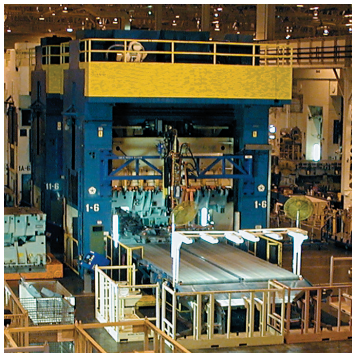

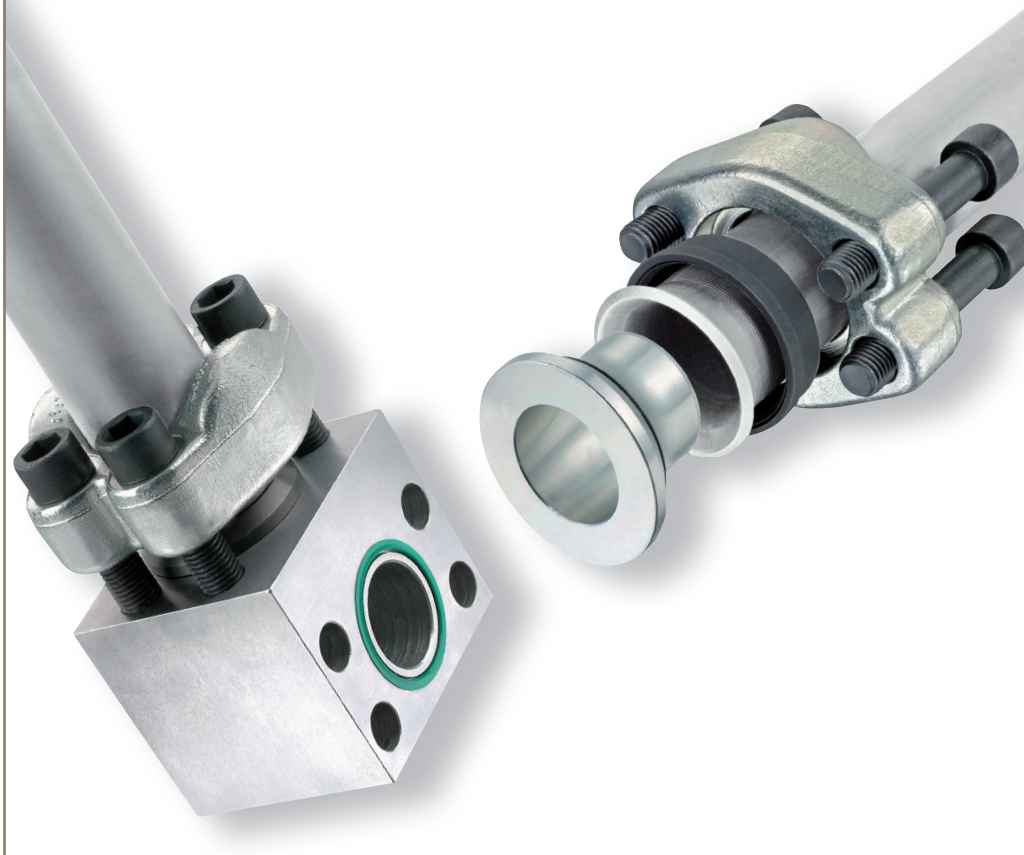

HPF – Parker High Performance Flange System

Non-welding flange technology for highest performance

Parker

ENGINEERING YOUR SUCCESS.

Note! The customer should provide the requisite certifications, classifications and test and inspection data whenever a quotation or order is placed.

For your safety!

Under certain circumstances, tube fittings can be subjected to extreme loadings such as vibrations and uncontrolled pressure peaks.

The reliability and safety of the products and their conformity to the applicable standards can only be assured by using genuine Parker components and following Parker assembly instructions.

Failure to follow this rule can adversely affect the functional safety and reliability of products, cause personal injury, property damage, and result in loss of your guarantee rights.

Subject to alteration

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Tube Fittings Division Europe

The market leader‘s expertise

Outstanding performance

Since 1929 the Parker Hannifin Corporation is a reliable partner in the sector of fluid power technology. Today Parker offers a variety of more than 100,000 quality products for many different industries and applications, making the company the manufacturer with the broadest experience and product range in the field of hydraulic and pneumatic components. Most of its expertise is based on the production of precision-made tube fittings, one of the first product groups of the corporation. A proof of Parker’s excellent performance.

Many years of experience in product design, engineering as well as application and production technology make the Tube Fittings Division Europe to a leading manufacturer - a position which is even more strengthened by sharing knowledge and technology within the huge family of the Parker Corporation.

Grand experience

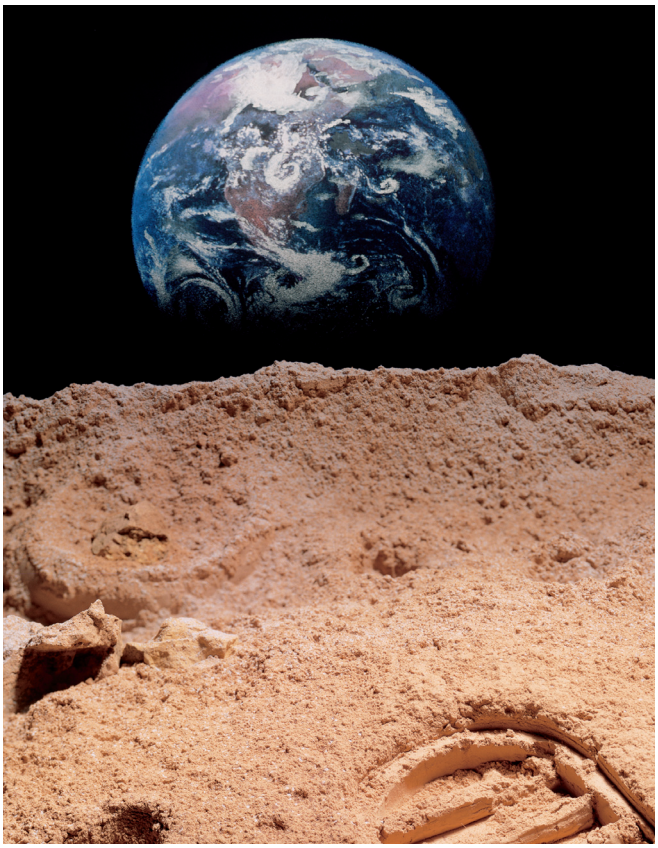
On the basis of multiple experience and knowledge gained about important industrial, mobile, offshore and further applications, Parker creates the broadest and best performing range of tube connection systems in the world.

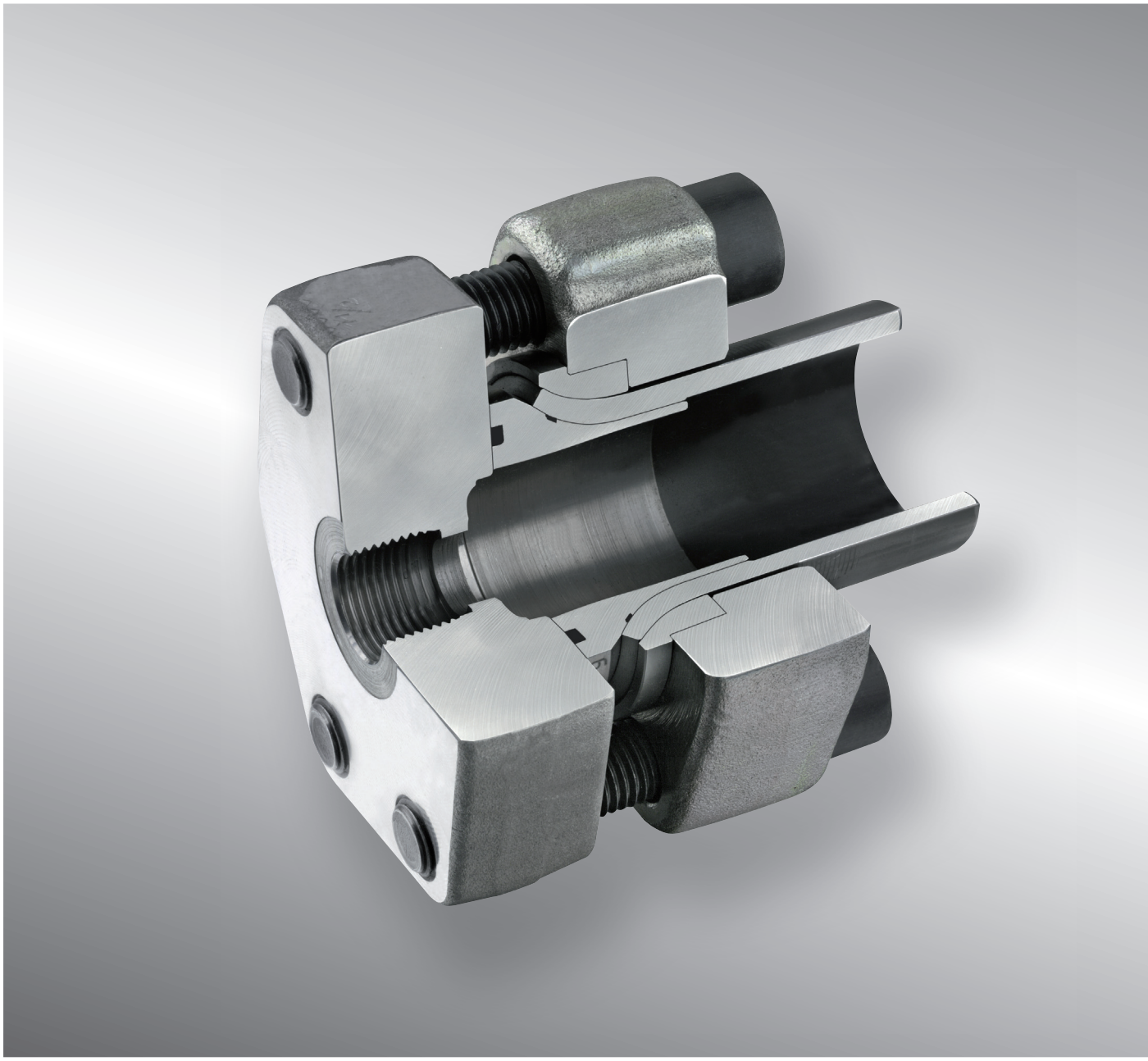
Why is Parker a distinguished manufacturer of fittings?

There are many reasons but the most important ones are the core competences in design and production which distinguish every Parker product.

Global standardisation

The Parker Fluid Connectors Group supports national and international standardisation acitivities. In cooperation with the products’ users, experienced Parker engineers make their contribution to the work of organisations such as SAE International, BSI and DIN. The resulting ISO standards for fluid connectors are of essential importance for all globally operating companies in the hydraulic and pneumatic industries.





HPF System description

HPF – The technology

Parker‘s mechanical flange system for the toughest requirements

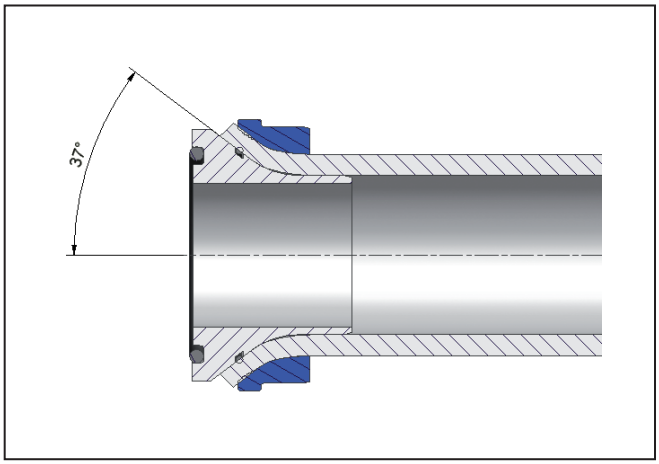
Parker‘s HPF system has been specially designed and developed to meet the requirements of mobile hydraulic and industrial equipment: high perfomance and high pressure.

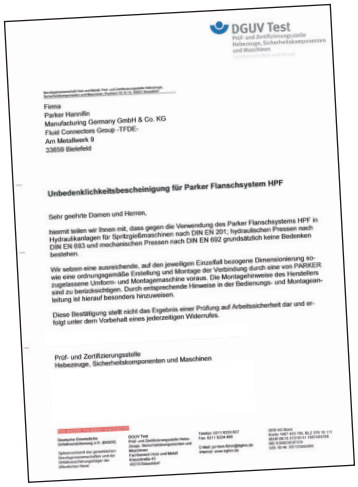
The system

The HPF system is adjusted to standard tube dimensions used in these industries. Diameters from 25 to 150 mm and wall thicknesses up to 17.5 mm.
The system is designed for flange patterns according to ISO 6162-1 (SAE J518, code 61), ISO 6162-2 (SAE J518, code 62) and ISO 6164.

Learning from nature

The best solutions for complex design problems can often be found in nature. The flaring of a tube is similar to the shape of a branch where it joints the trunk of a tree: The tube is flared by hydraulic axial pressure giving it a parabolic shaping, increasing from 10° up to 37°. The initial gentle incline of the shaping guarantees additional safety against strong system vibrations. The DGUV confirms the capability of this unique, patented system especially for the use in hydraulic and mechanical presses as well as in hydraulic power systems for injection moulding machines.



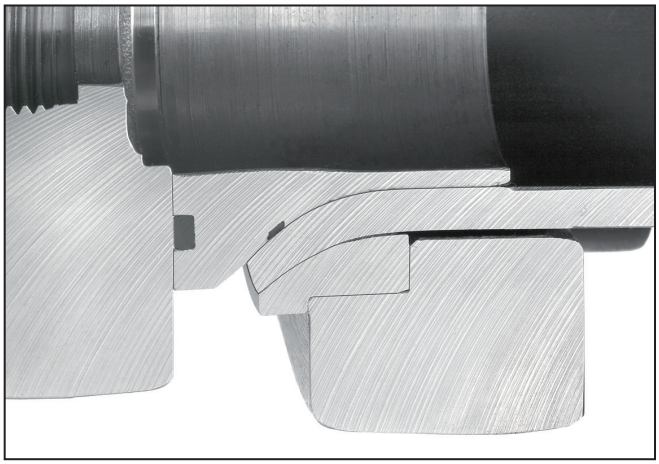


DGUV Test

Unbedenklichkeitsbescheinigung für Parker Flanschsystem HPF

The HPF Connector - Strong teamwork for the toughest demands

The lockring constitutes the core of the HPF connector. It is specially hardened, phosphated and manufactured with a particular contour. This ring supporting the tube on the outside provides additional tear-off safety for the connection. Depending on the size of the tube the safety function of the lockring is substituted for a specially designed and hardened one-piece flange with an adapted internal contour.
An insert is placed into the flared end of the tube. On the port side the sealing is guaranteed selectively by a special profile seal or an O-ring seal, on the tube side by an O-ring seal. The application of these soft-sealing elements both on the port side and the tube side guarantees the gas leak tightness of the HPF connector.
As the insert does not have a toothed profile, it can be easily assembled repeatedly.



HPF – The technology

Tube forming

The tube forming is performed by the Parflange® HPF machines; they can either be purchased or rented for a certain period of time. If required, assembly of ready-to-install straight or manipulated HPF tube lines can be carried out by a Parker CPS Piping Center.

HPF: Performance

The system is generally applicable with a working pressure up to 420 bar. As illustrated in the diagram forces are spread out ideally on the components.
The special profile seal is particularly resistant to gap extrusion, in contrast to conventional O-rings.

Flanging instead of welding: Error-free and riskless assembly

Nowadays many tube connections are welded. However, as even the best welding operator may make a mistake, each welding seam has to be tested, leading to an enormous loss of time and a significant increase of costs. Even finding trained staffed may be critical. Parker's HPF system offers various advantages compared to the welding solution:

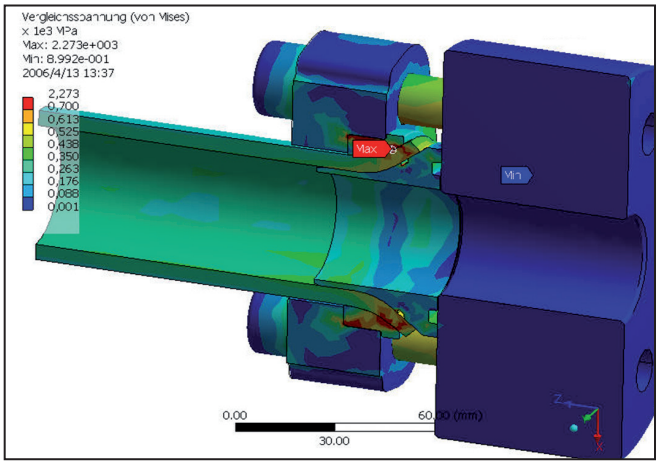
- Welding galvanic zinc-plated tubes is always critical. With HPF zinc-plated tubes can be used (no further painting necessary).
- Welding seams must be descaled and often be stained (environmental problems!).
- Welded tubes need to be cleaned, the tubes assembled with HPF do not require any cleaning.
- The flanging process does not cause noxious gases, thus eliminating explosion and fire hazards.

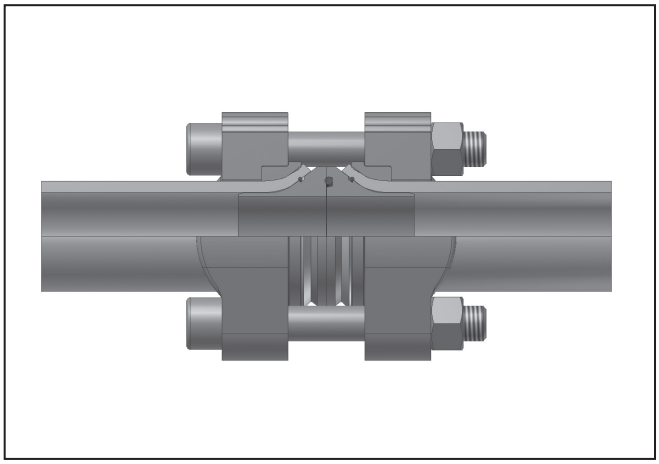
Cr(VI)-free corrosion protection

All components do of course have surfaces which are free of Cr(VI) platings. Parker is highly aware of its responsibility for the environment and human health. Therefore Parker has completely renounced the use of Cr(VI) containing surfaces.

Parker the system supplier

Parker products are ever globally available, regardless which one is needed. Being the customers' partner is an essential part of Parker's self-concept which includes development, design, implementation and maintenance activities for customised projects. The service even comprises stock-keeping and close on-site support for the customer. All this leads to significant reduction of expenses.





Complete Piping Solutions (CPS)

Homogeneous solutions offer efficiency

From Components to full service.
Parker offers you the competent complete solution for hydraulic systems. From advice via design and pre-configuring to delivery and installation - everything with the best quality and reliability. You only have one contact. You take the pressure off your own team, release capacity and overall save a lot of time. You achieve new efficiency.

Excellent complete solution.
Complete Piping Solutions from Parker are always to the customer's advantage. Equally high quality in all areas and available around the world.

The complete solution from a single source frees up customer capacity and lowers the need for customers to provide coordination effort. As a supplier of piping system solutions we offer our customers significant added value.

Advantages that pay off.

- High-quality system technology
- Saves time
- Saves money
- Customised user solutions
- Environmentally friendly
- Global supply
- Integration into existing systems

Advice	**Briefing/design meeting**
Design	**Pipe layout** **Pipe dimensioning** **Drawings** **Documentation**
Prefabrication	**Pipe bending** **Pipe end processing** **Pipe cleaning**
Delivery	**Assembly/ Dispatch** **Documentation**
Assembly	**On-site advice** **On-site assembly** **Testing and flushing** **Documentation**

Pipe bending

The requirements increase

So does our performance

In order to comply with the market and customer requirements in this segment we have aligned our performance to this. The following overview aims to emphasise the range of services offered by CPS Germany.

Development and design:
- Modern CAD systems can process all common 3D and 2D data formats and simulate installation situations
- The projects are produced as required by or in cooperation with the customer. These may be new systems or upgrades
- It may require taking pipe measurements on-site using a modern measurement system. These data can be transferred to the CAD system
- Data from the measurement system are used later for quality control in order to ensure an ideal and secure production process

Cold bending:
- After creating the data required for production it is transferred to the machines. The available bending machines process tubes and pipes with diameters from 6 x 1 mm to 190 x 20 mm (thin-walled Ø 220 x 6 mm)

Tube end processing:
- Modern CNC controlled machines are available for processing pipe ends. Tube end processing is carried out based on internal standards

Tube cleaning:
- Tube cleaning using the ISO 4406 / NAS 1638 standard
- Permanent control of the pollution and cleanliness level with modern measuring devices

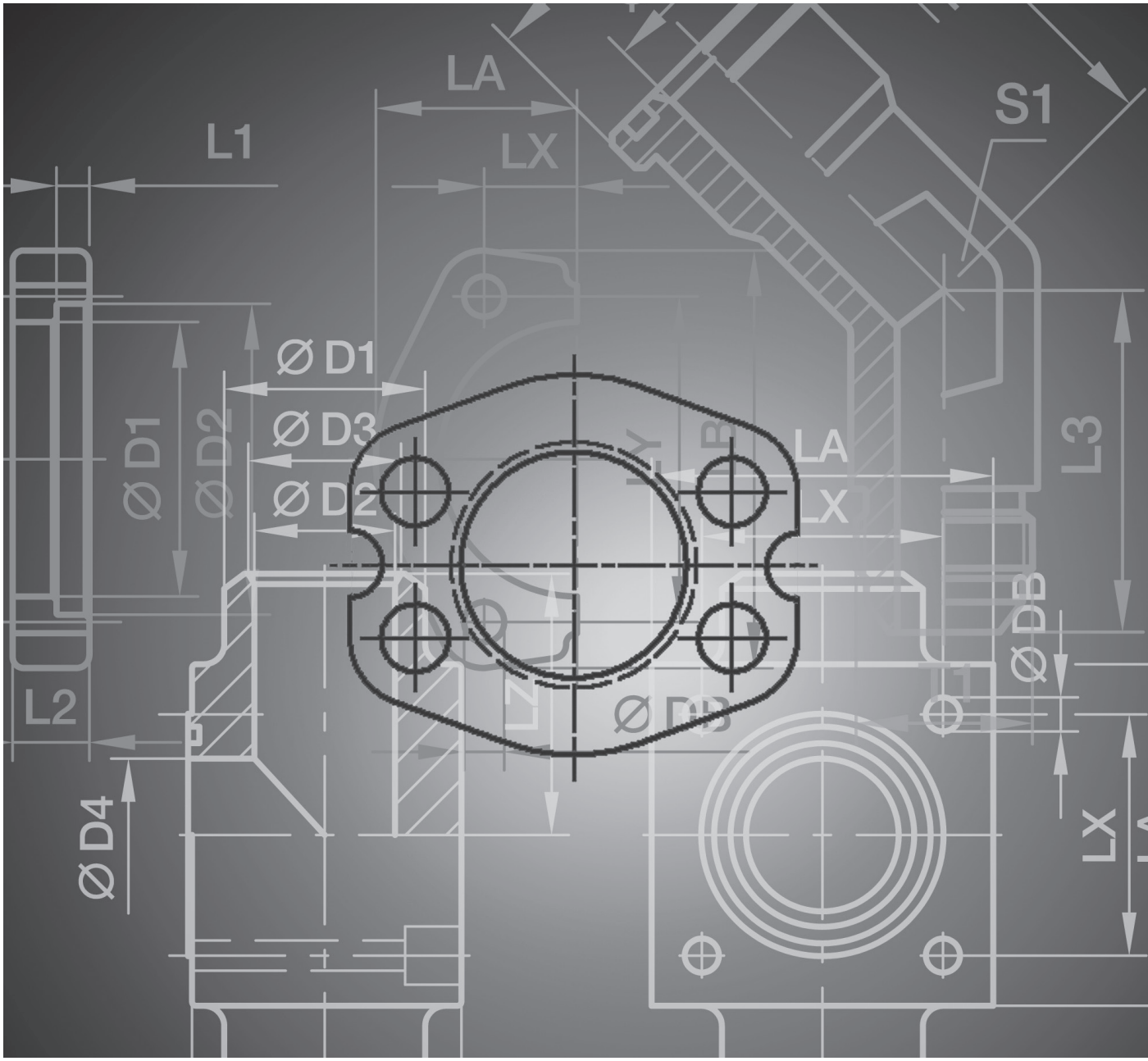
Pressure test:
- Pressure test to customer specifications possible

- Documentation at the customer's request

Installation / support:
- Delivery of pre-configured tube systems to the customer's desired address
- Installation of tube systems whilst taking into account the parameters and work steps set in the installation manual
- Installation by end customer training conducted by Parker

Video

Notes



Technical Data

Tube and Performance Specifications

Recommended steel tubes and pipes

Parker recommends the use of cold drawn seamless hydraulic tubes and pipes acc. to DIN EN 10305-4 E 355 (St. 52.4 NBK).

