2.4	14.3	15°	3-908
-10	5/8	14, 15, 16	7/8-14 UNF-2B	34	12.5	26	23.9	2.5	20.0	2.4	16.7	15°	3-910
-12	3/4	18, 20	1 1/16-12 UN-2B	41	16.0	32	29.2	3.3	23.0	2.4	19.0	15°	3-912
-14	7/8	22	1 3/16-12 UN-2B	45	18.0	35	32.3	3.3	23.0	2.4	19.0	15°	3-914
-16	1	25, 28	1 5/16-12 UN-2B	49	21.0	38	35.5	3.3	23.0	3.2	19.0	15°	3-916
-20	1 1/4	30, 32, 35	1 5/8-12 UN-2B	58	27.0	48	43.5	3.3	23.0	3.2	19.0	15°	3-920
-24	1 1/2	38, 42	1 7/8-12 UN-2B	65	33.0	54	49.8	3.3	23.0	3.2	19.0	15°	3-924
-32	2	50	2 1/2-12 UN-2B	88	45.0	70	65.7	3.3	23.0	3.2	19.0	15°	3-932

Table U18 — Port Detail — SAE J1926-1 (ISO 11926-1)

1) Nominal tube OD is shown for the standard inch sizes and the conversion to equivalent millimeter sizes. Figures are for reference only, as any boss can be used for a tubing size depending upon other design criteria.
2) See SAE J846 for more information.
3) If face of boss is on a machined surface, dimensions d2 and L3 need not apply as long as corner radius $R^{0.2}_{0.1}$ is maintained.
4) Diameter d5 shall be concentric with thread pitch diameter within 0.004 in (0.1mm) FIM, and shall be free from longitudinal and spiral tool marks. Annular tool marks up to 100 µin (2.5µm) max shall be permissible.
5) Tap drill depths given require use of bottoming taps to produce the specified full thread lengths. Where standard taps are used, the tap drill depths must be increased accordingly.
6) Maximum recommended spotface depth to permit sufficient wrench grip for proper tightening of the fitting or locknut.
7) 90 durometer nitrile is standard for hydraulic applications.
8) See page U27.

NOTE: For port tapping tools, see page S34. For assembly torques see page T5.

Dimensions and pressures for reference only, subject to change.

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SAE Straight Thread Connector Use in MS33649

SAE straight thread connectors, such as Parker F5OX, need a special hex chamfer of 35° to a controlled diameter to function properly in MS33649 port. In the past, when MS33649 was more popular, Parker fittings were made with this chamfer. However, this port has been superseded by SAE J1926-1 in industrial applications for over 50 years.

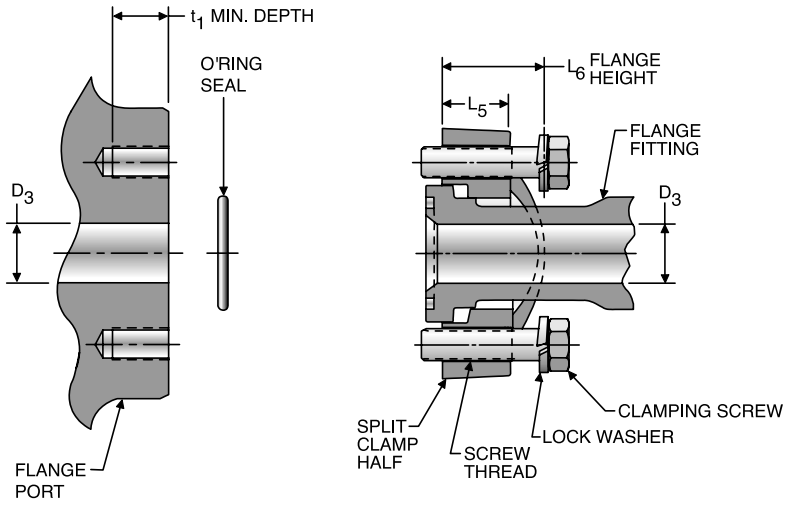
Since J1926-1 is a superior design, Parker, along with other manufacturers, discourages the use of MS33649 port in non-aircraft applications. In fact, a chamfer modification requirement for MS33649 will not be in the next printing of the SAE J514 specification, again to discourage the use of this port.

If you must use this port, you have to request fittings with this special chamfer requirement, which makes them special and more expensive.

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ISO 6162 — Four-Bolt Flange Connection (Includes SAE J518)

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Nominal Flange Size D3		2.5 to 31.5 MPa Series[1] (SAE Code 61)										O-Rings[3]	
		Clamping Screws Screw Holes				Flange Half and Bolt Pattern							
		Type I		Type II[2] (SAE J518)		C	J		W	Y	L5	L6	ISO 3601-1	Parker O-Ring
(in)	(mm)	Thread	t_1 Min. depth	Thread (UNC)	t_1 Min. depth	± 0.25	max.	min.	±0.25	Ref.			ID x Section	Size
1/2	13	M8 x 1.25	12.5	5/16 - 18	24	38.1	54.9	53.1	17.5	46	13	19	19 x 3.55	2-210
3/4	19	M10 x 1.5	16.5	3/8 - 16	22	47.6	65.8	64.3	22.3	52	14	22	25 x 3.55	2-214
1	25	M10 x 1.5	14.5	3/8 - 16	22	52.4	70.6	69.1	26.2	59	16	22	32.5 x 3.55	2-219
1 1/4	32	M10 x 1.5	16.5	7/16 - 14	28	58.7	80.3	78.5	30.2	73	14[4]	24	37.5 x 3.55	2-222
1 1/2	38	M12 x 1.75	19.5	1/2 - 13	27	69.9	94.5	93.0	35.7	83	16	25	47.5 x 3.55	2-225
2	51	M12 x 1.75	19.5	1/2 - 13	27	77.8	103.1	100.1	42.9	97	16	26	56 x 3.55	2-228
2 1/2	64	M12 x 1.75	21.5	1/2 - 13	30	88.9	115.8	112.8	50.8	109	19	38	69 x 3.55	2-232
3	76	M16 x 2	28.5	5/8 - 11	30	106.4	136.7	133.4	61.9	131	22	41	85 x 3.55	2-237
3 1/2	89	M16 x 2	28.5	5/8 - 11	33	120.7	153.9	150.9	69.9	140	22	28	97.5 x 3.55	2-241
4	102	M16 x 2	25.5	5/8 - 11	30	130.2	163.6	160.3	77.8	152	25	35	112 x 3.55	2-245
5	127	M16 x 2	27.5	5/8 - 11	33	152.4	182.6	185.7	92.1	181	28	41	136 x 3.55	2-253

Nominal Flange Size D3		40 MPa Series[1] (SAE Code 62)										O-Rings[3]	
		Clamping Screws Screw Holes				Flange Half and Bolt Pattern							
		Type I		Type II[2] (SAE J518)		C	J		W	Y	L5	L6	ISO 3601-1	Parker O-Ring
(in)	(mm)	Thread	t_1 Min. depth	Thread (UNC)	t_1 Min. depth	± 0.25	max.	min.	±0.25	Ref.			ID x Section	Size
1/2	13	M8 x 1.25	14.5	5/16 - 18	21	40.5	57.2	55.6	18.2	48	16	22	19 x 3.55	2-210
3/4	19	M10 x 1.5	16.5	3/8 - 16	24	50.8	72.1	70.6	23.8	60	19	28	25 x 3.55	2-214
1	25	M12 x 1.75	21.5	7/16 - 14	27	57.2	81.8	80.3	27.8	70	24	33	32.5 x 3.55	2-219
1 1/4	32	M12 x 1.75	18.5	1/2 - 13	25	66.6	96.0	94.5	31.8	78	27	38	37.5 x 3.55	2-222
1 1/2	38	M16 x 2	25.5	5/8 - 11	35	79.3	114.3	111.3	36.5	95	30	43	47.5 x 3.55	2-225
2	51	M20 x 2.5	33.5	3/4 - 10	38	96.8	134.9	131.8	44.5	114	37	52	56 x 3.55	2-228

Table U19 — Port Detail — ISO 6162

1) 1 MPa = 10 bar = 145 PSI.
2) Not for new design.
3) 90 durometer nitrile is standard for hydraulic applications.
4) 16 mm is also acceptable.

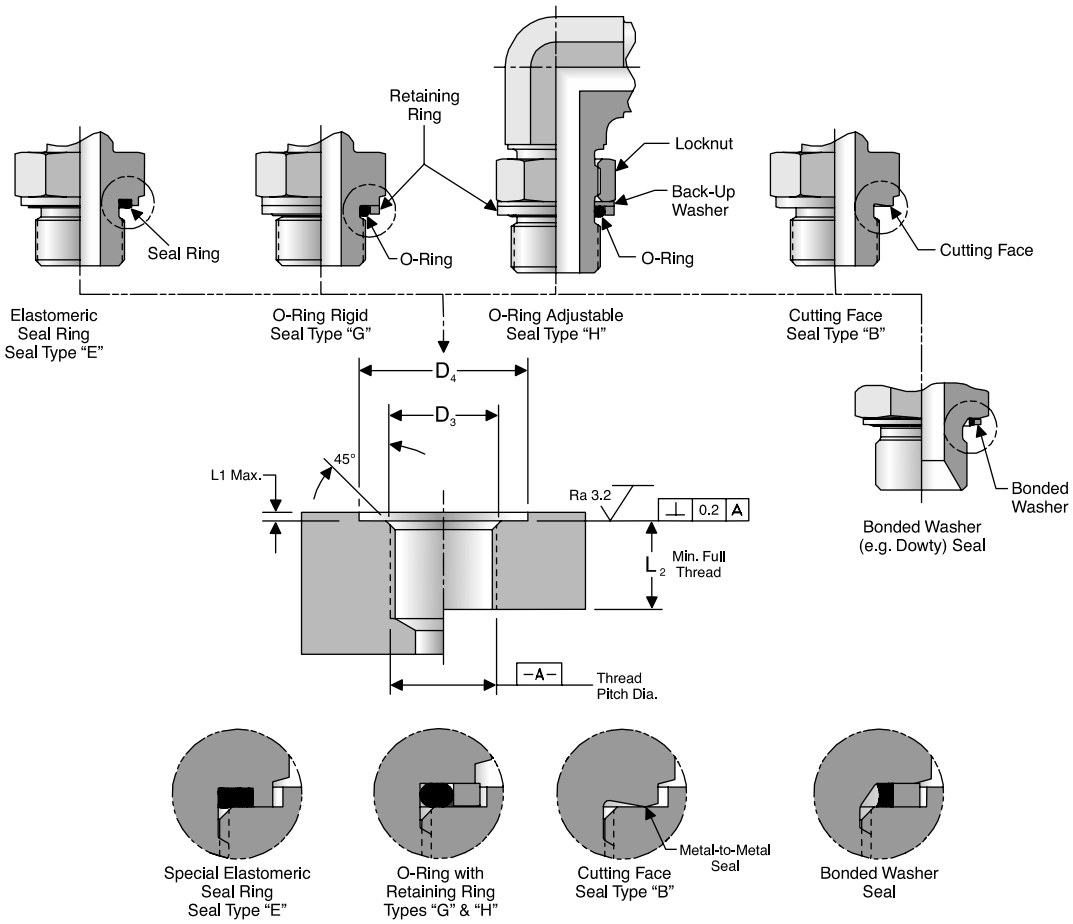
NOTE: For assembly procedure and torques, see page T8.

