



# Phastite for Pipe

Non-Welded Solution for High-Pressure Piping



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## Phastite Introduction

**Phastite** is a pipe connection technology providing non-welded, leak-free stainless steel piping connections safely and efficiently. The innovative design combines an intuitive and fast fabrication process to achieve permanent non-welded piping connections. Phastite is well suited for hydraulic systems, water, water-glycol and other media for operating pressures up to 10,000 psi (70 Mpa) and is specifically tested and approved for subsea depths to 15,000 ft (4500m).

Considering the accumulated time and steps required for a welded piping connection, a single pipe weld may require several hours. In comparison, Phastite eliminates those requirements and can be fabricated, **and ready for installation**, in minutes.

Phastite closes the performance gap between threaded fittings and welded connections in the 3/4" to 2" (DN20-DN50) pipe size range, while providing the time and safety benefits of a mechanically attached fitting (MAF). Phastite is designed, tested, and field validated to meet the demands of pressure cycling fluid power systems in energy and industrial market applications and is approved for subsea fluid power systems.

These Phastite benefits are magnified when comparing high pressure piping systems that require time-intensive, multi-pass welding. Additionally, Phastite eliminates the pre- and post-weld processes that drive *overall* welding time and costs. Firewatch, non destructive examination (NDE) and pickle/passivate are eliminated. Moreover, employee exposure to open flame and weld fumes, including hexavalent chromium, are minimized with Phastite.

Fig. 1 – Parker Phastite and Complementary Products



Phastite Fittings



SAE/ISO Code 61/62 & Dual Seal/Seal Sub Junction Blocks



SAE/ISO Code 61/62 Hydraulic 4-Bolt Flanges



Triple-Lok 2 HD 5k High Pressure Subsea 37° Flare Fittings



Heavy Series Pipe, Tube & Hose Clamps

## Total Phastite Non-Welded System

Phastite fittings are offered standard in a variety of flexible configurations and shapes to accommodate most piping schemes, including: straight and elbow couplings, SAE/ISO Code 61 & Code 62 hydraulic flanges and Parker Dual Seal/Seal Sub subsea flanges, all shown in Fig 1 [the one with multiple pictures]. Additional termination and service break options including ANSI B16.5 flange connections are available upon request. Consult the How to Order, Visual Index and Catalog Table sections for specific configurations.

Phastite fittings are most efficiently utilized in conjunction with complementary piping system components provided in this catalog such as Parker's 4-bolt hydraulic flange adapters, connector blocks, elbow blocks, and heavy-duty pipe clamps.

Integrating the cold bending of hydraulic piping further reduces welded connections and improves piping routing. Cold bent systems are highly reliable and can typically be field fabricated throughout the size range of Phastite fittings (see Fig 2).

For threaded connections, Parker's exclusive Triple-Lok 2 HD provides a 5000 psi (35 Mpa) high pressure solution in traditional JIC/37° flare fitting and is approved for subsea/submerged service.

Triple-Lok 2 HD provides.... in a traditional JIC/37° flare fitting design and is approved for subsea/submerged fluid power applications.



Fig. 2 – Cold bending of the piping is considered a best practice for improved routing and reduced connection points

## Fitting Construction and Materials

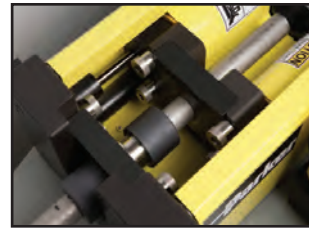
The Phastite fitting consists of two components; the fitting body and the collar. The fitting body is machined from 316/316L stainless steel. The Phastite collar is manufactured from high strength 2205 duplex stainless steel and is provided with a dry film moly coated lubricant to aid in assembly and eliminate galling.

PHASTITE COMPONENT	MATERIAL	SPECIFICATION(S)	SURFACE TREATMENT
Body-Straight	316/316L Stainless Steel	UNS S31600/S31603 EN 1.4401/1.4404	Passivation
Body-Elbow/Block	316/316L Stainless Steel	UNS 31600/31603 EN 1.4401/1.4404	Passivation
Collar	2205 Duplex Stainless Steel	UNS S31803 EN 1.4462	Passivation + Everlube® 620C

Table 1 - Standard Materials for Phastite Fittings



**STEP 1**  
Cut & gauge pipe.  
Mark pre-insertion & post-insertion indicators on pipe.



**STEP 2**  
Select & load tooling.  
Insert Phastite fitting & pipe into Phastool.  
Cycle machine.

## Phastite Fabrication

The fitting is delivered ready for fabrication with a pre-swage gap. After a quick visual pipe inspection, gauging, and marking process, Phastite fittings are hydraulically swaged to the pipe using the Phastool. The Phastite system is designed so that a permanent weld-equivalent connection is attained when this gap is fully closed, as shown in Fig 3 [Phastite's visual integrity...]. The closing of this pre-swage gap provides a visual indication of a properly assembled Phastite fitting. Email the Tube Fitting Division (tfd.support@support.parker.com) to obtain the Phastite Design and Installation guide for equipment details, operating instructions and piping system design recommendations.



**STEP 3**  
Remove assembly.  
Visually inspect pre/post insertion marks & pre-swage gap between fitting body & collar.

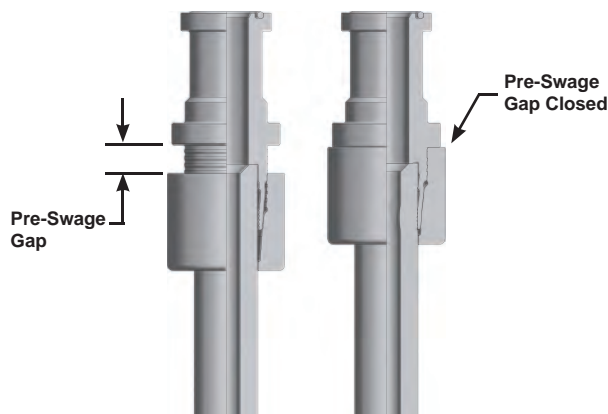


Fig. 3: Phastite's visual integrity check - close the factory delivered pre-swage gap for a weld-equivalent connection

## How Phastite Fittings Work

The robust design and permanent locking features assure leak-free performance in the most demanding fluid and gas system applications. The pipe sealing and retention features of Phastite are achieved through its unique design. As the Phastite collar is swaged to the fitting body, the radial sealing teeth progressively lock to the pipe. No seals or o-rings are used in this innovative metal-to-metal design.

A slight degree of pipe compression effectively provides a permanent loading to the connection, ensuring that the teeth permanently hold and seal the pipe as shown in Figure 4. Collar locking rings ensure absolute connection integrity as the mating geometries between the fitting body and the collar are permanently locked together. Once the collar is locked to the fitting body, it will not disengage - offering a permanent weld alternative connection in minutes.

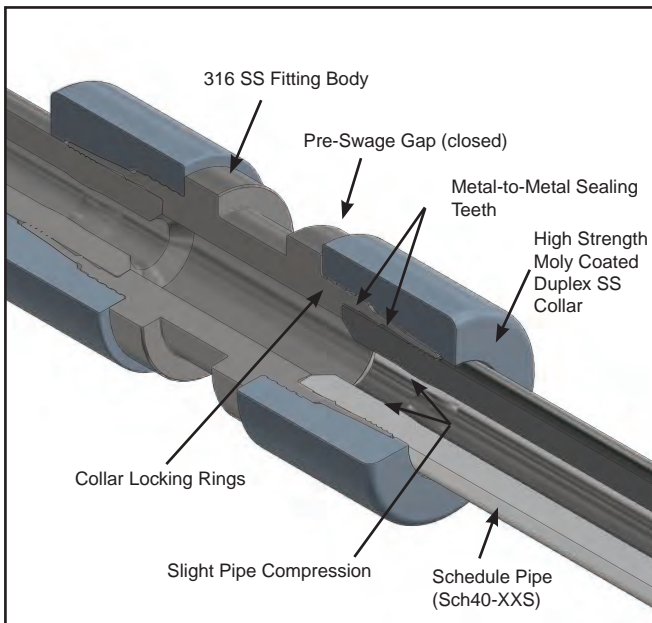


Fig. 4 – Internal view of Parker Phastite Fitting

## Pressure and Temperature

### Pressure

Phastite has been engineered and tested to withstand the most demanding pressure piping systems along with the vibration, pressure surges and external loading associated with these systems. Phastite has been designed and tested in accordance to ASME B31.1/B31.3 piping codes.

Consult **Table 2** for the rated operating pressures of the Phastite connection. Consult pressure piping code requirements (such as ASME B31.1/B31.3) for allowable working pressures of schedule pipe used with Phastite.

Phastite Size (NPS)	Phastite Size (ISO/DN)	Dynamic Operating Pressure	*Static Operating Pressure	** Minimum Operating Temp	** Maximum Operating Temp		
		PSI	PSI				
		MPa	MPa				
3/4"	20	6000	10000	-60°F	250°F		
		42	68				
1"	25	6000	10000				
		42	68				
1 1/2"	38	6000	10000			-50°C	120°C
		42	68				
2"	50	6000	10000				
		42	68				

Table 2 – Pressure & Temperature Ratings of Phastite Fittings

\*A Static pressure system is defined as having less than 30,000 maximum lifetime pressure cycles.

Pressure ratings shown above are represented for XXS/XXH stainless steel schedule pipe (3/4" sch 160). If lighter schedule pipes are selected, the connection pressure rating would be reduced accordingly.

The maximum allowable operating pressure of a specific Phastite fitting may be dictated by the configuration or interface. For example, Phastite fittings with SAE J518/ISO 6162-1 Code 61 flanges may be limited to 3000 psi / 21 MPa. Pressure ratings are provided for each configuration in the published catalog tables.

### Temperature

As shown on **Table 2**, Phastite fittings can be used throughout a wide temperature range.

Phastite fittings retain full operating pressure capabilities throughout the temperature range of -60°F to +250°F per ASME B31.3 pressure piping code. Consult the factory for operating temperature requirements beyond published range.

For Oil & Gas industry systems, Parker's operating temperature range is -40°F to 180°F (-40°C to 82°C) as established through Parker's New Technology Qualification program with DNV/GL. Additional details available upon request.

## Pipe Selection

Phastite for Pipe is used with standard commercially available schedule pipe throughout a wide range of schedules. However care must be taken to select the appropriate pipe. Factors such as pipe construction, grade, schedule, operating temperature and pressure requirements need to be considered. Refer to **Table 3** for Pipe Specifications below. Email the Tube Fitting Division (tfd.support@support.parker.com) to obtain the Phastite Design and Installation guide for additional guidelines on pipe condition. Use piping system rules/codes such as ASME, DNV/GL and API when applicable.

### Pipe Sizes, Schedules and Specifications

Phastite Size (NPS)	Phastite Size (ISO/DN)	Compatible Pipe Schedules
3/4"	20	40/Std, 80/XS, 160
1"	25	40/Std, 80/XS, 160, XXS/XXH
1 1/2"	38	40/Std, 80/XS, 160, XXS/XXH
2"	50	40/Std, 80/XS, 160, XXS/XXH

**Table 3 – Pipe Sizes and Schedules for Phastite Fittings**

### Pipe Specification

- ASTM A312/A312M Seamless and Welded Austenitic Stainless Steel Pipes, Grades: 304/304L, 316/316L, 317/317L, 321, and 347.
- Pipe must meet the dimensional (including ovality) requirements of ASTM A999/A999M – General Requirements for Alloy and Stainless Steel Pipe.
- Pipe to be fully annealed with maximum hardness of Rockwell HRB 90.
- Carbon steel pipes to ASTM A106B (ASME SA106) Uncoated.

## Testing and Approvals

Virtually every industrial and oil & gas performance requirement has been considered in the development and testing of Phastite. Phastite meets or exceeds SAE/ISO and ASTM F1387 performance requirements for mechanically attached fittings (MAFs), maintaining a fluid and gas-tight seal when subjected to an exhaustive battery of application-specific performance tests. Phastite also meets the requirements for ASME B31.1/B31.3 piping codes.

Additionally, Phastite has been specifically designed, tested and field validated to meet the specific demanding requirements of submerged/subsea, topside/offshore, and marine fluid power/hydraulic equipment and systems.

Phastite has successfully passed a comprehensive battery of tests as part of rigorous qualification program – DNV/GL Qualification of New Technology – DNVGL-RP-A203.



This mitigation-based qualification process exceeds typical performance requirements for MAFs. As a result, Phastite is approved for high-integrity pressure piping system and general purpose/conveyance piping systems.

Many tests and analyses were executed during the qualification of Phastite fittings. Specific Oil & Gas industry testing included, but not limited to:

- Hydrostatic Burst Test
- Cyclic Pressure Loading / Impulse
- Water Hammer
- Corrosion Testing
  - Stress Corrosion Cracking Testing
  - Crevice and Pitting Corrosion Testing
  - Hydrogen Induced Stress Cracking (HISC)
- External Pressure Testing / Ingression and Collapse Resistance (aka hyperbaric testing)
- Fire Test
- Flexural/Bending Test
- Torsion Test
- Tension/Pull Out Resistance Test
- Vibration Testing

Consult Parker Phastite Test Results Summary for additional information regarding the test plan and test results.

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## The Parker Advantage

- Qualified and tested for high-pressure piping systems up to 10,000 psi/68 Mpa
- Qualified and tested for submerged/subsea depths of 15,000 ft (4500m)
- Fabrication in minutes, regardless of schedule or fitting pressure class with simple hydraulic powered tool without special pipe preparation
- Eliminates pipe welding steps: prep, gapping, tacking, visual inspection, non destructive examination (NDE), cool time, grinding, clean-up, and pickle-passivate
- No hot works permitting, firewatch, safety plan, welding PPE, and hazardous weld fumes
- Available in a broad range of configurations, including several flange/service break options
- All metallic sealing, no supplemental/hidden seals
- Constructed from heat code traceable stainless steel
- Utilizes standard pipe, sizes 3/4"-2" (ISO DN20-DN50) with a wide range of standard pipe schedules
- Extensively designed, tested, and validated through DNVGL Technology Qualification Program, DNV-RP-A203
- Subjected to industry and application specific performance tests such as fire test, hyperbaric/collapse resistance, and numerous corrosion tests
- Highly corrosion resistant



## Hydraulic 4-Bolt Flange Introduction

A primary connection used in the industrial and energy segments for fluid power piping is the 4-bolt flange system. 4-bolt flange connections provide the ability to connect larger piping systems at reasonable assembly torques and are well suited for tight quarters where wrench clearances are limited. These industry standard connectors conforming to SAE J518/ISO 6162 provide high pressure connectivity to pipes, tubes and hose connections and are available from 1/2" to 5" flange sizes (DN13-DN127).

Parker Dual Seal Flanges, commonly referred to as "Seal Sub" flanges, provide increased operating pressure capabilities and resistance to loosening due to the integration of an "in-port" radial seal. Dual Seal Flanges utilize industry standard SAE J518-2/ISO 6162-2 (Code 62) bolts, bolt pattern and flange clamps and provide a dynamic operating pressure capability of 7500 psi/52Mpa.

Traditional 4-bolt hydraulic flanges are butt welded or socket welded to pipe. Parker's Phastite **non-welded** piping system utilizes both SAE 61/62 and Dual Seal/Seal Sub 4-bolt hydraulic flanges as proven, leak-free connection technologies. These key flange components enable piping systems to be fabricated and constructed with a high degree of flexibility while maintaining the advantages of a **non-welded** system.

This catalog also includes an offering of 4-bolt hydraulic flanges, blocks and flange adapters aligned with the Phastite size range.

**A comprehensive Parker 4-bolt flange product line offering is available in Catalog 4300.**

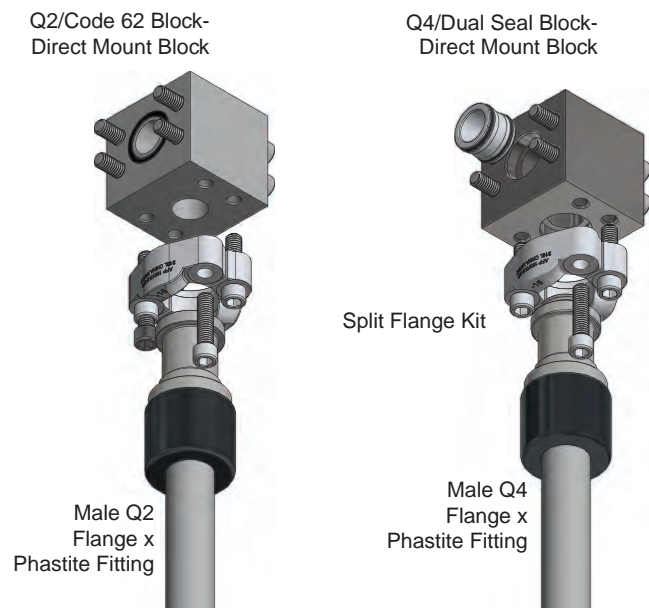


Fig. 5 – Phastite Fittings with 4-Bolt Flange Connections

## Flange Options

**Phastite Connectors** – Direct integration of C61/C62 flanges

**Junction Block Elbows and Tees** – Solid block construction elbows and tee blocks are used to connect 4-bolt hydraulic flanges. Elbow and tee blocks can be threaded to accept an o-ring flange (flat face) or include an o-ring face designed to be direct port mounted (o-ring face).

**Connector & Spacer Plates** – Used to connect two split flange faces, can be threaded or non-threaded.

**Plugs and Blind Flanges** – Provide a means to block off or terminate flow through flanges.

**Split Flange Clamps** – Split flange clamps are used for providing the holding power to the 4-bolt flange connection. Split Flange Clamps are available with UNC and metric bolting kits and can also be ordered with tapped or clearance holes.

**Split Flange Adapters** – Split flange adapters enable the connection of a traditional threaded connector (e.g. – 37° Flare) to be connected to 4-bolt flange.

## 4-Bolt Flange Nomenclature

Parker's 4-Bolt Hydraulic Flange component utilize a base nomenclature coding system as follows.

**Q1** – SAE J518 / ISO 6162-1, Code 61

**Q2** – SAE J518 / ISO 6162-2, Code 62

**Q4** – Parker Dual Seal/Seal Sub, Code 62 bolting pattern

A nomenclature configurator identifying part numbers, is located in the How to Order section.

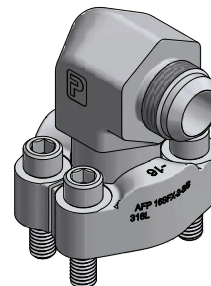


Fig. 6 – Split Flange 90° Adapter and Split Flange Kit

## How SAE/ISO Flange Connections Work

The 4-bolt flange is a proven leak-free connection technology and has achieved worldwide acceptance. The connection's success is its simplicity. It utilizes static face seal design featuring a high durometer o-ring with flange clamps and bolts providing the mechanical holding power.

Refer to **Figure 7** to see how 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 and resilient soft seal. A slight metal-to-metal contact at the outer face of the flange with the port face keeps the seal from extruding under high pressure. This metal-to-metal contact is maintained by the constant and evenly distributed clamping force provided by the flange. The clamping force is provided from the torque applied to the bolts.

This simple design provides several advantages over threaded port and fitting connections, namely:

- Large size tube/pipe connections (up to 5" / DN127)
- Lower tightening torque required from four bolts compared to that required for an equivalent sized threaded connector
- Lower torque allows for use of smaller wrenches/wrench swing clearances - providing easier assembly in tight quarters
- Up to 6000 psi (42 Mpa) dynamic operating pressure for SAE/ISO Code 62
- Ease of disassembly through use of split flange clamps

The connection does have minor disadvantages – additional components and the requirement for a larger footprint (area) compared to threaded tube/port connections.

## Assembly and Installation

Refer to the Assembly Section for assembly and installation instructions for Hydraulic Flanges.

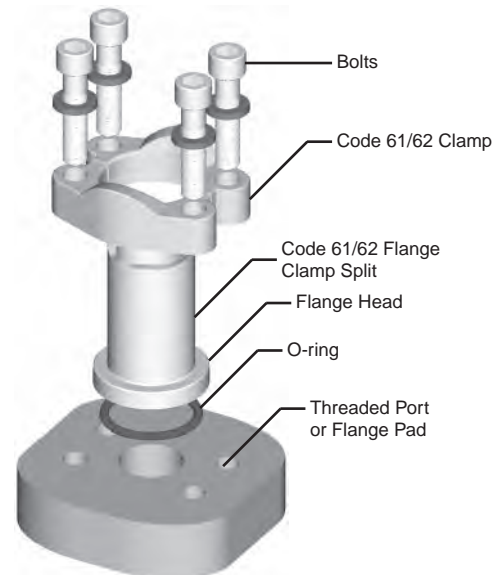


Fig. 7 – SAE 4-Bolt Flange Connection

## 4-Bolt Flange Fitting Materials

HYDRAULIC FLANGES	STAINLESS STEEL	
	MATERIAL/SPEC	TYPE
SAE C61 Flange Clamps	A182	F316/316L
SAE C62 Flange Clamps	A182	F316/316L
4-Bolt SAE Flanges/Blocks	A182	F316/316L
Weld & Braze Fittings/Flanges	A182	F316/316L
Flange Adapters	A182	F316/316L
HHCS Bolts	ASTM F593 ASME B18.2.1	18-8 (304)
SHCS Bolts	ASTM A574 ASME B18.3	18-8 (304)
SAE O-Ring	90 Durometer/NBR	

Table 4 – Materials for SAE/ISO and Dual Seal 4-Bolt Flanges

## Dual Seal/Seal Sub 4-Bolt Flanges

Parker's Dual Seal flanges provide an improved solution to 4-bolt flanges especially where high vibration and shock/water hammer loading may reduce the reliability of standard SAE/ISO Code 62 4-bolt flange connections. **Dual Seal flanges, known as Seal Sub flanges, are the preferred subsea fluid power 4-bolt flange connection technology for the oil & gas segment.**

Parker Dual Seal flanges provide increased operating pressure capabilities and resistance to leakage due to the integration of an "in-port" radial seal. This radial seal as illustrated in **Figure 8** provides improved port retention, increased sealing capability, sealing redundancy, and elimination of costly downtime due to field failures. Additionally, ingress of air or water caused by side loading of a traditional flange connection is eliminated.

Similar to Phastite fittings, Parker's dual/seal sub flange system is tested and qualified for subsea service. Dual Seal flanges are approved for depths of 20,000 ft (6000m) at full operating pressure.

## Design and Construction

Dual Seal flanges are available in 1/2", 1", 1 1/2", 2", and 1 1/4 x 1" (20 x 16 reducer flange) sizes. Dual Seal Flanges utilize an industry standard SAE J518-2/ISO 6162-2 (Code 62) UNC bolt thread and bolt pattern dimensions, and have an operating pressure capability of 7500 psi/52Mpa with a 4:1 design factor.

The Dual Seal male flange head incorporates a distinct pilot housing the radial seal o-ring as illustrated in **Figure 8**. The components of a male flange head include the flange head, a face seal o-ring, and a radial seal o-ring. **It is important to note that while the bolting pattern is identical to that of SAE J518-2/ISO 6162-2 (Code 62), the face seal o-rings are not the same. Consult the O-Ring Section on Page 40 for details.**

The fitting bodies are manufactured from mill traceable 316/316L stainless steel. Materials used in the manufacture of Parker Dual Seal products are compliant to NACE MR0175.

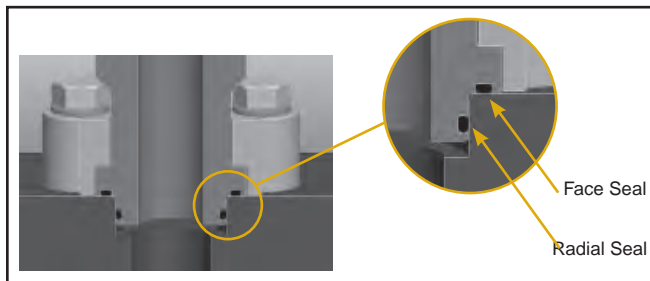


Fig. 8 – Section View of Dual Seal Connection

## How Dual Seal Flanges Work

The radial seal of the Dual Seal flange connection increases the pressure capabilities to 7500 psi (52 MPa). The traditional face seal provides resistance to external pressures introduced by the application environment, such as subsea ingress. Similar to traditional SAE Flanges, the flange clamps and bolts are used to compress the o-rings into the port and provide the clamping force required to retain a leak-tight connection.

