

CF Component

Ultra High Vacuum Fittings
Sizes 1 1/3" to 4 5/8"



Manufactured by MKS to industry standards, Series 88 components are a full line of metal-sealed stainless steel CF flanges and fittings that are interchangeable with ultra high vacuum equipment made by other manufacturers.

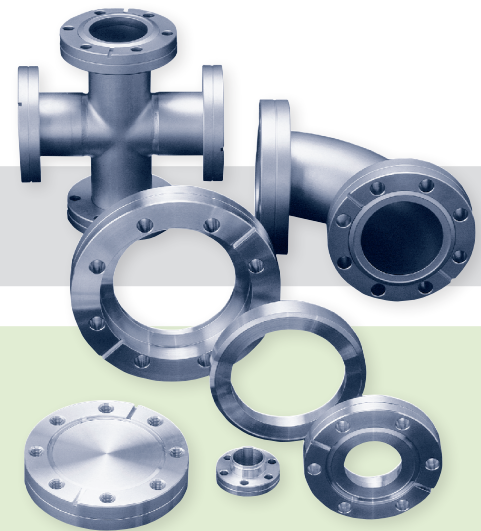
MKS offers a complete system of interfacing components including valves, which allows rapid assembly without welding, brazing, or soldering. Most sizes and types of fittings are available for immediate shipment from MKS' distribution centers located throughout North America, Asia, and Europe.

Series 88 is a line of CF-style fittings that are the standard for ultra high vacuum applications. They use a flat gasket placed between two knife edges to provide a vacuum tight seal. Mating flanges have identical profiles, i.e., they are sexless, eliminating the need to store two types or worry about compatibility.

Applications

Series 88 CF flanges are suitable for applications requiring a very clean environment, ultra high vacuum conditions, high temperature, or where critical or dangerous materials must be contained or excluded. These include:

- Difficult applications with corrosive, radioactive, toxic or air sensitive materials
- Materials creation and processing such as molecular beam epitaxy
- Analytical instrumentation including Auger electron spectrometers, mass spectrometers, and electron microscopes
- High energy physics installation such as accelerators and fusion devices



Series 88 Components

- CF Flanges
- Adapters
- Elbows, Tees, Crosses and Bellows
- Thin Metal Hose
- Plate and Nut Sets

Description

Made with very high purity stainless steel and meticulous cleaning procedures, Series 88 CF components are suitable for use in the ultra high vacuum applications to below 10^{-13} Torr and in temperatures from -196° to 500°C . The material characteristics of the flanges, seals, screws, and nuts are selected to provide high performance throughout a wide temperature range. Rotatable and nonrotatable flanges in sizes from mini 1-1/3 to 4-5/8 inches (34 to 117 mm) are available with several bore sizes to fit a range of tube diameters.

MKS uses the latest automated equipment to provide the highest quality and consistency. Very high purity type 304 stainless steel is selected to have few inclusions. Combined with MKS' surface treatment and cleaning procedures, this minimizes outgassing, permeability, and leakage. Proper hardness is maintained to prevent the knife edge from deteriorating.

Installation

CF components are assembled by inserting a gasket between the two flange faces, then securing the assembly with bolts. (See Figure 1.) Bolts should be tightened diagonally, versus sequentially around the circumference, for a secure vacuum seal. Assembly is cost effective through reuse of components and inch dimensional stubs, sockets, and tubes. The foolproof design provides leak tight joints consistently.

A variety of sealing hardware is available, such as plate nuts, dodecagon (12 point head) bolts, Viton® seals, and individually wrapped copper and silver-plated copper gaskets protected from corrosion and mechanical damage.

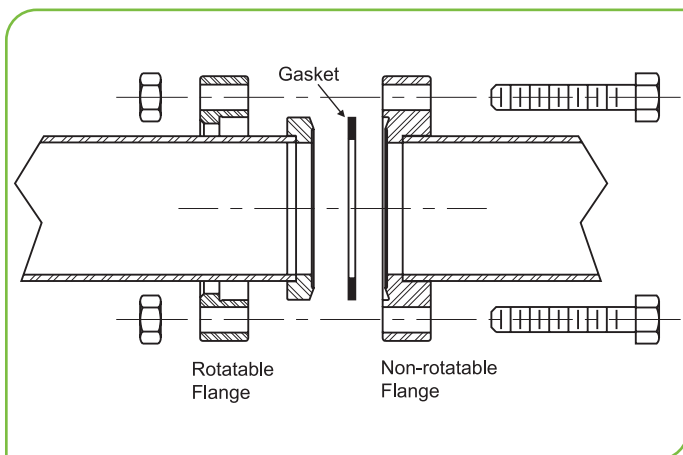


Figure 1 — CF Flange Installation

Plate nuts furnish the fastest, most convenient method to close flanges, reduce required clearance, assemble with one wrench, and are especially good in limited accessibility. Assembly time reduces greatly, because bolts are easier to start and tighten. The clearance needed is half that of regular nuts. They eliminate the need and cost for tapped flanges.

MKS is one of very few CF manufacturers who offer silver plated bolts, including the convenient dodecagon (12 point head) style, which greatly reduce the risk of seizure or breakage.

Copper gaskets make these flanges self-centering and the standard leak grooves simplify troubleshooting and gasket removal. MKS guarantees its CF flanges and fittings to be leak free. OFHC copper gaskets are cleaned, insured to be scratch free, individually sealed, and ready for use. Individual packaging protects flange seal surfaces.

Silver-plated copper gaskets are available for systems that require frequent high-temperature bakeout. This prevents oxides from forming during the bakeout, which could contaminate the system.

The Viton CF gasket offered by MKS has a unique notching in the design, allowing less outgassing than most elastomer seals.

CF flanges remain leak tight even after repeated cycling of the temperature over a wide range. The availability of both tapped and clearance bolt holes gives great flexibility.

Type 304 stainless steel is suited for assembly by tungsten inert gas (TIG) welding; simple fusion welding without filler metal is preferred. Users may braze components to the CF flanges if desired. CF flanges seal properly when the faces of mating flanges contact each other.

The rotatable versions simplify alignment with the bolt holes of other system components and give infinitely rotatable joints. All fittings have at least one rotatable flange for easy alignment. Nonrotatable flanges provide better knife edge protection. The precise tolerances to which MKS fabricates its CF flanges insure an exact fit every time.

Standard size inch tubing provides easy and economical connection to the user's equipment. Full and half nipples, adapters to a variety of other connection elements, tees, elbows, crosses, and flexible metal hoses for vibration isolation and movement give the line added versatility.

With its extensive engineering capabilities, MKS provides custom designed and manufactured shapes and sizes of components. Custom vacuum chambers can be fabricated as well as unique space and time saving fittings and adapters.

