

# 1

## Flanges & Fittings



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Del-Seal™ CF metal seal flanges

### Features

- Del-Seal™ CF metal seal flange
- Conflat® compatible
- Genderless mating
- Rotatable and non-rotatable
- Tapped or clearance bolt holes
- Wire Seal flanges used for tubes larger than 14 inches diameter
- Double Sided flanges
- Reducing flanges
- Hybrid Adapters interconnect dissimilar flange systems

MDC established its standing in the vacuum components world after becoming one of the first licensed manufacturers of Varian's patented Conflat® metal-seal flange, known today to most MDC customers as the Del-Seal™ CF metal-seal flange.

### Del-Seal™ CF Metal Seal Flanges

The reliable sealing performance of MDC's Del-Seal™ CF flanges is a result of a unique seal design and geometry which "captures" a metal gasket material. When a flat OFE copper gasket is pressed between the conical sealing edges of two Del-Seal™ CF flanges, a lateral cold flow of the gasket material occurs. This cold flow is limited by a vertical flange wall or capture groove that is concentric to the sealing knife edge. Further material flow away from the seal area is severely limited and high interface pressures are developed. These pressures cause gasket material to fill minor surface imperfections and produce a highly reliable seal. At high temperatures, the "capturing" geometry maintains high pressures despite softening of the gaskets. Del-Seal™ CF flanges can be baked to 450°C and cooled to -200°C and are suitable for vacuum service levels of  $1 \times 10^{-13}$  Torr. They are ideally suited for the rigorous demands of ultrahigh vacuum environments and capable of maintaining seal integrity through high temperature excursions. Del-Seal™ CF flanges are 100% compatible with the equivalent Varian Conflat® metal seal flanges.

Del-Seal™ CF flanges are classified as genderless flanges, since the seal geometries on both mating flanges are identical. They are available in both rotatable and nonrotatable geometries with clearance or threaded bolt holes, and for standard tube sizes from .250 to 14.0 inches in diameter.

MDC discourages resealing a Del-Seal™ CF flange with a previously used metal gasket and strongly recommends the installation of a new metal gasket every time a flange is fastened. When flange fasteners are tightened to their specified sealing torques a gap will remain between the mating flanges, this is normal and desirable. Tightening the flanges metal-to-metal is not necessary to achieve a UHV hermetic seal.

OFE copper, which stands for "Oxygen Free Electronic or Electrolytic grade Copper", is the metal gasket material of choice for most UHV sealing applications. For special applications which preclude the use of pure copper, various metal gasket materials including nickel, aluminum and silver plated copper are also available.

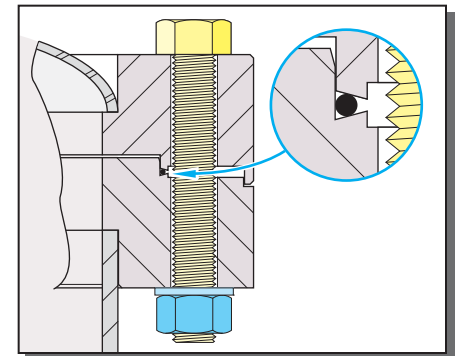
MDC can also provide specialized elastomer gaskets made of DuPont Dow Elastomers Viton® material. These can be used within existing UHV systems fitted with MDC Del-Seal™ CF flanges and allow frequent and repeated assembly and disassembly. These elastomer gaskets have rectangular cross sections and fit within the standard knife edge seal geometry of a Del-Seal™ CF metal seal flange. Note that the use of elastomer gasket seals in metal seal flanges will reduce the system's minimum and maximum temperatures and its vacuum ratings to -20°C, 150°C and  $1 \times 10^{-8}$  Torr, respectively. The torque required to make a leak tight seal with an elastomer gasket will be reduced to 7-10 lb-ft.

### Wire Seal Flanges

MDC Wire Seal Flanges provide a convenient method of metal-sealing large diameter vacuum chambers. These metal seal flanges pick up where the Del-Seal™ CF flanges leave off. They are available for tube sizes



Male and female wire seal flange set



Wire seal flange geometry

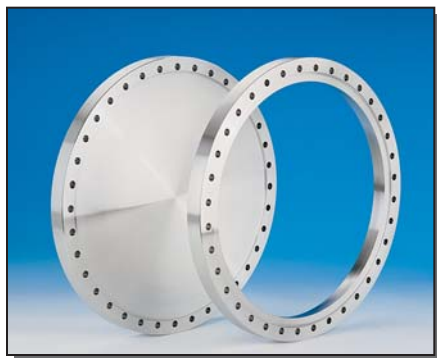
from 10 to 24 inch diameter, and only in a nonrotatable geometry. Because of their size, blank wire seal flanges are of significant weight. For applications restricted by weight limitations MDC offers blank wire-seal flanges with a dished-head construction which greatly reduces the flange's overall weight.

An .080 inch cross-section diameter OFE copper wire gasket is compressed between male and female mating flanges. The beveled geometry of the sealing surfaces confine the flow of the crushed gasket material, causing it to fill minor imperfections in the seal area. See the wire seal flange cross-section diagram at the bottom of the previous page. Applications for the use of wire-seal flanges include bell jars, vacuum furnaces and a variety of other ultrahigh vacuum enclosures. As with Del-Seal™ CF flanges, these too can be used with elastomer gaskets for high vacuum applications.

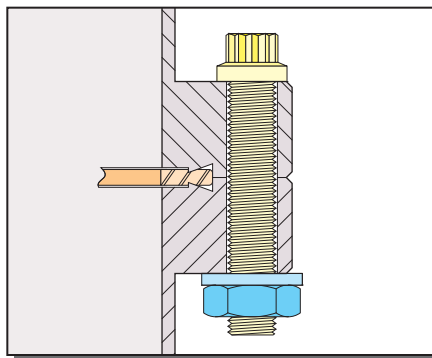
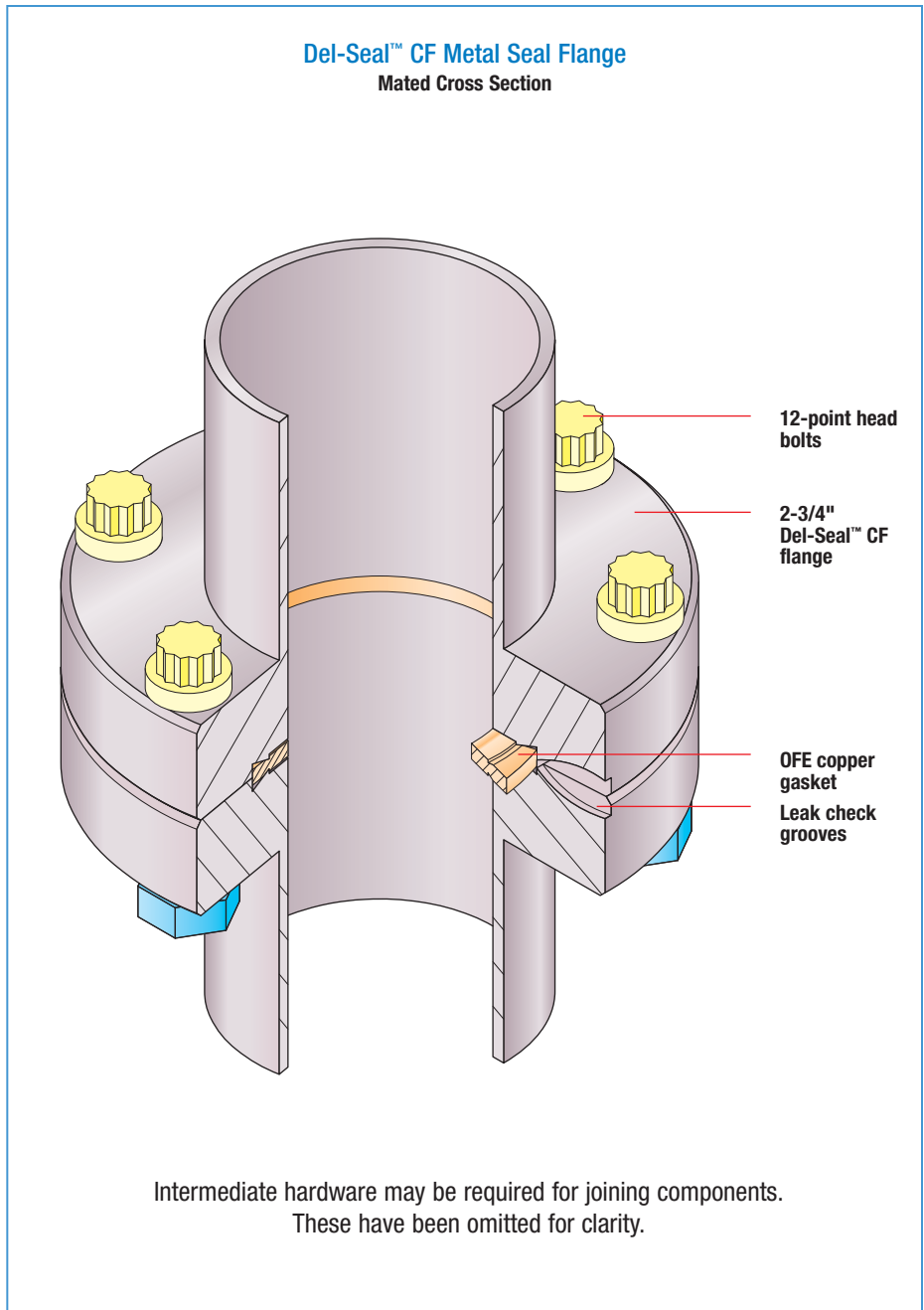
### Del-Seal™ CF Fittings

MDC Del-Seal™ CF fittings such as nipples, half nipples, reducer nipples, flexible nipples, elbows with 45° and 90° configurations, tees, reducer tees, crosses with four-, five- and six-way configurations, six-way cubes and multiport flange assemblies comprise the industry's largest selection of Del-Seal™ CF fitted vacuum components. If we do not have the product you seek, custom versions of most of these components can be quoted upon request.

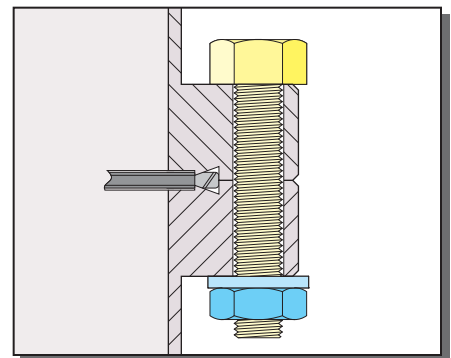
All dimensions in this catalog are given in inches unless specified otherwise.



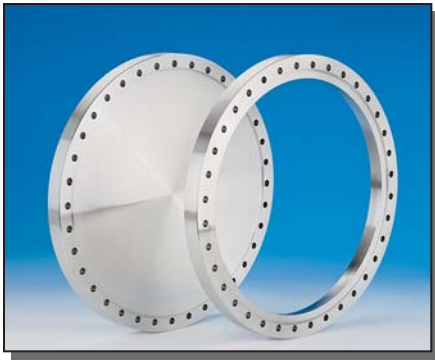
Del-Seal™ CF metal seal flange pair



Del-Seal™ CF metal gasket geometry  
12 point head bolt set shown



Del-Seal™ CF elastomer gasket geometry  
Hex head bolt set shown



Del-Seal™ CF metal seal flange

- Flange installation
- Nonrotatable & rotatable flanges

### Specifications

#### Material

Flanges	304ss
Gaskets	OFE Copper or Viton® elastomer
Bolts	300ss and silver plated
<hr/>	
Alternate material 18-8 SS bolts are supplied	

#### Fastening

Bolt head type	Hexagonal, socket or 12-point head	
Nut Type	Hexagonal or two hole plate nuts	
Bolt Size	Fractional Size	Torque
.160-32 UNC	8-32	7 lb-ft
.250-28 UNF	1/4-28	12 lb-ft
.312-24 UNF	5/16-24	15 lb-ft
.375-24 UNF	3/8-24	26 lb-ft
.500-20 UNF	1/2-20	33 lb-ft
.625-18 UNF	5/8-18	33 lb-ft
Elastomer seal, all sizes	7-10 lb-ft	

#### Vacuum Range

Del-Seal™ CF or Wire Seal	1x10 <sup>-13</sup> Torr
Elastomer seal	1x10 <sup>-8</sup> Torr

#### Temperature Range

Del-Seal™ CF or Wire Seal	-200°C to 450°C
Elastomer seal	Sustained: -20°C to 150°C
	Intermittent: 200°C

Standard specifications are for OFE copper metal seals; optional elastomer sealing specifications are stated for gaskets made of DuPont Dow Elastomers Viton®

### Flange Installation

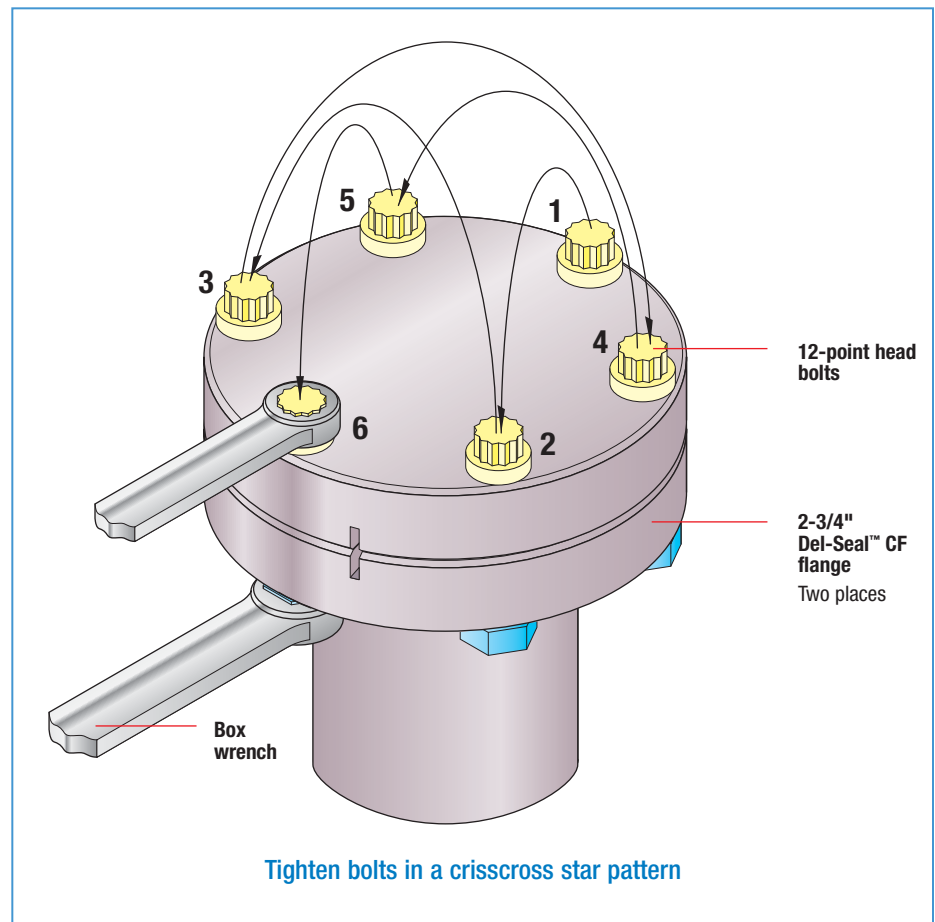
Using clean lint free gloves, place an MDC pre-cleaned OFE copper gasket against the knife edge seal of one of two standard Del-Seal™ CF flanges, preferably the flange most likely to hold and support the gasket from falling. With the gasket in place arrange mating flange with the desired bolt hole orientation. If flanges are fitted with leak test grooves, these should be aligned. With flanges aligned, insert proper size bolt and hand tighten. Washers are typically used on the nut side of the fastener assembly. Repeat this procedure with the remaining bolts.

Silver plated bolts or anti-seize thread lubricants are recommended for the fastening of all stainless steel hardware. This is especially true with tapped hole or blind-tapped hole mating Del-Seal™ CF flanges which will see high temperatures. Even at room temperatures, galling of non-lubricated stainless steel fasteners can lead to seizing and possible loss of a component. After hand tightening all bolts, support bolt and turn nut using two closed-end box wrenches. The tightening process must be

done gradually in 1/4 to 1/2 turn increments in a alternating crisscross pattern. Continue this incremental tightening until the desired torque ratings have been achieved. Tightening bolts in this fashion will insure a reliable seal with even gasket compression and deformation.

### Nonrotatable and Rotatable Flanges

Nonrotatable and rotatable flanges are typically used in combination for bolt alignment purposes. Nonrotatable flanges are often referred to as fixed flanges. A nonrotatable flange is constructed of a single machined piece. Once nonrotatable flanges are welded in place their fastening bolt holes are fixed in position. The industry standard for positioning fixed flange bolt holes is to have bolt holes straddle a vertical centerline. Flanges fitted with leak test grooves are welded so that the groove is positioned on that vertical centerline. A rotatable flange is constructed of two concentric or coaxial components, these are referred to as the receiver and the insert. The receiver, or outer ring, contains the fastening bolt holes while the insert is the blank or bored center piece



Tighten bolts in a crisscross star pattern

that contains the sealing knife edge and to which a mating tube is typically welded. The term “rotatable” pertains to the flange’s outer ring or receiver prior to the insertion of fasteners. The receiver is rotatable for the purpose of aligning bolt holes with fixed, nonrotatable mating flanges. Once the holes have been aligned and fasteners inserted, the flange is no longer rotatable. Fastening two rotatable flanges is not only difficult but also increases the possibility for damage to one or both of the mating flange knife edge seals. Caution should be exercised when fastening two rotatable flanges.

Del-Seal™ CF metal seal flanges are fitted with either clearance or threaded fastening bolt holes. Clearance holes are commonly referred to as through holes and threaded holes are commonly referred to as tapped holes. Tapped holes provide threads through the entire thickness of a flange. Exceptions to this include reducer flanges and cubes which are fitted with blind tapped holes. Blind tapped holes are drilled only part way through a flange and do not break through. Blind tapped holes are typically used where drilling through a component is not possible or desirable, like the direct tapping of a

chamber wall, where breaking through would provide a leak path through the vacuum walls.

All dimensions in this catalog are given in inches unless specified otherwise.



Wire Seal OFE Copper-seal flanges page 76



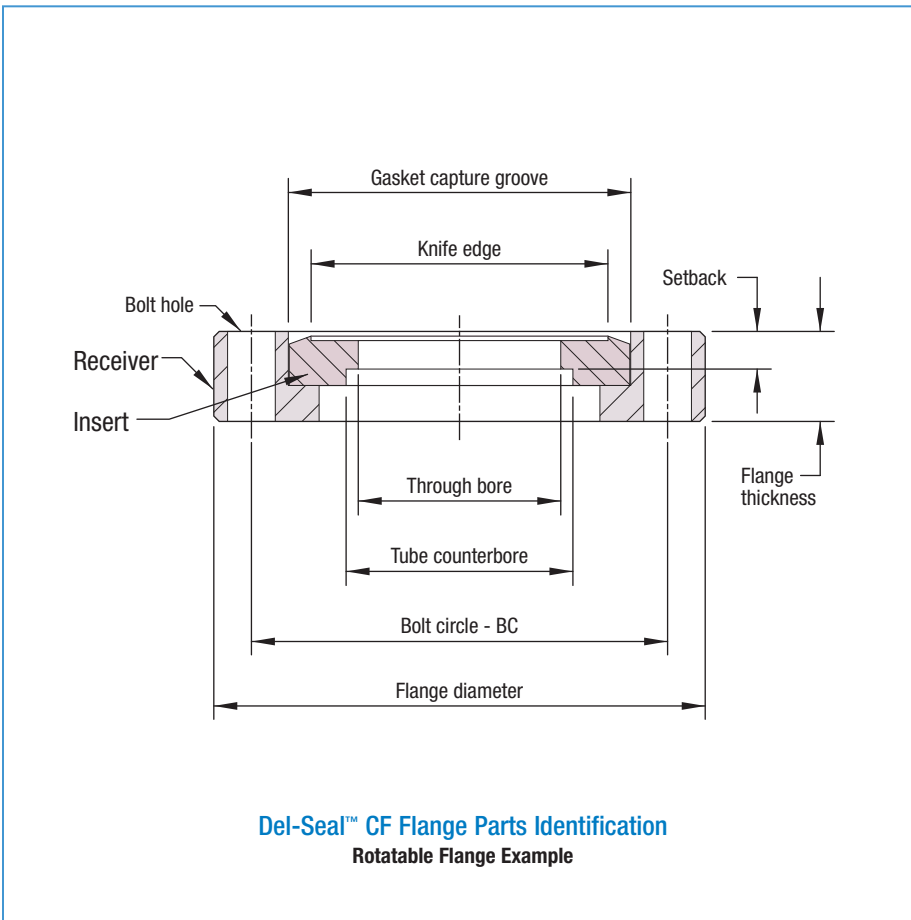
Del-Seal™ CF double sided flanges page 56



Hybrid adapters page 148



Del-Seal™ CF fittings page 62





**Nonrotatable**



**Rotatable**

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

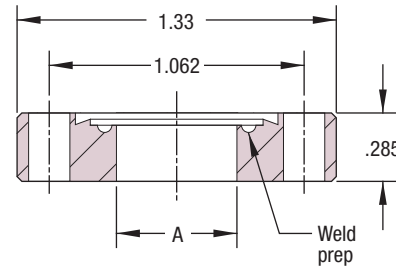
### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Socket head screws
Nut Type	Hexagonal or two hole plate nuts
Size	.160-32 UNC
Torque	7 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	.25 lb
<b>Dimensions</b>	1.33 OD x .625 ID maximum

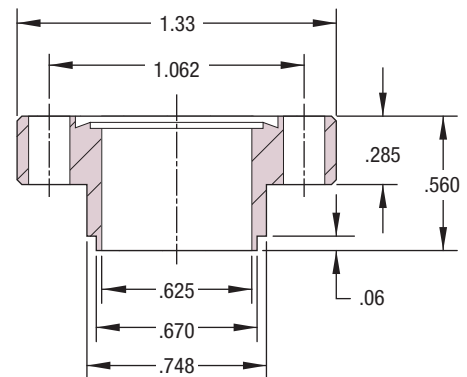
See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

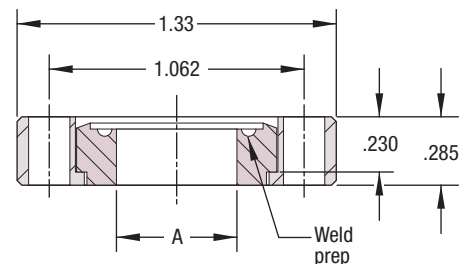
**Figure 1**



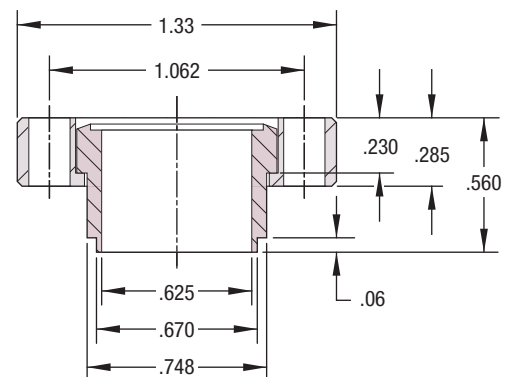
**Figure 2**



**Figure 3**

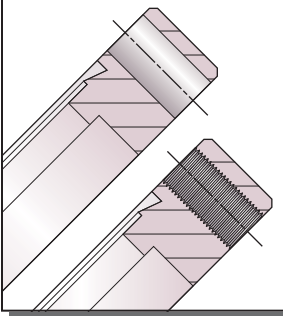


**Figure 4**



- Through hole flanges have 6 bolt holes drilled .172" diameter
- Tapped flanges have 6 bolt holes threaded 8-32
- Weld preps shown for small diameter, thin wall tube sizes

### Nonrotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	1/4	F133000	110000
1/4	CLEARANCE	1	.252	1/4	F133025	110001
3/8	CLEARANCE	1	.377	1/4	F133038	110002
1/2	CLEARANCE	1	.502	1/4	F133050	110003
3/4	CLEARANCE	2	.625	1/4	F133075	110004
BLANK	TAPPED	1	-	1/4	F133000T	130000
1/4	TAPPED	1	.252	1/4	F133025T	130001
3/8	TAPPED	1	.377	1/4	F133038T	130002
1/2	TAPPED	1	.502	1/4	F133050T	130003
3/4	TAPPED	2	.625	1/4	F133075T	130004

### Hardware



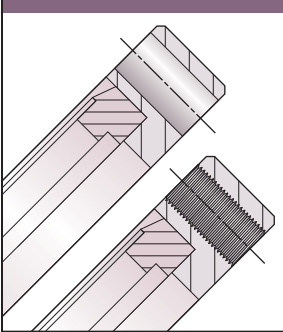
- Bolt Sets for clearance hole flanges include screws and nuts
- Bolt sets for tapped flanges include screws only

DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 0.64 I.D.	-	-	10	1/4	GK-075	191000
GASKET, VITON, 0.62 I.D.	-	-	5	1/4	GK-075V	191001
SOCKET HEAD SCREW	C	3/4	25	1/4	BA-075	190001
SOCKET HEAD SCREW	T	1/2	25	1/4	BA-050	190000
SOCKET HEAD SCREW	CUBE	1/2	36	1/2	BA-056	190155
SOCKET HEAD SCREW/PLATE NUT	C	3/4	24 / 12	1/4	BA-075-PN	190094
SOCKET HEAD, SILVER PLATED <sup>2</sup>	C	3/4	25	1/4	BA-075-SP	190037
SOCKET HEAD, SILVER PLATED <sup>2</sup>	T	1/2	25	1/4	BA-050-SP	190055
BALL WRENCH, HEX DRIVER, 8-32	-	-	1	1/4	WRENCH	540000
PLATE NUTS, 8-32	C	-	24	1/4	PN-133	190069
FLANGE COVER, PLASTIC	-	-	6	1/4	FC133	192020

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU075-6

<sup>2</sup> Silver plated screws only; nuts not silver plated

### Rotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	1/4	F133000R	100000
1/4	CLEARANCE	3	.252	1/4	F133025R	100001
3/8	CLEARANCE	3	.377	1/4	F133038R	100002
1/2	CLEARANCE	3	.502	1/4	F133050R	100003
3/4	CLEARANCE	4	.625	1/4	F133075R	100004
BLANK	TAPPED	3	-	1/4	F133000RT	120000
1/4	TAPPED	3	.252	1/4	F133025RT	120001
3/8	TAPPED	3	.377	1/4	F133038RT	120002
1/2	TAPPED	3	.502	1/4	F133050RT	120003
3/4	TAPPED	4	.625	1/4	F133075RT	120004



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets, metal / elastomer	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal
Size	.250-28 UNF
Torque	12 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	.50 lb
<b>Dimensions</b>	2.11 OD x .875 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

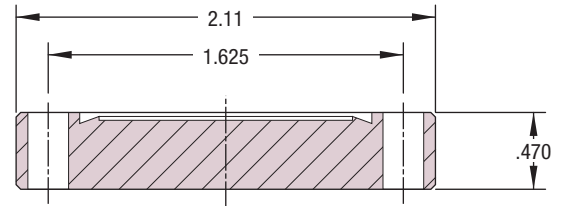


Figure 2

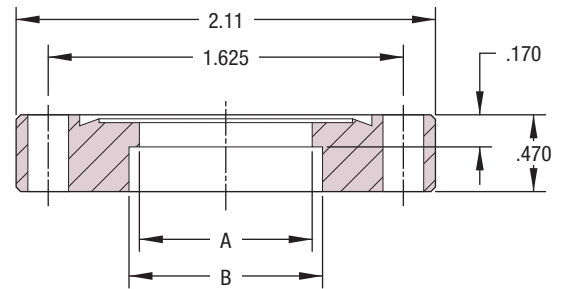


Figure 3

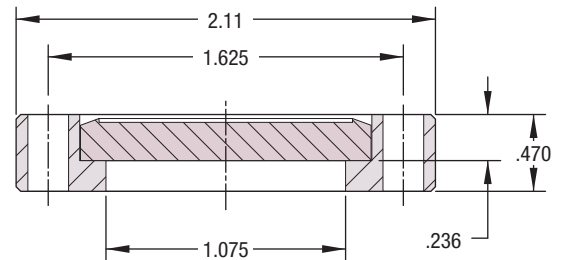
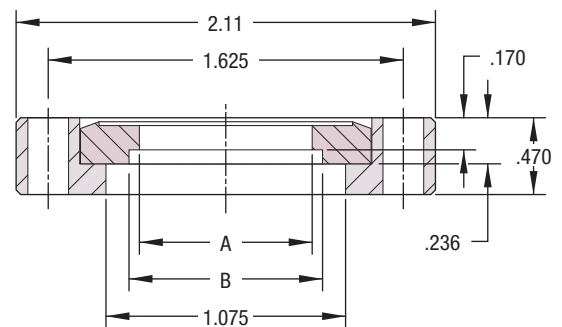
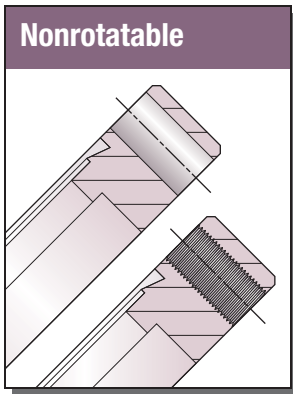


Figure 4



- Through hole flanges have 4 bolt holes drilled .265" diameter
- Tapped flanges have 4 bolt holes threaded .250-28





ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	1/2	F218000	110005
3/4	CLEARANCE	2	.690	.760	1/2	F218075	110006
1	CLEARANCE	2	.875	1.010	1/2	F218100	110007
BLANK	TAPPED	1	-	-	1/2	F218000T	130005
3/4	TAPPED	2	.690	.760	1/2	F218075T	130006
1	TAPPED	2	.875	1.010	1/2	F218100T	130007

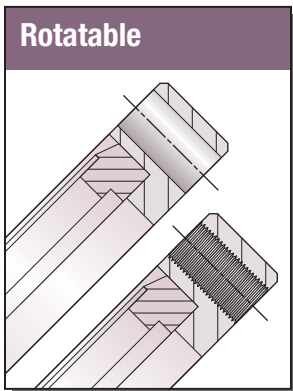


DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 1.00 I.D.	-	-	10	1/4	GK-100	191002
GASKET, VITON, 1.02 I.D.	-	-	5	1/4	GK-100V	191003
HEX HEAD BOLT	C	1-1/4	25	1	BA-150	190004
HEX HEAD BOLT	T	7/8	25	1	BA-085	190002
12-PT BOLT	C	1-1/4	25	1	BA-150-12	190040
12-PT BOLT	T	7/8	25	1	BA-085-12	190041
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	1-1/4	25	1	BA-150-12-SP	190061
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	7/8	25	1	BA-085-12-SP	190057
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001

<sup>1</sup> C = Clearance holes, T = Tapped holes

<sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	1/2	F218000R	100005
3/4	CLEARANCE	4	.690	.760	1/2	F218075R	100006
1	CLEARANCE	4	.875	1.010	1/2	F218100R	100007
BLANK	TAPPED	3	-	-	1/2	F218000RT	120005
3/4	TAPPED	4	.690	.760	1/2	F218075RT	120006
1	TAPPED	4	.875	1.010	1/2	F218100RT	120007



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal or two hole plate nuts
Size	.250-28 UNF
Torque	12 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	1 lb maximum
<b>Dimensions</b>	2.73 OD x .1.375 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

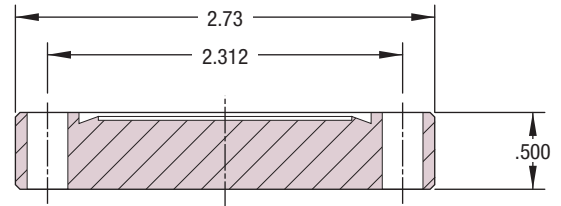


Figure 2

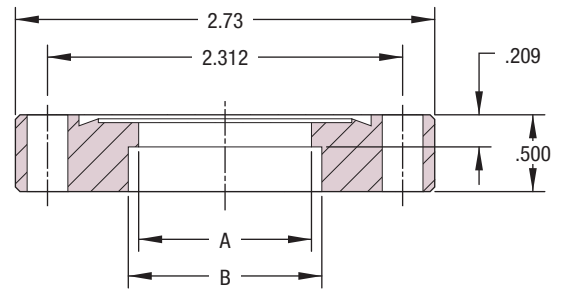


Figure 3

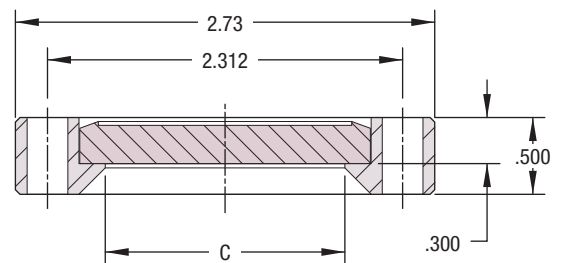
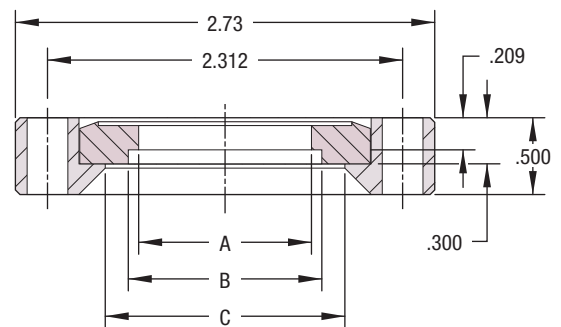
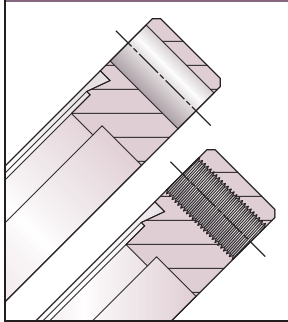


Figure 4



- Through hole flanges have 6 bolt holes drilled .265" diameter
- Tapped flanges have 6 bolt holes threaded .250-28

### Nonrotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	C	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	-	1	F275000	110008
1/4	CLEARANCE	2	-	.252	-	3/4	F275025	110009
1/2	CLEARANCE	2	-	.502	-	3/4	F275050	110010
3/4	CLEARANCE	2	.690	.760	-	3/4	F275075	110011
1	CLEARANCE	2	.875	1.010	-	3/4	F275100	110012
1-1/4	CLEARANCE	2	1.125	1.255	-	3/4	F275125	110013
1-1/2	CLEARANCE	2	1.375	1.510	-	3/4	F275150	110014
1-3/4	CLEARANCE	2	1.625	1.760	-	3/4	F275175	110052
BLANK	TAPPED	1	-	-	-	1	F275000T	130008
1/4	TAPPED	2	-	.252	-	3/4	F275025T	130009
1/2	TAPPED	2	-	.502	-	3/4	F275050T	130010
3/4	TAPPED	2	.690	.760	-	3/4	F275075T	130011
1	TAPPED	2	.875	1.010	-	3/4	F275100T	130012
1-1/4	TAPPED	2	1.125	1.255	-	3/4	F275125T	130013
1-1/2	TAPPED	2	1.375	1.510	-	3/4	F275150T	130014
1-3/4	TAPPED	2	1.625	1.760	-	3/4	F275175T	130094

### Hardware

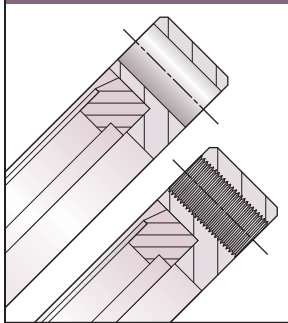


- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 1.45 I.D.	-	-	10	1/4	GK-150	191004
GASKET, COPPER, 1.53 I.D.	-	-	10	1/4	GK-175	191147
GASKET, COPPER, BLANK	-	-	10	1	GK-150S	191006
GASKET, VITON, 1.68 I.D.	-	-	5	1/4	GK-150V	191005
HEX HEAD BOLT	C	1-1/4	25	1	BA-150	190004
HEX HEAD BOLT	T	7/8	25	1	BA-085	190002
HEX HEAD BOLT / PLATE NUT	C	1-1/4	24 / 12	1	BA-150-PN	190093
12-PT BOLT	C	1-1/4	25	1	BA-150-12	190040
12-PT BOLT	T	7/8	25	1	BA-085-12	190041
12-PT BOLT	CUBE	7/8	36	1-1/2	BA-156-12	190156
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	1-1/4	25	1	BA-150-12-SP	190061
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	7/8	25	1	BA-085-12-SP	190057
12-PT BOLT / PLATE NUT	C	1-1/4	24 / 12	1	BA-150-12-PN	190049
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001
PLATE NUTS, .250-28	C	-	24	1/4	PN-275	190070
FLANGE COVER, PLASTIC	-	-	6	1/4	FC275	192022

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU150-6 <sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

### Rotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	C	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	1.56	1	F275000R	100008
1/4	CLEARANCE	4	-	.252	1.56	3/4	F275025R	100009
1/2	CLEARANCE	4	-	.502	1.56	3/4	F275050R	100010
3/4	CLEARANCE	4	.690	.760	1.56	3/4	F275075R	100011
1	CLEARANCE	4	.875	1.010	1.56	3/4	F275100R	100012
1-1/4	CLEARANCE	4	1.125	1.255	1.56	3/4	F275125R	100013
1-1/2	CLEARANCE	4	1.375	1.510	1.56	3/4	F275150R	100014
1-3/4	CLEARANCE	4	1.625	1.760	1.78	3/4	F275175R	100043
BLANK	TAPPED	3	-	-	1.56	1	F275000RT	120008
1/4	TAPPED	4	-	.252	1.56	3/4	F275025RT	120009
1/2	TAPPED	4	-	.502	1.56	3/4	F275050RT	120010
3/4	TAPPED	4	.690	.760	1.56	3/4	F275075RT	120011
1	TAPPED	4	.875	1.010	1.56	3/4	F275100RT	120012
1-1/4	TAPPED	4	1.125	1.255	1.56	3/4	F275125RT	120013
1-1/2	TAPPED	4	1.375	1.510	1.56	3/4	F275150RT	120014
1-3/4	TAPPED	4	1.625	1.760	1.78	3/4	F275175RT	120093



Nonrotatable



Rotatable

## Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

## Specifications

### Material

Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated

### Fastening

Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal or two hole plate nuts
Size	.312-24 UNF
Torque	15 lb-ft

**Vacuum Range**  $1 \times 10^{-13}$  Torr

**Temperature Range** -200°C to 450°C

**Weight** 1.5 lb maximum

**Dimensions** 3.37 OD x 1.875 ID maximum

See page 26 for elastomer specifications

## ULTRAHIGH VACUUM SERIES

Figure 1

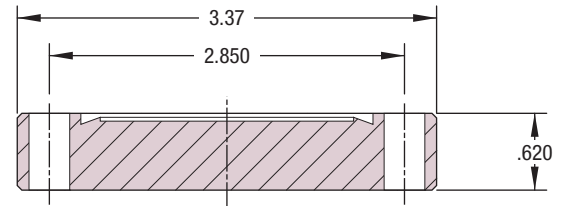


Figure 2

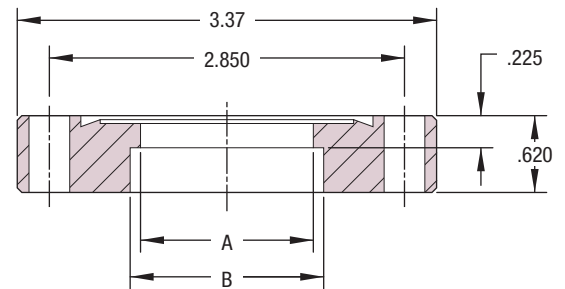


Figure 3

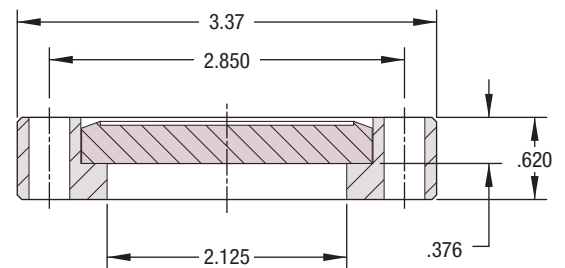
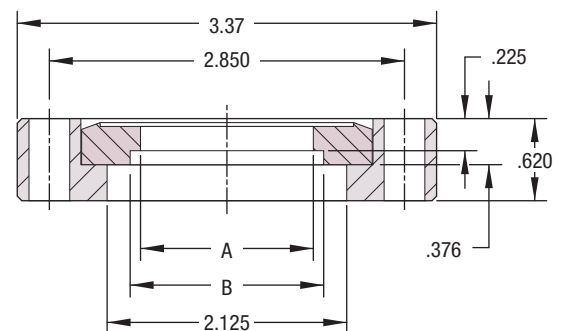
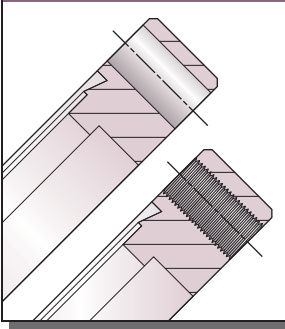


Figure 4



- Through hole flanges have 8 bolt holes drilled .332" diameter
- Tapped flanges have 8 bolt holes threaded .312-24

### Nonrotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	1-1/2	F338000	110015
1-1/2	CLEARANCE	2	1.375	1.510	1	F338150	110016
2	CLEARANCE	2	1.875	2.010	1	F338200	110017
BLANK	TAPPED	1	-	-	1-1/2	F338000T	130015
1-1/2	TAPPED	2	1.375	1.510	1	F338150T	130016
2	TAPPED	2	1.875	2.010	1	F338200T	130017

### Hardware

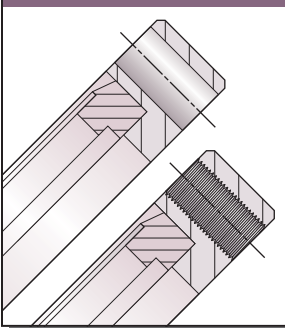


- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 2.01 I.D.	-	-	10	1/2	GK-200	191007
GASKET, VITON, 2.19 I.D.	-	-	1	1/4	GK-200V	191008
HEX HEAD BOLT	C	1-3/4	25	2	BA-180	190006
HEX HEAD BOLT	T	1-1/4	25	2	BA-125	190003
HEX HEAD BOLT / PLATE NUT	C	1-3/4	32 / 16	2	BA-180-PN	190095
12-PT BOLT	C	1-3/4	25	2	BA-180-12	190043
12-PT BOLT	T	1-1/4	25	2	BA-125-12	190044
12-PT BOLT	CUBE	1	48	3	BA-206-12	190157
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	1-3/4	25	2	BA-180-12-SP	190062
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	1-1/4	25	2	BA-125-12-SP	190058
12-PT BOLT / PLATE NUT	C	1-3/4	32 / 16	2	BA-180-12-PN	190050
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001
PLATE NUTS, .312-24	C	-	24	1/4	PN-338	190071
FLANGE COVER, PLASTIC	-	-	6	1/4	FC338	192023

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU200-6 <sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

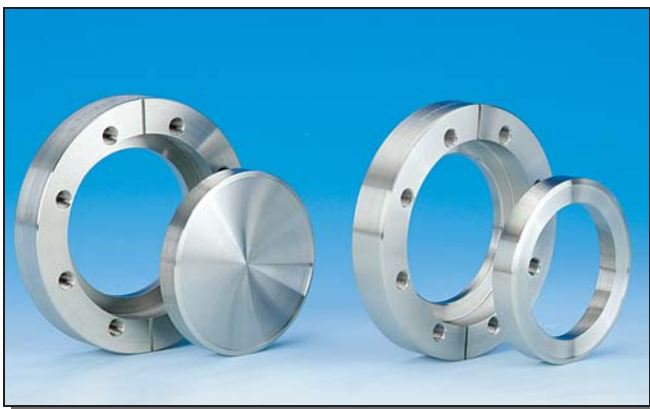
### Rotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	1-1/2	F338000R	100015
1-1/2	CLEARANCE	4	1.375	1.510	1	F338150R	100016
2	CLEARANCE	4	1.875	2.010	1	F338200R	100017
BLANK	TAPPED	3	-	-	1-1/2	F338000RT	120015
1-1/2	TAPPED	4	1.375	1.510	1	F338150RT	120016
2	TAPPED	4	1.875	2.010	1	F338200RT	120017



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal or two hole plate nuts
Size	.312-24 UNF
Torque	15 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	3 lb maximum
<b>Dimensions</b>	4.47 OD x 2.510 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

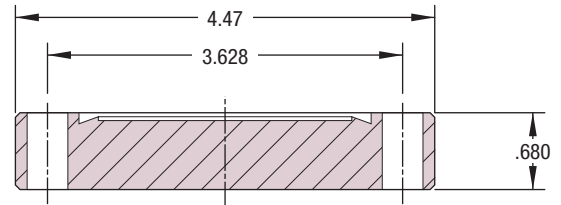


Figure 2

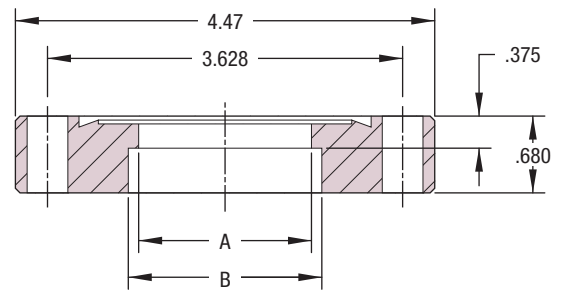


Figure 3

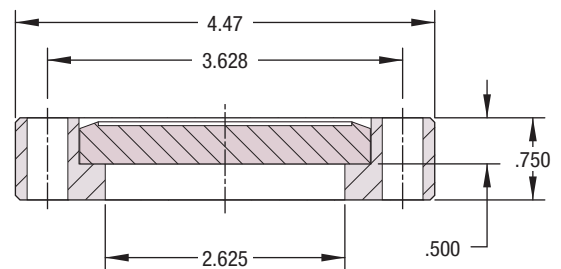
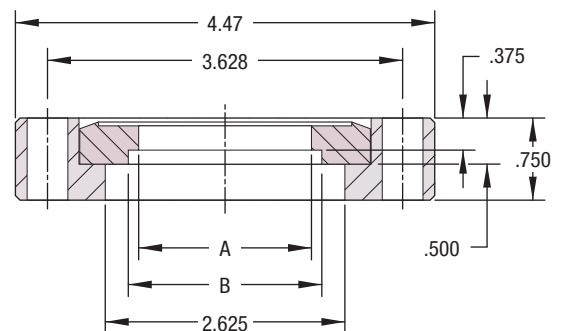
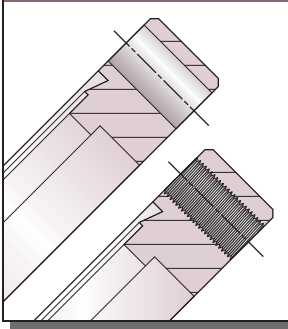


Figure 4



- Through hole flanges have 8 bolt holes drilled .332" diameter
- Tapped flanges have 8 bolt holes threaded .312-24

### Nonrotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	3	F450000	110018
1-1/2	CLEARANCE	2	1.375	1.510	2-1/2	F450150	110019
2	CLEARANCE	2	1.875	2.010	2	F450200	110020
2-1/2	CLEARANCE	2	2.375	2.510	2	F450250	110021
BLANK	TAPPED	1	-	-	3	F450000T	130018
1-1/2	TAPPED	2	1.375	1.510	2-1/2	F450150T	130019
2	TAPPED	2	1.875	2.010	2	F450200T	130020
2-1/2	TAPPED	2	2.375	2.510	2	F450250T	130021

### Hardware

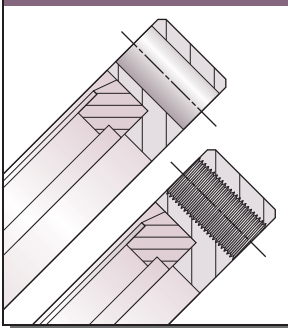


- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 2.51 I.D.	-	-	10	1/2	GK-250	191009
GASKET, VITON, 3.02 I.D.	-	-	1	1/4	GK-250V	191010
HEX HEAD BOLT	C	2	25	2	BA-200	190007
HEX HEAD BOLT	T	1-1/4	25	2	BA-125	190003
HEX HEAD BOLT / PLATE NUT	C	2	32 / 16	2	BA-200-PN	190096
12-PT BOLT	C	2	25	2	BA-200-12	190045
12-PT BOLT	T	1-1/4	25	2	BA-125-12	190044
12-PT BOLT	CUBE	1-1/8	48	4	BA-256-12	190158
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	2	25	2	BA-200-12-SP	190063
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	1-1/4	25	2	BA-125-12-SP	190058
12-PT BOLT / PLATE NUT	C	2	32 / 16	2	BA-200-12-PN	190051
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001
PLATE NUTS, .312-24	C	-	24	1/4	PN-450	190072
FLANGE COVER, PLASTIC	-	-	6	1/4	FC450	192024

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU250-6 <sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

### Rotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	3	F450000R	100018
1-1/2	CLEARANCE	4	1.375	1.510	2-1/2	F450150R	100019
2	CLEARANCE	4	1.875	2.010	2	F450200R	100020
2-1/2	CLEARANCE	4	2.375	2.510	2	F450250R	100021
BLANK	TAPPED	3	-	-	3	F450000RT	120018
1-1/2	TAPPED	4	1.375	1.510	2-1/2	F450150RT	120019
2	TAPPED	4	1.875	2.010	2	F450200RT	120020
2-1/2	TAPPED	4	2.375	2.510	2	F450250RT	120021



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

#### Material

Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated

#### Fastening

Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal or two hole plate nuts
Size	.312-24 UNF
Torque	15 lb-ft

**Vacuum Range**  $1 \times 10^{-13}$  Torr

**Temperature Range** -200°C to 450°C

**Weight** 3.5 lb maximum

**Dimensions** 4.62 OD x 2.875 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

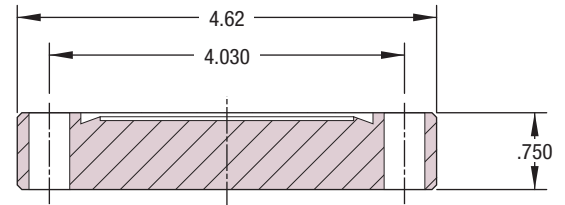


Figure 2

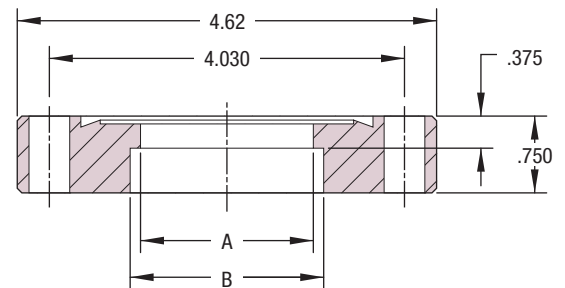


Figure 3

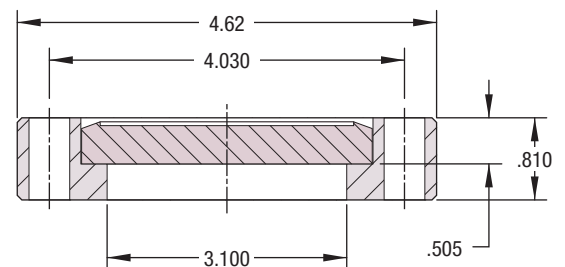
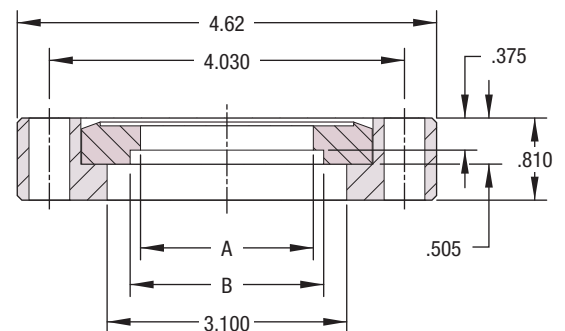
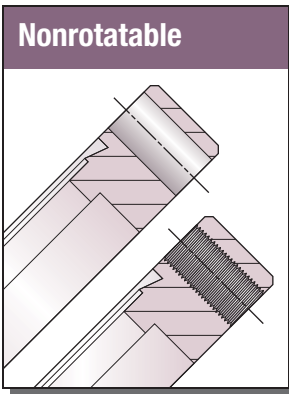


Figure 4



- Through hole flanges have 10 bolt holes drilled .332" diameter
- Tapped flanges have 10 bolt holes threaded .312-24





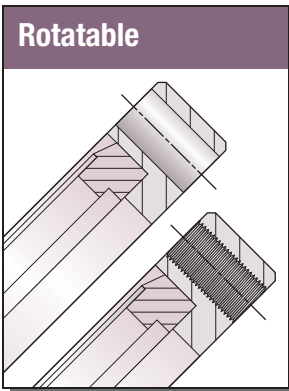
ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	3-1/2	F458000	110022
2-1/2	CLEARANCE	2	2.375	2.510	2-1/2	F458250	110023
3	CLEARANCE	2	2.875	3.010	2	F458300	110024
BLANK	TAPPED	1	-	-	3-1/2	F458000T	130022
2-1/2	TAPPED	2	2.375	2.510	2-1/2	F458250T	130023
3	TAPPED	2	2.875	3.010	2	F458300T	130024



- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

DESCRIPTION	BOLT <sup>1</sup> HOLE	FLANGE <sup>2</sup> GEOMETRY	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 3.01 I.D.	-	-	-	10	1	GK-300	191011
GASKET, VITON, 3.36 I.D.	-	-	-	1	1/4	GK-300V	191012
HEX HEAD BOLT	C	NR	2	25	2	BA-200	190007
HEX HEAD BOLT	C	R	2-1/4	25	2	BA-300	190008
HEX HEAD BOLT	T	BOTH	1-1/4	25	2	BA-125	190003
HEX HEAD BOLT/PLATE NUT	C	BOTH	2-1/4	40/20	2	BA-462-PN	190182
12-PT BOLT	C	NR	2	25	2	BA-200-12	190045
12-PT BOLT	C	R	2-1/4	25	2	BA-300-12	190046
12-PT BOLT	T	BOTH	1-1/4	25	2	BA-125-12	190044
12-PT BOLT, SILVER PLATED <sup>3</sup>	C	NR	2	25	2	BA-200-12-SP	190063
12-PT BOLT, SILVER PLATED <sup>3</sup>	C	R	2-1/4	25	2	BA-300-12-SP	190064
12-PT BOLT, SILVER PLATED <sup>3</sup>	T	BOTH	1-1/4	25	2	BA-125-12-SP	190058
12-PT BOLT/PLATE NUT	C	BOTH	2-1/4	40/20	2	BA-462-12-PN	190184
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	-	1	1/4	WRENCH	540001
PLATE NUTS, .312-24	C	BOTH	-	24	1/4	PN462	190180
FLANGE COVER, PLASTIC	-	-	-	6	1/2	FC458	192025

<sup>1</sup> C = Clearance holes, T = Tapped holes <sup>2</sup> NR = Nonrotatable, R = Rotatable <sup>3</sup> Silver plated bolts only; nuts and washers not silver plated



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	3-1/2	F458000R	100022
2-1/2	CLEARANCE	4	2.375	2.510	2-1/2	F458250R	100023
3	CLEARANCE	4	2.875	3.010	2	F458300R	100024
BLANK	TAPPED	3	-	-	3-1/2	F458000RT	120022
2-1/2	TAPPED	4	2.375	2.510	2-1/2	F458250RT	120023
3	TAPPED	4	2.875	3.010	2	F458300RT	120024



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal or two hole plate nuts
Size	.312-24 UNF
Torque	15 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	5.5 lb maximum
<b>Dimensions</b>	5.97 OD x 3.810 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

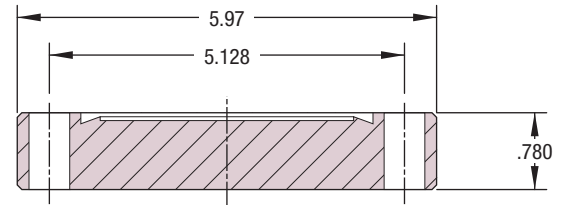


Figure 2

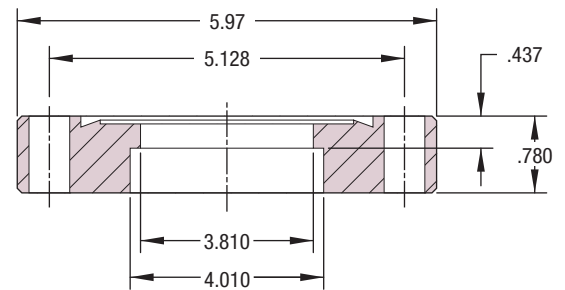


Figure 3

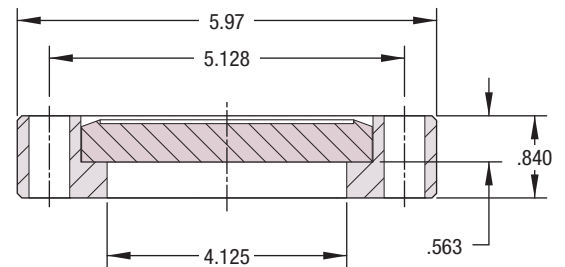
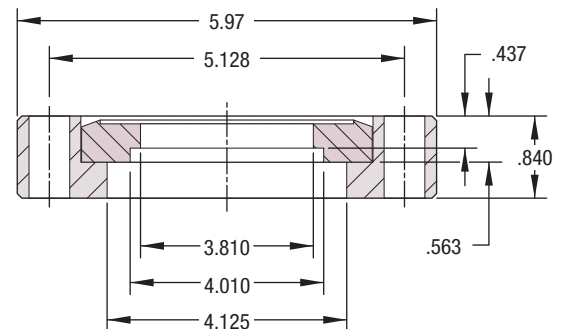
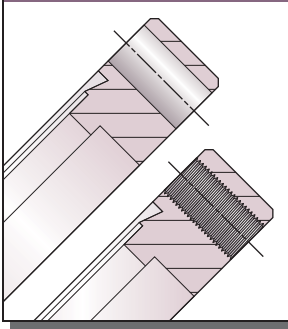


Figure 4



- Through hole flanges have 16 bolt holes drilled .332" diameter
- Tapped flanges have 16 bolt holes threaded .312-24

### Nonrotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	5-1/2	F600000	110025
4	CLEARANCE	2	3.810	4.010	3-1/2	F600400	110026
BLANK	TAPPED	1	-	-	5-1/2	F600000T	130025
4	TAPPED	2	3.810	4.010	3-1/2	F600400T	130026

### Hardware



- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

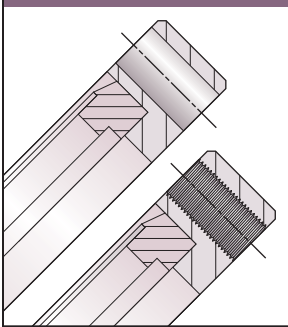
DESCRIPTION	BOLT <sup>1</sup> HOLE	FLANGE <sup>2</sup> GEOMETRY	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 4.01 I.D.	-	-	-	10	1-1/2	GK-400	191013
GASKET, VITON, 4.51 I.D.	-	-	-	1	1/4	GK-400V	191014
HEX HEAD BOLT	C	NR	2	25	2	BA-200	190007
HEX HEAD BOLT	C	R	2-1/4	25	2	BA-300	190008
HEX HEAD BOLT	T	BOTH	1-1/4	25	2	BA-125	190003
HEX HEAD BOLT / PLATE NUT	C	BOTH	2-1/4	32 / 16	2	BA-301-PN	190097
12-PT BOLT	C	NR	2	25	2	BA-200-12	190045
12-PT BOLT	C	R	2-1/4	25	2	BA-300-12	190046
12-PT BOLT	T	BOTH	1-1/4	25	2	BA-125-12	190044
12-PT BOLT	CUBE	NR	1-1/4	96	8	BA-406-12	190159
12-PT BOLT, SILVER PLATED <sup>3</sup>	C	NR	2	25	2	BA-200-12-SP	190063
12-PT BOLT, SILVER PLATED <sup>3</sup>	C	R	2-1/4	25	2	BA-300-12-SP	190064
12-PT BOLT, SILVER PLATED <sup>3</sup>	T	BOTH	1-1/4	25	2	BA-125-12-SP	190058
12-PT BOLT / PLATE NUT	C	BOTH	2-1/4	32 / 16	2	BA-301-12-PN	190053
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	-	1	1/4	WRENCH	540001
PLATE NUTS, .312-24	C	BOTH	-	24	1/4	PN-600	190073
FLANGE COVER, PLASTIC	-	-	-	6	1/2	FC600	192026

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU400-6

<sup>2</sup> NR = Nonrotatable, R = Rotatable

<sup>3</sup> Silver plated bolts only; nuts and washers not silver plated

### Rotatable



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	5-1/2	F600000R	100025
4	CLEARANCE	4	3.810	4.010	3-1/2	F600400R	100026
BLANK	TAPPED	3	-	-	5-1/2	F600000RT	120025
4	TAPPED	4	3.810	4.010	3-1/2	F600400RT	120026



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal
Size	.312-24 UNF
Torque	15 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	8 lb maximum
<b>Dimensions</b>	6.75 OD x 4.870 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

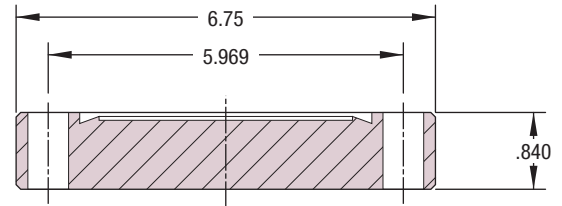


Figure 2

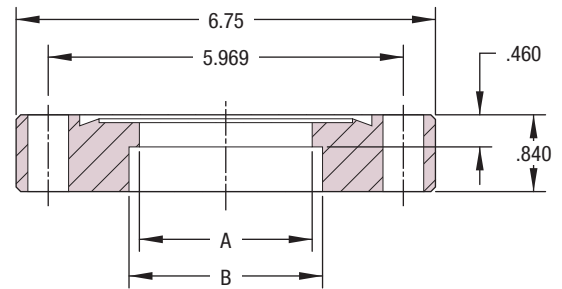


Figure 3

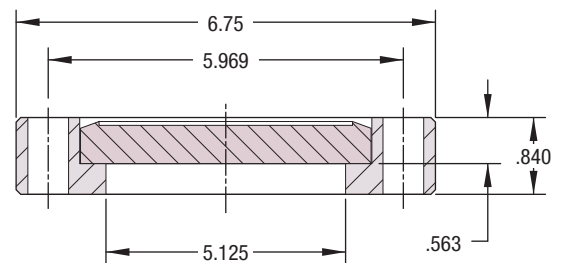
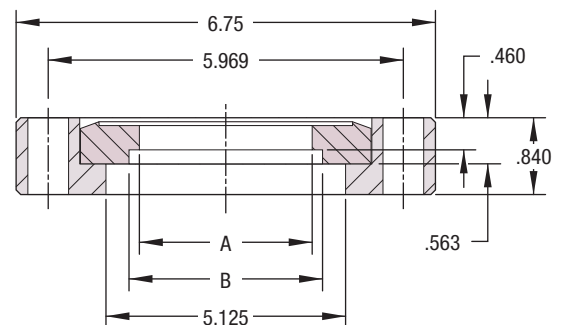
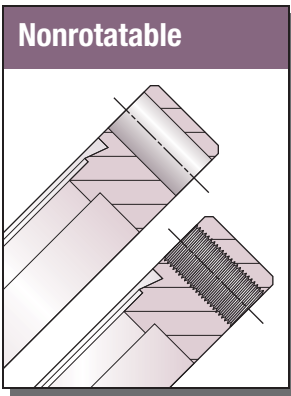


Figure 4



- Through hole flanges have 18 bolt holes drilled .332" diameter
- Tapped flanges have 18 bolt holes threaded .312-24



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	8	F675000	110027
4	CLEARANCE	2	3.810	4.010	5	F675400	110028
5	CLEARANCE	2	4.870	5.010	3-1/2	F675500	110029
BLANK	TAPPED	1	-	-	8	F675000T	130027
4	TAPPED	2	3.810	4.010	5	F675400T	130028
5	TAPPED	2	4.870	5.010	3-1/2	F675500T	130029

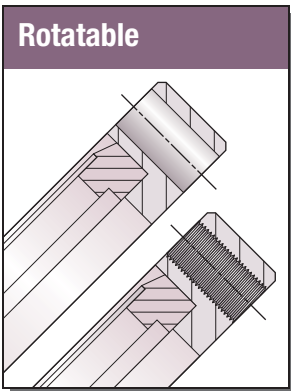


DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 5.01 I.D.	-	-	10	1-1/2	GK-500	191015
GASKET, VITON, 5.34 I.D.	-	-	1	1/4	GK-500V	191016
HEX HEAD BOLT	C	2-1/4	25	2	BA-300	190008
HEX HEAD BOLT	T	1-1/4	25	2	BA-125	190003
12-PT BOLT	C	2-1/4	25	2	BA-300-12	190046
12-PT BOLT	T	1-1/4	25	2	BA-125-12	190044
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	2-1/4	25	2	BA-300-12-SP	190064
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	1-1/4	25	2	BA-125-12-SP	190058
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001

<sup>1</sup> C = Clearance holes, T = Tapped holes

<sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

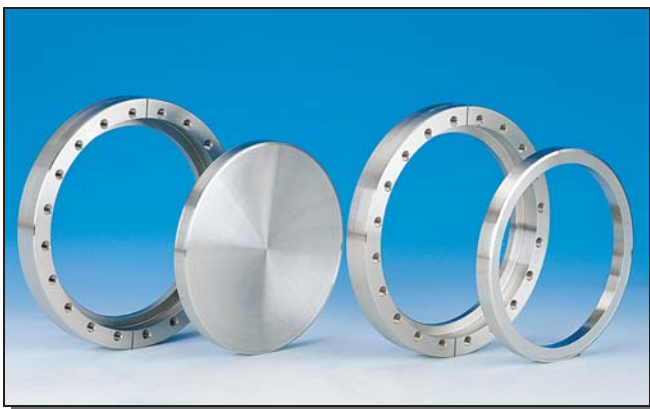
- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	8	F675000R	100027
4	CLEARANCE	4	3.810	4.010	5	F675400R	100028
5	CLEARANCE	4	4.870	5.010	3-1/2	F675500R	100029
BLANK	TAPPED	3	-	-	8	F675000RT	120027
4	TAPPED	4	3.810	4.010	5	F675400RT	120028
5	TAPPED	4	4.870	5.010	3-1/2	F675500RT	120029



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal or two hole plate nuts
Size	.312-24 UNF
Torque	15 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	12 lb maximum
<b>Dimensions</b>	7.97 OD x 5.812 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

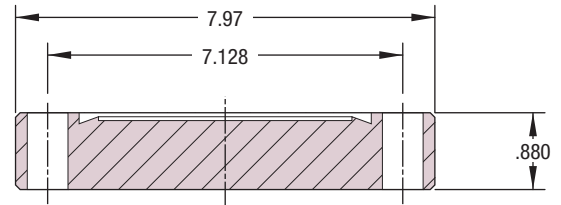


Figure 2

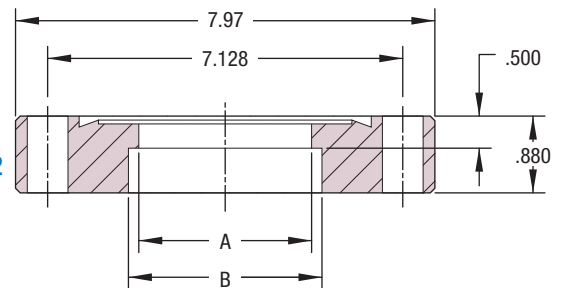


Figure 3

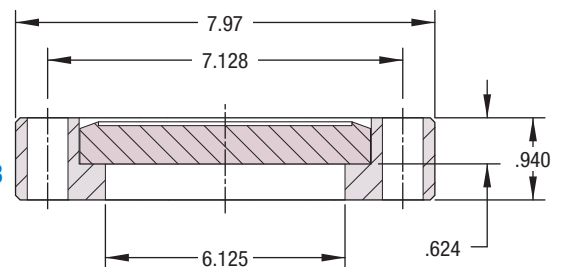
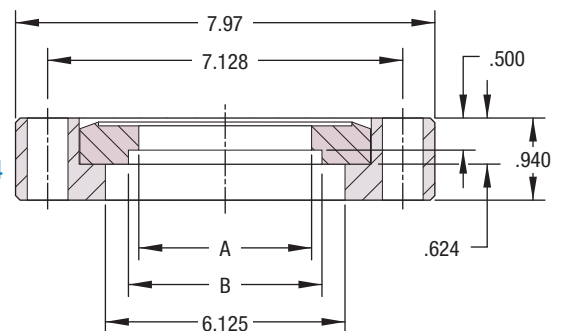
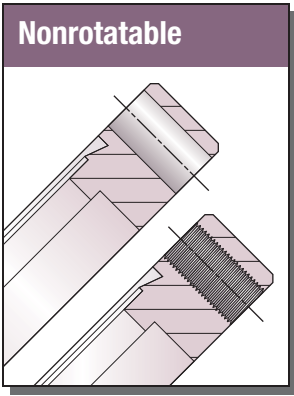