## Dual Seal/Seal Sub Floating Insert

In addition to utilizing the male Dual Seal flange head, an optional "floating" Dual Seal insert is used to connect mating female-to-female Dual Seal port connections. This type of connection relies **only upon** the radial seal and maintains the full operating pressure capability of the connection.

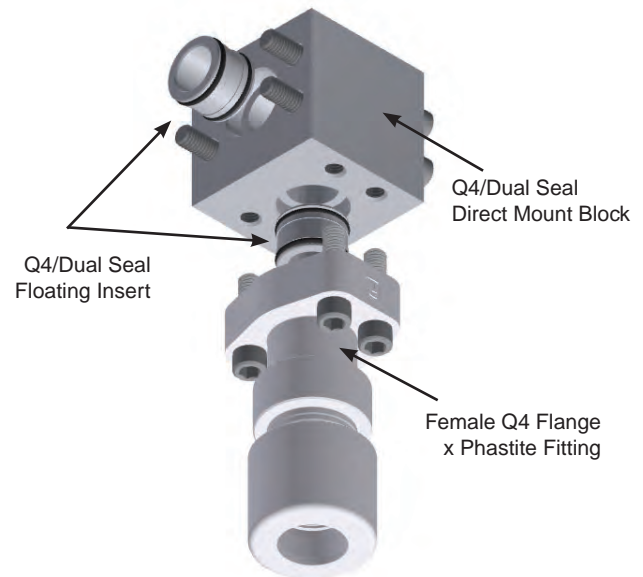


Fig. 9– Dual Seal Floating Insert

## Dual Seal Flange Availability

Parker Dual Seal Flange products are available in these common configurations as standard:

- **Phastite** – Direct integration of Dual Seal Flanges to Phastite non-welded piping connectors
- **Male Split Flange Adapters** – Dual Seal x: Male NPT, Female NPT, 37° Flare, O-Ring Face Seal
- **Socket Weld Adapter** – Dual Seal x 6000# socket weld adapter
- **Connectors, Junction Block Elbows & Tees**
- **Plugs, Blind Flanges and Custom Configurations**
- **Floating Seal Sub Inserts**



Fig. 10 – Partial Dual Seal Product Offering

## The Parker Advantage

**Increased Pressure Rating:** 7500 psi/52 MPa. Tested to SAE and ISO performance requirements including SAE J1644.

**Radial Seal:** The primary radial seal improves not only the operating pressure capabilities but also provides additional resistance to connection loosening. It also improves performance in impulse/water hammer and high vibration applications.

**Subsea Tested/Rated:** Parker Dual Seal flange system is qualified and tested at full pressure in submerged/subsea depths of 20,000 ft (6000m)

**Redundant Face Seal:** The face seal now serves as a redundant seal and provides a barrier to air and water ingress, specifically in subsea service.

**Proven and Preferred:** Parker Dual Seal/Seal Sub flange system is the preferred and proven fluid power flange connection system for reliable subsea/submerged performance.

**Captive O-Ring Groove:** Parker's face seal groove incorporates a captive o-ring groove (CORG) design preventing o-ring fallout during installation.

**Broad Offering:** Parker's Dual Seal flange connection is fully integrated into the Phastite non-welded piping system, a comprehensive line of flange adapters and connecting blocks.

## How to Order — Phastite for Pipe

Box 1	Box 2	Box 3	Box 4	Box 5	Box 6
Phastite Series	Phastite Pipe Size	Pipe and Flange Size or SAE Dash Size	End 2 Configuration (Flange or Threaded End)	Fitting Body Shape	Material Designator
Box 1	Box 2	Box 3	Box 4	Box 5	Box 6
Series	Series	Series	Configuration	Shape	Material Designator
PH = Phastite for Pipe	Phastite Pipe Size	Phastite Pipe Size	Male Split Flange Connections	Body Shape	SS = 316SS body + 2205SS duplex collar
	12P = 3/4"	12P = 3/4"	Q10 = SAE/ISO Male Code 61 Split Flange	CAP = Cap	
	16P = 1"	16P = 1"	Q20 = SAE/ISO Male Code 62 Split Flange	CS = Coupling Straight	
	24P = 1 1/2"	24P = 1 1/2"	Q40 = Dual Seal/Seal Sub Male Split Flange	E90 = 90° Elbow	
	32P = 2"	32P = 2"		FS = Female Straight	
			Female Split Flange Connections	MS = Male Straight	
		SAE Dash Size or Flange Size	Q1P = SAE/ISO Code 61 Female Threaded Service Break Flange		
		8 = 1/2"	Q2P = SAE/ISO Code 62 Female Threaded Service Break Flange		
		10 = 5/8"	Q4P = Female Dual Seal/Seal Sub Threaded Service Break Flange		
		12 = 3/4"	Q4B = Female Dual Seal/Seal Sub Service Break/Port Flange		
		16 = 1"			
		2016 = 20-16 Dual Seal	<b>Box 4 (End 2) Custom Configurations - Consult Factory</b>		
		20 = 1 1/4"	<i>X = Triple-Lok Male 37° Flare</i>		
		24 = 1 1/2"	<i>XO = Triple-Lok 2 Male 37° Flare w/ O-Ring</i>		
		32 = 2"	<i>X6 = Triple-Lok Female 37° Swivel</i>		
			<i>F = Female NPT</i>		
			<i>G = Female NPT</i>		
			<i>F50 = Male Non-Adjustable O-Ring Boss Stud</i>		
			<i>LO = Male Seal-Lok / ORFS</i>		
			<i>L6 = Female Seal-Lok / ORFS Swivel</i>		
			<i>W7 = 6000# Socket Weld</i>		
			<i>*A165-xxx = B16.5 ANSI Flange</i>		
			<b>BLANK = COUPLING or CAP</b>		

\*A165 = ANSI B16.5 Flange  
 xxx= flange class 600, 1500, 2500  
 Other flange pressure classes available upon request

### Phastite fitting nomenclature examples

Box 1	Box 2	Box 3 - Size	Box 4 - Configuration	Box 5	Box 6	Final Phastite Part
PH	16P	16	Q40	MS	SS	PH-16P-16Q40-MS-SS
PH	24P			CS	SS	PH-24P-CS-SS
PH	32P	CAP			SS	PH-32P-CAP-SS
PH	16P	12		CS	SS	PH-16P-12P-CS-SS
PH	24P	32	Q20	MS	SS	PH-24P-32Q20-MS-SS
PH	16P	2016	Q40	MS	SS	PH-16P-2016Q40-MS-SS
PH	16P	16	Q4B	E90	SS	PH-16P-16Q4B-E90-SS
PH	24P	20	XO	MS	SS	PH-24P-20XO-MS-SS
PH	16P	16	Q4B	FS	SS	PH-16P-16Q4B-FS-SS
PH	24P	24	Q2P	FS	SS	PH-24P-24Q2P-FS-SS
PH	24P	24	A165-600	MS	SS	PH-24P-24A165-600-MS-SS

**Note:**

Not all sizes and configurations are standard from stock.  
 90° Phastite elbow fittings available up to 1 1/2"  
 Consult factory for sizes and configurations not illustrated in product tables

## How to Order – SAE and Dual Seal/Seal Sub Flange Blocks

Box 1	Box 2	Box 3	Box 4	Box 5	Box 6
Connection Size	Connection Type	Shape	Flange Connection Type	Mounting Style	Material

Box 1 - Connection Size		Box 2 - Port/Pipe/Flange Connection Type		Box 3 - Shape	
Symbol	Size	Symbol	Description	Symbol	Description
one to three digit code depending on shape and size combinations*	SAE Dash Size (Size in inches x 16)	None	Union	None	Straight
	4 = 1/4"	B3	Braze Socket — clearance silver braze	E	Elbow 90
	6 = 3/8"	G	NPTF Port	H	Straight Union
	8 = 1/2"	G3	BSPT Port	J	Tee
	10 = 5/8"	G4	BSPP Flat Face Port		
	12 = 3/4"	Q1BO	Code 61 Flange Direct Mount with O-Ring and Drilled Mounting Holes		
	16 = 1"	Q1P	Code 61 Flange Flat Face Port with UNC Tapped Mounting Holes		
	2016 = 1 1/4" x 1" **	Q2BO	Code 62 Flange Direct Mount with O-Ring and Drilled Mounting Holes		
	20 = 1 1/4"	Q2P	Code 62 Flange Flat Face Port with UNC Tapped Mounting Holes		
	24 = 1 1/2"	Q4B	Dual Seal (Seal Sub) Direct Mount with Drilled Mounting Holes		
	32 = 2"	Q4P	Dual Seal (Seal Sub) Port with UNC Tapped Mounting Holes		
		SP	Spacer no Gage Ports		
		SPG	Spacer with 1/4-18 NPTF Gage Port		
	SPG5	Spacer with -4 SAE ORB (7/16-20 UNF) Gage Port			
	SPGG5	Spacer with 1/4-18 NPTF & -4 SAE ORB (7/16-20 UNF) Gage Ports			
	W4	Flat Weld Socket — Tube			
	W5	Flat Weld Socket — Pipe			
	W6	Extended Weld Socket — Tube			
	W7	Extended Weld Socket — Pipe			
	WB1	Weld Butt — Schedule 40			
	WB3	Weld Butt — Schedule 80			
	WB5	Weld Butt — Schedule 160			
	WB7	Weld Butt — Schedule XXS			

\*One code is required if end connections are the same size. Two or three codes are if they are different sizes (e.g., 16-12)

\*\* Only available with the Q4 Dual Seal connection.

Box 4 - Flange Connection Type	
Symbol	Description
Q1BO	Code 61 Flange Direct Mount with O-Ring and Drilled Mounting Holes
Q1P	Code 61 Flange Flat Face Port with UNC Tapped Mounting Holes
Q2BO	Code 62 Flange Direct Mount with O-Ring and Drilled Mounting Holes
Q2P	Code 62 Flange Flat Face Port with UNC Tapped Mounting Holes
Q4B	Dual Seal (Seal Sub) Direct Mount with Drilled Mounting Holes
Q4P	Dual Seal (Seal Sub) Port with UNC Tapped Mounting Holes




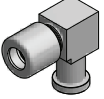
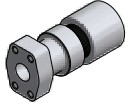
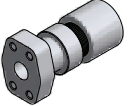
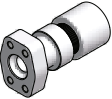

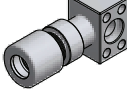



Box 5 - Mounting Style	
Symbol	Description
None	Inch Mounting Bolt Pattern
M	Metric Mounting Bolt Pattern

Box 6 - Material	
Symbol	Description
S	Steel, Zinc Plated (braze or weld parts are not plated)
SX	Steel, Oil Dipped
SS	Stainless Steel


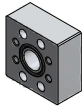
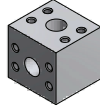
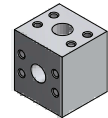

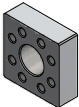
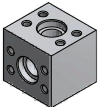
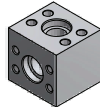
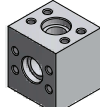
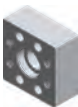
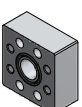
Example						
Connection Size	Connection Type	Shape	Flange Connection Type	Mounting Style	Material	Complete part number
24	G	E	Q2P		SS	24GEQ2PSS
16		H	Q2BO	M	SS	16HQ2PMSS
32-16	WB5		Q4P	M	SX	32-16WB5Q4PMSX
24-16-16	Q1BO	J	Q2PQ2P		S	24-16-16Q1BOJQ2PQ2PS

**Note:**  
Not all sizes and configurations are standard from stock.  
Consult factory for sizes and configurations not illustrated in product tables.

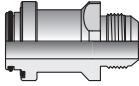

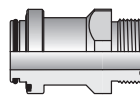

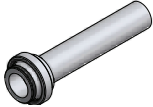

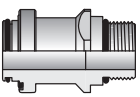
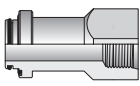
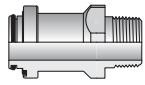
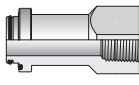
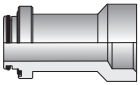
### Phastite Fittings

Couplings	<b>PH-P-CS</b> Phastite Coupling  17	<b>PH-P-E90</b> 90° Elbow Coupling  17	SAE /ISO Flange Connectors	<b>PH-P-Q10-MS</b> SAE/ISO Code 61 Flange  18	<b>PH-P-Q20-MS</b> SAE/ISO Code 62 Flange  18
	<b>PH-P-Q20-E90</b> SAE/ISO Code 62 90° Elbow  20	<b>PH-P-Q1P-FS</b> SAE/ISO Code 61 Service Break Flange  19		<b>PH-P-Q2P-FS</b> SAE/ISO Code 62 Service Break Flange  19	Dual Seal / Seal Sub Flange Connectors
<b>PH-P-Q4P-FS</b> Dual Seal Service Break Flange – Threaded  22	Dual Seal / Seal Sub Elbow Flange Connectors	<b>PH-P-Q40-E90</b> Dual Seal Flange 90° Elbow  22	<b>PH-P-Q4B-E90</b> Dual Seal Flange 90° Elbow Direct Mount  23	Threaded Connectors	
Phastite Equipment & Tooling		<b>Phastool 100</b>  48	<b>Tooling</b>  49		<b>Phastite Gauge</b> Pipe Marking & Sizing Gauges  49

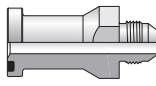

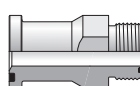


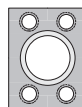
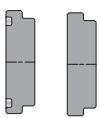
### 4-Bolt Hydraulic Flange Blocks

SAE/ISO Code 62 Flange Blocks	<b>HQ2P</b> SAE/ISO Code 62 Connector Plate  24	<b>Q2BOQ2P</b> SAE/ISO Code 62 Port Reducer  24	<b>EQ2P</b> SAE/ISO Code 62 Elbow  25	<b>JQ2P</b> SAE/ISO Code 62 Tee  25	<b>Q2BOEQ2P</b> SAE/ISO Code 62 Elbow Direct Mount  25	
	Dual Seal / Seal Sub Elbow Flange Blocks	<b>HQ4P</b> Dual Seal Connector Plate  26	<b>EQ4P</b> Dual Seal Elbow  26	<b>Q4BOEQ4P</b> Dual Seal Elbow Direct Mount  27	<b>JQ4P</b> Dual Seal Tee  27	
SAE ISO Code 62 x Dual Seal/ Seal Sub Conversion		<b>Q4BQ2P</b> Dual Seal x SAE/ISO C62 Flat Face  28	<b>Q2BOQ4P</b> SAE/ISO C62 O-Ring x Dual Seal Port  28			






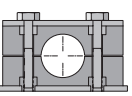
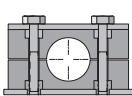
### Dual Seal/Seal Sub Adapters

<p><b>Dual Seal / Seal Sub Tube/Hose Adapters</b></p>	<p><b>XHQ40</b> Dual Seal x 37° Flare</p>  <p>29</p>	<p><b>XEQ40</b> Dual Seal x 37° Flare 90° Elbow</p>  <p>29</p>	<p><b>LOHQ40</b> Dual Seal x O-Ring Face Seal</p>  <p>29</p>	<p><b>Dual Seal / Seal Sub Port Adapters</b></p>	<p><b>Q4 Insert</b> Dual Seal Floating Insert</p>  <p>30</p>
<p><b>Q4OW3</b> Dual Seal Extender</p>  <p>30</p>	<p><b>PQ40</b> Dual Seal Port Plug</p>  <p>30</p>	<p><b>Dual Seal / Seal Sub ORB Port Adapters</b></p>	<p><b>F5OHQ40</b> Dual Seal x Male SAE-ORB</p>  <p>31</p>	<p><b>G5HQ40</b> Dual Seal x Female SAE-ORB</p>  <p>31</p>	<p><b>Dual Seal / Seal Sub NPT Adapters</b></p>
<p><b>FHQ40</b> Dual Seal x Male Pipe/NPTF</p>  <p>32</p>	<p><b>GHQ40</b> Dual Seal x Female Pipe/NPTF</p>  <p>32</p>	<p><b>Dual Seal / Seal Sub 6000# Socket Weld Pipe</b></p>	<p><b>W7HQ40</b> Dual Seal x 6000 # Socket Weld Pipe</p>  <p>32</p>		

### SAE/ISO Code 61/62 Flanges and Adapters

<p><b>JIC/37° Flare x SAE Code 61/62</b></p>	<p><b>XHQ1/XHQ2</b> SAE Code 61/62 x 37° Flare - Straight</p>  <p>33</p>	<p><b>XEQ1/XEQ2</b> SAE Code 61/62 x 37° Flare - 90° Elbow</p>  <p>34</p>	<p><b>ORFS x SAE Code 61/62</b></p>	<p><b>LOHQ1/Q2</b> SAE Code 61/62 x ORFS - Straight</p>  <p>35</p>	<p><b>LOEQ1/Q2</b> SAE Code 62 x ORFS X 90° Elbow</p>  <p>36</p>
<p><b>SAE/ISO Code 62 Connector Plate</b></p>	<p><b>CP2-1/8 LG</b> SAE/ISO Code 62 Connector Plate</p>  <p>37</p>	<p><b>SAE/ISO Blind Flange &amp; Plugs</b></p>	<p><b>PQB/PQP</b> SAE/ISO Code 61/62 Blind Flange</p>  <p>38</p>	<p><b>PQ/PQN</b> SAE/ISO Code 61/62 Flange Head Plug</p>  <p>38</p>	

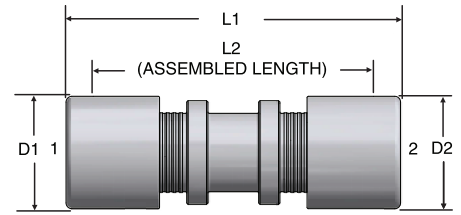
### Flanges, Hardware, O-Rings & Clamps

<p><b>SAE Split Flanges</b></p>	<p><b>FCS1/FCS2</b> SAE/ISO Code 61/62 Split Flanges &amp; Kit</p>  <p>39</p>	<p><b>O-Rings &amp; Seals</b></p>	<p><b>SAE 4-Bolt Flange O-Ring</b></p>  <p>40</p>	<p><b>Dual Seal Seal Sub Flange Head O-Ring</b></p>  <p>40</p>	<p><b>Dual Seal Seal Sub Radial Seal O-Ring</b></p>  <p>40</p>
<p><b>SAE Flange Fasteners &amp; Assy Torque</b></p>	<p><b>Fasteners</b> Bolting Chart for 4-bolt Flange Pairings</p>  <p>43</p>	<p><b>Pipe Clamps</b></p>	<p><b>Pipe Clamps Heavy Series</b></p>  <p>41</p>	<p><b>Hose Clamps Heavy Series Inside Smooth</b></p>  <p>41</p>	



## PH-P-CS

### Phastite Coupling

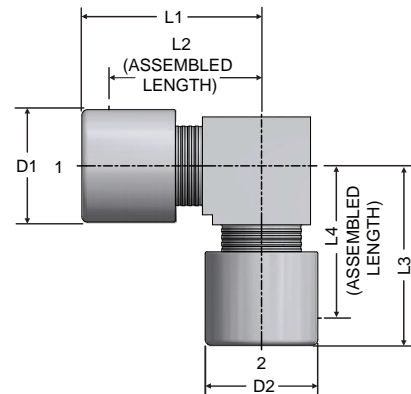


TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	COLLAR 1 D1 (in)	COLLAR 2 D2 (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)						DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-CSSS	3/4	3/4	6.44	5.52	1.93	1.93	3.06	6,000	10,000	42	70
PH-16P-CSSS	1	1	7.25	6.07	2.44	2.44	5.40	6,000	10,000	42	70
PH-16P-12P-CSSS	1	3/4	6.85	5.80	2.44	1.93	4.55	6,000	10,000	42	70
PH-24P-CSSS	1 1/2	1 1/2	9.33	7.35	3.35	3.35	12.35	6,000	10,000	42	70
PH-24P-16P-CSSS	1 1/2	1	8.33	6.75	3.35	2.44	10.82	6,000	10,000	42	70
PH-32P-CSSS	2	2	12.16	9.36	4.10	4.10	23.33	6,000	10,000	42	70
PH-32P-24P-CSSS	2	1 1/2	10.93	8.54	4.10	3.35	20.10	6,000	10,000	42	70

Additional sizes available upon request

## PH-P-E90

### Phastite 90° Degree Elbow



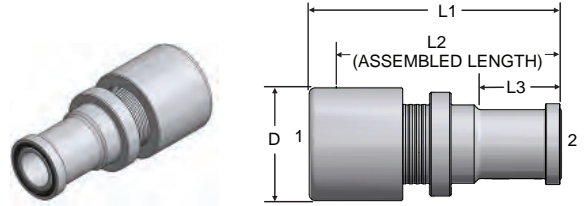
TUBE FITTING PART #	END SIZE		L1 (in)	L2 (in)	L3 (in)	L4 (in)	COLLAR DIA D1 (in)	COLLAR DIA D2 (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)								DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-E90SS	3/4	3/4	3.26	2.80	3.26	2.80	1.93	1.93	3.14	6,000	10,000	42	70
PH-16P-E90SS	1	1	3.89	3.30	3.89	3.30	2.44	2.44	6.77	6,000	10,000	42	70
PH-16P-12P-E90SS	1	3/4	3.89	3.30	3.51	3.05	2.44	1.93	6.74	6,000	10,000	42	70
PH-24P-16P-E90SS	1 1/2	1	5.38	4.39	4.37	3.78	3.35	2.44	14.42	6,000	10,000	42	70
PH-24P-E90SS	1 1/2	1 1/2	5.38	4.39	5.38	4.39	3.35	3.35	14.88	6,000	10,000	42	70

Additional sizes available upon request

Dimensions provided for reference only, subject to change

# PH-P-Q10-MS

## Phastite x SAE/ISO Code 61 Split Flange Connector

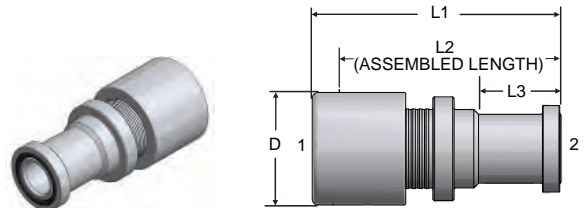


TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	CODE 61 LENGTH L3 (in)	COLLAR Dia D (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)						DYNAMIC	DYNAMIC
PH-12P-12Q10-MSSS	3/4	3/4	4.13	3.67	1.50	1.93	1.72	5,100	35
PH-12P-16Q10-MSSS	3/4	1	4.44	3.98	1.76	1.93	1.72	4,600	32
PH-16P-16Q10-MSSS	1	1	5.43	4.84	1.76	2.44	3.19	4,600	32
PH-16P-20Q10-MSSS	1	1 1/4	4.83	4.24	1.76	2.44	2.96	4,100	28
PH-16P-24Q10-MSSS	1	1 1/2	5.37	4.78	2.30	2.44	3.52	3,000	21
PH-24P-20Q10-MSSS	1 1/2	1 1/4	6.74	5.75	1.76	3.35	6.89	4,100	28
PH-24P-24Q10-MSSS	1 1/2	1 1/2	7.14	6.15	2.30	3.35	7.34	3,000	21
PH-24P-32Q10-MSSS	1 1/2	2	7.06	6.07	2.95	3.35	8.34	3,000	21
PH-32P-24Q10-MSSS	2	1 1/2	8.61	7.14	2.30	4.10	12.71	3,000	21
PH-32P-32Q10-MSSS	2	2	8.48	7.08	2.95	4.10	13.25	3,000	21