+ precision dimension / shape
+ high pressure capability
+ clean inside
+ excellent sealing surface after flaring

Welded tubes and pipes

Tubes and pipes acc. to above specification but welded and cold redrawn instead of seamless drawn are not recommend. Pressure capability might be reduced due to the welding seam zone. The quality of the seam might influence the quality of the flared surface.

Hot rolled pipes

Hot rolled pipes are not recommended for the following reasons:

Hot rolled pipes do not have precision dimensions and may slip in machine dies. They have scale on the inside and outside. The scale on the inside reduces the purity degree of the liquid. The scale moreover pollutes the tools during the flaring process, causing high costs for cleaning the tools and leading to a minor quality of the flared surface.

The maximum allowable working pressure of the tube is calculated according to the standards DIN 2413 I and III.
When dimensioning the whole system, pipes and flange connections have to be considered in common.

Material Specifications

1.0508 (E355/St.52.4) acc. to DIN EN 10305-4	
Tensile strength	min. 490 N/mm²
Yield strength	min. 355 N/mm²
Fatigue strength	265 N/mm²*
Elongation at break	min. 22 %

*No standard specification (experience value)

Tube calculation for land based and industrial applications

DIN 2413 I, only for static load

Calculation of working pressure of straight steel tubes for static stress up to 120°C. Corrosion – additional allowences are not considered for the calculation of pressures. Tubes with a diameter of O.D. / ID > 2 are calculated for static stress in accordance with DIN 2413 III, but with K = yield strength.

$$P = \frac{20 \cdot K \cdot s \cdot c}{S \cdot D}$$

P = permissible working pressure [bar]
K = yield strength [N/mm²]
s = tube wall thickness [mm]
c = factor for wall thickness allowance
= 0.8 for Tube-O.D. 4-5,
0.85 for Tube-O.D. 6-8,
0.9 for Tube-O.D. 10
S = Design factor = 1.5
D = tube outside diameter [mm]

Burst Pressure calculation

Calculation acc. to Formula of DIN 2413 I, but without safety value

BP = Burst Pressure
Rm = min. tensile strength
s = wall thickness
c = factor for wall thickness allowance
= 0.8 for Tube-O.D. 4-5,
0.85 for Tube-O.D. 6-8,
0.9 for Tube-O.D. 10
D = tube outside diameter [mm]

$$BP = \frac{20 \cdot Rm \cdot s \cdot c}{D}$$

DIN 2413 III, for dynamic load

Calculation of working pressure of straight steel tubes for dynamic stress up to 120°C.
Corrosion - additional allowences are not considered for the calculation of pressures.

$$P = \frac{20 \cdot K \cdot s \cdot c}{S \cdot (D + s \cdot c)}$$

P = permissible working pressure [bar]
K = yield strength [N/mm²]
s = tube wall thickness [mm]
c = factor for wall thickness allowance
= 0.8 for Tube-O.D. 4-5,
0.85 for Tube-O.D. 6-8,
0.9 for Tube-O.D. 10
S = Design factor = 1.5
D = tube outside diameter [mm]

Tubes - Land based and industrial applications (DIN Rules)

1 DIN 2413 I static pressure (PN) capability for straight pipe including manufacturing tolerance
2 DIN 2413 III dynamic pressure (PN) capability for straight pipe including manufacturing tolerance
3 Burst pressure (BP) calculation including manufacturing tolerance

Tube E 355N /St.42.4 NBK) - Cr(VI)-free plated or phosphated and oiled

Tube O.D. x W.T. mm	DIN 2413 I PN bar	DIN 2413 III PN bar	BP bar	Weight kg/mtr.	Phosphated and oiled Order code	Cr(VI)-free Order code
25X3.0	511	344	1151	1.63		R25X3ST52CF
25X4.0	682	445	1535	2.07		R25X4ST52CF
30X4.0	568	379	1279	2.56		R30X4ST52CF
30X5.0	710	461	1599	3.08		R30X5ST52CF
38X4.0	448	306	1010	3.35		R38X4ST52CF
38X5.0	561	374	1262	4.07		R38X5ST52CF
38X6.0	673	440	1515	4.74		R38X6ST52CF
42X4.0	406	279	914	3.75		R42X4ST52CF
42X5.0	507	342	1142	4.56		R42X5ST52CF
50X3.0	256	181	576	3.48		R50X3ST52CF
50X5.0	426	292	959	5.55	R50X5ST52	R50X5ST52CF
50X6.0	511	344	1151	6.50	R50X6ST52	R50X6ST52CF
50X8.0	682	445	1535	8.29	R50X8ST52	R50X8ST52CF
60X5.0	355	247	800	6.78		R60X5ST52CF
60X6.0	426	292	959	7.97	R60X6ST52	R60X6ST52CF
60X8.0	568	379	1279	10.26	R60X8ST52	R60X8ST52CF
60X10.0*	710	461	1599	12.30		
65X8.0	524	352	1121	11.25		R65X8ST52CF
66X8.5	549	367	1236	12.05	R66X8.5ST52	R66X8.5ST52CF
73X7.0	408	281	920	11.22	R73X7ST52	R73X7ST52CF
75X12.5	710	461	1599	19.27	R75X12.5ST52	R75X12.5ST52CF
80X3.0	160	115	360	5.70	R80X3ST52	
80X8.0	426	292	959	14.21	R80X8ST52	
80X10.0	533	357	1199	17.21	R80X10ST52	
88X14.0	678	443	1526	25.55	R88X14ST52	
90X5.0	237	168	533	10.48	R90X5ST52	R90X5ST52CF
90X9.0	426	292	959	17.98	R90X9ST52	R90X9ST52CF
97X12.0	527	354	1187	25.15	R97X12ST52	
101.6X16.0	671	439	1511	33.77	R101.6X16ST52	
114.3X17.5	652	428	1469	50.93	R114.3X17.5ST52	
115X15.0	556	371	1251	36,95	R115X15ST52	
120X20.0	710	461	1599	49.30	R120X20ST52	
130X15.0	492	332	1107	42.54	R130X15ST52	
150X15.0	426	292	959	49.94	R150X15ST52	

*Order code on request.
Other sizes on request.

Pressure reductions and temperatures

Required pressure reductions (dependent on the material) with reference to the catalogue pressures for higher temperatures. Both metal fitting material and elastomeric sealing compound have to be selected according to the temperature requirements of the system.

Material	Pressure reduction of permissible operating temperature in °C														
	-60	-54	-40	-35	-25	+20	+50	+100	+120	+150	+175	+200	+250	+300	+400
Steel, fittings			0 %							-11 %	-19 %		-28 %		
Steel, tubes			0 %							-19 %			-27 %		
Sealing material NBR (e.g. Perbunan)															
Sealing material FKM															
Sealing material Polyurethane (P5008)															

Permissible operating temperature
Ambient temperature of hydraulic and pneumatic applications
Temperature not permissible

Perbunan = registered trademark of Bayer

Calculation example:
Temperature = 200 °C
Material = Steel
Pressure reduction = 19 %
Pressure reduction tubes = 19 %
PN tube 30x4.0 (St.52.4), DIN 2413 III = 379 bar

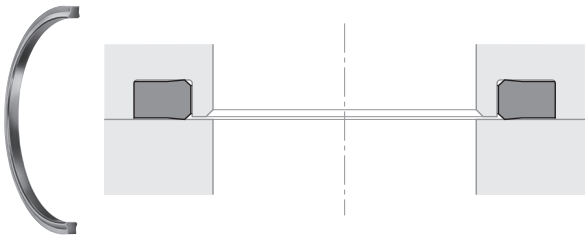
Formula:

$$PN_{\text{Connection } 200\,^\circ C} = \frac{420 \text{ bar}}{100\,\%} \times (100\,\% - 19\,\%) = 340 \text{ bar}$$

$$PN_{\text{tube } 200\,^\circ C} = \frac{379 \text{ bar}}{100\,\%} \times (100\,\% - 19\,\%) = 307 \text{ bar}$$

F37 seal

The F37 seal was developed especially for use with SAE flanges. Compared to a standard O-ring the special profile of the F37 seal is ideally adapted to higher pressures or unsuitable surface finish of the flanges.
The particularly low compression set of the polyurethane compound ensures dimensional stability of the seal over a large temperature range. Its high extrusion resistance prevents gap extrusion even if the flanges "breathe" under pressure. Due to good abrasion resistance, less preparation is necessary on the surface finish of the sealing area of the flange. The frequently occuring "pumping" phenomenon of O-rings is prevented by the shape of the F37 seal.



Application area

Static sealing for SAE-Flanges
Working pressure: ≤ 600 bar
Working temperature: see table above

Materials

The F37 seal is made of a polyurethane based Parker compound with a hardness of approx. 93 Shore A. In comparison with other polyurethane materials currently available on the market, it excels because of its increased heat resistance, improved performance against hydrolysis and low compression values.

For special requirements (pressure, temperature, speed, application in water, HFA-, HFB-fluids etc.), please contact our Consultancy Service, so that suitable materials and/or designs can be recommended.

Flow characteristics

Hydraulic systems are in most cases only rated with a flow velocity defined on the basis of experience. The pressure losses in lines are not taken into account, or measured later on when testing the system. As the pressure losses increase porportionally greater than the flow resistance, it is important to achieve the best rating of the system, so that they are already taken into account when planning the tube connections. Calculation is not as difficult as it is often thought, and this chapter is intended to provide a guideline. Besides, it provides information on how excessive pressure losses can be avoided, because pressure losses result in losses in performance and excessive heat. Noise occurs and possibly cavitation in suction lines.

Medium

All indications given with regards given concerning flow restrictions and to flow properties refer exclusively to liquids. For gaseous media, the variable density of the gas must additionally be taken into account.

Units

c = Flow velocity $\left[\frac{m}{s}\right]$

d = Pipe inside diameter [m]

L = Pipe length [m]

p = Pressure [Pa], 1 bar = 100000 Pa

$\dot{V}$ = Flow rate $\left[\frac{m^3}{s}\right]$, $1\ \frac{m^3}{s} = 6000\ \frac{l}{min}$

λ = Pipe friction factor

$\upsilon(T)$ = Kinematic viscosity of the medium depending on temperature $\left[\frac{m^2}{s}\right]$

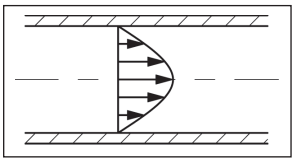
$\rho(T)$ = Density of the medium depending on temperature

ζ = Individual pressure loss coefficient $\left[\frac{kg}{m^3}\right]$

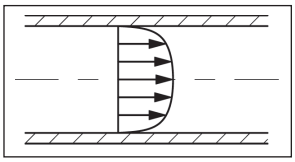
Only base units have been used. This has the advantage that the formula do not contain correction factors and there is no danger of confusion, e.g. that values are used with the wrong unit. In case values are given in other units – the flow rate is e.g. often given in l/min – it is advisable to convert them into the base units before starting calculation.

Pressure losses in pipe lines

To calculate pressure losses in pipe lines, it must first be determined whether there is a laminar or a turbulent flow. Laminar flow is homogenous and without turbulence. In case of turbulent flow, the losses increase much more quickly.



Flow profile
with laminar flow



Flow profile
with turbulent flow

The kind of flow is defined by the Reynolds' number. With a Reynolds' number of more than 2320, the flow changes to turbulent. The Reynolds' number is calculated according to the formula:

$$Re = \frac{c \cdot d}{\upsilon(T)}$$

The Reynolds' number is a non-dimensional number. The critical fluid velocity at which the flow regime can change, is thus calculated from:

$$c_{cr} = 2320 \cdot \frac{\upsilon(T)}{d} \left[\frac{m}{s}\right]$$

With a given flow rate, the fluid velocity can be calculated according to the formula:

$$c = \frac{\dot{V} \cdot 4}{d^2 \cdot \pi} \left[\frac{m}{s}\right]$$

Subsequently, the pipe friction factor λ is a function of the Reynolds' number and also depends on the roughness of the pipe. As hydraulically smooth pipes can generally be assumed in hydraulic applications, the pipe friction factor λ is calculated according to the following formula:

$$\text{laminar flow, } (Re < 2320): \lambda = \frac{64}{Re}$$

$$\textit{turbulent flow, } (Re > 2320): \lambda = \frac{0{,}3164}{\sqrt[4]{Re}}$$

Finally, if all factors are known, the pressure loss in certain pipe lines can be calculated according to the formula:

$$\Delta p = \lambda \cdot \frac{L}{d} \cdot \frac{\rho(T) \cdot c^2}{2} \text{ [Pa]}$$

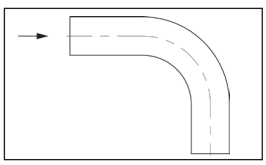
Calculation of individual losses

A hydraulic system does not only incorporate pipes, but also valves, fittings, pipe bends etc. that cause flow losses. These individual losses are often much higher than the pipe losses and are calculated according to the following formula:

$$\Delta p = \zeta \cdot \rho(T) \cdot \frac{c^2}{2} \text{ [Pa]}$$

Tube bends

With pipe bends, the pressure loss coefficient results from the ratio of bend to inside diameter (R/d).



Bend radius/Inside diameter	Pressure loss coefficient ζ
2	0.21
4	0.14
6 and more	0.11

Flow diameter and wall thickness

Determining tube sizes for hydraulic systems

Proper tube material, type and size for a given application and type of fitting are critical for efficient and trouble-free operation of the fluid system. Selection of proper tubing involves choosing the right tube material, and determining the optimum tube size (O.D. and wall thickness).
Proper sizing of the tube for various parts of a hydraulic system results in an optimum combination of efficient and cost effective performance.
A tube that is too small causes high fluid velocity, which has many detrimental effects. In pressure lines, it causes high friction losses and turbulence, both resulting in high pressure drops and heat generation. High heat accelerates wear in moving parts and rapid aging of seals and hoses, all resulting in reduced component life. High heat generation also means wasted energy, and hence, low efficiency.
Too large tubes increase system cost. Thus, optimum tube sizing is very critical. The following is a simple procedure for sizing tubes.

Determine required flow diameter

Use table to determine recommended flow diameter for the required flow rate and type of line.
The table is based on the following recommended flow velocities (DIN 24346):

Avoid flow rates > 8m/s!
The resulting forces are high and can destroy the tube lines.

Pressure lines – 3 → 5 $\left[\frac{m}{s}\right]$

Return lines – 2 → 4 $\left[\frac{m}{s}\right]$

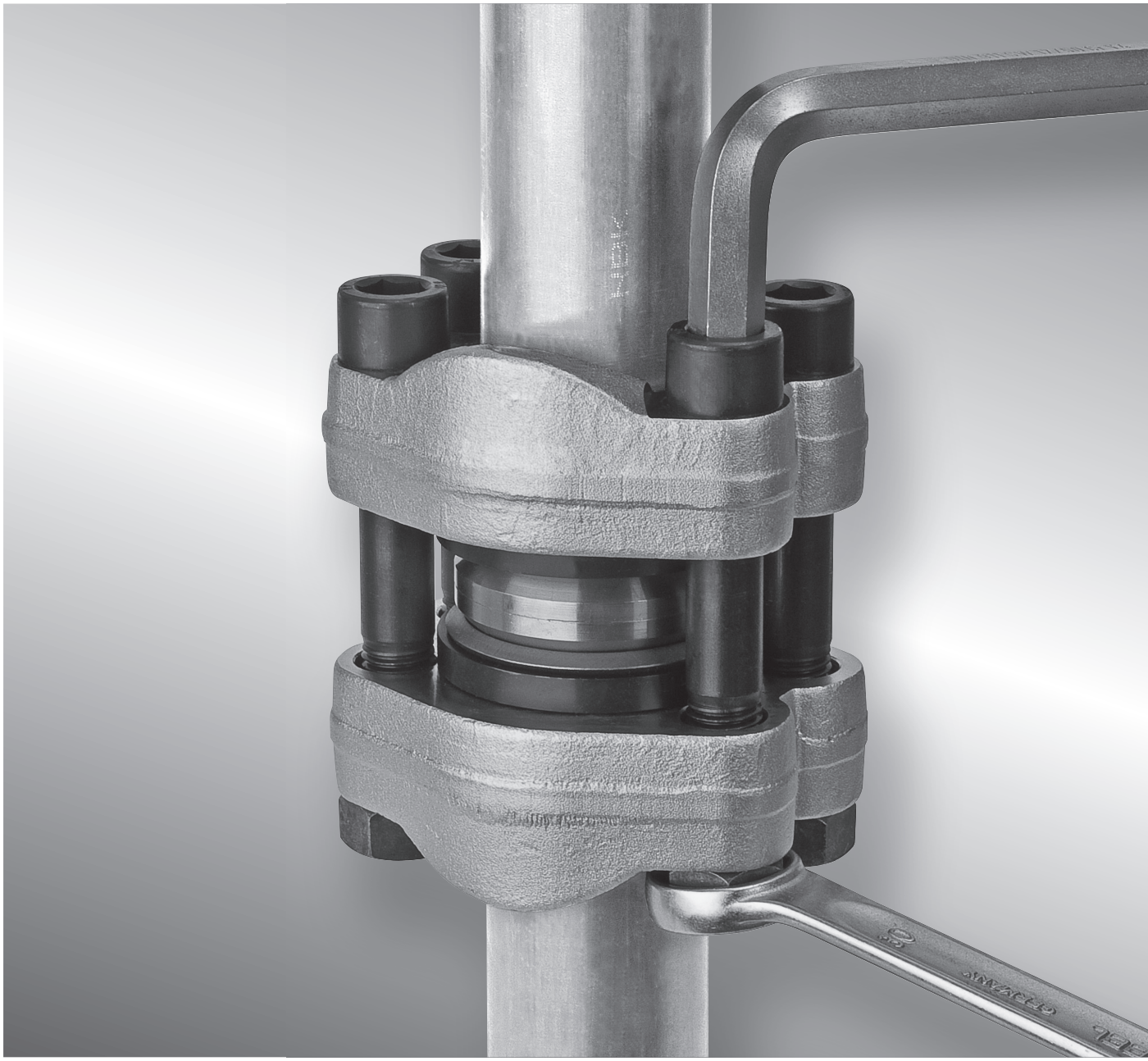
Suction lines – 1 $\left[\frac{m}{s}\right]$

If you wish to use different velocities than the above, use one of the following formulae to determine the required flow diameter.

$$\text{Tube - I.D. [mm]} = 4.61 \cdot \sqrt{\frac{\text{Flow } \left[\frac{\text{ltr.}}{\text{min}}\right]}{\text{Velocity } \left[\frac{m}{s}\right]}}$$

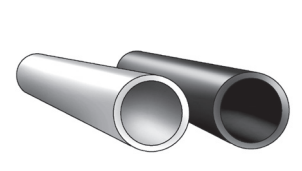
Maximum flow [l/min]	Flow diameter in millimeters		
	5 m/s Pressure lines	3 m/s Return lines	1 m/s suction lines
10	6.5	8.4	14.6
15	8.0	10.3	17.9
20	9.2	11.9	20.6
25	10.3	13.3	23.1
30	11.3	14.6	25.3
35	12.2	15.7	27.3
40	13.0	16.8	29.2
45	13.8	17.9	30.9
50	14.6	18.8	32.6
55	15.3	19.7	34.2
60	16.0	20.6	35.7
65	16.6	21.5	37.2
70	17.2	22.3	38.6
75	17.9	23.1	39.9
80	18.4	23.8	41.2
85	19.0	24.5	42.5
90	19.6	25.3	43.7
95	20.1	25.9	44.9
100	20.6	26.6	46.1
110	21.6	27.9	48.4
120	22.6	29.2	50.5
130	23.5	30.3	52.6
140	24.4	31.5	54.5
150	25.3	32.6	56.5
160	26.1	33.7	58.3
170	26.9	34.7	60.1
180	27.7	35.7	61.8
190	28.4	36.7	63.5
200	29.2	37.6	65.2
220	30.6	39.5	68.4
240	31.9	41.2	71.4
260	33.2	42.9	74.3
280	34.5	44.5	77.1
300	35.7	46.1	79.8
320	36.9	47.6	82.5
340	38.0	49.1	85.0
360	39.1	50.5	87.5
380	40.2	51.9	89.9
400	41.2	53.2	92.2
450	43.7	56.5	97.8
500	46.1	59.5	103.1
550	48.4	62.4	108.1
600	50.5	65.2	112.9
650	52.6	67.9	117.5
700	54.5	70.4	122.0
750	56.5	72.9	126.3
800	58.3	75.3	130.4
850	60.1	77.6	134.4
900	61.8	79.8	138.3
950	63.5	82.0	142.1
1000	65.2	84.2	145.8
1050	66.8	86.2	149.4
1100	68.4	88.3	152.9
1150	69.9	90.3	156.3
1200	71.4	92.2	159.7
1250	72.9	94.1	163.0
1300	74.3	96.0	166.2
1350	75.8	97.8	169.4
1400	77.1	99.6	172.5
1450	78.5	101.4	175.5
1500	79.8	103.1	178.5

Notes



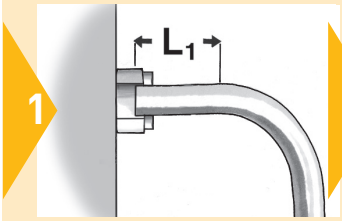
Installation

Tube selection



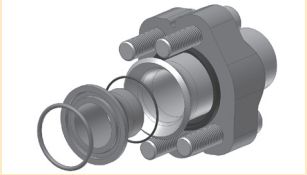
- Choose components acc. to the relevant catalogue table

Tube preparation



- Minimum straight length **L1** before bend
- Tube length before flaring determined by distance **X**

Selection of flange components



- Select suitable tube acc. to catalogue specification

⚠ Lockrings and inserts of other producers are strictly not permitted!