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ISO 1179-1[1] — Flat Face Port with British Standard Pipe, Parallel (BSPP) Threads
(DIN 3852, Part 2)
ISO 228-1 "G" Threads



Port Sealing Methods

Thread Size (ISO 228-1)	D3 (mm)	D4 (mm) Narrow Types B & E	D4 (mm) Wide Types G & H	L1 max. (mm)	L2 min. (mm)	EOlastic Seal (Type E) Part Number	O-Ring and Retaining Ring (Types G & H)[3] Parker O-Ring Size[2]	O-Ring I.D. x Section (mm)	Retaining Ring Part Number	Bonded Washer Part No.[4]
G 1/8-28	9.9	15	17.2	1.0	8.5	**ED10X1X**	5-585	7.98 x 1.88	1/8 Retaining Ring	**D9DT-2**
G 1/4-19	13.3	20	20.7	1.5	12.5	**ED14X1.5X**	2-111	10.77 x 2.62	1/4 Retaining Ring	**D9DT-4**
G 3/8 19	16.8	23	24.5	2.0	12.5	**EDR3/8X**	2-113	13.94 x 2.62	3/8 Retaining Ring	**D9DT-6**
G 1/2-14	21.1	28	34.0	2.5	14.5	**EDR1/2X**	5-256	17.96 x 2.62	1/2 Retaining Ring	**D9DT-8**
G 3/4-14	26.6	33	40.0	2.5	16.5	**ED26X1.5X**	2-119	23.47 x 2.62	3/4 Retaining Ring	**D9DT-12**
G 1-11	33.5	41	46.1	2.5	18.5	**ED33X2X**	2-217	29.74 x 3.53	1 Retaining Ring	**D9DT-16**
G 1 1/4-11	42.2	51	54.0	2.5	20.5	**ED42X2X**	2-222	37.69 x 3.53	1 1/4 Retaining Ring	**D9DT-20**
G 1 1/2-11	48.1	56	60.5	2.5	22.5	**ED48X2X**	2-224	44.04 x 3.53	1 1/2 Retaining Ring	**D9DT-24**
G 2-11	59.9	69	73.3	3.0	26.0	—	—	—	—	**D9DT-32**

Table U20 — Port Detail — ISO 1179-1

1) Conforms to proposed revision.
2) 90 durometer nitrile is standard for hydraulic applications.
3) See page O5 for O-ring and retaining ring ordering information.
4) See page O6 for details.

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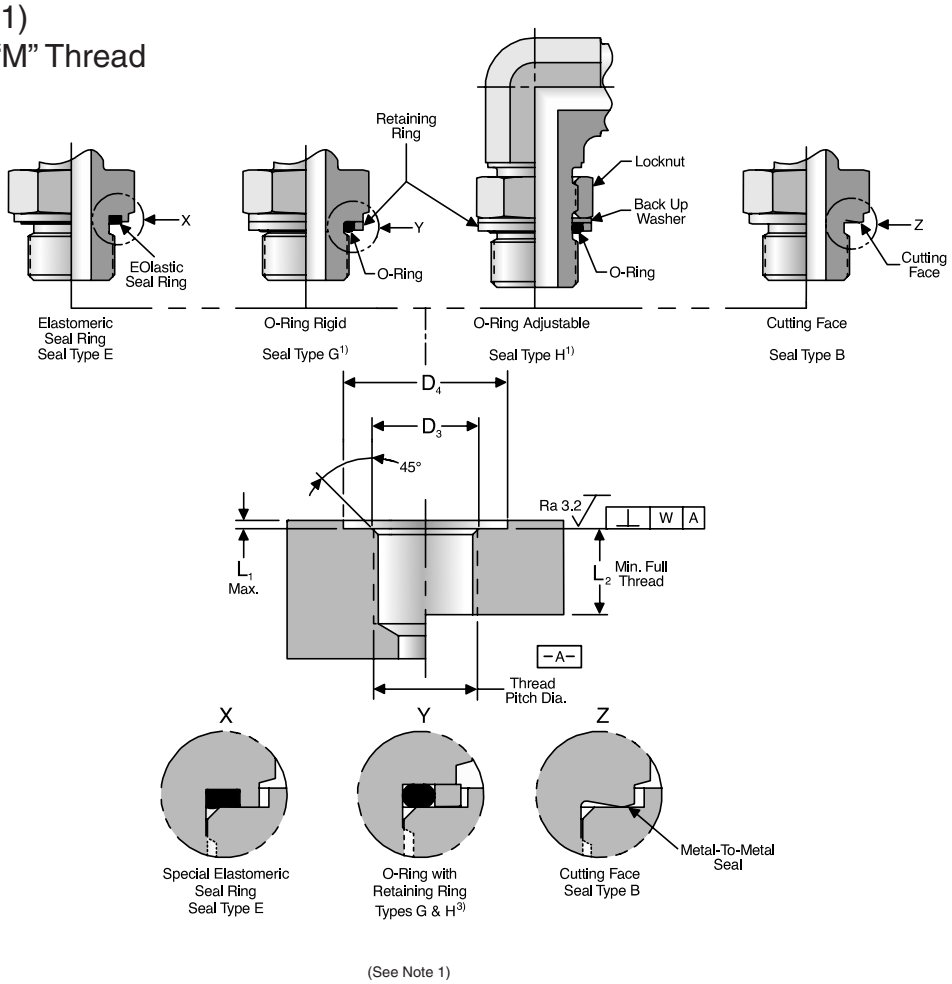
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ISO 9974-1 — Flat Face Port with Metric Threads

(DIN 3852, Part 1)

Metric ISO261, "M" Thread



(See Note 1)

ISO 9974 Port seal types available from Parker

Thead Size (ISO 261)	D 3 (mm)	D 4 (mm)	L 1 max. (mm)	L 2 min. (mm)	W (mm)	EOlastic Seal (Type E)	O-ring and Retaining Ring[1]		
						Part no.	O-ring Size[2]	O-ring ID x section (mm)	Retaining Ring Part No.
M8 x 1	8 +0.2	13	1	8		ED8X1X	3-902	6.07 x 1.63	M8 RR
M10 x 1	10 +0.2	15	1	8		ED10X1X	6-074	8.00 x 1.50	M10 RR
M12 x 1.5	12 +0.2	18	1.5	12		ED12X1.5X	2-012	9.25 x 1.78	M12 RR
M14 x 1.5	14 +o.2	20	1.5	12	0.1	ED14X1.5X	2-013	10.82 x 1.78	M14 RR
M16 x 1.5	16 +0.2	23	1.5	12		ED16X1.5X	3-907	13.46 x 2.08	M16 RR
M18 x 1.5	18 +0.2	25	2	12		ED18X1.5XX	2-114	15.54 x 2.62	M18 RR
M20 x 1.5[3]	20 +0.2	27	2	14		ED20X1.5X	2-017	17.17 x 1.78	M20 RR
M22 x 1.5	22 +0.2	28	2.5	14		ED22X1.5X	2-018	18.77 x 1.78	M22 RR
M24 x 1.5[4]	26 +0.2	30	2.5	14		—	2-019	20.35 x 1.78	M24 RR
M26 x 1.5	26 +0.2	33	2.5	16		ED26X1.5X	2-118	21.89 x 2.62	M26 RR
M27 x 2	27 +0.2	33	2.5	16		ED26X1.5X	2-119	23.47 x 2.62	M27 RR
M33 x 2	33 +0.3	41	2.5	18	0.2	ED33X2X	2-122	28.24 x 2.62	M33 RR
M36 x 2[4]	36 +0.3	43	2.5	18		—	2-124	31.42 x 2.62	M36 RR
M42 x 2	42 +0.3	51	2.5	20		ED42X2X	2-128	37.77 x 2.62	M42 RR
M45 x 2[4]	45 +0.3	50	2.5	20		—	2-130	40.94 x 2.62	M45 RR
M48 x 2	48 +0.3	56	2.5	22		ED48X2X	2-132	44.12 x 2.62	M48 RR

Table U21 — Port Detail — ISO 9974-1

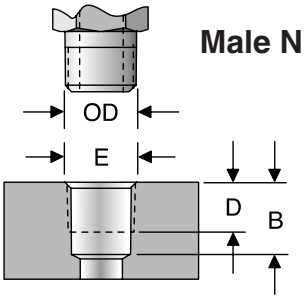
1) Seal types G and H are not covered in ISO 9974-1. See page O4 for retaining ring and O-ring ordering information.
2) 90 durometer nitrile is standard for hydraulic applications.
3) For diagnostic applications.
4) These sizes are not covered in ISO 9974-1.

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NPTF and BSPT Dimensions



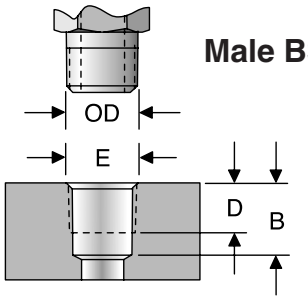
Male NPTF

Female NPTF

Thread Size NPTF	**O.D.** Male Thread Large Dia.	**D Min.** Thread Length	**B Min.** Tap Drill Depth [1]	**E** Chmf. Dia.
1/8-27	0.41	0.31	0.38	0.42
1/4-18	0.55	0.44	0.47	0.55
3/8-18	0.68	0.47	0.53	0.69
1/2-14	0.85	0.59	0.69	0.85
3/4-14	1.06	0.63	0.75	1.06
1-11 1/2	1.33	0.75	0.84	1.34
1 1/4-11 1/2	1.67	0.78	0.84	1.68
1 1/2-11 1/2	1.91	0.81	0.88	1.92
2-11 1/2	2.39	0.81	0.91	2.39

Table U22 — NPTF Dimensions

1) For bottoming taps only.



Male BSPT

Female BSPT

Thread Size BSPT	**O.D.** Male Thread Large Dia.	**D Min.** Thread Length	**B Min.** Tap Drill Depth [1]	**E** Chmf. Dia.
1/8-28	0.39	0.31	0.38	0.42
1/4-19	0.53	0.44	0.47	0.55
3/8-19	0.67	0.47	0.53	0.69
1/2-14	0.84	0.59	0.69	0.85
3/4-14	1.06	0.63	0.75	1.06
1-11	1.33	0.75	0.84	1.34
1 1/4-11	1.67	0.78	0.84	1.68
1 1/2-11	1.90	0.81	0.88	1.92
2-11	2.37	0.81	0.91	2.39

Table U23 — BSPT Dimensions

1) For bottoming taps only.

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Tube to Port[1)] Pairing for Medium Pressure[2)] Applications

Tube O.D.			Port Thread			
Inch (Dash Size)		Metric (mm)	SAE	ISO	NPTF	BSPP
1/8	(-2)	4	5/16-24	M8 x 1	1/16-27	G 1/8-28
3/16	(-3)	5	3/8-24	M10 x 1	1/8-27	G 1/8-28
1/4	(-4)	6	7/16-20	M10 x 1	1/8-27	G 1/8-28
5/16	(-5)	8	1/2-20	M12 x 1.5	1/8-27	G 1/4-19
3/8	(-6)	10	9/16-20	M14 x 1.5	1/4-18	G 1/4-19
1/2	(-8)	12	3/4-16	M16 x 1.5	3/8-18	G 3/8-19
—		15	3/4-16	M18 x 1.5	1/2-14	G 1/2-14
5/8	(-10)	16, 18	7/8-14	M22 x 1.5	1/2-14	G 1/2-14
3/4	(-12)	20	1 1/16-12	M27 x 2	3/4-14	G 3/4-14
7/8	(-14)	22	1 3/16-12	M27 x 2	3/4-14	G 3/4-14
1	(-16)	25, 28	1 5/16-12	M33 x 2	1-11 1/2	G 1-11
1 1/4	(-20)	30, 35	1 5/8-12	M42 x 2	1 1/4-11 1/2	G 1 1/4-11
1 1/2	(-24)	38, 42	1 7/8-12	M48 x 2	1 1/2-11 1/2	G 1 1/2-11
2	(-32)	50	2 1/2-12	M60 x 2	2-11 1/2	G 2-11

Table U24 — Tube to Port Pairing for Medium Pressure Applications

Notes:
1) Ports are in accordance with the standards listed below:
SAE J1926-1, ISO 6149-1, NPTF-SAE J476 and BSPP-ISO 1179-1
2) The pressure range covering all the sizes shown is 1000 to 5000 PSI.