Includes Standard O-Ring Compound – 90 Durometer NBR  
 Additional sizes available upon request

# PH-P-Q20-MS

## Phastite x SAE/ISO Code 62 Split Flange Connector



TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	CODE 62 LENGTH L3 (in)	COLLAR Dia D (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)						DYNAMIC	DYNAMIC
PH-12P-12Q20-MSSS	3/4	3/4	4.62	4.16	1.42	1.93	1.72	6,000	42
PH-12P-16Q20-MSSS	3/4	1	4.10	3.64	1.76	1.93	1.72	6,000	42
PH-16P-16Q20-MSSS	1	1	5.36	4.77	1.76	2.44	3.19	6,000	42
PH-16P-20Q20-MSSS	1	1 1/4	4.83	4.24	1.76	2.44	2.96	6,000	42
PH-16P-24Q20-MSSS	1	1 1/2	5.37	4.79	2.30	2.44	3.52	6,000	42
PH-24P-20Q20-MSSS	1 1/2	1 1/4	6.60	5.61	1.76	3.35	6.89	6,000	42
PH-24P-24Q20-MSSS	1 1/2	1 1/2	7.12	6.14	2.30	3.35	7.34	6,000	42
PH-24P-32Q20-MSSS	1 1/2	2	7.07	6.08	2.95	3.35	8.34	6,000	42
PH-32P-24Q20-MSSS	2	1 1/2	8.87	7.47	2.30	4.10	12.71	6,000	42
PH-32P-32Q20-MSSS	2	2	8.48	7.08	2.95	4.10	13.25	6,000	42

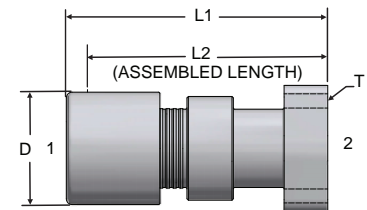
Includes Standard O-Ring Compound – 90 Durometer NBR  
 Additional sizes available upon request

Dimensions provided for reference only, subject to change

## PH-P-Q1P-FS

### Phastite x SAE/ISO Code 61 Threaded Service Break Flange

Flat Face Threaded Service Break Connection



TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	COLLAR DIA D (in)	FLANGE THREAD T (UNC-2B)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)						DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-12Q1P-FSSS	3/4	3/4	5.09	4.63	1.93	3/8 - 16	2.88	5,100	5,100	53	53
PH-16P-16Q1P-FSSS	1	1	5.66	5.07	2.44	3/8 - 16	4.57	4,600	4,600	32	32
PH-16P-20Q1P-FSSS	1	1 1/4	5.72	5.13	2.44	7/16 - 14	5.16	4,100	4,100	28	28
PH-24P-24Q1P-FSSS	1 1/2	1 1/2	6.04	5.05	3.35	1/2 - 13	8.96	3,000	3,000	21	21

Jump sizes available upon request

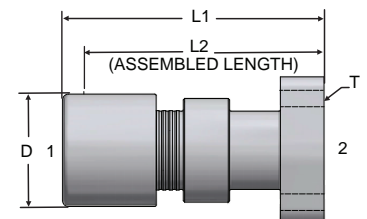
Available with metric threads to ISO 6162-1 upon request

Not available in 2" (32P)

## PH-P-Q2P-FS

### Phastite x SAE/ISO Code 62 Threaded Service Break Flange

Flat Face Threaded Service Break Connection



TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	COLLAR DIA D (in)	FLANGE THREAD T (UNC-2B)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)						DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-12Q2P-FSSS	3/4	3/4	5.09	4.63	1.93	3/8 - 16	3.09	6,000	10,000	42	70
PH-16P-16Q2P-FSSS	1	1	5.66	5.07	2.44	7/16 - 14	5.04	6,000	10,000	42	70
PH-16P-20Q2P-FSSS	1 1/4	1 1/4	5.72	5.13	2.44	1/2 - 13	5.57	6,000	10,000	42	70
PH-24P-24Q2P-FSSS	1 1/2	1 1/2	6.04	5.05	3.35	5/8 - 11	10.06	6,000	10,000	42	70

Jump sizes available upon request or consult HQ2P junction blocks

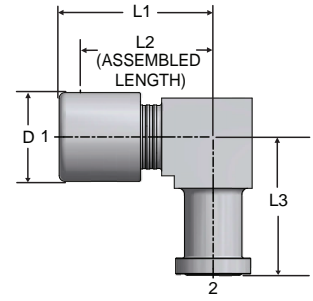
Not available in 2" (32P)

Available with metric threads to ISO 6162-2 upon request

Dimensions provided for reference only, subject to change

# PH-P-Q20-E90

Phastite x SAE/ISO Code 62 Split Flange Connector, 90° Elbow



TUBE FITTING PART #	END SIZE		L1 (in)	ASSEMBLED L2 (in)	L3 (in)	COLLAR DIA D (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)						DYNAMIC	DYNAMIC
PH-12P-12Q20-E90SS	3/4	3/4	3.34	2.88	2.98	1.93	3.10	6,000	42
PH-12P-16Q20-E90SS	3/4	1	3.34	2.88	2.98	1.93	3.94	6,000	42
PH-16P-16Q20-E90SS	1	1	3.73	3.14	3.35	2.44	4.82	6,000	42
PH-16P-20Q20-E90SS	1	1 1/4	3.97	3.38	3.63	2.44	6.01	6,000	42
PH-24P-24Q20-E90SS	1 1/2	1 1/2	5.37	4.38	4.70	3.35	11.38	6,000	42

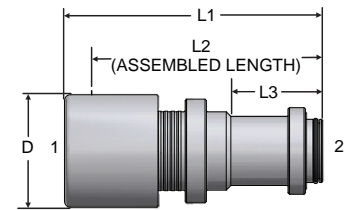
Includes Standard O-Ring Compound – 90 Durometer NBR  
 Additional sizes available upon request

SAE/ISO Code 61 (PH-XXP-Q10-E90) available upon request

Dimensions provided for reference only, subject to change

# PH-P-Q4O-MS

## Phastite Dual Seal/Seal Sub Split Flange Connector

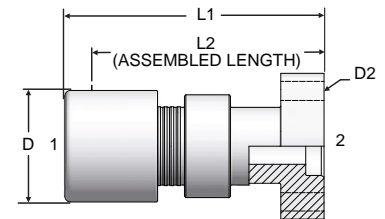


TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	DUAL SEAL LENGTH L3 (in)	COLLAR DIA D (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)						DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-8Q4O-MSSS	3/4	1/2	5.07	4.61	1.96	1.93	1.80	6,000	10,000	42	70
PH-12P-16Q4O-MSSS	3/4	1	4.66	4.20	1.99	1.93	2.21	6,000	10,000	42	70
PH-16P-16Q4O-MSSS	1	1	5.59	5.01	1.99	2.44	3.40	6,000	10,000	42	70
PH-16P-2016Q4O-MSSS	1	1 1/4 x 1	5.80	5.21	2.73	2.44	3.59	6,000	10,000	42	70
PH-16P-24Q4O-MSSS	1	1 1/2	5.45	4.87	2.38	2.44	3.97	6,000	10,000	42	70
PH-24P-16Q4O-MSSS	1 1/2	1	7.29	6.30	1.99	3.35	7.44	6,000	10,000	42	70
PH-24P-24Q4O-MSSS	1 1/2	1 1/2	7.20	6.22	2.38	3.35	7.66	6,000	10,000	42	70
PH-32P-24Q4O-MSSS	2	1 1/2	9.65	8.25	3.16	4.10	12.81	6,000	10,000	42	70
PH-32P-32Q4O-MSSS	2	2	9.65	8.25	3.47	4.10	14.14	6,000	10,000	42	70

Includes Standard O-Ring Compounds – 90 Durometer NBR  
 Additional sizes available upon request

# PH-P-Q4B-FS

## Phastite x Dual Seal Service Break & Port Flange Clearance Hole



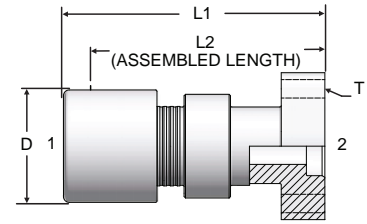
TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	COLLAR DIA D (in)	BOLT CLEARANCE HOLE D2 (in)	BOLTING SHCS (UNC-2A)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)							DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-8Q4B-FSSS	3/4	1/2	5.09	4.63	1.93	0.35	5/16 X 1.25	2.57	6,000	10,000	42	70
PH-16P-16Q4B-FSSS	1	1	5.66	5.07	2.44	0.47	7/16 X 1.75	4.95	6,000	10,000	42	70
PH-16P-2016Q4B-FSSS	1	1 1/4 x 1	5.72	5.13	2.44	0.52	1/2 X 1.75	5.48	6,000	10,000	42	70

Includes Standard O-Ring Compounds – 90 Durometer NBR  
 Additional sizes available upon request

Dimensions provided for reference only, subject to change

# PH-P-Q4P-FS

Phastite x Dual Seal/Seal Sub Service Break Flange  
UNC Threaded

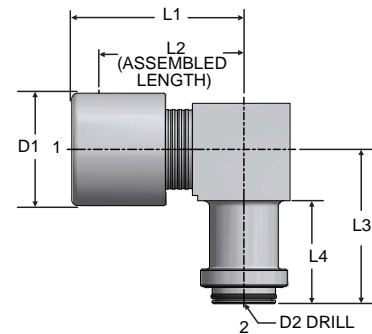


TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	COLLAR DIA D (in)	FLANGE THREAD T (UNC-2B)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)						DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-8Q4P-FSSS	3/4	1/2	5.09	4.63	1.93	5/16 - 18	2.57	6,000	10,000	42	70
PH-16P-16Q4P-FSSS	1	1	5.66	5.07	2.44	7/16 - 14	4.95	6,000	10,000	42	70
PH-16P-2016Q4P-FSSS	1	1 1/4 x 1	5.72	5.13	2.44	1/2 - 13	5.48	6,000	10,000	42	70
PH-24P-24Q4P-FSSS	1 1/2	1 1/2	6.04	5.05	3.35	5/8 - 11	9.91	6,000	10,000	42	70

Dual Seal/Seal Sub floating inserts (Q4 INSERT-SS) available on **page 30**.  
Additional sizes available upon request

# PH-P-Q4O-E90

Phastite x Dual Seal/Seal Sub Split Flange  
90° Elbow



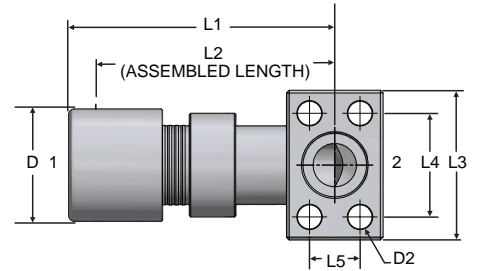
TUBE FITTING PART #	END SIZE		L1 (in)	ASSEMBLED L2 (in)	L3 (in)	DUAL SEAL LENGTH L4 (in)	COLLAR DIA D1 (in)	DRILL D2 (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)								DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-8Q4O-E90SS	3/4	1/2	3.26	2.80	2.97	1.94	1.93	0.50	1.83	6,000	10,000	42	70
PH-16P-16Q4O-E90SS	1	1	3.73	3.38	3.35	2.24	2.44	0.94	4.87	6,000	10,000	42	70
PH-16P-2016Q4O-E90SS	1	1 1/4 x 1	3.97	3.38	3.63	2.24	2.44	0.94	6.50	6,000	10,000	42	70
PH-24P-24Q4O-E90SS	1 1/2	1 1/2	5.37	4.38	4.20	2.44	3.35	1.38	11.41	6,000	10,000	42	70

Includes Standard O-Ring Compounds – 90 Durometer NBR

Dimensions provided for reference only, subject to change

# PH-P-Q4B-E90

Phastite x Dual Seal Flange Direct Mount  
90° Elbow

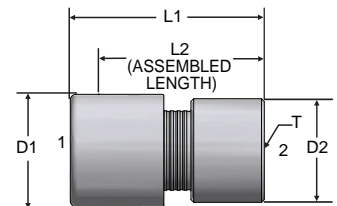


TUBE FITTING PART #	END SIZE		L1 (in)	ASSEMBLED L2 (in)	L3 (in)	L4 (in)	L5 (in)	COLLAR DIA D (in)	BOLT CLEARANCE HOLE D2 (in)	DIRECT MOUNT BOLTING SHCS (UNC-2A)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)										DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-8Q4B-E90SS	3/4	1/2	4.96	4.50	2.25	1.59	0.72	1.93	0.35	5/16 X 2.75	2.62	6,000	10,000	42	70
PH-16P-16Q4B-E90SS	1	1	4.13	1.23	3.25	2.25	1.09	2.44	0.47	7/16 X 3.25	6.94	6,000	10,000	42	70
PH-16P-2016Q4B-E90SS	1	1 1/4 X 1	5.92	5.33	3.49	2.62	1.25	2.44	0.52	1/2 X 3.25	8.01	6,000	10,000	42	70

Dual Seal/Seal Sub floating inserts (Q4 INSERT-SS) available on page 30.  
Direct mount SAE Code 61 & 62 fittings available upon request

# PH-P-G5-FS

Phastite x Female SAE O-Ring Boss  
(SAE J1926-1/ISO 11926-1)



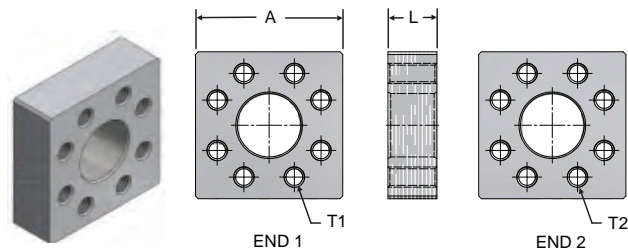
TUBE FITTING PART #	END SIZE		OAL L1 (in)	OAL ASSEMBLED L2 (in)	COLLAR DIA D1 (in)	BODY DIA D2 (in)	SAE PORT THREAD T (UN-2B)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)							DYNAMIC	STATIC	DYNAMIC	STATIC
PH-12P-12G5-FSSS	3/4	3/4	3.81	3.35	1.93	1.88	1 1/16-12	2.03	4,500		31	
PH-16P-16G5-FSSS	1	1	4.20	3.61	2.44	2.25	1 5/16-12	3.33	4,000		28	
PH-16P-20G5-FSSS	1	1 1/4	4.20	3.61	2.44	2.25	1 5/8-12	4.62	3,000		21	
PH-24P-24G5-FSSS	1 1/2	1 1/2	5.64	4.65	3.35	3.13	1 7/8-12	7.54	2,000		14	
PH-32P-32G5-FSSS	2	2	7.05	5.65	4.10	3.75	2 1/2-12	12.21	1,500		10	

Additional thread types and sizes available upon request

Dimensions provided for reference only, subject to change

# HQ2P

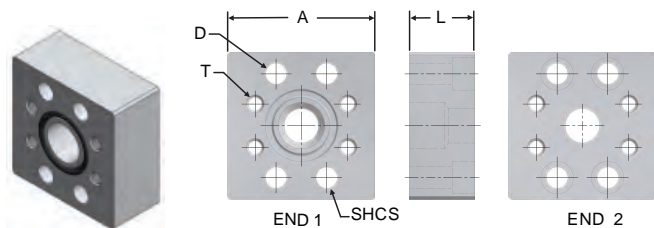
## SAE/ISO Code 62 Threaded Connector Plate



TUBE FITTING PART #	END SIZE		PORT THREAD T1 (UNC-2B)	PORT THREAD T2 (UNC-2B)	SQUARE A (in)	L (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)						DYNAMIC	DYNAMIC
12HQ2PSS	3/4	3/4	3/8-16	3/8-16	2.88	0.83	1.71	6,000	42
16HQ2PSS	1	1	7/16 - 14	7/16 - 14	3.19	1.06	2.57	6,000	42
16-12HQ2PSS	1	3/4	7/16 - 14	3/8-16	3.19	1.06	2.65	6,000	42
20-16HQ2PSS	1 1/4	1	1/2 - 13	7/16 - 14	3.80	0.98	3.47	6,000	42
20HQ2PSS	1 1/4	1 1/4	1/2 - 13	1/2 - 14	3.80	0.98	3.37	6,000	42
24HQ2PSS	1 1/2	1 1/2	5/8 - 11	5/8 - 11	4.50	1.38	6.54	6,000	42
24-20HQ2PSS	1 1/2	1 1/4	5/8 - 11	1/2 - 14	4.50	1.38	6.65	6,000	42
32HQ2PSS	2	2	3/4 - 10	3/4 - 10	5.25	1.46	9.00	6,000	42
32-24HQ2PSS	2	1 1/2	3/4 - 10	5/8 - 11	5.25	1.50	9.53	6,000	42

# Q2BOQ2P

## SAE/ISO Code 62 Port Reducer Plate



TUBE FITTING PART #	END SIZE		PORT THREAD T (UNC-2B)	SQUARE A (in)	CODE 62 O-RING	BOLT CLEARANCE HOLE D (in)	L (in)	END 1 CODE 62 BOLTING SHCS (UNC-2A)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)								DYNAMIC	DYNAMIC
16-12Q2BOQ2PSS	1	3/4	3/8 - 16	3.19	2-219	0.47	1.42	7/16 X 1.75	3.30	6,000	42
20-16Q2BOQ2PSS	1 1/4	1	7/16 - 14	3.80	2-222	0.52	1.61	1/2 X 1.75	5.34	6,000	42
24-16Q2BOQ2PSS	1 1/2	1	7/16 - 14	4.50	2-225	0.66	1.86	5/8 X 2.25	8.80	6,000	42
24-20Q2BOQ2PSS	1 1/2	1 1/4	1/2 - 13	4.50	2-225	0.66	1.86	5/8 X 2.25	8.54	6,000	42
32-24Q2BOQ2PSS	2	1 1/2	5/8 - 11	5.25	2-228	0.81	2.24	3/4 X 2.75	13.50	6,000	42

Includes Standard O-Ring Compound – 90 Durometer NBR

**All Q2 Series SAE/ISO Code 62 4-Bolt Flange Blocks:**

- Additional sizes available upon request
- Plated carbon steel available upon request
- Blocks are standard with UNC threads, ISO 6162 metric threads available upon request

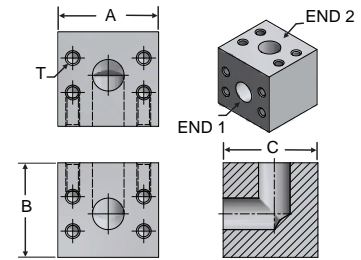
Dimensions provided for reference only, subject to change



# EQ2P

## SAE/ISO Code 62 Threaded Elbow

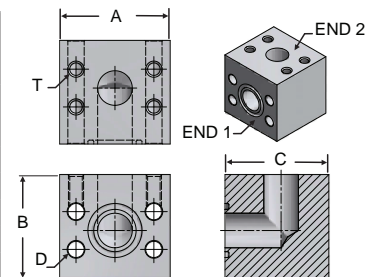
TUBE FITTING PART #	END SIZE		PORT THREAD T (UNC-2B)	A (in)	B (in)	C (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)						DYNAMIC	DYNAMIC	DYNAMIC	DYNAMIC
12EQ2PSS	3/4	3/4	3/8-16	2.82	2.50	2.50	4.50	6,000		42	
16EQ2PSS	1	1	7/16 - 14	3.19	3.00	3.00	7.18	6,000		42	
20EQ2PSS	1 1/4	1 1/4	1/2 - 13	3.75	3.50	3.50	11.28	6,000		42	
24EQ2PSS	1 1/2	1 1/2	5/8 - 11	4.50	4.00	4.00	17.52	6,000		42	
32EQ2PSS	2	2	3/4 - 10	5.50	5.00	5.38	36.45	6,000		42	



# Q2BOEQ2P

## SAE/ISO Code 62 Elbow - Direct Mount

TUBE FITTING PART #	END SIZE		PORT THREAD T (UNC-2B)	CODE 62 O-RING	A (in)	B (in)	C (in)	BOLT CLEARANCE HOLE D (in)	DIRECT MOUNT CODE 62 BOLTING SHCS (UNC-2A)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)									DYNAMIC	DYNAMIC	DYNAMIC	DYNAMIC
12Q2BOEQ2PSS	3/4	3/4	3/8-16	2-214	2.82	2.50	2.50	0.42	3/8 X 3.25	4.20	6,000		42	
16Q2BOEQ2PSS	1	1	7/16 - 14	2-219	3.19	3.00	3.00	0.52	7/16 X 3.75	6.73	6,000		42	
20Q2BOEQ2PSS	1 1/4	1 1/4	1/2 - 14	2-222	3.75	3.50	3.50	0.47	1/2 X 4.25	10.64	6,000		42	
24Q2BOEQ2PSS	1 1/2	1 1/2	5/8 - 11	2-225	4.50	4.00	4.00	0.66	5/8 X 5.00	16.47	6,000		42	
32Q2BOEQ2PSS	2	2	3/4 - 10	2-228	5.50	5.00	5.38	0.81	3/4 X 6.75	34.10	6,000		42	

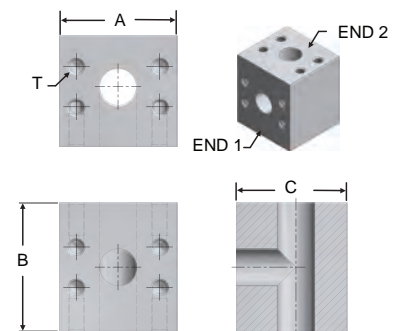


Includes Standard O-Ring Compound – 90 Durometer NBR

# JQ2P

## SAE/ISO Code 62 Threaded Tee

TUBE FITTING PART #	END SIZE			PORT THREAD T (UNC-2B)	A (in)	B (in)	C (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)		STANDARD PRESSURE (MPa)	
	1 (in)	2 (in)	3 (in)						DYNAMIC	DYNAMIC	DYNAMIC	DYNAMIC
12JQ2PSS	3/4	3/4	3/4	3/8-16	2.82	3.00	2.50	5.25	6,000		42	
16JQ2PSS	1	1	1	7/16 - 14	3.19	3.50	3.00	8.04	6,000		42	
20JQ2PSS	1 1/4	1 1/4	1 1/4	1/2 - 13	3.75	4.00	3.50	12.40	6,000		42	
24JQ2PSS	1 1/2	1 1/2	1 1/2	5/8 - 11	4.50	4.50	4.00	18.80	6,000		42	
32JQ2PSS	2	2	2	3/4 - 10	5.50	5.00	5.38	34.20	6,000		42	



### All Q2 Series SAE/ISO Code 62 4-Bolt Flange Blocks:

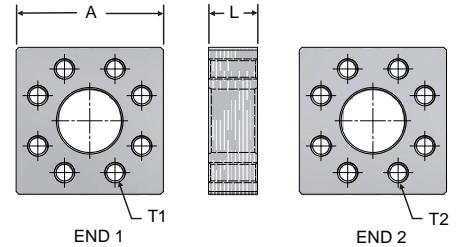
- Additional sizes available upon request
- Plated carbon steel available upon request
- Blocks are standard with UNC threads, ISO 6162 Metric threads available upon request

Dimensions provided for reference only, subject to change

# HQ4P

Code 62 Pattern

Dual Seal/Seal Sub Connector Plate



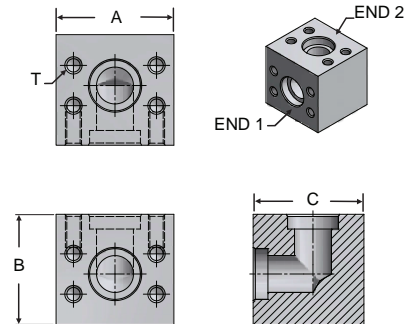
TUBE FITTING PART #	END SIZE		PORT THREAD T1 (UNC-2B)	PORT THREAD T2 (UNC-2B)	SQUARE A (in)	L (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)						DYNAMIC	DYNAMIC
8HQ4PSS	1/2	1/2	5/16 - 18	5/16 - 18	2.36	0.83	1.11	7500	52
16HQ4PSS	1	1	7/16 - 14	7/16 - 14	3.19	1.06	2.36	7500	52
2016HQ4PSS	1 1/4 x 1	1 1/4 x 1	1/2 - 13	1/2 - 13	3.80	0.98	3.30	7500	52
24HQ4PSS	1 1/2	1 1/2	5/8 - 11	5/8 - 11	4.50	1.38	6.28	7500	52
24-16HQ2PSS	1 1/2	1	5/8 - 11	7/16 - 14	4.50	1.38	6.55	7500	52
32HQ2PSS	2	2	3/4 - 10	3/4 - 10	5.25	1.46	9.15	7500	52