Figure 4



- Through hole flanges have 20 bolt holes drilled .332" diameter
- Tapped flanges have 20 bolt holes threaded .312-24



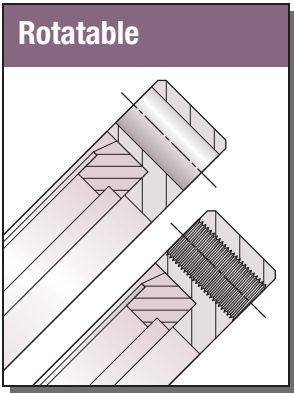
ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	12	F800000	110030
6	CLEARANCE	2	5.812	6.020	5-1/2	F800600	110031
BLANK	TAPPED	1	-	-	12	F800000T	130030
6	TAPPED	2	5.812	6.020	5-1/2	F800600T	130031



- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 6.01 I.D.	-	-	10	2	GK-600	191017
GASKET, VITON, 6.51 I.D.	-	-	1	1/4	GK-600V	191018
HEX HEAD BOLT	C	2-1/4	25	2	BA-300	190008
HEX HEAD BOLT	T	1-3/4	25	2	BA-600	190010
HEX HEAD BOLT / PLATE NUT	C	2-1/4	40 / 20	2	BA-300-PN	190098
12-PT BOLT	C	2-1/4	25	2	BA-300-12	190046
12-PT BOLT	T	1-3/4	25	2	BA-600-12	190047
12-PT BOLT	CUBE	1-1/4	120	10	BA-606-12	190160
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	2-1/4	25	2	BA-300-12-SP	190064
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	1-3/4	25	2	BA-600-12-SP	190059
12-PT BOLT / PLATE NUT	C	2-1/4	40 / 20	2	BA-300-12-PN	190052
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001
PLATE NUTS, .312-24	C	-	24	1/4	PN-800	190074
FLANGE COVER, PLASTIC	-	-	1	1/4	FC800	192007

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU600-6 <sup>2</sup> Silver plated bolts only; nuts and washers not silver plated



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	12	F800000R	100030
6	CLEARANCE	4	5.812	6.020	5-1/2	F800600R	100031
BLANK	TAPPED	3	-	-	12	F800000RT	120030
6	TAPPED	4	5.812	6.020	5-1/2	F800600RT	120031



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or 12-point head
Nut Type	Hexagonal
Size	.312-24 UNF
Torque	15 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	20 lb maximum
<b>Dimensions</b>	9.97 OD x 7.812 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

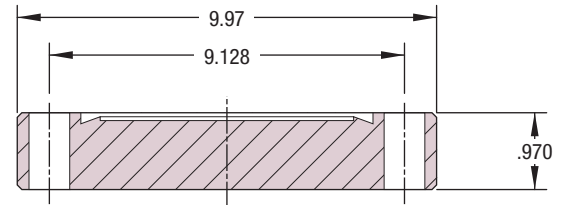


Figure 2

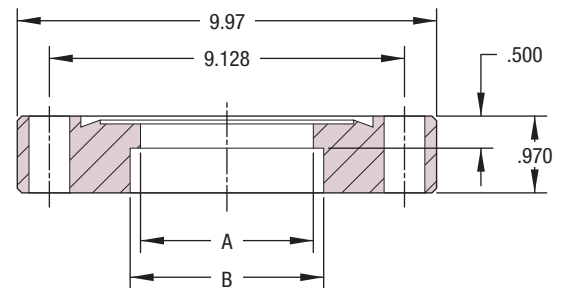


Figure 3

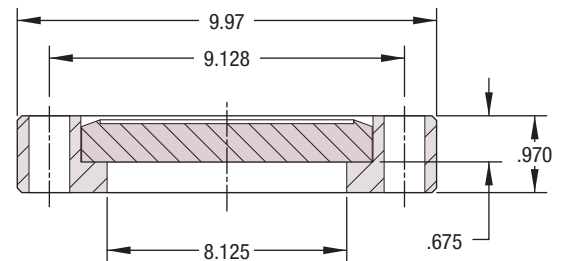
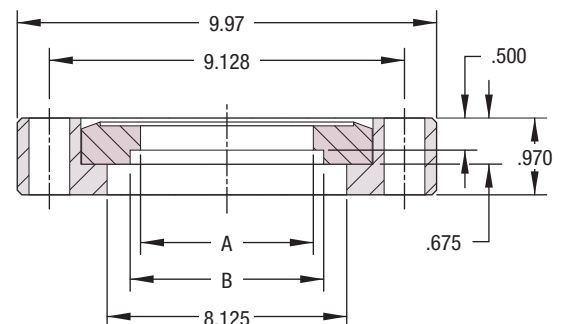
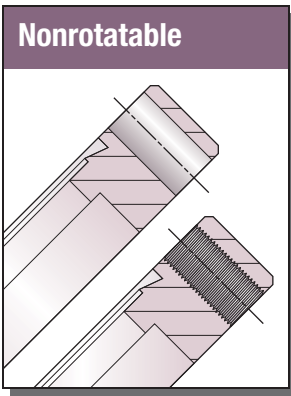


Figure 4



- Through hole flanges have 24 bolt holes drilled .332" diameter
- Tapped flanges have 24 bolt holes threaded .312-24





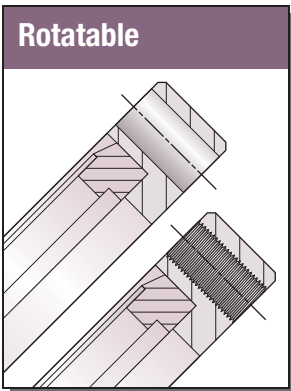
ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	20	F1000000	110032
8	CLEARANCE	2	7.812	8.020	7-1/2	F1000800	110033
BLANK	TAPPED	1	-	-	20	F1000000T	130032
8	TAPPED	2	7.812	8.020	7-1/2	F1000800T	130033



- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers

DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 8.00 I.D.	-	-	10	3	GK-800	191019
GASKET, VITON, 8.47 I.D.	-	-	1	1/4	GK-800V	191020
HEX HEAD BOLT	C	2-1/2	25	2	BA-800	190011
HEX HEAD BOLT	T	1-3/4	25	2	BA-600	190010
12-PT BOLT	C	2-1/2	25	2	BA-800-12	190048
12-PT BOLT	T	1-3/4	25	2	BA-600-12	190047
12-PT BOLT	CUBE	1-1/4	144	12	BA-806-12	190161
12-PT BOLT, SILVER PLATED <sup>2</sup>	C	2-1/2	25	2	BA-800-12-SP	190067
12-PT BOLT, SILVER PLATED <sup>2</sup>	T	1-3/4	25	2	BA-600-12-SP	190059
12-PT BOX WRENCH, 1/4" x 5/16"	-	-	1	1/4	WRENCH	540001
FLANGE COVER, PLASTIC	-	-	1	1/2	FC1000	192008

<sup>1</sup> C = Clearance holes, T = Tapped holes, CUBE = Tapped holes on CU800-6 <sup>2</sup> Silver plated bolts only; nuts and washers not silver plated



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	20	F1000000R	100032
8	CLEARANCE	4	7.812	8.020	7-1/2	F1000800R	100033
BLANK	TAPPED	3	-	-	20	F1000000RT	120032
8	TAPPED	4	7.812	8.020	7-1/2	F1000800RT	120033



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper gaskets
- Tapped or clearance bolt holes
- Varian and Balzers compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal head
Nut Type	Hexagonal
Size	.312-24 UNF
Torque	15 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight</b>	40 lb maximum
<b>Dimensions</b>	12.00 OD x 10.00 ID maximum

### ULTRAHIGH VACUUM SERIES

Figure 1

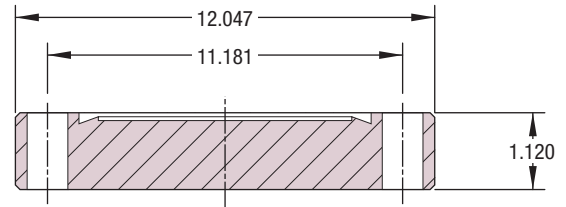


Figure 2

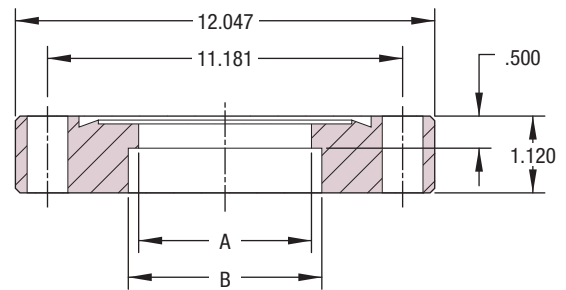


Figure 3

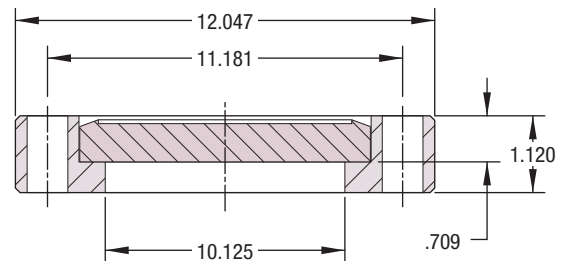
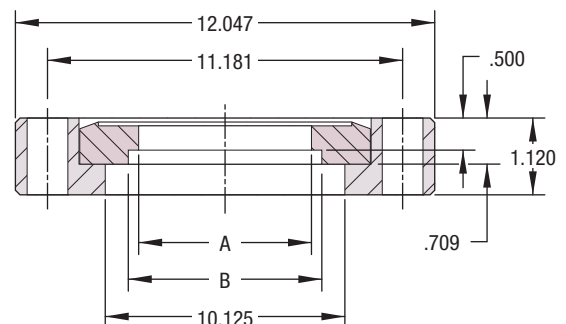
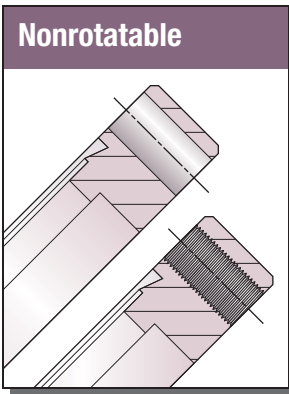


Figure 4



- Through hole flanges have 32 bolt holes drilled .332" diameter
- Tapped flanges have 32 bolt holes threaded .312-24



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	34	F1200000	110058
10	CLEARANCE	2	9.750	10.020	10	F12001000	110059
BLANK	TAPPED	1	-	-	34	F1200000T	130092
10	TAPPED	2	9.750	10.020	10	F12001000T	130093

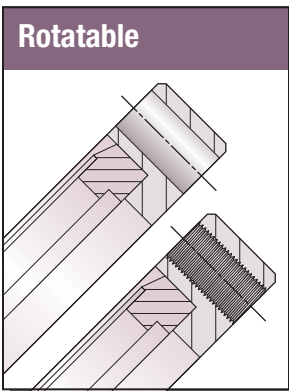


DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 10.00 I.D.	-	-	10	2	GK-1200	191094
GASKET, COPPER, 10.00 I.D.	-	-	1	1/4	GK-1200I	191070
HEX HEAD BOLT	C	3	32	1-1/2	BA-1200	190162
HEX HEAD BOLT	T	2	32	1-1/2	BA-1201	190163
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	C	3	32	1-1/2	BA-1200-SP	190164
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	T	2	32	1-1/2	BA-1201-SP	190165

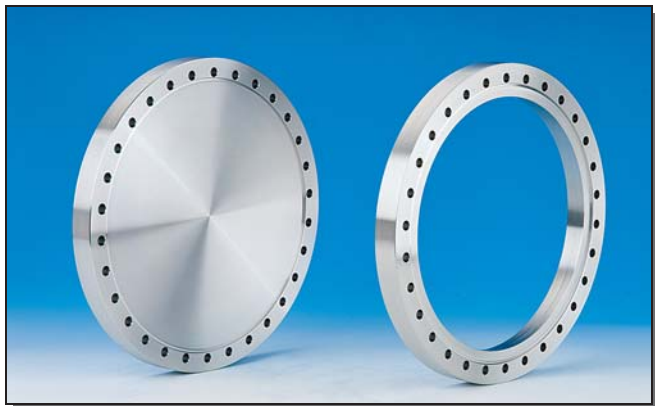
<sup>1</sup> C = Clearance holes, T = Tapped holes

<sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	33	F1200000R	100058
10	CLEARANCE	4	9.750	10.020	9	F12001000R	100059
BLANK	TAPPED	3	-	-	33	F1200000RT	120091
10	TAPPED	4	9.750	10.020	9	F12001000RT	120092



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

#### Material

Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated

#### Fastening

Bolt Type	Hexagonal head
Nut Type	Hexagonal
Size	.375-24 UNF
Torque	26 lb-ft

**Vacuum Range**  $1 \times 10^{-13}$  Torr

**Temperature Range** -200°C to 450°C

**Weight** 41 lb maximum

**Dimensions** 13.25 OD x 10.500 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

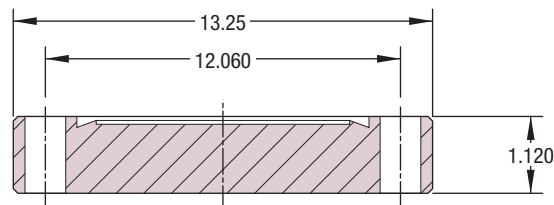


Figure 2

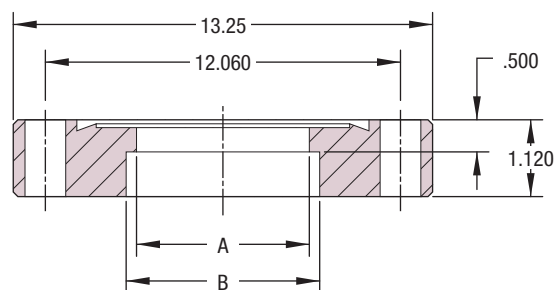


Figure 3

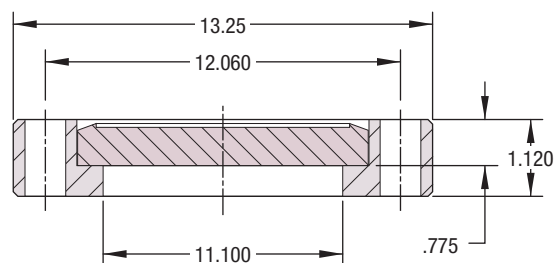
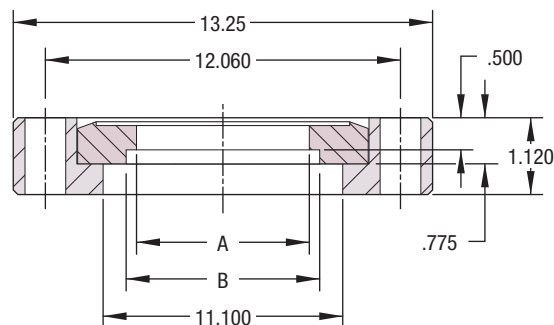
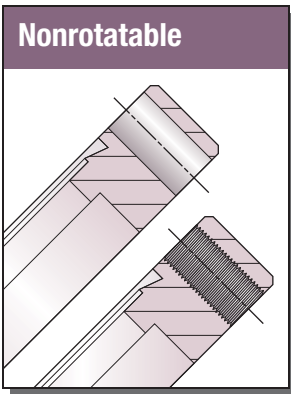


Figure 4



- Through hole flanges have 30 bolt holes drilled .390" diameter
- Tapped flanges have 30 bolt holes threaded .375-24



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	41	F1325000	110034
10	CLEARANCE	2	9.750	10.020	18	F13251000	110035
10-3/4	CLEARANCE	2	10.500	10.765	14	F13251075	110036
BLANK	TAPPED	1	-	-	41	F1325000T	130034
10	TAPPED	2	9.750	10.020	18	F13251000T	130035
10-3/4	TAPPED	2	10.500	10.765	14	F13251075T	130036

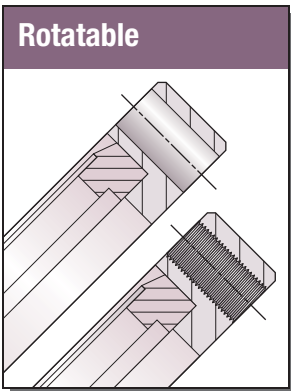


DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 10.87 I.D.	-	-	10	3-1/2	GK-1325	191021
GASKET, COPPER, 10.87 I.D.	-	-	1	1/4	GK-1325I	191022
GASKET, VITON, 11.36 I.D.	-	-	1	1/4	GK-1325V	191023
HEX HEAD BOLT	C	3	30	4	BA-1000	190012
HEX HEAD BOLT	T	2	30	2	BA-1001	190013
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	C	3	30	4	BA-1000-SP	190060
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	T	2	30	2	BA-1001-SP	190065

<sup>1</sup> C = Clearance holes, T = Tapped holes

<sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	41	F1325000R	100034
10	CLEARANCE	4	9.750	10.020	18	F13251000R	100035
10-3/4	CLEARANCE	4	10.500	10.765	14	F13251075R	100036
BLANK	TAPPED	3	-	-	41	F1325000RT	120034
10	TAPPED	4	9.750	10.020	18	F13251000RT	120035
10-3/4	TAPPED	4	10.500	10.765	14	F13251075RT	120036



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

#### Material

Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated

#### Fastening

Bolt Type	Hexagonal head
Nut Type	Hexagonal
Size	.375-24 UNF
Torque	26 lb-ft

**Vacuum Range**  $1 \times 10^{-13}$  Torr

**Temperature Range** -200°C to 450°C

**Weight** 46 lb maximum

**Dimensions** 14.00 OD x 11.750 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

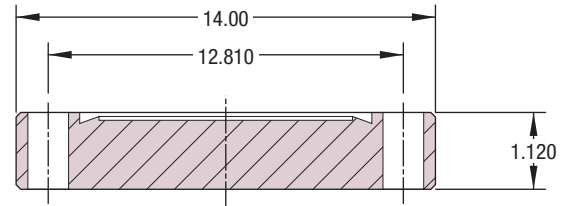


Figure 2

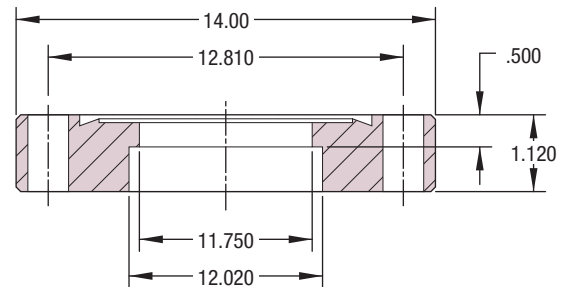


Figure 3

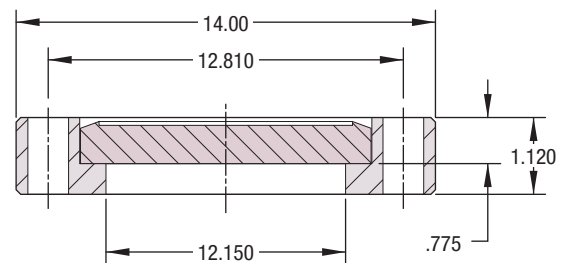
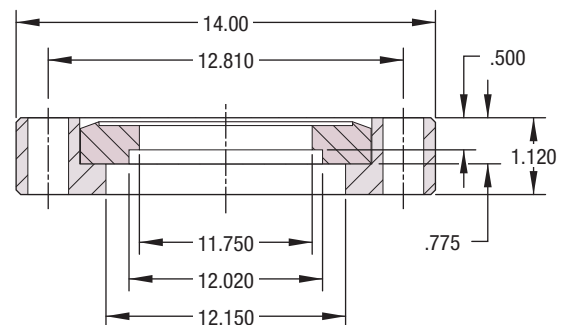
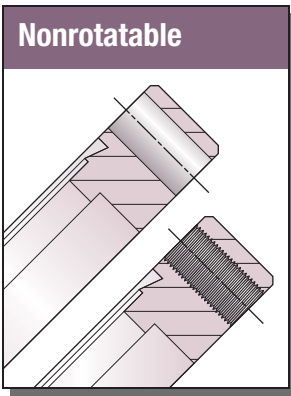


Figure 4



- Through hole flanges have 30 bolt holes drilled .390" diameter
- Tapped flanges have 30 bolt holes threaded .375-24



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	46	F1400000	110037
12	CLEARANCE	2	11.750	12.020	13	F14001200	110038
BLANK	TAPPED	1	-	-	46	F1400000T	130037
12	TAPPED	2	11.750	12.020	13	F14001200T	130038

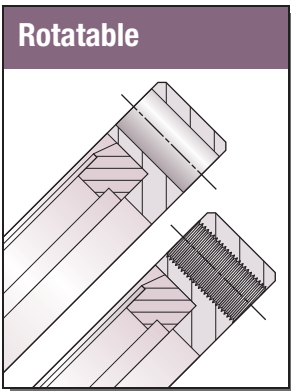


DESCRIPTION	BOLT <sup>1</sup> HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 11.52 I.D.	-	-	10	4	GK-1400	191024
GASKET, COPPER, 11.52 I.D.	-	-	1	1	GK-1400I	191025
GASKET, VITON, 12.11 I.D.	-	-	1	1/4	GK-1400V	191026
HEX HEAD BOLT	C	3	30	4	BA-1000	190012
HEX HEAD BOLT	T	2	30	2	BA-1001	190013
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	C	3	30	4	BA-1000-SP	190060
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	T	2	30	2	BA-1001-SP	190065

<sup>1</sup> C = Clearance holes, T = Tapped holes

<sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

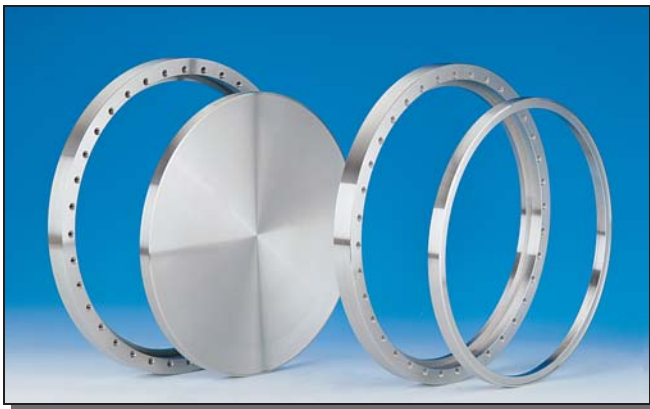
- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	46	F1400000R	100037
12	CLEARANCE	4	11.750	12.020	13	F14001200R	100038
BLANK	TAPPED	3	-	-	46	F1400000RT	120037
12	TAPPED	4	11.750	12.020	13	F14001200RT	120038



Nonrotatable



Rotatable

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Tapped or clearance bolt holes
- Conflat® compatible design

### Specifications

#### Material

Flanges	304ss
Gaskets, metal / elastomer	OFE Copper
Bolts	300ss and 300ss silver plated

#### Fastening

Bolt Type	Hexagonal head
Nut Type	Hexagonal
Size	.375-24 UNF
Torque	26 lb-ft

**Vacuum Range**  $1 \times 10^{-13}$  Torr

**Temperature Range** -200°C to 450°C

**Weight** 64 lb maximum

**Dimensions** 16.50 OD x 13.750 ID maximum

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

Figure 1

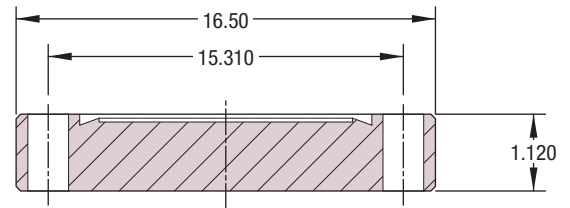


Figure 2

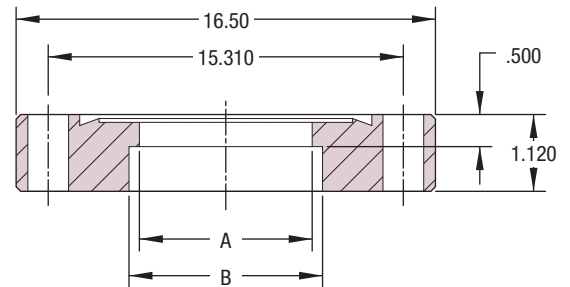


Figure 3

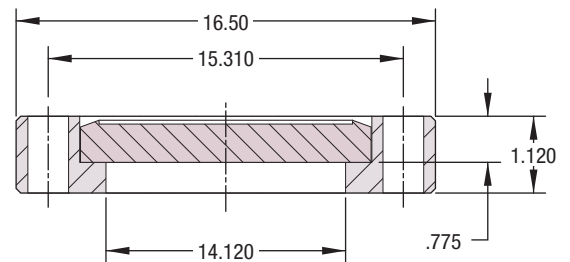
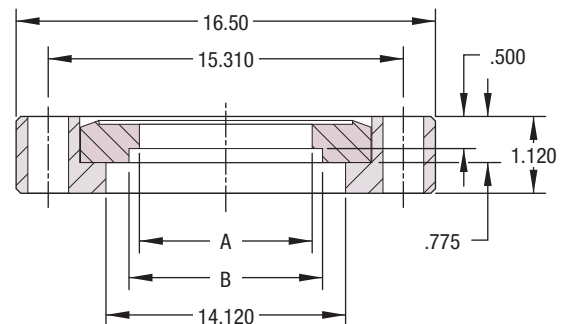
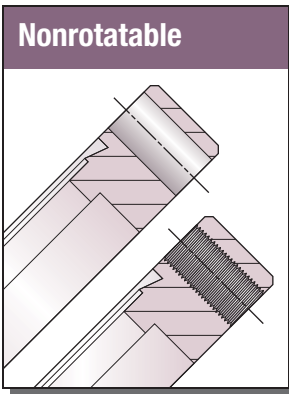


Figure 4



- Through hole flanges have 36 bolt holes drilled .390" diameter
- Tapped flanges have 36 bolt holes threaded .375-24





ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	1	-	-	64	F1650000	110039
14	CLEARANCE	2	13.750	14.020	18	F16501400	110040
BLANK	TAPPED	1	-	-	64	F1650000T	130039
14	TAPPED	2	13.750	14.020	18	F16501400T	130040

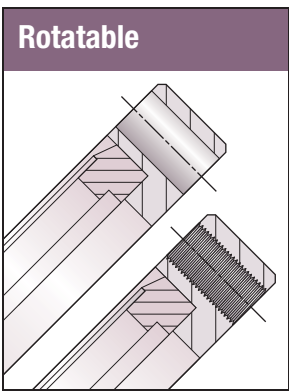


DESCRIPTION	BOLT HOLE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
GASKET, COPPER, 14.11 I.D.	-	-	10	5	GK-1650	191027
GASKET, COPPER, 14.11 I.D.	-	-	1	1	GK-1650I	191028
GASKET, VITON, 14.60 I.D.	-	-	1	1	GK-1650V	191029
HEX HEAD BOLT	C	3	36	5	BA-1650	190015
HEX HEAD BOLT	T	2	36	3	BA-1002	190014
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	C	3	36	5	BA-1650-SP	190068
HEX HEAD BOLT, SILVER PLATED <sup>2</sup>	T	2	36	3	BA-1002-SP	190066

<sup>1</sup> C = Clearance holes, T = Tapped holes

<sup>2</sup> Silver plated bolts only; nuts and washers not silver plated

- Bolt Sets for clearance hole flanges include bolts, flat washers and nuts
- Bolt sets for tapped flanges include bolts and flat washers



ID NOMINAL	BOLT HOLE	FIGURE	A	B	WT LB	REFERENCE	PART NUMBER
BLANK	CLEARANCE	3	-	-	64	F1650000R	100039
14	CLEARANCE	4	13.750	14.020	18	F16501400R	100040
BLANK	TAPPED	3	-	-	64	F1650000RT	120039
14	TAPPED	4	13.750	14.020	18	F16501400RT	120040



### ULTRAHIGH VACUUM SERIES

#### Description

Del-Seal™ CF Double Sided Flanges are designed to be inserted between two flanges of the same size. This provides a simple method for adding thermocouple gauge tubes or up-to-air valves to a system with virtually no change in conductance and pumping speed. Refer to Section 3.4 for special purpose double sided flanges which are supplied with accessories attached. Additional applications include viewport shutters, butterfly valves and spacers. All Del-Seal™ CF Double Sided Flanges are made of 304ss material. Each assembly requires two gaskets and longer length bolts. MDC does not recommend stacking more than one double sided flange in a single assembly.

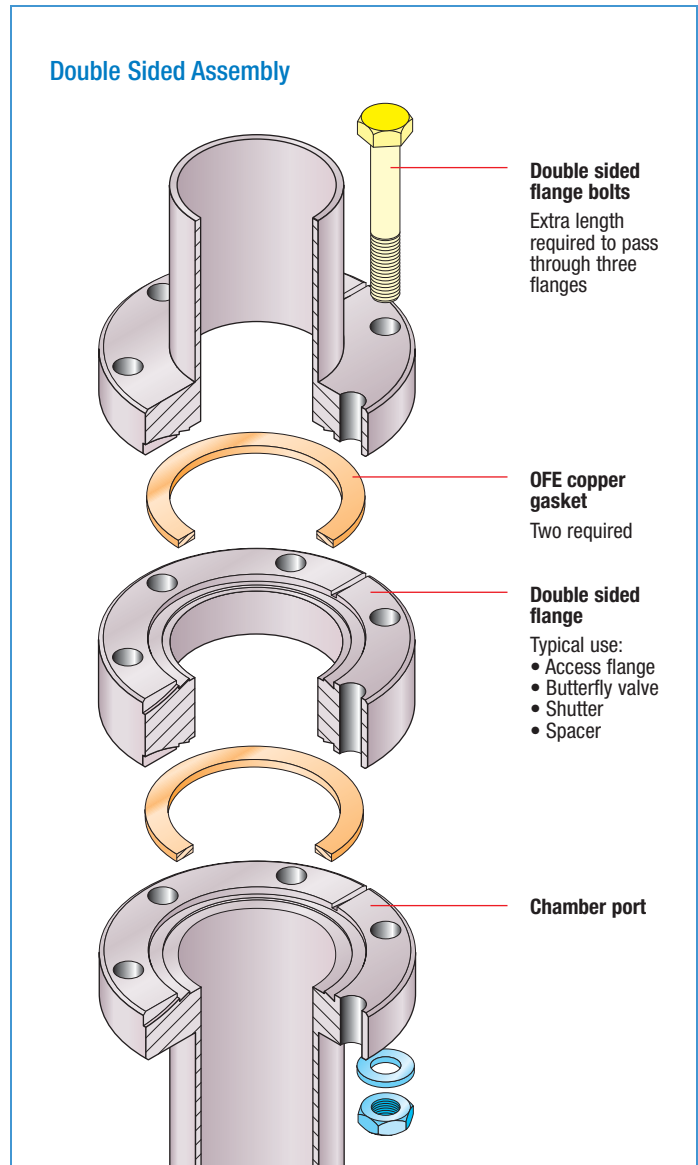
#### Features

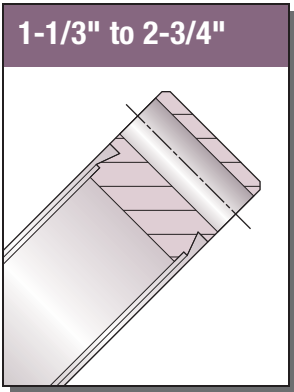
- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Nonrotatable geometry
- OFE Copper or optional Viton® elastomer gaskets
- Clearance bolt holes on most flanges
- Conflat® compatible design

#### Specifications

<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or socket head
Nut Type	Hexagonal
Size / Torque	.8-32 UNC / 7 lb-ft .250-28 UNF / 12 lb-ft .312-24 UNF / 15 lb-ft .375-24 UNF / 26 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight and Dimensions</b>	See table

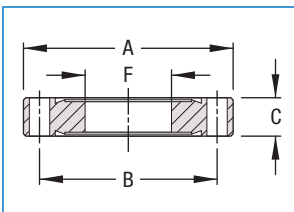
See page 26 for elastomer specifications





1-1/3" to 2-3/4"

- Bolt holes are clearance holes unless thread size is stated
- See Section 3.4 for double sided flanges with accessories attached



NOMINAL SIZE	A	B	C	F	NO. HOLES	HOLE SIZE	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	1.062	.285	BLANK	6	.172	1/2	FD-133000	140000
1-1/3	1.33	1.062	.285	.250	6	.172	1/2	FD-133025	140001
1-1/3	1.33	1.062	.285	.380	6	.172	1/2	FD-133037	140002
1-1/3	1.33	1.062	.285	.500	6	.172	1/2	FD-133050	140003

Leak check groove applied to one side only

2-1/8	2.11	1.625	.470	BLANK	4	.265	3/4	FD-218000	140004
2-1/8	2.11	1.625	.470	.750	4	.265	3/4	FD-218075	140005
2-1/8	2.11	1.625	.470	1.000	4	.265	3/4	FD-218100	140006

2-3/4	2.73	2.312	.750	BLANK	6	.265	3/4	FD-275000	140007
2-3/4	2.73	2.312	1.000	BLANK	6	.265	3/4	FD-275000-1	140043
2-3/4	2.73	2.312	.750	.250	6	.265	3/4	FD-275025	140008
2-3/4	2.73	2.312	.750	.500	6	.265	3/4	FD-275050	140009
2-3/4	2.73	2.312	.750	.750	6	.265	3/4	FD-275075	140010
2-3/4	2.73	2.312	.750	1.000	6	.265	3/4	FD-275100	140011
2-3/4	2.73	2.312	.750	1.250	6	.265	3/4	FD-275125	140012
2-3/4	2.73	2.312	.750	1.500	6	.265	3/4	FD-275150	140013
2-3/4	2.73	2.312	1.000	1.500	6	.265	3/4	FD-275150-1	140014

With tapped mounting holes

Thread

2-3/4	2.73	2.312	.750	1.500	6	.250-28	3/4	FD-275150T	140041
2-3/4	2.73	2.312	1.000	1.500	6	.250-28	3/4	FD-275150T-1	140042

With NPT tapped radial holes

NPT

Thread

2-3/4	2.73	2.312	.750	1.500	1	1/8-27	3/4	FD-275150-1H	420001
2-3/4	2.73	2.312	.750	1.500	2	1/8-27	3/4	FD-275150-2H	420002

Larger size flanges are found on the following two pages

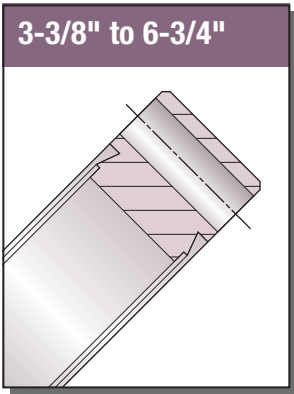


Hardware

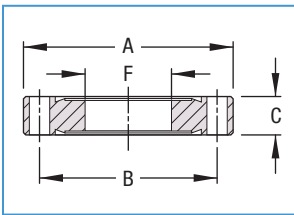
- Bolt Sets for clearance hole flanges include bolts, nuts and flat washers.