Specifications	
Minimum Pressure (with metal seals)	10 ⁻¹³ Torr
Leak Check	< 10 ⁻⁹ std-cc/s
Materials	Components <ul style="list-style-type: none"> Type 304 Stainless Steel Gaskets <ul style="list-style-type: none"> Copper, Silver Plated Copper or Viton Bolts <ul style="list-style-type: none"> Type 304 Stainless or Silver Plated Stainless
Metal Gasket Thickness	.08"/(2.03 mm)

Size	Metal Gasket Dimensions in/(mm)		Maximum Torque for Sealing ft/lbs (Newton-meters)
	Outer Diameter	Inner Diameter	
1 1/3"	0.84/(21)	0.64/(16)	5/(7)
2 1/8"	1.29/(33)	1.01/(26)	16/(22)
2 3/4"	1.90/(48)	1.45/(37)	16/(22)
3 3/8"	2.43/(62)	2.01/(51)	26/(35)
4 1/2"	3.24/(82)	2.51/(64)	26/(35)
4 5/8"	3.60/(91)	3.01/(76)	26/(35)

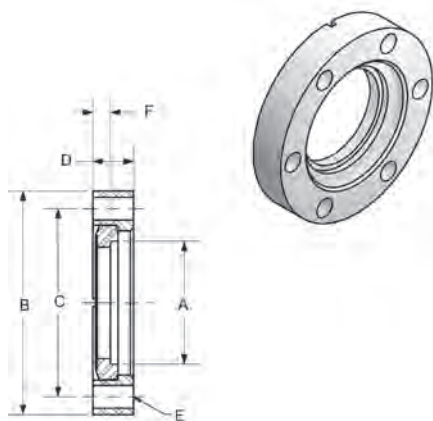
Note: Metal gaskets are .08" thick.

Table 1 — Gaskets and Torques

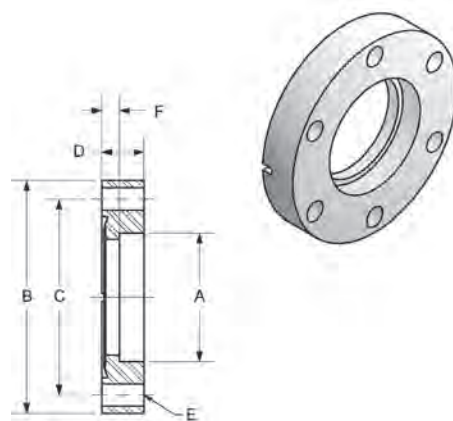
CF Flange Dimensions

in/mm

Flange Size	A Nominal Tube Diameter	B Flange Outside Diameter	C Bolt Circle Diameter	D Thickness	E Number of Holes	Tapped Holes Thread	Thru Holes Diameter	F Face to Counter Bore
1 1/3	.75 (19)	1.33 (34)	1.06 (27)	.30 (8)	6	8-32	.172 (4.3)	.18 (4.6)
2 1/8	1.00 (25)	2.12 (54)	1.62 (41)	.50 (13)	4	1/4-28	.265 (6.7)	.17 (4.3)
2 3/4	1.50 (38)	2.75 (70)	2.31 (59)	.50 (13)	6	1/4-28	.265 (6.7)	.21 (5.3)
3 3/8	2.00 (51)	3.38 (86)	2.85 (72)	.69 (18)	8	5/16-24	.332 (8.4)	.22 (5.6)
4 1/2	2.50 (64)	4.50 (114)	3.63 (92)	.69 (18)	8	5/16-24	.332 (8.4)	.38 (9.6)
4 5/8	3.01 (76)	4.61 (118)	4.03 (102)	.75 (19)	10	5/16-24	.332 (8.4)	.38 (9.6)



Rotatable



Non-Rotatable

CF Flanges

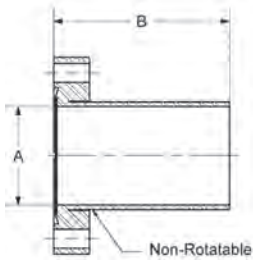
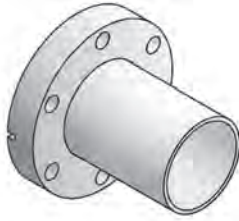
in/mm

Flange Size	For Tubing OD	Rotatable / Non-Rotatable	Bolt Holes	Part Number
1 1/3	Blank	Rotatable	Thru	100881014
1 1/3	Blank	Rotatable	Tapped	100881021
1 1/3	Blank	Non-Rotatable	Thru	100881000
1 1/3	Blank	Non-Rotatable	Tapped	100881007
1 1/3	.75 (19)	Rotatable	Thru	100881018
1 1/3	.75 (19)	Rotatable	Tapped	100881025
1 1/3	.75 (19)	Non-Rotatable	Thru	100881004
1 1/3	.75 (19)	Non-Rotatable	Tapped	100881011
2 1/8	Blank	Rotatable	Thru	100882010
2 1/8	Blank	Rotatable	Tapped	100882015
2 1/8	Blank	Non-Rotatable	Thru	100882000
2 1/8	Blank	Non-Rotatable	Tapped	100882005
2 1/8	.25 (6)	Rotatable	Thru	100882011
2 1/8	.25 (6)	Rotatable	Tapped	100882016
2 1/8	.25 (6)	Non-Rotatable	Thru	100882001
2 1/8	.25 (6)	Non-Rotatable	Tapped	100882006
2 1/8	.50 (13)	Rotatable	Thru	100882012
2 1/8	.50 (13)	Rotatable	Tapped	100882017
2 1/8	.50 (13)	Non-Rotatable	Thru	100882002
2 1/8	.50 (13)	Non-Rotatable	Tapped	100882007
2 1/8	.75 (19)	Rotatable	Thru	100882013
2 1/8	.75 (19)	Rotatable	Tapped	100882018
2 1/8	.75 (19)	Non-Rotatable	Thru	100882003
2 1/8	.75 (19)	Non-Rotatable	Tapped	100882008
2 1/8	1.00 (25)	Rotatable	Thru	100882014
2 1/8	1.00 (25)	Rotatable	Tapped	100882019
2 1/8	1.00 (25)	Non-Rotatable	Thru	100882004
2 1/8	1.00 (25)	Non-Rotatable	Tapped	100882009
2 3/4	Blank	Rotatable	Thru	100883014
2 3/4	Blank	Rotatable	Tapped	100883021