Additional sizes available upon request  
Plated carbon steel available upon request

# EQ4P

Code 62 Pattern

Dual Seal/Seal Sub Elbow



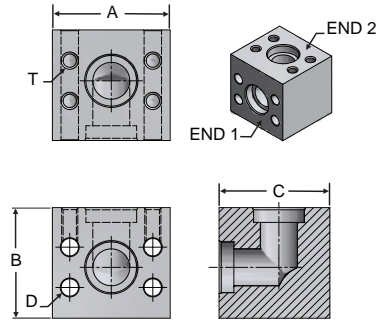
TUBE FITTING PART #	END SIZE		PORT THREAD T (UNC-2B)	A (in)	B (in)	C (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)						DYNAMIC	DYNAMIC
8EQ4PSS	1/2	1/2	5/16 - 18	2.36	2.28	2.28	3.18	7,500	52
16EQ4PSS	1	1	7/16 - 14	3.19	3.00	3.00	7.00	7,500	52
2016EQ4PSS	1 1/4 x 1	1 1/4 x 1	1/2 - 13	3.75	3.50	3.50	11.66	7,500	52
24EQ4PSS	1 1/2	1 1/2	5/8 - 11	4.50	4.00	4.00	17.32	7,500	52
32EQ4PSS	2	2	3/4 - 10	5.50	5.00	5.38	37.77	7,500	52

Additional sizes available upon request  
Plated carbon steel available upon request

Dimensions provided for reference only, subject to change

# Q4BEQ4P

Code 62 Pattern  
Dual Seal/Seal Sub  
Direct Mount Elbow

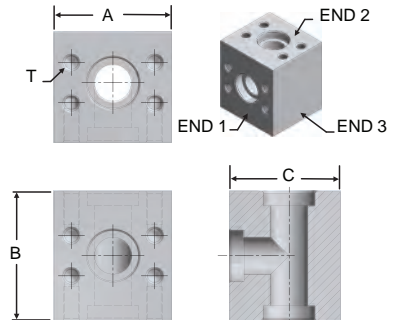


TUBE FITTING PART #	END SIZE		PORT THREAD T (UNC-2B)	A (in)	B (in)	C (in)	D (in)	DIRECT MOUNT CODE 62 BOLTING SHCS (UNC-2A)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)								DYNAMIC	DYNAMIC
8Q4BEQ4PSS	1/2	1/2	5/16 - 18	2.36	2.28	2.28	0.42	5/16 X 3.00	3.00	7,500	52
16Q4BEQ4PSS	1	1	7/16 - 14	3.19	3.00	3.00	0.52	7/16 X 3.75	6.60	7,500	52
2016Q4BEQ4PSS	1 1/4 x 1	1 1/4 x 1	1/2 - 13	3.75	3.50	3.50	0.47	1/2 X 4.25	11.35	7,500	52
24Q4BEQ4PSS	1 1/2	1 1/2	5/8 - 11	4.50	4.00	4.00	0.66	5/8 X 5.00	16.60	7,500	52
32Q4BEQ4PSS	2	2	3/4 - 10	5.50	5.00	5.38	0.81	3/4 X 6.75	35.45	7,500	52

Additional sizes available upon request. Plated carbon steel available upon request  
Bolts for illustration only

# JQ4P

Code 62 Pattern  
Dual Seal/Seal Sub Elbow



TUBE FITTING PART #	END SIZE			PORT THREAD T (UNC-2B)	A (in)	B (in)	C (in)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)	3 (in)						DYNAMIC	DYNAMIC
8JQ4PSS	1/2	1/2	1/2	3/8 - 16	2.36	2.68	2.28	3.63	7,500	52
16JQ4PSS	1	1	1	7/16 - 14	3.19	3.50	3.00	7.80	7,500	52
2016JQ4PSS	1 1/4 x 1	1 1/4 x 1	1 1/4 x 1	1/2 - 13	3.75	4.00	3.50	12.90	7,500	52
24JQ4PSS	1 1/2	1 1/2	1 1/2	5/8 - 11	4.50	4.50	4.00	18.50	7,500	52
32JQ4PSS	2	2	2	3/4 - 10	5.50	5.00	5.38	35.90	7,500	52

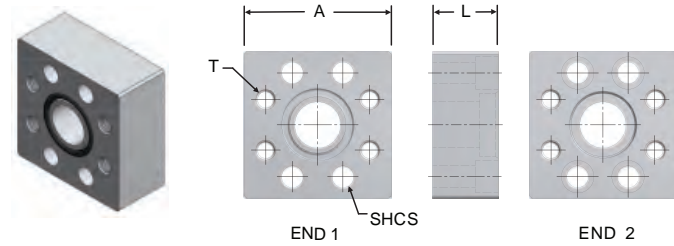
Additional sizes available upon request. Plated carbon steel available upon request

Dimensions provided for reference only, subject to change



### Q2BOQ4P

SAE/ISO Code 62 to Dual Seal/Seal Sub Port Conversion Adapter

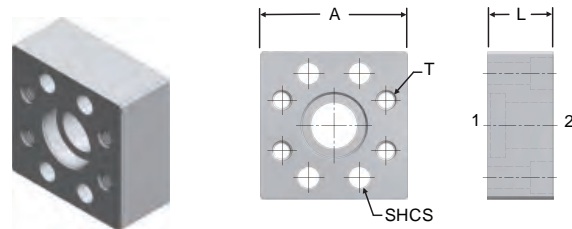


TUBE FITTING PART #	END SIZE		PORT THREAD T (UNC-2B)	CODE 62 O-RING	SQUARE A (in)	L (in)	CODE 62 BOLTING SHCS (UNC-2A)	WEIGHT (LBS)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 Q2 (in)	2 Q4 (in)							DYNAMIC	DYNAMIC
12-8Q2BOQ4PSS	3/4	1/2	5/16 - 18	2-214	2.88	1.18	3/8 x 1.50	3.30	6,000	42
16Q2BOQ4PSS	1	1	7/16 - 14	2-219	3.19	1.42	7/16 X 1.75	5.34	6,000	42
20-2016Q2BOQ4PSS	1 1/4	1 1/4 x 1	1/2 - 13	2-222	3.80	1.61	1/2 X 1.75	8.80	6,000	42
24Q2BOQ4PSS	1 1/2	1 1/2	5/8 - 11	2-225	4.50	1.86	5/8 X 2.25	8.54	6,000	42
32Q2BOQ4PSS	2	2	3/4 - 10	2-228	5.25	2.24	3/4 X 2.75	13.50	6,000	42

Includes Standard O-Ring Compound – 90 Durometer NBR  
Additional sizes available upon request

### Q4BQ2P

Dual Seal/Seal Sub to SAE/ISO Code 62 Port Conversion Adapter



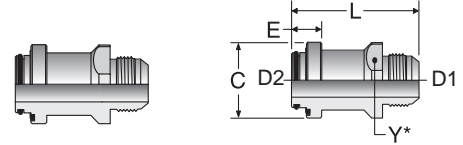
TUBE FITTING PART #	END SIZE		CODE 62 THREAD T (UNC-2B)	SQUARE A (in)	L (in)	DUAL SEAL BOLTING SHCS (UNC-2A)	STANDARD PRESSURE (PSI)	STANDARD PRESSURE (MPa)
	1 Q4 (in)	2 Q2 (in)					DYNAMIC	DYNAMIC
16Q4BQ2PSS	1	1	7/16 - 14	3.19	1.42	7/16 X 1.75	6,000	42
2016-20Q4BQ2PSS	1 1/4 x 1	1 1/4	1/2 - 13	3.80	1.61	1/2 X 1.75	6,000	42
24Q4BQ2PSS	1 1/2	1 1/2	5/8 - 11	4.50	1.86	5/8 X 2.25	6,000	42
32Q4BQ2PSS	2	2	3/4 - 10	5.25	2.24	3/4 X 2.75	6,000	42

Additional sizes available upon request

Dimensions provided for reference only, subject to change

# XHQ40

Dual Seal/Seal Sub x 37° Flare

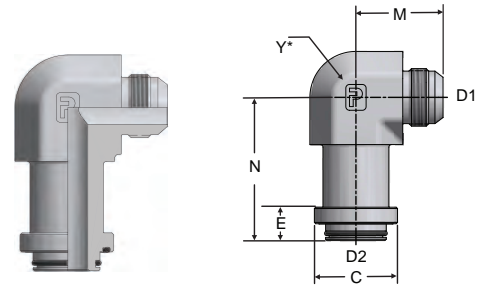


TUBE FITTING PART #	END SIZE		C (in)	D1 Drill (in)	D2 Drill (in)	E (in)	L (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 37° Flare	2 DUAL SEAL							DYNAMIC	DYNAMIC
	8 XHQ4OSS	1/2							1/2	1.25
8-16 XHQ4OSS	1/2	1	1.88	0.391	0.844	0.75	2.86	1.63	7.2	50
16 XHQ4OSS	1	1	1.88	0.844	0.844	0.75	3.18	1.63	4.8	33
16-24 XHQ4OSS	1	1 1/2	2.50	1.312	0.844	1.00	3.82	2.13	4.8	33
24 XHQ4OSS	1 1/2	1 1/2	2.50	1.312	1.312	1.00	4.00	2.13	3.6	25

Includes Standard O-Ring Compound – 90 Durometer NBR  
 Higher pressure ratings are achievable using Triple-Lok 2 end in sizes 16 & 24 (5000 psi/35 Mpa) – consult factory

# XEQ40

Dual Seal/Seal Sub x 37° Flare  
 90° Elbow

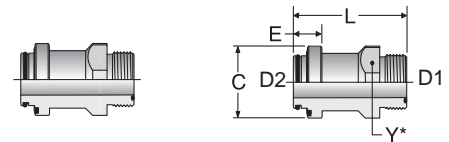


TUBE FITTING PART #	END SIZE		C (in)	D1 Drill (in)	D2 Drill (in)	E (in)	M (in)	N (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 37° Flare	2 DUAL SEAL								DYNAMIC	DYNAMIC
	8 XEQ4OSS	1/2								1/2	1.25
16 XEQ4OSS	1	1	1.88	0.844	0.938	0.75	1.97	3.24	1 7/8	3.5	24
16-2016 XEQ4OSS	1	1 1/4 x 1	2.13	0.844	0.938	0.78	1.97	3.27	1 7/8	3.5	24

Includes Standard O-Ring Compound – 90 Durometer NBR  
 Higher pressure ratings are achievable using Triple-Lok 2 end in size 16 (5000 psi/35 Mpa) – consult factory

# LOHQ40

Dual Seal/Seal Sub x O-Ring Face Seal (ORFS)



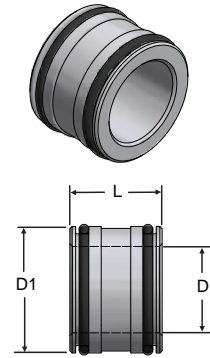
TUBE FITTING PART #	END SIZE		C (in)	D1 Drill (in)	D2 Drill (in)	E (in)	L (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 ORFS	2 DUAL							DYNAMIC	DYNAMIC
	8 LOHQ4OSS	1/2							1/2	1.25
16 LOHQ4OSS	1	1	1.88	0.807	0.807	0.75	2.96	1.63	6.0	42
24 LOHQ4OSS	1 1/2	1 1/2	2.5	1.260	1.260	1.00	3.61	2.13	5.0	35

Includes Standard O-Ring Compound – 90 Durometer NBR

Dimensions provided for reference only, subject to change

### Q4 Insert Dual Seal/Seal Sub Floating Insert

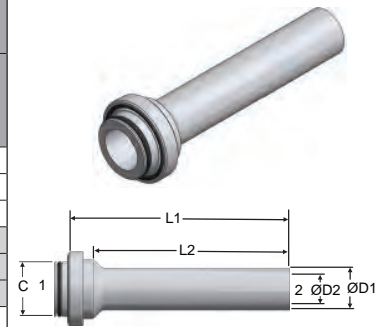
TUBE FITTING PART #	END SIZE		D (in)	D1 (in)	L (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 (in)	2 (in)				DYNAMIC	DYNAMIC
8 Q4 INSERTSS	1/2	1/2	0.50	0.75	1.00	7,500	52
16 Q4 INSERTSS	1	1	0.94	1.37	1.00	7,500	52
24 Q4 INSERTSS	1 1/2	1 1/2	1.31	1.74	1.26	7,500	52
32 Q4 INSERTSS	2	2	1.51	1.87	1.26	7,500	52



Includes Standard O-Ring Compound – 90 Durometer NBR

### Q4OW3 Dual Seal/Seal Sub Pipe Stub/Extender

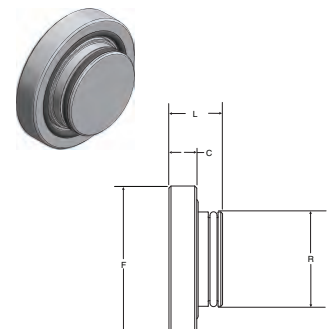
TUBE FITTING PART #	END SIZE		C (in)	L1 (in)	L2 (in)	D1 (in)	D2 (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	DUAL SEAL FLANGE 1 (in)	PIPE SIZE & SCHEDULE 2 (NPS)						DYNAMIC	DYNAMIC
8-1.050X0.113 Q4OW3SS	1/2	3/4 S40	1.25	8.00	6.57	1.05	0.82	3,695	25
8-1.050X0.154 Q4OW3SS	1/2	3/4 S80	1.25	7.50	6.07	1.05	0.74	5,197	36
8-1.050X0.219 Q4OW3SS	1/2	3/4 S160	1.25	6.00	4.57	1.05	0.61	7,500	52
16-1.050X0.113 Q4OW3SS	1	3/4 S80	1.88	7.82	6.82	1.05	0.82	3,695	25
16-1.050X0.154 Q4OW3SS	1	3/4 S80	1.88	7.50	6.50	1.05	0.74	5,197	36
16-1.315X0.179 Q4OW3SS	1	1 S80	1.88	9.50	8.50	1.32	0.96	4,555	31
16-1.315X0.250 Q4OW3SS	1	1 S160	1.88	8.00	7.00	1.32	0.82	6,639	46
16-1.315X0.358 Q4OW3SS	1	1 XXH	1.88	6.00	5.00	1.32	0.60	7,500	52
2016-1.315X0.179 Q4OW3SS	1 1/4 x 1	1 S80	2.13	9.50	8.50	1.32	0.96	4,555	31
2016-1.315X0.250 Q4OW3SS	1 1/4 x 1	1 S160	2.13	8.00	7.00	1.32	0.82	6,639	46
2016-1.315X0.358 Q4OW3SS	1 1/4 x 1	1 XXH	2.13	6.00	5.00	1.32	0.60	7,500	52
24-1.900X0.200 Q4OW3SS	1 1/2	1 1/2 S80	2.50	12.00	10.50	1.90	1.50	3,440	24
24-1.900X0.281 Q4OW3SS	1 1/2	1 1/2 S160	2.50	12.00	10.50	1.90	1.34	4,995	34
24-1.900X0.400 Q4OW3SS	1 1/2	1 1/2 XXH	2.50	10.00	8.50	1.90	1.10	7,500	52
32-2.375X0.218 Q4OW3SS	2	2 S80	3.13	12.00	10.50	2.38	1.94	2,970	20
32-2.375x0.343 Q4OW3SS	2	2 S160	3.13	12.00	10.50	2.38	1.69	4,880	34
32-2.375x0.436 Q4OW3SS	2	2 XXH	3.13	10.00	8.50	2.38	1.50	6,377	44



Includes Standard O-Ring Compound – 90 Durometer NBR. Dual Seal connection rating is 7500 psi/52 Mpa for AISI 316/316L. Pressure ratings are reduced per ASME B31.3 as required by pipe schedule. Additional sizes/schedule pairings and lengths available upon request. See page 50 for application illustration for Q4OW3-SS products.

### PQ40 Dual Seal/Seal Sub Port Plug

TUBE FITTING PART #	END SIZE	F (in)	C (in)	L (in)	R (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	DUAL SEAL					DYNAMIC	DYNAMIC
8 PQ4OSS	1/2	1.25	0.31	0.69	0.75	7.5	52
16PQ4OSS	1	1.88	0.38	0.75	1.37	7.5	52
2016 PQ4OSS	1 1/4 x 1	2.13	0.38	0.78	1.37	7.5	52
24 PQ4OSS	1 1/2	2.50	0.50	1.00	1.75	7.5	52
32 PQ4OSS	1 1/4 x 1	3.13	0.5	1	1.87	7.5	52

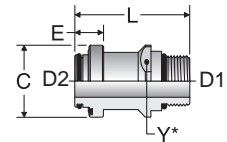
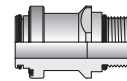


Includes Standard O-Ring Compound – 90 Durometer NBR

Dimensions provided for reference only, subject to change

**F5OHQ40**

Dual Seal/Seal Sub X Male SAE ORB

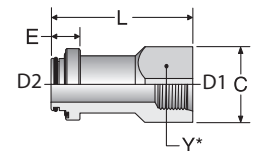
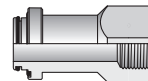


TUBE FITTING PART #	END SIZE		C (in)	D1 DRILL (in)	D2 DRILL (in)	E (in)	L (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 SAE-ORB	2 DUAL SEAL							DYNAMIC	DYNAMIC
8 F5OHQ4OSS	1/2	1/2	1.25	0.394	0.394	0.69	2.87	1.00	6.0	42
16 F5OHQ4OSS	1	1	1.88	0.844	0.844	0.75	3.00	1.63	4.0	28
24 F5OHQ4OSS	1 1/2	1 1/2	2.50	1.312	1.312	1.00	3.65	2.17	3.0	21

Includes Standard O-Ring Compound – 90 Durometer NBR

**G5HQ40**

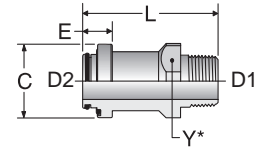
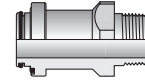
Dual Seal/Seal Sub X Female SAE ORB



TUBE FITTING PART #	END SIZE		C (in)	D1 DRILL (in)	D2 DRILL (in)	E (in)	L (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 SAE-ORB	2 DUAL SEAL							DYNAMIC	DYNAMIC
8 G5HQ4OSS	1/2	1/2	1.25	0.406	0.406	0.69	2.77	1.00	5.0	35
16 G5HQ4OSS	1	1	1.88	0.938	0.938	0.75	3.72	1.63	3.5	24
24 G5HQ4OSS	1 1/2	1 1/2	2.50	1.312	1.312	1.00	4.59	2.25	2.5	17

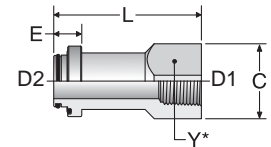
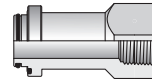
Includes Standard O-Ring Compound – 90 Durometer NBR

Dimensions provided for reference only, subject to change

**FHQ40****Dual Seal/Seal Sub X Male NPTF**

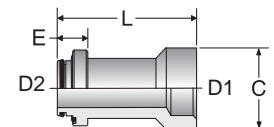
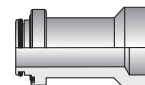
TUBE FITTING PART #	END SIZE		C (in)	D1 DRILL (in)	D2 DRILL (in)	E (in)	L (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 NPT	2 DUAL SEAL							DYNAMIC	DYNAMIC
	<b>8 FHQ4OSS</b>	1/2							1/2	1.25
<b>16 FHQ4OSS</b>	1	1	1.88	0.938	0.938	0.75	3.45	1.63	5.4	37
<b>24 FHQ4OSS</b>	1 1/2	1 1/2	2.50	1.312	1.312	1.00	4.1	2.13	3.6	25

Includes Standard O-Ring Compound – 90 Durometer NBR

**GHQ40****Dual Seal/Seal Sub X Female NPTF**

TUBE FITTING PART #	END SIZE		C (in)	D1 DRILL (in)	D2 DRILL (in)	E (in)	L (in)	Y (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 NPT	2 DUAL SEAL							DYNAMIC	DYNAMIC
	<b>8 GHQ4OSS</b>	1/2							1/2	1.25
<b>16 GHQ4OSS</b>	1	1	1.88	0.938	0.938	0.75	3.94	1.63	3.6	25
<b>24 GHQ4OSS</b>	1 1/2	1 1/2	2.50	1.312	1.312	1.00	4.81	2.25	3.0	21

Includes Standard O-Ring Compound – 90 Durometer NBR

**W7HQ40****Dual Seal/Seal Sub X 6000# Socket Weld**

TUBE FITTING PART #	END SIZE		C (in)	D1 WELD SOCKET (in)	D2 DRILL (in)	E (in)	L (in)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 6000# SW	2 DUAL SEAL						DYNAMIC	DYNAMIC
	<b>8 W7HQ4OSS</b>	1/2						1/2	1.25
<b>16 W7HQ4OSS</b>	1	1	1.88	0.938	0.938	0.75	3.44	7.5	52
<b>24 W7HQ4OSS</b>	1 1/2	1 1/2	2.50	1.312	1.312	1.00	4.43	7.5	52

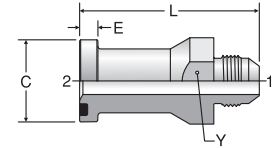
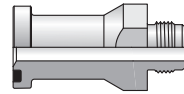
Includes Standard O-Ring Compound – 90 Durometer NBR

Note: Remove o-rings prior to welding

Standard pressure rating based upon Sch XXS/XXH or Sch 160 Pipe, Reduced pressure rating for elects STD/Sch40, or XS/Sch 80 pipe

Dimensions provided for reference only, subject to change



**XHQ1**SAE/ISO Code 61 x 37° Flare  
Flange Adapter

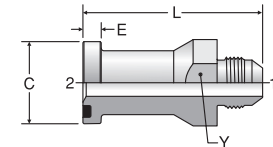
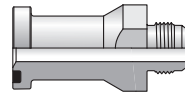
TUBE FITTING PART #	END SIZE		C (in)	E (in)	L (in)	Y (in)	*SAE FLANGE O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 37° FLARE	2 CODE 61						DYNAMIC -S	DYNAMIC -SS		
	8 XHQ1	1/2								1/2	1.188
8-12 XHQ1	1/2	3/4	1.500	0.265	2.56	1 3/8	2-214	5.0	35	5.0	35
12 XHQ1	3/4	3/4	1.500	0.265	2.77	1 3/8	2-214	5.0	35	5.0	35
12-16 XHQ1	3/4	1	1.750	0.315	2.86	1 5/8	2-219	5.0	35	4.6	32
16 XHQ1	1	1	1.750	0.315	2.91	1 5/8	2-219	4.0	28	4.6	32
16-20 XHQ1	1	1 1/4	2.000	0.315	3.31	1 7/8	2-222	4.0	28	4.0	28
20 XHQ1	1 1/4	1 1/4	2.000	0.315	3.36	1 7/8	2-222	4.0	28	4.0	28
24 XHQ1	1 1/2	1 1/2	2.375	0.315	3.57	2 1/8	2-225	3.0	21	3.0	21
32 XHQ1	2	2	2.812	0.375	4.04	2 5/8	2-228	2.0	14	2.4	16.5

XHQ1 Flange adapters exclude SAE flange port o-ring

Additional sizes available upon request

Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**XHQ2**SAE/ISO Code 62 x 37° Flare  
Flange Adapter