Size ISO 6162-1 3000psi Inch	Tube O.D. x W.T. mm	Tube length determination X in mm	Recommended minimum distance L1 mm
1 1/4	42x4.0	4.0	125
1 1/2	50x5.0	5.0	130
2	50x5.0	12.0	
2	60x5.0	6.5	125
2	60x6.0	6.0	
2 1/2	60x6.0	7.5	
2 1/2	73x7.0	9.0	
3	90x5.0	5.0	170
3	90x9.0	11.0	

Size ISO 6162-2 6000psi Inch	Tube O.D. x W.T. mm	Tube length determination X in mm	Recommended minimum distance L1 mm
3/4	25x3.0	8.0	130
3/4	25x4.0	8.5	
1	30x4.0	8.0	
1	30x5.0	8.0	
1	38x4.0	5.0	125
1	38x6.0	7.0	
1 1/4	38x4.0	9.5	
1 1/4	38x5.0	10.0	
1 1/4	38x6.0	12.0	
1 1/4	42x5.0	6.5	130
1 1/2	38x5.0	16.5	125
1 1/2	50x3.0	3.5	130
1 1/2	50x5.0	6.5	
1 1/2	50x6.0	5.5	
1 1/2	50x8.0	8.0	
2	50x5.0	16.0	165
2	50x6.0	16.0	170
2	50x8.0	18.0	
2	60x5.0	11.5	160
2	60x8.0	10.0	165
2	65x8.0	8.0	
2	66x8.5	7.0	
2 1/2	75x12.5	25.5	180

Size ISO 6164 400 bar Inch	Tube O.D. x W.T. mm	Tube length determination X in mm	Recommended minimum distance L1 mm
2	50x8.0	18.0	130
2	60x8.0	11.0	
2	60x10.0	12.5	
2 1/2	60x8.0	20.5	180
2 1/2	75x12.5	16.5	185
2 1/2	80x10.0	12.5	180
3	80x3.0	12.0	
3	80x8.0	16.0	185
3	80x10.0	16.0	
3	88x14.0	16.0	
3	90x9.0	11.0	
3	97x12.0	4.0	215*
3	101.6x16.0	11.5	
3 1/2	101.6x16.0	14.0	275*
4	114.3x17.5	10.0	290*
4	115x15.0	5.0	285*
4	120x20.0	14.0	
4 1/2	130x15.0	11.5	275*
5	150x15.0	13.0	290*

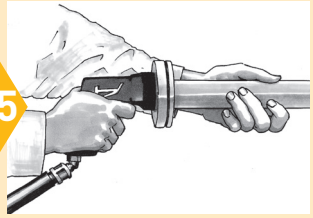
*Parameter for Parflare HPF170

- Cut tube squarely
- max. ±1° deviation

⚠ Burrs can result in sealing problems or tool wear

- Proper deburring and cleaning of inner and outer diameter
- Chamfer 1 mm x 45° max

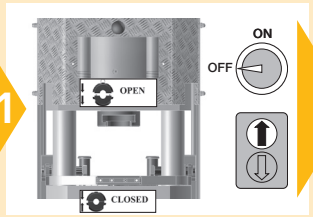
⚠ Burrs can result in sealing problems or tool wear



- Clean tube before flaring
- Adhere to project specification

⚠ Dirt can result in sealing problems or tool wear

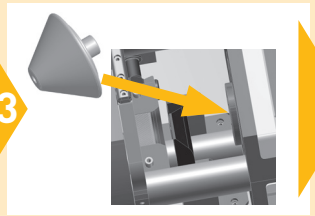
Tube forming with Parflare HPF 120



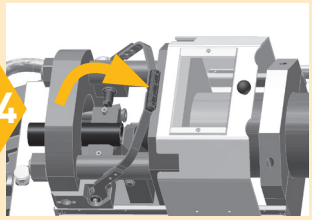
- Open safety cover
- Latch in „OPEN“ position
- Cylinder in „BACK“ position

⚠ Main switch „OFF“ during setting

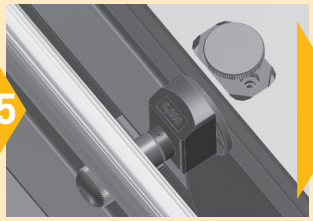
- Select suitable tools according to chart
- Check flaring pin for dirt, wear and damage
- Check flaring dies for dirt, wear and damage



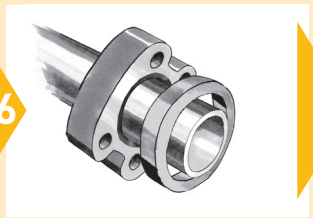
- Insert flaring pin
- Fix with bolt



- For inserting clamping jaws in „OPEN“ position
- Then insert lower clamping jaw
- Tip lower clamping jaw to make things easier
- Push clamping jaw on guide bolt to stop

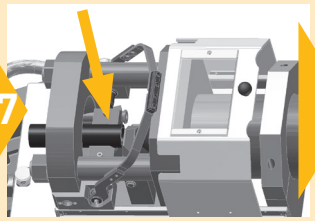


- Adjust tube stop wheel according to chart
- Tighten locking screw for tube stop adjustment



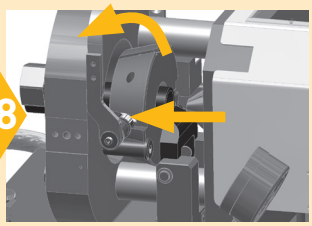
⚠ Two-part flange connectors with separate locking ring must not be assembled without a lockring

- Place flange components on tube before flaring
- First of all, place the flange in correct direction
- Then lockring in correct direction

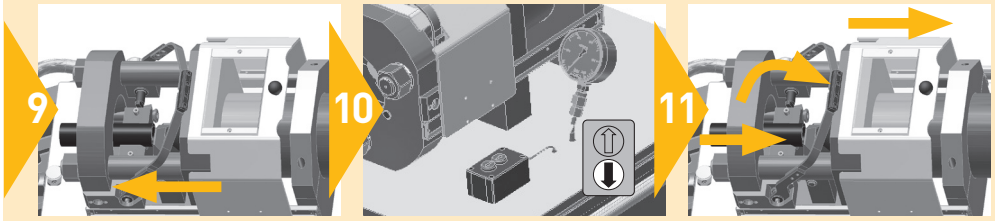


- Insert tube so that it lies against the stop
- Place upper jaw half

⚠ Support and secure long and heavy tubes horizontally



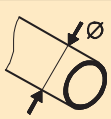
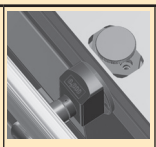
- Swing latch in position „CLOSED“
- Pull clamping jaws with tube into front plate



⚠Lubricate flaring pin with high pressure grease.
- Close protective hood
- Switch on main switch
- Machine is ready for flaring operation

- Start flaring operation by actuating button
- Observe pressure on manometer
- On reaching chart value, end flaring operation
- Run flaring pin to start position

- Open protective hood
- Push tube with clamping jaw completely out of the front plate up to the stop of both guide bolts
- Clamp in „OPEN“ position
- Lift upper jaw and remove tube

 Tube O.D. x W.T. mm	 Tube stop mm	Pressure Assembly bar
25x3.0	5.5	100
25x4.0	5.5	150
30x4.0	6.0	200
30x5.0	7.0	200
38x4.0	3.5	200
38x5.0	3.5	200
38x6.0	3.5	300
42x4.0	4.0	250
42x5.0	5.0	400
50x3.0	6.0	150
50x5.0	6.5	250
50x6.0	8.5	300
50x8.0	9.0	600
60x5.0	1.0	250
60x6.0	1.0	300
60x8.0	6.0	500
60x10.0	7.0	660
65x8.0	5.0	300
66x8.5	6.0	500
73x7.0	4.0	400
75x12.5	10.0	700
80x3.0	6.0	250
80x8.0	8.0	600
80x10.0	9.0	700
88x14.0	10.0	700
90x5.0	6.0	300
90x9.0	8.0	600
97x12.0	8.0**	670**
101.6x16.0	8.0**	670**
114.3x17.5	13.0**	670**
115x15.0	9.0**	670**
120x20.0	10.0**	670**
130x15.0	9.0**	670**
150x15.0	13.5**	670**

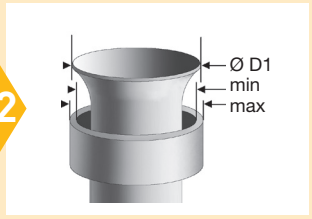
- Setting values are recommendations only
- Adjust setting to specific tube quality and tolerance
- **Parameter for Parflare HPF170

The operation of the Parflare HPF 170 machine is slightly different, please read the machine manual before use.

Checking the flare

- Clean flare for inspection
- Visual check: Check sealing surface for cracks, burrs, scratches and pitting

⚠Do not use any tubing with faulty sealing faces (risk of leakage)



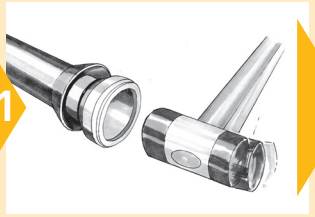
- Dimensional check of the flare according to chart

⚠Do not use any tubing with incorrectly dimensioned flaring diameters

Tube O.D. x W.T. mm	Flare Ø D1 ± 1mm
25x3.0	36.0
25x4.0	36.0
30x4.0	42.0
30x5.0	43.0
38x4.0	49.0
38x5.0	49.0
38x6.0	49.0
42x4.0	54.0
42x5.0	54.5
50x3.0	64.0
50x5.0	64.0
50x6.0	65.0
50x8.0	65.0

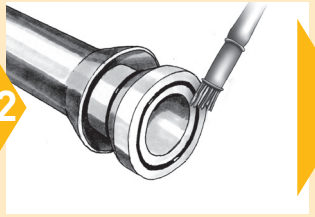
Tube O.D. x W.T. mm	Flare Ø D1 ± 1mm
60x5.0	74.0
60x6.0	74.0
60x8.0	78.0
60x10.0	78.0
65x8.0	82.0
66x8.5	84.0
73x7.0	86.0
75x12.5	92.0
80x3.0	94.5
80x8.0	95.0
80x10.0	95,0
88x14.0	104.0
90x5.0	105.0
90x9.0	105.5
97x12.0	119.0
101.6x16.0	118.0
114.3x17.5	143.0
115x15,.0	143.0
120x20.0	143.0
130x15.0	154.0
150x15.0	178.0

Installation HPF Flange connection

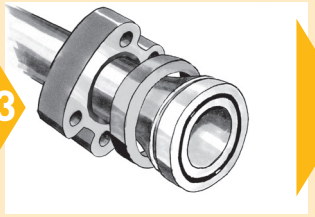


- Tube end must be clean
- Fix insert
- If necessary, use plastic hammer

⚠Avoid damage to sealing surfaces



- Insert sealing ring
- To protect the sealing ring from damage during repeat assembling, it can also be lubricated if necessary.
- The use of Parker O-Lube or Super-O-Lube is recommended (please pay attention to the material-, media- and temperature resistance).



- Check correct sealing of sealing rings
- Sealing face must not be dirty or damaged

- Position flange and place bolts

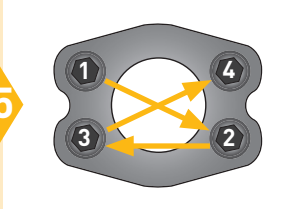
⚠Tube assembly must be stress-free at both ends

⚠Bolts must move freely

⚠Do not use shorter bolts indiciated in the catalogue!

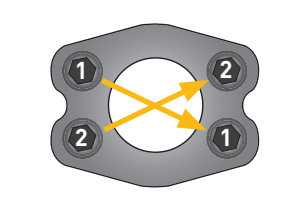
⚠Parker recommends to lubricate the bolts (recommended lubricant: MOLYKOTE® G-RAPID PLUS)

5



- Tighten the bolts diagonally in small steps until the appropriate torque is reached (page 25).
  1: Tighten the bolts lightly by hand with the Allen key.
  2: Apply 30% of the specified torque in accordance with the picture above.
  3: Apply 60% of the specified torque in accordance with the picture above.
  4: Apply 100% of the specified torque in accordance with the picture above.
  5: Repeat step 4.
  6: Apply 100% of the specified torque in a circular direction (clockwise).

Using two tools



- Tighten the bolts diagonally in small steps until the appropriate torque is reached (page 25).
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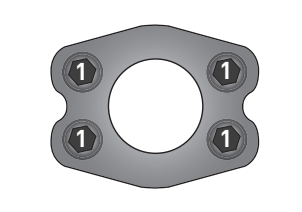
  3: Apply 60% of the specified torque in accordance with the picture above.
  4: Apply 100% of the specified torque in accordance with the picture above.
  5: Repeat step 4.
  6: Apply 100% of the specified torque in a circular direction (clockwise).

Using four tools



- Tighten the bolts diagonally in small steps until the appropriate torque is reached (page 25).
  1: Tighten the bolts lightly by hand with the Allen key.
  2: Apply 100% of the specified torque in accordance with the picture above.
  3: Apply 100% of the specified torque in a circular direction (clockwise).

The following applies whatever the number of tools:

- In cases where the tube lines must undergo pressure testing, and where the proof pressure exceeds the flange working pressure (e.g. PN x 1.5 proof pressure), a repeat of step 3 is required after pressure testing.
- Further tightening can be required after a week of operation, depending on the dynamics of the system. We recommend checking at least 10% of the connectors in accordance with the following procedure:
  - Apply 70% of the specified torque.
  - If the bolts do not move, the pre-tensioning is in order and no further tightening is required.
  - If the bolts can be turned, all the connectors must be retightened with 90% of the specified torque (only once).

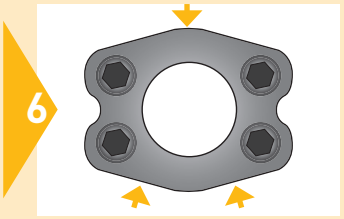
Recommended torques:

Size ISO 6162-1 3000 psi Inch	Tube O.D. x W.T. mm	Bolts mm	Torque 10.9 Nm*
1 1/4	42x4.0	M10	50
1 1/2	50x5.0	M12	75
2	50x5.0	M12	80
2	60x5.0	M12	
2	60x6.0	M12	
2 1/2	60x6.0	M12	90
2 1/2	73x7.0	M12	
3	90x5.0	M16	210
3	90x9.0	M16	

Size ISO 6164 400 bar Inch	Tube O.D. x W.T. mm	Bolts mm	Torque 10.9 Nm*
2	50x8.0	M16	210
2	60x8.0	M16	
2	60x10.0	M16	
2 1/2	60x8.0	M20	400
2 1/2	75x12.5	M20	
2 1/2	80x10.0	M20	
3	80x3.0	M24	600
3	80x8.0	M24	
3	80x10.0	M24	
3	88x14.0	M24	750
3	90x9.0	M24	
3	97x12.0	M24	
3	101.6x16.0	M24	
3 1/2	101.6x16.0	M24	
4	114.3x17.5	M30	1400
4	115x15.0	M30	
4	120x20.0	M30	
4 1/2**	130x15.0	M30	400
5**	150x15.0	M24	750

* Lubricate head seating and threads on bolts with (MOLYKOTE G-RAPID PLUS)
** Round flange design
Torques for 8.8-bolts (ISO6162-1) respectively 8.8- and 12.9-bolts (ISO 6162-2 und ISO 6164) are available on request.

Size ISO 6162-2 6000 psi Inch	Tube O.D. x W.T. mm	Bolts mm	Torque 10.9 Nm*
3/4	25x3.0	M10	45
3/4	25x4.0	M10	
1	30x4.0	M12	80
1	30x5.0	M12	
1	38x4.0	M12	
1	38x6.0	M12	
1 1/4	38x4.0	M14 / (M12)	120 / (80)
1 1/4	38x5.0	M14 / (M12)	
1 1/4	38x6.0	M14 / (M12)	
1 1/4	42x5.0	M14 / (M12)	
1 1/2	38x5.0	M16	210
1 1/2	50x3.0	M16	
1 1/2	50x5.0	M16	
1 1/2	50x6.0	M16	
1 1/2	50x8.0	M16	
2	50x5.0	M20	400
2	50x6.0	M20	
2	50x8.0	M20	
2	60x5.0	M20	
2	60x8.0	M20	
2	65x8.0	M20	
2	66x8.5	M20	
2 1/2	75x12.5	M24	550



- Be sure flange setting is correct
- Flange gap must be the same at all 3 points (4 locations on square flanges) required

Tools for Parflare machines

⚠ Use of worn or non- suitable tooling may result in flange failure and damage of machine
⚠ Tools must be checked regularly, at least after 50 assemblies
⚠ Worn tools must be replaced
⚠ Use only genuine Parker Parts
⚠ Tools must always be kept clean and lubricated

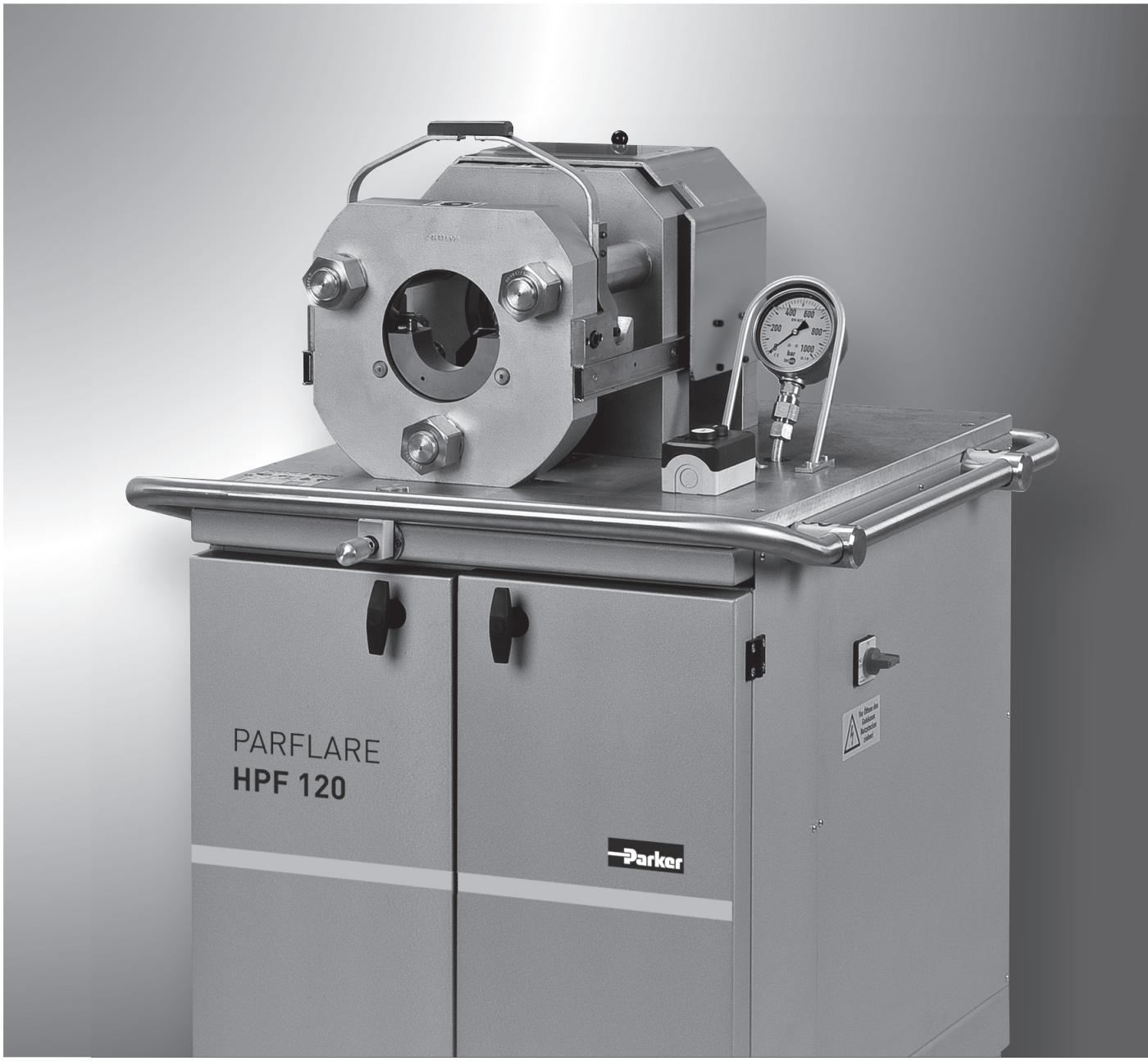
Checking instructions for Parflare HPF tools

1

- Clean pin for checking
- Visual check: Surface must be free of wear and damage

2

- Clean die halves for checking
- Visual check: Gripping surface must be clean and free of wear
- Use wire brush to remove metal particles from gripping surface



Machines und tooling

ENGINEERING YOUR SUCCESS.

Parflare HPF 120 and 170

Machines for manufacturing HPF flange connections

The Parflare HPF 120

The Parflare HPF 120 and Parflare HPF 170 have been developed for tube end forming by axial pressure operation for the HPF flange system and is a machine for single operation for tube sizes up to 150 mm maximal tube outside diameter (HPF 120 max. 90x9.0 mm; HPF 170 max. 150x15.0 mm)).

Flange flaring is achieved by axial pressure of the tool into the tube end. The flaring contour matches the Parker HPF insert.

The feed movement of the tool is produced by an hydraulic cylinder which is driven by a unit in the machine housing. The return feed is also electro-hydraulic. The tubes are clamped in clamping jaw sets which are clamped by means of a cone. The machine is equipped with an adjustable stop for the tube end. This enables flared flanges to be produced with consistent quality. The split clamping jaws and the tube stop allow simple operation and consistent results. The separation of the clamping jaws and removal of the tubes is made easier by a latch device.

The machine is designed for project work on site.

The Parflare HPF machines are supplied ready to go but tools must be ordered separately. Special clamping jaws and pins are requried for each tube size.

Application

- Alternative to conventional welded connections for hydraulic lines
- Machine for project work, on-site assembly and maintenance
- Not suitable for high volume production.

The Parflare HPF 170

Parflare HPF 120 and 170

Specification

Application	Flaring machine HPF 120	Flaring machine HPF 170
Process	Tube forming by axial pressure	Tube forming by axial pressure
Design	On-site and workshop machine for individual tube preparation. Transportable on wheels	Stationary workshop machine for individual tube preparation
Operation	Manual tube clamping Hydraulic driven tool Process control by setting wheels and pressure display	Manual tube clamping Hydraulic driven tool Process control by setting wheels and pressure display
Tube diameter	25 to 90 mm	97 to 150 mm
Tube material	Steel	Steel
Cycle time	1 - 2 minutes flaring time 3 - 5 minutes total cycle time	1 - 2 minutes flaring time 3 - 5 minutes total cycle time
Economic production quantity	max. 50 assemblies per day	max. 50 assemblies per day
Tools	Flaring pin BHPF... Clamping die set MHPF...	Flaring pin BHPF... Clamping die set MHPF...
Tool lubrication	manual	manual
Lubricant for pin	High pressure grease (e.g. Rivolta WAP)	High pressure grease (e.g. Rivolta WAP)
Machine dimensions (L x W x H)	890 x 800 x 1.307 mm	1200 x 730 x 1.460 mm
Weight	approx. 415 kg	approx. 1.100 kg
Nominal voltage	400 V/3Ph/1.1 kW	400 V/3Ph/2kW
Connecting cable	3m/CEE 16A	3m/CEE 16A
Sound pressure level	Max. 70 dB (A)	Max. 70 dB (A)

Parflare HPF 120 and 170

Ordering

Type	Order code HPF 120
Parflare HPF 120 WorkCentre Ready to use, including operating manual, filled with hydraulic oil and lubricant Without tools Basic machine 400V, 3 phase, 50Hz	HPF120EU400V
Catalogue 4167/DE	4167 via Parker catalogue service EMDC
Operating manual UK/DE	HPF120/MANUAL

Type	Order code HPF 170
Parflare HPF 170 Ready to use, including operating manual, filled with hydraulic oil and lubricant Without tools Basic machine 400V, 3 phase, 50Hz	HPF170EU400V
Catalogue 4167/DE	4167 via Parker catalogue service EMDC
Operating manual UK/DE	HPF170/MANUAL

Parflare machines are shipped in special containers which should be kept for future transportation to avoid damage.