CF Flanges				in/mm
Flange Size	For Tubing OD	Rotatable / Non-Rotatable	Bolt Holes	Part Number
2 3/4	Blank	Non-Rotatable	Thru	100883000
2 3/4	Blank	Non-Rotatable	Tapped	100883007
2 3/4	.25 (6)	Rotatable	Thru	100883015
2 3/4	.25 (6)	Rotatable	Tapped	100883022
2 3/4	.25 (6)	Non-Rotatable	Thru	100883001
2 3/4	.25 (6)	Non-Rotatable	Tapped	100883008
2 3/4	.50 (13)	Rotatable	Thru	100883016
2 3/4	.50 (13)	Rotatable	Tapped	100883023
2 3/4	.50 (13)	Non-Rotatable	Thru	100883002
2 3/4	.50 (13)	Non-Rotatable	Tapped	100883009
2 3/4	.75 (19)	Rotatable	Thru	100883017
2 3/4	.75 (19)	Rotatable	Tapped	100883024
2 3/4	.75 (19)	Non-Rotatable	Thru	100883003
2 3/4	.75 (19)	Non-Rotatable	Tapped	100883010
2 3/4	1.00 (25)	Rotatable	Thru	100883018
2 3/4	1.00 (25)	Rotatable	Tapped	100883025
2 3/4	1.00 (25)	Non-Rotatable	Thru	100883004
2 3/4	1.00 (25)	Non-Rotatable	Tapped	100883011
2 3/4	1.25 (32)	Rotatable	Thru	100883019
2 3/4	1.25 (32)	Rotatable	Tapped	100883026
2 3/4	1.25 (32)	Non-Rotatable	Thru	100883005
2 3/4	1.25 (32)	Non-Rotatable	Tapped	100883012
2 3/4	1.50 (38)	Rotatable	Thru	100883020
2 3/4	1.50 (38)	Rotatable	Tapped	100883027
2 3/4	1.50 (38)	Non-Rotatable	Thru	100883006
2 3/4	1.50 (38)	Non-Rotatable	Tapped	100883013
2 3/4	1.75 (45)	Rotatable	Thru	100883065
2 3/4	1.75 (45)	Rotatable	Tapped	100883067
2 3/4	1.75 (45)	Non-Rotatable	Thru	100883064
2 3/4	1.75 (45)	Non-Rotatable	Tapped	100883066
3 3/8	Blank	Rotatable	Thru	100884006
3 3/8	Blank	Rotatable	Tapped	100884009
3 3/8	Blank	Non-Rotatable	Thru	100884000
3 3/8	Blank	Non-Rotatable	Tapped	100884003
3 3/8	1.50 (38)	Rotatable	Thru	100884007
3 3/8	1.50 (38)	Rotatable	Tapped	100884010
3 3/8	1.50 (38)	Non-Rotatable	Thru	100884001
3 3/8	1.50 (38)	Non-Rotatable	Tapped	100884004
3 3/8	2.00 (51)	Rotatable	Thru	100884008
3 3/8	2.00 (51)	Rotatable	Tapped	100884011
3 3/8	2.00 (51)	Non-Rotatable	Thru	100884002
3 3/8	2.00 (51)	Non-Rotatable	Tapped	100884005
4 1/2	Blank	Rotatable	Thru	100885008
4 1/2	Blank	Rotatable	Tapped	100885012
4 1/2	Blank	Non-Rotatable	Thru	100885000
4 1/2	Blank	Non-Rotatable	Tapped	100885004
4 1/2	1.50 (38)	Rotatable	Thru	100885009
4 1/2	1.50 (38)	Rotatable	Tapped	100885013
4 1/2	1.50 (38)	Non-Rotatable	Thru	100885001
4 1/2	1.50 (38)	Non-Rotatable	Tapped	100885005
4 1/2	2.00 (51)	Rotatable	Thru	100885010
4 1/2	2.00 (51)	Rotatable	Tapped	100885014
4 1/2	2.00 (51)	Non-Rotatable	Thru	100885002
4 1/2	2.00 (51)	Non-Rotatable	Tapped	100885006
4 1/2	2.50 (64)	Rotatable	Thru	100885011
4 1/2	2.50 (64)	Rotatable	Tapped	100885015
4 1/2	2.50 (64)	Non-Rotatable	Thru	100885003
4 1/2	2.50 (64)	Non-Rotatable	Tapped	100885007
4 5/8	Blank	Rotatable	Thru	100885504
4 5/8	Blank	Rotatable	Tapped	100885506
4 5/8	Blank	Non-Rotatable	Thru	100885500
4 5/8	Blank	Non-Rotatable	Tapped	100885502
4 5/8	3.00 (76)	Rotatable	Thru	100885505
4 5/8	3.00 (76)	Rotatable	Tapped	100885507
4 5/8	3.00 (76)	Non-Rotatable	Thru	100885501
4 5/8	3.00 (76)	Non-Rotatable	Tapped	100885503

CF Half Nipple

in/mm

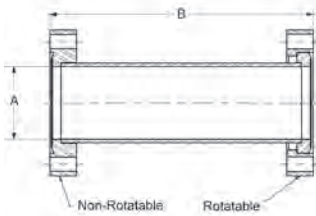
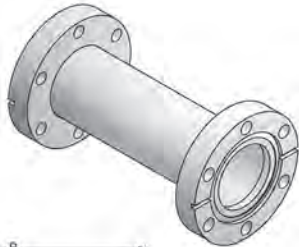


- Butt weld
- For use with orbital welders
- Thru holes

Flange Size	For Tubing Size (OD)	A	B	Part Number
1 1/3	.75 (19)	.62 (16)	1.50 (38)	100881046
2 1/8	1.00 (25)	.87 (22)	2.05 (52)	100882040
2 3/4	1.50 (38)	1.37 (35)	2.43 (62)	100883049
3 3/8	2.00 (51)	1.87 (47)	3.21 (82)	100884027
4 1/2	2.50 (64)	2.37 (60)	4.13 (105)	100885032
4 5/8	3.00 (76)	2.87 (73)	4.93 (125)	100885531

CF Full Nipple

in/mm



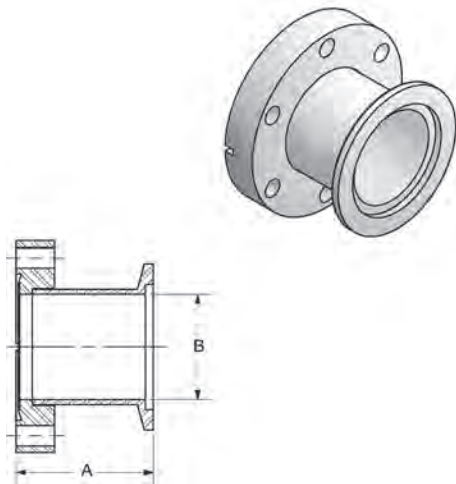
- Special lengths to order
- Thru holes

* Includes 12 mesh screen, 1/2" in from rotatable port

Flange Size	For Tubing Size (OD)	A	B	Part Number
1 1/3	.75 (19)	.62 (16)	3.00 (76)	100881047
2 1/8	1.00 (25)	.87 (22)	4.10 (104)	100882041
2 3/4	1.50 (38)	1.37 (35)	4.92 (125)	100883050
2 3/4*	1.50 (38)	1.37 (35)	4.00 (102)	100883069
3 3/8	2.00 (51)	1.87 (47)	6.42 (163)	100884028
4 1/2	2.50 (64)	2.37 (60)	8.26 (210)	100885033
4 5/8	3.00 (76)	2.87 (73)	9.88 (250)	100885532

Adapter, ISO-KF to CF

in/mm

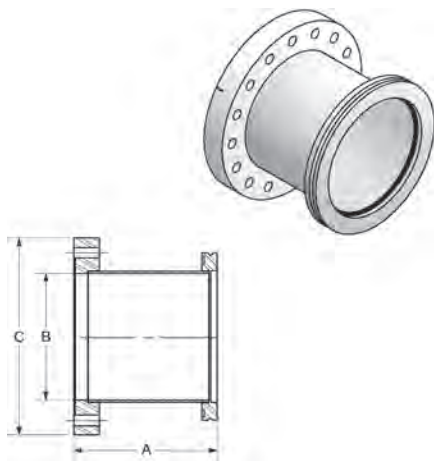


- Stainless steel type 304

Flange Size (KF)	Flange Size (CF)	A	B	Part Number
NW 16	Mini 1 1/3	2.08 (53)	0.62 (16)	100315601
NW 16	2 3/4	1.78 (45)	0.62 (16)	100315611
NW 25	2 1/8	1.89 (48)	0.87 (22)	100319812
NW 25	2 3/4	1.78 (45)	0.87 (22)	100315603
NW 40	2 3/4	1.78 (45)	1.33 (34)	100315605
NW 50	2 3/4	2.11 (54)	1.37 (35)	100319813
NW 50	4 1/2	1.95 (50)	1.83 (46)	100315606