TUBE FITTING PART #	END SIZE		C (in)	E (in)	L (in)	Y (in)	*SAE FLANGE O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 37° FLARE	2 CODE 62						DYNAMIC -S	DYNAMIC -SS		
	8 XHQ2	1/2								1/2	1.250
12 XHQ2	3/4	3/4	1.625	0.345	3.08	1 3/8	2-214	5.0	35	6.0	42
12-16 XHQ2	3/4	1	1.875	0.375	3.38	1 7/8	2-219	5.0	35	6.0	42
16 XHQ2	1	1	1.875	0.375	3.43	1 5/8	2-219	4.0	28	4.8	33
16-20 XHQ2	1	1 1/4	2.125	0.405	3.55	1 7/8	2-222	4.0	28	4.8	33
20 XHQ2	1 1/4	1 1/4	2.125	0.405	3.60	1 7/8	2-222	4.0	28	4.0	28
24 XHQ2	1 1/2	1 1/2	2.500	0.495	4.34	2 1/8	2-225	3.0	21	3.0	21
32 XHQ2	2	2	3.125	0.495	5.47	2 3/4	2-228	2.0	14	2.4	16.5

XHQ2 Flange adapters exclude SAE flange port o-ring

Additional sizes available upon request

Higher stainless steel pressure ratings are achievable using Triple-Lok 2 end in sizes 16-32 (5000 psi/35 Mpa) – consult factory

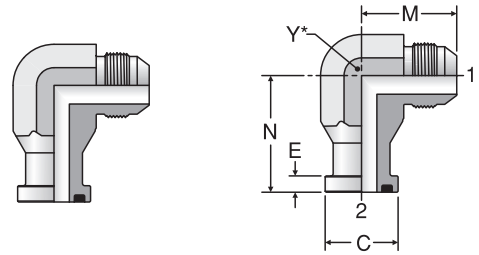
Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Dimensions provided for reference only, subject to change

# XEQ1

SAE/ISO Code 61 x 37° Flare  
90° Elbow



\* Y – Across Wrench Flats

TUBE FITTING PART #	End Size* Y – Across Wrench Flats							SAE FLANGE O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1	2	C (in)	E (in)	M (in)	N (in)	Y (in)		DYNAMIC -S		DYNAMIC -SS	
	37° FLARE	CODE 61										
8 XEQ1	1/2	1/2	1.188	0.265	1.34	1.90	2-210	5.0	35	5.0	35	
12 XEQ1	3/4	3/4	1.500	0.265	1.91	1.81	2-214	5.0	35	5.0	35	
16 XEQ1	1	1	1.750	0.315	2.07	2.13	2-219	4.0	28	3.5	24	
20 XEQ1	1 1/4	1 1/4	2.000	0.315	2.26	2.26	2-222	4.0	28	3.5	21	
24 XEQ1	1 1/2	1 1/2	2.375	0.315	2.72	2.64	2-225	3.0	21	2.0	14	
32 XEQ1	2	2	2.812	0.375	3.06	4.25	2-228	2.0	14	1.5	10.5	

Additional sizes available upon request

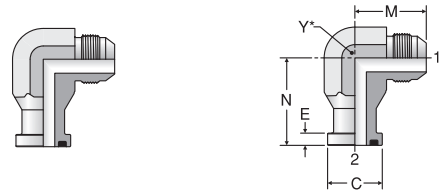
**XEQ1 Flange adapters exclude SAE flange port o-ring**

Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

# XEQ2

SAE/ISO Code 62 x 37° Flare  
90° Elbow



\* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE		C (in)	E (in)	M (in)	N (in)	Y (in)	SAE FLANGE O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1	2							DYNAMIC -S		DYNAMIC -SS	
	37° FLARE	CODE 62										
12 XEQ2	3/4	3/4	1.625	0.345	1.97	2.04	1 3/16	2-214	5.0	35	5.0	35
16 XEQ2	1	1	1.875	0.375	2.19	2.42	1 7/16	2-219	4.0	28	3.5	24
20 XEQ2	1 1/4	1 1/4	2.125	0.405	2.56	2.68	1 5/8	2-222	4.0	28	3.0	21
24 XEQ2	1 1/2	1 1/2	2.500	0.495	3.03	3.13	2	2-225	3.0	21	2.0	14

Additional sizes available upon request

**XEQ2 Flange adapters exclude SAE flange port o-ring**

Higher stainless steel pressure ratings are achievable using Triple-Lok 2 end in sizes 20 & 24 (5000 psi/35 Mpa) – consult factory

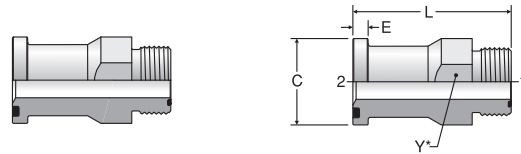
Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Dimensions provided for reference only, subject to change

# LOHQ1

SAE/ISO Code 61 x O-Ring Face Seal (ORFS) Flange Adapter



\* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE		C (in)	E (in)	L (in)	Y (in)	SAE FLANGE O-RING	ORFS O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 ORFS	2 CODE 61							DYNAMIC -S	DYNAMIC -SS		
8 LOHQ1	1/2	1/2	1.188	0.265	2.46	1 1/16	2-210	2-014	5.0	35	5.0	35
8-12 LOHQ1	1/2	3/4	1.500	0.265	2.62	1 3/8	2-214	2-014	5.0	35	5.0	35
12 LOHQ1	3/4	3/4	1.500	0.265	2.79	1 3/8	2-214	2-018	5.0	35	5.0	35
12-16 LOHQ1	3/4	1	1.750	0.315	2.79	1 5/8	2-219	2-018	4.6	32	4.6	32
16 LOHQ1	1	1	1.750	0.315	2.81	1 5/8	2-219	2-021	4.6	32	4.6	32
16-20 LOHQ1	1	1 1/4	2.000	0.315	3.21	1 7/8	2-222	2-021	4.0	28	4.0	28
20 LOHQ1	1 1/4	1 1/4	2.000	0.315	3.21	1 7/8	2-222	2-025	4.0	28	4.0	28
24 LOHQ1	1 1/2	1 1/2	2.375	0.315	3.29	2 1/8	2-225	2-029	3.0	21	3.0	21
32 LOHQ1	2	2	2.812	0.375	3.49	2 5/8	2-228	2-135	3.0	21	3.0	21

Additional sizes available upon request

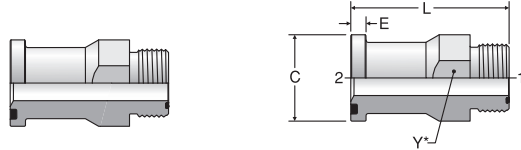
LOHQ1 Flange adapters include ORFS seal but exclude SAE flange port o-ring

Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

# LOHQ2

SAE/ISO Code 62 x O-Ring Face Seal (ORFS) Flange Adapter



\* Y – Across Wrench Flats

TUBE FITTING PART #	END SIZE		C (in)	E (in)	L (in)	Y (in)	SAE FLANGE O-RING	ORFS O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 ORFS	2 CODE 62							DYNAMIC -S	DYNAMIC -SS		
8 LOHQ2	1/2	1/2	1.250	0.305	2.58	1 1/8	2-210	2-014	6.0	42	6.0	42
12 LOHQ2	3/4	3/4	1.625	0.345	3.02	1 3/8	2-214	2-018	6.0	42	6.0	42
12-16 LOHQ2	3/4	1	1.875	0.375	3.34	1 5/8	2-219	2-018	6.0	42	6.0	42
16 LOHQ2	1	1	1.875	0.375	3.36	1 5/8	2-219	2-021	6.0	42	6.0	42
16-20 LOHQ2	1	1 1/4	2.125	0.405	3.43	1 7/8	2-222	2-021	6.0	42	6.0	42
20 LOHQ2	1 1/4	1 1/4	2.125	0.405	3.48	1 7/8	2-222	2-025	6.0	42	6.0	42
24 LOHQ2	1 1/2	1 1/2	2.500	0.495	4.14	2 1/8	2-225	2-029	5.0	35	5.0	35
32 LOHQ2	2	2	3.125	0.495	4.28	2 3/4	2-228	2-135	3.0	21	3.0	21

Additional sizes available upon request

LOHQ2 Flange adapters include ORFS seal but exclude SAE flange port o-ring

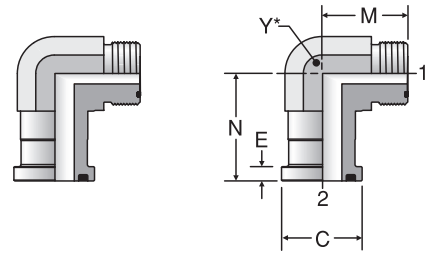
Consult page 40 for o-ring details

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Dimensions provided for reference only, subject to change

# LOEQ1

SAE/ISO Code 61 x O-Ring Face Seal (ORFS)  
90° Flange Adapter



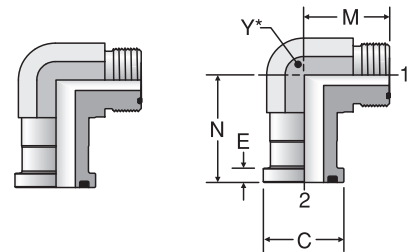
TUBE FITTING PART #	END SIZE		C (in)	E (in)	M (in)	N (in)	Y (in)	SAE FLANGE O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 ORFS	2 CODE 61							DYNAMIC -S		DYNAMIC -SS	
	12 LOEQ1	3/4							3/4	1.500	0.265	1.95
16 LOEQ1	1	1	1.750	0.315	2.05	2.13	1 7/16	2-219	4.6	32	4.6	32
20 LOEQ1	1 1/4	1 1/4	2.000	0.315	2.22	2.26	1 5/8	2-222	4.0	28	4.0	28
24 LOEQ1	1 1/2	1 1/2	2.375	0.315	2.54	2.64	2	2-225	3.0	21	3.0	21

LOEQ1 Flange adapters include ORFS seal but exclude SAE flange port O-ring  
Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

# LOEQ2

SAE/ISO Code 62 x O-Ring Face Seal (ORFS)  
90° Flange Adapter



Tube Fitting Part #	End Size		C (in)	E (in)	M (in)	N (in)	Y (in)	SAE Flange O-Ring	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
	1 ORFS	2 Code 62							DYNAMIC -S		DYNAMIC -SS	
	12 LOEQ2	3/4							3/4	1.625	0.345	2.01
16 LOEQ2	1	1	1.875	0.375	2.17	2.42	1 7/16	2-219	6.0	42	6.0	42
20 LOEQ2	1 1/4	1 1/4	2.125	0.405	2.5	2.68	1 5/8	2-222	5.0	35	5.0	35
24 LOEQ2	1 1/2	1 1/2	2.500	0.495	2.87	3.13	2	2-225	4.0	28	4.0	28

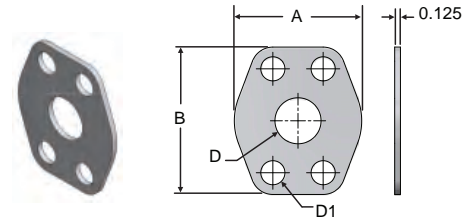
LOEQ2 Flange adapters include ORFS seal but exclude SAE flange port O-ring  
Consult page 40 for o-ring details

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Dimensions provided for reference only, subject to change

**CP2-1/8 LG****SAE/ISO Code 62 Connector Plate (Non-Threaded)**

For connecting two SAE/ISO Code 62 O-Ring Flanges  
or converting O-Ring Face to Flat Face Port/Component



TUBE FITTING PART #	SAE CODE 62 FLANGE SIZE	A (in)	B (in)	D (in)	D1 (in)
	(in)				
12CP2-1/8 LGSS	3/4	2.36	2.83	0.75	0.42
16CP2-1/8 LGSS	1	2.76	3.20	1.00	0.52
20CP2-1/8 LGSS	1 1/4	3.07	3.73	1.25	0.52
24CP2-1/8 LGSS	1 1/2	3.82	4.46	1.50	0.66
32CP2-1/8 LGSS	2	4.48	5.23	2.00	0.81

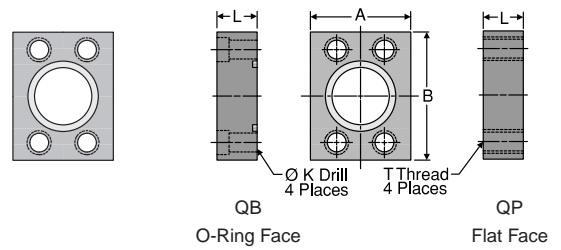
Standard Material: AISI 316/316L

Available in SAE/ISO Code 61 upon request

Dimensions provided for reference only, subject to change

# PQB/PQP

## SAE/ISO Code 61/62 Blind Flange



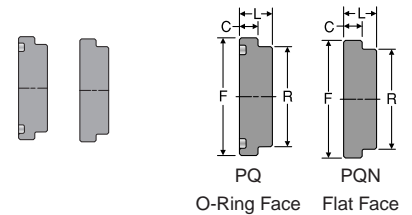
TUBE FITTING PART #		SAE FLANGE SIZE (in)	SAE FLANGE (ISO-DN)	A (in)	B (in)	K DRILL DIA (in)	L (in)	T THREAD (UNC-2B)	SAE FLANGE O-RING	MOUNTING HARDWARE SHCS	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
O-RING FACE	FLAT FACE											
<b>SAE/ISO CODE 61 BLIND FLANGE (BLANKING FLANGE)</b>												
8PQ1B	8PQ1P	1/2	13	1.500	2.120	0.344	1.20	5/16-18	2-210	5/16-18 x 2.00	5.0	35
12PQ1B	12PQ1P	3/4	19	1.750	2.620	0.406	1.20	3/8-16	2-214	3/8-16 x 2.00	5.0	35
16PQ1B	16PQ1P	1	2	2.000	2.820	0.406	1.45	3/8-16	2-219	3/8-16 x 2.25	4.6	32
20PQ1B	20PQ1P	1 1/4	32	2.500	3.190	0.469	1.45	7/16-14	2-222	7/16-14 x 2.25	4.0	28
24PQ1B	24PQ1P	1 1/2	38	2.750	3.750	0.531	1.70	1/2-13	2-225	1/2-13 x 2.50	3.0	21
32PQ1B	32PQ1P	2	51	3.250	4.000	0.531	1.70	1/2-13	2-228	1/2-13 x 2.50	3.0	21
<b>SAE/ISO CODE 62 BLIND FLANGE (BLANKING FLANGE)</b>												
8PQ2B	8PQ2P	1/2	13	1.750	2.220	0.344	0.94	5/16-18	2-210	5/16-18 x 1.50	6.0	42
12PQ2B	12PQ2P	3/4	19	2.000	2.810	0.406	1.19	3/8-16	2-214	3/8-16 x 2.00	6.0	42
16PQ2B	16PQ2P	1	2	2.250	3.190	0.469	1.44	7/16-14	2-219	7/16-14 x 2.25	6.0	42
20PQ2B	20PQ2P	1 1/4	32	2.750	3.750	0.531	1.44	1/2-13	2-222	1/2-13 x 2.50	6.0	42
24PQ2B	24PQ2P	1 1/2	38	3.250	4.500	0.656	1.69	5/8-11	2-225	5/8-11 x 2.75	6.0	42
32PQ2B	32PQ2P	2	51	4.000	5.250	0.781	1.69	3/4-10	2-228	3/4-10 x 3.00	6.0	42

To receive mounting hardware kit, insert "K" after the material designator. Example: 24PQ2BSSK  
 Mounting hardware kits are available for Q1B/Q2B part numbers and include (4) UNC SHCS bolts, (4) washers, and Fluorocarbon o-ring  
 Consult Parker Catalog 4300 for carbon steel availability and larger size options  
 Consult factory for parts designed for use with metric fasteners/hardware

# PQ/PQN

## SAE/ISO Code 61/62 Split Flange

### Blanking Plug



TUBE FITTING PART #		SAE FLANGE SIZE (in)	SAE FLANGE (ISO-DN)	C (in)	F (in)	L (in)	R (in)	SAE FLANGE O-RING	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)	STANDARD PRESSURE (x 1000 PSI)	STANDARD PRESSURE (MPa)
O-RING FACE	FLAT FACE											
<b>SAE/ISO CODE 61 FLANGE HEAD PLUG</b>												
8PQ1	8PQ1N	1/2	13	0.265	1.188	0.500	0.924	2-210	5.0	35	5.0	35
12PQ1	12PQ1N	3/4	19	0.265	1.500	0.560	1.234	2-214	5.0	35	5.0	35
16PQ1	16PQ1N	1	2	0.315	1.750	0.560	1.484	2-219	5.0	35	4.6	32
20PQ1	20PQ1N	1 1/4	32	0.315	2.000	0.560	1.684	2-222	4.0	28	4.0	28
24PQ1	24PQ1N	1 1/2	38	0.315	2.380	0.620	1.964	2-225	3.0	21	3.0	21
32PQ1	32PQ1N	2	51	0.375	2.810	0.620	2.434	2-228	3.0	21	3.0	21
<b>SAE/ISO CODE 62 FLANGE HEAD PLUG</b>												
12PQ2	12NQ2N	3/4	19	0.345	1.625	0.690	1.234	2-214	6.0	42	6.0	42
16PQ2	16PQ2N	1	2	0.375	1.875	0.810	1.484	2-219	6.0	42	6.0	42
20PQ2	20PQ2N	1 1/4	32	0.405	2.125	1.000	1.704	2-222	6.0	42	6.0	42
24PQ2	24PQ2N	1 1/2	38	0.495	2.500	1.190	1.984	2-225	6.0	42	6.0	42
32PQ2	32NQ2N	2	51	0.495	3.125	1.500	2.604	2-228	6.0	42	6.0	42

Split Flanges and Split Flange Kits on page XX  
 O-ring not included, consult page 40 for o-ring details

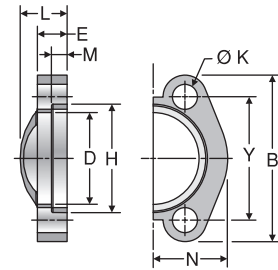
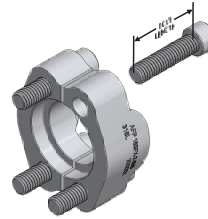
Dimensions provided for reference only, subject to change



# FCS1 / FCS1K

# FCS2 / FCS2K

## SAE/ISO 61/62 Flange Clamps, Split



SAE/ISO CODE 61 FLANGE CLAMPS, SPLIT																			
SPLIT FLANGE HALF PART NUMBER #	SPLIT FLANGE *KIT PART NUMBER #	SAE FLANGE SIZE (in)	SAE FLANGE SIZE (ISO-DN)	B (in)	D (in)	E (in)	H (in)	K DRILL (in)	L (in)	M (in)	N (in)	Y (in)	*BOLTING HARDWARE (UNC)	*BOLTING HARDWARE (Metric)	O-RING SIZE	STANDARD PRESSURE (x 1000 PSI)		STANDARD PRESSURE (Mpa)	
																S	SS	S	SS
8FCS1	8FCS1K	1/2	13	2.12	0.955	0.50	1.22	0.350	0.75	0.245	0.86	1.50	5/16-18 x 1.25	M8x25	2-210	5.0	5.0	35	35
12FCS1	12FCS1K	3/4	19	2.56	1.265	0.56	1.53	0.417	0.88	0.245	0.98	1.88	3/8-16 x 1.25	M10x30	2-214	5.0	5.0	35	35
16FCS1	16FCS1K	1	25	2.75	1.515	0.62	1.78	0.417	0.94	0.295	1.11	2.06	3/8-16 x 1.25	M10x30	2-219	4.6	4.6	32	32
20FCS1	20FCS1K	1 1/4	32	3.12	1.720	0.56	2.03	0.472	0.88	0.295	1.39	2.31	7/16-14 x 1.50	N/A	2-222	4.0	4.0	28	28
20FCS1M	-	1 1/4	32	3.12	1.720	0.56	2.03	0.433	0.88	0.295	1.39	2.31	N/A	M10x40	2-222	4.0	4.0	28	28
24FCS1	24FCS1K	1 1/2	38	3.69	2.000	0.62	2.41	0.524	1.00	0.295	1.58	2.75	1/2-13 x 1.50	M12x35	2-225	3.0	3.0	21	21
32FCS1	32FCS1K	2	51	4.00	2.470	0.62	2.84	0.524	1.03	0.355	1.86	3.06	1/2-13 x 1.50	M12x35	2-228	3.0	3.0	21	21

SAE/ISO CODE 62 FLANGE CLAMPS, SPLIT																			
SPLIT FLANGE HALF PART NUMBER #	SPLIT FLANGE *KIT PART NUMBER #	SAE FLANGE SIZE (in)	SAE FLANGE SIZE (ISO-DN)	B (in)	D (in)	E (in)	H (in)	K DRILL (in)	L (in)	M (in)	N (in)	Y (in)	*BOLTING HARDWARE (UNC)	*BOLTING HARDWARE (Metric)	O-RING SIZE	STANDARD PRESSURE (x 1000 PSI)		STANDARD PRESSURE (Mpa)	
																S	SS	S	SS
8FCS2	8FCS2K	1/2	13	2.22	0.970	0.62	1.28	0.350	0.88	0.285	0.89	1.594	5/16-18 x 1.25	M8x30	2-210	6.0	6.0	42	42
12FCS2	12FCS2K	3/4	19	2.81	1.280	0.75	1.66	0.417	1.12	0.325	1.14	2.00	3/8-16 x 1.50	M10x35	2-214	6.0	6.0	42	42
16FCS2	16FCS2K	1	25	3.19	1.530	0.94	1.91	0.472	1.31	0.355	1.33	2.25	7/16-14 x 1.75	N/A	2-219	6.0	6.0	42	42
16FCS2M	-	1	25	3.19	1.530	0.94	1.91	0.524	1.31	0.355	1.33	2.25	N/A	M12x45	2-219	6.0	6.0	42	42
20FCS2	20FCS2K	1 1/4	32	3.75	1.750	1.06	2.16	0.524	1.50	0.385	1.48	2.63	1/2-13 x 1.75	M12x45	2-222	6.0	6.0	42	42
24FCS2	24FCS2K	1 1/2	38	4.44	2.030	1.19	2.53	0.657	1.69	0.475	1.83	3.13	5/8-11 x 2.25	M16x55	2-225	6.0	6.0	42	42
32FCS2	32FCS2K	2	51	5.25	2.660	1.44	3.16	0.811	2.06	0.475	2.20	3.81	3/4-10 x 2.75	M20x70	2-228	6.0	6.0	42	42

Steel Flanges and Hardware: Zinc Plated. Stainless Steel: 316SS

\*To order a split flange kit, insert "K" after the material designator as shown

Kits include two split flange halves, 4 hex cap screws (bolts), 4 washers, and o-ring

Provided lengths for Hex Head Cap Screw or Hollow Hex Cap Screws

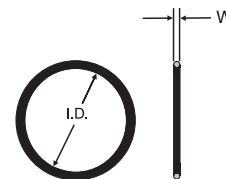
Larger sizes available in both SAE/ISO Code 61 (SAE 3000) and Code 62 (SAE 6000)

FCS2S/FCS2SK and FCS2SS/FCS2SSK series split flanges/kits are used with both SAE/ISO Code 62 flanges and Parker Dual Seal/Seal Sub Flange systems

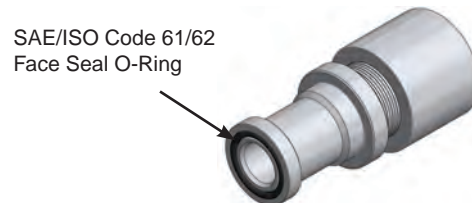
Dimensions provided for reference only, subject to change