NOMINAL SIZE	HARDWARE DESCRIPTION	BOLT THREAD	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
1-1/3	GASKET, COPPER	-	-	10	1/4	GK-075	191000
1-1/3	GASKET, VITON	-	-	5	1/4	GK-075V	191001
1-1/3	SOCKET HEAD BOLT	8-32	1-1/4	6	1/4	BA-133D	190111
2-1/8	GASKET, COPPER	-	-	10	1/4	GK-100	191002
2-1/8	GASKET, VITON	-	-	5	1/4	GK-100V	191003
2-1/8	HEX HEAD BOLT	.250-28	2	4	1/4	BA-218D	190112
2-3/4	GASKET, COPPER	-	-	10	1/2	GK-150	191004
2-3/4	GASKET, COPPER BLANK	-	-	10	1/2	GK-150S	191006
2-3/4	GASKET, VITON	-	-	5	1/4	GK-150V	191005
2-3/4	HEX HEAD BOLT	.250-28	2-1/4	6	1	BA-275D	190113

Continued on next two pages



• Bolt holes are clearance holes unless thread size is stated

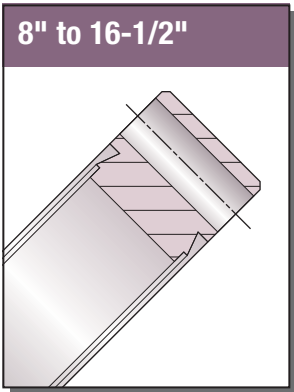


NOMINAL SIZE	A	B	C	F	NO. HOLES	HOLE SIZE	WT LB	REFERENCE	PART NUMBER
3-3/8	3.37	2.850	.620	BLANK	8	.332	1-1/2	FD-338000	140015
3-3/8	3.37	2.850	.620	1.500	8	.332	1	FD-338150	140016
3-3/8	3.37	2.850	.620	2.000	8	.332	1	FD-338200	140017
4-1/2	4.47	3.628	.680	BLANK	8	.332	3	FD-450000	140018
4-1/2	4.47	3.628	.680	1.500	8	.332	2-1/2	FD-450150	140019
4-1/2	4.47	3.628	.680	2.000	8	.332	2	FD-450200	140020
4-1/2	4.47	3.628	.680	2.500	8	.332	2	FD-450250	140021
4-5/8	4.62	4.030	.750	BLANK	10	.332	3-1/2	FD-458000	140022
4-5/8	4.62	4.030	.750	2.500	10	.332	2-1/2	FD-458250	140023
4-5/8	4.62	4.030	.750	3.000	10	.332	2	FD-458300	140024
6	5.97	5.128	.780	BLANK	16	.332	5-1/2	FD-600000	140025
6	5.97	5.128	.780	4.000	16	.332	3-1/2	FD-600400	140026
6-3/4	6.75	5.969	.840	BLANK	18	.332	8	FD-675000	140027
6-3/4	6.75	5.969	.840	4.000	18	.332	5	FD-675400	140028
6-3/4	6.75	5.969	.840	5.000	18	.332	3-1/2	FD-675500	140029



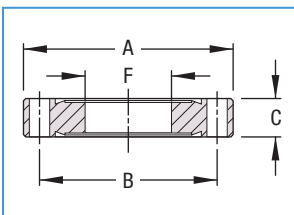
• Bolt Sets for clearance hole flanges include bolts, nuts and flat washers

NOMINAL SIZE	HARDWARE DESCRIPTION	BOLT THREAD	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
3-3/8	GASKET, COPPER	-	-	10	1/2	GK-200	191007
3-3/8	GASKET, VITON	-	-	1	1/4	GK-200V	191008
3-3/8	HEX HEAD BOLT	.312-24	2-1/4	8	3/4	BA-338D	190114
4-1/2	GASKET, COPPER	-	-	10	1	GK-250	191009
4-1/2	GASKET, VITON	-	-	1	1/4	GK-250V	191010
4-1/2	HEX HEAD BOLT	.312-24	2-1/2	8	3/4	BA-450D	190115
4-5/8	GASKET, COPPER	-	-	10	1	GK-300	191011
4-5/8	GASKET, VITON	-	-	1	1/4	GK-300V	191012
4-5/8	HEX HEAD BOLT	.312-24	2-3/4	10	1	BA-458D	190116
6	GASKET, COPPER	-	-	10	1-1/2	GK-400	191013
6	GASKET, VITON	-	-	1	1/4	GK-400V	191014
6	HEX HEAD BOLT	.312-24	2-3/4	16	2	BA-600D	190117
6-3/4	GASKET, COPPER	-	-	10	1-1/2	GK-500	191015
6-3/4	GASKET, VITON	-	-	1	1/4	GK-500V	191016
6-3/4	HEX HEAD BOLT	.312-24	3	18	2-1/2	BA-675D	190118



8" to 16-1/2"

• Bolt holes are clearance holes unless thread size is stated



NOMINAL SIZE	A	B	C	F	NO. HOLES	HOLE SIZE	WT LB	REFERENCE	PART NUMBER
8	7.97	7.128	.870	BLANK	20	.332	12	FD-800000	140030
8	7.97	7.128	.870	6.000	20	.332	5-1/2	FD-800600	140031
10	9.97	9.128	.970	BLANK	24	.332	20	FD-1000000	140032
10	9.97	9.128	.970	8.000	24	.332	7-1/2	FD-1000800	140033
13-1/4	13.25	12.060	1.120	BLANK	30	.390	41	FD-1325000	140034
13-1/4	13.25	12.060	1.120	10.000	30	.390	18	FD-13251000	140035
13-1/4	13.25	12.060	1.120	10.750	30	.390	14-1/2	FD-13251075	140036
14	14.00	12.810	1.120	BLANK	30	.390	46	FD-14000000	140037
14	14.00	12.810	1.120	12.000	30	.390	13	FD-14001200	140038
16-1/2	16.50	15.310	1.120	BLANK	36	.390	64	FD-1650000	140039
16-1/2	16.50	15.310	1.120	14.000	36	.390	18-1/2	FD-16501400	140040



• Bolt Sets for clearance hole flanges include bolts, nuts and flat washers

NOMINAL SIZE	HARDWARE DESCRIPTION	BOLT THREAD	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
8	GASKET, COPPER	-	-	10	2	GK-600	191017
8	GASKET, VITON	-	-	1	1/4	GK-600V	191018
8	HEX HEAD BOLT	.312-24	3-1/4	20	3	BA-800D	190119
10	GASKET, COPPER	-	-	10	2-1/2	GK-800	191019
10	GASKET, VITON	-	-	1	1/4	GK-800V	191020
10	HEX HEAD BOLT	.312-24	3-1/2	24	3	BA-1000D	190120
13-1/4	GASKET, COPPER	-	-	10	3-1/2	GK-1325	191021
13-1/4	GASKET, COPPER	-	-	1	1/4	GK-1325I	191022
13-1/4	GASKET, VITON	-	-	1	1/4	GK-1325V	191023
13-1/4	HEX HEAD BOLT	.375-24	4	30	3-1/2	BA-1001D	190121
14	GASKET, COPPER	-	-	10	4	GK-1400	191024
14	GASKET, COPPER	-	-	1	1/4	GK-1400I	191025
14	GASKET, VITON	-	-	1	1/4	GK-1400V	191026
	HEX HEAD BOLT	.375-24	4	30	3-1/2	BA-1001D	190121
16-1/2	GASKET, COPPER	-	-	10	5	GK-1650	191027
16-1/2	GASKET, COPPER	-	-	1	1/4	GK-1650I	191028
16-1/2	GASKET, VITON	-	-	1	1/4	GK-1650V	191029
16-1/2	HEX HEAD BOLT	.375-24	4	36	4	BA-1650D	190122



[Del-Seal to Del-Seal Zero Length Reducers](#)  
For ASA TO Del-Seal Adapters, see page 151

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Nonrotatable geometry
- OFE Copper or optional Viton® elastomer gaskets
- Clearance and blind-tapped bolt holes
- Conflat® compatible design

### Specifications

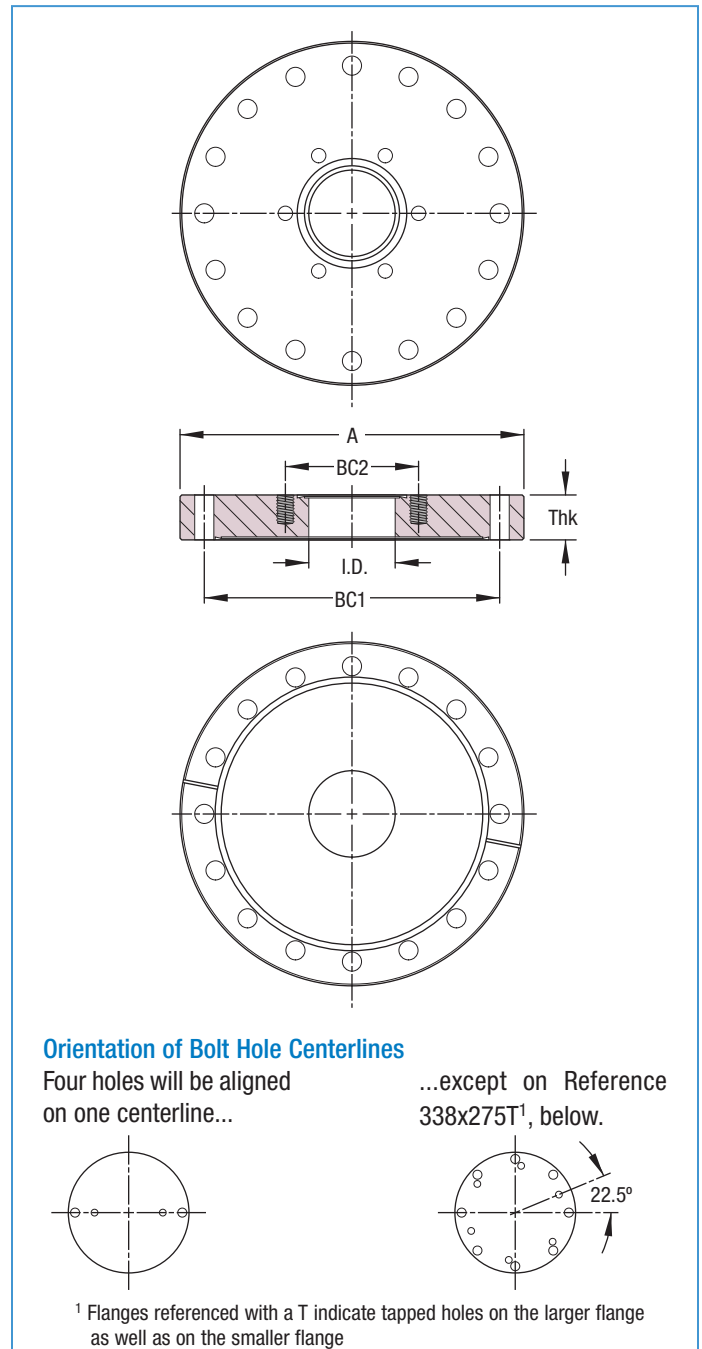
<b>Material</b>	
Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated
<b>Fastening</b>	
Bolt Type	Hexagonal or socket head
Nut Type	Hexagonal
Size / Torque	.160-32 UNC / 7 lb-ft .250-28 UNF / 12 lb-ft .312-24 UNF / 15 lb-ft .375-24 UNF / 26 lb-ft
<b>Vacuum Range</b>	$1 \times 10^{-13}$ Torr
<b>Temperature Range</b>	-200°C to 450°C
<b>Weight and Dimensions</b>	See table

See page 26 for elastomer specifications

### ULTRAHIGH VACUUM SERIES

#### Description

Zero length reducers are used for a change in size of flanges within the Del-Seal™ CF family. “Zero length” means the total thickness of a unit is the thickness of one flange only. Non-zero-length reducers, on page 65, may have straight or conical sections between flanges. Hybrid adapters are used for a change in method of sealing, such as Del-Seal™ CF to ISO, and are found in Section 1.5, page 148.



# Del-Seal™ CF Flanges

## Zero Length Reducers

MAIN FLANGE	REDUCER FLANGE	A	I.D.	THK	BC1	TAPPED HOLES BC2	THREAD	DEPTH	WT LB	REFERENCE	PART NUMBER
2-1/8	1-1/3	2.11	.62	.470	1.625 T <sup>1</sup>	1.062	8-32	1/4	1/2	218x133T	150000
2-3/4	1-1/3	2.73	.62	.500	2.312	1.062	8-32	1/4	3/4	275x133	150001
2-3/4	2-1/8	2.73	1.00	.500	2.312 T <sup>1</sup>	1.625	.250-28	5/16	1/2	275x218T	150002
3-3/8	1-1/3	2.73	.62	.620	2.850	1.062	8-32	3/8	1-1/2	338x133	150003
3-3/8	2-1/8	3.37	1.00	.620	2.850	1.625	.250-28	3/8	1-1/2	338x218	150004
3-3/8	2-3/4	3.37	1.50	.620	2.850 T <sup>1</sup>	2.312	.250-28	3/8	1	338x275T	150005
4-1/2	1-1/3	4.47	.62	.680	3.628	1.062	8-32	3/8	3	450x133	150006
4-1/2	2-1/8	4.47	1.00	.680	3.628	1.625	.250-28	1/2	3	450x218	150007
4-1/2	2-3/4	4.47	1.50	.680	3.628	2.312	.250-28	1/2	2-1/2	450x275	150008
4-1/2	3-3/8	4.47	2.00	.680	3.628 T <sup>1</sup>	2.850	.312-24	1/2	2-1/2	450x338T	150009
4-5/8	1-1/3	4.62	.62	.750	4.030	1.062	8-32	3/8	3-1/2	458x133	150010
4-5/8	2-1/8	4.62	1.00	.750	4.030	1.625	.250-28	1/2	3	458x218	150011
4-5/8	2-3/4	4.62	1.50	.750	4.030	2.312	.250-28	1/2	3	458x275	150012
4-5/8	3-3/8	4.62	2.00	.750	4.030	2.850	.312-24	1/2	2-1/2	458x338	150013
6	1-1/3	5.97	.62	.780	5.128	1.062	8-32	3/8	6	600x133	150014
6	2-1/8	5.97	1.00	.780	5.128	1.625	.250-28	1/2	5-1/2	600x218	150015
6	2-3/4	5.97	1.50	.780	5.128	2.312	.250-28	1/2	5-1/2	600x275	150016
6	3-3/8	5.97	2.00	.780	5.128	2.850	.312-24	1/2	5	600x338	150017
6	4-1/2	5.97	2.50	.780	5.128	3.628	.312-24	1/2	4-1/2	600x450	150018
6	4-5/8	5.97	3.00	.780	5.128	4.030	.312-24	1/2	4	600x458	150019
6-3/4	1-1/3	6.75	.62	.840	5.969	1.062	8-32	3/8	8	675x133	150020
6-3/4	2-1/8	6.75	1.00	.840	5.969	1.625	.250-28	1/2	8	675x218	150021
6-3/4	2-3/4	6.75	1.50	.840	5.969	2.312	.250-28	1/2	7-1/2	675x275	150022
6-3/4	3-3/8	6.75	2.00	.840	5.969	2.850	.312-24	1/2	7	675x338	150023
6-3/4	4-1/2	6.75	2.50	.840	5.969	3.628	.312-24	1/2	6-1/2	675x450	150024
6-3/4	4-5/8	6.75	3.00	.840	5.969	4.030	.312-24	1/2	6	675x458	150025
6-3/4	6	6.75	4.00	.840	5.969 T <sup>1</sup>	5.128	.312-24	1/2	5	675x600T	150026
8	1-1/3	7.97	.62	.880	7.128	1.062	8-32	3/8	12	800x133	150027
8	2-1/8	7.97	1.00	.880	7.128	1.625	.250-28	5/8	12	800x218	150028
8	2-3/4	7.97	1.50	.880	7.128	2.312	.250-28	5/8	11-1/2	800x275	150029
8	3-3/8	7.97	2.00	.880	7.128	2.850	.312-24	5/8	11	800x338	150030
8	4-1/2	7.97	2.50	.880	7.128	3.628	.312-24	5/8	10-1/2	800x450	150031
8	4-5/8	7.97	3.00	.880	7.128	4.030	.312-24	5/8	10	800x458	150032
8	6	7.97	4.00	.880	7.128	5.128	.312-24	5/8	8-1/2	800x600	150033
8	6-3/4	7.97	5.00	.880	7.128 T <sup>1</sup>	5.969	.312-24	5/8	7-1/2	800x675T	150034
10	1-1/3	9.97	.62	.970	9.128	1.062	8-32	3/8	20	1000x133	150035
10	2-1/8	9.97	1.00	.970	9.128	1.625	.250-28	5/8	20	1000x218	150036
10	2-3/4	9.97	1.50	.970	9.128	2.312	.250-28	5/8	20	1000x275	150037
10	3-3/8	9.97	2.00	.970	9.128	2.850	.312-24	5/8	20	1000x338	150038
10	4-1/2	9.97	2.50	.970	9.128	3.628	.312-24	5/8	18-1/2	1000x450	150039
10	4-5/8	9.97	3.00	.970	9.128	4.030	.312-24	5/8	18-1/2	1000x458	150040
10	6	9.97	4.00	.970	9.128	5.128	.312-24	5/8	17	1000x600	150041
10	6-3/4	9.97	5.00	.970	9.128	5.969	.312-24	5/8	17	1000x675	150042
10	8	9.97	6.00	.970	9.128	7.128	.312-24	5/8	15-1/2	1000x800	150043
13-1/4	1-1/3	13.25	.62	1.120	12.060	1.062	8-32	3/8	41	1325x133	150044
13-1/4	2-1/8	13.25	1.00	1.120	12.060	1.625	.250-28	3/4	41	1325x218	150045
13-1/4	2-3/4	13.25	1.50	1.120	12.060	2.312	.250-28	3/4	41	1325x275	150046
13-1/4	3-3/8	13.25	2.00	1.120	12.060	2.850	.312-24	3/4	40	1325x338	150047
13-1/4	4-1/2	13.25	2.50	1.120	12.060	3.628	.312-24	3/4	39	1325x450	150048
13-1/4	4-5/8	13.25	3.00	1.120	12.060	4.030	.312-24	3/4	39	1325x458	150049
13-1/4	6	13.25	4.00	1.120	12.060	5.128	.312-24	3/4	37	1325x600	150050
13-1/4	6-3/4	13.25	5.00	1.120	12.060	5.969	.312-24	3/4	37	1325x675	150051
13-1/4	8	13.25	6.00	1.120	12.060	7.128	.312-24	3/4	34	1325x800	150052
13-1/4	10	13.25	8.00	1.120	12.060	9.128	.312-24	3/4	30	1325x1000	150053



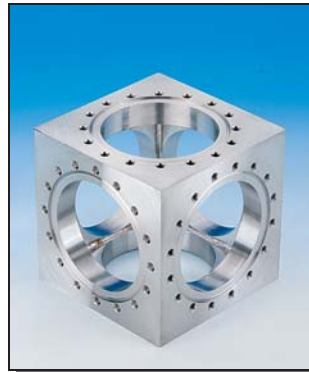
90° Del-Seal CF Elbows page 66



Del-Seal CF Reducing Cross page 71



Del-Seal CF 5-Way Cross page 72



Del-Seal CF 6-Way Cube page 73

### Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Rotatable and nonrotatable geometries
- OFE Copper or optional Viton® elastomer gaskets
- Clearance bolt holes
- Conflat® compatible design
- Standard matte finish

### -Specifications

#### Material

Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss and 300ss silver plated

#### Fastening

Bolt Type	Hexagonal, 12-point or socket head
Nut Type	Hexagonal or two hole plate nuts
Size / Torque	See individual flange specs, Section 1.1

#### Vacuum

Range	$1 \times 10^{-13}$ Torr
Leak Test	$2 \times 10^{-10}$ cc/sec of He

<b>Temperature Range</b>	-200°C to 450°C
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<b>Weight and Dimensions</b>	See table
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See page 26 for elastomer specifications

## ULTRAHIGH VACUUM SERIES

### Description

MDC Del-Seal™ CF Tube Fittings are convenient “building-block” components. They offer great flexibility in the design and construction of high and ultrahigh vacuum systems. All fittings are fabricated from type 304 stainless steel drawn and welded vacuum tubing. To facilitate assembly alignment, a rotatable flange is supplied opposite a nonrotatable flange on each axis. Elbows are supplied with two rotatable flanges.

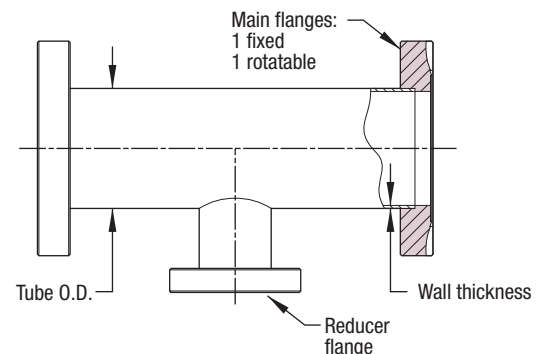
In general, reducers are used for a change in size of flanges within a single method of sealing, such as Del-Seal™ CF to Del-Seal™ CF. Reducers may be either zero length or include a section of tubing between flanges. Zero length Del-Seal™ CF reducers are on page 60.

Non-zero-length reducers are also called nipple reducers and have either a straight tube or a conical section between flanges. Nipple and conical reducers are on page 65.

In general, hybrid adapters provide a transition between two different methods of creating a vacuum seal, such as metal seal CF to elastomer seal ISO. Common configurations of Del-Seal™ CF to various other vacuum connections are listed in Section 1.5, Hybrid Adapters, beginning on page 148.

Reducing tees and crosses have a single main tube with main flanges and a smaller diameter reducer tube with a reducer flange or flanges.

### Fittings Parts Identification Tee Reducer Example

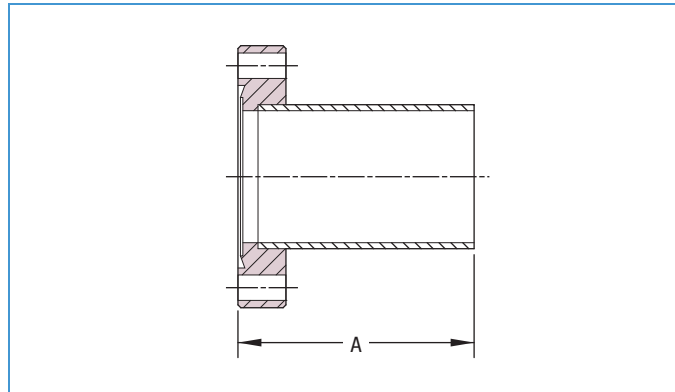


- Main flanges are on the larger tube
- Reducer flange is on the smaller tube
- In general, each axis includes one rotatable and one nonrotatable flange
- Tubes are specified by outer diameter (O.D.) and wall thickness

All dimensions in this catalog are given in inches unless specified otherwise.



Half Nipple

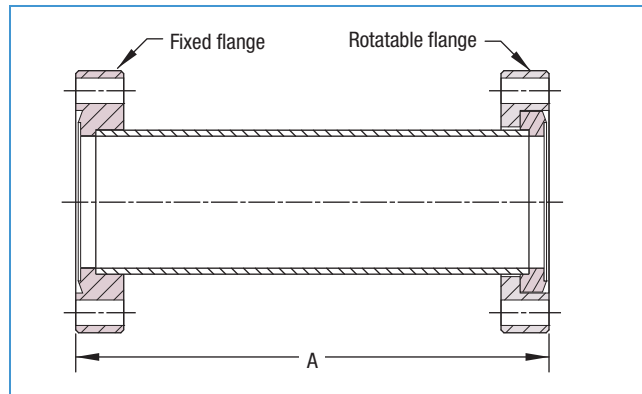


- Weldable fitting
- Full range of clearance or tapped holes, fixed or rotatable Del-Seal™ CF flange
- Custom lengths available

NOMINAL FLANGE	FLANGE O.D.	FLANGE CONFIG. <sup>1</sup>	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	NR	.75	.035	1.50	1/2	075-1	401000
1-1/3	1.33	T	.75	.035	1.50	1/2	075-1T	401021
1-1/3	1.33	R	.75	.035	1.50	1/2	075-1R	401020
1-1/3	1.33	RT	.75	.035	1.50	1/2	075-1RT	401027
2-1/8	2.11	NR	1.00	.065	2.04	1/2	100-1	401001
2-1/8	2.11	T	1.00	.065	2.04	1/2	100-1T	401030
2-1/8	2.11	R	1.00	.065	2.04	1/2	100-1R	401031
2-1/8	2.11	RT	1.00	.065	2.04	1/2	100-1RT	401032
2-3/4	2.73	NR	1.50	.065	2.46	1	150-1	401002
2-3/4	2.73	T	1.50	.065	2.46	1	150-1T	401023
2-3/4	2.73	R	1.50	.065	2.46	1	150-1R	401022
2-3/4	2.73	RT	1.50	.065	2.46	1	150-1RT	401028
3-3/8	3.37	NR	2.00	.065	3.21	1-1/2	200-1	401003
3-3/8	3.37	T	2.00	.065	3.21	1-1/2	200-1T	401033
3-3/8	3.37	R	2.00	.065	3.21	1-1/2	200-1R	401034
3-3/8	3.37	RT	2.00	.065	3.21	1-1/2	200-1RT	401035
4-1/2	4.47	NR	2.50	.065	4.12	3	250-1	401004
4-1/2	4.47	T	2.50	.065	4.12	3	250-1T	401025
4-1/2	4.47	R	2.50	.065	4.12	3	250-1R	401024
4-1/2	4.47	RT	2.50	.065	4.12	3	250-1RT	401029
4-5/8	4.62	NR	3.00	.065	3.53	3	300-1	401005
4-5/8	4.62	T	3.00	.065	3.53	3	300-1T	401036
4-5/8	4.62	R	3.00	.065	3.53	3	300-1R	401037
4-5/8	4.62	RT	3.00	.065	3.53	3	300-1RT	401038
6	5.97	NR	4.00	.083	5.31	4	400-1	401006
6	5.97	T	4.00	.083	5.31	4	400-1T	401039
6	5.97	R	4.00	.083	5.31	4	400-1R	401026
6	5.97	RT	4.00	.083	5.31	4	400-1RT	401040
6-3/4	6.75	NR	5.00	.083	4.93	5	500-1	401007
6-3/4	6.75	T	5.00	.083	4.93	5	500-1T	401041
6-3/4	6.75	R	5.00	.083	4.93	5	500-1R	401042
6-3/4	6.75	RT	5.00	.083	4.93	5	500-1RT	401043
8	7.97	NR	6.00	.120	6.56	7-1/2	600-1	401008
8	7.97	T	6.00	.120	6.56	7-1/2	600-1T	401044
8	7.97	R	6.00	.120	6.56	7-1/2	600-1R	401045
8	7.97	RT	6.00	.120	6.56	7-1/2	600-1RT	401046
10	9.97	NR	8.00	.120	8.00	11	800-1	401009
13-1/4	13.25	NR	10.00	.120	10.00	28	1000-1	401010

<sup>1</sup> NR = Non-Rotatable, T = Tapped holes, R = Rotatable, RT = Rotatable Tapped

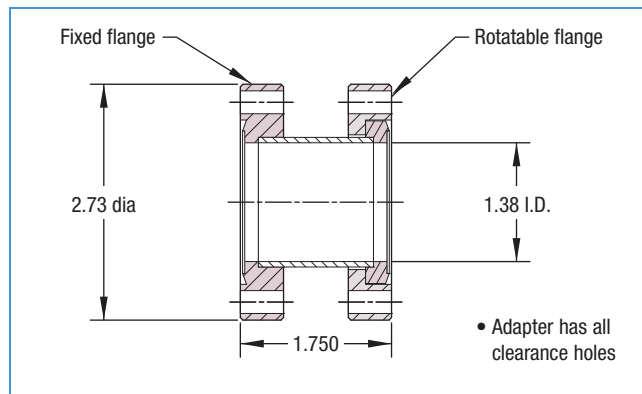
## Nipple



- Coupling to mate two identical size Del-Seal™ CF flanges
- Includes one rotatable and one nonrotatable Del-Seal™ CF flanges
- Custom lengths available

NOMINAL FLANGE	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	3.00	1/2	075-2	402000
2-1/8	2.11	1.00	.065	4.08	1	100-2	402001
2-3/4	2.73	1.50	.065	4.93	1-1/2	150-2	402002
3-3/8	3.37	2.00	.065	6.45	2-1/2	200-2	402003
4-1/2	4.47	2.50	.065	8.25	3	250-2	402004
4-5/8	4.62	3.00	.065	7.08	5-1/2	300-2	402005
6	5.97	4.00	.083	10.62	9-1/2	400-2	402006
6-3/4	6.75	5.00	.083	9.87	11	500-2	402007
8	7.97	6.00	.120	13.12	16	600-2	402008
10	9.97	8.00	.120	16.00	27-1/2	800-2	402009
13-1/4	13.25	10.00	.120	20.00	58	1000-2	402010

## Minimum Length

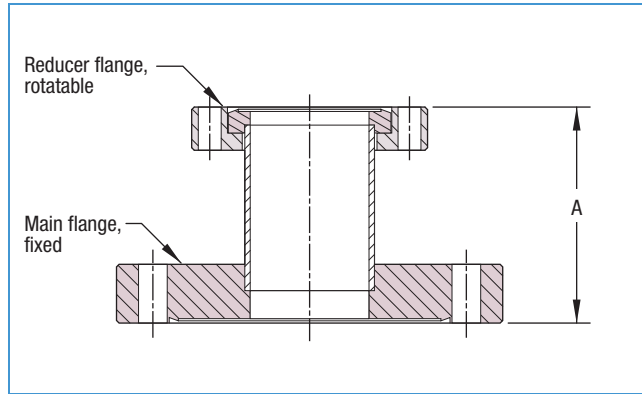


- Special nipple to mate two tapped flanges
- 2-3/4" Del-Seal™ CF flanged nipple mounts between two tapped flanges with minimum spacing
- Includes 12 each .250-28 threaded studs, nuts and washers

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
TAPPED FLANGE ADAPTER WITH MOUNTING HARDWARE	2	TFA-1	468008

The Tapped Flange Adapter is a nipple with a minimum length for mating two tapped flanges. Studs must be screwed into each tapped flange prior to installing the adapter. The Tapped Flange Adapter has clearance holes on each flange which slip over the studs. Nuts are then screwed onto the studs to complete the installation. Studs, nuts and washers are provided with the adapter.