Adapter, ISO-MF Flange to CF Flange

in/mm

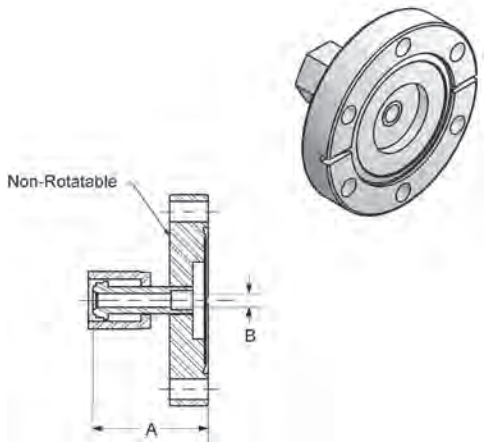


- Stainless steel type 304
- Special adapters available upon request

Flange Size	A	B	C	Part Number
NW 63 to 4 1/2" CF	4.33 (110)	2.37 (60)	4.50 (114)	100762206

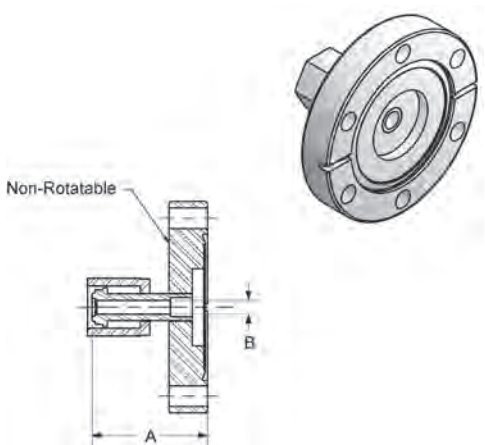
Adapter, CF to VCR® Female

in/mm

 <p>Non-Rotatable</p>	Flange Size	A	B	VCR Size	Part Number
	<ul style="list-style-type: none"> • Thru holes • VCR-compatible parts may be used 	1 1/3 to 4 VCR	1.43 (36)	.19 (5)	1/4
	2 1/8 to 4 VCR	1.50 (38)	.19 (5)	1/4	100882032
	2 1/8 to 8 VCR	1.69 (43)	.41 (10)	1/2	100882033
	2 1/8 to 12 VCR	2.19 (56)	.62 (16)	3/4	100882036
	2 3/4 to 4 VCR	1.50 (38)	.19 (5)	1/4	100883054
	2 3/4 to 8 VCR	1.69 (43)	.41 (10)	1/2	100883057
	2 3/4 to 12 VCR	2.19 (56)	.62 (16)	3/4	100883058
	3 3/8 to 4 VCR	1.80 (46)	.19 (5)	1/4	100884033
	3 3/8 to 8 VCR	1.88 (48)	.41 (10)	1/2	100884035
	3 3/8 to 12 VCR	2.38 (60)	.62 (16)	3/4	100884037

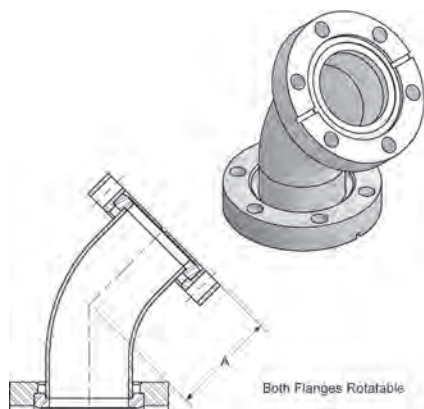
Adapter, CF to VCR® Male

in/mm

 <p>Non-Rotatable</p>	Flange Size	A	B	VCR Size	Part Number
	<ul style="list-style-type: none"> • Thru holes • VCR-compatible parts may be used 	1 1/3 to 4 VCR	1.43 (36)	.19 (5)	1/4
	2 1/8 to 4 VCR	1.50 (38)	.19 (5)	1/4	100882031
	2 1/8 to 8 VCR	1.69 (43)	.41 (10)	1/2	100882034
	2 1/8 to 12 VCR	2.19 (56)	.62 (16)	3/4	100882035
	2 3/4 to 4 VCR	1.50 (38)	.19 (5)	1/4	100883055
	2 3/4 to 8 VCR	1.69 (43)	.41 (10)	1/2	100883056
	2 3/4 to 12 VCR	2.19 (56)	.62 (16)	3/4	100883059
	3 3/8 to 4 VCR	1.80 (46)	.19 (5)	1/4	100884032
	3 3/8 to 8 VCR	1.88 (48)	.41 (10)	1/2	100884034
	3 3/8 to 12 VCR	2.38 (60)	.62 (16)	3/4	100884036

CF Elbow 45° Smooth Radius

in/mm

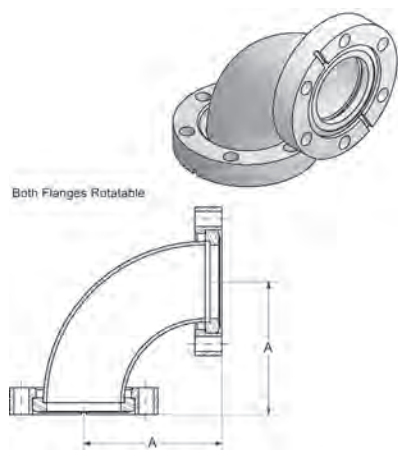


- Flanges same size on both sides

Flange Size	For Tubing Size (OD)	A	Part Number
1 1/3	.75 (19)	.81 (21)	100881052
2 1/8	1.00 (25)	1.35 (34)	100882038
2 3/4	1.50 (38)	1.82 (46)	100883061
3 3/8	2.00 (51)	2.53 (64)	100884039
4 1/2	2.50 (64)	3.37 (86)	100885037
4 5/8	3.00 (76)	4.05 (103)	100885528

CF Elbow 90° Smooth Radius

in/mm

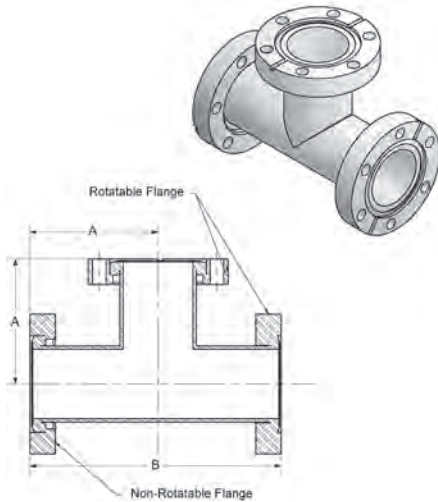


- Flanges same size on both sides

Flange Size	For Tubing Size (OD)	A	Part Number
1 1/3	.75 (19)	1.50 (38)	100881030
2 1/8	1.00 (25)	2.22 (56)	100882039
2 3/4	1.50 (38)	2.46 (63)	100883030
3 3/8	2.00 (51)	3.21 (82)	100884014
4 1/2	2.50 (64)	4.13 (105)	100885018
4 5/8	3.00 (76)	4.86 (123)	100885529

CF Tee

in/mm

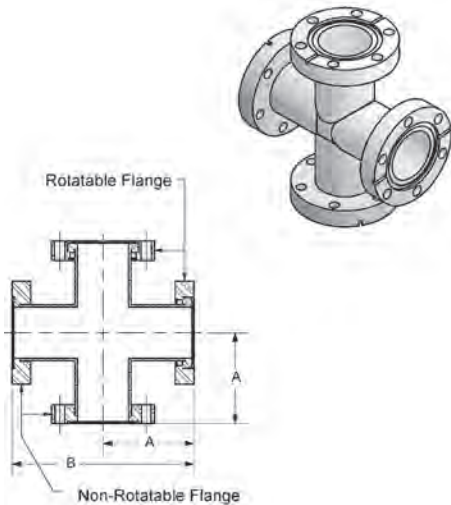


- Flanges same size on all sides

Flange Size	For Tubing OD	A	B	Part Number
1 1/3	.75 (19)	1.50 (38)	3.00 (76)	100881028
2 1/8	1.00 (25)	2.06 (52)	4.12 (105)	100882042
2 3/4	1.50 (38)	2.46 (63)	4.92 (125)	100883028
3 3/8	2.00 (51)	3.21 (82)	6.42 (166)	100884012