### SAE/ISO 4-Bolt Flange Face O-Ring

SAE/ISO Code 61 & Code 62 Flanges



TUBE FITTING PART #	HOSE PRODUCTS DIVISION PART#	FLANGE SAE DASH SIZE	SAE/ISO Flange Size	IMPERIAL DIMS		METRIC DIMS		MATERIAL
				W (in)	I.D. (in)	W (mm)	I.D. (mm)	
2-210	711510-6	-8	1/2	0.139	0.734	3.53	18.64	*
2-214	711510-5	-12	3/4	0.139	0.984	3.53	24.99	*
2-219	711510-4	-16	1	0.139	1.296	3.53	32.92	*
2-222	711510-3	-20	1 1/4	0.139	1.484	3.53	37.69	*
2-225	711510-2	-24	1 1/2	0.139	1.859	3.53	47.22	*
2-228	711510-1	-32	2	0.139	2.234	3.53	56.74	*
2-232	711510-7	-40	2 1/2	0.139	2.734	3.53	69.44	*
2-237	711510-8	-48	3	0.139	3.359	3.53	85.32	*



90 Durometer NBR (Nitrile) is standard. Consult factory for additional compounds  
Specify size and compound. Example: 2-210 NBR

### Dual Seal/Seal Sub 4-Bolt Flange O-Rings

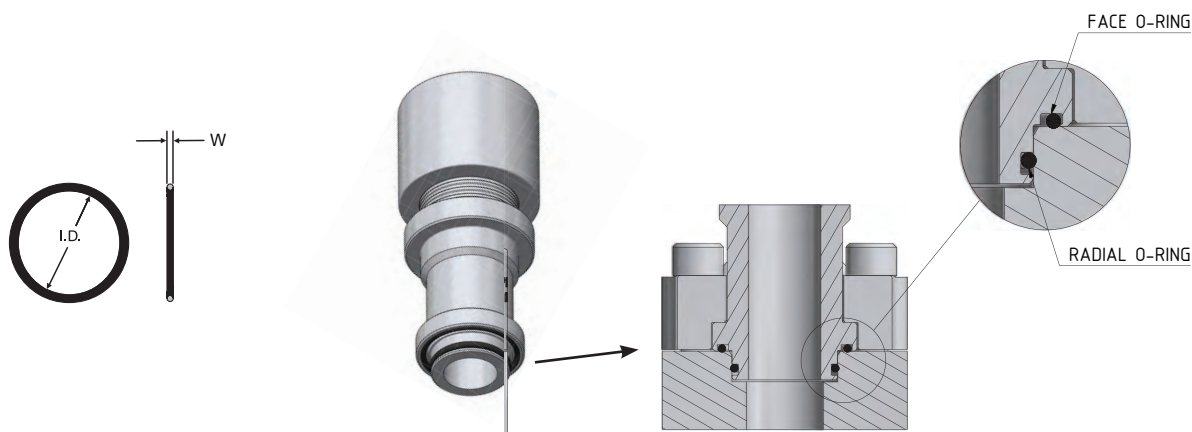
Flange Face Seal O-Rings

Radial Seal O-Rings

DUAL SEAL FLANGE FACE SEAL O-RING	DUAL SEAL SEAL SUB FLANGE SIZE	DUAL SEAL SEAL SUB FLANGE SIZE	IMPERIAL DIMS		METRIC DIMS		MATERIAL
			W (in)	I.D. (in)	W (mm)	I.D. (mm)	
2-022	-8	1/2	0.070	0.989	1.78	25.12	*
2-129	-16	1	0.103	1.549	2.62	39.34	*
2-129	-2016	1 1/4 x 1	0.103	1.549	2.62	39.34	*
2-136	-24	1 1/2	0.103	1.987	2.62	50.47	*
2-141	-32	2	0.103	2.300	2.62	58.42	*

DUAL SEAL SEAL SUB RADIAL SEAL O-RING	DUAL SEAL SEAL SUB FLANGE SIZE	DUAL SEAL SEAL SUB FLANGE SIZE	IMPERIAL DIMS		METRIC DIMS		MATERIAL
			W (in)	I.D. (in)	W (mm)	I.D. (mm)	
2-113	-8	1/2	0.103	0.549	2.62	13.94	*
2-123	-16	1	0.103	1.174	2.62	29.82	*
2-123	-2016	1 1/4 x 1	0.103	1.174	2.62	29.82	*
2-129	-24	1 1/2	0.103	1.549	2.62	39.34	*
2-131	-32	2	0.103	1.674	2.62	42.52	*

90 Durometer NBR (Nitrile) is standard. Consult factory for additional compounds  
Specify size and compound. Example: 2-022 NBR



Dimensions provided for reference only, subject to change



## Heavy Duty Clamps

Parker's Heavy Series pipe clamps are designed and manufactured in accordance to DIN 3015, Part 2 with UNC threads. Parker's Heavy series tube, pipe, and hose clamps are designed for the high mechanical stresses seen in robust fluid power/hydraulic systems. A properly designed clamping plan is a necessary part of fluid power power systems. Parker's Heavy Series clamps are used to reduce the associated problems introduced through dynamic fluid system cycling, mechanical shock and vibration.

**The products represented in this section reflect only a small portion of the overall clamp product line from Parker. Consult Catalog 4300 or 4100GB for Parker's extensive offering of clamps up to 8"/220mm in several materials, construction series, clamps for hoses/cables, and mounting options.**

## Design

Both the upper and lower clamp halves are identical. For tubes and pipes, the "ribs" inside the bore of the clamp halves provide excellent resistance axial loading and movement. These clamps provide exceptional resiliency, a wide operating temperature range, and high mechanical strength. High resilient polypropylene (PP) is the most common material utilized in fluid power clamps, but other materials are available to cover most application-specific requirements.

### Clamp Materials:

Polypropylene, Polyamide, and Aluminum. Consult the mechanical, temperature, and chemical properties chart on page 42 for more details.

### Hardware Materials:

Most metallic hardware is available in both carbon steel and stainless steel.

### Sizing/Grouping:

There is a range of "size groups", each with specific envelope dimensions allowing for standardized hardware requirements and stacking of different size tubes/pipes/hoses within the same group. Tube or pipe sizes with different groups can not be intermixed or stacked. For example, 1" and 1 ¼" pipe sizes share Group H5 hardware and allow for the ability to stack pipes of these sizes.

## Clamp Spacing and Positioning:

Proper clamp positioning and spacing is a key consideration for a successful fluid power clamping system. Clamp spacing guidelines are provided on the following page in **Table 9 and in the Design and Installation Guide.**

## Mounting and Installation

Parker's Heavy Series clamps utilize two primary methods for mounting – weld plates and rail mounting. Regardless of method, it is imperative that clamps are mounted to a rigid structure. Clamping pipes, tubes and hoses together without affixing the mounting rail or weld plate to a rigid surface does not provide adequate support for vibration and system dampening.

### Weld Plate Mounting:

The weld plate mounting system allows the user to attach a clamp assembly to a metallic structure for welding. Once the weld plate is attached to the structure, one clamp half is placed onto the weld plate, followed by the pipe. Next, the second clamp half can be placed on the pipe followed by the cover plate and bolts. Finalize the connection by tightening the bolts to the recommended torque. It is important to weld without the thermoplastic insert in place as to avoid damaging or melting the insert. **See Figure 11.**



**Fig. 11 – Weld Plate Assembly**



**Fig. 12 – Mounting Rail Assembly**

### Rail Mounting:

The use of a clamp-specific mounting rail is a second method to mount the clamping system components to a support structure. **See Figure 12.** Using a mounting rail allows multiple clamps to be mounted side-by-side to restrain a group of tube, pipe or hose assemblies. The mounting rail also provides the ability to move the location of the clamps along the axis of the rail for ease of alignment. The rail can be attached to a support structure by welding or mechanical methods such as bolting. Once the mounting rail is installed, rail nuts slide into the rail. The first clamp half, followed by the pipe can then be installed over the corresponding rail nuts. Finally, the second clamp half and cover plate are installed. Finalize the connection by tightening to the recommended assembly torque. Rail mounting can take up less footprint than a comparable weld plate mounting arrangement.

Additionally, **CRA** (Channel Rail Adapter) rail nuts for strut channel are available for rail mounting clamps to common industrial channel rails used for mounting conduit, cables, and general services piping.

**Stacking of Clamps:**

A primary feature of the Parker clamping system is the ability to accommodate stacking of clamps within a group number. Stacking bolts and stacking plates are required. Simply tighten the stacking bolts and add the stacking plate and then add a second clamp assembly over the first one. Complete the mounting by assembling a cover plate and bolts. **Note: When stacking, the clamps must be from the same group.**



Fig. 13 - Stacked clamps awaiting a third "layer"

**Clamp Body Material Properties**

MECHANICAL PROPERTIES	POLYPROPYLENE (PP)
Tensile E-Module	1073 N/mm <sup>2</sup> (ISO 527)
Tensile Strength at Yield	24 MPa (ISO 527-2)
Ball Indentation Hardness (Brinell Hardness)	45,4 MPa (ISO 2039-1)
Low Temperature Notch Impact Strength	3 kJ/m <sup>2</sup> at -20 °C / -4.0 °F (acc. to Charpy / ISO 179 / 1eU)
Notched Impact Strength	5 kJ/m <sup>2</sup> at +23 °C / +73.4 °F (acc. to Charpy / ISO 179 / 1eU)

THERMAL PROPERTIES	POLYPROPYLENE (PP)
Temperature Resistance (min-max)	-25°C to +90°C -13°C to +194°F

CHEMICAL RESISTANCE	POLYPROPYLENE (PP)
Light Acids, Solvents	Stable
Fuels, Mineral Oils	Stable
Alcohol, Paints, Seawater	Stable

Table 5 – Mechanical, Thermal, Electrical, & Chemical Resistance Properties of Parker Polypropylene Inserts

**Clamp Hardware Material Options**

PARKER HPP SERIES CLAMP METALLIC HARDWARE			
METALLIC COMPONENTS	BASE PART CODE	CARBON STEEL COATING	STAINLESS STEEL
Hex Head Bolt	BCPH	Zinc-Nickel	316
Stacking Bolt	SBH	Zinc-Nickel	316
Weld Plates	WPH	Zinc-Phosphated	316
Channel Rail Adapter	CRA	Zinc-Nickel	316
Cover Plates	CPH	Zinc-Nickel	316
Stacking/Locking Plate	LPH	Zinc-Nickel	316
Rail Nut	RNH	Zinc-Nickel	316
Mounting Rail	RH/TSC	Plain & Oiled	316

Table 6 - Metallic components material & plating condition

**Heavy Series Clamp Kits:**

In addition to ordering as discrete components, clamps may also be ordered in kits that include inserts and required hardware for weld plate kits, mounting rail kits, and stacking kits. Three more common kit options are illustrated below that include: Weld Plate/Hex Bolt, Mounting Rail/Hex Bolt, and Stacking Kit. Consult factory or full Parker catalogs for additional content related to kit options, including kits with stainless steel hardware.

**Example: WPH5334.** Heavy series weld plate pipe kit for 1" nominal pipe that includes: (2) clamp 5334-HPP inserts, (2) hex bolts, (1) weld plate, and (1) cover plate.



Weld Plate Kit



Rail Nut Kit



Stacked Assembly Kit

BOX 1	BOX 2	CLAMP GROUP AND SIZING			
MOUNTING KIT PREFIX	PIPE KIT SIZING CODE	CLAMP GROUP #	NOMINAL PIPE SIZE	PIPE OD (in)	PIPE OD (mm)
WPH RNH SAH	4213	H4	1/2"	0.84	21.3
	4267	H4	3/4"	1.05	26.7
	5334	H5	1"	1.31	33.4
	5422	H5	1 1/4"	1.66	42.2
	6483	H6	1 1/2"	1.90	48.3
	6603	H6	2"	2.38	60.3
MOUNTING KIT PREFIX	TUBE KIT SIZING CODE	CLAMP GROUP #	INCH TUBE OD	TUBE OD (in)	TUBE OD (mm)
WPH RNH SAH	3095	H3	3/8"	0.37	9.4
	3127	H3	1/2"	0.50	12.7
	3160	H3	5/8"	0.63	16.0
	4190	H4	3/4"	0.75	19.1
	4254	H4	1"	1.00	25.4
	5320	H5	1 1/4"	1.25	31.8
	5381	H5	1 1/2"	1.50	38.1
	6508	H6	2"	2.00	50.8
	6635	H6	2 1/2"	2.50	63.5
	7762	H7	3"	3.00	76.2
MOUNTING KIT PREFIX	100R2 HOSE SIZING CODE	CLAMP GROUP #	HOSE ID	HOSE OD (in)	HOSE OD (mm)
WPH RNH SAH	4150H	H4	1/4"	0.59	15.0
	4198H	H4	3/8"	0.78	19.8
	4221H	H4	1/2"	0.87	22.1
	4251H	H4	5/8"	0.99	25.1
	4292H	H4	3/4"	1.15	29.2
	6378H	H6	1"	1.49	37.8
	6484H	H6	1 1/4"	1.91	48.4
	6544H	H6	1 1/2"	2.14	54.4
MOUNTING KIT PREFIX	COMPACT SPIRAL HOSE SIZING CODE	CLAMP GROUP #	HOSE ID	HOSE OD (in)	HOSE OD (mm)
WPH RNH SAH	4213H	H4	1/2"	0.84	21.3
	4250H	H4	5/8"	0.98	25.0
	4280H	H4	3/4"	1.10	28.0
	6354H	H6	1"	1.39	35.4
	6445H	H6	1 1/4"	1.75	44.5
	6350H	H6	1 1/2"	2.09	53.0
	6680H	H6	2"	2.68	68.0

Table 7 – Parker Heavy Series Clamp Kits Nomenclature

**Bolt tightening torque and pipe shearing forces**

The indicated bolt tightening torque and axial pipe shearing forces refer to the assembly with cover plates, non-stacked, using hex bolts. Additional tightening torques and shearing force values for Standard Series Clamps and Metric Clamps are published in Parker Catalogs 4300 and 4100GB.

The forces values in the accompanying table represent the resistance to sliding provided by the clamps in the axial direction. Sliding (shear) may occur in clamps exceeding values in chart or at lower values due to other factors such as undersized tube or pipe, any friction modifiers, or insufficiently tightened hardware.

PARKER HPP SERIES HEAVY CLAMPS						
CLAMP GROUP	BOLT THREAD (UNC)	BOLT THREAD (metric)	POLYPROPYLENE (PP)			
			BOLT TORQUE (Nm)	BOLT TORQUE (ft-lb)	F PIPE SHEARING FORCE (kN)	F PIPE SHEARING FORCE (lbf)
H3	3/8-16	M10	12	9	1.6	360
H4	3/8-16	M10	12	9	2.9	651
H5	3/8-16	M10	15	11	3.3	740
H6	7/16-14	M12	30	22	8.2	1843
H7	5/8-11	M16	45	33	11.0	2475

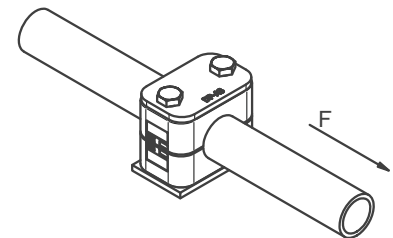


Fig. 14 – Shear force illustration

Table 8 – Bolt tightening torque & shearing force resistance – Heavy Parklump Series

**Recommended Clamp Spacing**

The following clamp spacing guidelines correspond to the respective outside tube/pipe diameters for static loads. For heavy pipe loading, vibration and cycling, additional clamps may be required. These pipe clamp spacing guidelines are provided for reference and are generally applicable to industrial piping rules. Consult specific type approval registrar or code compliance requirement for additional tube and pipe clamp spacing recommendations. See Table 9 and Figure 15.

NOMINAL PIPE SIZE	FITTING SIZE	A (inch)	B (inch)	C (inch)
3/4	12	1.5-2.5	55-60	4.5-5.5
1	16	2.0-3.0	80-85	5.5-7.5
1 1/2	24	3.0-4.0	90-100	8-10
2	32	4.0-5.0	90-100	10-11

Table 9 – Pipe Clamping Guide

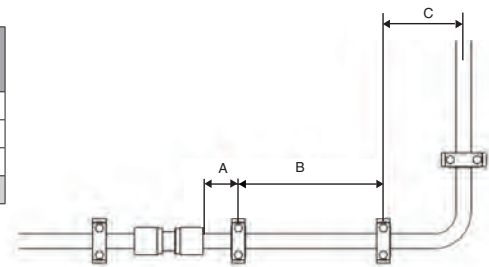


Fig. 15 – Clamp Spacing Layout

**Clamps for Hoses**

Parker’s Parklump Heavy series hose are specifically designed for the requirements of hoses. The smooth inside diameter profile of the clamps protects hoses from damage during normal hydraulic operation where hoses can shorten and expand during pressure cycling. See Figure 16.



Fig. 16 – Parker hose clamp stacked assembly with smooth inside profile

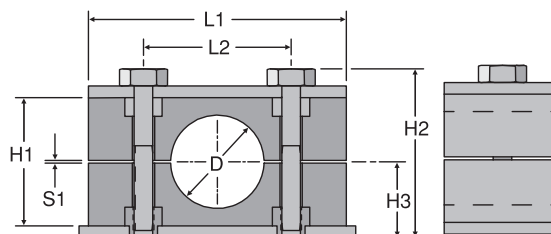
**Supporting at Bends**

Tube and pipe bends must be fixed with clamps adjacent to both sides of the bend for proper support as shown. See Figure 15.

# Clamp Halves

## Heavy Series

### DIN 3015, Part 2 - UNC Hardware



TUBE CLAMP HALVES (HEAVY)											
CLAMP INSERTS PART NUMBER (1 UNIT = 2 HALVES)	TUBE SIZE	CLAMP GROUP #	D (DIA)		H1	H2	H3	L1	L2	S1	POLYPROPYLENE FROM STOCK
			(in)	(mm)							
3095-HPP	3/8"	H3	0.37	9.4	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	19.1	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	31.8	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-HPP	2 1/2"	H6	2.50	63.5	3.50	4.61	2.17	4.52	3.54	0.07	*
7762-HPP	3"	H7	3.00	76.2	4.72	5.74	2.75	5.98	4.80	0.07	*

**Notes:**

One clamp set includes two identical halves of polypropylene material.

Standard material is Polypropylene, Polyamide and Aluminum clamp materials available upon request.

Tube and Pipe clamps are black in color and incorporate internal ribs/tension clearance.

Hose clamps are green in color and incorporate a smooth inside surface and relief for minor hose expansion.

Parker Standard Series, Twin Series, Heavy Twin Series, and Metric Series clamps are available in Catalog 4300

SCHEDULE PIPE CLAMP HALVES (HEAVY)											
CLAMP INSERTS PART NUMBER (1 UNIT = 2 HALVES)	PIPE TUBE SIZE	CLAMP GROUP #	D (DIA)		H1	H2	H3	L1	L2	S1	POLYPROPYLENE FROM STOCK
			(in)	(mm)							
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	2.38	60.3	3.50	4.61	2.17	4.52	3.54	0.07	*

100R2 HYDRAULIC HOSE CLAMP HALVES (HEAVY INSIDE SMOOTH)											
CLAMP INSERTS PART NUMBER (1 UNIT = 2 HALVES)	HOSE OD SIZE	CLAMP GROUP #	D (DIA)		H1	H2	H3	L1	L2	S1	POLYPROPYLENE FROM STOCK
			(in)	(mm)							
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	*

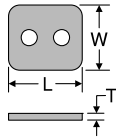
PARKER COMPACT SPIRAL HOSE CLAMP HALVES (HEAVY INSIDE SMOOTH)											
CLAMP INSERTS PART NUMBER (1 UNIT = 2 HALVES)	HOSE OD SIZE	CLAMP GROUP #	D (DIA)		H1	H2	H3	L1	L2	S1	POLYPROPYLENE FROM STOCK
			(in)	(mm)							
H4213-HPP	1/2"	H4	0.84	21.3	1.83	2.80	1.26	2.75	1.77	0.02	*
H4250-HPP	5/8"	H4	0.98	25.0	1.83	2.80	1.26	2.75	1.77	0.02	*
H4280-HPP	3/4"	H4	1.10	28.0	1.83	2.80	1.26	2.75	1.77	0.02	*
H6354-HPP	1"	H6	1.39	35.4	3.42	4.61	2.17	4.52	3.54	0.02	*
H6445-HPP	1 1/4"	H6	1.75	44.5	3.42	4.61	2.17	4.52	3.54	0.07	*
H6350-HPP	1 1/2"	H6	2.09	53.0	3.42	4.61	2.17	4.52	3.54	0.07	*
H6680-HPP	2"	H6	2.68	68.0	3.42	4.61	2.17	4.52	3.54	0.02	*

**WARNING:**

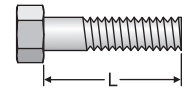
This product can expose you to chemicals including 1,4-Dioxane which is known to the State of California to cause cancer. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

Dimensions provided for reference only, subject to change

**CPH**  
Cover Plate Heavy



**BCPH**  
Hex Head Cap Screw  
(2 required per clamp set)



TUBE FITTING PART #	CLAMP GROUP #	L LENGTH		W WIDTH		T THICKNESS		STANDARD FROM STOCK	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	-S	-SS
CPH-3	H3	2.16	55	1.18	30	0.31	8	*	*
CPH-4	H4	2.75	70	1.18	30	0.31	8	*	*
CPH-5	H5	3.34	85	1.18	30	0.31	8	*	*
CPH-6	H6	4.52	115	1.77	45	0.39	10	*	*
CPH-7	H7	5.98	152	2.36	60	0.39	10	*	*

Steel: Zinc Nickel Plated. Stainless Steel: 316

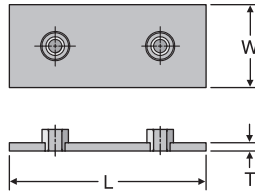
**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

TUBE FITTING PART #	CLAMP GROUP #	L LENGTH (in)	UNC THREAD	STANDARD FROM STOCK	
				-S	-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	*	*

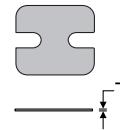
Steel: Zinc Nickel Plated. Grade 5. Stainless Steel: 316

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**WPH**  
Weld Plate Heavy



**LPH**  
Locking Plate Heavy  
for stacking



TUBE FITTING PART #	CLAMP GROUP #	UNC THREAD	L LENGTH		W WIDTH		T THICKNESS		STANDARD FROM STOCK	
			(in)	(mm)	(in)	(mm)	(in)	(mm)	-S	-SS
WPH-3	H3	3/8-16	2.88	73	1.18	30	0.31	8	*	*
WPH-4	H4	3/8-16	3.34	85	1.18	30	0.31	8	*	*
WPH-5	H5	3/8-16	3.94	100	1.18	30	0.31	8	*	*
WPH-6	H6	7/16-14	5.51	140	1.79	45	0.39	10	*	*
WPH-7	H7	5/8-11	7.09	180	2.36	60	0.39	10	*	*

Steel 1020, zinc phosphate plated. Stainless Steel: 316

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

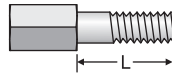
TUBE FITTING PART #	CLAMP GROUP #	T THICKNESS (in)	T THICKNESS (mm)	STANDARD FROM STOCK
				-S
LPH-3	H3	0.31	8	*
LPH-4	H4	0.31	8	*
LPH-5	H5	0.31	8	*
LPH-6	H6	0.39	10	*
LPH-7	H7	0.39	10	*

Steel: Zinc Nickel Plated. Stainless Steel: 316 upon request

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Dimensions provided for reference only, subject to change

**SBH**  
Stacking Bolt Heavy

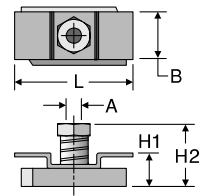


TUBE FITTING PART #	CLAMP GROUP #	L LENGTH (in)	UNC THREAD	STANDARD FROM STOCK	
				-S	-SS
SBH-3	H3	1.02	3/8-16	*	*
SBH-4	H4	1.61	3/8-16	*	*
SBH-5	H5	2.01	3/8-16	*	*
SBH-6	H6	3.27	7/16-14	*	*
SBH-7	H7	4.33	5/8-11	*	*

Steel: Zinc Nickel Plated. Stainless Steel: 316 upon request

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**CRA**  
Channel Rail Adapter (UNC)

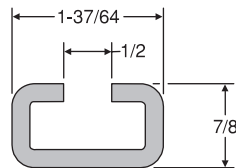


TUBE FITTING PART #	CLAMP GROUP #	THREAD "A" UNC	L in (mm)	B in (mm)	H1 in (mm)	H2 in (mm)	STANDARD FROM STOCK	
			-S	-SS				
CRA 3-5	H3, H4, H5	3/8-16	1.37 (35)	0.86 (22)	0.73 (18.5)	1.08 (27.5)	*	*
			1.77 (45)	0.98 (25)	0.67 (17)	1.08 (27.5)	*	*
CRA 6	H6	7/16-14					*	*

Steel: Zinc Nickel Plated. Stainless Steel upon request.  
For use with industrial channel rails/struts (Parker does not supply)

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**RH / TSC**  
Mounting Rail Heavy  
For use with RNH rail nuts

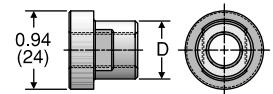


TUBE FITTING PART #	ALT TUBE FITTING PART #	CLAMP GROUP #	LENGTH	STANDARD FROM STOCK	
				-S	-SS
R1H	TSC1X	ALL	3.28 ft (1 meter)	*	*
R2H	TSC2X	ALL	6.56 ft (2 meters)	*	*

Steel: Unplated & oiled. Stainless Steel: 316

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**RNH**  
Mounting Rail Nut Heavy  
For use with RH/TSC mounting rail



TUBE FITTING PART #	CLAMP GROUP #	D DIAMETER		THREAD	STANDARD FROM STOCK	
		(in)	(mm)		-S	-SS
RNH-10	H3, H4, H5	0.70	18	3/8-16	*	*
RNH-12	H6	0.78	20	7/16-14	*	*

Steel: Zinc Nickel Plated. Stainless Steel: 316

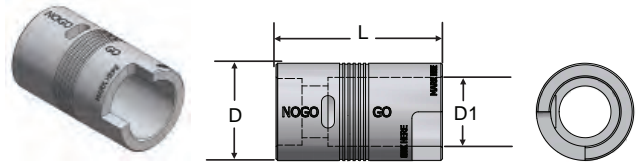
**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Dimensions provided for reference only, subject to change

# PH-P-GAUGE

## Phastite Pipe Go/No-Go Marking Gauge

CONSULT FABRICATION GUIDE FOR USE. Use of gauge is required to assure pipe is within appropriate tolerance and to properly mark pipe during fabrication



TUBE FITTING PART #	PIPE SIZE (in)	L (in)	D (in)	D1 (in)	WEIGHT (LBS)
PH-12P-GAUGE-D	3/4	2.81	1.50	1.05	0.73
PH-16P-GAUGE-D	1	3.20	1.88	1.32	1.26
PH-24P-GAUGE-D	1 1/2	4.40	2.50	1.90	2.58
PH-32P-GAUGE-D	2	5.30	3.00	2.38	3.86

Material: Aluminum

Dimensions provided for reference only, subject to change

## Phastool 100

### Hydraulic Phastite Swaging Tool

An efficient and dependable non-welded piping fabrication tool used for permanently swaging Phastite fittings to pipe. Swaging is accomplished through hydraulic power provided by a 10,000 psi/70 Mpa pump.