Tube to Port[1)] Pairing for High Pressure[2)] Applications

Tube O.D.			Port Thread			
Inch (Dash Size)		Metric (mm)	SAE	ISO	NPTF	BSPP
1/8	(-2)	4	5/16-24	M8 x 1	1/16-27	G 1/8-28
3/16	(-3)	5	3/8-24	M10 x 1	1/8-27	G 1/8-28
1/4	(-4)	6	7/16-20	M12 x 1.5	1/8-27	G 1/8-28
5/16	(-5)	8	1/2-20	M14 x 1.5	1/8-27	G 1/4-19
3/8	(-6)	10	9/16-20	M16 x 1.5	1/4-18	G 3/8-19
1/2	(-8)	12	3/4-16	M18 x 1.5	3/8-18	G 3/8-19
5/8	(-10)	14, 16	7/8-14	M22 x 1.5	1/2-14	G 1/2-14
3/4	(-12)	20	1 1/16-12	M27 x 2	3/4-14	G 3/4-14
7/8	(-14)	—	1 3/16-12	M30 x 2	3/4-14	G 3/4-14
1	(-16)	25	1 5/16-12	M33 x 2	1-11 1/2	G 1-11
1 1/4	(-20)	30	1 5/8-12	M42 x 2	1 1/4-11 1/2	G 1 1/4-11
1 1/2	(-24)	38	1 7/8-12	M48 x 2	1 1/2-11 1/2	G 1 1/2-11
2	(-32)	50	2 1/2-12	M60 x 2	2-11 1/2	—

Table U25 — Tube to Port Pairing for High Pressure Applications

Notes:
1) Ports are in accordance with the standards listed below.
SAE J1926-1, ISO 6149-1, NPTF-SAE J476 and BSPP-ISO 1179-1
2) Pressure range covering all sizes shown is 2500 to 9000 PSI.

Dimensions and pressures for reference only, subject to change.

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316L Gas and Fluids Chart —
Recommended for Use with Seal-Lok Lite

Conveyed Media – Gases or Fluids	Compatibility
Combustion Gases	A
Cooking Oil	A
Diesel Fuel	A
Freon 12	A
Gasoline, unleaded	A
Grease	A
Helium	A
Hydraulic Oil	A
Hydrogen Gas	A
Manufactured (Town) Gas	A
Motor Oil	A
Natural Gas	A
Propane Gas	A
Steam	A
Water, Deionized	A
Water, Distilled	A
Water, Fresh	A

Table B7 – 316L Gas and Fluids Chart

Ratings – Chemical Effect
A = Excellent, 250°F max. based upon O-ring.

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Chemical Compatibility Chart —
Chemicals NOT Recommended for Use with Seal-Lok Lite

Chemical	Compatibility	Chemical	Compatibility
Aluminum Chloride 20%	C	Plating Solutions, Chromium Plating: Fluosilicate Bath 95°F	C
Aluminum Fluoride	D	Plating Solutions, Copper Plating (Acid): Copper Fluoborate Bath 120°F	D
Aluminum Hydroxide	C	Plating Solutions, Copper Plating (Acid): Copper Sulfate Bath R.T.	D
Ammonium Phosphate, Dibasic	C	Plating Solutions, Gold Plating: Acid 75°F	C
Ammonium Phosphate, Monobasic	C	Plating Solutions, Gold Plating: 75°F	C
Aniline Hydrochloride	D	Plating Solutions, Indium Sulfamate Plating R.T.	C
Antimony Trichloride	D	Plating Solutions, Iron Plating: Ferrous Am Sulfate Bath 150°F	C
Aqua Regia (80% HCl, 20% HNO3)	D	Plating Solutions, Iron Plating: Ferrous Chloride Bath 190°F	D
Aromatic Hydrocarbons	C	Plating Solutions, Iron Plating: Ferrous Sulfate Bath 150°F	C
Benzonitrile	D	Plating Solutions, Iron Plating: Fluoborate Bath 145°F	D
Bromine	D	Plating Solutions, Iron Plating: Sulfamate 140°F	D
Chloric Acid	C	Plating Solutions, Iron Plating: Sulfate-Chloride Bath 160°F	D
Chlorine Water	C	Plating Solutions, Lead Fluoborate Plating	C
Chlorine, Anhydrous Liquid	C	Plating Solutions, Nickel Plating: Fluoborate 100-170°F	C
Copper Chloride	D	Plating Solutions, Nickel Plating: High-Chloride 130-160°F	C
Copper Cyanide	B	Plating Solutions, Nickel Plating: Sulfamate 100-140°F	C
Copper Fluoborate	D	Plating Solutions, Nickel Plating: Watts Type 115-160°F	C
Ethyl Sulfate	D	Plating Solutions, Rhodium Plating 120°F	D
Ferric Chloride	D	Plating Solutions, Tin-Fluoborate Plating 100°F	C
Ferrous Chloride	D	Plating Solutions, Tin-Lead Plating 100°F	C
Hydrobromic Acid 100%	D	Plating Solutions, Zinc Plating: Acid Chloride 140°F	D
Hydrobromic Acid 20%	D	Plating Solutions, Zinc Plating: Acid Fluoborate Bath R.T.	C
Hydrochloric Acid 100%	D	Plating Solutions, Zinc Plating: Acid Sulfate Bath 150°F	C
Hydrochloric Acid 20%	D	Sea Water	C
Hydrochloric Acid 37%	D	Silver Bromide	D
Hydrochloric Acid, Dry Gas	D	Sodium Bisulfate	C
Hydrofluoric Acid 20%	D	Sodium Bromide	C
Hydrofluoric Acid 50%	D	Sodium Fluoride	D
Hydrofluoric Acid 75%	D	Sodium Hypochlorite (<20%)	C
Hydrofluosilicic Acid 100%	D	Sodium Hypochlorite (100%)	D
Ink	C	Sodium Sulfide	D
Iodine	D	Stannic Chloride	D
Lead Sulfamate	C	Sulfur Chloride	D
Magnesium Chloride	D	Sulfur Trioxide	C
Melamine	D	Sulfuric Acid (10-75%)	D
Mercuric Chloride (dilute)	D	Sulfuric Acid (75-100%)	D
Mercuric Cyanide	C	Sulfuric Acid (hot concentrated)	C
Nickel Chloride	C	Tartaric Acid	C
Nitrating Acid (<15% HNO3)	D	Tin Salts	D
Nitrating Acid (>15% H2SO4)	C	Trichloroacetic Acid	C
Nitrating Acid (Š15% H2SO4)	C		
Oils: Ginger	D		
Pentane	C		
Perchloric Acid	C		
Phosphoric Acid (>40%)	D		
Phosphoric Acid (molten)	C		
Phosphoric Acid (Š40%)	C		
Plating Solutions, Chromium Plating: Barrel Chrome Bath 95°F	D		
Plating Solutions, Chromium Plating: Black Chrome Bath 115°F	C		
Plating Solutions, Chromium Plating: Chromic-Sulfuric Bath 130°F	C		
Plating Solutions, Chromium Plating: Fluoride Bath 130°F	D		

Table B8 – Chemical Compatibility Chart

Ratings – Chemical Effect

C = Fair – Moderate Effect. Not recommended for continuous use. Softening, loss of strength, swelling may occur.

D = Severe Effect. Not recommended for ANY use.

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Appendix

The Fitting Authority

Metric Conversions

SI Prefixes		
Prefix	SI Symbol	Multiplication Factor
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
hecto	h	10^{2}
deka	da	10^{1}
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	m	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}

Table V1 — SI Prefixes

Derived Units			
Quantity	Unit	SI Symbol	Formula
Acceleration	Meter per Second Squared	—	m/s^2
Angular Velocity	Radian per Second	—	rad/s
Area	Square Meter	—	m^2
Density	Kilogram per Cubic Meter	—	kg/m^3
Electric Resistance	Ohm	W	V/A
Energy & Work	Joule	J	N.m
Force	Newton	N	$kg.m/s^2$
Frequency	Hertz	Hz	cycles/s
Power	Watt	W	J/s
Pressure & Stress	Pascal	Pa	N/m^2
Quantity of Heat	Joule	J	N.m
Specific Heat	Joule per Kilogram-Kelvin	—	J/kg.K
Thermal Conductivity	Watt per Meter-Kelvin	—	W/m.K
Velocity	Meter per second	—	m/s
Viscosity, Dynamic	Pascal Second	—	Pa.s
Viscosity, Kinematic	Square Meter per Second	—	m^2/s
Voltage	Volt	V	W/A
Volume	Cubic Meter	—	m^3

Table V2 — Derived Units

Basic Units		
Quantity	Unit	SI Symbol
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electric Current	Ampere	A
Thermodynamic Temperature	Kelvin	K
Amount of Substance	Mole	mol
Luminous Intensity	Candela	cd

Table V3 — Basic Units

Supplementary Units		
Quantity	Unit	SI Symbol
Plane Angle	Radian	rad
Solid Angle	Sterodian	sr

Table V4 — Supplementary Units

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Metric Conversions

English to Metric				Metric to English		
	To Convert From	To	Multiply By	To Convert From	To	Multiply By
Area	sq. in. (in^2)	sq. mm (mm^2)	645.16	square millimeters (mm^2)	square inches (in^2)	0.00155
	sq. in. (in^2)	sq. cm (cm^2)	6.4516			
	sq. ft. (ft^2)	sq. meters (m^2)	0.0929			
Density	pounds/cubic ft (lb/ft^3)	Kilograms/cubic meter (kg/m^3)	16.02	kilograms/cubic meter (kg/m^3)	pounds/cubic ft (lb/ft^3)	0.0624
Energy	British thermal units (Btu) (1 J = Ws = 0.2388 cal)	joules (J)	1055	joules (J)	British thermal units (Btu)	0.000947
Force	pounds - force (lbf) (1N = 0.102 kgf)	newtons (N)	4.448	newtons (N)	pounds - force (lbf)	0.2248
Length	inches (in)	millimeters (mm)	25.4	millimeters (mm)	inches (in)	0.03937
	feet (ft)	meters (m)	0.3048	meters (m)	feet (ft)	3.281
	miles (mi)	kilometers (km)	1.609	kilometers (km)	miles (mi)	0.621
Mass (Weight)	ounces (oz)	grams (g)	28.35	grams (g)	ounces (oz)	0.035
	pounds-mass (lb)	kilograms (kg)	0.4536	kilograms (kg)	pounds-mass (lb)	2.205
	short tons (2000 lb) (tn)	metric tons (1000 kg) (t)	0.9072	metric tons (1000 kg) (t)	short tons (2000 lb) (tn)	1.102
Power	horsepower (550 ft. lb/s) (hp)	kilowatts (kW)	0.7457	kolowatts (kW)	horsepower (550 ft. lb/s) (hp)	1.341
Pressure	pounds/square inch (psi)	kilograms (f)/square cm ($kg\ (f)/cm^2$)	0.0703	kilograms (f)/square cm ($kg\ (f)/cm^2$)	pounds/square inch (psi)	14.22
	pounds/square inch (psi)	kilopascals (kPa)	6.8948	kolopascals (kPa)	pounds/square inch (psi)	0.145
	pounds/square inch (psi)	bars (100 kPa)	0.06895	bars (100 kPa)	pounds/square inch (psi)	14.503
Stress	pounds/square inch (psi) ($1\ N/mm^2 = 1$ MPa)	megapascals (MPa)	0.006895	megapascals (MPa) ($1\ N/mm^2 = 1$ MPa)	pounds/square inch (psi)	145.039
Temperature	degrees fahrenheit (°F)	degrees celsius (°C)	5/9 (after subtracting 32)	degrees celsius (°C)	degrees fahrenheit (°F)	9/5 (then add 32)
Torque or Bending Moment	pounds-force-foot (lb-ft)	Newtons-meter (Nm)	1.3567	Newtons-meter (Nm)	pounds-force-foot (lb-ft)	0.737
	pounds-force-inch (lb-in)	Newtons-meter (Nm)	0.113	Newtons-meter (Nm)	pounds-force-inch (lb-in)	8.85
Velocity	feet/second (ft/s)	meters/second (m/s)	0.3048	meters/second (m/s)	feet/second (ft/s)	3.2808
Viscosity	dynamic (centipoise)	pascal-second (Pas)	0.001	pascal-second)Pas)	dynamic (centipoise)	1000
	kenematic-$foot^2$/sec (ft^2/s)	$meter^2$/sec (m^2/s)	0.0929	$meter^2$/sec (m^2/s)	$foot^2$/sec (ft^2/s)	10.7643
Volume	cubic inch (in^3)	cubic centimeter (cm^3) (milliliter)	16.3871	cubic centimeter (cm^3) (milliliter)	cubic inch (in^3)	0.061
	quarts (qt)	liters (1000 cm^3)	0.9464	liters (1000 cm^3)	quarts (qt)	1.057
	gallons (gal)	liters	3.7854	liters	gallons (gal)	0.2642

Table V5 — English to Metric and Metric to English Conversions

Dimensions and pressures for reference only, subject to change.