Flaring tools for machines: Parflare HPF 120 and 170

	Clamping die set MHPF	Pressure pin BHPF
Tube O.D. mm	Order code	Order code
25	MHPF25	BHPF25/38
30	MHPF30	
38	MHPF38	
42	MHPF42	BHPF38/50
50	MHPF50	
60	MHPF60	BHPF50/90
65	MHPF65	
66	MHPF66	
73	MHPF73	
75	MHPF75	
80	MHPF80	
88	MHPF88	
90	MHPF90	
97*	MHPF97	BHPF90/170
101.6*	MHPF101.6	
114.3*	MHPF114.3	
115*	MHPF115	
120*	MHPF120	
130*	MHPF130	
150*	MHPF150	

*For Parflare HPF 170

Tool lifetime
Assembly tools are subject to wear and must be regularly (max. 50 assemblies) cleaned and checked (for checking instructions see chapter Installation). In advance of each forming the flaring pins should be lubricated with a high pressure grease. Worn tools can cause dangerous assembly failures and must be replaced in time. Maximum lifetime can be achieved by observing the following:

- Regular cleaning and checking
- Clean and corrosion-protected storage
- Proper de-burring and cleaning of tube end
- Proper tool selection and operation
- Use of specified lubricant

Parflare HPF 120 and 170

Features, advantages and benefits of Parflare HPF machines

1. **Cost saving –** Compared to welding or brazing, the flaring process is much less time consuming. Special tube preparation and finishing are not necessary. Energy consumption for flaring is far below the energy needed for brazing or welding.

2. **Zinc plated tubing –** The Parflare process allows the use of zinc plated tubing. The cost for cleaning post process, or painting can be saved.

3. **Excellent sealing quality –** The HPF inserts are precisely fitted into the contour of the tube termination. Sealing is achieved by an O-ring.

4. **Process/Product concept –** Parflare machines are especially designed to match Parker HPF standards. Machines, tools and products are fine tuned for reliable performance.

5. **Workshop use –** The rigid machine design allows project work in on-site piping workshops.

6. **Short clamping length –** Clamping dies for HPF flaring are optimised for minimum straight tube length.

7. **Easy to use –** All operational devices are obvious so that machine operation is intuitive. Insertion and withdrawal of the tube ends are facilitated by the two part clamping jaws.

8. **Quality –** Consistent quality results are achieved by recommended values for machine setting.

9. **Constant flare diameter –** The diameter of the flare is given by the tool contour and the tube stop adjustment.

10. **Flexible –** Different tube material and quality might require special setting of tube stop. For best results, these parameters can be manually adjusted based on operators experience.

11. **Clean –** The Parflare process is environmentally clean and safe. As no heat or chemicals are used, hazards from fumes or heat do not occur.

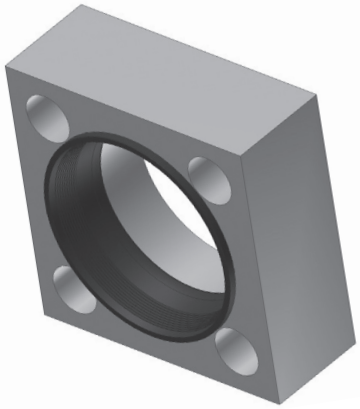
12. **Ready to go –** The Parflare HPF machines are delivered including all necessary items such as tool magazine (HPF 120), electric plug, operator manual, declaration of CE conformity, short instruction pictograms on machine housing and dimensional charts for tube preparation.

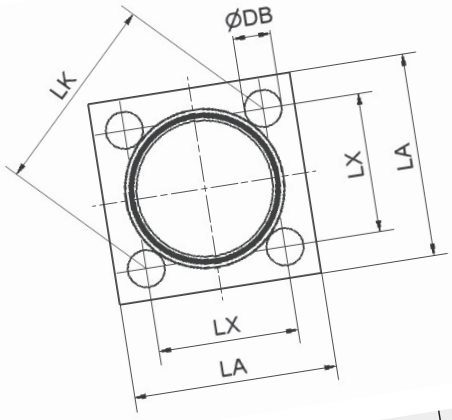
Notes

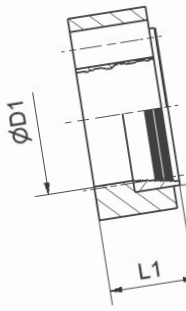
– ISO 6164 Square flange

PFC – Complete flange incl. lockring

SO 6164 footprint







Size Inch	Tube O.D.	Order code	LK	D1	D2	L1	LA	LX	DB	Weight (Steel) kg/1 piece	P
2 1/2	75.0	**HPFC440-75PHR**	118	80.5	95	58	120	83.4	22.0	5.5	
3	80.0	**HPFC448-80PHR**	145	90.5	111	56	150	102.5	26.0	6.0	
3	88.0	**HPFC448-88PHR**	145	90.5	111	59	150	102.5	26.0	5.8	
3	90.0	**HPFC448-90PHR**	145	90.5	111	58	150	102.5	26.0	5.7	
3	97.0	**HPFC448-97CF***	145	98.0	-	52	150	102.5	26.0	4.9	
3 1/2	101.6	**HPFC456-101.6CF***	160	102.5	-	60	160	113.1	26.0	6.7	
4	114.3	**HPFC464-114.3CF***	175	114.8	-	70	180	123.7	31.5	9.5	

*One-part flange without separate locking ring

Ordering information/Nomenclature

Order code – HPF

Example: HPF6 | 20 | -42x3.0 | OR | CF

Part Code Flange-Type	Flange-Code	Footprint	
HPF (M)	**3**	ISO 6162-1	(SAE 3000)
HPF (M)	**6**	ISO 6162-2	(SAE 6000)
HPF	**4**	ISO 6164	Square flange

Series

8	12	16	20	24	32	40	48	64	72	80
1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	4 1/2”	5”

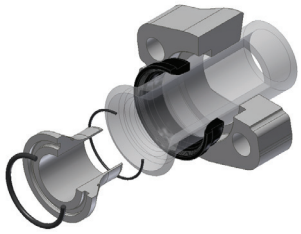
Pipe size
42x3.0 / Pipe O.D. x wall thicknes (mm)

Sealing system

OR	O-Ring-Seal
V	F37-Seal
F	Flat Face

Material and coating

CF	Steel, Cr(VI)-free
PHR	Steel, phosphated (Lockring, resp. ISO 6164 Flange)



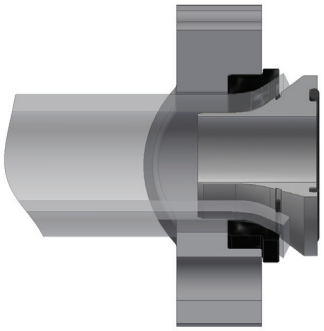
Ordering example for a tube to port flange connection:

Parts (Connection kit*)	Component	Qty.	Code	Material
HPF620-38X6.0-ORCF	Flange	1	HPFC620-38CF	Steel, Cr(VI)-free
Tube to port connection	Insert	1	IP620-38X6.0-VCF	Steel, Cr(VI)-free
1 ¼" 6000psi footprint	O-Ring	1	OR37.69X3.53X	NBR, 90° Shore A
38X6.0 Tube	O-Ring	1	OR29.87X1.78X	NBR, 90° Shore A
HPFM620-38X6.0-FCF	Flange with female thread	1	HPFM632-60CF	Steel, Cr(VI)-free
Tube to tube connection	Insert (flat)	1	IP632-60X8.0-FCF	Steel, Cr(VI)-free
with threaded flange	O-Ring		OR56.87X1.78	Steel, Cr(VI)-free
2" 6000psi footprint				
60X8.0 Tube				
HPF448-80X10.0-VCF	Flange	1	HPFC448-80PHR	Steel, phosphated
Tube to port connection	Insert	1	IP448-80X10.0-VCF	Steel, Cr(VI)-free
3" ISO 6164 footprint	F37-Profile seal	1	F37S448X	PUR, P5008
80X10.0 Tube	O-Ring	1	OR69.57X1.78X	NBR, 90° Shore A

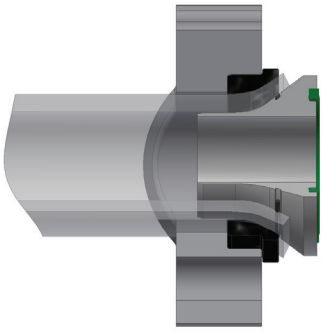
*Bolts are not components of the kit. Bolts see page 45, 55, 65.

Assembly examples

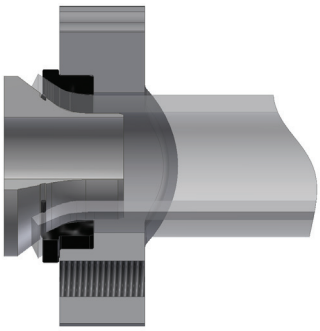
Combination possibilities - HPF



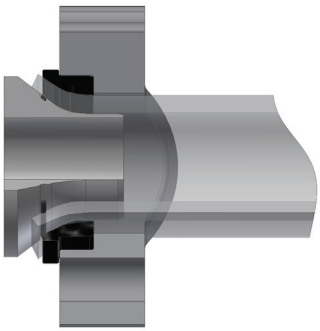
HPFC - flange with IPOR insert
Full flange, insert with face-side O-Ring seal



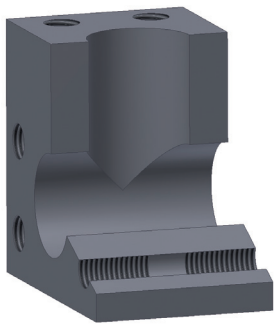
HPFC - flange with IPV insert
Full flange, insert with F37 profile seal



HPFCM - flange with IPF insert
Full flange with internal thread, insert with smooth sealing face

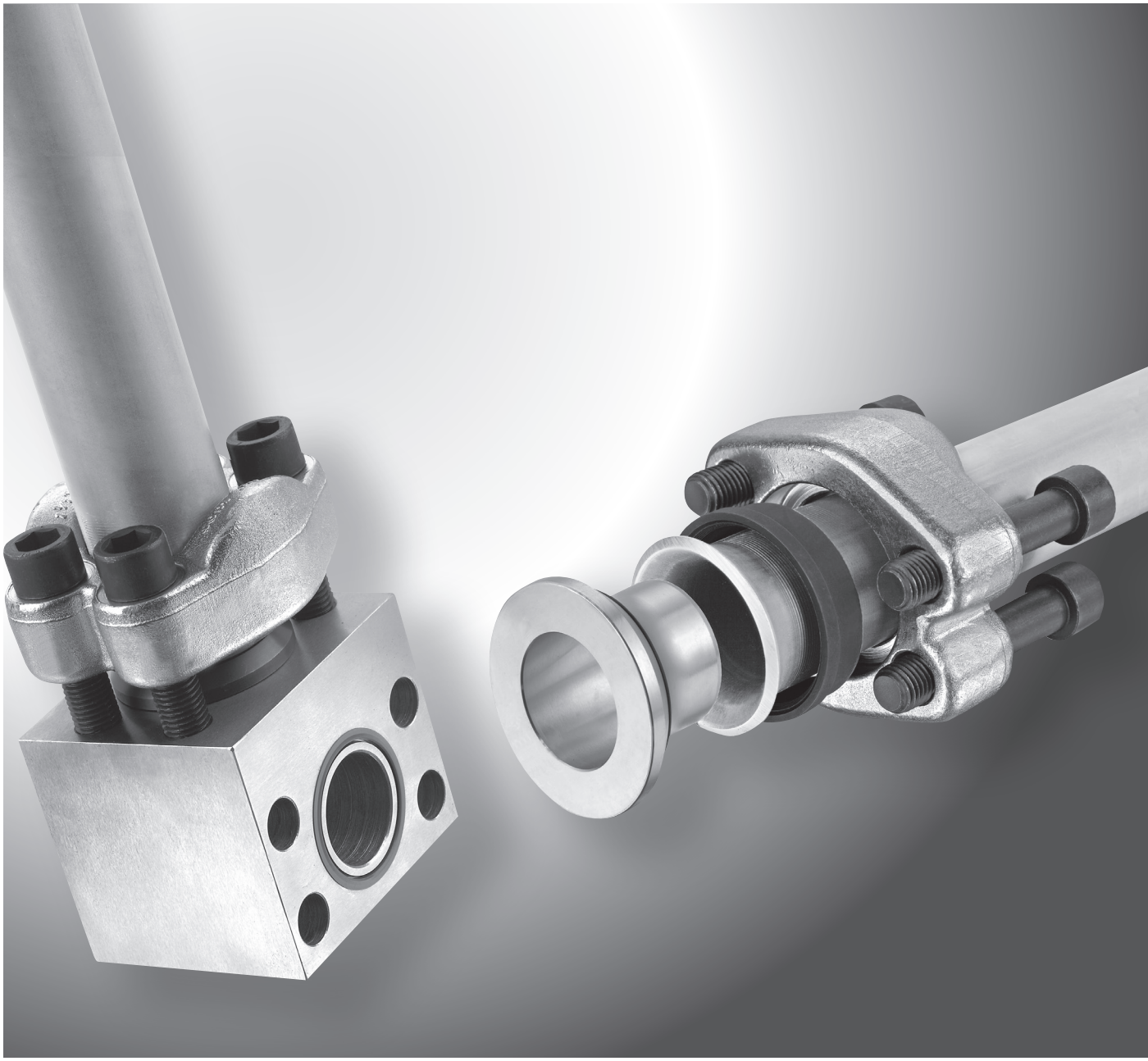


HPFC - flange with IPF insert
Full flange, insert with smooth sealing face



Connection with smooth
sealing face
e.g. block, pump, valve, etc.

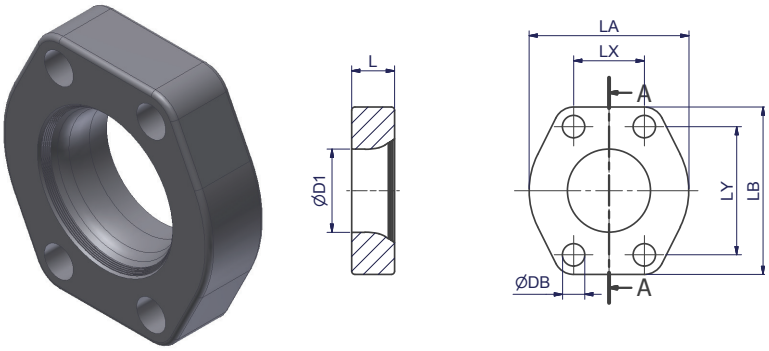
Notes



HPF - SAE 3000/ISO 6162-1

HPFC – Complete flange

ISO 6162-1 footprint



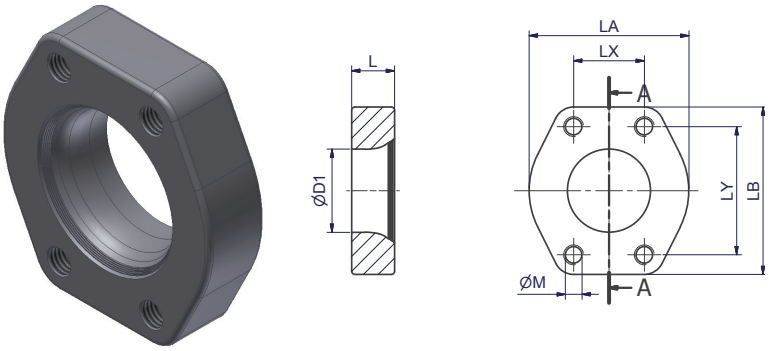
Size Inch	Tube O.D.	Order code	D1	L	LA	LB	LX	LY	DB	Weight (Steel) kg/1 piece	PN (bar)
1 1/4	42	**HPFC320-42CF**	42.5	22	73	79.4	30.2	58.7	11.0	0.5	280
1 1/2	50	**HPFC324-50CF**	50.5	25	83	93.8	35.7	69.9	13.0	0.7	280
2	50	**HPFC332-50CF**	50.5	26	97	101.6	42.9	77.8	13.5	1.1	280
2	60	**HPFC332-60CF**	60.5	26	97	101.6	42.9	77.8	13.5	0.9	280
2 1/2	60	**HPFC340-60CF**	60.5	38	109	114.3	50.8	88.9	13.5	2.0	210
2 1/2	73	**HPFC340-73CF**	74.0	38	109	114.3	50.8	88.9	13.5	1.5	210
3	90	**HPFC348-90CF**	90.5	41	131	135.1	61.9	106.4	17.0	2.3	210

Pressure ratings (PN) refer to the flanges.
Effective pressure depends on the used tube and operating temperature (page 14f).

Material	Suffix surface and material
Steel, zinc plated, Cr(VI)-free	CF

HPFCM – Complete flange with female thread

ISO 6162-1 footprint



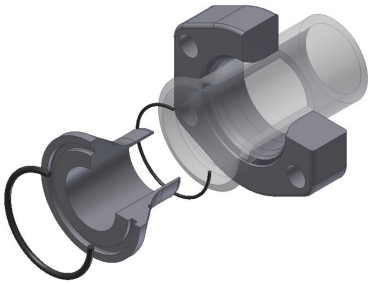
Size Inch	Tube O.D.	Order code	D1	L	LA	LB	LX	LY	M	Weight (Steel) kg/1 piece	PN (bar)
1 1/4	42	**HPFCM320-42CF**	42.5	22	73	79.4	30.2	58.7	M10	0.5	280
1 1/2	50	**HPFCM324-50CF**	50.5	25	83	93.8	35.7	69.9	M12	0.7	280
2	50	**HPFCM332-50CF**	50.5	26	97	101.6	42.9	77.8	M12	1.1	280
2	60	**HPFCM332-60CF**	60.5	26	97	101.6	42.9	77.8	M12	0.9	280
2 1/2	60	**HPFCM340-60CF**	60.5	38	109	114.3	50.8	88.9	M12	2.0	210
2 1/2	73	**HPFCM340-73CF**	74.0	38	109	114.3	50.8	88.9	M12	1.5	210
3	90	**HPFCM348-90CF**	90.5	41	131	135.1	61.9	106.4	M16	2.3	210

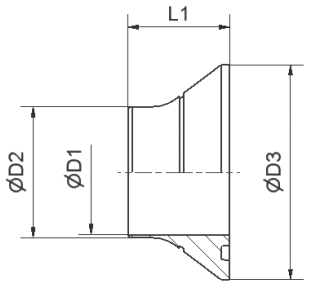
Pressure ratings (PN) refer to the flanges.
Effective pressure depends on the used tube and operating temperature (page 14f).

Material	Suffix surface and material
Steel, zinc plated, Cr(VI)-free	CF

IPOR – Insert with face seal O-Ring

ISO 6162-1 footprint



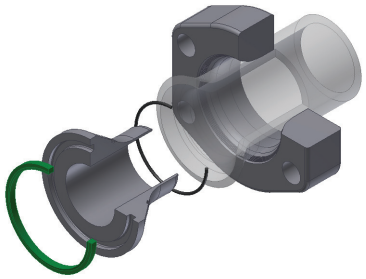


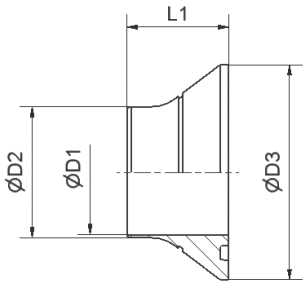
Size Inch	Tube	Complete part (flange incl. insert and seals)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	O-Ring (face seal)	O-Ring
1 1/4	42x4.0	**HPF320-42X4.0-ORCF**	**IP320-42X4.0-ORCF**	30.5	33.4	50.8	34	0.11	OR37.7X3.53X	OR37.82X1.78X
1 1/2	50x5.0	**HPF324-50X5.0-ORCF**	**IP324-50X5.0-ORCF**	36.5	39.4	60.4	39	0.19	OR47.22X3.53X	OR50.52X1.78X
2	50x5.0	**HPF332-50X5.0-ORCF**	**IP332-50X5.0-ORCF**	36.5	39.4	71.4	46	0.36	OR56.75X3.53X	OR50.52X1.78X
2	60x5.0	**HPF332-60X5.0-ORCF**	**IP332-60X5.0-ORCF**	46.5	49.4	71.4	38	0.25	OR56.75X3.53X	OR56.87X1.78X
2	60x6.0	**HPF332-60X6.0-ORCF**	**IP332-60X6.0-ORCF**	44.3	47.3	71.4	38	0.25	OR56.75X3.53X	OR56.87X1.78X
2 1/2	60x6.0	**HPF340-60X6.0-ORCF**	**IP340-60X6.0-ORCF**	44.3	47.3	84.1	47	0.49	OR69.44X3.53X	OR56.87X1.78X
2 1/2	73x7.0	**HPF340-73X7.0-ORCF**	**IP340-73X7.0-ORCF**	55.2	58.2	84.1	40	0.35	OR69.44X3.53X	OR66.40X1.78X
3	90x5.0	**HPF348-90X5.0-ORCF**	**IP348-90X5.0-ORCF**	76.5	79.4	101.6	38	0.39	OR85.32X3.53X	OR88.62X1.78X
3	90x9.0	**HPF348-90X9.0-ORCF**	**IP348-90X9.0-ORCF**	68.5	71.4	101.6	43	0.54	OR85.32X3.53X	OR82.27X1.78X

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP324-50X5.0-ORCF

IPV – Insert with F37 profile seal

ISO 6162-1 footprint



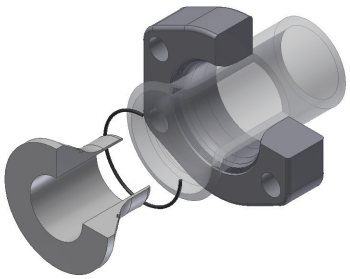


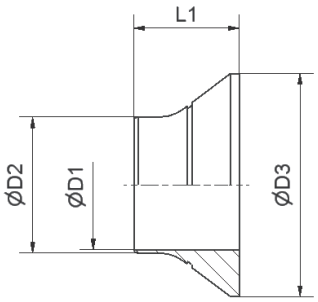
Size Inch	Tube	Complete part (flange incl. insert and seals)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	F37 seal	O-Ring
1 1/4	42x4.0	**HPF320-42X4.0-VCF**	**IP320-42X4.0-VCF**	30.5	33.4	50.8	34	0.11	F37S20X	OR37.82X1.78X
1 1/2	50x5.0	**HPF324-50X5.0-VCF**	**IP324-50X5.0-VCF**	36.5	39.4	60.4	39	0.19	F37S24X	OR50.52X1.78X
2	50x5.0	**HPF332-50X5.0-VCF**	**IP332-50X5.0-VCF**	36.5	39.4	71.4	46	0.36	F37S32X	OR50.52X1.78X
2	60x5.0	**HPF332-60X5.0-VCF**	**IP332-60X5.0-VCF**	46.5	49.4	71.4	38	0.25	F37S32X	OR56.87X1.78X
2	60x6.0	**HPF332-60X6.0-VCF**	**IP332-60X6.0-VCF**	44.3	47.3	71.4	38	0.25	F37S32X	OR56.87X1.78X
2 1/2	60x6.0	**HPF340-60X6.0-VCF**	**IP340-60X6.0-VCF**	44.3	47.3	84.1	47	0.49	F37S40X	OR56.87X1.78X
2 1/2	73x7.0	**HPF340-73X7.0-VCF**	**IP340-73X7.0-VCF**	55.2	58.2	84.1	40	0.35	F37S40X	OR66.40X1.78X
3	90x5.0	**HPF348-90X5.0-VCF**	**IP348-90X5.0-VCF**	76.5	79.4	101.6	38	0.39	F37S48X	OR88.62X1.78X
3	90x9.0	**HPF348-90X9.0-VCF**	**IP348-90X9.0-VCF**	68.5	71.4	101.6	43	0.54	F37S48X	OR82.27X1.78X