CF Cross

in/mm

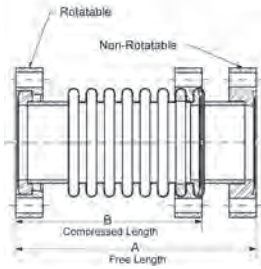


- Flanges same size on all sides

Flange Size	For Tubing OD	A	B	Part Number
1 1/3	.75 (19)	1.50 (38)	3.00 (76)	100881029
2 1/8	1.00 (25)	2.06 (52)	4.12 (105)	100882043
2 3/4	1.50 (38)	2.46 (63)	4.92 (125)	100883029
3 3/8	2.00 (51)	3.21 (82)	6.42 (166)	100884013

Bellows Section

in/mm

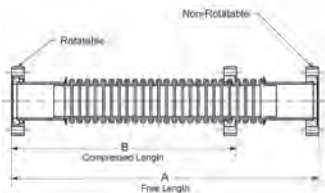


- Type 321 stainless steel
- Flexible coupling for vibrations and alignment
- Thru holes

Flange Size	Static Bend Radius	A	B	Spring Rate (lb/in)	Part Number
1 1/3	3.0 (76)	4.15 (105)	3.80 (97)	70	100881045
2 1/8	4.0 (102)	3.41 (86)	3.20 (81)	58	100882028
2 3/4	5.5 (140)	4.15 (105)	3.20 (81)	61	100883047
3 3/8	8.0 (203)	4.29 (109)	3.20 (81)	58	100884025

Thin Wall Metal Hose

in/mm



- Type 321 stainless steel
- Special lengths to order
- Both ends must be supported for the 4 1/2 and 6 inch sizes

Flange Size	Static Bend Radius	A	B	Wall Thickness	Spring Rate (lb/in)	Part Number
1 1/3	1.63 (41)	11.3 (287)	7.8 (198)	.006 (.152)	27	100881032
1 1/3	1.63 (41)	21.2 (539)	13.8 (351)	.006 (.152)	12	100881033
1 1/3	1.63 (41)	40.9 (1039)	25.6 (650)	.006 (.152)	9	100881034
2 1/8	1.38 (35)	11.3 (287)	7.8 (198)	.006 (.152)	16	100882020
2 1/8	1.38 (35)	22.1 (561)	14.7 (373)	.006 (.152)	7	100882021
2 1/8	1.38 (35)	41.8 (1062)	26.5 (673)	.006 (.152)	3	100882022
2 3/4	2.50 (64)	12.3 (312)	8.7 (221)	.006 (.152)	9	100883032
2 3/4	2.50 (64)	22.1 (561)	14.1 (358)	.006 (.152)	4	100883033
2 3/4	2.50 (64)	41.9 (1064)	25.0 (635)	.006 (.152)	2	100883034
3 3/8	3.25 (83)	13.3 (338)	10.5 (267)	.006 (.152)	13	100884016
3 3/8	3.25 (83)	23.2 (589)	17.0 (432)	.006 (.152)	6	100884017
3 3/8	3.25 (83)	42.9 (1090)	29.8 (757)	.006 (.152)	3	100884018
4 1/2	6.75 (172)	13.8 (351)	9.1 (231)	.006 (.152)	15	100885020
4 1/2	6.75 (172)	23.7 (602)	16.2 (412)	.006 (.152)	7	100885021
4 1/2	6.75 (172)	43.4 (1102)	30.3 (770)	.006 (.152)	3	100885022

Flange Protector Caps

Flange Size	Description	Part Number
1 1/3	Flange protector cap, plastic	100003050
2 1/8	Flange protector cap, plastic	100005285
2 3/4	Flange protector cap, plastic	100003049
3 3/8	Flange protector cap, plastic	100003048

CF Hardware

Flange Size	Description	Quantity	Part Number
1 1/3	Bolt Set, Tapped, 8-32 x 0.56	25	100889029
1 1/3	Bolt Set, Tapped, 8-32 x 0.62	25	100889030
1 1/3	Bolt Set, Tapped, 8-32 x 0.75	25	100889031
1 1/3	Bolt Set, Tapped, 8-32 x 0.50	25	100889032
2 1/8, 2 3/4	Bolt Set, Tapped, 1/4-28 x 1.00	25	100889033
3 3/8, 4 1/2, 4 5/8	Bolt Set, Tapped, 5/16-24 x 1.25	25	100889035
1 1/3	Bolt/Nut Set, Thru, 8-32 x 0.75	25	100889047
1 1/3	Bolt/Nut Set, Thru, 8-32 x 0.87	25	100889147
1 1/3	Bolt/Nut Set, Thru, 8-32 x 0.75, Ag	25	100889048
1 1/3	Bolt/Nut Set, Thru, 8-32 x 0.87, Ag	25	100889148
2 1/8, 2 3/4	Bolt/Nut Set, Thru, 1/4-28 x 1.25	25	100889049
2 1/8, 2 3/4	Bolt/Nut Set, Thru, 1/4-28 x 1.38	25	100889150
3 3/8	Bolt/Nut Set, Thru, 5/16-24 x 1.75	25	100889051
4 1/2	Bolt/Nut Set, Thru, 5/16-24 x 2.00	25	100889053
4 5/8	Bolt/Nut Set, Thru, 5/16-24 x 2.25	25	100889055
1 1/3	Bolt/Nut Set, Double-Sided, 8-32 x 1.25	25	100889123
1 1/3	Bolt/Nut Set, Double-Sided, 8-32 x 1.25, Ag	25	100889124
2 1/8, 2 3/4	Bolt/Nut Set, Double-Sided, 1/4-28 x 1.75	25	100889125
2 3/4	Bolt/Nut Set, Double-Sided, 1/4-28 x 2.00	25	100889126
2 3/4	Bolt/Nut Set, Double-Sided, 1/4-28 x 2.50	25	100889153
3 3/8	Bolt/Nut Set, Double-Sided, 5/16-24 x 2.50	25	100889130
4 1/2	Bolt/Nut Set, Double-Sided, 5/16-24 x 2.75	25	100889127
4 5/8	Bolt/Nut Set, Double-Sided, 5/16-24 x 3.00	25	100889128
1 1/3	Viton Seal, Beveled Edge	5	100889020
2 1/8	Viton Seal, Beveled Edge	5	100889021
2 3/4	Viton Seal, Beveled Edge	5	100889022
3 3/8	Viton Seal, Beveled Edge	5	100889023
4 1/2	Viton Seal, Beveled Edge	5	100889024
4 5/8	Viton Seal, Beveled Edge	5	100889025

CF Hardware

Flange Size	Description	Quantity	Part Number
1 1/3	Silver-Plated Copper Gasket	1	100889181
2 1/8	Silver-Plated Copper Gasket	1	100889182
2 3/4	Silver-Plated Copper Gasket	1	100889183
3 3/8	Silver-Plated Copper Gasket	1	100889184
4 1/2	Silver-Plated Copper Gasket	1	100889185
4 5/8	Silver-Plated Copper Gasket	1	100889186
1 1/3	Copper Gasket, Etched, Individually Sealed	10	100889103
2 1/8	Copper Gasket, Etched, Individually Sealed	10	100889104
2 3/4	Copper Gasket, Etched, Individually Sealed	10	100889105
3 3/8	Copper Gasket, Etched, Individually Sealed	10	100889106
4 1/2	Copper Gasket, Etched, Individually Sealed	10	100889107
4 5/8	Copper Gasket, Etched, Individually Sealed	10	100889108