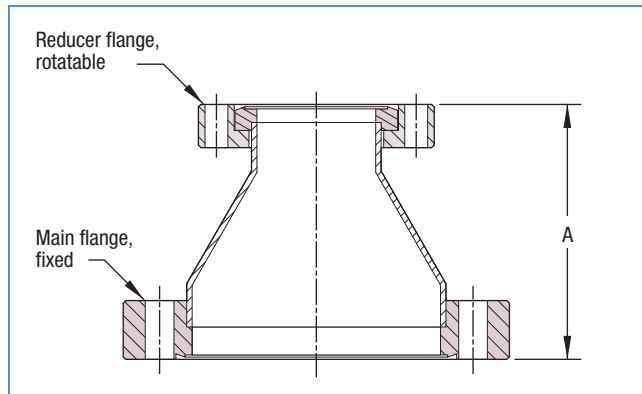
### Straight Tube



- For Del-Seal™ CF to Del-Seal™ CF connections of different size flanges
- Smaller flange is rotatable
- Zero-length reducers, see page 60
- Hybrid Adapters for Del-Seal™ CF to non-Del-Seal™ CF connections are found in Section 1.5

MAIN FLANGE NOM.	O.D.	REDUCER FLANGE		TUBE		A	WT LB	REFERENCE	PART NUMBER
		NOM.	O.D.	O.D.	WALL				
2-3/4	2.73	1-1/3	1.33	.75	.035	2.50	1	F275075-1R	402011
3-3/8	3.37	2-3/4	2.73	1.50	.065	2.50	2-1/2	F338150-1R	402012
4-1/2	4.47	2-3/4	2.73	1.50	.065	2.50	3-1/2	F450150-1R	402013
6	5.97	2-3/4	2.73	1.50	.065	2.50	6	F600150-1R	402014
6	5.97	4-1/2	4.47	2.50	.065	2.50	7	F600250-1R	402015
8	7.97	2-3/4	2.73	1.50	.065	2.50	12	F800150-1R	402016
8	7.97	4-1/2	4.47	2.50	.065	2.50	14	F800250-1R	402017
8	7.97	6	5.97	4.00	.083	2.50	16	F800400-1R	402018

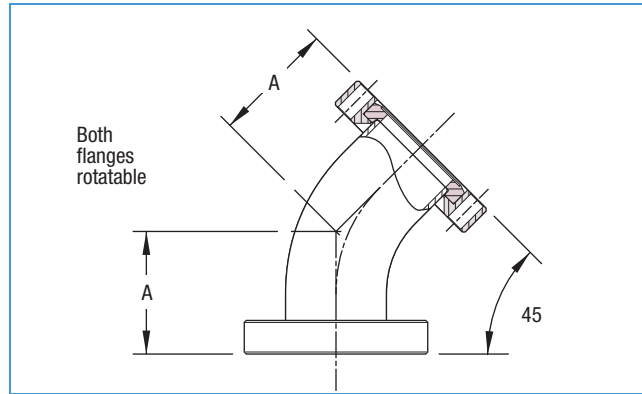
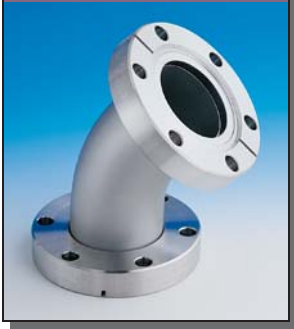
### Conical



- For Del-Seal™ CF to Del-Seal™ CF connections of different size flanges
- Smaller flange is rotatable
- Zero-length reducers, see page 60
- Hybrid Adapters for Del-Seal™ CF to non-Del-Seal™ CF connections are found in Section 1.5

MAIN FLANGE NOM.	O.D.	REDUCER FLANGE		CONICAL SECTION		A	WT LB	REFERENCE	PART NUMBER	
		NOM.	O.D.	DIA.	WALL					
2-3/4	2.73	1-1/3	1.33	1.50 -	.75	.065	3.08	1-1/2	FCR275-133	402030
2-3/4	2.73	2-1/8	2.11	1.50 -	1.00	.065	2.75	2	FCR275-218	402041
3-3/8	3.37	2-3/4	2.73	2.00 -	1.50	.065	2.80	3	FCR338-275	402031
4-1/2	4.47	2-3/4	2.73	2.50 -	1.50	.065	2.95	4	FCR450-275	402032
4-1/2	4.47	3-3/8	3.37	2.50 -	2.00	.065	2.97	5	FCR450-338	402033
4-5/8	4.62	2-3/4	2.73	3.00 -	1.50	.065	4.20	5	FCR458-275	402034
4-5/8	4.62	3-3/8	3.37	3.00 -	2.00	.065	4.22	6	FCR458-338	402035
4-5/8	4.62	4-1/2	4.47	3.00 -	2.50	.065	4.37	7	FCR458-450	402036
6	5.97	3-3/8	3.37	4.00 -	2.00	.065	4.28	8	FCR600-338	402037
6	5.97	4-1/2	4.47	4.00 -	2.50	.065	4.43	9	FCR600-450	402038
6	5.97	4-5/8	4.62	4.00 -	3.00	.065	4.43	10	FCR600-458	402039
8	7.97	6	5.97	6.00 -	4.00	.120	9.79	15	FCR800-600	402040

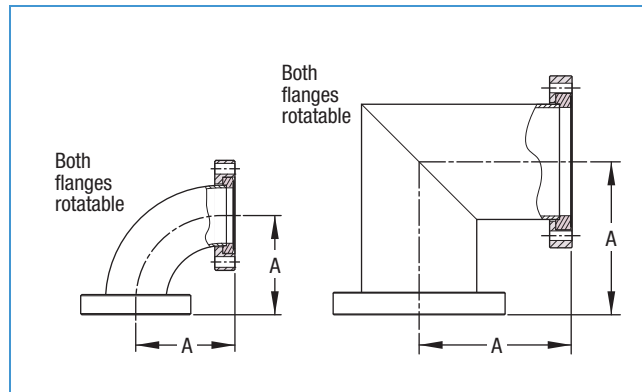
## 45° with Tangents



### Radiussed tube

NOMINAL FLANGE	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	1.26	1/2	075-45L	403029
2-1/8	2.11	1.00	.065	1.36	1	100-45L	403030
2-3/4	2.73	1.50	.065	1.83	1-1/2	150-45L	403031
3-3/8	3.37	2.00	.065	2.54	3-1/2	200-45L	403032
4-1/2	4.47	2.50	.065	3.38	5	250-45L	403033
4-5/8	4.62	3.00	.065	4.06	6	300-45L	403034
6	5.97	4.00	.083	5.25	10	400-45L	403035

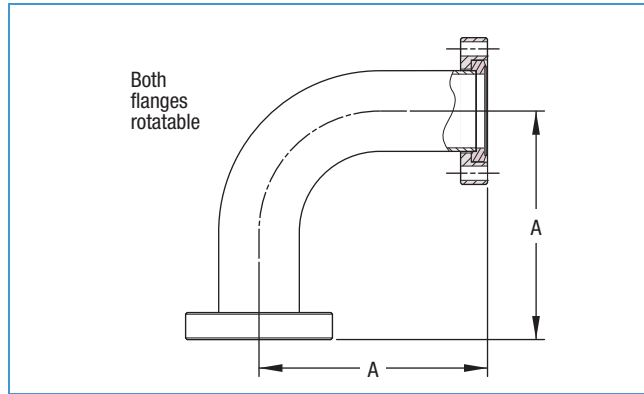
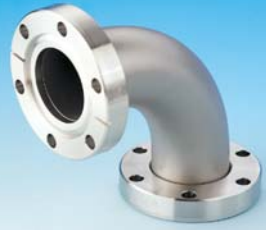
## 90 Degree



### Radiussed or mitered tube

NOMINAL FLANGE	FLANGE O.D.	BEND TYPE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	RADIUS	.75	.035	1.63	1/2	075-2L	403000
2-1/8	2.11	RADIUS	1.00	.065	1.67	1	100-2L	403036
2-3/4	2.73	RADIUS	1.50	.065	2.46	1-1/2	150-2L	403002
3-3/8	3.37	RADIUS	2.00	.065	3.23	3-1/2	200-2L	403003
4-1/2	4.47	RADIUS	2.50	.065	4.13	5	250-2L	403004
4-5/8	4.62	RADIUS	3.00	.065	4.88	5-1/2	300-2LR	403037
4-5/8	4.62	MITER	3.00	.120	3.53	6	300-2LM	403005
6	5.97	RADIUS	4.00	.083	6.44	11	400-2LR	403038
6	5.97	MITER	4.00	.120	5.31	11-1/2	400-2LM	403006
6-3/4	6.75	MITER	5.00	.120	4.93	11	500-2LM	403007
8	7.97	RADIUS	6.00	.109	9.50	19	600-2LR	403039
8	7.97	MITER	6.00	.120	6.56	19-1/2	600-2LM	403008
10	9.97	MITER	8.00	.120	8.00	27	800-2LM	403009
13-1/4	13.25	MITER	10.00	.120	10.00	56	1000-2LM	403010

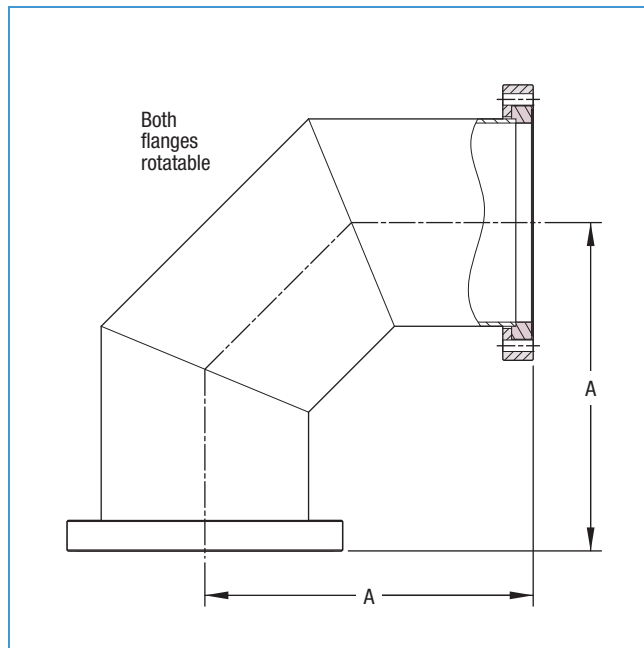
### 90° with Tangents



### Radiussed tube

NOMINAL FLANGE	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	1.92	3/4	075-2LL	403040
2-1/8	2.11	1.00	.065	2.23	1-1/2	100-2LL	403041
2-3/4	2.73	1.50	.065	3.15	2-1/2	150-2LL	403042
3-3/8	3.37	2.00	.065	4.29	3	200-2LL	403043
4-1/2	4.47	2.50	.065	5.57	5	250-2LL	403044
4-5/8	4.62	3.00	.065	6.69	6	300-2LL	403045
6	5.97	4.00	.083	8.75	12	400-2LL	403046

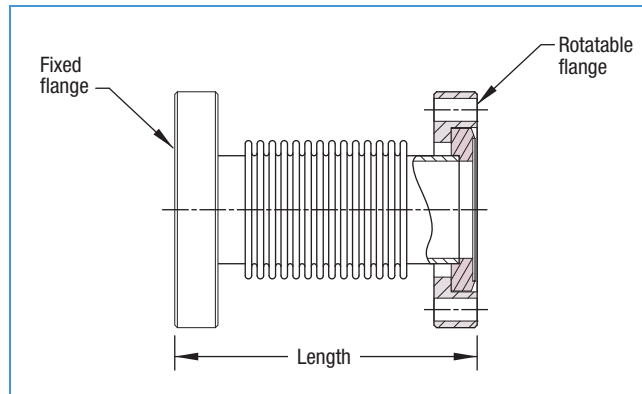
### High Conductance



### Mitered tube

NOMINAL FLANGE	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
8	7.97	6.00	.120	9.50	23	600-2L-HC	403011
10	9.97	8.00	.120	12.50	31	800-2L-HC	403012
13-1/4	13.25	10.00	.120	15.50	43	1000-2L-HC	403013

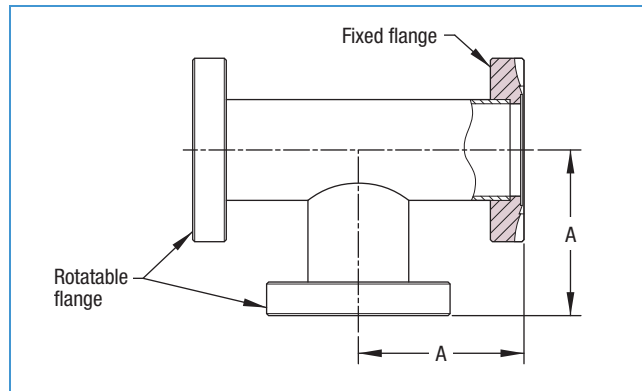
### Flexible Coupling



- Used for short misalignment connections
- Also used in Gimbal Assemblies, *see page 441*

FLANGE NOM.	FLANGE O.D.	BELLOWS I.D.	WALL THK	FREE LENGTH	COMPR'D LENGTH	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.50	.006	3.00	2.62	1/2	075-X	400000
1-1/3	1.33	.50	.006	10.00	-	1/2	075-X-10	400001
2-1/8	2.11	.75	.006	3.44	3.06	1	100-X	400002
2-3/4	2.73	1.25	.006	3.50	3.10	1	150-X	400003
3-3/8	3.37	1.62	.006	4.00	3.50	1-1/2	200-X	400004
4-1/2	4.47	2.00	.006	6.25	5.50	4	250-X	400005
4-5/8	4.62	2.50	.008	7.25	6.50	4	300-X	400006
6	5.97	3.50	.008	7.62	6.62	7	400-X	400007
6-3/4	6.75	4.00	.008	8.00	7.00	10	500-X	400008
8	7.97	5.50	.010	9.00	8.00	12	600-X	400009
10	9.97	7.50	.012	10.00	9.00	22	800-X	400010
13-1/4	13.25	10.00	.012	11.00	10.00	50	1000-X	400011

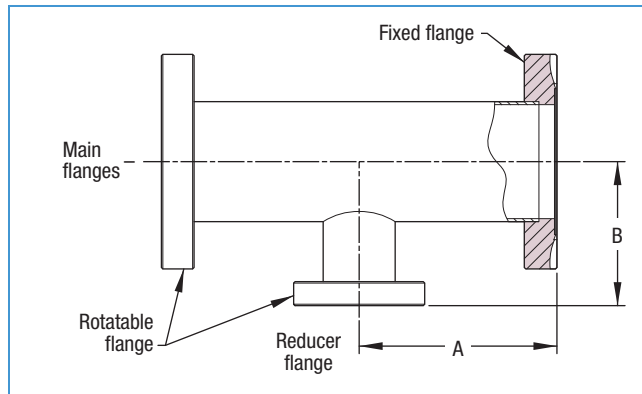
### Tee



- Each axis has one rotatable flange

NOMINAL FLANGE	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	1.50	1/2	075-3	404000
2-1/8	2.11	1.00	.065	2.04	1-1/2	100-3	404001
2-3/4	2.73	1.50	.065	2.46	2	150-3	404002
3-3/8	3.37	2.00	.065	3.23	4	200-3	404003
4-1/2	4.47	2.50	.065	3.38	8	250-3	404038
4-5/8	4.62	3.00	.065	3.63	9	300-3	404039
6	5.97	4.00	.083	4.31	15	400-3	404040
6-3/4	6.75	5.00	.120	4.93	16	500-3	404007
8	7.97	6.00	.109	6.12	25	600-3	404041
10	9.97	8.00	.109	7.50	26	800-3	404042
13-1/4	13.25	10.00	.120	10.00	38	1000-3	404010

### Reducing Tees



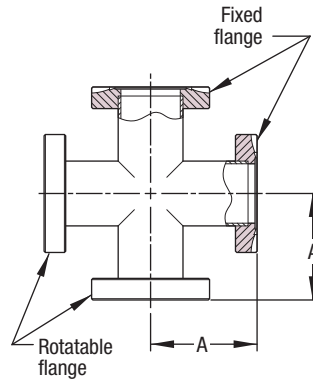
- Del-Seal™ CF to Del-Seal™ CF connections of different size flanges
- Each axis has one rotatable flange

MAIN FLANGES			A	REDUCER FLANGE			B	WT LB	REFERENCE	PART NUMBER
NOM.	TUBE	WALL		NOM.	TUBE	WALL				
2-1/8	1.00	.065	2.04	1-1/3	.75	.035	2.50	1-1/2	100-3-075	404043
2-3/4	1.50	.065	2.46	1-1/3	.75	.035	2.75	2	150-3-075	404044
2-3/4	1.50	.065	2.46	2-1/8	1.00	.065	2.30	2	150-3-100	404045
3-3/8	2.00	.065	3.23	1-1/3	.75	.035	2.13	2-1/2	200-3-075	404058
3-3/8	2.00	.065	3.23	2-1/8	1.00	.065	2.55	3	200-3-100	404046
3-3/8	2.00	.065	3.23	2-3/4	1.50	.065	2.71	3-1/2	200-3-150	404047
4-1/2	2.50	.065	3.38	2-3/4	1.50	.065	2.46	3-1/2	250-3-150	404048
4-1/2	2.50	.065	3.38	3-3/8	2.00	.065	3.48	4-1/2	250-3-200	404049
4-5/8	3.00	.065	3.63	2-3/4	1.50	.065	3.21	6	300-3-150	404050
4-5/8	3.00	.065	3.63	3-3/8	2.00	.065	3.48	7	300-3-200	404051
4-5/8	3.00	.065	3.63	4-1/2	2.50	.065	3.63	8-1/2	300-3-250	404052
6	4.00	.083	4.31	3-3/8	2.00	.065	4.23	10	400-3-200	404053
6	4.00	.083	4.31	4-1/2	2.50	.065	4.13	11	400-3-250	404054
6	4.00	.083	4.31	4-1/2	3.00	.065	4.13	12-1/2	400-3-300	404055
8	6.00	.109	5.50	4-5/8	3.00	.065	5.13	12-1/2	600-3-300	404056
8	6.00	.109	5.50	6	4.00	.083	5.31	19	600-3-400	404057

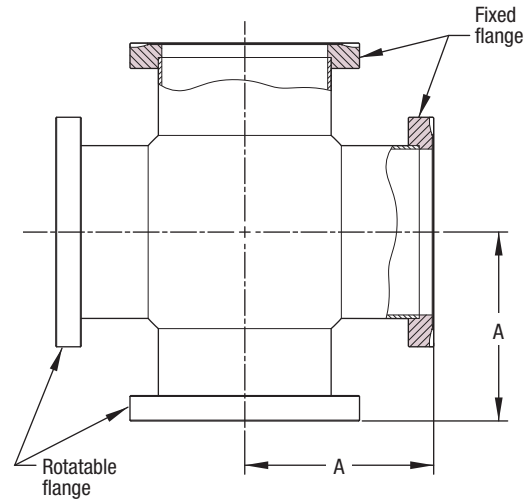
## Four-Way Crosses



Tube body



Spherical body

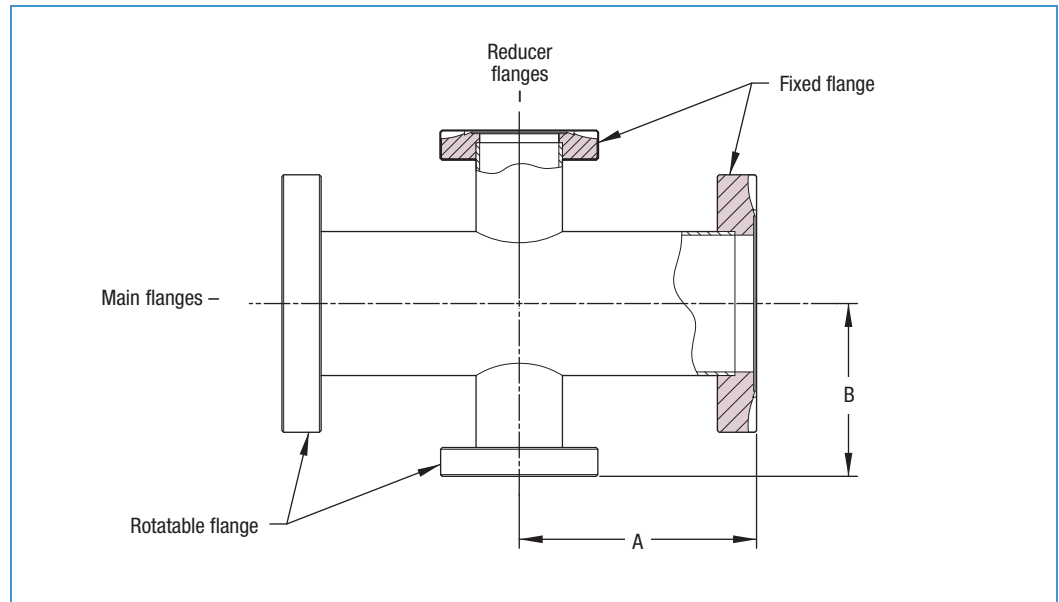


- Each axis has one rotatable flange
- Body type dependent on tube size

NOMINAL FLANGE	FLANGE O.D.	TUBE O.D.	TUBE WALL	BODY TYPE	SPHERE O.D.	SPHERE WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	TUBE	-	-	1.50	1/2	075-4	405000
2-1/8	2.11	1.00	.065	TUBE	-	-	2.04	1-3/4	100-4	405001
2-3/4	2.73	1.50	.065	TUBE	-	-	2.46	2-1/2	150-4	405002
3-3/8	3.37	2.00	.065	TUBE	-	-	3.23	4-1/2	200-4	405003
4-1/2	4.47	2.50	.065	TUBE	-	-	3.38	4-1/2	250-4	405031
4-5/8	4.62	3.00	.065	TUBE	-	-	3.63	6	300-4	405032
6	5.97	4.00	.083	TUBE	-	-	4.31	14-1/2	400-4T	405033
6	5.97	4.00	.120	SPHERE	6-1/4	.120	5.31	14-1/2	400-4S	405006
6-3/4	6.75	5.00	.120	SPHERE	9	.120	4.93	22	500-4S	405007
8	7.97	6.00	.109	TUBE	-	-	6.12	32	600-4T	405034
8	7.97	6.00	.120	SPHERE	9	.120	6.56	32	600-4S	405008
10	9.97	8.00	.109	TUBE	-	-	7.50	47	800-4T	405035
10	9.97	8.00	.120	SPHERE	12	.120	8.00	47	800-4S	405009
13-1/4	13.25	10.00	.120	SPHERE	16	.120	10.00	70	1000-4S	405010



### Reducing Crosses



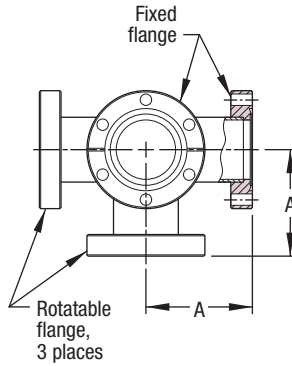
- Del-Seal™ CF to Del-Seal™ CF connections of different size flanges
- Each axis has one rotatable flange

MAIN FLANGES			A	REDUCER FLANGES			B	WT LB	REFERENCE	PART NUMBER
FLANGE	TUBE	WALL		FLANGE	TUBE	WALL				
2-1/8	1.00	.065	2.04	1-1/3	.75	.035	2.50	2	100-4-075	405036
2-3/4	1.50	.065	2.46	1-1/3	.75	.035	2.75	2-1/2	150-4-075	405037
2-3/4	1.50	.065	2.46	2-1/8	1.00	.065	2.30	2-1/2	150-4-100	405038
3-3/8	2.00	.065	3.23	1-1/3	.75	.035	2.13	3-1/2	200-4-075	405051
3-3/8	2.00	.065	3.23	2-1/8	1.00	.065	2.55	4	200-4-100	405039
3-3/8	2.00	.065	3.23	2-3/4	1.50	.065	2.71	4-1/2	200-4-150	405040
4-1/2	2.50	.065	3.38	2-3/4	1.50	.065	2.96	5	250-4-150	405041
4-1/2	2.50	.065	3.38	3-3/8	2.00	.065	3.44	6	250-4-200	405042
4-5/8	3.00	.065	3.63	2-3/4	1.50	.065	3.21	7-1/2	300-4-150	405043
4-5/8	3.00	.065	3.63	3-3/8	2.00	.065	3.73	8-1/2	300-4-200	405044
4-5/8	3.00	.065	3.63	4-1/2	2.50	.065	3.63	8-1/2	300-4-250	405045
6	4.00	.083	4.31	3-3/8	2.00	.065	4.23	12-1/2	400-4-200	405046
6	4.00	.083	4.31	4-1/2	2.50	.065	4.13	12-1/2	400-4-250	405047
6	4.00	.083	4.31	4-5/8	3.00	.065	4.13	12-1/2	400-4-300	405048
8	6.00	.109	5.50	4-5/8	3.00	.065	5.13	22	600-4-300	405049
8	6.00	.109	5.50	6	4.00	.083	5.31	24	600-4-400	405050

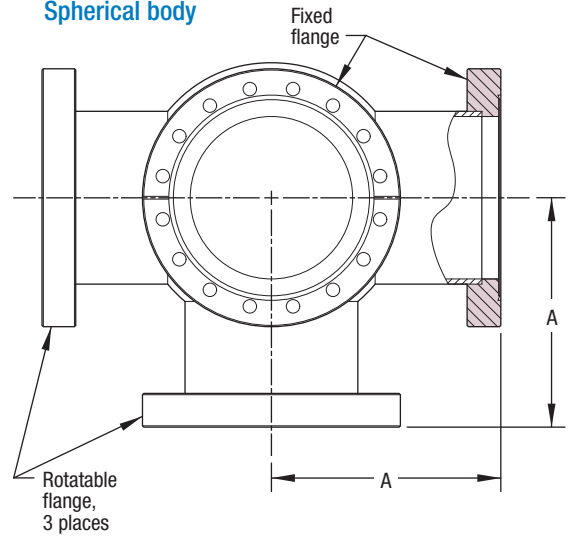
### Five-Way Crosses



**Tubular body**



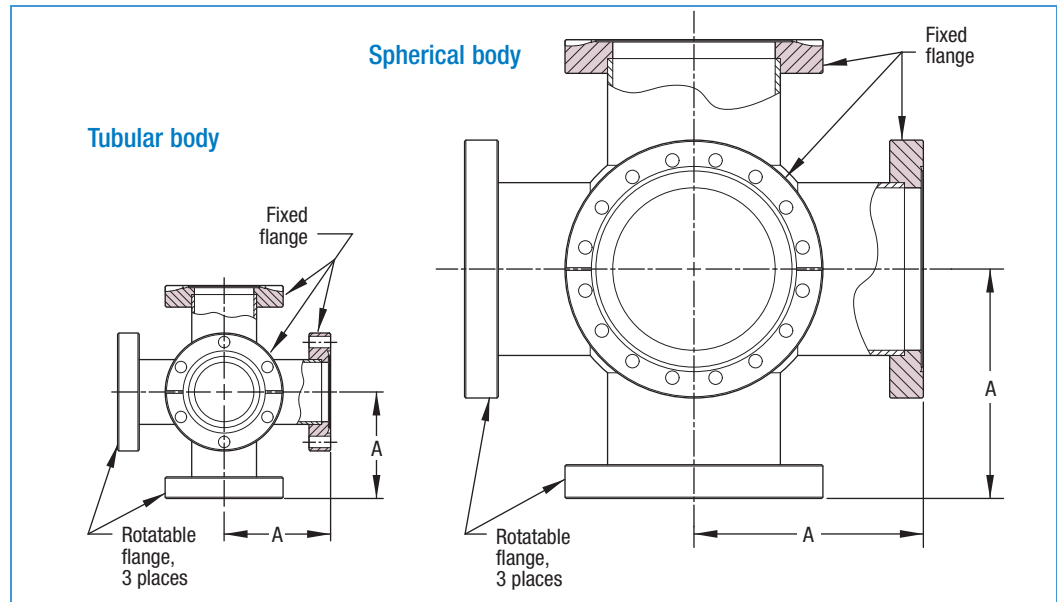
**Spherical body**



- Each axis has one rotatable flange
- Body type dependent on tube size

FLANGE NOM.	FLANGE O.D.	TUBE O.D.	TUBE WALL	BODY TYPE	BODY DIMEN. O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	TUBE	-	-	1.50	3/4	075-5	406000
2-1/8	2.11	1.00	.065	TUBE	-	-	2.04	2	100-5	406001
2-3/4	2.73	1.50	.065	TUBE	-	-	2.46	3-1/2	150-5	406002
3-3/8	3.37	2.00	.065	TUBE	-	-	3.21	6-1/2	200-5	406003
4-1/2	4.47	2.50	.120	TUBE	-	-	4.12	13	250-5	406004
4-5/8	4.62	3.00	.120	TUBE	-	-	3.53	14	300-5	406005
6	5.97	4.00	.120	SPHERE	6-1/4	.120	5.31	22	400-5S	406006
6-3/4	6.75	5.00	.120	SPHERE	9	.120	4.93	35	500-5S	406007
8	7.97	6.00	.120	SPHERE	9	.120	6.56	38	600-5S	406008
10	9.97	8.00	.120	SPHERE	12	.120	8.00	60	800-5S	406009
13-1/4	13.25	10.00	.120	SPHERE	16	.120	10.00	94	1000-5S	406010

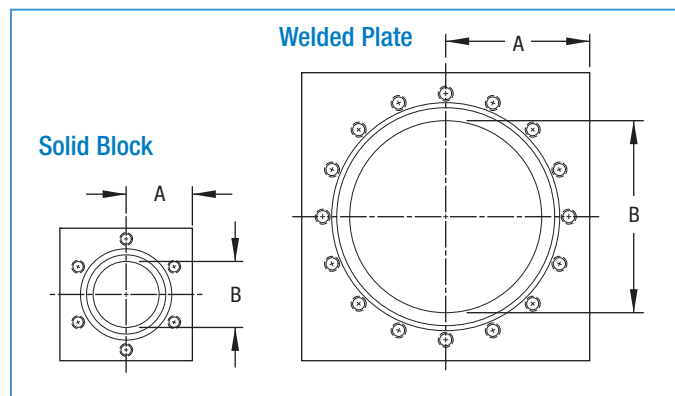
## Six-Way Crosses



- Each axis has one rotatable flange
- Body type dependent on tube size

FLANGE NOM.	FLANGE O.D.	TUBE O.D.	TUBE WALL	BODY TYPE	BODY DIMEN. O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.75	.035	TUBE	-	-	1.50	3/4	075-6	407000
2-1/8	2.11	1.00	.065	TUBE	-	-	2.04	2-1/2	100-6	407001
2-3/4	2.73	1.50	.065	TUBE	-	-	2.46	3-1/2	150-6	407002
3-3/8	3.37	2.00	.065	TUBE	-	-	3.21	7	200-6	407003
4-1/2	4.47	2.50	.120	TUBE	-	-	4.12	16-1/2	250-6	407004
4-5/8	4.62	3.00	.120	TUBE	-	-	3.53	17-1/2	300-6	407005
6	5.97	4.00	.120	SPHERE	6-1/4	.120	5.31	27	400-6S	407006
6-3/4	6.75	5.00	.120	SPHERE	9	.120	4.93	40	500-6S	407007
8	7.97	6.00	.120	SPHERE	9	.120	6.56	44	600-6S	407008
10	9.97	8.00	.120	SPHERE	12	.120	8.00	72	800-6S	407009
13-1/4	13.25	10.00	.120	SPHERE	16	.120	10.00	122	1000-6S	407010

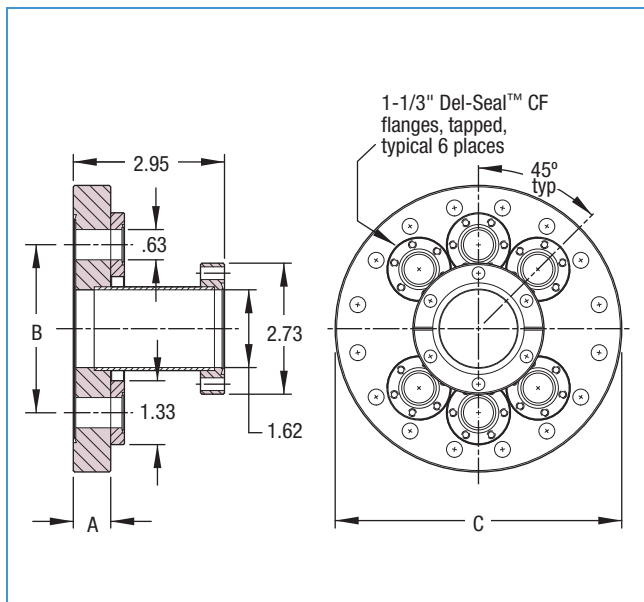
## Cubes



- 1-1/3" to 4-1/2" sizes machined from solid block
- 6" to 10" sizes constructed with welded plates
- Requires special length bolts – refer to hardware listing for each individual flange size

FLANGE NOM.	REF. O.D.	CONSTRUCTION I.D.	WALL	HOLES THREAD	DEPTH	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	.62	SOLID	8-32	.25	.68	1	CU075-6	408000
2-3/4	2.73	1.50	SOLID	.250-28	.37	1.38	3	CU150-6	408001
3-3/8	3.37	2.00	SOLID	.312-24	.37	1.69	5	CU200-6	408002
4-1/2	4.47	2.50	SOLID	.312-24	.50	2.25	8	CU250-6	408003
6	5.97	4.00	.937	.312-24	.50	3.00	16	CU400-6	408004
8	7.97	6.00	.937	.312-24	.50	4.00	30	CU600-6	408005
10	9.97	8.00	.937	.312-24	.50	5.00	45	CU800-6	408006

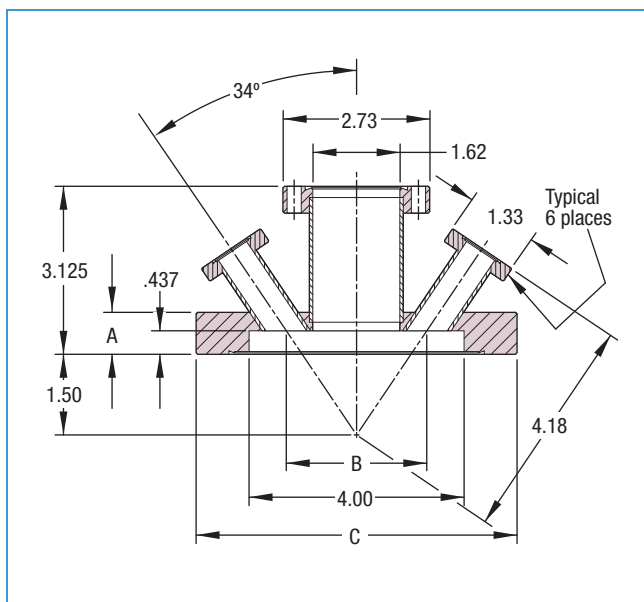
## Straight-In



- Includes six straight-in tapped mini flanges around a 2-3/4" Del-Seal™ CF port
- Assemblies are fully electropolished

DESCRIPTION	A	B	C	WT LB	REFERENCE	PART NUMBER
6" DEL-SEAL FLANGE	.78	3.50	5.97	7	MAF600-6-133T	409006
8" DEL-SEAL FLANGE	.88	4.25	7.97	12	MAF800-6-133T	409010

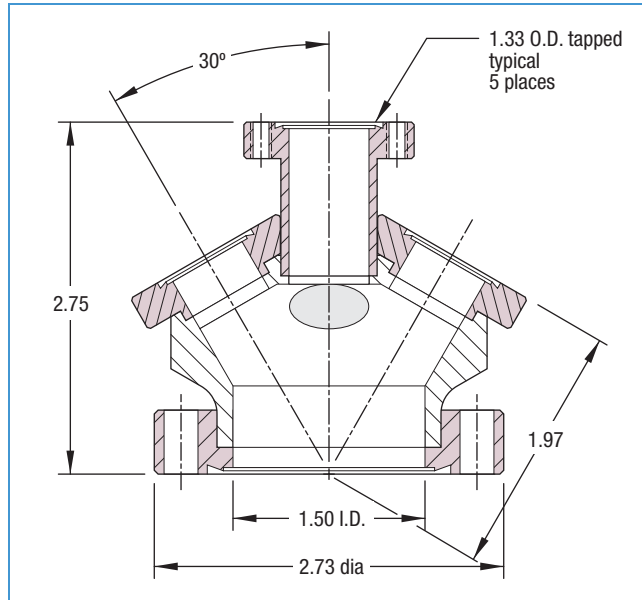
## Angled



- Includes six angled clearance hole mini flanges equally spaced around a 2-3/4" Del-Seal™ CF port
- Assemblies are fully electropolished

DESCRIPTION	A	B	C	WT LB	REFERENCE	PART NUMBER
6" DEL-SEAL FLANGE	.78	2.61	5.97	7	MAF600-133A	409005
8" DEL-SEAL FLANGE	.88	2.61	7.97	12	MAF800-133A	409011

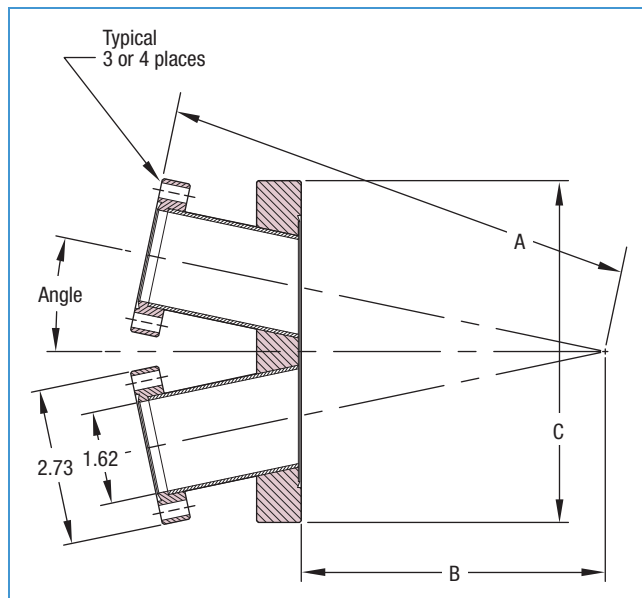
## Multi-Mini Flange



- Provides five tapped mini flanges mounted on a 2-3/4" Del-Seal™ CF port
- Assemblies are fully electropolished
- Requires use of studs on main flange