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP324-50X5.0-VCF

IPF – Insert with flat face

ISO 6162-1 footprint





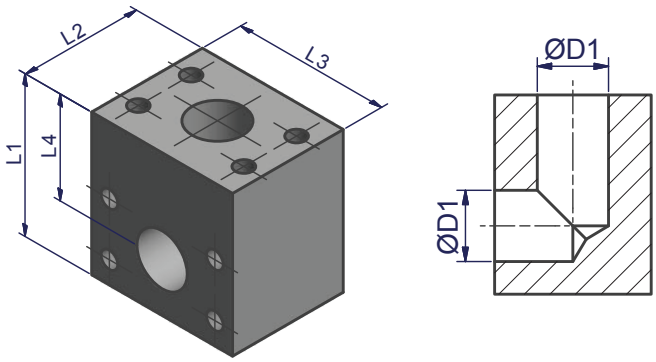
Size Inch	Tube	Complete part (flange* incl. insert and seals)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	O-Ring
1 1/4	42x4.0	**HPF320-42X4.0-FCF**	**IP320-42X4.0-FCF**	30.5	33.4	50.8	34	0.13	OR37.82X1.78X
1 1/2	50x5.0	**HPF324-50X5.0-FCF**	**IP324-50X5.0-FCF**	36.5	39.4	60.4	39	0.20	OR50.52X1.78X
2	50x5.0	**HPF332-50X5.0-FCF**	**IP332-50X5.0-FCF**	36.5	39.4	71.4	46	0.38	OR50.52X1.78X
2	60x5.0	**HPF332-60X5.0-FCF**	**IP332-60X5.0-FCF**	46.5	49.4	71.4	38	0.27	OR56.87X1.78X
2	60x6.0	**HPF332-60X6.0-FCF**	**IP332-60X6.0-FCF**	44.3	47.3	71.4	38	0.27	OR56.87X1.78X
2 1/2	60x6.0	**HPF340-60X6.0-FCF**	**IP340-60X6.0-FCF**	44.3	47.3	84.1	47	0.51	OR56.87X1.78X
2 1/2	73x7.0	**HPF340-73X7.0-FCF**	**IP340-73X7.0-FCF**	55.2	58.2	84.1	40	0.37	OR66.40X1.78X
3	90x5.0	**HPF348-90X5.0-FCF**	**IP348-90X5.0-FCF**	76.5	79.4	101.6	38	0.41	OR88.62X1.78X
3	90x9.0	**HPF348-90X9.0-FCF**	**IP348-90X9.0-FCF**	68.5	71.4	101.6	43	0.57	OR82.27X1.78X

* Flange with female thread = HPFM3…-FCF

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP324-50X5.0-FCF

LB - Flange L-block

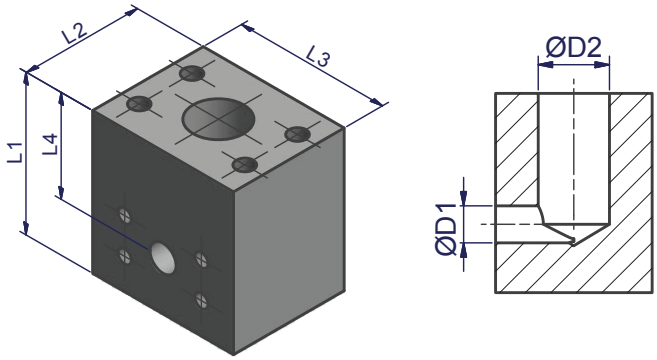
ISO 6162-1 footprint



Size Inch	Order code	D1	L1	L2	L3	L4	Weight (Steel) kg/1 piece.
1 1/4	**LB320CFX**	30.0	80.0	58.0	80.0	51.0	2.4
1 1/2	**LB324CFX**	38.0	90.0	68.0	90.0	56.0	3.4
2	**LB332CFX**	48.0	96.0	78.0	100.0	57.0	4.4
2 1/2	**LB340CFX**	60.0	110.0	88.0	110.0	65.0	6.0
3	**LB348CFX**	73.0	135.0	110.0	135.0	80.0	11.3

Other sizes on request

LBR - Flange L-block reducer



Size Inch	Order code	D1	D2	L1	L2	L3	L4	Weight (Steel) kg/1 piece.
1 1/2 - 1 1/4	**LBR324-320CFX**	30.0	38.0	90.0	68.0	90.0	56.0	3.6
2 - 1 1/4	**LBR332-320CFX**	30.0	48.0	96.0	78.0	100.0	57.0	4.7
2 - 1 1/2	**LBR332-324CFX**	38.0	48.0	96.0	78.0	100.0	57.0	4.6
2 1/2 - 1 1/2	**LBR340-324CFX**	38.0	60.0	110.0	88.0	110.0	65.0	6.5
2 1/2 - 2	**LBR340-332CFX**	48.0	60.0	110.0	88.0	110.0	65.0	6.3
3 - 2	**LBR348-332CFX**	48.0	73.0	135.0	110.0	135.0	80.0	11.9
3 - 2 1/2	**LBR348-340CFX**	60.0	73.0	135.0	110.0	135.0	80.0	11.6

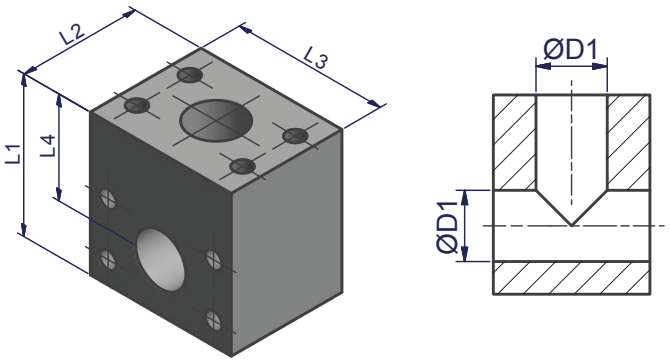
Other sizes on request

Please change **suffixes** according to coating

Coating	Suffix surface and material	Example Flange L-block	Example Flange L-block reducer
Steel, zinc plated, Cr(VI)-freei	CFX	LB324CFX	LBR324-320CFX
Steel, oiled	SX	LB324SX	LBR324-320SX

TB - Flange T-block

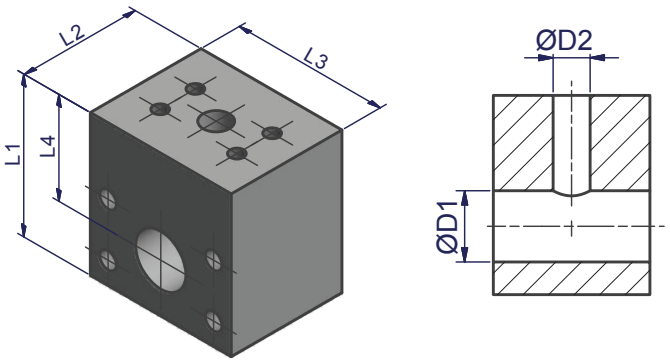
ISO 6162-1 footprint



Size Inch	Order code	D1	L1	L2	L3	L4	Weight (Steel) kg/1 piece
1 1/4	**TB320CFX**	30.0	80.0	58.0	80.0	51.0	2.2
1 1/2	**TB324CFX**	38.0	90.0	68.0	90.0	56.0	3.1
2	**TB332CFX**	48.0	96.0	78.0	100.0	57.0	3.9
2 1/2	**TB340CFX**	60.0	110.0	88.0	110.0	65.0	5.3
3	**TB348CFX**	73.0	135.0	110.0	135.0	80.0	10.0

Other sizes on request

TBR - Flange T-block reducer



Size Inch	Order code	D1	D2	L1	L2	L3	L4	Weight (Steel) kg/1 piece
1 1/2 - 1 1/4 - 1 1/2	**TBR324-320-324CFX**	38.0	30.0	90.0	68.0	90.0	56.0	3.3
2 - 1 1/4 - 2	**TBR332-320-332CFX**	48.0	30.0	96.0	78.0	100.0	57.0	4.3
2 - 1 1/2 - 2	**TBR332-324-332CFX**	48.0	38.0	96.0	78.0	100.0	57.0	4.2
2 1/2 - 1 1/2 - 2 1/2	**TBR340-324-340CFX**	60.0	38.0	110.0	88.0	110.0	65.0	5.9
2 1/2 - 2 - 2 1/2	**TBR340-332-340CFX**	60.0	48.0	110.0	88.0	110.0	65.0	5.6
3 - 2 - 3	**TBR348-332-348CFX**	73.0	48.0	135.0	110.0	135.0	80.0	11.0
3 - 2 1/2 - 3	**TBR348-340-348CFX**	73.0	60.0	135.0	110.0	135.0	80.0	10.6

Other sizes on request

Please change **suffixes** according to coating

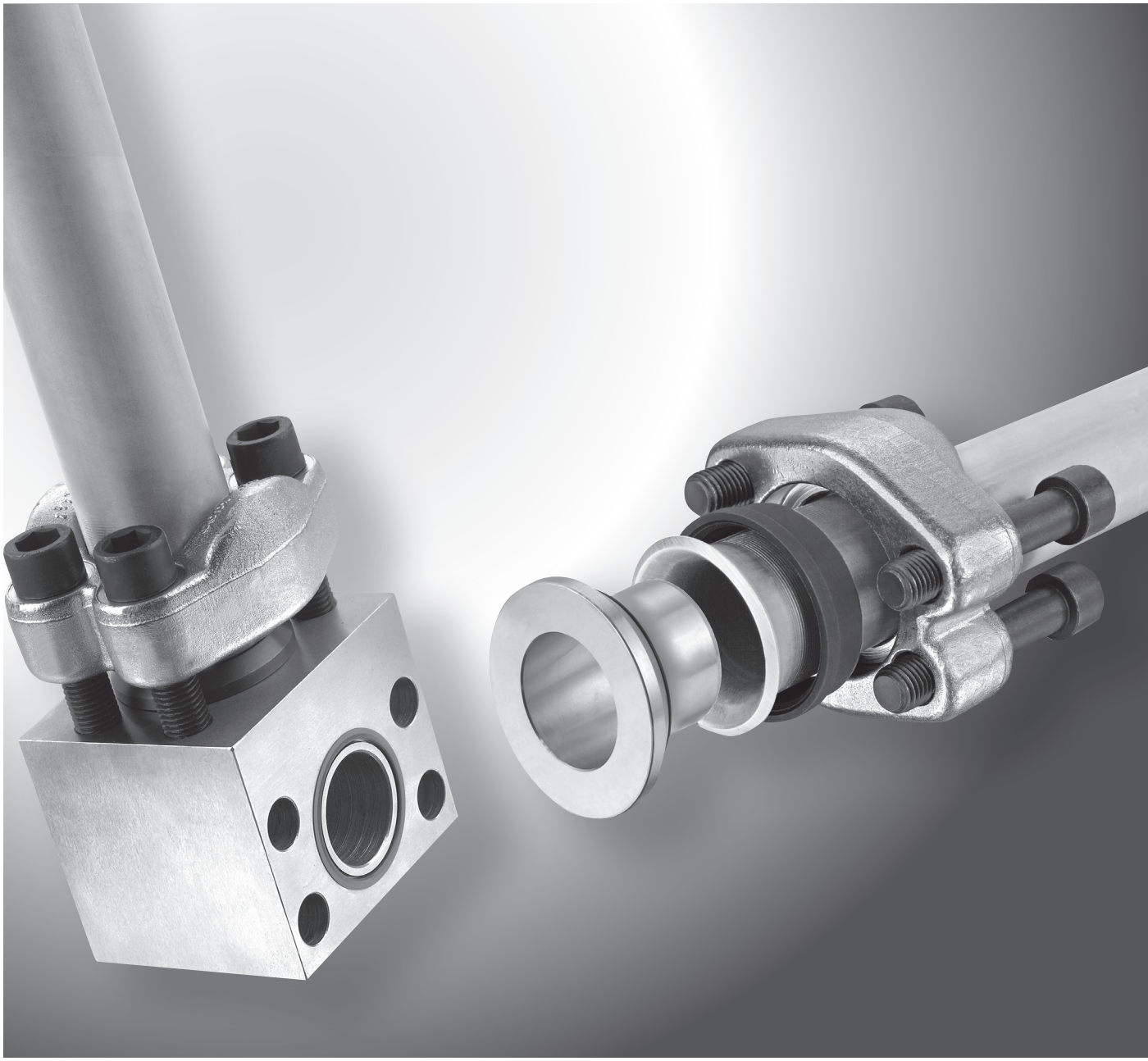
Coating	Suffix surface and material	Example Flange T-block	Example Flange T-block reducer
Steel, zinc plated, Cr(VI)-free	CFX	TB324CFX	TBR324-320-324CFX
Steel, oiled	SX	TB324SX	TBR324-320-324SX

Bolts and nuts

HPF ISO 6162-1 footprint

Size Inch	Tube	Connection Tube to Tube						Connection Tube to Port	
		Flange with through-hole – Flange with thread		Flange with through-hole – Flange with through-hole					
		Bolts ISO 4762 10.9 (DIN 912)		Bolts ISO 4762 10.9 (DIN 912)		Nuts ISO 4032 10		Bolts ISO 4762 10.9 (DIN 912)	
		Description	Order code	Description	Order code	Description	Order code	Description	Order code
1 1/4	42x4.0	M10x70	**ZYLS10X70109X**	M10x80	**ZYLS10X80109X**	M10	**ISO4032-M10-10X**	M10x45	**ZYLS10X45109X**
1 1/2	50x5.0	M12x75	**ZYLS12X75109X**	M12x90	**ZYLS12X90109X**	M12	**ISO4032-M12-10X**	M12x55	**ZYLS12X55109X**
2	50x5.0	M12x90	**ZYLS12X90109X**	M12x110	**ZYLS12X110109X**	M12	**ISO4032-M12-10X**	M12x65	**ZYLS12X65109X**
2	60x5.0	M12x90	**ZYLS12X90109X**	M12x100	**ZYLS12X100109X**	M12	**ISO4032-M12-10X**	M12x55	**ZYLS12X55109X**
2	60x6.0	M12x70	**ZYLS12X70109X**	M12x100	**ZYLS12X100109X**	M12	**ISO4032-M12-10X**	M12x55	**ZYLS12X55109X**
2 1/2	60x6.0	M12x100	**ZYLS12X100109X**	M12x140	**ZYLS12X140109X**	M12	**ISO4032-M12-10X**	M12x80	**ZYLS12X80109X**
2 1/2	73x7.0	M12x90	**ZYLS12X90109X**	M12x130	**ZYLS12X130109X**	M12	**ISO4032-M12-10X**	M12x70	**ZYLS12X70109X**
3	90x5.0	M16x110	**ZYLS16X110109X**	M16x130	**ZYLS16X130109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
3	90x9.0	M16x120	**ZYLS16X120109X**	M16x140	**ZYLS16X140109X**	M16	**ISO4032-M16-10X**	M16x85	**ZYLS16X85109X**

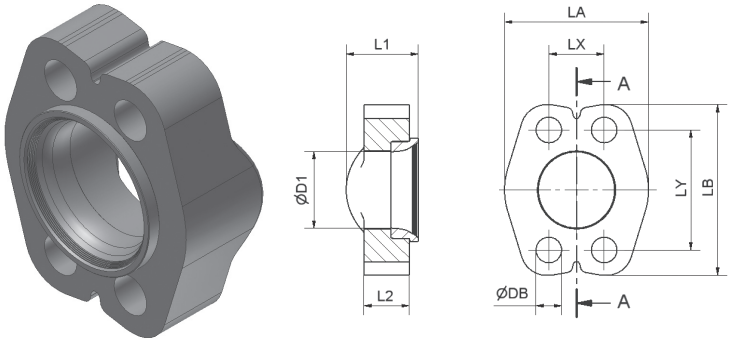
Notes



HPF – SAE 6000/ISO 6162-2

HPFC – Complete flange incl. lockring

ISO 6162-2 footprint



Size Inch	Tube O.D.	Order code	D1	L1	L2	LA	LB	LX	LY	DB	Weight (Steel) kg/1 piece	PN (bar)
3/4	25	**HPFC612-25CF**	25.5	34	19	60.5	71.4	23.8	50.8	10.5	0.5	420
1	30	**HPFC616-30CF**	30.5	42	24	69.9	81.0	27.8	57.2	13.0	0.5	420
1	38	**HPFC616-38CF**	38.5	41	24	69.9	81.0	27.8	57.2	13.0	0.6	420
1 1/4	38	**HPFC620-38CF**	38.5	45	27	77.7	95.3	31.8	66.7	15.0	0.9	420
1 1/4	38	**HPFC620-38H12CF**	38.5	45	27	77.7	95.3	31.8	66.7	13.3	1.1	420
1 1/4	42	**HPFC620-42CF**	42.5	46	27	77.7	95.3	31.8	66.7	15.0	0.9	420
1 1/4	42	**HPFC620-42H12CF**	42.5	46	27	77.7	95.3	31.8	66.7	13.3	1.1	420
1 1/2	38	**HPFC624-38CF**	38.5	49	30	95.3	112.8	36.5	79.4	17.0	1.7	420
1 1/2	50	**HPFC624-50CF**	50.5	49	30	95.3	112.8	36.5	79.4	17.0	1.5	420
2	50	**HPFC632-50CF**	50.5	58	37	114.3	133.4	44.5	96.8	22.0	2.5	420
2	60	**HPFC632-60CF**	60.5	62	37	114.3	133.4	44.5	96.8	22.0	2.4	350
2	60x5*	**HPFC632-60X5CF**	60.5	62	37	114.3	133.4	44.5	96.8	22.0	2.4	280
2	65	**HPFC632-65CF**	65.5	61	37	114.3	133.4	44.5	96.8	22.0	2.3	350
2	66	**HPFC632-66CF**	66.5	63	37	114.3	133.4	44.5	96.8	22.0	2.3	350
2 1/2	75	**HPFC640-75CF**	76.0	49	45	150.0	176.0	58.7	123.8	25.0	5.3	420

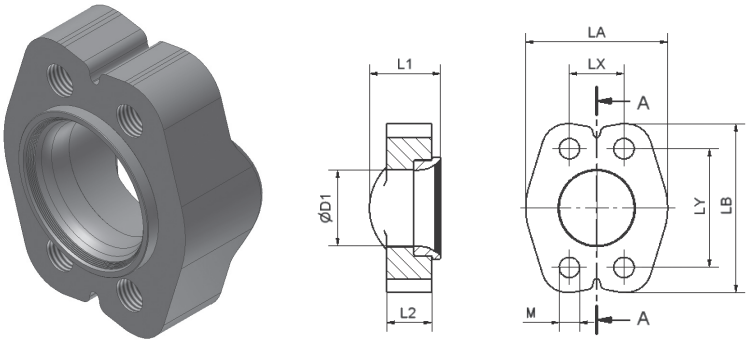
* Special size 60x5 = Tube O.D. 60 and wallthickness 5

Pressure ratings (PN) refer to the flanges.
Effective pressure depends on the used tube and operating temperature (page 14f).

Material	Suffix surface and material
Steel, zinc plated, Cr(VI)-free	CF

HPFCM – Complete flange with metric female thread incl. lockring

ISO 6162-2 footprint



Size Inch	Tube O.D.	Order code	D1	L1	L2	LA	LB	LX	LY	M	Weight (Steel) kg/1 piece	PN (bar)
3/4	25	**HPFCM612-25CF**	25.5	34	19	60.5	71.4	23.8	50.8	M10	0.5	420
1	30	**HPFCM616-30CF**	30.5	42	24	69.9	81.0	27.8	57.2	M12	0.5	420
1	38	**HPFCM616-38CF**	38.5	41	24	69.9	81.0	27.8	57.2	M12	0.6	420
1 1/4	38	**HPFCM620-38CF**	38.5	45	27	77.7	95.3	31.8	66.7	M14	0.9	420
1 1/4	38	**HPFCM620-38TM12CF**	38.5	45	27	77.7	95.3	31.8	66.7	M12	1.1	420
1 1/4	42	**HPFCM620-42CF**	42.5	46	27	77.7	95.3	31.8	66.7	M14	0.9	420
1 1/4	42	**HPFCM620-42TM12CF**	42.5	46	27	77.7	95.3	31.8	66.7	M12	1.1	420
1 1/2	38	**HPFCM624-38CF**	38.5	49	30	95.3	112.8	36.5	79.4	M16	1.7	420
1 1/2	50	**HPFCM624-50CF**	50.5	49	30	95.3	112.8	36.5	79.4	M16	1.5	420
2	50	**HPFCM632-50CF**	50.5	58	37	114.3	133.4	44.5	96.8	M20	2.5	420
2	60	**HPFCM632-60CF**	60.5	62	37	114.3	133.4	44.5	96.8	M20	2.4	350
2	60x5*	**HPFC632-60X5CF**	60.5	62	37	114.3	133.4	44.5	96.8	M20	2.4	280
2	65	**HPFCM632-65CF**	65.5	61	37	114.3	133.4	44.5	96.8	M20	2.3	350
2	66	**HPFCM632-66CF**	66.5	63	37	114.3	133.4	44.5	96.8	M20	2.3	350
2 1/2	75	**HPFCM640-75CF**	76.0	49	45	150.0	176.0	58.7	123.8	M24	5.3	420

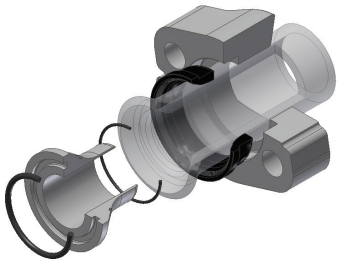
* Special size 60x5 = Tube O.D. 60 and wallthickness 5

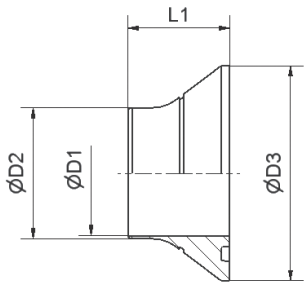
Pressure ratings (PN) refer to the flanges.
Effective pressure depends on the used tube and operating temperature (page 14f).