Plate Nut Sets

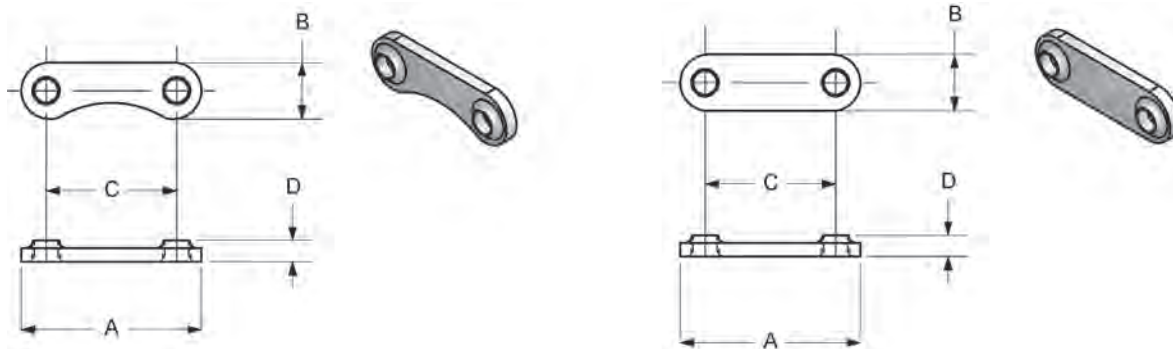


Plate Nut (24 per package)

Flange Size	Thread Size	A	B	C	D	Part Number
1 1/3	8-32	.80"	.30"	.53"	.15"	100889071
2 3/4	1/4-28	1.41"	.50"	1.16"	.18"	100889072
3 3/8	5/16-24	1.75"	.50"	1.09"	.22"	100889073
4 1/2	5/16-24	2.03"	.50"	1.39"	.22"	100889074

Plate Nut and Bolt Sets

Flange Size	Description	Part Number
1 1/3	Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 8-32 x 0.75	100889077
2 3/4	Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 1/4-28 x 1.25	100889079
3 3/8	Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24 x 1.75	100889081
4 1/2	Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24 x 2.00	100889083

Plate Nut and Dodecagon (12 pt) Silver Plated Bolt Sets

Flange Size	Description	Part Number
1 1/3	Dodecagon Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 8-32 x 0.75	100889090
2 3/4	Dodecagon Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 1/4-28 x 1.25	100889092
3 3/8	Dodecagon Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24 x 1.75	100889094
4 1/2	Dodecagon Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24 x 2.00	100889096

Dodecagon (12 pt) Bolts with Nuts and Washers*

Flange Size	Description	Part Number
2 1/8, 2 3/4	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Tapped, 1/4-28 x 1.00	100889042
2 1/8, 2 3/4	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Thru, 1/4-28 x 1.25	100889062
2 1/8, 2 3/4	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Thru, 1/4-28 x 1.38	100889151
3 3/8, 4 1/2, 4 5/8	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Tapped, 5/16-24 x 1.25	100889044
4 1/2	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Thru, 5/16-24 x 2.00	100889066
3 3/8	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Thru, 5/16-24 x 1.75	100889064
4 5/8	Dodecagon Bolt/Nut/Washer Set, Silver Plated, Thru, 5/16-24 x 2.25	100889068

* Note: There are 25 bolts, nuts, and washers per package.

Type	Part Number
45° Elbow, 1 1/3"	100881052
45° Elbow, 2 1/8"	100882038
45° Elbow, 2 3/4"	100883061
45° Elbow, 3 3/8"	100884039
45° Elbow, 4 1/2"	100885037
45° Elbow, 4 5/8"	100885528
90° Elbow, 1 1/3"	100881030
90° Elbow, 2 1/8"	100882039
90° Elbow, 2 3/4"	100883030
90° Elbow, 3 3/8"	100884014
90° Elbow, 4 1/2"	100885018
90° Elbow, 4 5/8"	100885529
Adapter, 1 1/3" to 4 VCR-F	100881049
Adapter, 1 1/3" to 4 VCR-M	100881050
Adapter, 2 1/8" to 4 VCR-M	100882031
Adapter, 2 1/8" to 4 VCR-F	100882032
Adapter, 2 1/8" to 8 VCR-F	100882033
Adapter, 2 1/8" to 8 VCR-M	100882034
Adapter, 2 1/8" to 12 VCR-M	100882035
Adapter, 2 1/8" to 12 VCR-F	100882036
Adapter, 2 3/4" to 4 VCR-F	100883054
Adapter, 2 3/4" to 4 VCR-M	100883055
Adapter, 2 3/4" to 8 VCR-M	100883056
Adapter, 2 3/4" to 8 VCR-F	100883057
Adapter, 2 3/4" to 12 VCR-F	100883058
Adapter, 2 3/4" to 12 VCR-M	100883059
Adapter, 3 3/8" to 4 VCR-M	100884032
Adapter, 3 3/8" to 4 VCR-F	100884033
Adapter, 3 3/8" to 8 VCR-M	100884034
Adapter, 3 3/8" to 8 VCR-F	100884035
Adapter, 3 3/8" to 12 VCR-M	100884036
Adapter, 3 3/8" to 12 VCR-F	100884037
Adapter, ISO-KF to CF, NW 16 to 1-1/3" CF	100315601
Adapter, ISO-KF to CF, NW 25 to 2-3/4" CF	100315603
Adapter, ISO-KF to CF, NW 40 to 2-3/4" CF	100315605
Adapter, ISO-KF to CF, NW 50 to 4-1/2" CF	100315606
Adapter, ISO-KF to CF, NW 16 to 2-3/4" CF	100315611
Adapter, ISO-KF to CF, NW 25 to 2 1/8" CF	100319812
Adapter, ISO-KF to CF, NW 50 to 2 3/4" CF	100319813
Adapter, MF to CF, NW 63 to 4.5" CF	100762206
Bellows Section, 1 1/3"	100881045
Bellows Section, 2 1/8"	100882028
Bellows Section, 2 3/4"	100883047
Bellows Section, 3 3/8"	100884025
Bolt/Nut Set, Double-Sided, 8-32x1.25, 1 1/3"	100889123
Bolt/Nut Set, Double-Sided, 8-32x1.25, 1 1/3"	100889124
Bolt/Nut Set, Double-Sided, 1/4-28x1.75, 2 1/8", 2 3/4"	100889125
Bolt/Nut Set, Double-Sided, 1/4-28x2.00, 2 3/4"	100889126
Bolt/Nut Set, Double-Sided, 5/16-24x2.75, 4 1/2"	100889127
Bolt/Nut Set, Double-Sided, 5/16-24x3.00, 4 5/8"	100889128
Bolt/Nut Set, Double-Sided, 5/16-24x2.50, 3 3/8"	100889130
Bolt/Nut Set, Double-Sided, 1/4-28x2.50, 2 3/4"	100889153
Bolt/Nut Set, Thru, 8-32x0.75, 1 1/3"	100889047
Bolt/Nut Set, Thru, 8-32x0.75, 1 1/3"	100889048
Bolt/Nut Set, Thru, 1/4-28x1.25, 2 1/8", 2 3/4"	100889049
Bolt/Nut Set, Thru, 5/16-24x1.75, 3 3/8"	100889051
Bolt/Nut Set, Thru, 5/16-24x2.00, 4 1/2"	100889053
Bolt/Nut Set, Thru, 5/16-24x2.25, 4 5/8"	100889055
Bolt/Nut Set, Thru, 8-32x0.87, 1 1/3"	100889147
Bolt/Nut Set, Thru, 8-32x0.87, 1 1/3"	100889148
Bolt/Nut Set, Thru, 1/4-28x1.38, 2 1/8", 2 3/4"	100889150
Bolt Set, Tapped, 8-32x0.56, 1 1/3"	100889029
Bolt Set, Tapped, 8-32x0.62, 1 1/3"	100889030
Bolt Set, Tapped, 8-32x0.75, 1 1/3"	100889031
Bolt Set, Tapped, 8-32x0.50, 1 1/3"	100889032
Bolt Set, Tapped, 1/4-28x1.00, 2 1/8", 2 3/4"	100889033
Bolt Set, Tapped, 5/16-24x1.25, 3 3/8", 4 1/2", 4 5/8"	100889035
Copper Gasket, Etched, 1 1/3"	100889103
Copper Gasket, Etched, 2 1/8"	100889104
Copper Gasket, Etched, 2 3/4"	100889105
Copper Gasket, Etched, 3 3/8"	100889106
Copper Gasket, Etched, 4 1/2"	100889107
Copper Gasket, Etched, 4 5/8"	100889108