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Tube End Connections
Threads, Conformance Specifications and Use

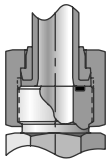
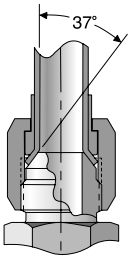
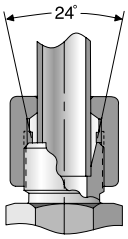
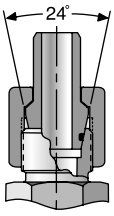
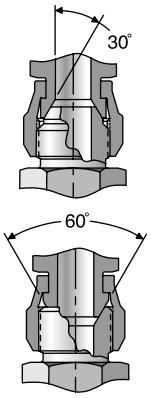
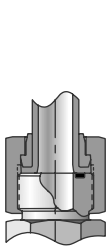
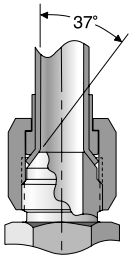
			SAE J514 ISO 8434-1 JIS B2351	ISO 8434-4		
						
Description	**O-Ring Face Seal (ORFS) "Seal-Lok"**	**37° Flare "Triple-Lok"**	**Inch 24° Cone Flareless "Ferulok"**	**Metric 24° Cone Flareless "EO" and "EO2"**	**Metric 24° Cone Flareless "JIS"**	**30° Flare and 60° Cone "JIS"**
Thread Type	ISO 263 ANSI B1.1 unified	ISO 263 ANSI B1.1, unified	ISO 263 ANSI B1.1, unified	ISO 261 Metric fine	ISO 261 JIS B 0207	ISO 228-1 JIS B0202, BS2779
ISO No.	8434-3 (12151-1)[1]	8434-2 (12151-6)[1]	—	8434-1 & -4 (12151-2)[1]	—	—
SAE No.	J1453/J516[2]	J514/J516[2]	J514	—	—	—
DIN No.	—	—	—	3861, 3865 & 20078[2]	—	—
JIS No.	—	—	—	Similar to B2351	B2351	B8363[3]
BSI No.	—	—	—	—	—	Similar to BS 5200[4]
Current use	Mainly used in North America slowly gaining acceptance in Europe and Japan.	Used throughout the world with major usage in North America.	Mainly used in North America.	Mainly used in Europe. Slowly gaining acceptance in North America.	Mainly used in Japan for hard plumbed systems.	Mainly used in Japan, U.K. and British common-wealth countries.

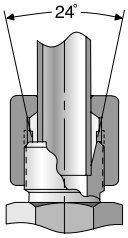
Table V6 — Tube End Connections

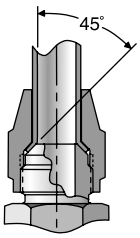
1) Hose fitting specification no. (to be published).
2) Hose fitting specification no.
3) Adapter and hose fitting specification no.
4) 60° cone fittings only. See page V6 for more information.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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Tube End Connections
Thread Size Guide — Inch Thread





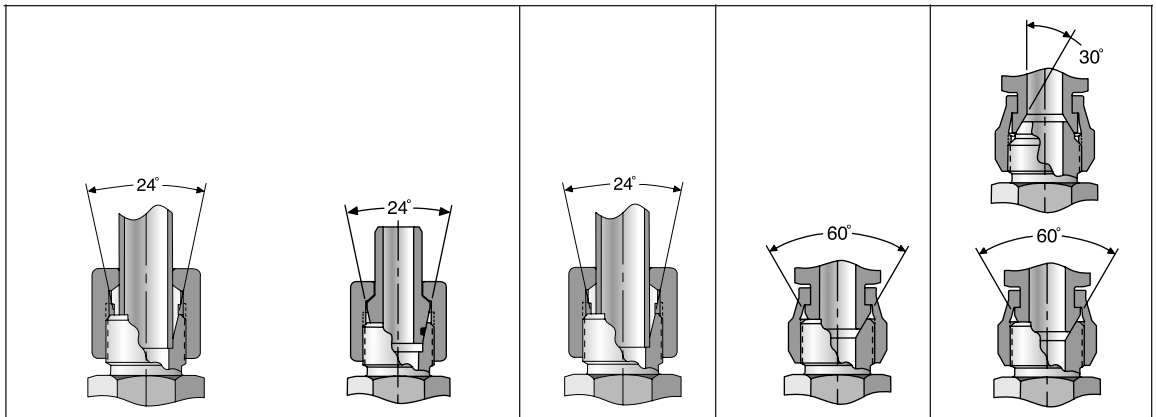
Tube O.D. or Adapter Size			O-ring Face Seal (ORFS)	37° Flare	Inch 24° cone[3] Flareless	SAE 45° Flare[3]
Nominal metric size[3]	Nominal Inch size	Nominal Inch SAE dash size	SAE J1453 "Seal-Lok"	SAE J514 "Triple-Lok"	SAE J514 "Ferulok"	SAE J512
(mm)	(in)		Inch ANSI B1.1, unified (ISO 263)	Inch ANSI B1.1, unified (ISO 263)	Inch ANSI B1.1, unified (ISO 263)	Inch ANSI B1.1, unified (ISO 263)
—	1/8	-2	—	5/16-24	5/16-24	5/16-24
4	—	—	—	—	—	—
5	3/16	-3	—	3/8-24	3/8-24	3/8-24
6	1/4	-4	9/16-18	7/16-20	7/16-20	7/16-20
8	5/16	-5	—	1/2-20	1/2-20	1/2-20
10	3/8	-6	11/16-16	9/16-18	9/16-18	5/8-18
12	1/2	-8	13/16-16	3/4-16	3/4-16	3/4-16
14	5/8	-10	1-14	7/8-14	7/8-14	7/8-14
15[1]	5/8	-10	1-14	7/8-14	—	—
16	5/8	-10	1-14	7/8-14	—	—
18[1]	3/4	-12	1 3/16-12	1 1/16-12	1 1/16-12	1 1/16-14
20	3/4	-12	1 3/16-12	1 1/16-12	—	—
22[1]	7/8	-14	—	1 3/16-12	1 3/16-12	—
25	1	-16	1 7/16-12	1 5/16-12	1 5/16-12	—
28[1]	1 1/4	-20	1 11/16-12	—	1 5/8-12	—
30	1 1/4	-20	1 11/16-12	1 5/8-12	—	—
32[2]	1 1/4	-20	1 11/16-12	1 5/8-12	—	—
38	1 1/2	-24	2-12	1 7/8-12	1 7/8-12	—
50	2	-32	2 1/2-12[4]	2 1/2-12	2 1/2-12	—

Table V7 — Tube End Connections

1) Not preferred for high pressure applications.
2) Non-preferred size. Use 30mm size in place of 32mm size.
3) Metric tube sizes do not apply to "Ferulok" and 45° flare fittings.
4) Not part of SAE J1453.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Tube End Connections
Thread Size Guide — Metric, BSPP and JIS Threads



Tube O.D. or Adapter Size	Metric 24° cone Flareless DIN 3861 "EO" and "EO-2"		Weld Nipple DIN 3865	Metric 24° cone Flareless JIS B2351 "JIS"	60° Cone BS 5200	30° Flare and 60° Cone JIS B8363
	LL Series Metric ISO 261	L Series Metric ISO 261	S Series Metric ISO 261	Metric ISO 261 (JIS B0207)	ISO 228-1 (BSPP)[5]	ISO 228-1 (JIS B 0202) (BSPP)[5]
(mm)						
—	—	—	—	—	—	—
4	M8 x 1	—	—	—	—	—
5	M10 x 1[3]	—	—	—	—	—
6	M10 x 1	M12 x 1.5	M14 x 1.5	M12 x 1.5	G 1/8 A	G 1/4 B
8	M12 x 1	M14 x 1.5	M16 x 1.5	M14 x 1.5	G 1/4 A	—
9[2]	—	—	—	—	—	G 3/8 B
10	M14 X 1[4]	M16 x 1.5	M18 x 1.5	M16 x 1.5	G 3/8 A	—
12	M16 x 1[4]	M18 x 1.5	M20 x 1.5	M18 x 1.5	G 1/2 A	G 1/2 B
14	—	—	M22 x 1.5	—	—	—
15[1]	—	M22 x 1.5	—	—	—	—
16	—	—	M24 x 1.5	M24 x 1.5	G 5/8 A[6]	—
18[1]	—	M26 x 1.5	—	—	—	—
19[2]	—	—	—	—	—	G 3/4 B
20	—	—	M30 x 2	M28 x 1.5	G 3/4 A	—
22[1]	—	M30 x 2	—	—	—	—
25	—	—	M36 x 2	M35 x 1.5	G 1 A	G 1 B
28[1]	—	M36 x 2	—	—	—	—
30	—	—	M42 x 2	M40 x 1.5	G 1-1/4 A	—
32[2]	—	—	—	—	—	G 1-1/4 B
35[1]	—	M42 x 2	—	—	—	—
38	—	—	M52 x 2	M48 x 1.5	G 1-1/2 A	G 1-1/2 B
42[1]	—	M52 x 2	—	—	—	—
50	—	—	—	—	G 2 A	G 2 B

Table V8— Tube End Connections

1) Not preferred for high pressure applications.
2) Not preferred sizes. Use 10mm, 20mm and 30mm sizes in place of 9mm, 19mm and 32mm sizes, respectively.
3) Covered in ISO 8434-1. Non-standard with Parker TFDE (Ermeto).
4) Not part of DIN or ISO standards, but offered by Parker TFDE (Ermeto).
5) ISO 228-1 G threads and JIS B 0202 G or PF threads can be interchanged. "A" and "B" indicate different tolerance classes on the male threads, "A" having tighter tolerances than "B".
6) Non-preferred size.