Material	Suffix surface and material
Steel, zinc plated, Cr(VI)-free	CF

IPOR – Insert with face seal O-Ring

ISO 6162-2 footprint



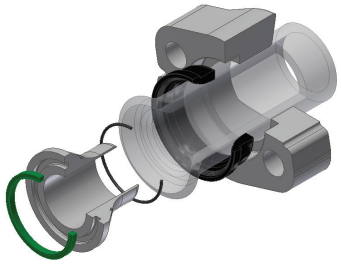


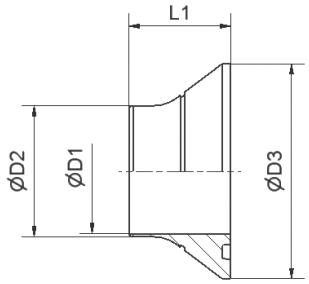
Size Inch	Tube	Complete part (flange incl. lockring, insert and seal)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	O-Ring (face seal)	O-Ring
3/4	25x3.0	**HPF612-25X3.0-ORCF**	**IP612-25X3.0-ORCF**	15.5	18.5	41.5	38	0.11	OR25X3.53X	OR25.12X1.78X
3/4	25x4.0	**HPF612-25X4.0-ORCF**	**IP612-25X4.0-ORCF**	13.5	16.5	41.5	39	0.11	OR25X3.53X	OR23.52X1.78X
1	30x4.0	**HPF616-30X4.0-ORCF**	**IP616-30X4.0-ORCF**	18.5	21.5	47.5	40	0.15	OR32.92X3.53X	OR28.3X1.78X
1	30x5.0	**HPF616-30X5.0-ORCF**	**IP616-30X5.0-ORCF**	16.5	19.5	47.5	41	0.16	OR32.92X3.53X	OR26.7X1.78X
1	38x4.0	**HPF616-38X4.0-ORCF**	**IP616-38X4.0-ORCF**	26.5	29.5	47.5	35	0.11	OR32.92X3.53X	OR36.27X1.78X
1	38x6.0	**HPF616-38X6.0-ORCF**	**IP616-38X6.0-ORCF**	22.5	25.5	47.5	37	0.13	OR32.92X3.53X	OR29.87X1.78X
1 1/4	38x4.0	**HPF620-38X4.0-ORCF**	**IP620-38X4.0-ORCF**	26.5	29.5	54.0	39	0.18	OR37.7X3.53X	OR36.27X1.78X
1 1/4	38x4.0	**HPF620-38X4.0H12-ORCF**	**IP620-38X4.0-ORCF**	26.5	29.5	54.0	39	0,18	OR37.7X3.53X	OR36.27X1.78X
1 1/4	38x5.0	**HPF620-38X5.0-ORCF**	**IP620-38X5.0-ORCF**	24.5	27.5	54.0	40	0.19	OR37.7X3.53X	OR34.65X1.78X
1 1/4	38x5.0	**HPF620-38X5.0H12-ORCF**	**IP620-38X5.0-ORCF**	24.5	27.5	54.0	40	0.19	OR37.7X3.53X	OR34.65X1.78X
1 1/4	38x6.0	**HPF620-38X6.0-ORCF**	**IP620-38X6.0-ORCF**	22.5	25.5	54.0	42	0.21	OR37.7X3.53X	OR29.87X1.78X
1 1/4	38x6.0	**HPF620-38X6.0H12-ORCF**	**IP620-38X6.0-ORCF**	22.5	25.5	54.0	42	0.21	OR37.7X3.53X	OR29.87X1.78X
1 1/4	42x5.0	**HPF620-42X5.0-ORCF**	**IP620-42X5.0-ORCF**	28.5	31.5	54.0	38	0.17	OR37.7X3.53X	OR37.82X1.78X
1 1/4	42x5.0	**HPF620-42X5.0H12-ORCF**	**IP620-42X5.0-ORCF**	28.5	31.5	54.0	38	0.17	OR37.7X3.53X	OR37.82X1.78X
1 1/2	38x5.0	**HPF624-38X5.0-ORCF**	**IP624-38X5.0-ORCF**	24.4	27.4	63.5	47	0.33	OR47.22X3.53X	OR34.65X1.78X
1 1/2	50x3.0	**HPF624-50X3.0-ORCF**	**IP624-50X3.0-ORCF**	40.5	43.5	63.5	38	0.19	OR47.22X3.53X	OR50.52X1.78X
1 1/2	50x5.0	**HPF624-50X5.0-ORCF**	**IP624-50X5.0-ORCF**	36.5	39.5	63.5	40	0.21	OR47.22X3.53X	OR50.52X1.78X
1 1/2	50x6.0	**HPF624-50X6.0-ORCF**	**IP624-50X6.0-ORCF**	34.5	37.5	63.5	42	0.24	OR47.22X3.53X	OR47.37X1.78X
1 1/2	50x8.0	**HPF624-50X8.0-ORCF**	**IP624-50X8.0-ORCF**	30.5	33.5	63.5	42	0.27	OR47.22X3.53X	OR44.17X1.78X
2	50x5.0	**HPF632-50X5.0-ORCF**	**IP632-50X5.0-ORCF**	36.5	39.5	79.5	51	0.53	OR56.75X3.53X	OR50.52X1.78X
2	50x6.0	**HPF632-50X6.0-ORCF**	**IP632-50X6.0-ORCF**	34.5	37.5	79.5	53	0.58	OR56.75X3.53X	OR47.3X1.78X
2	50x8.0	**HPF632-50X8.0-ORCF**	**IP632-50X8.0-ORCF**	30.5	33.5	79.5	53	0.61	OR56.75X3.53X	OR44.17X1.78X
2	60X5.0	**HPF632-60X5.0-ORCF**	**IP632-60X5.0-ORCF**	46.5	49.5	79.5	43	0.40	OR56.75X3.53X	OR56.87X1.78X
2	60x8.0	**HPF632-60X8.0-ORCF**	**IP632-60X8.0-ORCF**	40.5	43.5	79.5	47	0.49	OR56.75X3.53X	OR56.87X1.78X
2	65x8.0	**HPF632-65X8.0-ORCF**	**IP632-65X8.0-ORCF**	45.5	48.5	79.5	44	0.42	OR56.75X3.53X	OR60.05X1.78X
2	66x8.5	**HPF632-66X8.5-ORCF**	**IP632-66X8.5-ORCF**	45.5	48.5	79.5	44	0.42	OR56.75X3.53X	OR60.05X1.78X
2 1/2	75x12.5	**HPF640-75X12.5-ORCF**	**IP640-75X12.5-ORCF**	46.1	49.1	107.7	62	1.31	OR69.44X3.53X	OR60.05X1.78X

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP624-50X5.0-ORCF

IPV – Insert with F37-Profile seal

ISO 6162-2 footprint



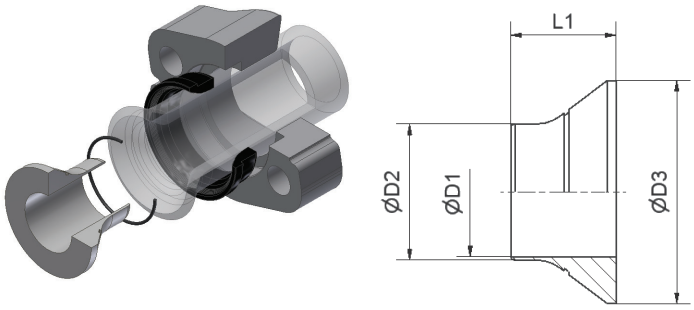


Size Inch	Tube	Complete part (flange incl. lockring, insert and seal)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	F37 seal	O-Ring
3/4	25x3.0	**HPF612-25X3.0-VCF**	**IP612-25X3.0-VCF**	15.5	18.5	41.5	38	0.11	F37S12X	OR25.12X1.78X
3/4	25x4.0	**HPF612-25X4.0-VCF**	**IP612-25X4.0-VCF**	13.5	16.5	41.5	39	0.11	F37S12X	OR23.52X1.78X
1	30x4.0	**HPF616-30X4.0-VCF**	**IP616-30X4.0-VCF**	18.5	21.5	47.5	40	0.15	F37S16X	OR28.3X1.78X
1	30x5.0	**HPF616-30X5.0-VCF**	**IP616-30X5.0-VCF**	16.5	19.5	47.5	41	0.16	F37S16X	OR26.7X1.78X
1	38x4.0	**HPF616-38X4.0-VCF**	**IP616-38X4.0-VCF**	26.5	29.5	47.5	35	0.11	F37S16X	OR36.27X1.78X
1	38x6.0	**HPF616-38X6.0-VCF**	**IP616-38X6.0-VCF**	22.5	25.5	47.5	37	0.13	F37S16X	OR29.87X1.78X
1 1/4	38x4.0	**HPF620-38X4.0-VCF**	**IP620-38X4.0-VCF**	26.5	29.5	54.0	39	0.18	F37S20X	OR36.27X1.78X
1 1/4	38x4.0	**HPF620-38X4.0H12-VCF**	**IP620-38X4.0-VCF**	26.5	29.5	54.0	39	0.18	F37S20X	OR36.27X1.78X
1 1/4	38x5.0	**HPF620-38X5.0-VCF**	**IP620-38X5.0-VCF**	24.5	27.5	54.0	40	0.19	F37S20X	OR34.65X1.78X
1 1/4	38x5.0	**HPF620-38X5.0H12-VCF**	**IP620-38X5.0-VCF**	24.5	27.5	54.0	40	0.19	F37S20X	OR34.65X1.78X
1 1/4	38x6.0	**HPF620-38X6.0-VCF**	**IP620-38X6.0-VCF**	22.5	25.5	54.0	42	0.21	F37S20X	OR29.87X1.78X
1 1/4	38x6.0	**HPF620-38X6.0H12-VCF**	**IP620-38X6.0-VCF**	22.5	25.5	54.0	42	0.21	F37S20X	OR29.87X1.78X
1 1/4	42x5.0	**HPF620-42X5.0-VCF**	**IP620-42X5.0-VCF**	28.5	31.5	54.0	38	0.17	F37S20X	OR37.82X1.78X
1 1/4	42x5.0	**HPF620-42X5.0H12-VCF**	**IP620-42X5.0-VCF**	28.5	31.5	54.0	38	0.17	F37S20X	OR37.82X1.78X
1 1/2	38x5.0	**HPF624-38X5.0-VCF**	**IP624-38X5.0-VCF**	24.4	27.4	63.5	47	0.33	F37S24X	OR34.65X1.78X
1 1/2	50x3.0	**HPF624-50X3.0-VCF**	**IP624-50X3.0-VCF**	40.5	43.5	63.5	38	0.19	F37S24X	OR50.52X1.78X
1 1/2	50x5.0	**HPF624-50X5.0-VCF**	**IP624-50X5.0-VCF**	36.5	39.5	63.5	40	0.21	F37S24X	OR50.52X1.78X
1 1/2	50x6.0	**HPF624-50X6.0-VCF**	**IP624-50X6.0-VCF**	34.5	37.5	63.5	42	0.24	F37S24X	OR47.37X1.78X
1 1/2	50x8.0	**HPF624-50X8.0-VCF**	**IP624-50X8.0-VCF**	30.5	33.5	63.5	42	0.27	F37S24X	OR44.17X1.78X
2	50x5.0	**HPF632-50X5.0-VCF**	**IP632-50X5.0-VCF**	36.5	39.5	79.5	51	0.53	F37S32X	OR50.52X1.78X
2	50x6.0	**HPF632-50X6.0-VCF**	**IP632-50X6.0-VCF**	34.5	37.5	79.5	53	0.58	F37S32X	OR47.3X1.78X
2	50x8.0	**HPF632-50X8.0-VCF**	**IP632-50X8.0-VCF**	30.5	33.5	79.5	53	0.61	F37S32X	OR44.17X1.78X
2	60X5.0	**HPF632-60X5.0-VCF**	**IP632-60X5.0-VCF**	46.5	49.5	79.5	43	0.40	F37S32X	OR56.87X1.78X
2	60x8.0	**HPF632-60X8.0-VCF**	**IP632-60X8.0-VCF**	40.5	43.5	79.5	47	0.49	F37S32X	OR56.87X1.78X
2	65x8.0	**HPF632-65X8.0-VCF**	**IP632-65X8.0-VCF**	45.5	48.5	79.5	44	0.42	F37S32X	OR60.05X1.78X
2	66x8.5	**HPF632-66X8.5-VCF**	**IP632-66X8.5-VCF**	45.5	48.5	79.5	44	0.42	F37S32X	OR60.05X1.78X
2 1/2	75x12.5	**HPF640-75X12.5-VCF**	**IP640-75X12.5-VCF**	46.1	49.1	107.7	62	1.31	F37S40X	OR60.05X1.78X

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP624-50X5.0-VCF

IPF – Insert with flat face seal

ISO 6162-2 footprint



Size Inch	Tube	Complete part (flange* incl. lockring, insert and seal)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	O-Ring
3/4	25x3.0	**HPF612-25X3.0-FCF**	**IP612-25X3.0-FCF**	15.5	18.5	41.5	38	0.11	OR25.12X1.78X
3/4	25x4.0	**HPF612-25X4.0-FCF**	**IP612-25X4.0-FCF**	13.5	16.5	41.5	39	0.11	OR23.52X1.78X
1	30x4.0	**HPF616-30X4.0-FCF**	**IP616-30X4.0-FCF**	18.5	21.5	47.5	40	0.15	OR28.3X1.78X
1	30x5.0	**HPF616-30X5.0-FCF**	**IP616-30X5.0-FCF**	16.5	19.5	47.5	41	0.16	OR26.7X1.78X
1	38x4.0	**HPF616-38X4.0-FCF**	**IP616-38X4.0-FCF**	26.5	29.5	47.5	35	0.11	OR36.27X1.78X
1	38x6.0	**HPF616-38X6.0-FCF**	**IP616-38X6.0-FCF**	22.5	25.5	47.5	37	0.13	OR29.87X1.78X
1 1/4	38x4.0	**HPF620-38X4.0-FCF**	**IP620-38X4.0-FCF**	26.5	29.5	54.0	39	0.18	OR36.27X1.78X
1 1/4	38x4.0	**HPF620-38X4.0H12-FCF****	**IP620-38X4.0-FCF**	26.5	29.5	54.0	39	0.18	OR36.27X1.78X
1 1/4	38x5.0	**HPF620-38X5.0-FCF**	**IP620-38X5.0-FCF**	24.5	27.5	54.0	40	0.19	OR34.65X1.78X
1 1/4	38x5.0	**HPF620-38X5.0H12-FCF****	**IP620-38X5.0-FCF**	24.5	27.5	54.0	40	0.19	OR34.65X1.78X
1 1/4	38x6.0	**HPF620-38X6.0-FCF**	**IP620-38X6.0-FCF**	22.5	25.5	54.0	42	0.21	OR29.87X1.78X
1 1/4	38x6.0	**HPF620-38X6.0H12-FCF****	**IP620-38X6.0-FCF**	22.5	25.5	54.0	42	0,21	OR29.87X1.78X
1 1/4	42x5.0	**HPF620-42X5.0-FCF**	**IP620-42X5.0-FCF**	28.5	31.5	54.0	38	0.17	OR37.82X1.78X
1 1/4	42x5.0	**HPF620-42X5.0H12-FCF****	**IP620-42X5.0-FCF**	28.5	31.5	54.0	38	0.17	OR37.82X1.78X
1 1/2	38x5.0	**HPF624-38X5.0-FCF**	**IP624-38X5.0-FCF**	24.4	27.4	63.5	47	0.35	OR34.65X1.78X
1 1/2	50x3.0	**HPF624-50X3.0-FCF**	**IP624-50X3.0-FCF**	40.5	43.5	63.5	38	0.19	OR50.52X1.78X
1 1/2	50x5.0	**HPF624-50X5.0-FCF**	**IP624-50X5.0-FCF**	36.5	39.5	63.5	40	0.21	OR50.52X1.78X
1 1/2	50x6.0	**HPF624-50X6.0-FCF**	**IP624-50X6.0-FCF**	34.5	37.5	63.5	42	0.24	OR47.37X1.78X
1 1/2	50x8.0	**HPF624-50X8.0-FCF**	**IP624-50X8.0-FCF**	30.5	33.5	63.5	42	0.27	OR44.17X1.78X
2	50x5.0	**HPF632-50X5.0-FCF**	**IP632-50X5.0-FCF**	36.5	39.5	79.5	51	0.53	OR50.52X1.78X
2	50x6.0	**HPF632-50X6.0-FCF**	**IP632-50X6.0-FCF**	34.5	37.5	79.5	53	0.58	OR47.3X1.78X
2	50x8.0	**HPF632-50X8.0-FCF**	**IP632-50X8.0-FCF**	30.5	33.5	79.5	53	0.61	OR44.17X1.78X
2	60X5.0	**HPF632-60X5.0-FCF**	**IP632-60X5.0-FCF**	46.5	49.5	79.5	43	0.40	OR56.87X1.78X
2	60x8.0	**HPF632-60X8.0-FCF**	**IP632-60X8.0-FCF**	40.5	43.5	79.5	47	0.49	OR56.87X1.78X
2	65x8.0	**HPF632-65X8.0-FCF**	**IP632-65X8.0-FCF**	45.5	48.5	79.5	44	0.42	OR60.05X1.78X
2	66x8.5	**HPF632-66X8.5-FCF**	**IP632-66X8.5-FCF**	45.5	48.5	79.5	44	0.42	OR60.05X1.78X
2 1/2	75x12.5	**HPF640-75X12.5-FCF**	**IP640-75X12.5-FCF**	46.1	49.1	107.7	62	1.33	OR60.05X1.78X

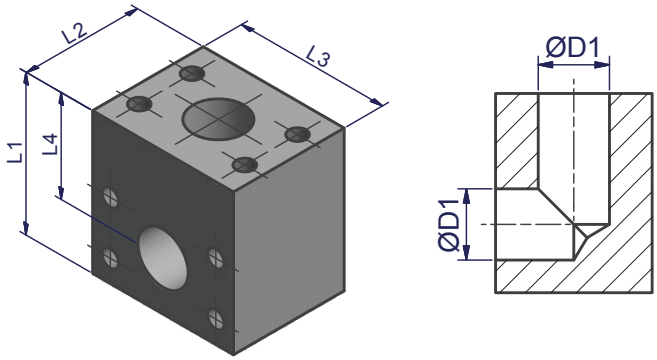
* Flange with female thread = HPFM6…-FCF

** Flange with female thread = HPFM6...TM12-FCF (e.g. HPFM620-38X4.0TM12-FCF)

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP624-50X5.0-FCF

LB - Flange L-block

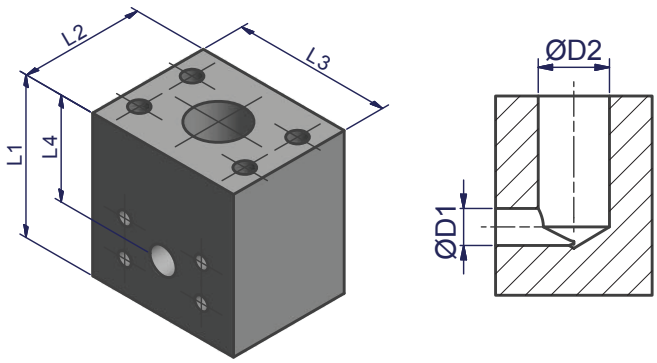
ISO 6162-2 footprint



Size Inch	Order code	D1	L1	L2	L3	L4	Weight (Steel) kg/1 piece
3/4	**LB612CFX**	19.0	75.0	60.0	75.0	49.0	2.5
1	**LB616CFX**	25.0	80.0	65.0	80.0	54.0	2.8
1 1/4	**LB620CFX**	30.0	86.0	64.0	90.0	57.0	3.2
1 1/2	**LB624CFX**	38.0	100.0	74.0	100.0	66.0	4.6
2	**LB632CFX**	48.0	122.0	88.0	132.0	78.0	8.7
2 1/2	**LB640CFX**	60.0	175.0	152.0	178.0	99.0	32.4

Other sizes on request

LBR - Flange L-block reducer



Size Inch	Order code	D1	D2	L1	L2	L3	L4	Weight (Steel) kg/1 piece
1 - 3/4	**LBR616-612CFX**	19.0	25.0	80.0	65.0	80.0	54.0	2.6
1 1/4 - 3/4	**LBR620-612CFX**	19.0	30.0	86.0	64.0	90.0	57.0	3.0
1 1/4 - 1	**LBR620-616CFX**	25.0	30.0	86.0	64.0	90.0	57.0	3.3
1 1/2 - 1	**LBR624-616CFX**	25.0	38.0	100.0	74.0	100.0	66.0	5.0
1 1/2 - 1 1/4	**LBR624-620CFX**	30.0	38.0	100.0	74.0	100.0	66.0	4.8
2 - 1 1/4	**LBR632-620CFX**	30.0	48.0	122.0	88.0	132.0	78.0	9.8
2 - 1 1/2	**LBR632-624CFX**	38.0	48.0	122.0	88.0	132.0	78.0	9.1
2 1/2 - 1 1/2	**LBR640-624CFX**	38.0	60.0	175.0	152.0	178.0	99.0	30.0
2 1/2 - 2	**LBR640-632CFX**	48.0	60.0	175.0	152.0	178.0	99.0	31.2

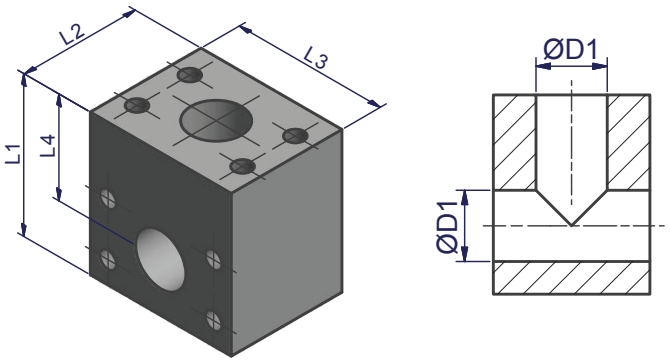
Other sizes on request

Please change **suffixes** according to coating

Coating	Suffix surface and material	Example Flange L-block	Example Flange L-block reducer
Steel, zinc plated, Cr(VI)-free	CFX	LB624CFX	LBR624-620CFX
Steel, oiled	SX	LB624SX	LBR624-620SX

TB - Flange T-block

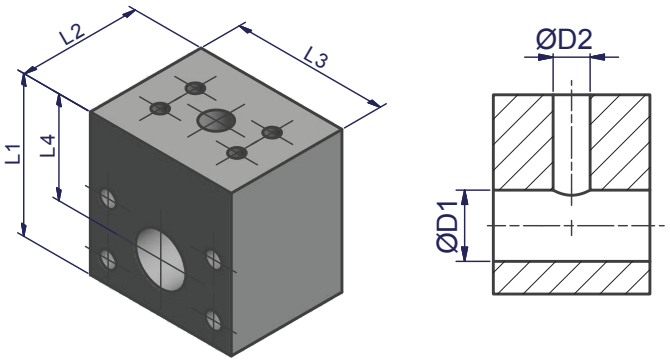
ISO 6162-2 footprint



Size Inch	Order code	D1	L1	L2	L3	L4	Weight (Steel) kg/1 piece
3/4	**TB612CFX**	19.0	75.0	60.0	75.0	49.0	2.3
1	**TB616CFX**	25.0	80.0	65.0	80.0	54.0	2.5
1 1/4	**TB620CFX**	30.0	86.0	64.0	90.0	57.0	3.0
1 1/2	**TB624CFX**	38.0	100.0	74.0	100.0	66.0	4.6
2	**TB632CFX**	48.0	122.0	88.0	132.0	78.0	8.1
2 1/2	**TB640CFX**	60.0	155.0	120.0	175.0	100.0	19.5