Type	Part Number
Cross, 1 1/3"	100881029
Cross, 2 1/8"	100882043
Cross, 2 3/4"	100883029
Cross, 3 3/8"	100884013
Dodecagon Bolt/Nut/Washer Set, Tapped, 1/4-28x1.00, 2 1/8", 2 3/4"	100889042
Dodecagon Bolt/Nut/Washer Set, Tapped, 5/16-24x1.75, 3 3/8", 4 1/2", 4 5/8"	100889044
Dodecagon Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 8-32x0.75, 1 1/3"	100889090
Dodecagon Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 1/4-28x1.25, 2 3/4"	100889092
Dodecagon Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24x1.75, 3 3/8"	100889094
Dodecagon Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24x2.00, 4 1/2"	100889096
Dodecagon Bolt/Nut/Washer Set, Thru, 1/4-28x1.25, 2 1/8", 2 3/4"	100889062
Dodecagon Bolt/Nut/Washer Set, Thru, 5/16-24x1.75, 3 3/8"	100889064
Dodecagon Bolt/Nut/Washer Set, Thru, 5/16-24x2.00, 4 1/2"	100889066
Dodecagon Bolt/Nut/Washer Set, Thru, 5/16-24x2.25, 4 5/8"	100889068
Dodecagon Bolt/Nut/Washer Set, Thru, 1/4-28x1.38, 2 1/8", 2 3/4"	100889151
Flange, 1 1/3", Blank, Nonrotatable	100881000
Flange, 1 1/3", 0.75", Nonrotatable, Thru	100881004
Flange, 1 1/3", Blank, Nonrotatable, Tapped	100881007
Flange, 1 1/3", 0.75", Nonrotatable, Tapped	100881011
Flange, 1 1/3", Blank, Rotatable, Thru	100881014
Flange, 1 1/3", 0.75", Rotatable, Thru	100881018
Flange, 1 1/3", Blank, Rotatable, Tapped	100881021
Flange, 1 1/3", 0.75", Rotatable, Tapped	100881025
Flange, 2 1/8", Blank, Nonrotatable, Thru	100882000
Flange, 2 1/8", 0.25", Nonrotatable, Thru	100882001
Flange, 2 1/8", 0.50", Nonrotatable, Thru	100882002
Flange, 2 1/8", 0.75", Nonrotatable, Thru	100882003
Flange, 2 1/8", 1.00", Nonrotatable, Thru	100882004
Flange, 2 1/8", Blank, Nonrotatable, Tapped	100882005
Flange, 2 1/8", 0.25", Nonrotatable, Tapped	100882006
Flange, 2 1/8", 0.50", Nonrotatable, Tapped	100882007
Flange, 2 1/8", 0.75", Nonrotatable, Tapped	100882008
Flange, 2 1/8", 1.00", Nonrotatable, Tapped	100882009
Flange, 2 1/8", Blank, Rotatable, Thru	100882010
Flange, 2 1/8", 0.25", Rotatable, Thru	100882011
Flange, 2 1/8", 0.50", Rotatable, Thru	100882012
Flange, 2 1/8", 0.75", Rotatable, Thru	100882013
Flange, 2 1/8", 1.00", Rotatable, Thru	100882014
Flange, 2 1/8", Blank, Rotatable, Tapped	100882015
Flange, 2 1/8", 0.25", Rotatable, Tapped	100882016
Flange, 2 1/8", 0.50", Rotatable, Tapped	100882017
Flange, 2 1/8", 0.75", Rotatable, Tapped	100882018
Flange, 2 1/8", 1.00", Rotatable, Tapped	100882019
Flange, 2 3/4", Blank, Nonrotatable, Thru	100883000
Flange, 2 3/4", 0.25", Nonrotatable, Thru	100883001
Flange, 2 3/4", 0.50", Nonrotatable, Thru	100883002
Flange, 2 3/4", 0.75", Nonrotatable, Thru	100883003
Flange, 2 3/4", 1.00", Nonrotatable, Thru	100883004
Flange, 2 3/4", 1.25", Nonrotatable, Thru	100883005
Flange, 2 3/4", 1.50", Nonrotatable, Thru	100883006
Flange, 2 3/4", Blank, Nonrotatable, Tapped	100883007
Flange, 2 3/4", 0.25", Nonrotatable, Tapped	100883008
Flange, 2 3/4", 0.50", Nonrotatable, Tapped	100883009
Flange, 2 3/4", 0.75", Nonrotatable, Tapped	100883010
Flange, 2 3/4", 1.00", Nonrotatable, Tapped	100883011
Flange, 2 3/4", 1.25", Nonrotatable, Tapped	100883012
Flange, 2 3/4", 1.50", Nonrotatable, Tapped	100883013
Flange, 2 3/4", Blank, Nonrotatable, Thru	100883000
Flange, 2 3/4", 0.25", Nonrotatable, Thru	100883001