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
2-3/4" DEL-SEAL FLANGE WITH FIVE TAPPED MINI FLANGES	2-1/2	MMF275-5-133	409004

## Cluster Flange



- Angled ports are configured to focus three or four 2-3/4" Del-Seal™ CF ports at a specified flange-to-sample distance.
- Ports are directed towards the center of a standard Del-Seal™ CF six-way cross, page 73
- Assemblies are fully electropolished

DESCRIPTION	NO. OF PORTS	ANGLE	A	B	C	WT LB	REFERENCE	PART NUMBER
6" DEL-SEAL FLANGE	3	11.9°	8.19	5.31	5.97	12	CF600-3-275	409007
8" DEL-SEAL FLANGE	3	13°	9.84	6.57	7.97	12	CF800-3-275	409009
8" DEL-SEAL FLANGE	4	13°	9.84	6.57	7.97	13	CF800-4-275	409008



Blank Flanges



Bored Flanges

## Features

- UHV rated to  $1 \times 10^{-13}$  Torr
- High temperature rated to 450°C
- Nonrotatable geometry
- Dished head blank or flat blank option
- OFE Copper or optional Viton® elastomer gaskets
- Clearance bolt holes

## Specifications

### Material

Flanges	304ss
Gaskets	OFE Copper
Bolts	300ss

### Fastening

Bolt Type	Hexagonal head
Nut Type	Hexagonal
Size / Torque	.375-24 UNF / 26 lb-ft
	.500-20 UNF / 33 lb-ft
	.625-18 UNF / 33 lb-ft

**Vacuum Range**  $1 \times 10^{-13}$  Torr

**Temperature Range** -200°C to 450°C

**Weight and Dimensions** See table

See page 26 for elastomer specifications

## ULTRAHIGH VACUUM SERIES

Figure 1 Female Blank

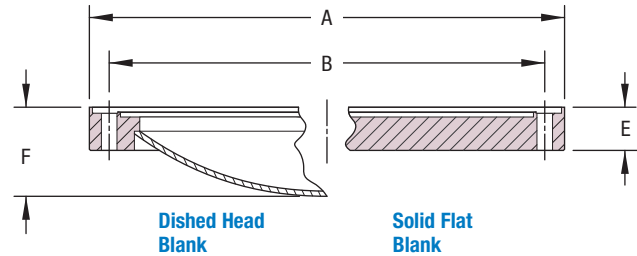


Figure 2 Female Bored

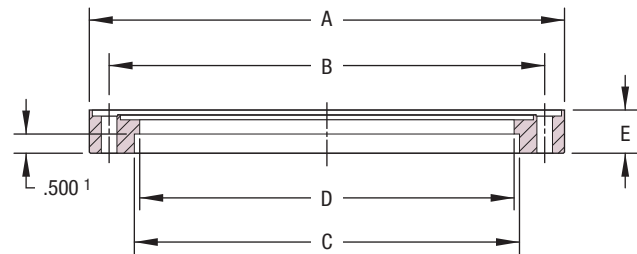


Figure 3 Male Blank

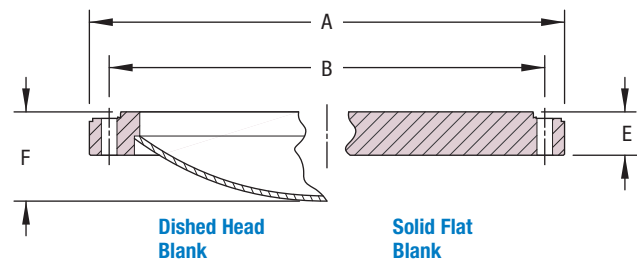
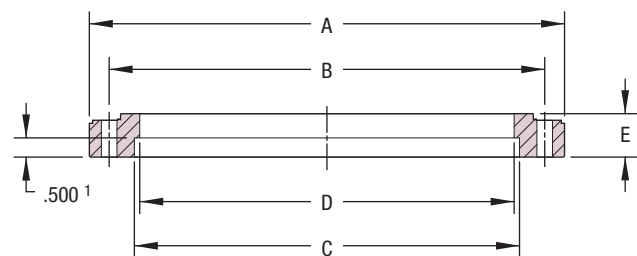
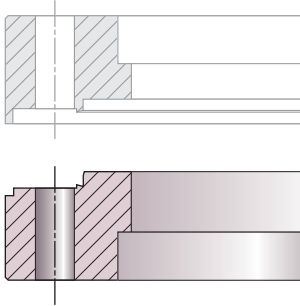


Figure 4 Male Bored



<sup>1</sup> 27-1/8" diameter flanges have a counterbore depth of .625

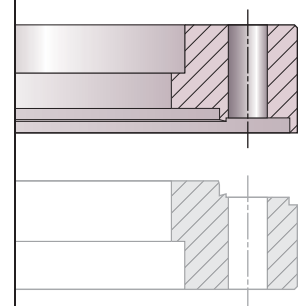
### Male Flange



MDC Wire Seal Flanges provide a convenient method of metal-sealing relatively large diameter vacuum chambers. Applications include bell jars, vacuum furnaces, and a variety of other ultra-high vacuum enclosures. All MDC Wire Seal Flanges are made of 304ss material. To make the seal, an .080" cross-section diameter OFE copper wire gasket is compressed between mating male and female flanges. The geometry of the beveled sealing surface confines the flow of the crushed gasket material, causing it to fill in minor nicks and scratches in the seal area. These flanges can also be used with elastomer gaskets.

Dimensions given in the table below apply to both the male flanges on the left and the female flanges on the right.

### Female Flange



PART NUMBER	REFERENCE	O.D. NOM.	A	B	NO. HOLES	C	D	E	F	WT LB	REFERENCE	PART NUMBER
180000	WSF12-00M	12-3/8	12.375	11.343	24	-	BLANK	1.125	2.33	15	WSF12-00F	180003
180024	WSF12-00MB	12-3/8	12.375	11.343	24	-	BLANK	1.125	-	35	WSF12-00FB	180025
180002	WSF12-10M	12-3/8	12.375	11.343	24	10	9.750	1.125	-	12	WSF12-10F	180001
180004	WSF14-00M	14-5/8	14.625	13.593	32	-	BLANK	1.125	2.33	20	WSF14-00F	180007
180026	WSF14-00MB	14-5/8	14.625	13.593	32	-	BLANK	1.125	-	49	WSF14-00FB	180027
180006	WSF14-12M	14-5/8	14.625	13.593	32	12	11.750	1.125	-	16	WSF14-12F	180005
180008	WSF17-00M	17-1/4	17.250	15.718	36	-	BLANK	1.125	2.60	28	WSF17-00F	180011
180028	WSF17-00MB	17-1/4	17.250	15.718	36	-	BLANK	1.125	-	68	WSF17-00FB	180029
180010	WSF17-14M	17-1/4	17.250	15.718	36	14	13.750	1.125	-	22	WSF17-14F	180009
180012	WSF19-00M	19-9/16	19.562	17.875	36	-	BLANK	1.312	3.04	41	WSF19-00F	180015
180030	WSF19-00MB	19-9/16	19.562	17.875	36	-	BLANK	1.312	-	105	WSF19-00FB	180031
180014	WSF19-16M	19-9/16	19.562	17.875	36	16	15.750	1.312	-	34	WSF19-16F	180013
180016	WSF22-00M	22-1/8	22.125	20.187	36	-	BLANK	1.500	3.50	61	WSF22-00F	180019
180032	WSF22-00MB	22-1/8	22.125	20.187	36	-	BLANK	1.500	-	155	WSF22-00FB	180033
180018	WSF22-18M	22-1/8	22.125	20.187	36	18	17.750	1.500	-	51	WSF22-18F	180017
180020	WSF27-00M	27-1/8	27.125	25.843	40	-	BLANK	1.750	4.43	76	WSF27-00F	180023
180034	WSF27-00MB	27-1/8	27.125	25.843	40	-	BLANK	1.750	-	276	WSF27-00FB	180035
180022	WSF27-24M	27-1/8	27.125	25.843	40	24	23.750	1.750	-	60	WSF27-24F	180021

### Hardware



- Bolt Sets include bolts, nuts and flat washers.
- Copper wire gaskets .080" cross-section diameter
- Viton O-rings .070" cross-section diameter (nominal 1/16")

USE ON FLANGE	DESCRIPTION	THREAD SIZE	BOLT LENGTH	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
12-3/8	HEX HEAD BOLT	.375-24	2-1/2	24	5	WBA-100	190016
12-3/8	GASKET, COPPER	-	-	1	1	WGK-100	191050
12-3/8	GASKET, VITON	-	-	1	1	WGK-100V	540007
14-5/8	HEX HEAD BOLT	.375-24	2-3/4	32	5	WBA-120	190017
14-5/8	GASKET, COPPER	-	-	1	1	WGK-120	191051
14-5/8	GASKET, VITON	-	-	1	1	WGK-120V	540008
17-1/4	HEX HEAD BOLT	.500-20	2-3/4	36	10	WBA-140	190018
17-1/4	GASKET, COPPER	-	-	1	1	WGK-140	191052
17-1/4	GASKET, VITON	-	-	1	1	WGK-140V	540009
19-9/16	HEX HEAD BOLT	.500-20	3	36	15	WBA-160	190019
19-9/16	GASKET, COPPER	-	-	1	1	WGK-160	191053
19-9/16	GASKET, VITON	-	-	1	1	WGK-160V	540010
22-1/8	HEX HEAD BOLT	.625-18	3-1/2	36	20	WBA-180	190020
22-1/8	GASKET, COPPER	-	-	1	1	WGK-180	191054
22-1/8	GASKET, VITON	-	-	1	1	WGK-180V	540011
27-1/8	HEX HEAD BOLT	.625-18	4	40	25	WBA-240	190021
27-1/8	GASKET, COPPER	-	-	1	1	WGK-240	191055
27-1/8	GASKET, VITON	-	-	1	1	WGK-240V	540012



Kwik-Flange™ ISO KF Assembly

### Features

- Vacuum rated to  $1 \times 10^{-8}$  Torr
- Bakeable to 150°C
- Fast connect and disconnect
- Economical reusable fittings
- Genderless geometry
- Rotatable bolt ring adapter
- Elastomer gasket seal
- Varied fastening methods
- ISO KF and LF compatible
- Specialty fittings available
- Type 304 stainless steel construction

MDC's Kwik-Flange™ ISO KF components are an economical system of reusable interfacing stainless steel vacuum fittings for tube sizes ranging from 1/2" through 2" diameters. These flanges can operate in high vacuum environments to pressures in the  $1 \times 10^{-8}$  Torr range. The Kwik-Flange™ ISO KF flange system is ideally suited for applications requiring rapid and frequent assembly and disassembly. MDC ISO KF flanges comply with all ISO specifications for vacuum mounting hardware and are compatible with most third party ISO KF flanges and components.

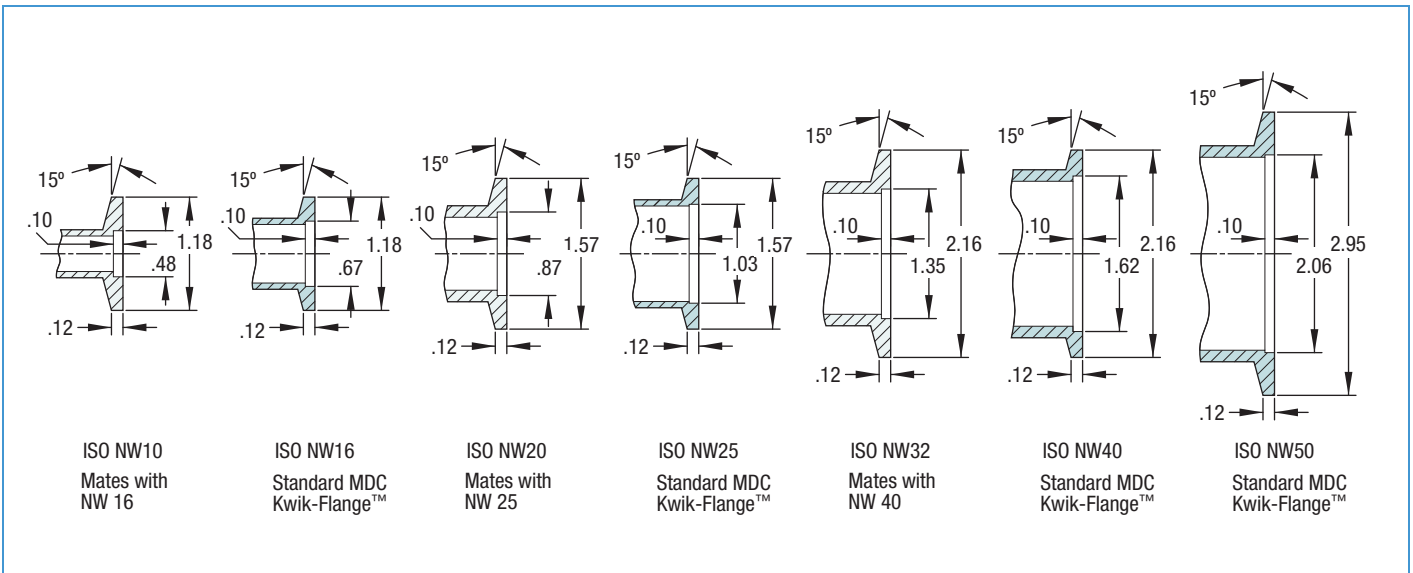
The primary method of fastening and sealing a Kwik-Flange™ is achieved by a hinged radial clamp that provides uniform compression of an elastomer gasket secured between two mating flanges. The elastomer gasket is mounted on a stainless steel centering ring with tubular rims or extensions that protrude on either side of the gasket. These rims or extensions fit into locator grooves on the respective mating flanges and conveniently center the gasket between the flanges prior to sealing. The seal is made on the flat surfaces outside the locator groove or counterbore. The seal can be made quickly by finger-tightening a wing nut on the all-metal hinged aluminum clamp or by securing bolts in an alternate crisscross pattern on the aluminum bulkhead style clamps. In both cases a uniform pressure is applied around the outer flange surfaces to make a reliable seal.

The MDC Kwik-Flange™ ISO KF family of modular building-block components includes

all of the commonly used standard hardware and fittings. Virtually all standard MDC feedthroughs and accessories are available for use with Kwik-Flange™ ISO KF flanges.

Reducer flanges are available to connect different size ISO components. This catalog includes ISO KF and ISO LF reducer flanges for KF to KF, KF to LF and LF to LF flange combinations. Hybrid adapters are available to connect ISO KF components to other non ISO vacuum fittings and mounts. These include Del-Seal™ CF metal seal flanges, ANSI ASA flanges, Swagelok® compression tube fittings and VCR® metal gasket tube fittings, national pipe thread fitting, etc. For more details and information on hybrid adapters please reference Section 1.5 of this catalog.

MDC Kwik-Flange™ ISO KF flanges are available in four standard maximum tube sizes including 3/4", 1", 1-1/2" and 2" diameters. Each of these basic flanges are then offered in weldable formats, prepped for varying smaller tube sizes. Typically, U.S. tube sizes are specified in inches and identified by their outside diameters. MDC standard ISO KF flange size designations are as follows... K075 for 0.75", K100 for 1.00", K150 for 1.50" and K200 for 2.00" tube diameters. It's worth mentioning that, with the exception of the centering ring locator diameter, three of the ISO KF flanges depicted in the diagram below, namely NW 10, 20 and 32, are identical to NW 16, 25 and 40 respectively. These latter flanges being the standard for all of MDC's ISO KF fitted products. Customers having vacuum





equipment fitted with NW 10, 20 and 32 flanges can mate them with MDC NW 16, 25 and 40, respectively, by using MDC's reducer centering ring. The reducer centering ring is constructed with two different size tubular rims or extensions which mate with the respective flange size centering ring locator groove or counterbore.

As previously noted, Kwik-Flange™ ISO KF flanges provide a vacuum mount interface for tube diameters up to 2.00 inches. For tube diameters above this, Large-Flange™ ISO LF flanges are used. Kwik-Flange™ and Large-Flange™ flanges are part of one and the same family of ISO standard elastomer sealed mounts. Together they provide a complete range of vacuum mounts for 0.75 to 20.0 inch diameter tubes. ISO KF and LF sealing mechanisms are similar but their fastening and clamping methods differ. Due to the wide variation of references used by ISO flange manufacturers, MDC emphasizes the use of the standard ISO NW reference. Note that for all practical purposes, NW and DN references are identical. Large-Flange™ ISO LF flanges are presented immediately after the Kwik-Flange™ ISO KF flanges.

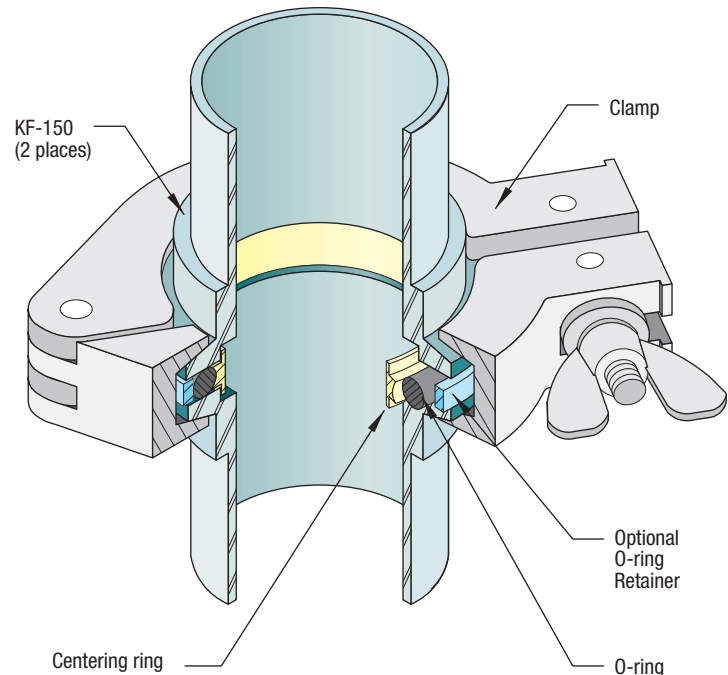
In general, MDC components compare with international components using an inch-to-millimeter ratio. U.S. sizes refer to a tube's outside diameter, whereas international sizes refer to a tube's inside diameter. The chart below gives a quick comparison between inch and metric ISO flange sizes.

All dimensions in this catalog are given in inches unless specified otherwise.

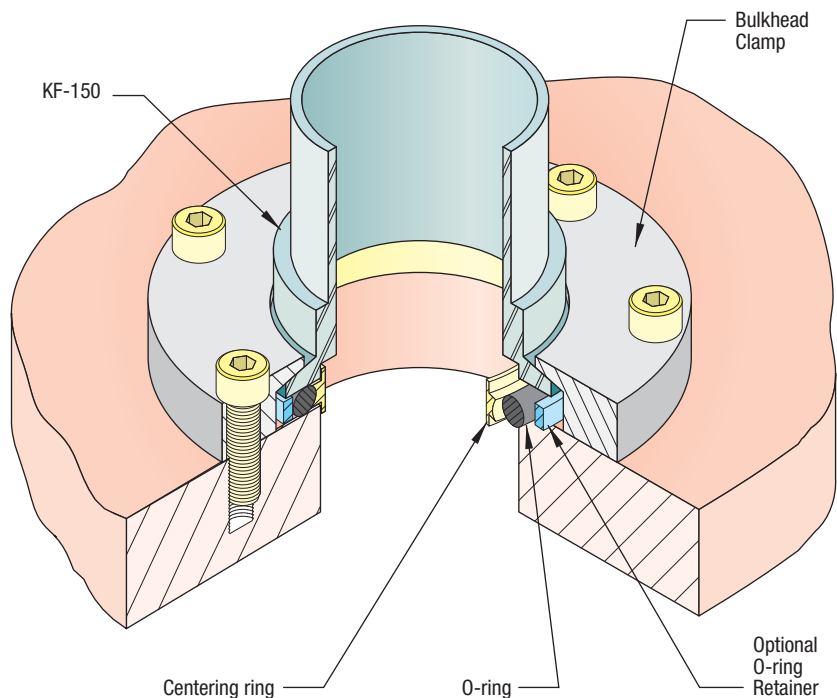
### Inch-Metric ISO Comparison

MDC	O.D.		I.D.	
	Inches	ISO	mm	Inches
K075	.75	NW16	16	.63
K100	1.00	NW25	25	.98
K150	1.50	NW40	40	1.57
K200	2.00	NW50	50	1.97
L250	2.50	NW63	63	2.48
L300	3.00	NW80	80	3.15
L400	4.00	NW100	100	3.94
L600	6.00	NW160	160	6.30
L800	8.00	NW200	200	7.87
L1000	10.00	NW250	250	9.84
L1200	12.75	NW320	320	12.60
L1600	16.00	NW400	400	15.75
L2000	20.00	NW500	500	19.69

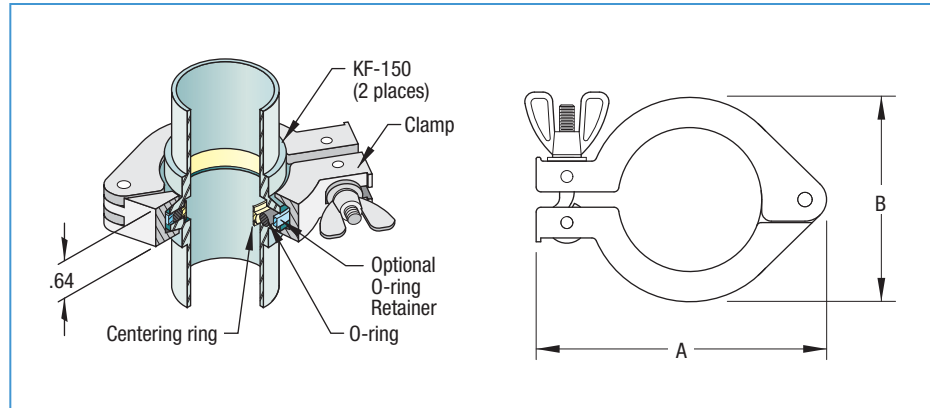
Kwik-Flange™ ISO KF  
Typical Installation



Bulkhead Clamp  
Typical Installation



### Hinged Clamp



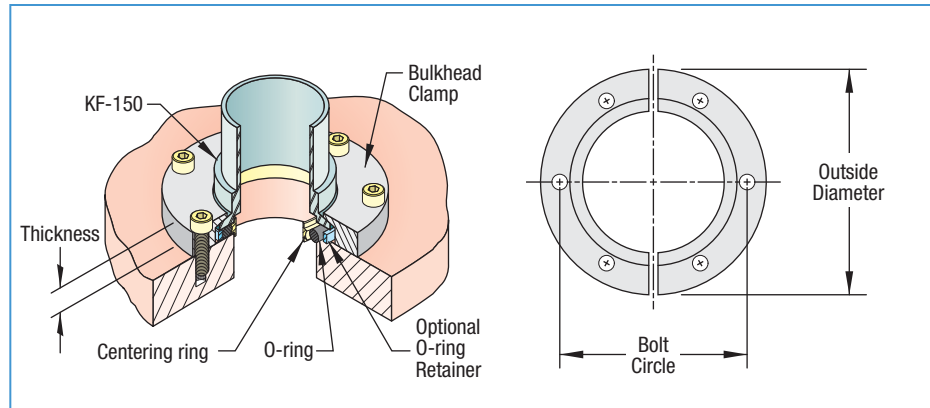
#### Features

- Fastens ISO KF Kwik-Flange™ of comparable size
- Quick make and break
- Stainless steel wing nut and bolt
- Aluminum clamp construction
- Requires centering ring with elastomer gasket

Hinged Clamp assemblies are the most commonly used method for making Kwik-Flange™ vacuum seal connections. Prior to clamping, flanges can be rotated 360° and accept self-locating centering ring seals. Pressure is applied uniformly around the 15° outer surface of both flanges by finger-tightening the single wing nut until the first metal-to-metal contact is made between the spacing lips of the centering ring and the inner surface of the mating flanges. This compresses the O-ring between the flanges and makes the vacuum seal.

FLANGE SIZE	TUBE SIZE	A	B	PART NUMBER
NW16	1/2 - 3/4	2.77	1.63	701000
NW25	1	3.14	2.00	701001
NW40	1-1/2	3.78	2.66	701002
NW50	2	4.54	3.44	701003

### Bulkhead Clamp



#### Features

- Fastens ISO KF Kwik-Flange™ directly to flat plates
- Bolt fastening
- Split ring geometry
- Aluminum construction
- Requires centering ring with elastomer gasket

Bolted bulkhead clamps are commonly used to fasten Kwik-Flange™ ISO KF components to flat chamber walls or baseplates. Use of this product requires customer machining of six or eight 10-32 UNC threaded bolt holes on the mounting surface. Once a clamp has been positioned and aligned with the mating bolt holes, a vacuum seal is made by alternately wrench-tightening opposing pairs of bolts. A complete Bulkhead Clamp Assembly consists of two semicircular clamps, six or eight 10-32 x 5/8 inch bolts and washers.

FLANGE SIZE	NO. BOLTS	THK	BC	OD	PART NUMBER
NW16	6	.36	1.50	2.00	716000
NW25	6	.39	1.89	2.37	716001
NW40	6	.37	2.44	2.94	716002
NW50	8	.40	3.25	3.75	716003

### Centering Rings



### Features

- Standard ring mates two ISO KF Kwik-Flanges™ of equal size
- Reducer ring mates two ISO KF Kwik-Flanges™ of unequal sizes
- Includes elastomer gasket
- Stainless steel or aluminum construction

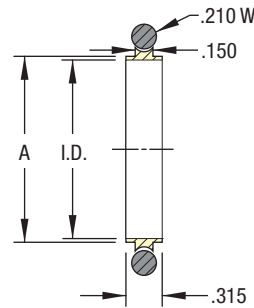
### O-Ring Retainer



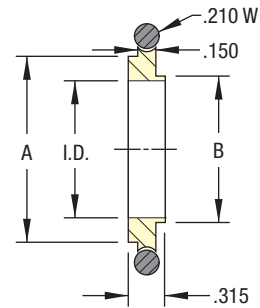
### Features

- Supports O-ring outside diameter during pressure burst
- Not for sustained pressures above one atmosphere
- Stainless steel construction

### Standard Centering Ring



### Reducer Centering Ring



Centering ring assemblies are placed between two ISO flanges with matching outer diameters. The widest portion of the centering ring rests inside a centering ring locator groove (blank flange) or counterbore (bored flange) on the Kwik-Flange™. The O-ring rests on the flat polished surface *outside* the locator groove or counterbore. Sizes in the table to the right apply to all variations of centering ring and elastomer combinations. Reference and part numbers are given with individual flanges.

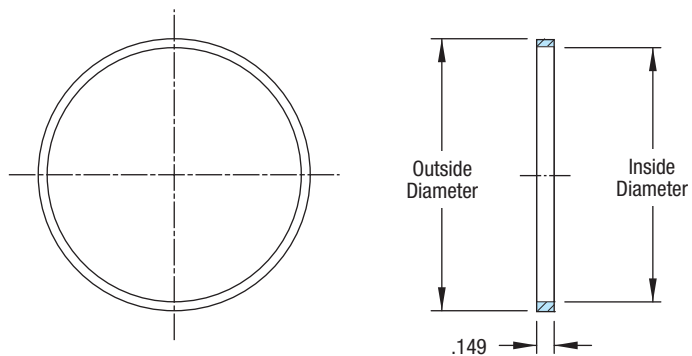
FLANGE SIZE	A	B	ID	O-RING ID	PART NUMBER
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#### Standard Centering Ring

NW16	.66	-	.63	.73	710000
NW25	1.02	-	.97	1.10	710001
NW40	1.61	-	1.55	1.60	710002
NW50	2.05	-	1.97	2.10	710003

#### Reducer Centering Ring

NW16-10	.67	.47	.39	.73	710010
NW25-20	1.02	.87	.83	1.10	710011
NW40-32	1.61	1.34	1.26	1.60	710012



Place an O-ring retainer over a centering ring assembly which is already centered on a single flange face. Place the second flange over the centering ring and O-ring retainer and secure with a hinged clamp. Note that all MDC products are intended for vacuum applications only.

FLANGE ISO REF.	TUBE SIZE	OD	ID	PART NUMBER
NW16	3/4	1.31	1.16	710025
NW25	1	1.70	1.56	710026
NW40	1-1/2	2.31	2.16	710027
NW50	2	2.75	2.67	710028



Large-Flange™ ISO LF flange assembly

### Features

- Vacuum rated to  $1 \times 10^{-8}$  Torr
- Bakeable to 150°C
- Fast connect and disconnect
- Economical reusable fittings
- Genderless geometry
- Rotatable bolt ring adapter
- Elastomer gasket seal
- Varied fastening methods
- ISO KF and LF compatible
- Specialty fittings available
- Type 304 stainless steel construction

### Inch-Metric ISO Comparison

MDC	O.D.		I.D.	
	Inches	ISO	mm	Inches
K075	.75	NW16	16	.63
K100	1.00	NW25	25	.98
K150	1.50	NW40	40	1.57
K200	2.00	NW50	50	1.97
L250	2.50	NW63	63	2.48
L300	3.00	NW80	80	3.15
L400	4.00	NW100	100	3.94
L600	6.00	NW160	160	6.30
L800	8.00	NW200	200	7.87
L1000	10.00	NW250	250	9.84
L1200	12.75	NW320	320	12.60
L1600	16.00	NW400	400	15.75
L2000	20.00	NW500	500	19.69

MDC's Large-Flange™ ISO LF components are an economical system of reusable and interfacing stainless steel vacuum fittings for tube sizes ranging from 2-1/2" through 20" diameters. Large-Flange™ ISO LF flanges pick up where the Kwik-Flange™ ISO KF system leaves off. These flanges can operate in high vacuum environments to pressures in the  $1 \times 10^{-8}$  Torr range. The Large-Flange™ ISO LF flange system is ideally suited for applications requiring rapid and frequent assembly and disassembly. MDC ISO LF flanges comply with all ISO specifications for vacuum mounting hardware and are compatible with most third party ISO LF flanges and components.

The primary method of fastening and sealing a Large-Flange™ is achieved by using multiple double-claw clamp assemblies to provide uniform compression of an elastomer gasket trapped between two mating flanges. The elastomer gasket is mounted on an aluminum centering ring that has tubular rims or extensions that protrude on either side of the gasket. These rims or extensions fit into centering ring locator grooves or counterbores on the corresponding mating flanges and conveniently center the gasket between the flanges prior to sealing. A reliable seal is then made by tightening bolts in an alternating crisscross pattern and thus applying uniform pressure around the entire flange sealing surface.

Other fastening methods include single claw clamps, bolted rotatable, bolted nonrotatable and non ISO standard MDC band clamps. Geometries for each fastening method are depicted at the bottom of these two pages.

Single claw clamps are ideally suited for applications where one of the mating flanges is flush mounted and fitted with threaded bolt holes. This is typical on most MDC gate

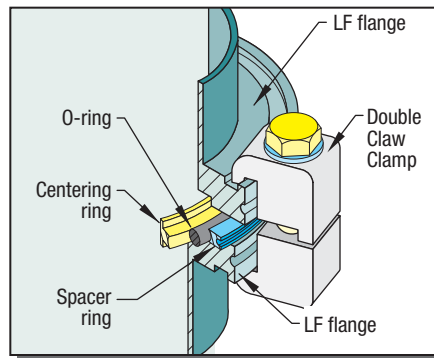
valves constructed with Large-Flange™ ISO LF port flanges. Both the double and single claw clamp fasteners provide unlimited rotation or positioning of mating flanges prior to final tightening of bolts.

Bolted rotatable adapter rings provide a convenient way of fastening claw style flanges to threaded ISO LF flanges, without the use of individual claw clamps. Rotatable bolt rings are ideally suited for use in applications where low profile geometry is required.

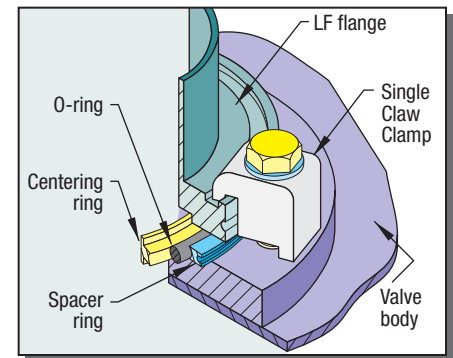
Bolted nonrotatable Large-Flange™ ISO LF flanges use bolts for fastening and are typically used where single claw fasteners are not desirable. They, too, are ideally suited for use in applications where low profile geometry is required, but do not offer rotatable construction.

Since the ISO LF standard does not provide the convenience of hinged clamping, MDC developed its own and unique band-clamp flange system that addresses this problem. The band-clamp style flanges are a modification of the Large-Flange™ ISO LF flange system. They provide the convenience of Kwik-Flange™ ISO KF hinged clamps for tube sizes from 2-1/2 to 8 inches in diameter. The band clamp uses a stainless steel strap fitted with an eye bolt and wing nut for quick assembly or disassembly.

The MDC Large-Flange™ ISO LF family of modular building-block components includes all of the commonly used standard hardware and fittings. Virtually all standard MDC feedthroughs and accessories are available for use with Large-Flange™ ISO LF flanges. Reducer flanges are available to connect different size ISO components. This section includes ISO KF and ISO LF reducer flanges for KF to KF, KF to LF and LF to LF flange



Double Claw Assembly



Single Claw Assembly

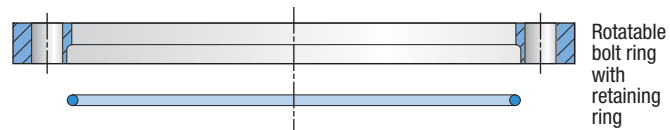
combinations. Hybrid adapters are available to connect ISO LF components to non ISO vacuum fittings and mounts. Some of these include Del-Seal™ CF metal seal flanges, ANSI ASA flanges, Swagelok® compression tube fittings and VCR® metal gasket tube fittings and national pipe thread fittings. For more details and information on hybrid adapters please reference Section 1.5 in this catalog.

MDC Large-Flange™ ISO LF flanges are available in nine standard maximum tube sizes including 2-1/2", 3", 4", 6", 8", 10", 12-3/4", 16" and 20" diameters. Each of these basic flanges are also offered in blanked formats which are suitable for custom modification or to blank-off unused chamber ports. Typically, U.S. tube sizes are specified in inches and identified by their outside diameters. MDC standard ISO LF flange size designations are as follows... L250 for 2.50", L300 for 3.00", L400 for 4.00", L600 for 6.00", L800 for 8.00", L1000 for 10.0", L1200 for 12.75", L1600 for 16.0" and L2000 for 20.0" tube diameters.