Other sizes on request

TBR - Flange T-block reducer



Size Inch	Order code	D1	D2	L1	L2	L3	L4	Weight (Steel) kg/1 piece
1 - 3/4 - 1	**TBR616-612-616CFX**	25.0	19.0	80.0	65.0	80.0	54.0	2.7
1 1/4 - 3/4 - 1 1/4	**TBR620-612-620CFX**	30.0	19.0	85.0	62.0	100.0	53.0	3.4
1 1/4 - 1 - 1 1/4	**TBR620-616-620CFX**	30.0	25.0	86.0	64.0	90.0	57.0	3.3
1 1/2 - 1 - 1 1/2	**TBR624-616-624CFX**	38.0	25.0	100.0	74.0	100.0	66.0	5.0
1 1/2 - 1 1 /4 - 1 1/2	**TBR624-620-624CFX**	38.0	30.0	100.0	74.0	100.0	66.0	4.8
2 - 1 1/4 - 2	**TBR632-620-632CFX**	48.0	30.0	122.0	88.0	132.0	78.0	8.7
2 - 1 1/2 - 2	**TBR632-624-632CFX**	48.0	38.0	122.0	88.0	132.0	78.0	8.4
2 1/2 - 1 1/2 - 2 1/2	**TBR640-624-640CFX**	60.0	39.0	155.0	86.0	175.0	100.0	14.6
2 1/2 - 2 - 2 1/2	**TBR640-632-640CFX**	60.0	48.0	155.0	120.0	175.0	100.0	20.2

Other sizes on request

Please change **suffixes** according to coating

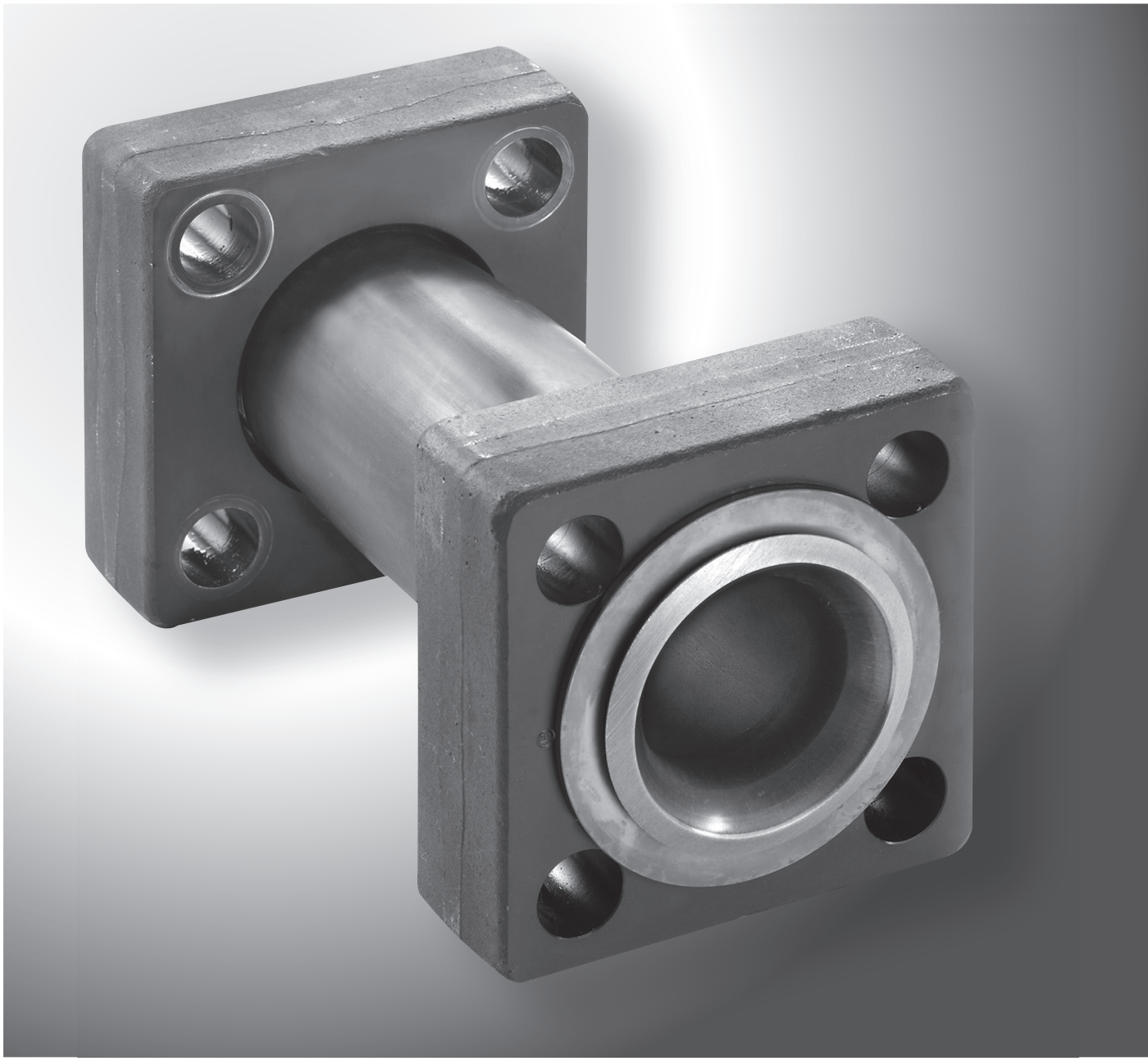
Coating	Suffix surface and material	Example Flange T-block	Example Flange T-block reducer
Steel, zinc plated, Cr(VI)-free	CFX	TB624CFX	TBR624-620-624CFX
Steel, oiled	SX	TB624SX	TBR624-620-624SX

Bolts and nuts

HPF ISO 6162-2 footprint

Size Inch	Tube	Connection Tube to Tube						Connection Tube to Port	
		Flange with through-hole – Flange with thread		Flange with through-hole – Flange with through-hole					
		Bolts ISO 4762 10.9 (DIN 912)		Bolts ISO 4762 10.9 (DIN 912)		Nuts ISO 4032 10		Bolts ISO 4762 10.9 (DIN 912)	
		Description	Order code	Description	Order code	Description	Order code	Description	Order code
3/4	25x3.0	M10x80	**ZYLS10X80109X**	M10x90	**ZYLS10X90109X**	M10	**ISO4032-M10-10X**	M10x50	**ZYLS10X50109X**
3/4	25x4.0	M10x80	**ZYLS10X80109X**	M10x90	**ZYLS12X90109X**	M10	**ISO4032-M10-10X**	M10x50	**ZYLS10X50109X**
1	30x4.0	M12x90	**ZYLS12X90109X**	M12x110	**ZYLS12X110109X**	M12	**ISO4032-M12-10X**	M12x60	**ZYLS12X60109X**
1	30x5.0	M12x90	**ZYLS12X90109X**	M12x110	**ZYLS12X110109X**	M12	**ISO4032-M12-10X**	M12x60	**ZYLS12X60109X**
1	38x4.0	M12x90	**ZYLS12X90109X**	M12x110	**ZYLS12X110109X**	M12	**ISO4032-M12-10X**	M12x60	**ZYLS12X60109X**
1	38x6.0	M12x90	**ZYLS12X90109X**	M12x110	**ZYLS12X110109X**	M12	**ISO4032-M12-10X**	M12x60	**ZYLS12X60109X**
1 1/4	38x4.0	M14x100	**ZYLS14X100109X**	M14x120	**ZYLS14X120109X**	M14	**ISO4032-M14-10X**	M14x70	**ZYLS14X70109X**
1 1/4	38x4.0	M12x100	**ZYLS12X100109X**	M12x120	**ZYLS12X120109X**	M12	**ISO4032-M12-10X**	M12x70	**ZYLS12X70109X**
1 1/4	38x5.0	M14x100	**ZYLS14X100109X**	M14x120	**ZYLS14X120109X**	M14	**ISO4032-M14-10X**	M14x70	**ZYLS14X70109X**
1 1/4	38x5.0	M12x100	**ZYLS12X100109X**	M12x120	**ZYLS12X120109X**	M12	**ISO4032-M12-10X**	M12x70	**ZYLS12X70109X**
1 1/4	38x6.0	M14x100	**ZYLS14X100109X**	M14x120	**ZYLS14X120109X**	M14	**ISO4032-M14-10X**	M14x70	**ZYLS14X70109X**
1 1/4	38x6.0	M12x100	**ZYLS12X100109X**	M12x120	**ZYLS12X120109X**	M12	**ISO4032-M12-10X**	M12x70	**ZYLS12X70109X**
1 1/4	42x5.0	M14x100	**ZYLS14X100109X**	M14x120	**ZYLS14X120109X**	M14	**ISO4032-M14-10X**	M14x70	**ZYLS14X70109X**
1 1/4	42x5.0	M12x100	**ZYLS12X100109X**	M12x120	**ZYLS12X120109X**	M12	**ISO4032-M12-10X**	M12x70	**ZYLS12X70109X**
1 1/2	38x5.0	M16x110	**ZYLS16X110109X**	M16x150	**ZYLS16X150109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
1 1/2	50x3.0	M16x110	**ZYLS16X110109X**	M16x130	**ZYLS16X130109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
1 1/2	50x5.0	M16x110	**ZYLS16X110109X**	M16x130	**ZYLS16X130109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
1 1/2	50x6.0	M16x110	**ZYLS16X110109X**	M16x130	**ZYLS16X130109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
1 1/2	50x8.0	M16x110	**ZYLS16X110109X**	M16x130	**ZYLS16X130109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
2	50x5.0	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2	50x6.0	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2	50x8.0	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2	60x5.0	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2	60x8.0	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2	65x8.0	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2	66x8.5	M20x140	**ZYLS20X140109X**	M20x160	**ZYLS20X160109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2 1/2	75x12.5	M24x160	**ZYLS24X160109X**	M24x220	**ZYLS14X220109X**	M24	**ISO4032-M24-10X**	M24x120	**ZYLS24X120109X**

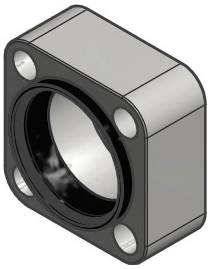
Notes

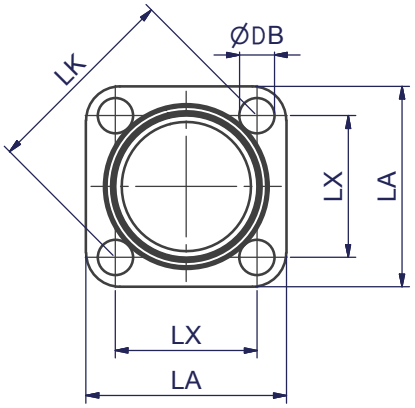


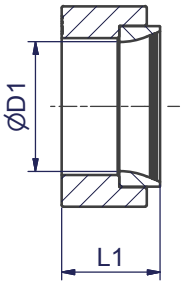
HPF – ISO 6164 Square flange

HPFC – Complete flange incl. lockring

ISO 6164 footprint



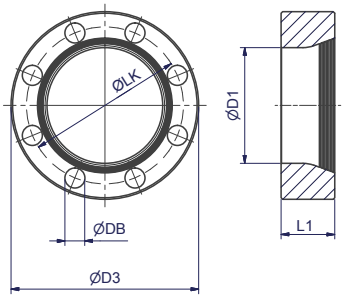




Size Inch	Tube O.D.	Order code	LK	D1	L1	LA	LX	DB	Weight (Steel) kg/1 piece	PN (bar)
2	50.0	**HPFC432-50CF***	98	50.5	40	100	69.3	17.5	2.1	400
2	60.0	**HPFC432-60CF***	98	61.0	40	100	69.3	17.5	1.7	400
2 1/2	60.0	**HPFC440-60CF***	118	61.0	50	120	83.4	22.0	3.8	400
2 1/2	75.0	**HPFC440-75PHR****	118	76.0	58	120	83.4	22.0	5.5	400
2 1/2	80.0	**HPFC440-80CF***	118	81.0	50	120	83.4	22.0	2.8	400
3	80.0	**HPFC448-80PHR****	145	81.0	56	150	102.5	26.0	6.0	350
3	88.0	**HPFC448-88PHR****	145	89.0	59	150	102.5	26.0	5.8	400
3	90.0	**HPFC448-90PHR****	145	91.0	58	150	102.5	26.0	5.7	350
3	97.0	**HPFC448-97CF***	145	98.0	52	150	102.5	26.0	4.9	350
3	101.6	**HPF448-101.6CF***	145	102.7	52	150	102.5	26.0	4.7	400
3 1/2	101.6	**HPFC456-101.6CF***	160	102.5	60	160	113.1	26.0	7.0	400
4	114.3	**HPFC464-114.3CF***	175	114.8	70	180	123.7	31.5	9.5	400
4	115.0	**HPFC464-115CF***	175	116.0	70	180	123.7	31.5	9.4	400
4	120.0	**HPFC464-120CF***	175	121.1	70	180	123.7	31.5	9.0	400

HPFC - Round flange design

Footprint deviating from ISO 6164



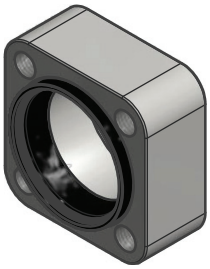
Size Inch	Tube OD	Order code	LK	D1	L1	D3	DB	Weight (Steel) kg/1 piece	PN (bar)
4 1/2	130	**HPFC872-130CF***	175	131.1	60	214	21	8.6	350
5	150	**HPFC880-150CF***	205	151.1	70	245	26	12.9	300

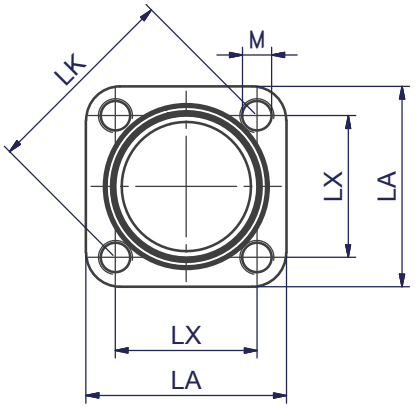
Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	HPFC464-114.3CF

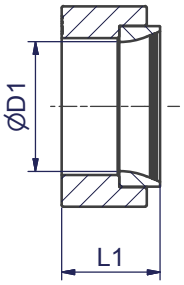
*One-piece flange without separate locking ring
**Flange phosphated with lockring
Pressure ratings (PN) refer to the flanges.
Effective pressure depends on the used tube and operating temperature (page 14f).

HPFCM – Complete flange with metric female thread incl. lockring

ISO 6164 footprint



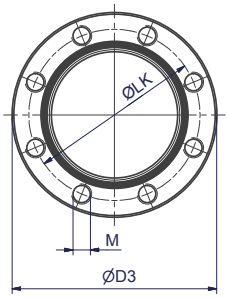


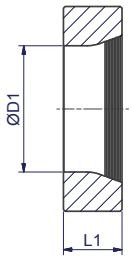


Size Inch	Tube O.D.	Order code	LK	D1	L1	LA	LX	M	Weight (Steel) kg/1 piece	PN (bar)
2	50.0	**HPFCM432-50CF***	98	50.5	40	100	69.3	M16	2.2	400
2	60.0	**HPFCM432-60CF***	98	61.0	40	100	69.3	M16	1.8	400
2 1/2	60.0	**HPFCM440-60CF***	118	61.0	50	120	83.4	M20	3.9	400
2 1/2	75.0	**HPFCM440-75CF**	118	76.0	58	120	83.4	M20	5.5	400
2 1/2	80.0	**HPFCM440-80CF***	118	81.0	50	120	83.4	M20	3.1	400
3	80.0	**HPFCM448-80CF**	145	81.0	56	150	102.5	M24	6.0	350
3	88.0	**HPFCM448-88CF**	145	89.0	59	150	102.5	M24	5.8	400
3	90.0	**HPFCM448-90CF**	145	91.0	58	150	102.5	M24	5.7	350
3	97.0	**HPFCM448-97CF***	145	98.0	52	150	102.5	M24	5.2	350
3	101.6	**HPFCM448-101.6CF***	145	102.7	52	150	102.5	M24	4.9	400
3 1/2	101.6	**HPFCM456-101.6CF***	160	102.5	60	160	113.1	M24	7.0	400
4	114.3	**HPFCM464-114.3CF***	175	115.4	70	180	123.7	M30	9.9	400
4	115.0	**HPFCM464-115CF***	175	116.0	70	180	123.7	M30	9.9	400
4	120.0	**HPFCM464-120CF***	175	121.1	70	180	123.7	M30	9.6	400

HPFC - Round flange design

Footprint deviating from ISO 6164





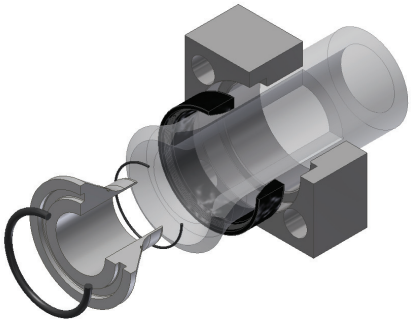
Size Inch	Tube OD	Order code	LK	D1	L1	D3	M	Weight (Steel) kg/1 piece	PN (bar)
4 1/2	130.0	**HPFCM872-130CF***	175	131.1	60	214	M20	9.0	350
5	150.0	**HPFCM880-150CF***	205	151.1	70	245	M24	13.7	300

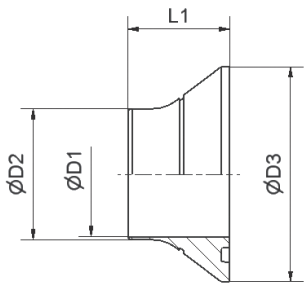
Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	HPFCM464-114.3CF

*One-piece flange without separate locking ring
Pressure ratings (PN) refer to the flanges.
Effective pressure depends on the used tube and operating temperature (page 14f).

IPOR – Insert with face seal O-Ring

ISO 6164 footprint





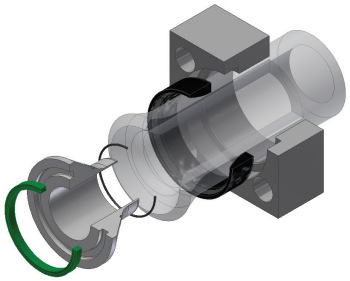
Size Inch	Tube	Complete part (flange incl. insert and seals)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	O-Ring (face seal)	O-Ring
2	50x8.0	**HPF432-50X8.0-ORCF**	**IP432-50X8.0-ORCF**	29.9	32.9	79.4	53.3	0.57	0R56.52X5.33X	0R44.17X1.78X
2	60x8.0	**HPF432-60X8.0-ORCF**	**IP432-60X8.0-ORCF**	40.0	43.0	79.4	47.3	0.47	0R56.52X5.33X	0R56.87X1.78X
2	60x10.0	**HPF432-60X10.0-ORCF**	**IP432-60X10.0-ORCF**	36.0	39.0	79.4	50.3	0.53	0R56.52X5.33X	0R50.52X1.78X
2 1/2	60x8.0	**HPF440-60X8.0-ORCF**	**IP440-60X8.0-ORCF**	40.0	43.0	94.2	57.0	0.88	0R69.22X5.33X	0R56.87X1.78X
2 1/2	75x12.5	**HPF440-75X12.5-ORCF**	**IP440-75X12.5-ORCF**	46.5	49.5	94.2	53.0	0.72	0R69.22X5.33X	0R60.05X1.78X
2 1/2	80x10.0	**HPF440-80X10.0-ORCF**	**IP440-80X10.0-ORCF**	56.4	59.4	94.2	46.0	0.56	0R69.22X5.33X	0R69.57X1.78X
3	80x3.0	**HPF448-80X3.0-ORCF**	**IP448-80X3.0-ORCF**	59.0	73.5	104.0	43.0	0.72	0R75.57X5.33X	0R82.27X1.78X
3	80x8.0	**HPF448-80X8.0-ORCF**	**IP448-80X8.0-ORCF**	60.5	63.5	104.0	49.0	0.75	0R75.57X5.33X	0R72.75X1.78X
3	80x10.0	**HPF448-80X10.0-ORCF**	**IP448-80X10.0-ORCF**	56.5	59.4	104.0	52.0	0.86	0R75.57X5.33X	0R69.57X1.78X
3	88x14.0	**HPF448-88X14.0-ORCF**	**IP448-88X14.0-ORCF**	56.5	59.4	104.0	52.0	0.86	0R75.57X5.33X	0R72.75X1.78X
3	90x9.0	**HPF448-90X9.0-ORCF**	**IP448-90X9.0-ORCF**	58.0	71.4	104.0	45.0	0.79	0R75.57X5.33X	0R82.27X1.78X
3	97x12.0	**HPF448-97X12.0-ORCF**	**IP448-97X12.0-ORCF**	59.0	72.4	104.0	46.0	0.81	0R75.57X5.33X	0R82.27X1.78X
3	101.6x16.0	**HPF448-101.6X16.0-ORCF**	**IP448-101.6X16.0-ORCF**	58.0	69.0	104.0	48.0	0.88	0R75.57X5.33X	0R82.27X1.78X
3 1/2	101.6x16x0	**HPF456-101.6X16.0-ORCF**	**IP456-101.6X16.0-ORCF**	66.0	69.0	119.0	58.0	1.30	0R85.09X5.33X	0R82.27X1.78X
4	114.3x17.5	**HPF464-114.3X17.5-ORCF**	**IP464-114.3X17.5-ORCF**	75.7	78.7	131.0	59.0	1.55	0R88.27X5.33X	0R94.97X1.78X
4	115x15.0	**HPF464-115X15.0-ORCF**	**IP464-115X15.0-ORCF**	76.0	84.4	128.0	54.0	1.40	0R88.27X5.33X	0R101.32X1.78X
4	120x20.0	**HPF464-120X20.0-ORCF**	**IP464-120X20.0-ORCF**	76.4	79.4	131.0	60.0	1.58	0R88.27X5.33X	0R94.97X1.78X
4 1/2	130x15.0	**HPF872-130X15.0-ORCF***	**IP872-130X15.0-ORCF**	95.4	99.4	140.0	56.0	1.54	0R110.49X5.33X	0R113.97X2.62X
5	150x15.0	**HPF880-150X15.0-ORCF***	**IP880-150X15.0-ORCF**	115.4	119.4	166.0	60.0	2.23	0R129.54X5.33X	0R139.37X2.62X

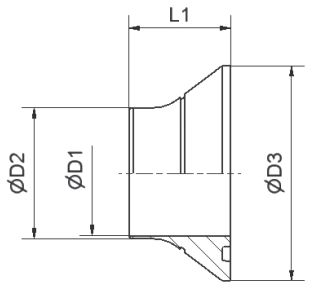
*Round flange design, footprint deviating from ISO 6164