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Port End Connections
Threads, Conformance Specifications, and Use

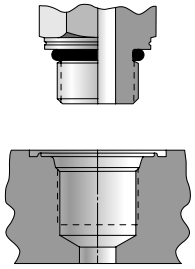
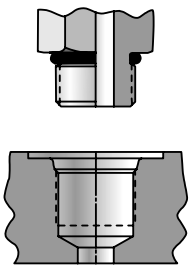
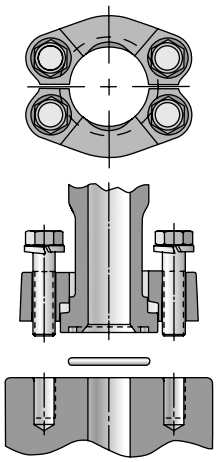
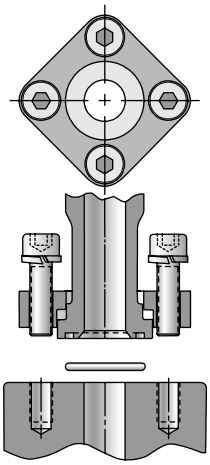
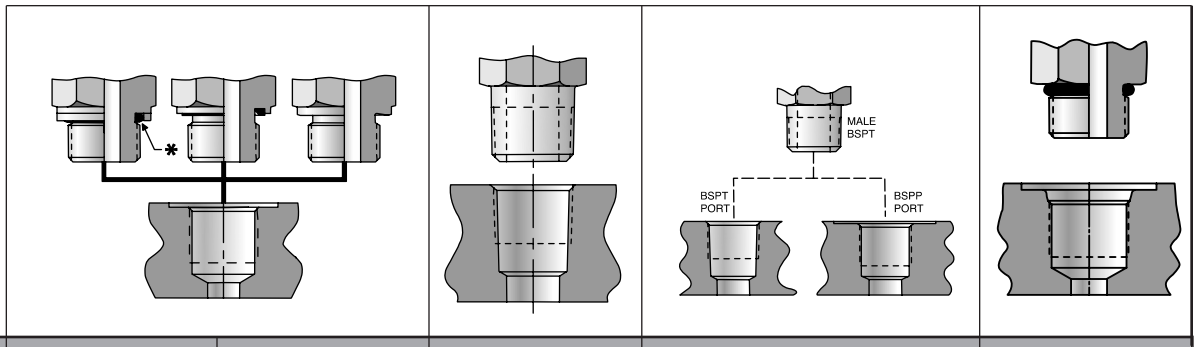
Port Description	Metric Straight Thread O-Ring Port	SAE Straight Thread O-Ring Port	Four Screw Split Flange	Four Screw One Piece Square Flange
				
Thread Type	ISO 261 Metric Fine	ISO 263 ANSI B1.1, Unified	Metric screws: ISO 261 Inch screws: ISO 263	ISO 261
ISO No.	6149	11926	6162	6164
SAE No.	J2244	J1926	J518 (covers inch screws only)	—
DIN No.	3852-3 Form “W”	—	—	—
JIS No.	—	—	B8363 (covers flange head only)	—
BSI No.	—	—	—	—
Current use	Gaining use in U.S. and western Europe. Widely used in former Soviet block countries.	Widely used in North America. Limited use in the rest of the world.	Widely used throughout the world.	Mainly used in Germany. Limited use elsewhere.

Table V9 — Port End Connections

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Port End Connections
Threads, Conformance Specifications, and Use



Port Description	British Standard Pipe Parallel (BSPP) Flat Face Port	Metric Straight Thread Flat Face Port	NPTF - Dryseal American Standard Taper Pipe	JIS/BSPT British Standard Pipe, Taper	JIS/BSPP British Standard Pipe, Parallel O-ring Port
Thread Type	ISO 228-1 BS 2779	ISO 261 Metric Fine	ANSI B1.20.3	ISO 7 BS 21 JIS B 0203	ISO 228-1 BS 2779 JIS B 0202
ISO No.	1179[1)]	9974	—	—	—
SAE No.	—	—	J476	—	—
DIN No.	3852-2 Form X or Y	3852-1 Form X or Y	—	Similar to: 3852-2 form Z	—
JIS No.	—	—	—	B8363	B2351 Type “O”
BSI No.	—	—	—	—	Similar to BS 5380
Current use	Most popular in western Europe and former UK colonies. Limited use in rest of the world.	Moderate use in Europe, mainly in Germany.	Mainly used in North America some use in rest of the world.	Mainly used in Japan and parts of western Europe.	Mainly used in Japan. Some use in U.K. of similar port, BS5380.

Table V10 — Port End Connections

1) Being revised.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Hydra-Tool Pre-Setting Pressures for EO and EO-2 Steel Fittings

Pressures for Steel EO Fittings Using Stop Adapter (971107 & 971108)

Pre-Setting Pressues (psi) for EO Fittings Wall Thickness (mm)							
Size	**Series**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**4.0**
6	**L**	500	500	500			
6	**S**	500					
8	**L**	500		500			
8	**S**	500	500				
10	**L**		500				
10	**S**		500				
12	**L**	300	300	500			
12	**S**		300				
14	**S**			1,500			
15	**L**		500	800			
16	**S**			1,200		1,300	
18	**L**		1,000			1,300	
20	**S**				2,000		
22	**L**		1,500	1,500			
25	**S**					2,000	2,000
28	**L**			2,000			
30	**S**					3,000	
35	**L**			3,000		3,300	
38	**S**						3,500
42	**L**					4,000	

Table V11 — Pre-Setting Pressures for Steel EO Fittings

NOTE: The values provided in this chart are provided as a guide only and normally will produce a satisfactory bite when using the Parker Hydra-Tool.

Pressures for Steel EO-2 Fittings Using Stop Adapter (971107 & 971108)

Hydra-Tool Pre-Setting Pressures (psi) for EO-2 Fittings in Steel and Stainless Steel Using the Stop Adapter		
Size	**Series**	**psi**
6	**L**	1,100
6	**S**	1,100
8	**L**	1,300
8	**S**	1,300
10	**L**	1,800
10	**S**	1,800
12	**L**	2,000
12	**S**	2,000
14	**S**	2,300
15	**L**	2,300
16	**S**	3,000
18	**L**	3,000
20	**S**	4,100
22	**L**	3,100
25	**S**	5,500
28	**L**	3,700
30	**S**	6,600
35	**L**	5,300
38	**S**	8,400
42	**L**	7,600

Table V12 — Pre-Setting Pressures for Steel and Stainless Steel EO-2 Fittings

NOTE: The values provided in this chart are provided as a guide only and normally will produce a satisfactory bite when using the Parker Hydra-Tool.

Hydra-Tool Pre-Setting Pressures for Ferulok Fittings[1) 2) 3)]

Tube Size	Wall Thickness – Steel							Wall Thickness – Stainless Steel						
	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.035	0.049	0.065	0.083	0.095	0.109	0.120
4	300	300	500	600	600	600		300	300	500	700	700	700	
6	300	500	600	700	700	700	700	300	500	700	700	700	700	800
8		500	700	800	900	1,000	1,000		600	700	1,000	1,000	1,100	1,100
10			700	900	1,000	1,100	1,100			800	1,000	1,100	1,300	1,300
12			900	1,000	1,100	1,100	1,300			1,000	1,100	1,300	1,300	1,500
14			1,000	1,100	1,100	1,300	1,500			1,000	1,300	1,300	1,500	1,600
16				1,100	1,300	1,500	1,600				1,500	1,500	1,600	1,600
20					1,500	1,600	1,800					1,600	2,000	2,000
24					1,800	2,000	2,300					2,100	2,300	2,300
32					2,800	2,900	3,300					3,100	3,300	3,300

Table V13 — Hydra-Tool Recommended Pre-Setting Pressures for Inch Tube

1) These values are provided as a guide only and normally will produce a satisfactory bite.
2) Ferulok pre-setting dies are positive stop dies. Use of above pressures is optional.
3) For wall thicknesses greater than those listed, contact the Tube Fittings Division.

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Hyferset Pre-Setting Pressures for Ferulok Fittings[1)]

Tube Size	Wall Thickness — Steel							Wall Thickness — Stainless Steel						
	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.035	0.049	0.065	0.083	0.095	0.109	0.120
4	800	900	1,400	1,800	1,800	1,800		900	1,000	1,500	2,000	2,000	2,000	
6	900	1,400	800	2,000	2,000	2,000	2,200	1,000	1,500	2,000	2,000	2,000	2,000	2,500
8		1,600	2,000	2,500	2,700	3,000	3,200		1,800	2,200	3,000	3,000	3,500	3,500
10			2,200	2,700	3,000	3,500	3,500			2,500	3,000	3,500	4,000	4,000
12			2,700	3,000	3,500	3,500	4,000			3,000	3,500	4,000	4,000	4,500
14			3,000	3,500	3,500	4,000	4,500			3,000	4,000	4,000	4,500	5,000
16				3,500	4,000	4,500	5,000				4,500	4,500	5,000	5,000
18				4,000	4,500	4,500	5,000				4,500	5,000	5,000	5,500
20					4,500	5,000	5,500					5,000	6,000	6,000
24					5,500	6,000	7,000					6,500	7,000	7,000
28					7,000	7,500	8,000					7,500	8,000	8,500
32					8,500	9,000	10,000					9,500	10,000	10,000

Table V14 — Pre-Setting Pressures for Ferulok Fittings

1) Ferulok pre-setting dies are positive stop dies. Use of above pressures is optional.

Hyferset Pre-Setting Pressures for EO Steel Fittings[2)]

Pre-Setting Pressures (psi) for EO2 Fittings					
Tube Size (mm)	Wall Thickness (mm)				
	1.0	1.5	2.0	2.5	3.0
6-L	650	650			
6-S	650	650			
8-L	900	900			
8-S	900	900			
10-L	1,350	1,350	1,550		
10-S	1,350	1,350	1,550		
12-L	1,750	1,750	1,750	1,750	
12-S	1,750	1,750	1,750	1,750	
14-S		2,000	2,000	2,200	2,200
15-L	1,800	1,800			
16-S		2,200	1,450	1,450	
18-L	2,000	2,000	2,000		
20-S			3,300	3,500	
22-L		3,100	3,100		
25-S				4,000	4,000
28-L		3,500	3,500		

Table V15 — Pre-Setting Pressures for EO Fittings

2) EO and EO-2 pre-setting dies are not positive stop style. Pre-setting must be done using pressures given in these charts.

Hyferset Pre-Setting Pressures for EO-2 Steel Fittings[2)]

Hyferset Pre-Setting Pressures (psi) for EO-2 Fittings		
Size	Series	Any wall
6	L	1,150
6	S	1,150
8	L	1,450
8	S	1,450
10	L	2,450
10	S	2,450
12	L	2,800
12	S	2,800
14	S	3,500
15	L	2,800
16	S	3,900
18	L	3,200
20	S	5,600
22	L	4,950
25	S	6,400
28	L	5,600

Table V16 — Pre-Setting Pressures for EO-2 Fittings

2) EO and EO-2 pre-setting dies are not positive stop style. Pre-setting must be done using pressures given in these charts.

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Hydra-Tool

Recommended Flaring Pressures For Metric Tube

Size (mm)	Material	Tube Wall Thickness 1.0	1.5	2.0	2.5	3.0	Min. Straight Length to Start of Bend
6	SS	400	700	1100			1-5/8
	Steel	300	500	800			
	Copper	150	200	350			
	Aluminum	150	200	350			
8	SS	500	800	1300			1-5/8
	Steel	400	600	1000			
	Copper	150	250	400			
	Aluminum	150	250	400			
10	SS	600	900	1500			1-5/8
	Steel	500	700	1100			
	Copper	200	300	500			
	Aluminum	200	300	500			
12	SS	800	1200	2000	2500		2-3/16
	Steel	600	900	1500	1900		
	Copper	250	350	600	750		
	Aluminum	250	350	600	750		
16	SS	900	2000	2500	2800	3000	2-5/16
	Steel	680	1500	1900	2100	2300	
	Copper	275	600	750	800	900	
	Aluminum	275	600	750	800	900	
18	SS	1000	1700	2500	3100	3500	2-5/16
	Steel	750	1300	1900	2300	2700	
	Copper	300	500	750	900	1100	
	Aluminum	300	500	750	900	1100	
20	SS		1500	2400	3000	3400	2-7/16
	Steel		1100	1800	2300	2600	
	Copper		500	700	900	1000	
	Aluminum		500	700	900	1000	
25	SS			2400	3000	3400	2-7/16
	Steel			1800	2300	2600	
	Copper			700	900	1000	
	Aluminum			700	900	1000	
30	SS			2800	3400	4000	2-1/2
	Steel			2100	2600	3000	
	Copper			800	1000	1200	
	Aluminum			800	1000	1200	
32	SS				4000	4500	2-7/8
	Steel				3000	3400	
	Copper				1200	1300	
	Aluminum				1200	1300	
38	SS				4500	5800	2-7/8
	Steel				3400	4400	
	Copper				1300	1700	
	Aluminum				1300	1700	
42	SS				4700	6500	2-7/8
	Steel				3600	5200	
	Copper				1500	1900	
	Aluminum				1500	1900	
50	SS				5200	7200	2-7/8
	Steel				3900	6100	
	Copper				1900	2300	
	Aluminum				1900	2300	

Table V17 — Recommended Flaring Pressures, Metric Tube

Dimensions and pressures for reference only, subject to change.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Hydra-Tool