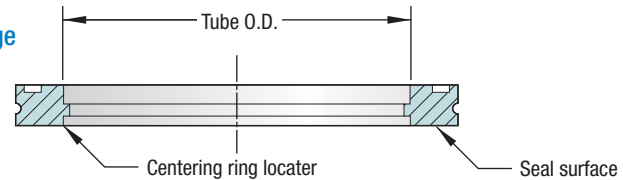
In general, MDC components compare with international components using an inch-to-millimeter ratio. U.S. sizes refer to a tube's outside diameter, whereas international sizes refer to a tube's inside diameter. The chart on the previous page gives a quick comparison between inch and metric ISO flange sizes.

All dimensions in this catalog are given in inches unless specified otherwise.

#### Rotatable bolt ring assembly



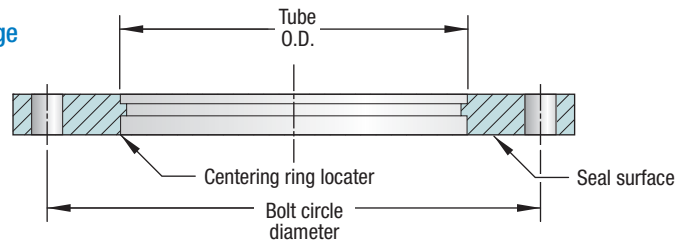
#### Claw clamp flange



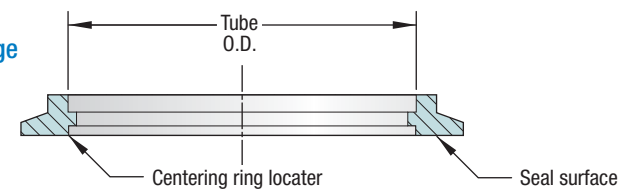
#### Centering ring assembly



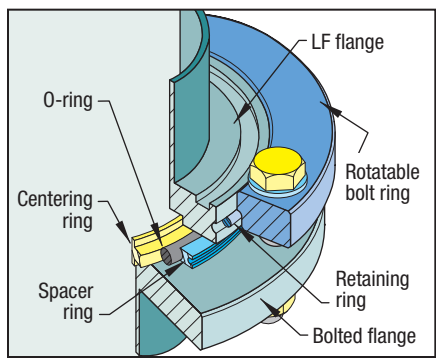
#### Bolted flange



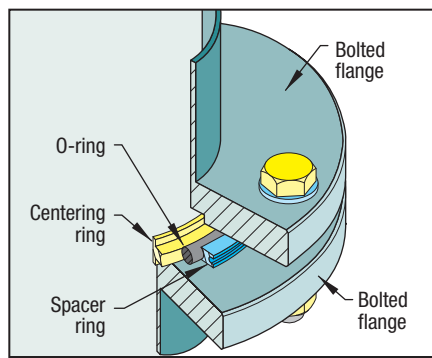
#### Band clamp flange



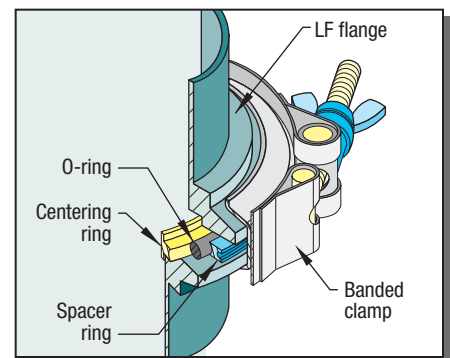
- Intermediate hardware may be required for joining components. These have been omitted for clarity.
- Seal surface is outside the centering ring locator groove (blank flanges) or counterbore (bored flanges).



Bolted Rotatable Assembly

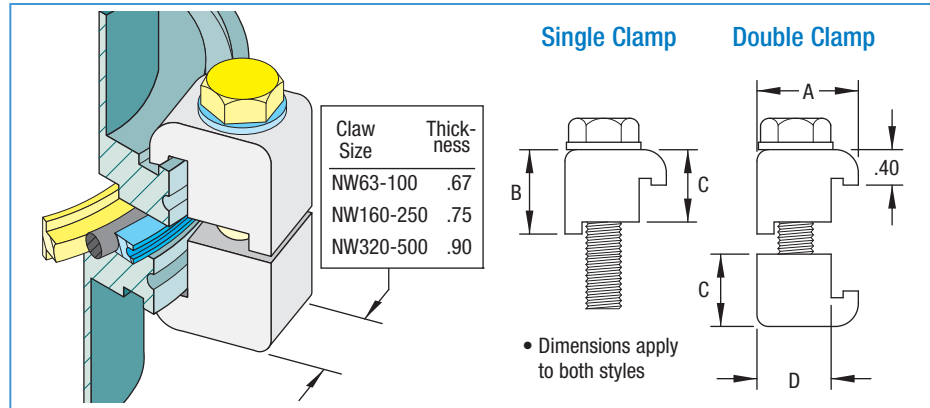


Bolted Nonrotatable Assembly



Band clamp Assembly

### Claw Clamp



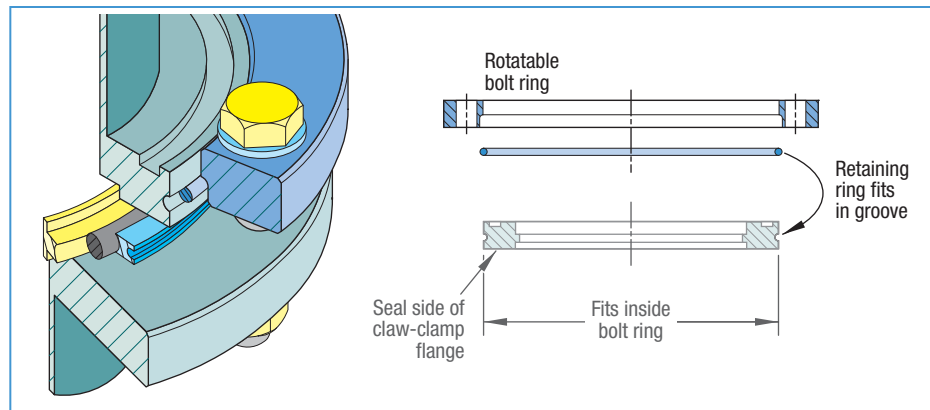
### Features

- Fastens ISO LF Large-Flange™ of comparable size
- Quick make and break
- Zinc plated steel bolt
- Aluminum claw construction
- Requires centering ring with elastomer gasket

Double Claw-Clamp Assemblies are commonly used for making Large-Flange™ vacuum seal connections. Assembly is simplified by the 360° rotatable flanges and the self-centering feature of the centering ring. Single Claw-Clamp Assemblies are used to mate a clamp-style Large-Flange™ to a threaded bolt-style Large-Flange™, such as on a gate valve. The vacuum seal is made by compressing the O-ring between the mating flanges. This is done by alternately wrench-tightening opposing pairs of clamps until the first metal-to-metal contact is made between the inner surfaces of the flanges and the spacing lip of the centering ring.

FLANGE SIZE	A	B	C	D	PART NUMBER
<b>Single Clamp</b>					
NW63-100	.94	.93	.79	.64	801000
NW160-250	1.10	.93	.79	.80	801002
NW320-500	1.33	1.18	1.00	1.03	801005
<b>Double Clamp</b>					
NW63-100	.94	.93	.79	.64	802000
NW160-250	1.10	.93	.79	.80	802002
NW320-500	1.33	1.18	1.00	1.03	802005

### Rotatable Bolt Ring



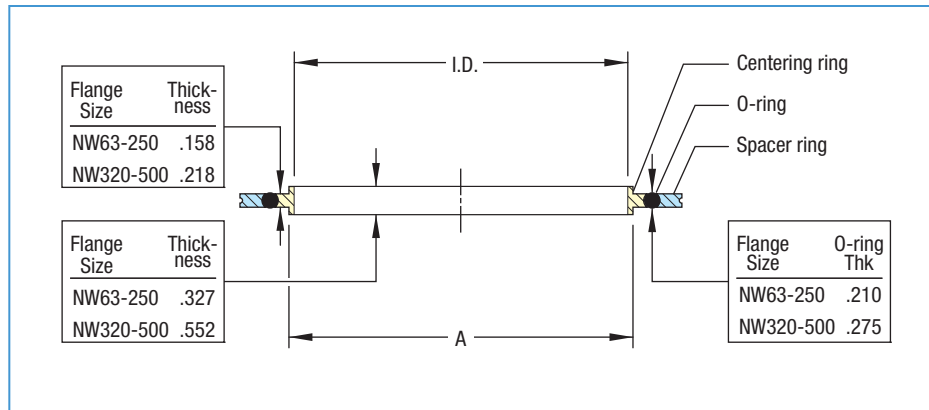
### Features

- Converts claw clamp flange to bolt style Large-Flange™
- Bolt fastening
- Aluminum construction
- Includes nickel plated spring steel retainer
- Does not include claw-clamp flange
- Requires centering ring with elastomer gasket and bolts

Slip the bolt ring over a standard claw-clamp style flange and install the retaining ring. After the bolt ring has been rotated to align the bolt holes, the vacuum seal is made by alternately wrench-tightening opposing pairs of bolts. One complete Rotatable Bolt Ring Assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring.

FLANGE SIZE	RING O.D.	BOLT HOLES	HOLE SIZE	BOLT CIRCLE	PART NUMBER
NW63	5.12	4	.35	4.33	853000
NW80	5.71	8	.35	4.92	853008
NW100	6.50	8	.35	5.71	853001
NW160	8.86	8	.43	7.87	853002
NW200	11.22	12	.43	10.24	853003
NW250	13.19	12	.43	12.20	853004
NW320	16.73	12	.54	15.55	853005
NW400	20.08	16	.54	18.09	853006
NW500	24.02	16	.54	22.83	853007

### Centering Rings



### Features

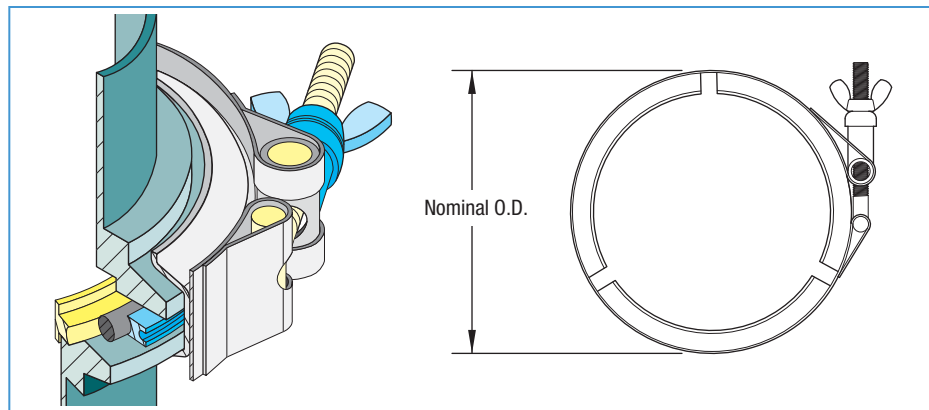
- Standard ring mates ISO LF Large-Flange™ of equal size
- Includes elastomer gasket and spacer ring
- Aluminum or stainless steel construction

Centering ring assemblies are placed between two ISO flanges with matching outer diameters. The widest portion of the centering ring rests inside a locator groove (blank flange) or counterbore (bored flange) on the Large-Flange™. The O-ring rests on the flat polished surface *outside* the groove or counterbore.

Sizes in the table to the right apply to all variations of centering ring and elastomer combinations. Reference and part numbers are given with individual flanges.

FLANGE SIZE	TUBE SIZE	A	ID	O-RING ID	PART NUMBER
NW63	2-1/2	2.73	2.61	2.85	810000
NW80	3	3.26	3.14	3.35	810008
NW100	4	3.99	3.86	4.10	810001
NW160	6	5.99	5.87	5.98	810002
NW200	8	8.35	8.23	8.48	810003
NW250	10	10.25	10.13	10.48	810004
NW320	12-3/4	12.46	12.25	12.48	810005
NW400	16	15.67	15.47	15.48	810006
NW500	20	19.65	19.45	19.46	810007

### Band Clamp

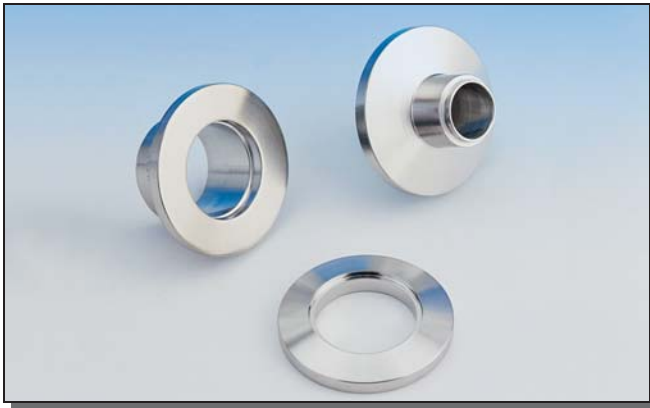


### Features

- Fastens modified ISO Large-Flange™ of comparable size
- Wing nut fastener
- Quick make and break
- Stainless steel construction

Band clamp assemblies are used for fastening MDC's non ISO Large-Flange™. These flanges employ the same centering rings used in their ISO LF counterparts and provide the convenience of Kwik-Flange™ style fastening in Large-Flange™ tube sizes. Pressure is applied uniformly around the 20° outer surface of both flanges by finger-tightening the single wing nut until the first metal-to-metal contact is made between the spacing lips of the centering ring and the inner surface of the mating flanges. This compresses the O-ring between the flanges and makes a vacuum seal.

FLANGE ISO REF.	TUBE SIZE	NOMINAL O.D.	PART NUMBER
NW63	2-1/2	4	540002
NW80	3	4-1/2	540003
NW100	4	5-1/2	540004
NW160	6	7-1/4	540005
NW200	8	9-3/4	540006



Kwik-Flange™ ISO KF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric, nonrotatable geometry
- Elastomer O-ring seal
- Clamp style fastening
- ISO compatible design

### Specifications

#### Material

Flanges	304ss
O-rings	Viton®, Buna-N® or Silicone elastomer
Clamps, hinged & bulkhead	Aluminum

#### Fastening

Clamp Type	Hinged with 10-32 thread
Bulkhead Type	Hexagonal head bolts, 10-32 thread
Nut Type	Hexagonal
Torque	Clamp: Finger tight Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-20°C	200°C	150°C

**Weight** 1/4 lb maximum

**Dimensions** 1.18 OD x .680 ID maximum

## HIGH VACUUM SERIES

Figure 1 Blank

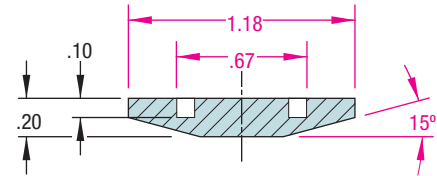


Figure 2 Unbored stub

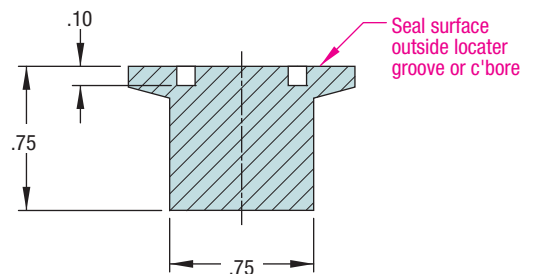


Figure 3 Weld flange - small tube

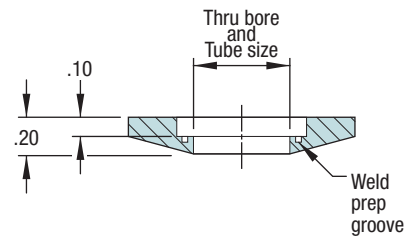


Figure 4 Weld flange

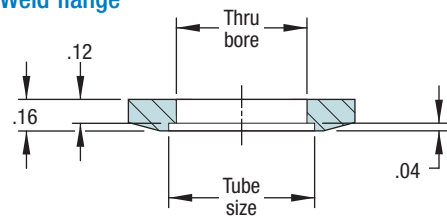
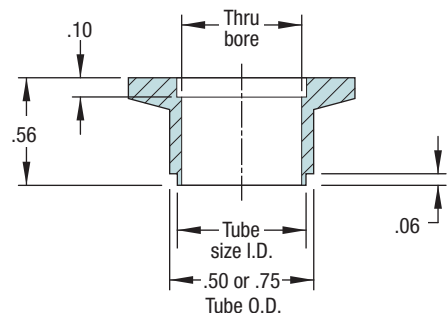


Figure 5 Socket weld



• Magenta colored dimensions are common to all flanges.



### Flange Assembly

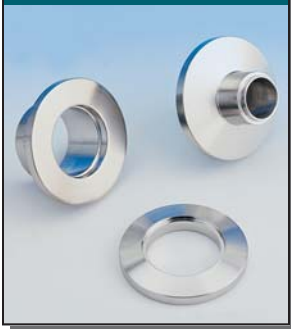


FLANGE ISO REF.	FLANGE O.D.	TUBE SIZE	WELD FLANGES	HINGED CLAMP	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW16	1.18	1/2	K050-W	K075-C	K075-CR	1/2	K050-CA	700000
NW16	1.18	3/4	K075-W	K075-C	K075-CR	1/2	K075-CA	700001

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Kwik-Flange™ assembly consists of two weld flanges, one hinged clamp and one stainless steel centering ring assembly with a Viton® elastomer O-ring.

### Flange



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	TUBE SIZE	THRU BORE	WT LB	REFERENCE	PART NUMBER
BLANK	1	BLANK	-	-	1/4	K075-B	712000
BLANK	2	UNBORED STUB	-	-	1/4	K075-US	715000
3/8	3	WELD	.377	.377	1/4	K075W-038	713005
1/2	3	WELD	.502	.502	1/4	K075W-050	713006
1/2	5	SOCKET WELD	.425	.375	1/4	K050-W	713000
3/4	4	WELD	.760	.680	1/4	K075W-075	713007
3/4	5	SOCKET WELD	.670	.625	1/4	K075-W	713001

### Hardware



DESCRIPTION	PRIMARY MATL	O-RING MATL	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	SS	VITON	1/4	K075-CR	710000
CENTERING RING ASSEMBLY	SS	BUNA-N	1/4	K075-CRB	710004
CENTERING RING ASSEMBLY	SS	SILICONE	1/4	K075-CRS	710021
CENTERING RING ASSEMBLY	AL	VITON	1/4	K075-CRA	710013
CENTERING RING ASSEMBLY	AL	BUNA-N	1/4	K075-CRAB	710017
CENTERING RING ADAPTER NW16 to NW10	SS	VITON	1/4	K075050-CR	710010
CENTERING RING ADAPTER NW16 to NW10	SS	BUNA-N	1/4	K075050-CRB	710029
CENTERING RING ADAPTER NW16 to NW10	SS	SILICONE	1/4	K075050-CRS	710030
O-RING, NON-STANDARD NW10, .60 ID	-	VITON	1/4	K050-O	711004
O-RING, NON-STANDARD NW10, .60 ID	-	BUNA-N	1/4	K050-OB	711020
O-RING, NON-STANDARD NW10, .60 ID	-	SILICONE	1/4	K050-OS	711005
O-RING, REPLACEMENT	-	VITON	1/4	K075-O	711000
O-RING, REPLACEMENT	-	BUNA-N	1/4	K075-OB	711021
O-RING, REPLACEMENT	-	SILICONE	1/4	K075-OS	711006
O-RING RETAINER	SS	-	1/4	K075-ORR	710025
CLAMP, HINGED	AL	-	1/2	K075-C	701000
CLAMP, BULKHEAD	ALUMINUM WITH 6 BOLTS	-	1/2	K075-BC	716000
FLANGE COVER	FLEXIBLE PLASTIC -6 PER PKG.	-	1/4	KFC075	192027



Kwik-Flange™ ISO KF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric, nonrotatable geometry
- Elastomer O-ring seal
- Clamp style fastening
- ISO compatible design

### Specifications

#### Material

Flanges	304ss
O-rings	Viton®, Buna-N® or Silicone elastomer
Clamps, hinged & bulkhead	Aluminum

#### Fastening

Clamp Type	Hinged with 10-32 thread
Bulkhead Type	Hexagonal head bolts, 10-32 thread
Nut Type	Hexagonal
Torque	Clamp: Finger tight Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-20°C	200°C	150°C

**Weight** 1/4 lb maximum

**Dimensions** 1.57 OD x .875 ID maximum

## HIGH VACUUM SERIES

Figure 1 Blank

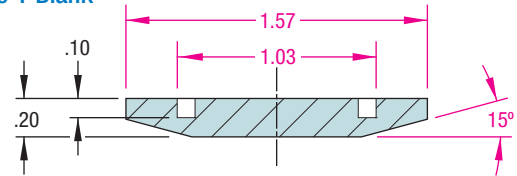


Figure 2 Unbored stub

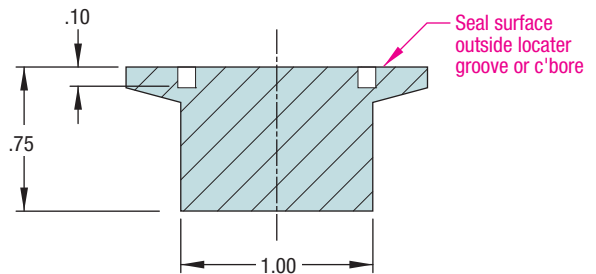


Figure 3 Weld flange - small tube

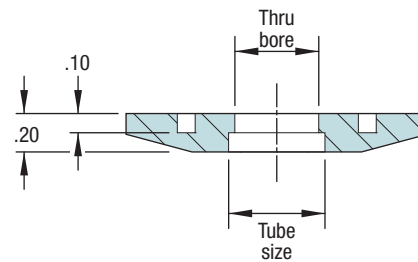


Figure 4 Weld flange

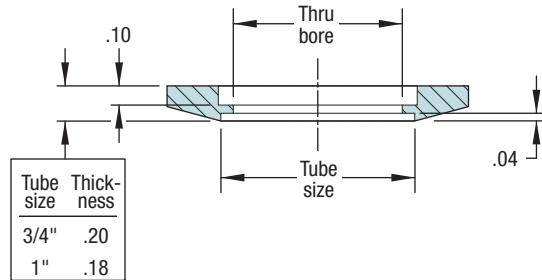
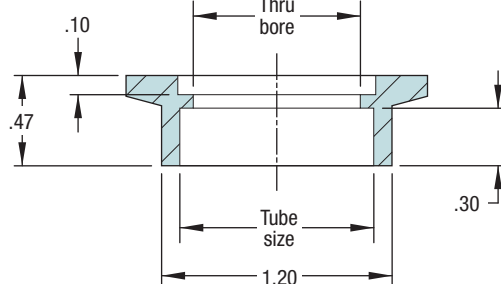


Figure 5 Socket weld



• Magenta colored dimensions are common to all flanges.

### Flange Assembly



FLANGE ISO REF.	FLANGE O.D.	TUBE SIZE	WELD FLANGES	HINGED CLAMP	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW25	1.57	1	K100-W	K100-C	K100-CR	1	K100-CA	700002

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Kwik-Flange™ assembly consists of two weld flanges, one hinged clamp and one stainless steel centering ring assembly with a Viton® elastomer O-ring.

### Flange



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	TUBE SIZE	THRU BORE	WT LB	REFERENCE	PART NUMBER
BLANK	1	BLANK	-	-	1/4	K100-B	712001
BLANK	2	UNBORED STUB	-	-	1/4	K100-US	715001
3/8	3	WELD	.377	.312	1/4	K100W-038	713008
1/2	3	WELD	.502	.437	1/4	K100W-050	713009
3/4	4	WELD	.760	.680	1/4	K100W-075	713010
1	4	WELD	1.010	.880	1/4	K100W-100	713011
1	5	SOCKET WELD	1.010	.870	1/4	K100-W	713002

### Hardware



DESCRIPTION	PRIMARY MATL	O-RING MATL	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	SS	VITON	1/4	K100-CR	710001
CENTERING RING ASSEMBLY	SS	BUNA-N	1/4	K100-CRB	710005
CENTERING RING ASSEMBLY	SS	SILICONE	1/4	K100-CRS	710022
CENTERING RING ASSEMBLY	AL	VITON	1/4	K100-CRA	710014
CENTERING RING ASSEMBLY	AL	BUNA-N	1/4	K100-CRAB	710018
CENTERING RING ADAPTER NW25 to NW20	SS	VITON	1/4	K100087-CR	710011
CENTERING RING ADAPTER NW25 to NW20	SS	BUNA-N	1/4	K100087-CRB	710031
CENTERING RING ADAPTER NW25 to NW20	SS	SILICONE	1/4	K100087-CRS	710032
O-RING, REPLACEMENT	-	VITON	1/4	K100-O	711001
O-RING, REPLACEMENT	-	BUNA-N	1/4	K100-OB	711022
O-RING, REPLACEMENT	-	SILICONE	1/4	K100-OS	711007
O-RING RETAINER	SS	-	1/4	K100-ORR	710026
CLAMP, HINGED	AL	-	1/2	K100-C	701001
CLAMP, BULKHEAD	ALUMINUM WITH 6 BOLTS	-	1/2	K100-BC	716001
FLANGE COVER	FLEXIBLE PLASTIC -6 PER PKG.	-	1/4	KFC100	192028



Kwik-Flange™ ISO KF

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric, nonrotatable geometry
- Elastomer O-ring seal
- Clamp style fastening
- ISO compatible design
- Watercooled fitting available, page 113

## Specifications

### Material

Flanges	304ss
O-rings	Viton®, Buna-N® or Silicone elastomer
Clamps, hinged & bulkhead	Aluminum

### Fastening

Clamp Type	Hinged with 10-32 thread
Bulkhead Type	Hexagonal head bolts, 10-32 thread
Nut Type	Hexagonal
Torque	Clamp: Finger tight Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-20°C	200°C	150°C

**Weight** 1/2 lb maximum

**Dimensions** 2.16 OD x 1.375 ID maximum

## HIGH VACUUM SERIES

Figure 1 Blank

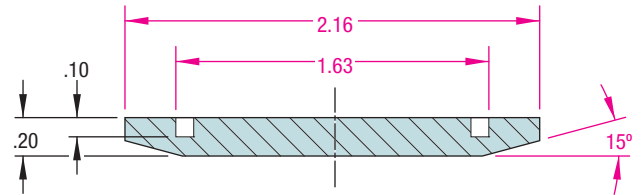


Figure 2 Unbored stub

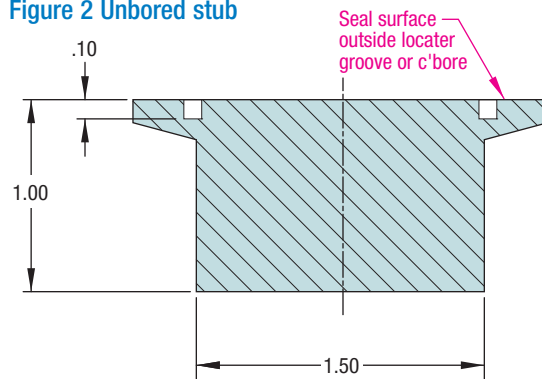


Figure 3 Weld flange - small tube

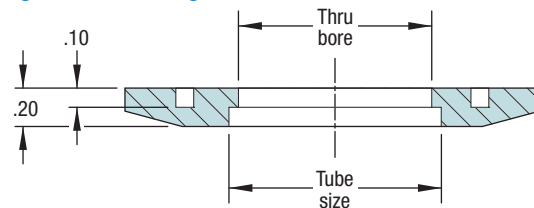


Figure 4 Weld flange

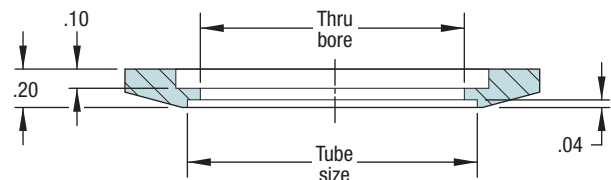
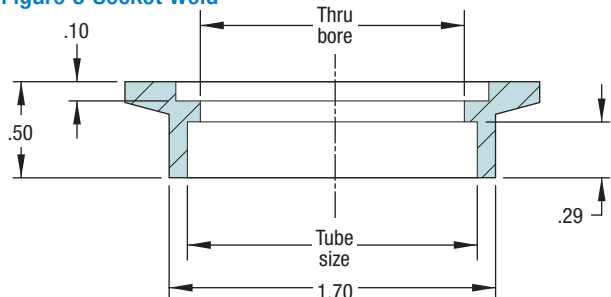


Figure 5 Socket weld



• Magenta colored dimensions are common to all flanges.

### Flange Assembly



FLANGE ISO REF.	FLANGE O.D.	TUBE SIZE	WELD FLANGES	HINGED CLAMP	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW40	2.16	1-1/2	K150-W	K150-C	K150-CR	1	K150-CA	700003

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Kwik-Flange™ assembly consists of two weld flanges, one hinged clamp and one stainless steel centering ring assembly with a Viton® elastomer O-ring.

### Flange



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	TUBE SIZE	THRU BORE	WT LB	REFERENCE	PART NUMBER
BLANK	1	BLANK	-	-	1/4	K150-B	712002
BLANK	2	UNBORED STUB	-	-	1/2	K150-US	715002
3/8	3	WELD	.377	.312	1/4	K150W-038	713012
1/2	3	WELD	.502	.437	1/4	K150W-050	713013
3/4	3	WELD	.760	.680	1/4	K150W-075	713014
1	3	WELD	1.010	.870	1/4	K150W-100	713015
1-1/2	4	WELD	1.510	1.375	1/4	K150W-150	713016
1-1/2	5	SOCKET WELD	1.510	1.375	1/4	K150-W	713003

### Hardware



DESCRIPTION	PRIMARY MATL	O-RING MATL	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	SS	VITON	1/4	K150-CR	710002
CENTERING RING ASSEMBLY	SS	BUNA-N	1/4	K150-CRB	710006
CENTERING RING ASSEMBLY	SS	SILICONE	1/4	K150-CRS	710023
CENTERING RING ASSEMBLY	AL	VITON	1/4	K150-CRA	710015
CENTERING RING ASSEMBLY	AL	BUNA-N	1/4	K150-CRAB	710019
CENTERING RING ADAPTER NW40 to NW32	SS	VITON	1/4	K150137-CR	710012
CENTERING RING ADAPTER NW40 to NW32	SS	BUNA-N	1/4	K150137-CRB	710033
CENTERING RING ADAPTER NW40 to NW32	SS	SILICONE	1/4	K150137-CRS	710034
O-RING, REPLACEMENT	-	VITON	1/4	K150-O	711002
O-RING, REPLACEMENT	-	BUNA-N	1/4	K150-OB	711024
O-RING, REPLACEMENT	-	SILICONE	1/4	K150-OS	711008
O-RING RETAINER	SS	-	1/4	K150-ORR	710027
CLAMP, HINGED	AL	-	3/4	K150-C	701002
CLAMP, BULKHEAD	ALUMINUM WITH 6 BOLTS	-	1/2	K150-BC	716002
FLANGE COVER	FLEXIBLE PLASTIC -6 PER PKG.	-	1/4	KFC150	192029



Kwik-Flange™ ISO KF

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Elastomer O-ring seal
- Clamp style fastening
- ISO compatible design
- Watercooled fitting available, page 113

## Specifications

### Material

Flanges	304ss
O-rings	Viton®, Buna-N® or Silicone elastomer
Clamps, hinged & bulkhead	Aluminum

### Fastening

Clamp Type	Hinged with 10-32 thread
Bulkhead Type	Hexagonal head bolts, 10-32 thread
Nut Type	Hexagonal
Torque	Clamp: Finger tight Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-20°C	200°C	150°C

**Weight** 1/2 lb maximum

**Dimensions** 2.16 OD x 1.375 ID maximum

## HIGH VACUUM SERIES

Figure 1 Blank

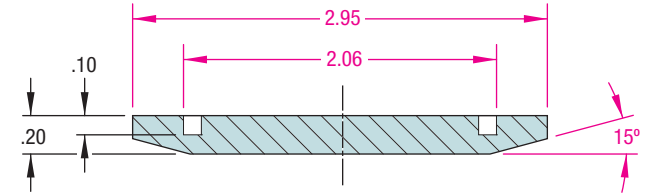


Figure 2 Unbored stub

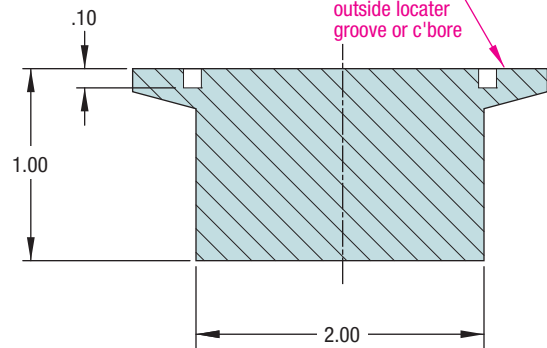


Figure 3 Weld flange - small tube

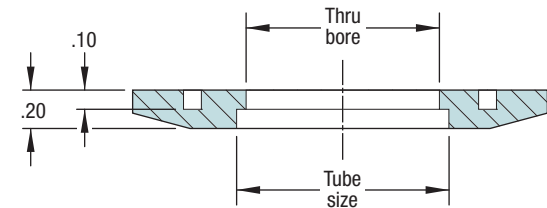


Figure 4 Weld flange

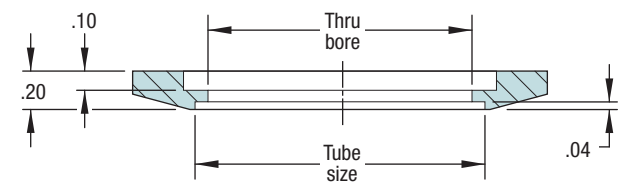
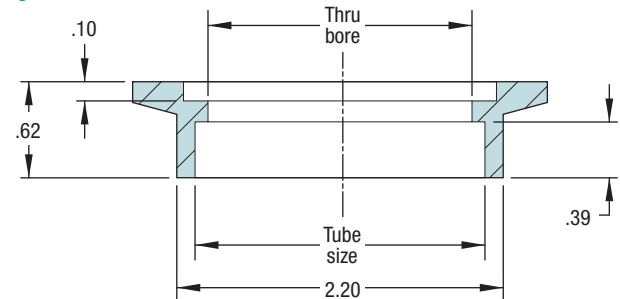


Figure 5 Socket weld



• Magenta colored dimensions are common to all flanges.

### Flange Assembly



FLANGE ISO REF.	FLANGE O.D.	TUBE SIZE	WELD FLANGES	HINGED CLAMP	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW50	2.95	2	K200-W	K200-C	K200-CR	1-1/2	K200-CA	700004

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Kwik-Flange™ assembly consists of two weld flanges, one hinged clamp and one stainless steel centering ring assembly with a Viton® elastomer O-ring.