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP448-80X10.0-ORCF

IPV – Insert with F37-Profile seal

ISO 6164 footprint





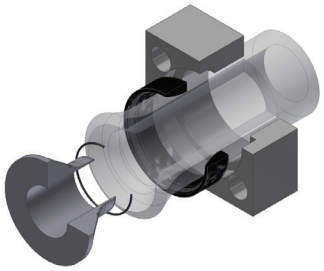
Size Inch	Tube	Complete part (flange incl. lockring, insert and seal)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	F37 seal	O-Ring
2	50x8.0	**HPF432-50X8.0-VCF**	**IP432-50X8.0-VCF**	29.9	32.9	79.4	53.3	0.57	F37S432X	OR44.17X1.78X
2	60x8.0	**HPF432-60X8.0-VCF**	**IP432-60X8.0-VCF**	40.0	43.0	79.4	47.3	0.47	F37S432X	OR56.87X1.78X
2	60x10.0	**HPF432-60X10.0-VCF**	**IP432-60X10.0-VCF**	36.0	39.0	79.4	50.3	0.53	F37S432X	OR50.52X1.78X
2 1/2	60x8.0	**HPF440-60X8.0-VCF**	**IP440-60X8.0-VCF**	40.0	43.0	94.2	57.0	0.88	F37S440X	OR56.87X1.78X
2 1/2	75x12.5	**HPF440-75X12.5-VCF**	**IP440-75X12.5-VCF**	46.5	49.5	94.2	53.0	0.72	F37S440X	OR60.05X1.78X
2 1/2	80x10.0	**HPF440-80X10.0-VCF**	**IP440-80X10.0-VCF**	56.4	59.4	94.2	46.0	0.56	F37S440X	OR69.57X1.78X
3	80x3.0	**HPF448-80X3.0-VCF**	**IP448-80X3.0-VCF**	59.0	73.5	104.0	43.0	0.72	F37S448X	OR82.27X1.78X
3	80x8.0	**HPF448-80X8.0-VCF**	**IP448-80X8.0-VCF**	60.5	63.5	104.0	49.0	0.75	F37S448X	OR72.75X1.78X
3	80x10.0	**HPF448-80X10.0-VCF**	**IP448-80X10.0-VCF**	56.5	59.4	104.0	52.0	0.86	F37S448X	OR69.57X1.78X
3	88x14.0	**HPF448-88X14.0-VCF**	**IP448-88X14.0-VCF**	56.5	59.4	104.0	52.0	0.86	F37S448X	OR72.75X1.78X
3	90x9.0	**HPF448-90X9.0-VCF**	**IP448-90X9.0-VCF**	58.0	71.4	104.0	45.0	0.79	F37S448X	OR82.27X1.78X
3	97x12.0	**HPF448-97X12.0-VCF**	**IP448-97X12.0-VCF**	59.0	72.4	104.0	46.0	0.81	F37S448X	OR82.27X1.78X
3	101.6x16.0	**HPF448-101.6X16.0-VCF**	**IP448-101.6X16.0-VCF**	58.0	69.0	104.0	48.0	0.88	F37S448X	OR82.27X1.78X
3 1/2	101.6x16.0	**HPF456-101.6X16.0-VCF**	**IP456-101.6X16.0-VCF**	66.0	69.0	119.0	58.0	1.30	F37S456X	OR82.27X1.78X
4	114.3x17.5	**HPF464-114.3X17.5-VCF**	**IP464-114.3X17.5-VCF**	75.7	78.7	131.0	59.0	1.55	F37S464X	OR94.97X1.78X
4	115.x15.0	**HPF464-115X15.0-VCF**	**IP464-115X15.0-VCF**	76.0	84.4	128.0	54.0	1.40	F37S464X	OR101.32X1.78X
4	120x20.0	**HPF464-120X20.0-VCF**	**IP464-120X20.0-VCF**	76.4	79.4	131.0	60.0	1.58	F37X464X	OR94.97X1.78X
4 1/2	130x15.0	**HPF872-130X15.0-VCF***	**IP872-130X15.0-VCF**	95.4	99.4	140.0	56.0	1.54	F37X872X	OR113.97X2.62X
5	150x15.0	**HPF880-150X15.0-VCF***	**IP880-150X15.0-VCF**	115.4	119.4	166.0	60.0	2.23	F37S880X	OR139.37X2.62X

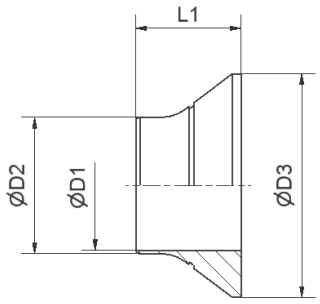
*Round flange design, footprint deviating from ISO 6164

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP448-80X10.0-VCF

IPF – Insert with flat face seal

ISO 6164 footprint





Size Inch	Tube	Complete part (flange incl. lockring, insert and seal)	Insert (incl. seals)	D1	D2	D3	L1	Weight (Steel) kg/1 piece	O-Ring (face seal)
2	50x8.0	**HPF432-50X8.0-FCF**	**IP432-50X8.0-FCF**	29.9	32.9	79.4	53.3	0.57	OR44.17X1.78X
2	60x8.0	**HPF432-60X8.0-FCF**	**IP432-60X8.0-FCF**	40.0	43.0	79.4	47.3	0.47	OR56.87X1.78X
2	60x10.0	**HPF432-60X10.0-FCF**	**IP432-60X10.0-FCF**	36.0	39.0	79.4	50.3	0.53	OR50.52X1.78X
2 1/2	60x8.0	**HPF440-60X8.0-FCF**	**IP440-60X8.0-FCF**	40.0	43.0	94.2	57.0	0.88	OR56.87X1.78X
2 1/2	75x12.5	**HPF440-75X12.5-FCF**	**IP440-75X12.5-FCF**	46.5	49.5	94.2	53.0	0.72	OR60.05X1.78X
2 1/2	80x10.0	**HPF440-80X10.0-FCF**	**IP440-80X10.0-FCF**	56.4	59.4	94.2	46.0	0.56	OR69.57X1.78X
3	80x3.0	**HPF448-80X3.0-FCF**	**IP448-80X3.0-FCF**	59.0	73.5	104.0	43.0	0.72	OR82.27X1.78X
3	80x8.0	**HPF448-80X8.0-FCF**	**IP448-80X8.0-FCF**	60.5	63.5	104.0	49.0	0.75	OR72.75X1.78X
3	80x10.0	**HPF448-80X10.0-FCF**	**IP448-80X10.0-FCF**	56.5	59.4	104.0	52.0	0.86	OR69.57X1.78X
3	88x14.0	**HPF448-88X14.0-FCF**	**IP448-88X14.0-FCF**	56.5	59.4	104.0	52.0	0.86	OR72.75X1.78X
3	90x9.0	**HPF448-90X9.0-FCF**	**IP448-90X9.0-FCF**	58.0	71.4	104.0	45.0	0.79	OR82.27X1.78X
3	97x12.0	**HPF448-97X12.0-FCF**	**IP448-97X12.0-FCF**	59.0	72.4	104.0	46.0	0.81	OR82.27X1.78X
3	101.6x16.0	**HPF448-101.6X16.0-FCF**	**IP448-101.6X16.0-FCF**	58.0	69.0	104.0	48.0	0.88	OR82.27X1.78X
3 1/2	101.6x16.0	**HPF456-101.6X16.0-FCF**	**IP456-101.6X16.0-FCF**	66.0	69.0	119.0	58.0	1.36	OR82.27X1.78X
4	114.3x17.5	**HPF464-114.3X17.5-FCF**	**IP464-114.3X17.5-FCF**	75.7	78.7	131.0	59.0	1.61	OR94.97X1.78X
4	115x15.0	**HPF464-115X15.0-FCF**	**IP464-115X15.0-FCF**	76.0	84.4	128.0	54.0	1.46	OR101.32X1.78X
4	120x20.0	**HPF464-120X20.0-FCF**	**IF464-120X20.0-FCF**	76.4	79.4	131.0	60.0	1.64	OR94.97X1.78X
4 1/2	130x15.0	**HPF872-130X15.0-FCF***	**IP872-130X15.0-FCF**	95.4	99.4	140.0	56.0	1.61	OR113.97X2.62X
5	150x15.0	**HPF880-150X15.0-FCF***	**IP880-150X15.0-FCF**	115.4	119.4	166.0	60.0	2.32	OR139.37X2.62X

*Round flange design, footprint deviating from ISO 6164

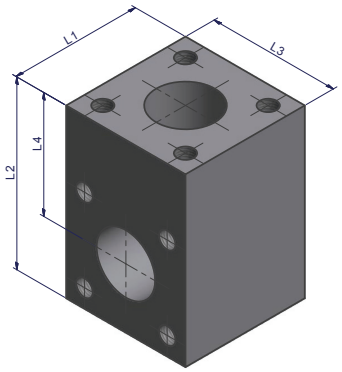
Flange with female thread = HPFM4...-FCF

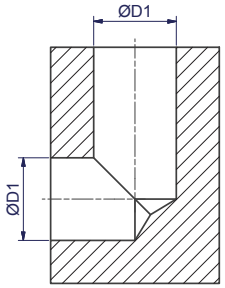
*Flange with female thread = HPFM8...-FCF

Material	Suffix surface and material	Example
Steel, zinc plated, Cr(VI)-free	CF	IP448-80X10.0-FCF

LB(HPF) - Flange L-block

ISO 6164 footprint

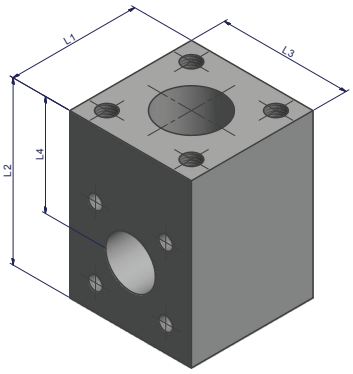


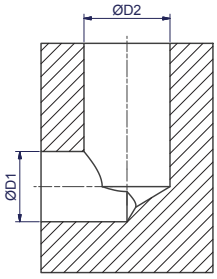


Size Inch	Order code	D1	L1	L2	L3	L4	Weight (Steel) kg/1 piece
2	**LB432CFX**	49.0	100.0	140.0	100.0	90.0	8.7
2 1/2	**LBHPF440CFX**	54.0	120.0	160.0	120.0	100.0	14.2
3	**LBHPF448CFX**	58.0	150.0	200.0	150.0	125.0	29.3
3 1/2	**LBHPF456CFX**	66.0	160.0	205.0	160.0	125.0	33.7
4	**LBHPF464CFX**	74.0	180.0	240.0	180.0	150.0	49.2
4 1/2	**LBHPF872CFX**	on request					
5	**LBHPF880CFX**	on request					

Other sizes on request

LBR(HPF) - Flange L-block reducer





Size Inch	Order code	D1	D2	L1	L2	L3	L4	Weight (Steel) kg/1 piece
2 1/2 - 2	**LBRHPF440-432CFX**	49.0	54.0	120.0	160.0	120.0	100.0	14.8
3 - 2	**LBRHPF448-432CFX**	49.0	58.0	150.0	200.0	150.0	125.0	30.4
3 - 2 1/2	**LBRHPF448-440CFX**	54.0	58.0	150.0	200.0	150.0	125.0	29.9
3 1/2 - 2 1/2	**LBRHPF456-440CFX**	54.0	66.0	160.0	205.0	160.0	125.0	34.9
3 1/2 - 3	**LBRHPF464-448CFX**	58.0	66.0	160.0	205.0	160.0	125.0	34.2
4 - 3	**LBRHPF464-448CFX**	58.0	74.0	180.0	240.0	180.0	150.0	51.4
4 - 3 1/2	**LBRHPF464-456CFX**	66.0	74.0	180.0	240.0	180.0	150.0	51.0
4 1/2 - 3 1/2	**LBRHPF872-456CFX**	on request						
4 1/2 - 4	**LBRHPF872-464CFX**	on request						
5 - 4	**LBRHPF880-464CFX**	on request						
5 - 41/2	**LBRHPF880-872CFX**	on request						

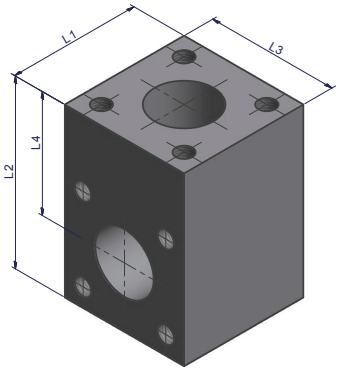
Other sizes on request

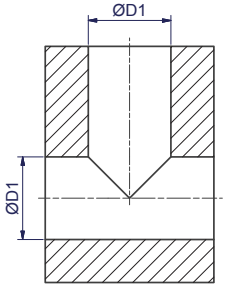
Please change **suffixes** according to coating

Coating	Suffix surface and material	Example Flange L-block	Example Flange L-block reducer
Steel, zinc plated, Cr(VI)-free	CFX	LBHPF440CFX	LBRHPF440-432CFX
Steel, oiled	SX	LBHPF440SX	LBRHPF440-432SX

TB(HPF) - Flange T-block

ISO 6164 footprint

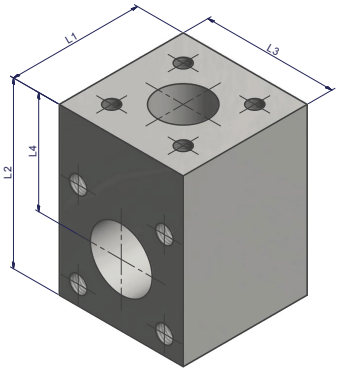


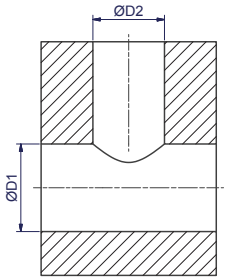


Size Inch	Order code	D1	L1	L2	L3	L4	Weight (Steel) kg/1 piece
2	**TB432CFX**	49.0	100.0	140.0	100.0	90.0	8.0
2 1/2	**TBHPF440CFX**	54.0	120.0	160.0	120.0	100.0	13.4
3	**TBHPF448CFX**	58.0	150.0	200.0	150.0	125.0	28.1
3 1/2	**TBHPF456CFX**	66.0	160.0	205.0	160.0	125.0	32.1
4	**TBHPF464CFX**	74.0	180.0	240.0	180.0	150.0	46.9
4 1/2	**TBHPF872CFX**	on request					
5	**TBHPF880CFX**	on request					

Other sizes on request

TBR - Flange T-block reducer





Size Inch	Order code	D1	D2	L1	L2	L3	L4	Weight (Steel) kg/1 piece
2 1/2 - 2 -2 1/2	**TBRHPF440-432-440CFX**	54.0	49.0	120.0	160.0	120.0	100.0	14.0
3 - 2 - 3	**TBRHPF448-432-448CFX**	58.0	49.0	150.0	200.0	150.0	125.0	28.8
3 - 2 1/2 - 3	**TBRHPF448-440-448CFX**	58.0	54.0	150.0	200.0	150.0	125.0	28.5
3 1/2 - 2 1/2 - 3 1/2	**TBRHPF456-440-456CFX**	66.0	54.0	160.0	205.0	160.0	125.0	33.2
3 1/2 - 3 - 3 1/2	**TBRHPF456-448-456CFX**	66.0	58.0	160.0	205.0	160.0	125.0	32.7
4 - 3 - 4	**TBRHPF464-448-464CFX**	74.0	58.0	180.0	240.0	180.0	150.0	49.0
4 - 3 1/2 - 4	**TBRHPF464-456-464CFX**	74.0	66.0	180.0	240.0	180.0	150.0	48.3
4 1/2 - 3 1/2 - 4 1/2	**TBRHPF872-456-872CFX**	on request						
4 1/2 - 4 - 4 1/2	**TBRHPF872-464-872CFX**	on request						
5 - 4 - 5	**TBRHPF880-464-880CFX**	on request						
5 - 4 1/2 - 5	**TBRHPF880-872-880CFX**	on request						

Other sizes on request

Please change **suffixes** according to coating

Coating	Suffix surface and material	Example Flange T-block	Example Flange T-block reducer
Steel, zinc plated, Cr(VI)-free	CFX	TB440CFX	TBR440-432-440CFX
Steel, oiled	SX	TB440SX	TBR440-432-440SX

Bolts and nuts

HPF ISO 6164 footprint

Size Inch	Tube	Connection Tube to Tube						Connection Tube to Port	
		Flange with through-hole Flange with thread		Flange with through-hole – Flange with through-hole					
		Bolts ISO 4762 10.9 (DIN 912)		Bolts ISO 4762 10.9 (DIN 912)		Nuts ISO 4032 10		Bolts ISO 4762 10.9 (DIN 912)	
		Description	Order code	Description	Order code	Description	Order code	Description	Order code
2	50x8.0	M16x120	**ZYLS16X120109X**	M16x160	**ZYLS16X160109X**	M16	**ISO4032-M16-10X**	M16x90	**ZYLS16X90109X**
2	60x8.0	M16x100	**ZYLS16X100109X**	M16x140	**ZYLS16X140109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
2	60x10.0	M16x100	**ZYLS16X100109X**	M16x140	**ZYLS16X140109X**	M16	**ISO4032-M16-10X**	M16x80	**ZYLS16X80109X**
2 1/2	60x8.0	M20x130	**ZYLS20X130109X**	M20x180	**ZYLS20X180109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
2 1/2	75x12.5	M20x140	**ZYLS20X140109X**	M20x200	**ZYLS20X200109X**	M20	**ISO4032-M20-10X**	M20x120	**ZYLS20X120109X**
2 1/2	80x10.0	M20x120	**ZYLS20X120109X**	M20x180	**ZYLS20X180109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
3	80x3.0	M24x120	**ZYLS24X120109X**	M24x200	**ZYLS24X200109X**	M24	**ISO4032-M24-10X**	M24x110	**ZYLS24X110109X**
3	80x8.0	M24x140	**ZYLS24X140109X**	M24x200	**ZYLS24X200109X**	M24	**ISO4032-M24-10X**	M24x110	**ZYLS24X110109X**
3	80x10.0	M24x140	**ZYLS24X140109X**	M24x200	**ZYLS24X200109X**	M24	**ISO4032-M24-10X**	M24x110	**ZYLS24X110109X**
3	88x14.0	M24x140	**ZYLS24X140109X**	M24x200	**ZYLS24X200109X**	M24	**ISO4032-M24-10X**	M24x110	**ZYLS24X110109X**
3	90x9.0	M24x140	**ZYLS24X140109X**	M24x200	**ZYLS24X200109X**	M24	**ISO4032-M24-10X**	M24x110	**ZYLS24X110109X**
3	97x12.0	M24x110	**ZYLS24X110109X**	M24x160	**ZYLS24X160109X**	M24	**ISO4032-M24-10X**	M24x100	**ZYLS24X100109X**
3	101.6x16.0	M24x120	**ZYLS24X120109X**	M24x180	**ZYLS24X180109X**	M24	**ISO4032-M24-10X**	M24x100	**ZYLS24X100109X**
3 1/2	101.6x16.0	M24x140	**ZYLS24X140109X**	M24x200	**ZYLS24X200109X**	M24	**ISO4032-M24-10X**	M24x120	**ZYLS24X120109X**
4	114.3x17.5	M30x150	**ZYLS30X150109X**	M30x230	**ZYLS30X230109X**	M30	**ISO4032-M30-10X**	M30x130	**ZYLS30X130109X**
4	115x15.0	M30x150	**ZYLS30X150109X**	M30x210	**ZYLS30X210109X**	M30	**ISO4032-M30-10X**	M30x120	**ZYLS30X120109X**
4	120x20.0	M30x150	**ZYLS30X150109X**	M30x230	**ZYLS30X230109X**	M30	**ISO4032-M30-10X**	M30x130	**ZYLS30X130109X**
4 1/2	130x15.0	M20x120	**ZYLS20X120109X**	M20x180	**ZYLS20X180109X**	M20	**ISO4032-M20-10X**	M20x100	**ZYLS20X100109X**
5	150x15.0	M24x150	**ZYLS24X150109X**	M24x220	**ZYLS24X220109X**	M24	**ISO4032-M24-10X**	M24x130	**ZYLS24X130109X**

Notes

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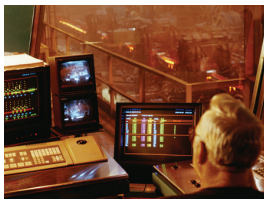
Solenoid valves
Thermostatic expansion valves



Electromechanical

Key Markets

Aerospace
Factory automation
Life science & medical
Machine tools
Packaging machinery
Paper machinery
Plastics machinery & converting
Primary metals
Semiconductor & electronics
Textile
Wire & cable

Key Products

AC/DC drives & systems
Electric actuators, gantry robots & slides
Electrohydrostatic actuation systems
Electromechanical actuation systems
Human machine interface
Linear motors
Stepper motors, servo motors, drives & controls
Structural extrusions

Filtration

Key Markets

Aerospace
Food & beverage
Industrial plant & equipment
Life sciences
Marine
Mobile equipment
Oil & gas
Power generation & renewable energy
Process
Transportation
Water Purification

Key Products

Analytical gas generators
Compressed air filters & dryers
Engine air, coolant, fuel & oil filtration systems
Fluid condition monitoring systems
Hydraulic & lubrication filters
Hydrogen, nitrogen & zero air generators
Instrumentation filters
Membrane & fiber filters
Microfiltration
Sterile air filtration
Water desalination & purification filters & systems

Fluid & Gas Handling

Key Markets

Aerial lift
Agriculture
Bulk chemical handling
Construction machinery
Food & beverage
Fuel & gas delivery
Industrial machinery
Life sciences
Marine
Mining
Mobile
Oil & gas
Renewable energy
Transportation

Key Products

Check valves
Connectors for low pressure fluid conveyance
Deep sea umbilicals
Diagnostic equipment
Hose couplings
Industrial hose
Mooring systems & power cables
PTFE hose & tubing
Quick couplings
Rubber & thermoplastic hose
Tube fittings & adapters
Tubing & plastic fittings

Hydraulics

Key Markets

Aerial lift
Agriculture
Alternative energy
Construction machinery
Forestry
Industrial machinery
Machine tools
Marine
Material handling
Mining
Oil & gas
Power generation
Refuse vehicles
Renewable energy
Truck hydraulics
Turf equipment

Key Products

Accumulators
Cartridge valves
Electrohydraulic actuators
Human machine interfaces
Hybrid drives
Hydraulic cylinders
Hydraulic motors & pumps
Hydraulic systems
Hydraulic valves & controls
Hydrostatic steering
Integrated hydraulic circuits
Power take-offs
Power units
Rotary actuators
Sensors

Pneumatics

Key Markets

Aerospace
Conveyor & material handling
Factory automation
Life science & medical
Machine tools
Packaging machinery
Transportation & automotive

Key Products

Air preparation
Brass fittings & valves
Manifolds
Pneumatic accessories
Pneumatic actuators & grippers
Pneumatic valves & controls
Quick disconnects
Rotary actuators
Rubber & thermoplastic hose & couplings
Structural extrusions
Thermoplastic tubing & fittings
Vacuum generators, cups & sensors

Process Control

Key Markets

Alternative fuels
Biopharmaceuticals
Chemical & refining
Food & beverage
Marine & shipbuilding
Medical & dental
Microelectronics
Nuclear Power
Offshore oil exploration
Oil & gas
Pharmaceuticals
Power generation
Pulp & paper
Steel
Water/wastewater

Key Products

Analytical Instruments
Analytical sample conditioning products & systems
Chemical injection fittings & valves
Fluoropolymer chemical delivery fittings, valves & pumps
High purity gas delivery fittings, valves, regulators & digital flow controllers
Industrial mass flow meters/ controllers
Permanent no-weld tube fittings
Precision industrial regulators & flow controllers
Process control double block & bleeds
Process control fittings, valves, regulators & manifold valves

Sealing & Shielding

Key Markets

Aerospace
Chemical processing
Consumer
Fluid power
General industrial
Information technology
Life sciences
Microelectronics
Military
Oil & gas
Power generation
Renewable energy
Telecommunications
Transportation

Key Products

Dynamic seals
Elastomeric o-rings
Electro-medical instrument design & assembly
EMI shielding
Extruded & precision-cut, fabricated elastomeric seals
High temperature metal seals
Homogeneous & inserted elastomeric shapes
Medical device fabrication & assembly
Metal & plastic retained composite seals
Shielded optical windows
Silicone tubing & extrusions
Thermal management
Vibration dampening

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