Recommended Flaring Pressures For Inch Tube

Size	Material	Tube Wall Thickness								Minimum Straight Length To Start of Bend
		0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	
4	SS	400	700	1100						1-5/8
	Steel	300	500	800						
	Copper	150	200	350						
	Aluminum	150	200	350						
5	SS	500	800	1300						1-5/8
	Steel	400	600	1000						
	Copper	150	250	400						
	Aluminum	150	250	400						
6	SS	600	900	1500						1-5/8
	Steel	500	700	1100						
	Copper	200	300	500						
	Aluminum	200	300	500						
8	SS	800	1200	2000	2500					2-3/16
	Steel	600	900	1500	1900					
	Copper	250	350	600	750					
	Aluminum	250	350	600	750					
10	SS	900	2000	2500	2800	3000				2-5/16
	Steel	680	1500	1900	2100	2300				
	Copper	275	600	750	800	900				
	Aluminum	275	600	750	800	900				
12	SS	1000	1700	2500	3100	3500	4000			2-5/16
	Steel	750	1300	1900	2300	2700	3000			
	Copper	300	500	750	900	1100	1200			
	Aluminum	300	500	750	900	1100	1200			
14	SS		1500	2400	3000	3400	4200			2-7/16
	Steel		1100	1800	2300	2600	3200			
	Copper		500	700	900	1000	1300			
	Aluminum		500	700	900	1000	1300			
16	SS			2400	3000	3400	4200	4800		2-7/16
	Steel			1800	2300	2600	3200	3600		
	Copper			700	900	1000	1300	1400		
	Aluminum			700	900	1000	1300	1400		
20	SS			2800	3400	4000	4800	5300		2-1/2
	Steel			2100	2600	3000	3600	4000		
	Copper			800	1000	1200	1400	1600		
	Aluminum			800	1000	1200	1400	1600		
24	SS				4000	4500	5300	5800		2-7/8
	Steel				3000	3400	4000	4400		
	Copper				1200	1300	1600	1700		
	Aluminum				1200	1300	1600	1700		
32	SS					3300	4000	5000	6300	3
	Steel					2500	3000	3800	4700	
	Copper					1000	1200	1500	1900	
	Aluminum					1000	1200	1500	1900	

Table V18 — Recommended Flaring Pressures, Inch Tube

Note: If tube size and wall thickness are not shown on this chart, see page A31, Table A28 for recommended tube size for use with 37° flare fittings.

Recommended Use of Porting Tools

Parker offers porting tools for machining precision ports (glands) conforming to DIN 3852-1, SAE J1926-1 (SAE straight thread port) and the new world standard port, ISO 6149-1.

Machining ports to accept Parker tube fittings is completed in three simple steps.

To begin, select the appropriate size port tooling for the fitting end in question. Next, follow these machining steps.

1. Pilot Hole Drilling.

First, make a pilot hole for the couterbore by using a drill or bore size found in the couterbore tooling tables. Make hole depth according to the port detail on pages A18, A19 and A21. Parker Tube Fittings Division does not sell tap drills or bore tooling.

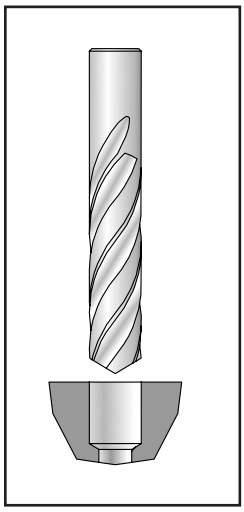


Fig. V1 — Pilot drilling for counterbore tool

2. Port Counterboring.

Then, run the counterbore tool into the pilot diameter created in step 1. All features and dimensions of the port and O-ring cavity are built into the counterboring tool except the depth. The depth of the counterbore machining may vary from a light spotface, up to the maximum spotface depth listed on the port detail on pages A18 and A19.

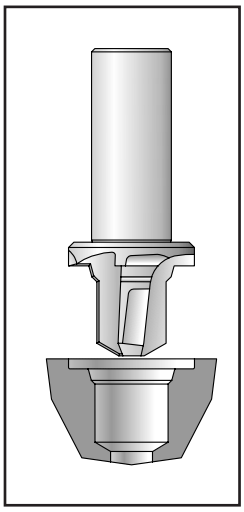


Fig. V2 — Counterboring tool

Note: It is necessary to create a spotface surface which is flat and perpendicular to the port, and with a smooth finish to prevent leakage or O-ring extrusion. Cast or forged surfaces must be spotface machined to meet these requirements. Even on smooth surfaces (machined surfaces), it is necessary to lightly touch the surfact to assure a smooth radius at the entrance of the port.

3. Thread Tapping.

Lastly, the machined port must be threaded to accommodate the fitting. Use the appropriate Parker tapping tool or another tap intended for the same thread type, size, and class.

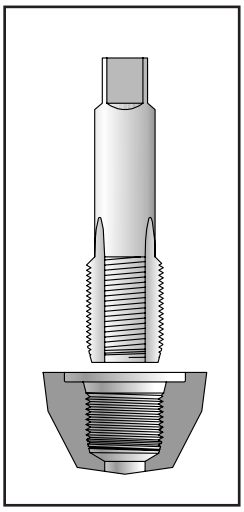


Fig. V3 — Tapping

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Applicable Standards For TFD Products
by Standard Number

ASTM A269	Seamless and welded type 316 Stainless Steel tubing
ASTM B633	Zinc plating
ASTM F1387	Mechanically attached fittings — Triple-Lok, Ferulok and Seal-Lok
DIN 2353	24° cone compression (bite-type) fitting range (configurations)
DIN 3852-1	Metric parallel thread port (ISO 9974-1)
DIN 3852-2	BSPP parallel thread port (ISO 1179-1)
DIN 3852-3	Metric O-ring port (ISO 6149-1)
DIN 3861	24° cone machining and sleeve for compression (bite-type) fittings
DIN 3865	24° cone nipple with O-ring
DIN 3859	Technical delivery conditions for compression fittings
DIN 1630	Seamless steel tube
DIN 2391	Seamless precision steel tubes
DIN 17458	Stainless steel tubes
ISO 1179[1)]	BSPP, flat face port and stud ends – same as DIN 3852 - Part 2
ISO 3304	Seamless precision steel tubes
ISO 3305	Welded precision steel tubes
ISO 6149	Metric straight thread O-ring port and stud ends – same as SAE J2244 and DIN 3852, Part 3
ISO 6162	Four bolt split flange connections – inch and metric bolts (inch bolt, Part II – same as SAE J518)
ISO 8434-1	24° cone bite type fittings (EO fittings)
ISO 8434-2	Metric 37° flare fittings (Metric Triple-Lok)
ISO 8434-3	Metric face seal fitting with ISO 6149 port end – (Metric Seal-Lok)
ISO 8434-4	24° cone bite type fittings with weld nipple (EO Fittings)
ISO 8434-5[4)]	Test methods for threaded fluid connectors
SIO 8434-6[3)]	60° cone connectors with BSPP threads
ISO 9974	Metric flat face port and stud ends – same as DIN 3852 - Part 1
JIS B8363	60° cone (male and female) hose adapters
MIL-16142	UN/UNF straight thread O-ring port – same as SAE J1926-1
MIL-F-18866	37° flare and flareless tube fittings – Triple-Lok and Ferulok (dimensionally similar to SAE J514)
MIL-33649	Straight thread O-ring port – **different from SAE J1926-1**
NFPA T3.8.3[2)]	Test methods for steel separable tube fittings
SAE J343	Tests and procedures for hose and hose assemblies (impulse test applies to fittings)
SAE J356	Welded and flash controlled low carbon steel tubing
SAE J512	Automotive tube fittings - 45° flare type - Inverted flare type - Tapered sleeve compression type
SAE J514	Hydraulic tube fittings - 37° flare (Triple-Lok) - Flareless – 24° bite type (Ferulok) - O-ring plugs - Pipe fittings - Adapter unions (pipe swivel – “07” adapters)
SAE J515	Hydraulic O-rings (SAE straight thread, face seal, four-bolt split flange, and metric O-ring port)
SAE J518	Code 61 and 62 four-bolt split flange connections – (same as ISO 6162 Type II flange connection)
SAE J524	Seamless low carbon steel tubing
SAE J525	Welded and cold drawn low carbon steel tubing
SAE J527	Brazed double wall steel tubing
SAE J528	Seamless copper tube
SAE J531	Automotive pipe, filler and drain plugs (HP and HHP plugs)
SAE J533	Flares for tubing – 37° and 45° single and double flares
SAE J846	Coding system for identification of fluid connectors
SAE J1065	Pressure ratings for hydraulic tubing
SAE J1231	Beaded tube hose fittings
SAE J1453	O-ring face seal fitting with SAE port end – (Seal-Lok)
SAE J1644	Test methods for fluid connectors
SAE J1926	SAE straight thread O-ring port and stud ends – same as ISO 11926
SAE J2244	Metric straight thread O-ring port and stud ends – same as ISO 6149
SAE J2435	Welded and flash controlled C-1021 tubing
SAE J2467	Welded and cold drawn, C-1021 tubing
SAE J2613	Welded and flash controlled high strength low alloy (HSLA) tubing
SAE J2614	Welded and cold drawn HSLA tubing

Table V19 — Applicable Standards by Standard Number

1) Being revised. 2) Inactive. 3) To be issued. 4) Being revised under new number — ISO 19879.

Parker Hannifin Corporation
Tube Fittings Division
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http://www.parker.com/tfd

Thread Designations and Standards for Threads Used in Fluid Connectors

Abbreviation	Description	Applicable Std.
Straight Pipe		
NPSC	American Standard Straight Pipe Threads in Pipe Couplings Couplings	ANSI B1.20.1 FED-STD-H28/7
NPSF	Dryseal American Standard Fuel Internal Straight Pipe Threads (generally used in soft or ductile materials to mate with NPTF external taper threads)	SAEJ476 ANSI B1.20.3 FED-STD-H28/8
NPSI	Dryseal American Intermediate Internal Straight Pipe Threads (for brittle or hard materials; intended to mate with PTF-SAE short external taper threads)	SAE J476 ANSI B1.20.3 FED-STD-H28/8
NPSM	American Standard Straight Pipe Threads for Free-Fitting Mechanical Joints for Fixtures (these threads fit freely over NPTF threads. They are used in swivel nuts of 07 adapters)	ANSI B1.20.1 FED-STD-H28/7
Taper Pipe		
ANPT	Aeronautical National Taper Pipe Threads (similar to NPT with various additional requirements in gaging)	MIL-P-7105
NPT	American Standard Taper Pipe Threads for General Use	ANSI B1.20.1 FED-STD-H28/7
NPTF	Dryseal American Standard Taper Pipe Threads (used in all of our steel and brass fittings)	SAE J476 ANSI B1.20.3 FED-STD-H28/8
PTF — SAE Short	Dryseal SAE Short Taper Pipe Threads (mainly used in low pressure pneumatic and fuel applications)	SAE J476 ANSI B1.20.3 FED-STD-H28/8
PTF — SPL Short[1)]	Dryseal Special Short Taper Pipe Threads	ANSI B1.20.3
PTF — SPL Extra Short[1)]	Dryseal Special Extra Short Taper Pipe Threads	ANSI B1.20.3
Unified Threads		
UN	Unified Constant Pitch Threads (standard series: 4, 6, 8, 12, 16, 20, 28, 32)	ANSI B1.1 FED-STD-H28/2
UNC	Unified Coarse Threads	ANSI B1.1 FED-STD-H28/2
UNEF	Unifed Extra Fine Threads	ANSI B1.1 FED-STD-H28/2
UNF	Unified Fine Threads	ANSI B1.1 FED-STD-H28/2
UNS	Unified Special Pitch Threads	ANSI B1.1 FED-STD-H28/3
UNJ	Unified Controlled Root Radius Threads	ANSI B1.15 FED-STD-H28/4

Table V20 — Thread Designations and Standards for Threads Used in Fluid Connectors **(continued on the next page)**

1) Used in some pneumatic components where shortened thread depth is required because of lack of enough material due to component size limitations.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
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Thread Designations and Standards for Threads Used in Fluid Connectors (Continued)

Abbreviation	Description	Applicable Std.
Metric Threads		
M	Metric Screw Threads — M profile	ISO 261 ANSI B1.13M FED-STD-H28/21
M — Keg	Metric Taper Threads (mainly used in Germany)	DIN 158
British Standard Pipe Threads		
R (BSPT)	British Standard Taper Pipe Threads, External	BS 21 ISO 7/1
Rc (BSPT)	British Standard Taper Pipe Threads, Internal	BS 21 ISO 7/1
Rp or G (BSPP)	British Standard Pipe (Parallel) Threads	BS 2779 ISO 228/1
Japanese Standard Pipe Threads		
PF[1)]	JIS Parallel Pipe Threads	JIS B202 ISO 228/1
PT[1)]	JIS Taper Pipe Threads	JIS B203 ISO 7/1
PS	JIS Parallel Internal Pipe Threads (to mate with PT threads)	JIS B203

Table V20 (Cont'd) — Thread Designations and Standards for Threads Used in Fluid Connectors

1) PF and PT threads are functionally interchangeable with BSPP and BSPT threads, respectively.
These are old designations. They are being replaced with G (for PF) and R and Rc (for PT) as documents are revised.