Type	Part Number	Type	Part Number
Flange, 2 3/4", 0.50", Nonrotatable, Thru	100883002	Full Nipple, 1 1/3", 0.75"	100881047
Flange, 2 3/4", 0.75", Nonrotatable, Thru	100883003	Full Nipple, 2 1/8", 1.00"	100882041
Flange, 2 3/4", 1.00", Nonrotatable, Thru	100883004	Full Nipple, 2 3/4", 1.50"	100883050
Flange, 2 3/4", 1.25", Nonrotatable, Thru	100883005	Full Nipple w/ Screen, 2 3/4", 1.50"	100883069
Flange, 2 3/4", 1.50", Nonrotatable, Thru	100883006	Full Nipple, 3 3/8", 2.00"	100884028
Flange, 2 3/4", Blank, Nonrotatable, Tapped	100883007	Full Nipple, 4 1/2", 2.50"	100885033
Flange, 2 3/4", 0.25", Nonrotatable, Tapped	100883008	Full Nipple 4 5/8", 3.00"	100885532
Flange, 2 3/4", 0.50", Nonrotatable, Tapped	100883009		
Flange, 2 3/4", 0.75", Nonrotatable, Tapped	100883010	Half Nipple, 1 1/3", .75"	100881046
Flange, 2 3/4", 1.00", Nonrotatable, Tapped	100883011	Half Nipple, 2 1/8", 1.00"	100882040
Flange, 2 3/4", 1.25", Nonrotatable, Tapped	100883012	Half Nipple, 2 3/4", 1.50"	100883049
Flange, 2 3/4", 1.50", Nonrotatable, Tapped	100883013	Half Nipple, 3 3/8", 2.00"	100884027
Flange, 2 3/4", Blank, Rotatable, Thru	100883014	Half Nipple, 4 1/2", 2.50"	100885032
Flange, 2 3/4", 0.25", Rotatable, Thru	100883015	Half Nipple, 4 5/8", 3.00"	100885531
Flange, 2 3/4", 0.50", Rotatable, Thru	100883016		
Flange, 2 3/4", 0.75", Rotatable, Thru	100883017	Plate Nut Set, 8-32, 1 1/3"	100889071
Flange, 2 3/4", 1.00", Rotatable, Thru	100883018	Plate Nut Set, 1/4-28, 2 3/4"	100889072
Flange, 2 3/4", 1.25", Rotatable, Thru	100883019	Plate Nut Set, 5/16-24, 3 3/8"	100889073
Flange, 2 3/4", 1.50", Rotatable, Thru	100883020	Plate Nut Set, 5/16-24, 4 1/2"	100889074
Flange, 2 3/4", Blank, Rotatable, Tapped	100883021		
Flange, 2 3/4", 0.25", Rotatable, Tapped	100883022	Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 8-32x0.75, 1 1/3"	100889077
Flange, 2 3/4", 0.50", Rotatable, Tapped	100883023		
Flange, 2 3/4", 0.75", Rotatable, Tapped	100883024	Plate Nut/Bolt Set: 12 Plate Nuts, 24 Bolts/Washers, 1/4-28x1.25, 2 3/4"	100889079
Flange, 2 3/4", 1.00", Rotatable, Tapped	100883025		
Flange, 2 3/4", 1.25", Rotatable, Tapped	100883026	Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24x1.75, 3 3/8"	100889081
Flange, 2 3/4", 1.50", Rotatable, Tapped	100883027		
Flange, 2 3/4", 1.75", Nonrotatable, Thru	100883064	Plate Nut/Bolt Set: 16 Plate Nuts, 32 Bolts/Washers, 5/16-24x2.00, 4 1/2"	100889083
Flange, 2 3/4", 1.75", Rotatable, Thru	100883065		
Flange, 2 3/4", 1.75", Nonrotatable, Tapped	100883066	Silver-Plated Copper Gasket (1), 1 1/3"	100889181
Flange, 2 3/4", 1.75", Rotatable, Tapped	100883067	Silver-Plated Copper Gasket (1), 2 1/8"	100889182
		Silver-Plated Copper Gasket (1), 2 3/4"	100889183
Flange, 3 3/8", Blank, Nonrotatable, Thru	100884000	Silver-Plated Copper Gasket (1), 3 3/8"	100889184
Flange, 3 3/8", 1.50", Nonrotatable, Thru	100884001	Silver-Plated Copper Gasket (1), 4 1/2"	100889185
Flange, 3 3/8", 2.00", Nonrotatable, Thru	100884002	Silver-Plated Copper Gasket (1), 4 5/8"	100889186
Flange, 3 3/8", Blank, Nonrotatable, Tapped	100884003		
Flange, 3 3/8", 1.50", Nonrotatable, Tapped	100884004	Tee, 1 1/3"	100881028
Flange, 3 3/8", 2.00", Nonrotatable, Tapped	100884005	Tee, 2 1/8"	100882042
Flange, 3 3/8", Blank, Rotatable, Thru	100884006	Tee, 2 3/4"	100883028
Flange, 3 3/8", 1.50", Rotatable, Thru	100884007	Tee, 3 3/8"	100884012
Flange, 3 3/8", 2.00", Rotatable, Thru	100884008		
Flange, 3 3/8", Blank, Rotatable, Tapped	100884009	Thin Wall Metal Hose, 1.63", 1 1/3"	100881032
Flange, 3 3/8", 1.50", Rotatable, Tapped	100884010	Thin Wall Metal Hose, 1.63", 1 1/3"	100881033
Flange, 3 3/8", 2.00", Rotatable, Tapped	100884011	Thin Wall Metal Hose, 1.63", 1 1/3"	100881034
		Thin Wall Metal Hose, 1.38", 2 1/8"	100882020
Flange, 4 1/2", Blank, Nonrotatable, Thru	100885000	Thin Wall Metal Hose, 1.38", 2 1/8"	100882021
Flange, 4 1/2", 1.50", Nonrotatable, Thru	100885001	Thin Wall Metal Hose, 1.38", 2 1/8"	100882022
Flange, 4 1/2", 2.00", Nonrotatable, Thru	100885002	Thin Wall Metal Hose, 2.50", 2 3/4"	100883032
Flange, 4 1/2", 2.50", Nonrotatable, Thru	100885003	Thin Wall Metal Hose, 2.50", 2 3/4"	100883033
Flange, 4 1/2", Blank, Nonrotatable, Tapped	100885004	Thin Wall Metal Hose, 2.50", 2 3/4"	100883034
Flange, 4 1/2", 1.50", Nonrotatable, Tapped	100885005	Thin Wall Metal Hose, 3.25", 3 3/8"	100884016
Flange, 4 1/2", 2.00", Nonrotatable, Tapped	100885006	Thin Wall Metal Hose, 3.25", 3 3/8"	100884017
Flange, 4 1/2", 2.50", Nonrotatable, Tapped	100885007	Thin Wall Metal Hose, 3.25", 3 3/8"	100884018
Flange, 4 1/2", Blank, Rotatable, Thru	100885008	Thin Wall Metal Hose, 6.75", 4 1/2"	100885020
Flange, 4 1/2", 1.50", Rotatable, Thru	100885009	Thin Wall Metal Hose, 6.75", 4 1/2"	100885021
Flange, 4 1/2", 2.00", Rotatable, Thru	100885010	Thin Wall Metal Hose, 6.75", 4 1/2"	100885022
Flange, 4 1/2", 2.50", Rotatable, Thru	100885011		
Flange, 4 1/2", Blank, Rotatable, Tapped	100885012	Viton Seal, Beveled Edge (5), 1 1/3"	100889020
Flange, 4 1/2", 1.50", Rotatable, Tapped	100885013	Viton Seal, Beveled Edge (5), 2 1/8"	100889021
Flange, 4 1/2", 2.00", Rotatable, Tapped	100885014	Viton Seal, Beveled Edge (5), 2 3/4"	100889022
Flange, 4 1/2", 2.50", Rotatable, Tapped	100885015	Viton Seal, Beveled Edge (5), 3 3/8"	100889023
		Viton Seal, Beveled Edge (5), 4 1/2"	100889024
Flange, 4 5/8", Blank, Nonrotatable, Thru	100885500	Viton Seal, Beveled Edge (5), 4 5/8"	100889025
Flange, 4 5/8", 3.00", Nonrotatable, Thru	100885501		
Flange, 4 5/8", Blank, Nonrotatable, Tapped	100885502		
Flange, 4 5/8", 3.00", Nonrotatable, Tapped	100885503		
Flange, 4 5/8", Blank, Rotatable, Thru	100885504		
Flange, 4 5/8", 3.00", Rotatable, Thru	100885505		
Flange, 4 5/8", Blank, Rotatable, Tapped	100885506		
Flange, 4 5/8", 3.00", Rotatable, Tapped	100885507		