The equipment is designed to be bench mounted or can be used while within the provided shipping and storage crate by removing the side panels. The Phastool system is provided in convenient Equipment and Tooling kits available on the following page.

#### PHASTOOL 100:

- Swages Phastite fittings 3/4"-2" (DN20-DN50), schedules 40/STD, 80/XS, 160, and XXS
- Cycle time: 30 seconds
- Weight: 495 lbs/220 kg
- Comprehensive set-up fabrication, routing, and troubleshooting instructions are included within the detailed ***Phastool 100 Design and Installation Guide***.
- Pump can be provided with optional pressure limiting valve (recommended for 3/4" size)

Parker recommends using pump 900085 and NOT utilizing a "high-flow" electric pump commonly used on other TFD equipment.



Fig. 17 – Phastool 100

**⚠ WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)



Fig. 18 – Electric Pump (900085)



Fig. 19 – Optional electric pump with pressure limiting valve

Dimensions provided for reference only, subject to change



## Phastool EQUIPMENT KIT:

<b>Description</b>	<b>Part Number</b>
Phastool 100 Kit .....	<b>PHASTOOL 100 KIT</b>

**PHASTOOL 100 KIT Includes:**

Phastool 100.....	<b>PT100-3000</b>
Hydraulic Pump.....	<b>900085</b>
Pressure Gauge, 10,000 psi/70 MPa.....	<b>900044</b>
Pressure Gauge Tee.....	<b>6 R6LO-S</b>
Pump Adapter.....	<b>6 G6L-S</b>
Hose Assembly, 10,000 psi/70 MPa .....	<b>910004</b>
Tool to hose swivel adapter.....	<b>6 C6LO-S</b>
Tool to hose adapter.....	<b>6 F5OLO-S</b>
Phastool Shipping/Storage Crate (wood) .....	<b>Included</b>

## PHASTOOL TOOLING KIT:

<b>Description</b>	<b>Part Number</b>
Phastool Complete Tooling Kit.....	<b>PHASTOOL 100 TOOL KIT</b>

**PHASTOOL 100 TOOL KIT** Includes all die sets for the complete size range of Phastite fittings and corresponding pipe measuring/marketing gauges. The kit includes a heavy constructed wood shipping and storage crate with divided sections to store individual die sets and gauges. See **Table 10** for complete listing of kit contents

**WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

PHASTOOL 100 TOOL KIT CONTENTS					
SCHEDULE PIPE SIZE	ISO/DN PIPE SIZE	PIPE GAUGE PART #	FITTING DIE PART #	PIPE DIE PART #	ELBOW DIE PART #
		Weight (lb / kg)	Weight (lb / kg)	Weight (lb / kg)	Weight (lb / kg)
3/4"	20	<b>PH-12P-GAUGE-D</b>	<b>PT100-PD2075B</b>	<b>PT100-PD2075A</b>	<b>PT100-PD2075E</b>
		.73 lb / .3 kg	24 lb / 10.7 kg	24 lb / 10.7 kg	17 lb / 7.5 kg
1"	25	<b>PH-16P-GAUGE-D</b>	<b>PT100-PD2100B</b>	<b>PT100-PD2100A</b>	<b>PT100-PD2100E</b>
		1.26 lb / .56 kg	21 lb / 9.4 kg	21 lb / 9.4 kg	17 lb / 7.5 kg
1 1/2"	38	<b>PH-24P-GAUGE-D</b>	<b>PT100-PD2150B</b>	<b>PT100-PD2150A</b>	<b>PT100-PD2150E</b>
		2.58 lb / 1.5 kg	21 lb / 9.4 kg	21 lb / 9.4 kg	17 lb / 7.5 kg
2"	50	<b>PH-32P-GAUGE-D</b>	<b>PT100-PD2200B</b>	<b>PT100-PD2200A</b>	N/A
		3.86 lb / 1.7 kg	15 lb / 6.7 kg	15 lb / 6.7 kg	

**Table 10 – Phastool 100 Tooling Kit Components**

Tooling is constructed from hardened alloy carbon steel with black oxide finish  
 Pipe measuring/marketing gauges constructed from Aluminum  
 Individual die sets and pipe measuring/marketing gauges also sold separately (non-kitted)

Dimensions provided for reference only, subject to change

## Phastite Assembly and Installation

Email the Tube Fitting Division ([tfd.support@support.parker.com](mailto:tfd.support@support.parker.com)) to obtain the Phastite Design and Installation guide for set up and operation instructions of the Phastool 100 equipment and tooling. This comprehensive guide provides design, fabrication, installation and troubleshooting guidelines for Phastite and complementary products.



Fig. 20 – Phastool 100

## Line Terminations & Access Points

The Phastite system offers numerous standard options to provide connection to fluid power components and for line terminations/access points such as may be required for flushing, pressure testing, or connecting to tube or flex hoses. Line terminations such as SAE/Dual Seal series blind flange and plugs can be found in the preceding pages and the PH-G5-FS series female ORB connection provides options to common threaded interfaces such as NPT, 37° flare, compression, and other common fluid power interfaces. See **Figure 20** for illustration.



Fig. 21 - PH-G5-FS ORB Threaded Phastite Connector

## Q4OW3 Pipe Stubs

The Phastite system is fully integrated into Dual Seal/Seal Sub flanges. Parker’s line of Q4OW3 fittings shown in **Figure 21** have been developed to provide unparalleled flexibility. Available in 18 catalogued pipe size/schedule/flange pairings, Q4OW3 pipe stubs serve as stand offs, extenders, and even weld adapters. They can be cut to length and swaged directly to Phastite fittings. These problem solvers minimize the requirements for non-catalogued Phastite fittings and blocks.



Fig. 22 - Versatile Q4OW3 Pipe Stubs

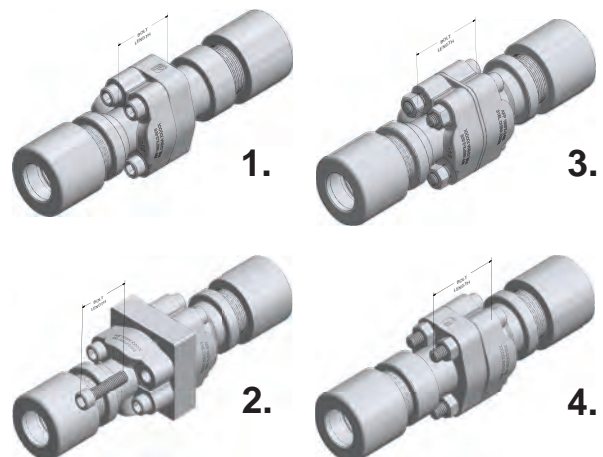
## Flange Service Breaks

There are several options for providing SAE/ISO Code 61/Code 62 and Dual Seal/Seal Sub service breaks when connecting pipe-to-pipe with flanges. The following service break pairing options are available:

1. Split Flange x Female Pad Flange
2. Split Flange x Split Flange with Threaded Connector Plate
3. Split Flange x Split Flange with Connector Plate (Code 62 only)
4. Female Pad Flange with Floating Q4 Insert (Dual Seal only)

ANSI B16.5 service break options are available upon request

Consult catalog tables for specific configuration availability. Consult the Phastite Service Break Bolting Guide on **Page 51** for hardware requirements.



## Metric & UNC Bolting for 4-Bolt Flanges

Both SAE J518 and ISO 6162 incorporate provisions for the use of UNC and Metric hardware. Split flanges clamps, Phastite fittings, flange blocks, connector plates, blind flanges, and other catalogued configurations are designed with clearance holes that accommodate both UNC and Metric hardware. The exception to this is 1"/DN25 Code 62 where clearance holes are designed to accommodate only 7/16-14 UNC bolting. Clearance holes for M12 hardware is available upon request.

## Phastite Bolting Guide for Service Break Pairings

Unless listed under the part table in the catalog, Parker does not provide bolting hardware. Bolting lengths for individual fittings are listed in the catalog tables. For Phastite service break connection pairings, **consult Table 11**. This Phastite service break bolting guide provides UNC bolt/screw lengths for several Phastite service break pairing options to assure a minimum required full thread engagement.

This bolting guide includes provisions for SAE/ISO Code 62 and Dual Seal/Seal Sub stainless steel hardware. Additional bolting guidance for carbon steel hardware and SAE/ISO Code 61 is available upon request.


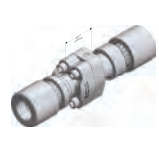

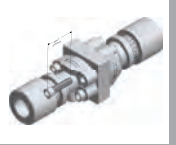
Phastite Service Break Pairings Bolting Matrix					Male Split Flange Female Pad Flange w/ Clearance Holes	Male Split Flange Female Threaded Pad Flange	Male Split/Captive Flanges with CP2-1/8 plate	Male Split Flanges w/ Threaded Connector Plate
								
Pairings Bolting Matrix	SCREW THREAD (UNC)	MIN FULL THREAD ENGAGEMENT REQUIRED (in.)	BOLT GRADE ***316 STAINLESS STEEL	NUT GRADE ***316 STAINLESS STEEL	Q2-MS/Q2B-FS Q4-MS/Q4B-FS 2 x Q4-FS / Q4 Insert	Q2-MS/Q2P-FS Q4-MS/Q4P-FS	2 x Q2-MS / CP2-1/8 LG	2 x Q2-MS / HQ2P 2 x Q4-MS / HQ4P
SHCS / HHCS NOMINAL SCREW LENGTH - (inches)								
-8	5/16-18	0.83	ASTM A240	8M	1.75, 2.00	*1.25	2.00	*1.25
-12	3/8-16	1.00	ASTM A240	8M	2.25	*1.50	2.25	*1.50
-16	7/16-14	1.06	ASTM A240	8M	2.50, 2.75	*1.75	2.75	*1.75
-20	1/2-13	1.00	ASTM A240	8M	3.00	*1.75	3.00	*1.75
-20x16 **	1/2-13	1.00	ASTM A240	8M	3.00	*1.75	N/A	*1.75
-24	5/8-11	1.38	ASTM A240	8M	N/A	*2.25	3.50	*2.25
-32	3/4-10	1.50	ASTM A240	8M	N/A	*2.75	4.00	*2.75

Table 11 –Assembly Torques for SAE/ISO Flanges

\* Uses standard split flange kit bolt/screw lengths

\*\* 20-16 jump down flange size, available in Dual Seal only, consult catalog tables for available configurations

\*\*\* Grades for 316 hardware reflected in chart, but A286 alloy and 304 can also be used.

Dimensions provided for reference only, subject to change

## Assembly of Parker 4-Bolt Flanges

Steps to properly assemble SAE/ISO and Dual Seal Flanges:

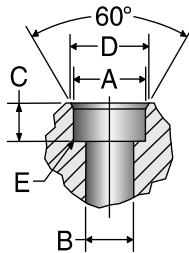
1. Inspect components to ensure that male and female port threads and sealing surfaces are free of burrs, nicks and scratches, or any foreign material.
2. Lubricate face seal & radial seal (for Dual Seal) o-rings
3. Position flange and clamp halves.
4. Insert cap screws/bolts through clamp halves.
5. The use of flat washers **is** recommended. For carbon steel bolting applications, use hardened flat washers. Lockwashers are not recommended per SAE/ISO guidance.
6. For stainless steel, apply an appropriate anti-seize compound to the bolts & female threads to resist galling
7. Hand tighten bolts
8. Torque bolts in diagonal sequence (see Fig. 23) in small increments to the appropriate torque level listed in Tables 12 and 13.

Flange Dash Size	Flange Size SAE	Flange Size ISO/DN	UNC Bolt (SAE J518)	Assy Torque (+10%/-0) ft-lbs	Metric Bolt (ISO 6162)	Assy Torque (+10%/-0) N-m
SAE J518/ISO 6162-1 Code 61						
-8	1/2	13	5/16-18	17	M8	24
-12	3/4	19	3/8-16	31	M10	50
-16	1	25	3/8-16	31	M10	50
-20	1 1/4	32	7/16-14	52	M10	50
-24	1 1/2	38	1/2-13	77	M12	92
-32	2	51	1/2-13	77	M12	92
-40	2 1/2	64	1/2-13	77	M12	92

Flange Dash Size	Flange Size SAE	Flange Size ISO/DN	UNC Bolt (SAE J518)	Assy Torque (+10%/-0) ft-lbs	Metric Bolt (ISO 6162)	Assy Torque (+10%/-0) N-m
SAE J518/ISO 6162-2 Code 62						
-8	1/2	13	5/16-18	17	M8	24
-12	3/4	19	3/8-16	31	M10	50
-16	1	25	7/16-14	52	M12	92
-20	1 1/4	32	1/2-13	77	M12	130
-24	1 1/2	38	5/8-11	155	M16	210
-32	2	51	3/4-10	265	M20	400

Tables 12 – Assembly Torques for SAE/ISO Flanges

## Port Dimensions of Dual Seal Flanges



Dual Seal/Seal-Sub Flanges Port Dimensions				
A (in.)	B (in.)	C (in.)	D C'Sink	E Radius (in.)
0.750-0.752	0.500	0.400	0.820 x 60°	0.02
1.375-1.377	0.938	0.400	1.445 x 60°	0.02
1.375-1.377	0.938	0.400	1.445 x 60°	0.02
1.750-1.752	1.312	0.530	1.820 x 60°	0.02
1.874-1.876	1.510	0.530	1.944x 60°	0.02

Fig. 23 - Dimensions & Illustration of Dual Seal/Seal Sub Port (Modifications to SAE J518-2/Code 62 Port)

Flange Dash Size	Flange Size SAE	UNC Bolt (SAE J518)	Assy Torque (+10%/-0) ft-lbs
Dual Seal/Seal Sub Flanges			
-8	1/2	5/16-18	17
-16	1	7/16-14	52
-2016	1 1/4 x 1	1/2-13	77
-24	1 1/2	5/8-11	155
-32	2	3/4-10	265

Table 13 – Assembly Torques for Dual Seal Flanges

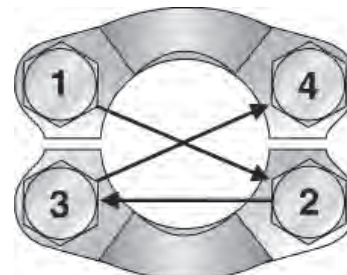


Fig. 24 – Bolt Tightening Sequencing for SAE/ISO & Dual Seal Flanges

## Offer of Sale

1. **Definitions.** As used herein, the following terms have the meanings indicated.
  - Buyer: means any customer receiving a Quote for Products from Seller.
  - Goods: means any tangible part, system or component to be supplied by the Seller.
  - Products: means the Goods, Services and/or Software as described in a Quote provided by the Seller.
  - Quote: means the offer or proposal made by Seller to Buyer for the supply of Products.
  - Seller: means Parker-Hannifin Corporation, including all divisions and businesses thereof.
  - Services: means any services to be supplied by the Seller.
  - Software: means any software related to the Products, whether embedded or separately downloaded.
  - Terms: means the terms and conditions of this Offer of Sale or any newer version of the same as published by Seller electronically at [www.parker.com/saleterms](http://www.parker.com/saleterms).
2. **Terms.** All sales of Products by Seller are contingent upon, and will be governed by, these Terms and, these Terms are incorporated into any Quote provided by Seller to any Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.
3. **Price; Payment.** The Products set forth in Seller's Quote are offered for sale at the prices indicated in Seller's Quote. Unless otherwise specifically stated in Seller's Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). All sales are contingent upon credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.
4. **Shipment; Delivery; Title and Risk of Loss.** All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise agreed, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective indicated shipping date will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.
5. **Warranty.** The warranty related to the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of use, whichever occurs first; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the completion of the Services by Seller; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer:  
**DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. BUYER AGREES AND ACKNOWLEDGES THAT UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".**
6. **Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.
7. **LIMITATION OF LIABILITY.** IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, NON-COMPLETION OF SERVICES, USE, LOSS OF USE OF, OR INABILITY TO USE THE PRODUCTS OR ANY PART THEREOF, LOSS OF DATA, IDENTITY, PRIVACY, OR CONFIDENTIALITY, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.**
8. **Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which are or become Buyer's property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.
9. **Special Tooling.** Special Tooling includes but is not limited to tooling, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Products. A tooling charge may be imposed for any Special Tooling. Such Special Tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in Special Tooling belonging to Seller that is utilized in the manufacture of the Products, even if such Special Tooling has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property in its sole discretion at any time.
10. **Security Interest.** To secure payment of all sums due, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.
11. **User Responsibility.** The Buyer through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. The Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and other technical information provided with the Product. If Seller provides Product options based upon data or specifications provided by the Buyer, the Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event the Buyer is not the end-user, Buyer will ensure such end-user complies with this paragraph.
12. **Use of Products; Indemnity by Buyer.** Buyer shall comply with all instructions, guides and specifications provided by Seller with the Products. **Unauthorized Uses.** If Buyer uses or resells the Products for any uses prohibited in Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products provided by Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tooling, equipment, plans,

- drawings, designs or specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing or tampering with the Products for any reason; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.
13. **Cancellations and Changes.** Buyer may not cancel or modify any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller, at any time, may change Product features, specifications, designs and availability.
14. **Limitation on Assignment.** Buyer may not assign its rights or obligations without the prior written consent of Seller.
15. **Force Majeure.** Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control ("Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.
16. **Waiver and Severability.** Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of these Terms by legislation or other rule of law shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.
17. **Termination.** Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.
18. **Ownership of Software.** Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.
19. **Indemnity for Infringement of Intellectual Property Rights.** Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights ("Intellectual Property Rights") except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by the Seller to the Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for such claims of infringement of Intellectual Property Rights.
20. **Governing Law.** These Terms and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.
21. **Entire Agreement.** These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.
22. **Compliance with Laws.** Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Product from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws.



## Parker Safety Guide for Selecting and Using Hose, Tubing, Fittings, Connectors, Conductors, Valves and Related Accessories

Parker Publication No. 4400-B.1

**WARNING:** Failure or improper selection or improper use of hose, tubing, fittings, assemblies, valves, connectors, conductors or related accessories (“Products”) can cause death, personal injury and property damage. Possible consequences of failure or improper selection or improper use of these Products include but are not limited to:

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocutation from high voltage electric powerlines.
- Contact with suddenly moving or falling objects that are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.
- Dangerously whipping Hose.
- Tube or pipe burst.
- Weld joint fracture.
- Contact with conveyed fluids that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity buildup or other sources of electricity.
- Sparking or explosion while spraying paint or flammable liquids.
- Injuries resulting from inhalation, ingestion or exposure to fluids.

Before selecting or using any of these Products, it is important that you read and follow the instructions below. No product from any division in Parker Fluid Connectors Group is approved for in-flight aerospace applications. For hoses and fittings used in in-flight aerospace applications, please contact Parker Aerospace Group.

### 1.0 GENERAL INSTRUCTIONS

**1.1 Scope:** This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) these Products. For convenience, all rubber and/or thermoplastic products commonly called “hose” or “tubing” are called “Hose” in this safety guide. Metallic tube or pipe are called “tube”. All assemblies made with Hose are called “Hose Assemblies”. All assemblies made with Tube are called “Tube Assemblies”. All products commonly called “fittings”, “couplings” or “adapters” are called “Fittings”. Valves are fluid system components that control the passage of fluid. Related accessories are ancillary devices that enhance or monitor performance including crimping, flaring, flanging, presetting, bending, cutting, deburring, swaging machines, sensors, tags, lockout handles, spring guards and associated tooling. This safety guide is a supplement to and is to be used with the specific Parker publications for the specific Hose, Fittings and Related Accessories that are being considered for use. Parker publications are available at [www.parker.com](http://www.parker.com). SAE J1273 ([www.sae.org](http://www.sae.org)) and ISO 17165-2 ([www.ansi.org](http://www.ansi.org)) also provide recommended practices for hydraulic Hose Assemblies, and should be followed.

**1.2 Fail-Safe:** Hose, Hose Assemblies, Tube, Tube Assemblies and Fittings can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Hose, Hose Assembly, Tube, Tube Assembly or Fitting will not endanger persons or property.

**1.3 Distribution:** Provide a copy of this safety guide to each person responsible for selecting or using Hose, Tube and Fitting products. Do not select or use Parker Hose, Tube or Fittings without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the Products.

**1.4 User Responsibility:** Due to the wide variety of operating conditions and applications for Hose, Tube and Fittings. Parker does not represent or warrant that any particular Hose, Tube or Fitting is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the Products.
- Assuring that the user’s requirements are met and that the application presents no health or safety hazards.
- Following the safety guide for Related Accessories and being trained to operate Related Accessories.
- Providing all appropriate health and safety warnings on the equipment on which the Products are used.
- Assuring compliance with all applicable government and industry standards.

**1.5 Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the Products being considered or used, or call 1-800-CPARKER, or go to [www.parker.com](http://www.parker.com), for telephone numbers of the appropriate technical service department.