Document Sources for Connector Specifications

ANSI American National Standards Institute
11 West 42nd Street, 13th Floor
New York, New York 10036-8002
Phone: 212-642-4900
Fax: 212-398-0023
www.ansi.org/public/std_info.html

BSI British Standards Institution
389 Chiswick High Road
London, W4 4AL
United Kingdom
Phone: 44-181-996-9000
Fax: 44-181-996-7400
www.bsi.org.uk/bsis/index.htm

British Standards are also available from ANSI

DIN Deutsches Institut Fur Normung
(German Institute for Standards)
Burggrafenstrasse 6
Postfach 1107
D - 1000 Berlin 30, Germany
www.beuth.de/beuth.htm/?datenbanken

English translations of some German Standards can be obtained from:

ANSI

— or —

Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112-9660
Phone: 1-800-854-7179

FED-STD Federal Standard
Department of Defense Single Stock Point
Commanding Officer
Naval Publications and Forms Center
5801 Taber Avenue
Philadelphia, PA 19120-5099

ISO International Organization for Standardization
Case Postale 56
I, Rue de Varembe
CH - 1211 Geneve 20
Switzerland
www.iso.ch/infoe/catinfo.html

ISO Documents are also available from ANSI

JIS Japanese Industrial Standards
Published by Japanese Standards Association
1-24 Akasaka 4
Minto-ku, Tokyo 107-8440
Japan
Phone: 81-3-3583-8000
Fax: 81-3-3586-2014

English translations of some Japanese Standards can be obtained from ANSI

SAE SAE International
400 Commonwealth Drive
Warrendale, PA 15096-0001
Phone: 412-776-4841
Fax: 412-776-0002
www.sae.org/prodserv/stds/stdsinfo/standard.html

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Glossary of Key Tube Fittings, Fluid Power and Other Engineering Terms

Alloy: A substance having metallic properties and composed of two or more chemical elements of which at least one is a metal.

Annealing: Heat treating process used primarily to soften metals or to stabilize their structures.

Boss: A relatively short protrusion or projection from the surface of a forging or casting, often cylindrical in shape.

Brass: An alloy consisting mainly of copper (over 50%) and zinc, to which smaller amounts of other elements may be added.

Braze 505: Braze 505 is a trademark of the Handy & Harman Company.

Brazing: The joining of metals through the use of heat and capillary flow of a filler metal. The filler metal having a melting temperature above 840 degrees Fahrenheit, but below the melting point of the metals being joined.

Bright Annealing: Annealing in a protective atmosphere to prevent discoloration of the bright surface.

Brinell Hardness Test: A test for determining the hardness of a material by forcing a hard steel or carbide ball of specified diameter into it under a specified load.

Brittle Fracture: A fracture which is accompanied by little or no plastic deformation.

Brittleness: The quality of a material that leads to crack propagation without appreciable plastic deformation.

Bulk Modulus: The measure of resistance to compressibility of a fluid. It is the reciprocal of the compressibility.

Burnishing: Smoothing surfaces of a work piece through frictional contact between it and some hardened tooling.

Carbonitriding: A case hardening process of suitable ferrous material that is effected by the simultaneous absorption of nitrogen and carbon into the surface of the work piece, by heating above the lower transformation temperature in a suitable gaseous atmosphere.

Cavitation: A localized gaseous condition within a liquid stream which occurs when the pressure is reduced to the vapor pressure. Generally occurs in pumps and suction lines where fluid velocity is too high due to poorly sized (too small) line size.

Chatter: The undesirable wavy surface on a machined surface, produced by vibration of the tool, grinding wheel or work piece itself during machining or grinding.

Chromate Treatment: A treatment of metal in a solution of a hexavalent chromium compound to produce a conversion coating of chromium compounds on the surface of the metal, thus improving the resistance to corrosion.

Cold Heading: Working metal at room temperature in such a manner that the cross-sectional area of a portion or all of the stock is increased.

Cold Working (Cold Forming): Permanently deforming metal, usually at room temperature, by the application of an external force in order to produce a near net shape component.

Compressibility: The change in volume of a unit volume of a fluid when subjected to a unit change in pressure.

Corrosion: The deterioration of a metal by chemical or electrochemical reaction with its environment.

Creep: Time dependent strain occuring under stress. This phenomenon may result in relaxation i.e.the relief of pre-load/pre-stress in assembled components.

Crimping: A swaging and squeezing operation usually used to secure components, such as, nuts and shells to their mating parts.

Deburring: Removing burrs, sharp edges or fins from metal parts usually by filing, grinding or tumbling the work in a barrel containing suitable liquid medium and abrasives.

Density: Ratio of the mass of an object (including fluids) to its volume.

Diamond Pyramid Hardness Test (DPH): An indentation hardness test employing a 136° diamond pyramid indenter and variable loads.

Ductility: The ability of a metal to deform plastically (permanently) without fracturing.

Dynamic Pressure Rating: See PRESSURE, RATED DYNAMIC.

Easy Flo 45: Easy Flo 45 is a trademark of the Handy & Harman Company.

Elastic Deformation: Change of dimensions accompanying stress in the elastic range, original dimensions being restored upon release of stress.

Elastomer: Often referred to as rubber, is a high polymer that can be, or has been modified to a state exhibiting little plastic flow and quick recovery from an extending force.

Erosion: Destruction of metals or other materials by the abrasive action of moving fluids, or particles.

Extrusion: Conversion of an ingot slug or billet into lengths of uniform cross section by plastically forcing the metal through a die orifice having the desired cross sectional profile.

Fatigue/Endurance Limit: The maximum stress below which a material can presumably endure an infinite number of stress cycles.

Fatigue Fracture: The initiation of minute cracks, propagating into ultimate fracture under the application of repeated or fluctuating stresses having a maximum value less than the tensile strength of the material.

Ferrous Metal: A metal in which the major constituent is iron.

Fire Point: The temperature to which a fluid must be heated to *ignite* and *burn* for at least five seconds in the presence of air when a small flame is applied.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Glossary

Fitting: A connector or closure for fluid power lines and passages.

Flare Test: A test applied to tubing, involving a tapered expansion over a cone, in order to verify tube ductility and resistance to cracking during flaring operation.

Flaring: Forming an outward acute-angle flange on a tubular part.

Flash Point: The temperature to which a liquid must be heated to form a mixture with air that can be ignited *momentarily* by a flame.

Flow: Movement of fluid generated by pressure differences.

Flow, Laminar: A flow situation in which fluid moves in parallel lamina or streamlined layers.

Flow Lines: A fiber pattern, frequently observed in wrought metal, which indicates the manner in which the metal flowed during forming.

Flow Rate: The volume, mass or weight of a fluid passing through any conductor per unit of time.

Flow, Turbulent: A flow situation in which the fluid particles move in a random fluctuation manner. This is generally caused by too high fluid velocity.

Fluid Friction: Friction due to the viscosity of the fluid.

Fluid Power System: A system that transmits and controls power through the use of a pressurized fluid within an enclosed circuit.

Fluorocarbon Rubber: An elastomeric material which is extensively used for O-ring. Fluorocarbon (Viton) is recommended for higher temperatures than nitrile (Buna N) material.

Flux: In brazing, cutting, soldering or welding, material used to dissolve or facilitate the removal of oxides and other undesirable substances.

Folds: Defects in metals, usually on or near the surface caused by continued fabrication of overlapping surfaces.

Forgeabiltiy: Term used to describe the relative ability of materials to deform without rupture.

Forging: Plastically deforming metal, usually hot, into desired shapes with compressive force, with or without dies.

Forging Die: A forging whose shape is determined by impressions in specially prepared dies.

Free Machining: Denotes the machining characteristics of an alloy to which one or more ingredients have been introduced to produce small broken chips, lower power consumption, better surface finish and longer tool life.

Galling: Localized welding on mating surfaces of metal parts caused from excessive friction developed during the rubbing action that occurs during assembly.

Galvanic Corrosion: Corrosion resulting from the placing of two dissimilar metals in direct contact with each other then exposing them to an incompatible fluid or atmosphere.

Hammer, Liquid: Pressure and depression waves created by relatively rapid flow changes and transmitted through the system.

Handy Flux: Handy Flux is a trademark of the Handy & Harman Company.

Hardening: Increasing the hardness of a material by suitable treatment, usually involving heating and rapid cooling.

Hardness: Resistance of a material to scratching, abrasion, cutting or deformation.

Head, Pressure: The pressure due to the height of a column or body of fluid.

Heading: See COLD HEADING.

Hot Finishing/Hot Forming: A deformation operation performed at elevated temperature, usually above the recrystallization temperature of the metal.

Hydraulic Power: Power derived from flow rate and pressure differential of the fluid.

Hydraulics: Engineering science pertaining to liquid pressure and flow.

Hydrogen Embrittlement: A condition of low ductility in metals resulting from the absorption of hydrogen.

Hydropneumatics: Engineering science pertaining to the combination of hydraulic and pneumatic fluid power.

Impact Test: A single blow to determine the behavior of materials when subjected to high rates of loading, usually sudden and in the bending, tension or torsion mode. Charpy or Izod tests are typically used to measure materials' impact energy characteristics.

Inclusions: Nonmetallic materials in solid metallic matrix.

Intergranular Corrosion: A preferential corrosive attack at the grain boundaries of a metal.

LB2000: Registered Trademark of ITW.

Lubricant: Any substance used to reduce friction between two surfaces which are in contact.

MPG 2: Registered Trademark of Dubois Chemical Inc.

Machinability: The relative ease of machining a metal.

Machining: Removing material, in the form of chips, from work, usually through the use of a machine.

Malleability: The characteristic of metals that permits plastic deformation in compression without rupture.

Mandrel: (1) A metal bar around which other metal may be cast bent, formed, or shaped. (2) A rod used to retain the cavity in hollow metal products during working.

Mechanical Properties: The properties of a material that reveal its elastic and inelastic behavior under the application of force, thus indicating the material's suitability for mechanical applications. Examples of such properties are: tensile strength, elongation, modulus of elasticity, yield strength, reduction in area and fatigue limit.

Microhardness: The hardness of microscopic areas or of the individual microconstituents in a metal.

Microstructure: The structure of polished and etched metals as revealed by a microscope at a magnification greater than ten diameters.

Parker Hannifin Corporation
Tube Fittings Division
Columbus, Ohio
http://www.parker.com/tfd

Glossary

Mild Steel: Carbon steel with a maximum of .25 percent carbon.

Nitriding: A case hardening process conducted by the introduction of nitrogen into the surface of a solid ferrous alloy.

Nitrile (Buna N): A copolymer of butadienne and acrylonitrile. It is the elastomer most widely used to manufacture O-rings.

Nondestructive: Inspection or test by methods that do not destroy the part.

O-ring: A torus, or doughnut shaped object, generally made from elastomer and is used primarily for sealing.

Passivation: A process used to improve corrosive behavior of a metal by changing its chemically active surface to a much less reactive state.

Pipe: (l) The defect in wrought or cast products resulting from the central cavity formed by contraction in metal, especially ingots, during solidification. (2) A tubular metal product that includes iron pipe size (I.P.S.) and schedule number in its classification.

Pipe Thread, Dry Seal: Tapered pipe threads in which sealing is a function of root and crest interference.

Pitting: Forming small sharp cavities in a metal surface by corrosion, mechanical action or nonuniform electrodeposition.

Plastic Deformation: Deformation that does or will remain permanent in an element after removal of the stress that caused it.

Pneumatics: Engineering science pertaining to gaseous pressure and flow.

Port: A terminus of a passage in a component to which conductors can be connected.

Port, Pipe: A port which conforms to pipe thread standards.

Port, Straight Thread: A port which conforms to straight thread standards. It typically employs an O-ring compressed in a wedge-shaped cavity.

Power Supply, Fluid: Energy source which generates and maintains a flow of fluid under pressure.

Precipitation Hardening: Hardening caused by the precipitation of a constituent from a supersaturated solid solution.

Pressure: Force per unit area, usually expressed in pounds per square inch (psi).

Pressure, Absolute: The pressure above absolute zero, i.e., the sum of atmospheric pressure plus gage pressure.

Pressure, Atmospheric: Pressure exerted by the atmosphere at any specific location. [Sea level atmospheric pressure is approximately 14.7 pounds per square inch (about 1 bar)]

Pressure, Burst: The pressure which causes failure of, and consequential loss of fluid through the product envelope.

Pressure, Cyclic Test: A pressure range applied in cyclic endurance tests that are performed to help determine recommended working pressure.

Pressure, Differential (Pressure Drop): The difference in pressure between any two points of a system or a component.

Pressure, Gage: Pressure differential above or below ambient atmospheric pressure.

Pressure, Nominal: A pressure value assigned to a component or system for the purpose of convenient designation.

Pressure, Operating: See WORKING PRESSURE.

Pressure, Proof: The non-destructive test pressure, in excess of the maximum rated operating pressure, which causes no permanent deformation, external leakage, or other resulting malfunction.

Pressure, Rated Dynamic: The maximum fluctuating pressure load that a pressure containing envelope is capable of sustaining for a minimum of 1 million operating cycles without failure.

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, temperature excursions, etc.

Pressure, Relief: The pressure at which the relief valve is set for actuation. This pressure is generally slightly higher than the system working pressure.

Pressure Shock: A pressure wave front which moves at a sonic velocity, due to sudden stoppage of fluid flow.

Pressure, Static: The pressure in a fluid at rest.

Pressure, Surge: The pressure increases resulting from pressure fluctuations in a hydraulic system.

Pressure, Working: The pressure at which the apparatus is being operated in a given application.

Pressure, Working Rated: The qualified operating pressure which is recommended for a system or a component by the manufacturer.

Proof Load: A pre-determined load, generally some multiple of the service load, to which a specimen or structure is submitted before acceptance for use.

Quenching: Rapid cooling method used in heat treating process.

Residual Stress: Stress existing in a body that is free of external forces or thermal gradients.

Rockwell Hardness Test: A test for determining the hardness of a material based upon the depth of penetration of a specified penetrator into the specimen.

Roughness: Relatively finely-spaced surface irregularities, the height, width and direction of which establish the predominant surface pattern.

STP: Distributed by First Brand Corp. Danbury, CT.

Scaling: (1) Forming a thick layer of oxidation products on metals at high temperatures. (2) Depositing water-insoluble constituents on a metal surface, as in cooling tubes and water boilers.

Seam: A fold or lap on the surface of a metal appearing as a crack, usually resulting from a defect obtained in casting or in working.

Segregation: Concentration of alloying elements in specific regions in a metallic object.

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Glossary

Shear Strength: The load divided by the original cross-sectional area of a section separated by a shear force.

Sour Environment: Fluids containing water as a liquid and hydrogen sulfide, and may cause sulfide stress cracking (SSC) of susceptible materials.

Specific Gravity, Liquid: The ratio of the weight of a given volume of liquid to an equal volume of water.

Spot Facing: Machining in the mating component, a flat seat for a bolt head, nut, locknut or other similar element.

Springback: (1) The elastic recovery of metal after stressing. (2) The degree to which metal tends to return to its original shape or contour after undergoing a forming operation.

Stainless Steel: Basically, low carbon alloy steels containing at least 11.5% chromium. These steels are characterized by their high resistance to corrosion.

Static Pressure Rating: See pressure, rated static

Steel: An iron-based alloy, containing: manganese, usually carbon, and often other alloying elements.

Strain: A measure of the relative change in size or shape of a body. Example, linear strain is computed as the ratio of change in length to the original length.

Stress: The result of a force acting on a given surface area. Computed as the ratio of the applied force to the affected area.

Stress Corrosion Cracking (SCC): Fracture in a material resulting from the combined action of applied stress and corrosive environment.

Stress Raisers/Concentration: Changes in contour or discontinuities in structure that cause local increases in stress.

Stringer: In wrought materials, an elongated configuration of microconstituents or foreign material aligned in the direction of working.

Sulfide Stress: Brittle failure by cracking under the combined action of tensile stress and corrosion in the presence of water Cracking (SSC) and hydrogen sulfide.

Surge: A transient rise of pressure or flow.

Swaging: Forming a taper or a reduction on metal products such as rod and tubing by forging, squeezing or hammering.

Temperature, Ambient: The temperature of the environment in which the apparatus is working.

Tensile Strength: In tensile testing, the ratio of maximum load to original cross-sectional area.

Tensile Strength, Ultimate: The maximum stress that a material can withstand.

Torque: Turning effort (moment) applied to a component for fastening, tightening or assembling.

Torsion: A twisting action resulting in shear stresses and strain.

Toughness: Ability of a metal to absorb energy and deform without fracturing.

Tube: Hollow, cylindrical products having outside diameters that are not standardized for threading. Tubes are dimensionally classified in terms of their outside diameters and wall thicknesses.

Upsetting: See COLD HEADING.

Vacuum: Pressure less than ambient atmospheric pressure.

Vibra-Seal: Vibra-Seal is a registered trademark of Loctite Corporation.

Viscosity: A measure of the internal friction or the resistance of a fluid to flow.

Viton: Viton is a registered trademark of E.I. Du Pont de Nemours and Company.

Welding: Joining two or more pieces of metal by applying heat, pressure or both with or without filler metal, to produce a localized union through fusion or recrystallization across the interface.

Work Hardening: An increase in hardness and strength caused by plastic deformation at temperatures lower than the recrystallization range. (Same as Strain Hardening. See also, Cold Working.)

Working Pressure, Dynamic: See PRESSURE, RATED DYNAMIC.

Working Pressure, Static: See PRESSURE, RATED STATIC.

Yield Strength: The maximum stress that can be applied to a material, which upon removal, the material will return to approximately its original shape.

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Aerospace

Key Markets
- Commercial transports
- Military aircraft
- Regional transports
- Aircraft engines
- Business and general aviation

Key Products
- Flight control systems and components
- Hydraulic systems and components
- Fuel systems and components
- Pneumatic systems and components
- Inert oxygen generating systems
- Fluid metering, delivery and atomization devices
- Wheels and brakes
- Couplings, fittings, hoses and tubes



Automation

Key Markets
- Factory automation
- Transportation and automotive
- Life sciences and medical
- Machine tools
- Semiconductor and electronics

Key Products
- Pneumatic motion and control
- Air preparation
- Vacuum controls and sensors
- Electromechanical stepper and servo motors, drives, and controls
- Human machine interface
- Electric actuators, gantry robots, slides and linear motors
- Structural extrusion



Climate & Industrial Controls

Key Markets
- Refrigeration and air conditioning
- Transportation/mobile
- Process
- Industrial machinery
- Medical/life sciences
- Fuel cells
- Precision cooling

Key Products
- Pressure regulators
- Check, ball and service valves
- Value-added systems
- Thermostatic and expansion valves
- Electronic controllers
- Contaminant controls
- Heating/air conditioning hose
- Gerotors



Filtration

Key Markets
- Industrial machinery
- Process
- Mobile
- Marine
- Oil & gas
- Power generation and energy
- Transportation
- Food and beverage

Key Products
- Hydraulic, lubrication and coolant filters
- Process, chemical, water and microfiltration filters
- Compressed air and gas purification filters
- Condition monitoring
- Analytical gas generators
- Nitrogen, hydrogen and zero air generators
- Engine air, fuel, oil filtration and systems



Fluid Connectors

Key Markets
- Construction machinery
- Agriculture
- Transportation
- Mobile
- Industrial machinery
- Oil & gas

Key Products
- Rubber and thermoplastic hose
- Industrial hose
- Tube fittings and adaptors
- Tubing and plastic fittings
- Brass fittings and valves
- Hose couplings
- Quick disconnects



Hydraulics

Key Markets
- Construction machinery
- Agriculture
- Industrial machinery
- Oil & gas
- Truck hydraulics
- Power generation and energy

Key Products
- Hydraulic cylinders and accumulators
- Hydraulic valves and controls
- Hydraulic motors and pumps
- Power take-offs
- Hydraulic systems



Instrumentation

Key Markets
- Power generation
- Oil & gas
- Petrochemical
- Microelectronics
- Biopharmaceutical

Key Products
- Medium/high pressure fittings and valves
- Instrumentation fittings, valves, manifolds and regulators
- High purity fittings, valves and regulators
- Fluoropolymer fittings, valves, pumps and regulators
- Analytical systems



Seal

Key Markets
- Transportation
- Energy, oil & gas
- Semiconductor
- Aerospace
- Fluid power
- Life sciences
- Telecommunications

Key Products
- Elastomeric O-rings
- Homogeneous and inserted elastomeric shapes and diaphragms
- Metal and plastic retained composite seals
- Polymeric and plastic dynamic seals
- Rubber and plastic boots/bellows
- Extruded and precision-cut/fabricated elastomeric seals
- Thermoplastic engineered seals





37° and 45° Flare Nose Angles



Male Pipe Thread Sizes



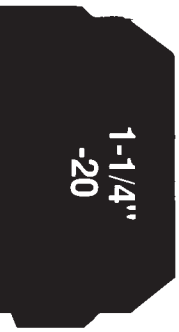










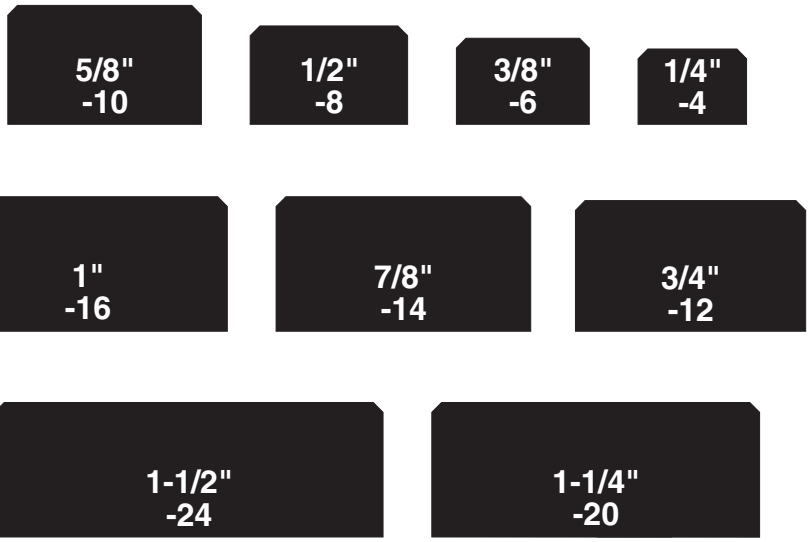












O-Ring Face Seal (SAE J1453)

SAE (JIC) 37° Flare Nose Cone Sizes

Male Pipe Thread Sizes

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FITTING END SIZE CHART

SAE (JIC) 37° Flare Nose Cone Sizes

SAE 45° Flare Nose Cone Sizes