### 2.0 HOSE, TUBE AND FITTINGS SELECTION INSTRUCTIONS

**2.1 Electrical Conductivity:** Certain applications require that the Hose be nonconductive to prevent electrical current flow. Other applications require the Hose and the Fittings and the Hose/Fitting interface to be sufficiently conductive to drain off static electricity. Extreme care must be exercised when selecting Hose, Tube and Fittings for these or any other applications in which electrical conductivity or nonconductivity is a factor.

The electrical conductivity or nonconductivity of Hose, Tube and Fittings is dependent upon many factors and may be susceptible to change. These factors include but are not limited to the various materials used to make the Hose and the Fittings, Fitting finish (some Fitting finishes are electrically conductive while others are nonconductive), manufacturing methods (including moisture control), how the Fittings contact the Hose, age and amount of deterioration or damage or other changes, moisture content of the Hose at any particular time, and other factors.

The following are considerations for electrically nonconductive and conductive Hose. For other applications consult the individual catalog pages and the appropriate industry or regulatory standards for proper selection.

**2.1.1 Electrically Nonconductive Hose:** Certain applications require that the Hose be nonconductive to prevent electrical current flow or to maintain electrical isolation. For applications that require Hose to be electrically nonconductive, including but not limited to applications near high voltage electric lines, only special nonconductive Hose can be used. The manufacturer of the equipment in which the nonconductive Hose is to be used must be consulted to be certain that the Hose, Tube and Fittings that are selected are proper for the application. Do not use any Parker Hose or Fittings for any such application requiring nonconductive Hose, including but not limited to applications near high voltage electric lines or dense magnetic fields, unless (i) the application is expressly approved in the Parker technical publication for the product, (ii) the Hose is marked “nonconductive”, and (iii) the manufacturer of the equipment on which the Hose is to be used specifically approves the particular Parker Hose, Tube and Fittings for such use.

**2.1.2 Electrically Conductive Hose:** Parker manufactures special Hose for certain applications that require electrically conductive Hose. Parker manufactures special Hose for conveying paint in airless paint spraying applications. This Hose is labeled “Electrically Conductive Airless Paint Spray Hose” on its lay-line and packaging. This Hose must be properly connected to the appropriate Parker Fittings and properly grounded in order to dissipate dangerous static charge buildup, which occurs in all airless paint spraying applications. Do not use any other Hose for airless paint spraying, even if electrically conductive. Use of any other Hose or failure to properly connect the Hose can cause a fire or an explosion resulting in death, personal injury, and property damage. All hoses that convey fuels must be grounded.

Parker manufactures a special Hose for certain compressed natural gas (“CNG”) applications where static electricity buildup may occur. Parker CNG Hose assemblies comply with the requirements of ANSI/IAS NGV 4.2; CSA 12.52, “Hoses for Natural Gas Vehicles and Dispensing Systems” ([www.ansi.org](http://www.ansi.org)). This Hose is labeled “Electrically Conductive for CNG Use”

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on its layline and packaging. This Hose must be properly connected to the appropriate Parker Fittings and properly grounded in order to dissipate dangerous static charge buildup, which occurs in, for example, high velocity CNG dispensing or transfer. Do not use any other Hose for CNG applications where static charge buildup may occur, even if electrically conductive. Use of other Hoses in CNG applications or failure to properly connect or ground this Hose can cause a fire or an explosion resulting in death, personal injury, and property damage. Care must also be taken to protect against CNG permeation through the Hose wall. See section 2.6, Permeation, for more information. Parker CNG Hose is intended for dispenser and vehicle use within the specified temperature range. Parker CNG Hose should not be used in confined spaces or unventilated areas or areas exceeding the specified temperature range. Final assemblies must be tested for leaks. CNG Hose Assemblies should be tested on a monthly basis for conductivity per ANSI/IAS NGV 4.2; CSA 12.52.

Parker manufactures special Hose for aerospace in-flight applications. Aerospace in-flight applications employing Hose to transmit fuel, lubricating fluids and hydraulic fluids require a special Hose with a conductive inner tube. This Hose for in-flight applications is available only from Parker's Stratoflex Products Division. Do not use any other Parker Hose for in-flight applications, even if electrically conductive. Use of other Hoses for in-flight applications or failure to properly connect or ground this Hose can cause a fire or an explosion resulting in death, personal injury and property damage. These Hose assemblies for in-flight applications must meet all applicable aerospace industry, aircraft engine and aircraft requirements.

- 2.2 Pressure:** Hose, Tube and Fitting selection must be made so that the published maximum working pressure of the Hose, Tube and Fittings are equal to or greater than the maximum system pressure. The maximum working pressure of a Hose, or Tube Assembly is the lower of the respective published maximum working pressures of the Hose, Tube and the Fittings used. Surge pressures or peak transient pressures in the system must be below the published maximum working pressure for the Hose, Tube and Fitting. Surge pressures and peak pressures can usually only be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressures and cannot be used to determine surge pressures or peak transient pressures. Published burst pressure ratings for Hose is for manufacturing test purposes only and is no indication that the Product can be used in applications at the burst pressure or otherwise above the published maximum recommended working pressure.
- 2.3 Suction:** Hoses used for suction applications must be selected to insure that the Hose will withstand the vacuum and pressure of the system. Improperly selected Hose may collapse in suction application.
- 2.4 Temperature:** Be certain that fluid and ambient temperatures, both steady and transient, do not exceed the limitations of the Hose, Tube, Fitting and Seals. Temperatures below and above the recommended limit can degrade Hose, Tube, Fittings and Seals to a point where a failure may occur and release fluid. Tube and Fittings performances are normally degraded at elevated temperature. Material compatibility can also change at temperatures outside of the rated range. Properly insulate and protect the Hose Assembly when routing near hot objects (e.g. manifolds). Do not use any Hose in any application where failure of the Hose could result in the conveyed fluids (or vapors or mist from the conveyed fluids) contacting any open flame, molten metal, or other potential fire ignition source that could cause burning or explosion of the conveyed fluids or vapors.
- 2.5 Fluid Compatibility:** Hose, and Tube Assembly selection must assure compatibility of the Hose tube, cover, reinforcement, Tube, Plating and Seals with the fluid media used. See the fluid compatibility chart in the Parker publication for the product being considered or used. This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis.
- Hose, and Tube that is chemically compatible with a particular fluid must be assembled using Fittings and adapters containing likewise compatible seals. Flange or flare processes can change Tube material properties that may not be compatible with certain requirements such as NACE
- 2.6 Permeation:** Permeation (that is, seepage through the Hose or Seal) will occur from inside the Hose or Fitting to outside when Hose or Fitting is used with gases, liquid and gas fuels, and refrigerants (including but not limited to such materials as helium, diesel fuel, gasoline, natural gas, phosphate esters, Skydrol, or LPG). This permeation may result in high concentrations of vapors which are potentially flammable, explosive, or toxic, and in loss of fluid. Dangerous explosions, fires, and other hazards can result when using the wrong Hose for such applications. The system designer must take into account the fact that this permeation

will take place and must not use Hose or Fitting if this permeation could be hazardous. The system designer must take into account all legal, government, insurance, or any other special regulations which govern the use of fuels and refrigerants. Never use a Hose or Fitting even though the fluid compatibility is acceptable without considering the potential hazardous effects that can result from permeation through the Hose or Tube Assembly.

Permeation of moisture from outside the Hose or Fitting to inside the Hose or Fitting will also occur in Hose or Tube assemblies, regardless of internal pressure. If this moisture permeation would have detrimental effects (particularly, but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used. The sudden pressure release of highly pressurized gas could also result in Explosive Decompression failure of permeated Seals and Hoses.

- 2.7 Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.
- 2.8 Routing:** Attention must be given to optimum routing to minimize inherent problems (kinking or flow restriction due to Hose collapse, twisting of the Hose, proximity to hot objects or heat sources). For additional routing recommendations see SAE J1273 and ISO 17165-2. Hose Assemblies have a finite life and should be installed in a manner that allows for ease of inspection and future replacement. Hose because of its relative short life, should not be used in residential and commercial buildings inside of inaccessible walls or floors, unless specifically allowed in the product literature. Always review all product literature for proper installation and routing instructions.
- 2.9 Environment:** Care must be taken to insure that the Hose, Tube and Fittings are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.
- 2.10 Mechanical Loads:** External forces can significantly reduce Hose, Tube and Fitting life or cause failure. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type Fittings or adapters may be required to insure no twist is put into the Hose. Use of proper Hose or Tube clamps may also be required to reduce external mechanical loads. Unusual applications may require special testing prior to Hose selection.
- 2.11 Physical Damage:** Care must be taken to protect Hose from wear, snagging, kinking, bending smaller than minimum bend radius and cutting, any of which can cause premature Hose failure. Any Hose that has been kinked or bent to a radius smaller than the minimum bend radius, and any Hose that has been cut or is cracked or is otherwise damaged should be removed and discarded. Fittings with damages such as scratches on sealing surfaces and deformation should be replaced.
- 2.12 Proper End Fitting:** See instructions 3.2 through 3.5. These recommendations may be substantiated by testing to industry standards such as SAE J517 for hydraulic applications, or MIL-A-5070, AS1339, or AS3517 for Hoses from Parker's Stratoflex Products Division for aerospace applications.
- 2.13 Length:** When determining the proper Hose or Tube length of an assembly, be aware of Hose length change due to pressure, Tube length change due to thermal expansion or contraction, and Hose or Tube and machine tolerances and movement must be considered. When routing short hose assemblies, it is recommended that the minimum free hose length is always used. Consult the hose manufacturer for their minimum free hose length recommendations. Hose assemblies should be installed in such a way that any motion or flexing occurs within the same plane.
- 2.14 Specifications and Standards:** When selecting Hose, Tube and Fittings, government, industry, and Parker specifications and recommendations must be reviewed and followed as applicable.
- 2.15 Hose Cleanliness:** Hose and Tube components may vary in cleanliness levels. Care must be taken to insure that the Hose and Tube Assembly selected has an adequate level of cleanliness for the application.
- 2.16 Fire Resistant Fluids:** Some fire resistant fluids that are to be conveyed by Hose or Tube require use of the same type of Hose or Tube as used with petroleum base fluids. Some such fluids require a special Hose, Tube, Fitting and Seal, while a few fluids will not work with any Hose at all. See instructions 2.5 and 1.5. The wrong Hose, Tube, Fitting or Seal may fail after a very short service. In addition, all liquids but pure water may burn fiercely under certain conditions, and even pure water leakage may be hazardous.



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- 2.17 Radiant Heat:** Hose and Seals can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the Hose or Seal. Performance of Tube and Fitting subjected to the heat could be degraded.
- 2.18 Welding or Brazing:** When using a torch or arc welder in close proximity to hydraulic lines, the hydraulic lines should be removed or shielded with appropriate fire resistant materials. Flame or weld spatter could burn through the Hose or Seal and possibly ignite escaping fluid resulting in a catastrophic failure. Heating of plated parts, including Hose Fittings and adapters, above 450°F (232°C) such as during welding, brazing or soldering may emit deadly gases. Any elastomer seal on fittings shall be removed prior to welding or brazing, any metallic surfaces shall be protected after brazing or welding when necessary. Welding and brazing filler material shall be compatible with the Tube and Fitting that are joined.
- 2.19 Atomic Radiation:** Atomic radiation affects all materials used in Hose and Tube assemblies. Since the long-term effects may be unknown, do not expose Hose or Tube assemblies to atomic radiation. Nuclear applications may require special Tube and Fittings.
- 2.20 Aerospace Applications:** The only Hose, Tube and Fittings that may be used for in-flight aerospace applications are those available from Parker's Stratoflex Products Division. Do not use any other Hose or Fittings for in-flight applications. Do not use any Hose or Fittings from Parker's Stratoflex Products Division with any other Hose or Fittings, unless expressly approved in writing by the engineering manager or chief engineer of Stratoflex Products Division and verified by the user's own testing and inspection to aerospace industry standards.
- 2.21 Unlocking Couplings:** Ball locking couplings or other Fittings with quick disconnect ability can unintentionally disconnect if they are dragged over obstructions, or if the sleeve or other disconnect member, is bumped or moved enough to cause disconnect. Threaded Fittings should be considered where there is a potential for accidental uncoupling.
- 3.0 HOSE AND FITTINGS ASSEMBLY AND INSTALLATION INSTRUCTIONS**
- 3.1 Component Inspection:** Prior to assembly, a careful examination of the Hose and Fittings must be performed. All components must be checked for correct style, size, catalog number, and length. The Hose must be examined for cleanliness, obstructions, blisters, cover looseness, kinks, cracks, cuts or any other visible defects. Inspect the Fitting and sealing surfaces for burrs, nicks, corrosion or other imperfections. Do NOT use any component that displays any signs of nonconformance.
- 3.2 Hose and Fitting Assembly:** Do not assemble a Parker Fitting on a Parker Hose that is not specifically listed by Parker for that Fitting, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. Do not assemble a Parker Fitting on another manufacturer's Hose or a Parker Hose on another manufacturer's Fitting unless (i) the engineering manager or chief engineer of the appropriate Parker division approves the Assembly in writing or that combination is expressly approved in the appropriate Parker literature for the specific Parker product, and (ii) the user verifies the Assembly and the application through analysis and testing. For Parker Hose that does not specify a Parker Fitting, the user is solely responsible for the selection of the proper Fitting and Hose Assembly procedures. See instruction 1.4.
- To prevent the possibility of problems such as leakage at the Fitting or system contamination, it is important to completely remove all debris from the cutting operation before installation of the Fittings. The Parker published instructions must be followed for assembling the Fittings on the Hose. These instructions are provided in the Parker Fitting catalog for the specific Parker Fitting being used, or by calling 1-800-CPARKER, or at [www.parker.com](http://www.parker.com).
- 3.3 Related Accessories:** Do not crimp or swage any Parker Hose or Fitting with anything but the listed swage or crimp machine and dies in accordance with Parker published instructions. Do not crimp or swage another manufacturer's Fitting with a Parker crimp or swage die unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division.
- 3.4 Parts:** Do not use any Parker Fitting part (including but not limited to socket, shell, nipple, or insert) except with the correct Parker mating parts, in accordance with Parker published instructions, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division.
- 3.5 Field Attachable/Permanent:** Do not reuse any field attachable Hose Fitting that has blown or pulled off a Hose. Do not reuse a Parker permanent Hose Fitting (crimped or swaged) or any part thereof. Complete Hose Assemblies may only be reused after proper inspection under section 4.0. Do not assemble Fittings to any previously used hydraulic Hose that was in service, for use in a fluid power application.
- 3.6 Pre-Installation Inspection:** Prior to installation, a careful examination of the Hose Assembly must be performed. Inspect the Hose Assembly for any damage or defects. DO NOT use any Hose Assembly that displays any signs of nonconformance.
- 3.7 Minimum Bend Radius:** Installation of a Hose at less than the minimum listed bend radius may significantly reduce the Hose life. Particular attention must be given to preclude sharp bending at the Hose to Fitting juncture. Any bending during installation at less than the minimum bend radius must be avoided. If any Hose is kinked during installation, the Hose must be discarded.
- 3.8 Twist Angle and Orientation:** Hose Assembly installation must be such that relative motion of machine components does not produce twisting.
- 3.9 Securement:** In many applications, it may be necessary to restrain, protect, or guide the Hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.
- 3.10 Proper Connection of Ports:** Proper physical installation of the Hose Assembly requires a correctly installed port connection insuring that no twist or torque is transferred to the Hose when the Fittings are being tightened or otherwise during use.
- 3.11 External Damage:** Proper installation is not complete without insuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage or damage to sealing surfaces are corrected or eliminated. See instruction 2.10.
- 3.12 System Checkout:** All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Hose maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using.
- 3.13 Routing:** The Hose Assembly should be routed in such a manner so if a failure does occur, the escaping media will not cause personal injury or property damage. In addition, if fluid media comes in contact with hot surfaces, open flame or sparks, a fire or explosion may occur. See section 2.4.
- 3.14 Ground Fault Equipment Protection Devices (GFEEDs): WARNING! Fire and Shock Hazard.** To minimize the danger of fire if the heating cable of a Multitube bundle is damaged or improperly installed, use a Ground Fault Equipment Protection Device. Electrical fault currents may be insufficient to trip a conventional circuit breaker.
- For ground fault protection, the IEEE 515:** ([www.ansi.org](http://www.ansi.org)) standard for heating cables recommends the use of GFEEDs with a nominal 30 milliampere trip level for "piping systems in classified areas, those areas requiring a high degree of maintenance, or which may be exposed to physical abuse or corrosive atmospheres".
- 4.0 TUBE AND FITTINGS ASSEMBLY AND INSTALLATION INSTRUCTIONS**
- 4.1 Component Inspection:** Prior to assembly, a careful examination of the Tube and Fittings must be performed. All components must be checked for correct style, size, material, seal, and length. Inspect the Fitting and sealing surfaces for burrs, nicks, corrosion, missing seal or other imperfections. Do NOT use any component that displays any signs of nonconformance.
- 4.2 Tube and Fitting Assembly:** Do not assemble a Parker Fitting with a Tube that is not specifically listed by Parker for that Fitting, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. The Tube must meet the requirements specified to the Fitting.
- The Parker published instructions must be followed for assembling the Fittings to a Tube. These instructions are provided in the Parker Fitting catalog for the specific Parker Fitting being used, or by calling 1-800-CPARKER, or at [www.parker.com](http://www.parker.com).
- 4.3 Related Accessories:** Do not preset or flange Parker Fitting components using another manufacturer's equipment or procedures unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. Tube, Fitting component and tooling must be checked for correct style, size and material. Operation and maintenance of Related Accessories must be in accordance with the operation manual for the designated Accessory.
- 4.4 Securement:** In many applications, it may be necessary to restrain, protect, or guide the Tube to protect it from damage by unnecessary flexing, pressure surges, vibration, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.

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- 4.5 **Proper Connection of Ports:** Proper physical installation of the Tube Assembly requires a correctly installed port connection insuring that no torque is transferred to the Tube when the Fittings are being tightened or otherwise during use.
- 4.6 **External Damage:** Proper installation is not complete without insuring that tensile loads, side loads, flattening, potential abrasion, thread damage or damage to sealing surfaces are corrected or eliminated. See instruction 2.10.
- 4.7 **System Checkout:** All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Tube Assembly maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using.
- 4.8 **Routing:** The Tube Assembly should be routed in such a manner so if a failure does occur, the escaping media will not cause personal injury or property damage. In addition, if fluid media comes in contact with hot surfaces, open flame or sparks, a fire or explosion may occur. See section 2.4.
- 5.0 **HOSE AND FITTING MAINTENANCE AND REPLACEMENT INSTRUCTIONS**
- 5.1 Even with proper selection and installation, Hose life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a possible Hose failure, and experience with any Hose failures in the application or in similar applications should determine the frequency of the inspection and the replacement for the Products so that Products are replaced before any failure occurs. Certain products require maintenance and inspection per industry requirements. Failure to adhere to these requirements may lead to premature failure. A maintenance program must be established and followed by the user and, at minimum, must include instructions 5.2 through 5.7
- 5.2 **Visual Inspection Hose/Fitting:** Any of the following conditions require immediate shut down and replacement of the Hose Assembly:
  - Fitting slippage on Hose;
  - Damaged, cracked, cut or abraded cover (any reinforcement exposed);
  - Hard, stiff, heat cracked, or charred Hose;
  - Cracked, damaged, or badly corroded Fittings;
  - Leaks at Fitting or in Hose;
  - Kinked, crushed, flattened or twisted Hose; and
  - Blistered, soft, degraded, or loose cover.
- 5.3 **Visual Inspection All Other:** The following items must be tightened, repaired, corrected or replaced as required:
  - Leaking port conditions;
  - Excess dirt buildup/;
  - Worn clamps, guards or shields; and
  - System fluid level, fluid type, and any air entrapment.
- 5.4 **Functional Test:** Operate the system at maximum operating pressure and check for possible malfunctions and leaks. Personnel must avoid potential hazardous areas while testing and using the system. See section 2.2.
- 5.5 **Replacement Intervals:** Hose assemblies and elastomeric seals used on Hose Fittings and adapters will eventually age, harden, wear and deteriorate under thermal cycling and compression set. Hose Assemblies and elastomeric seals should be inspected and replaced at specific replacement intervals, based on previous service life, government or industry recommendations, or when failures could result in unacceptable downtime, damage, or injury risk. See section 1.2. Hose and Fittings may be subjected to internal mechanical and/or chemical wear from the conveying fluid and may fail without warning. The user must determine the product life under such circumstances by testing. Also see section 2.5.
- 5.6 **Hose Inspection and Failure:** Hydraulic power is accomplished by utilizing high pressure fluids to transfer energy and do work. Hoses, Fittings and Hose Assemblies all contribute to this by transmitting fluids at high pressures. Fluids under pressure can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure and handling the Hoses transporting the fluids. From time to time, Hose

Assemblies will fail if they are not replaced at proper time intervals. Usually these failures are the result of some form of misapplication, abuse, wear or failure to perform proper maintenance. When Hoses fail, generally the high pressure fluids inside escape in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High pressure fluids can and will penetrate the skin and cause severe tissue damage and possibly loss of limb. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a Hose failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the Hose Assembly. Simply shutting down the hydraulic pump may or may not eliminate the pressure in the Hose Assembly. Many times check valves, etc., are employed in a system and can cause pressure to remain in a Hose Assembly even when pumps or equipment are not operating. Tiny holes in the Hose, commonly known as pinholes, can eject small, dangerously powerful but hard to see streams of hydraulic fluid. It may take several minutes or even hours for the pressure to be relieved so that the Hose Assembly may be examined safely.

Once the pressure has been reduced to zero, the Hose Assembly may be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a Hose Assembly that has failed. Consult the nearest Parker distributor or the appropriate Parker division for Hose Assembly replacement information.

Never touch or examine a failed Hose Assembly unless it is obvious that the Hose no longer contains fluid under pressure. The high pressure fluid is extremely dangerous and can cause serious and potentially fatal injury.

- 5.7 **Elastomeric seals:** Elastomeric seals will eventually age, harden and deteriorate under thermal cycling and compression set. Elastomeric seals should be inspected and replaced.
- 5.8 **Refrigerant gases:** Special care should be taken when working with refrigeration systems. Sudden escape of refrigerant gases can cause blindness if the escaping gases contact the eye and can cause freezing or other severe injuries if it contacts any other portion of the body.
- 5.9 **Compressed natural gas (CNG):** Parker CNG Hose Assemblies should be tested after installation and before use, and at least on a monthly basis per instructions provided on the Hose Assembly tag. The recommended procedure is to pressurize the Hose and check for leaks and to visually inspect the Hose for damage and to perform an electrical resistance test.
  - Caution:** Matches, candles, open flame or other sources of ignition shall not be used for Hose inspection. Leak check solutions should be rinsed off after use.
- 6.0 **HOSE STORAGE**
- 6.1 **Age Control:** Hose and Hose Assemblies must be stored in a manner that facilitates age control and first-in and first-out usage based on manufacturing date of the Hose and Hose Assemblies. Unless otherwise specified by the manufacturer or defined by local laws and regulations:
  - 6.1.1 The shelf life of rubber hose in bulk form or hose made from two or more materials is 28 quarters (7 years) from the date of manufacture, with an extension of 12 quarters (3 years), if stored in accordance with ISO 2230;
  - 6.1.2 The shelf life of thermoplastic and polytetrafluoroethylene hose is considered to be unlimited;
  - 6.1.3 Hose assemblies that pass visual inspection and proof test shall not be stored for longer than 2 years.
  - 6.1.4 **Storage:** Stored Hose and Hose Assemblies must not be subjected to damage that could reduce their expected service life and must be placed in a cool, dark and dry area with the ends capped. Stored Hose and Hose Assemblies must not be exposed to temperature extremes, ozone, oils, corrosive liquids or fumes, solvents, high humidity, rodents, insects, ultraviolet light, electromagnetic fields or radioactive materials.

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