### Flange



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	TUBE SIZE	THRU BORE	WT LB	REFERENCE	PART NUMBER
BLANK	1	BLANK	-	-	1/4	K200-B	712003
BLANK	2	UNBORED STUB	-	-	1/2	K200-US	715003
3/8	3	WELD	.377	.312	1/4	K200W-038	713017
1/2	3	WELD	.502	.437	1/4	K200W-050	713018
3/4	3	WELD	.760	.680	1/4	K200W-075	713019
1	3	WELD	1.010	.870	1/4	K200W-100	713020
1-1/2	3	WELD	1.510	1.370	1/4	K200W-150	713021
2	4	WELD	2.010	1.875	1/4	K200W-200	713022
2	5	SOCKET WELD	2.010	1.870	1/4	K200-W	713004

### Hardware



DESCRIPTION	PRIMARY MATL	O-RING MATL	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	SS	VITON	1/4	K200-CR	710003
CENTERING RING ASSEMBLY	SS	BUNA-N	1/4	K200-CRB	710007
CENTERING RING ASSEMBLY	SS	SILICONE	1/4	K200-CRS	710024
CENTERING RING ASSEMBLY	AL	VITON	1/4	K200-CRA	710016
CENTERING RING ASSEMBLY	AL	BUNA-N	1/4	K200-CRAB	710020
O-RING, REPLACEMENT	-	VITON	1/4	K200-O	711003
O-RING, REPLACEMENT	-	BUNA-N	1/4	K200-OB	711025
O-RING, REPLACEMENT	-	SILICONE	1/4	K200-OS	711009
O-RING RETAINER	SS	-	1/4	K200-ORR	710028
CLAMP, HINGED	AL	-	1	K200-C	701003
CLAMP, BULKHEAD	AL WITH 8 BOLTS	-	1/2	K200-BC	716003
FLANGE COVER	FLEXIBLE PLASTIC	-6 PER PKG.	1/4	KFC200	192030



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Three methods of fastening
- ISO compatible & modified ISO design
- Watercooled fitting available, page 113

### Specifications

#### Material

Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum
Band clamps	431ss, heat treated

#### Fastening

Claw Clamp	M8-1.25 thread, 3-4 required
Band clamp	.250-28 thread
Bolt Type	Hexagonal head, M8-1.25 thread
Nut Type	Hexagonal
Torque	Band clamps: Finger tight Bolts: 7-10 lb-ft

#### Vacuum Range

$1 \times 10^{-8}$  Torr

#### Temperature Range

	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C

#### Weight

3 lb maximum

#### Dimensions

Clamp style: 3.74 OD x 2.37 ID maximum  
Bolt style: 5.12 OD x 2.37 ID maximum

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

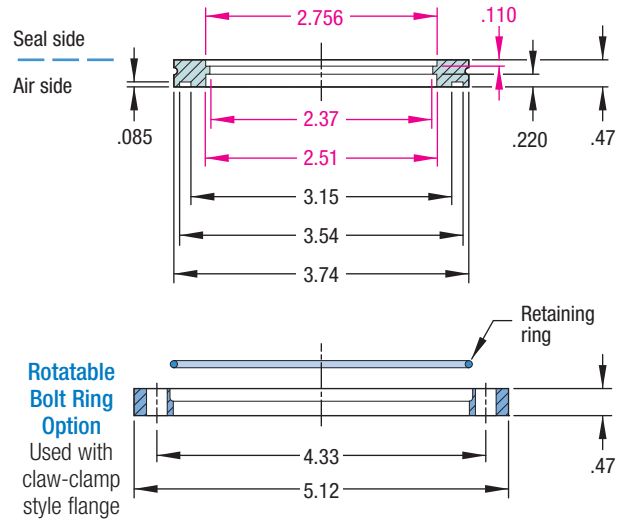


Figure 2 Bolt style

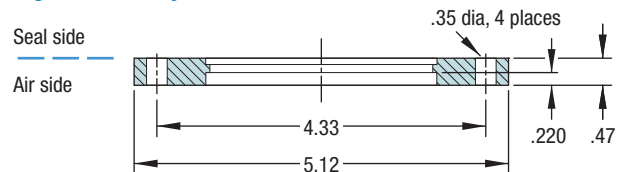


Figure 3 Band clamp style, modified ISO design

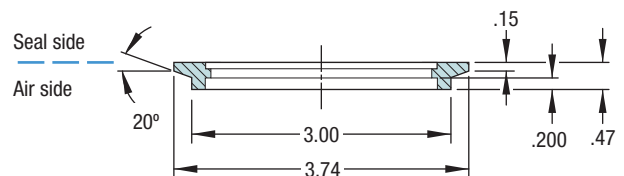
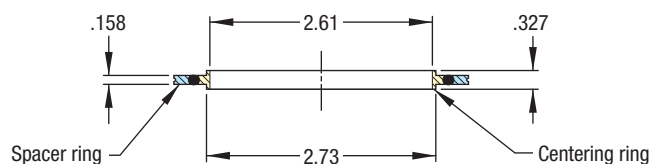


Figure 4 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.





FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW63	2.50	L250-W	DC-8	L250-CR	2-1/2	L250-CA	800000

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, four double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	1	L250-B	812000
2.50	1	WELD	CLAW-CLAMP	1/2	L250-W	813000
-	2	BLANK	BOLT	4	L250-BB	852000
2.50	2	WELD	BOLT	3	L250-BW	850000
-	3	BLANK	BANDED-CLAMP	1	L250-CFB	812014
2.50	3	WELD	BANDED-CLAMP	1/2	L250-CFW	813014

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	2	L250-RBF	853000
RETAINING RING, NICKEL PLATED STEEL	1/4	L250-RR	853020

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L250-CR	810000
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L250-CRB	810020
CENTERING RING ASSEMBLY	SS	VITON	-	1	L250-CRSS	810009
O-RING	-	VITON	-	1/4	L250-O	811000
O-RING	-	BUNA-N	-	1/4	L250-OB	811020
CLAMP, SINGLE CLAW	AL	STEEL	M8X35	1/4	SC-8	801000
CLAMP, DOUBLE CLAW	AL	STEEL	M8X45	1/4	DC-8	802000
CLAMP, BANDED	SS	STEEL	.250-28	1	L250-CFC	540002
BOLTS, CLEARANCE HOLE, PKG OF 4	-	STEEL	M8X45	1	LBA-250	854000
BOLTS, TAPPED HOLE, PKG OF 4	-	STEEL	M8X30	1	LBA-251	854020

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Three methods of fastening
- ISO compatible & modified ISO design
- Watercooled fitting available, page 113

### Specifications

<b>Material</b>			
Flanges	304ss		
Rotatable Bolt Ring	Aluminum		
O-rings	Viton® or Buna-N® elastomer		
Claw Clamps	Aluminum		
Band clamps	431ss, heat treated		
<b>Fastening</b>			
Claw Clamp	M8-1.25 thread, 4-8 required		
Band clamp	.250-28 thread		
Bolt Type	Hexagonal head, M8-1.25 thread		
Nut Type	Hexagonal		
Torque	Band clamps: Finger tight Bolts: 7-10 lb-ft		
<b>Vacuum Range</b>	$1 \times 10^{-8}$ Torr		
<b>Temperature Range</b>	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
<b>Weight</b>	3 lb maximum		
<b>Dimensions</b>	Clamp style: 4.33 OD x 2.87 ID maximum Bolt style: 5.71 OD x 2.87 ID maximum		

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

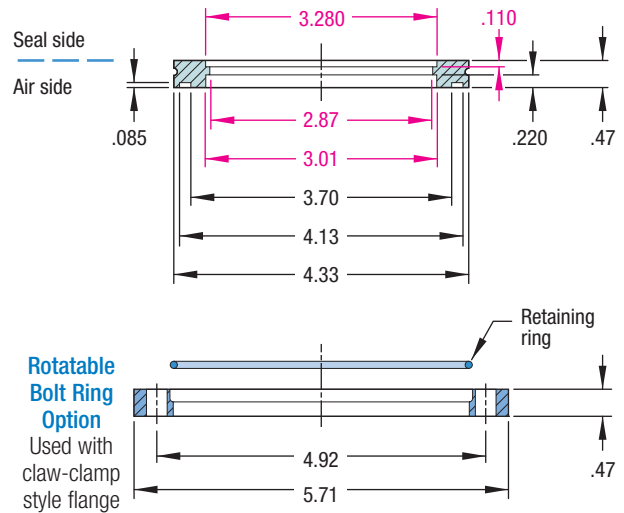


Figure 2 Bolt style

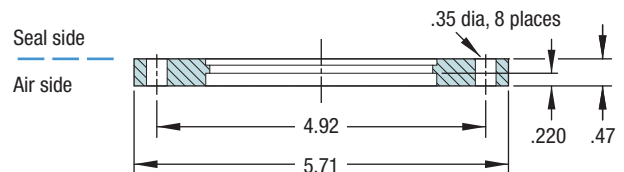


Figure 3 Band clamp style, modified ISO design

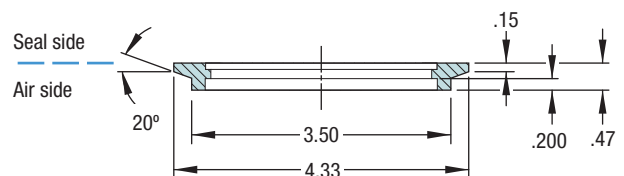
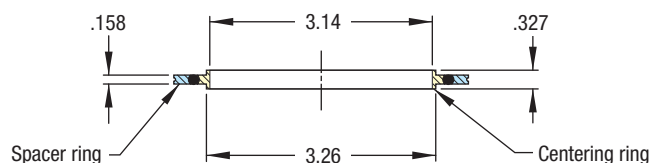


Figure 4 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.



FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW80	3.00	L300-W	DC-8	L300-CR	2-1/2	L300-CA	800008

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, four double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	1	L300-B	812008
3.00	1	WELD	CLAW-CLAMP	1/2	L300-W	813008
-	2	BLANK	BOLT	4	L300-BB	852008
3.00	2	WELD	BOLT	3	L300-BW	850008
-	3	BLANK	BANDED-CLAMP	1	L300-CFB	812015
3.00	3	WELD	BANDED-CLAMP	1/2	L300-CFW	813015

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	2	L300-RBF	853008
RETAINING RING, NICKEL PLATED STEEL	1/4	L300-RR	853028

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L300-CR	810008
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L300-CRB	810028
CENTERING RING ASSEMBLY	SS	VITON	-	1	L300-CRSS	810010
O-RING	-	VITON	-	1/4	L300-O	811008
O-RING	-	BUNA-N	-	1/4	L300-OB	811028
CLAMP, SINGLE CLAW	AL	STEEL	M8X35	1/4	SC-8	801000
CLAMP, DOUBLE CLAW	AL	STEEL	M8X45	1/4	DC-8	802000
CLAMP, BANDED	SS	STEEL	.250-28	1	L300-CFC	540003
BOLTS, CLEARANCE HOLE, PKG OF 8	-	STEEL	M8X45	1	LBA-300	854001
BOLTS, TAPPED HOLE, PKG OF 8	-	STEEL	M8X30	1	LBA-301	854021

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Three methods of fastening
- ISO compatible & modified ISO design
- Watercooled fitting available, page 113

### Specifications

#### Material

Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum
Band clamps	431ss, heat treated

#### Fastening

Claw Clamp	M8-1.25 thread, 4-8 required
Band clamp	.250-28 thread
Bolt Type	Hexagonal head, M8-1.25 thread
Nut Type	Hexagonal
Torque	Band clamps: Finger tight Bolts: 7-10 lb-ft

#### Vacuum Range

$1 \times 10^{-8}$  Torr

#### Temperature Range

	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C

#### Weight

6 lb maximum

#### Dimensions

Clamp style: 5.12 OD x 3.83 ID maximum  
Bolt style: 6.50 OD x 3.87 ID maximum

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

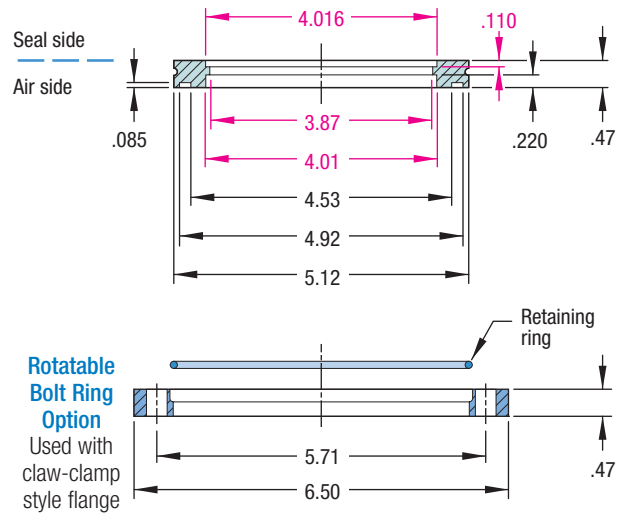


Figure 2 Bolt style

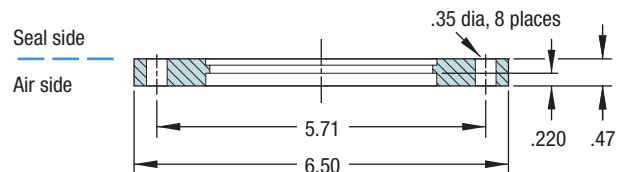


Figure 3 Band clamp style, modified ISO design

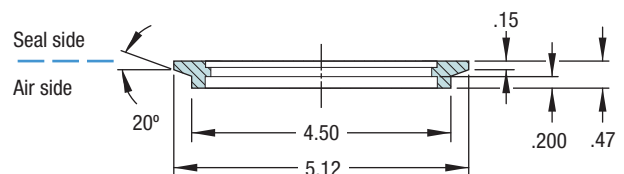
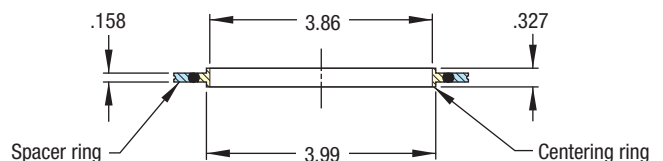


Figure 4 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.



FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW100	4.00	L400-W	DC-8	L400-CR	3	L400-CA	800001

A flange assembly provides all the flange components for making a single vacuum seal in a system.

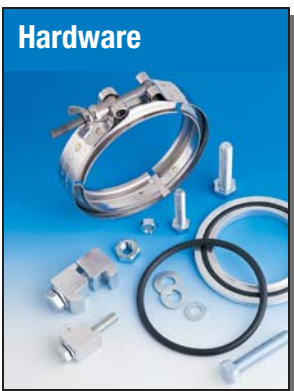
Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, four double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	1	L400-B	812001
4.00	1	WELD	CLAW-CLAMP	1/2	L400-W	813001
-	2	BLANK	BOLT	4	L400-BB	852001
4.00	2	WELD	BOLT	3	L400-BW	850001
-	3	BLANK	BANDED-CLAMP	1	L400-CFB	812016
4.00	3	WELD	BANDED-CLAMP	1/2	L400-CFW	813016

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	2	L400-RBF	853001
RETAINING RING, NICKEL PLATED STEEL	1/4	L400-RR	853021

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L400-CR	810001
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L400-CRB	810021
CENTERING RING ASSEMBLY	SS	VITON	-	1	L400-CRSS	810011
O-RING	-	VITON	-	1/4	L400-O	811001
O-RING	-	BUNA-N	-	1/4	L400-OB	811021
CLAMP, SINGLE CLAW	AL	STEEL	M8X35	1/4	SC-8	801000
CLAMP, DOUBLE CLAW	AL	STEEL	M8X45	1/4	DC-8	802000
CLAMP, BANDED	SS	STEEL	.250-28	1	L400-CFC	540004
BOLTS, CLEARANCE HOLE, PKG OF 8	-	STEEL	M8X45	1	LBA-300	854001
BOLTS, TAPPED HOLE, PKG OF 8	-	STEEL	M8X30	1	LBA-301	854021

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Three methods of fastening
- ISO compatible & modified ISO design
- Watercooled fitting available, page 113

### Specifications

#### Material

Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum
Band clamps	431ss, heat treated

#### Fastening

Claw Clamp	M10-1.50 thread, 4-8 required
Band clamp	.250-28 thread
Bolt Type	Hexagonal head, M10-1.50 thread
Nut Type	Hexagonal
Torque	Band clamps: Finger tight Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C

**Weight** 11 lb maximum

**Dimensions** Clamp style: 7.09 OD x 5.87 ID maximum  
Bolt style: 8.86 OD x 5.83 ID maximum

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

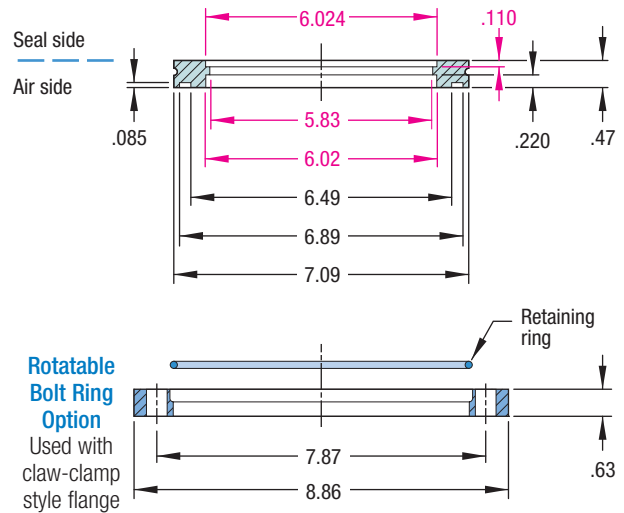


Figure 2 Bolt style

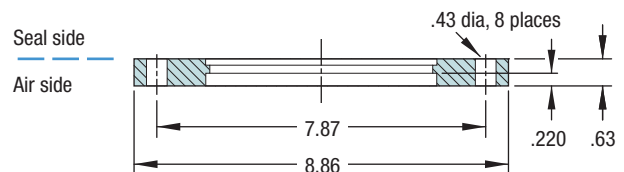


Figure 3 Band clamp style, modified ISO design

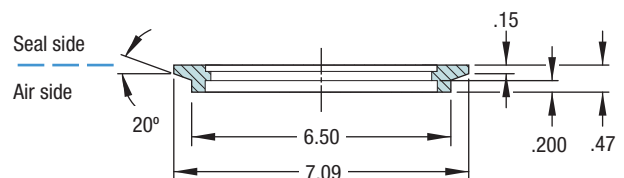
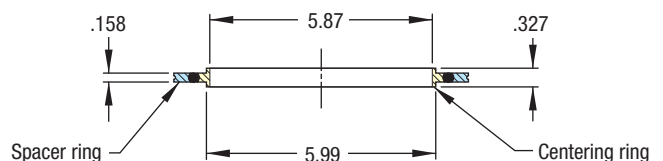


Figure 4 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.



FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW160	6.00	L600-W	DC-10	L600-CR	4	L600-CA	800002

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, four double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	5	L600-B	812002
6.00	1	WELD	CLAW-CLAMP	1-1/2	L600-W	813002
-	2	BLANK	BOLT	11	L600-BB	852002
6.00	2	WELD	BOLT	5	L600-BW	850002
-	3	BLANK	BANDED-CLAMP	5	L600-CFB	812017
6.00	3	WELD	BANDED-CLAMP	2	L600-CFW	813017

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	3	L600-RBF	853002
RETAINING RING, NICKEL PLATED STEEL	1/2	L600-RR	853022

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L600-CR	810002
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L600-CRB	810022
CENTERING RING ASSEMBLY	SS	VITON	-	1	L600-CRSS	810012
O-RING	-	VITON	-	1/4	L600-O	811002
O-RING	-	BUNA-N	-	1/4	L600-OB	811022
CLAMP, SINGLE CLAW	AL	STEEL	M10X35	1/4	SC-10	801002
CLAMP, DOUBLE CLAW	AL	STEEL	M10X45	1/4	DC-10	802002
CLAMP, BANDED	SS	STEEL	.250-28	2	L600-CFC	540005
BOLTS, CLEARANCE HOLE, PKG OF 8	-	STEEL	M10X45	2	LBA-600	854002
BOLTS, TAPPED HOLE, PKG OF 8	-	STEEL	M10X30	2	LBA-601	854022

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Three methods of fastening
- ISO compatible & modified ISO design
- Watercooled fitting available, page 113

### Specifications

#### Material

Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum
Band clamps	431ss, heat treated

#### Fastening

Claw Clamp	M10-1.50 thread, 6-12 required
Band clamp	.250-28 thread
Bolt Type	Hexagonal head, M10-1.50 thread
Nut Type	Hexagonal
Torque	Band clamps: Finger tight Bolts: 7-10 lb-ft

#### Vacuum Range

$1 \times 10^{-8}$  Torr

#### Temperature Range

	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C

#### Weight

3 lb maximum

#### Dimensions

Clamp style: 9.45 OD x 7.83 ID maximum  
Bolt style: 11.22 OD x 7.83 ID maximum

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

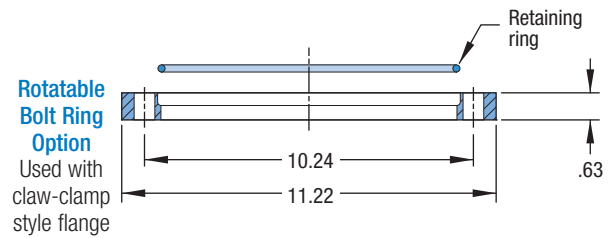
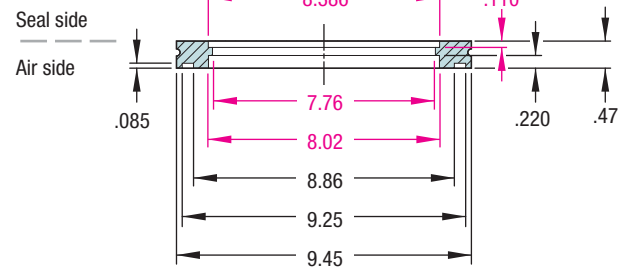


Figure 2 Bolt style

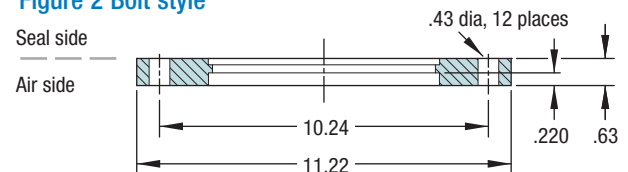


Figure 3 Band clamp style, modified ISO design

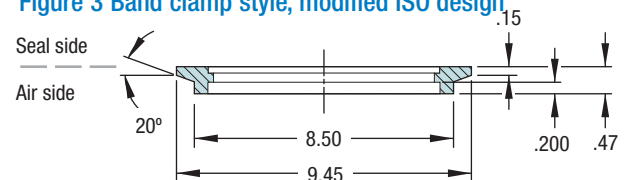
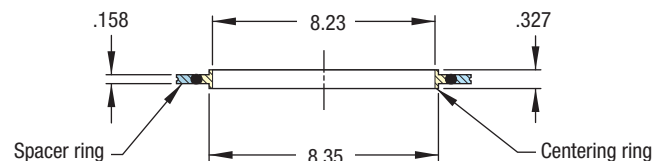


Figure 4 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.





### Flange Assembly

FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW200	8.00	L800-W	DC-10	L800-CR	4	L800-CA	800003

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, six double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.

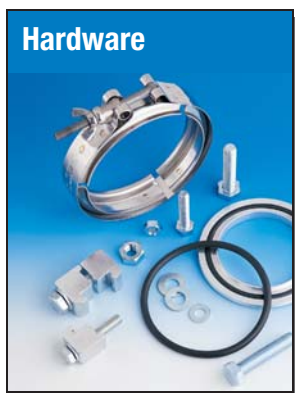


### Flange

TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	8	L800-B	812003
8.00	1	WELD	CLAW-CLAMP	2	L800-W	813003
-	2	BLANK	BOLT	18	L800-BB	852003
8.00	2	WELD	BOLT	8	L800-BW	850003
-	3	BLANK	BANDED-CLAMP	8	L800-CFB	812018
8.00	3	WELD	BANDED-CLAMP	2	L800-CFW	813018

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	6	L800-RBF	853003
RETAINING RING, NICKEL PLATED STEEL	1/2	L800-RR	853023

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



### Hardware

DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L800-CR	810003
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L800-CRB	810023
CENTERING RING ASSEMBLY	SS	VITON	-	1	L800-CRSS	810013
O-RING	-	VITON	-	1/4	L800-O	811003
O-RING	-	BUNA-N	-	1/4	L800-OB	811023
CLAMP, SINGLE CLAW	AL	STEEL	M10X35	1/4	SC-10	801002
CLAMP, DOUBLE CLAW	AL	STEEL	M10X45	1/4	DC-10	802002
CLAMP, BANDED	SS	STEEL	.250-28	2	L800-CFC	540006
BOLTS, CLEARANCE HOLE, PKG OF 12	-	STEEL	M10X45	2	LBA-800	854003
BOLTS, TAPPED HOLE, PKG OF 12	-	STEEL	M10X30	2	LBA-801	854023

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Claw-clamp style or bolt style fastening
- ISO compatible design

### Specifications

<b>Material</b>				
Flanges	304ss			
Rotatable Bolt Ring	Aluminum			
O-rings	Viton® or Buna-N® elastomer			
Claw Clamps	Aluminum			
<b>Fastening</b>				
Claw Clamp	M10-1.50 thread, 6-12 required			
Bolt Type	Hexagonal head, M10-1.50 thread			
Nut Type	Hexagonal			
Torque	Bolts: 7-10 lb-ft			
<b>Vacuum Range</b>	$1 \times 10^{-8}$ Torr			
<b>Temperature Range</b>	Minimum	Intermittent	Sustained	
Viton®	-20°C	200°C	150°C	
Buna-N®	-20°C	100°C	80°C	
<b>Weight</b>	25 lb maximum			
<b>Dimensions</b>	Clamp style: 11.42 OD x 9.75 ID maximum			
	Bolt style: 13.19 OD x 9.75 ID maximum			

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

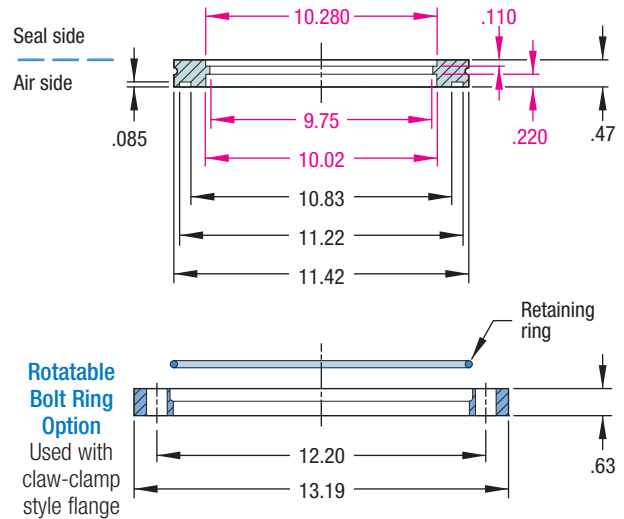


Figure 2 Bolt style

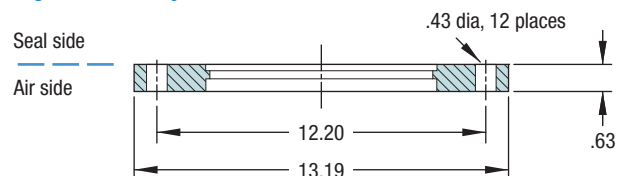
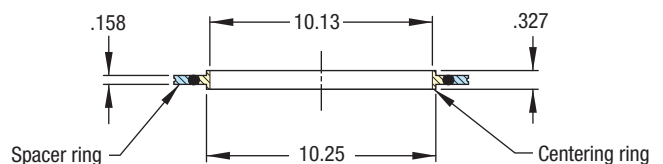


Figure 3 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.



FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW250	10.00	L1000-W	DC-10	L1000-CR	7	L1000-CA	800004

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, six double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	13	L1000-B	812004
10.00	1	WELD	CLAW-CLAMP	3	L1000-W	813004
-	2	BLANK	BOLT	25	L1000-BB	852004
10.00	2	WELD	BOLT	10	L1000-BW	850004

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	10	L1000-RBF	853004
RETAINING RING, NICKEL PLATED STEEL	1/2	L1000-RR	853024

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L1000-CR	810004
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L1000-CRB	810024
CENTERING RING ASSEMBLY	SS	VITON	-	1	L1000-CRSS	810014
O-RING	-	VITON	-	1/4	L1000-O	811004
O-RING	-	BUNA-N	-	1/4	L1000-OB	811024
CLAMP, SINGLE CLAW	AL	STEEL	M10X35	1/4	SC-10	801002
CLAMP, DOUBLE CLAW	AL	STEEL	M10X45	1/4	DC-10	802002
BOLTS, CLEARANCE HOLE, PKG OF 12	-	STEEL	M10X45	2	LBA-800	854003
BOLTS, TAPPED HOLE, PKG OF 12	-	STEEL	M10X30	2	LBA-801	854023

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Claw-clamp style or bolt style fastening
- ISO compatible design

### Specifications

<b>Material</b>	
Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum
<b>Fastening</b>	
Claw Clamp	M12-1.75 thread, 8-12 required
Bolt Type	Hexagonal head, M12-1.75 thread
Nut Type	Hexagonal
Torque	Bolts: 7-10 lb-ft
<b>Vacuum Range</b> $1 \times 10^{-8}$ Torr	
<b>Temperature Range</b>	
Viton®	Minimum: -20°C, Intermittent: 200°C, Sustained: 150°C
Buna-N®	Minimum: -20°C, Intermittent: 100°C, Sustained: 80°C
<b>Weight</b> 50 lb maximum	
<b>Dimensions</b>	
Clamp style: 14.57 OD x 12.42 ID maximum	
Bolt style: 16.73 OD x 12.42 ID maximum	

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

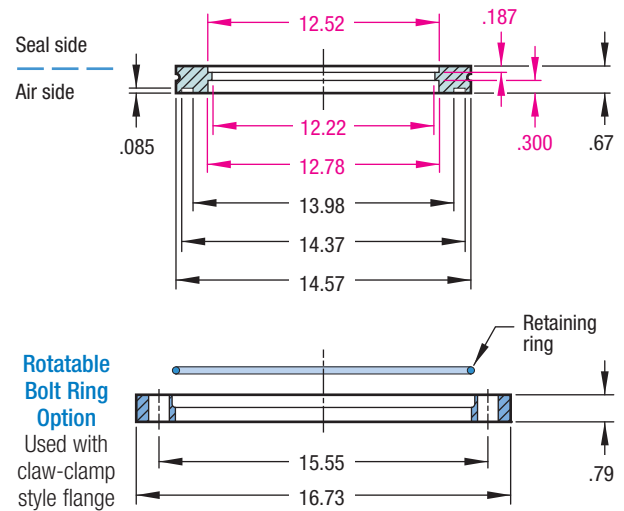


Figure 2 Bolt style

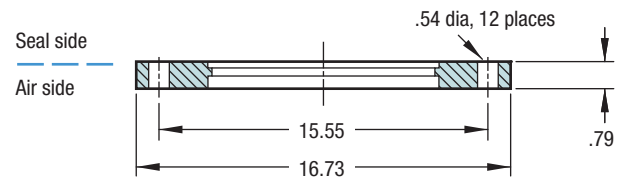
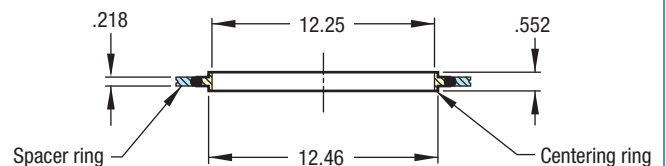


Figure 3 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locater groove on blank flanges is .250" wide.



**Flange Assembly**

FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW320	12.75	L1200-W	DC-12	L1200-CR	18	L1200-CA	800005

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, eight double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



**Flange**

TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	32	L1200-B	812005
12.75	1	WELD	CLAW-CLAMP	8	L1200-W	813005
-	2	BLANK	BOLT	50	L1200-BB	852005
12.75	2	WELD	BOLT	25	L1200-BW	850005

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	12	L1200-RBF	853005
RETAINING RING, NICKEL PLATED STEEL	1/2	L1200-RR	853025

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



**Hardware**

DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L1200-CR	810005
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L1200-CRB	810025
CENTERING RING ASSEMBLY	SS	VITON	-	1	L1200-CRSS	810015
O-RING	-	VITON	-	1/4	L1200-O	811005
O-RING	-	BUNA-N	-	1/4	L1200-OB	811025
CLAMP, SINGLE CLAW	AL	STEEL	M12X50	1/4	SC-12	801005
CLAMP, DOUBLE CLAW	AL	STEEL	M12X55	1/4	DC-12	802005
BOLTS, CLEARANCE HOLE, PKG OF 12	-	STEEL	M12X60	2	LBA-1275	854005
BOLTS, TAPPED HOLE, PKG OF 12	-	STEEL	M12X45	2	LBA-1276	854025

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Claw-clamp style or bolt style fastening
- ISO compatible design

### Specifications

#### Material

Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum

#### Fastening

Claw Clamp	M12-1.75 thread, 8-16 required
Bolt Type	Hexagonal head, M12-1.75 thread
Nut Type	Hexagonal
Torque	Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C

**Weight** 75 lb maximum

**Dimensions** Clamp style: 17.72 OD x 15.50 ID maximum  
Bolt style: 20.08 OD x 15.50 ID maximum

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

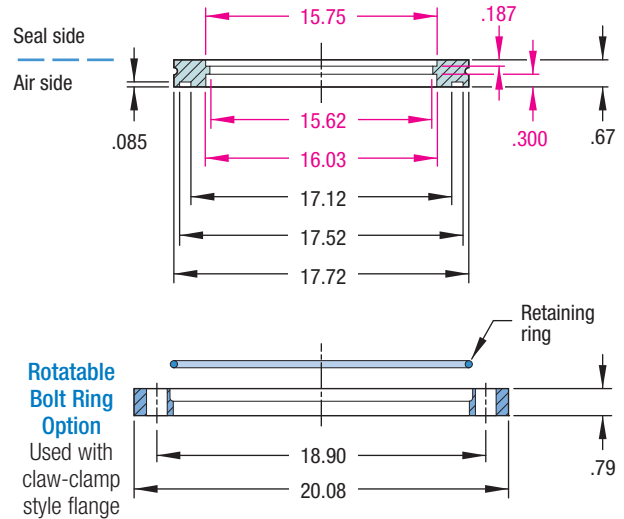


Figure 2 Bolt style

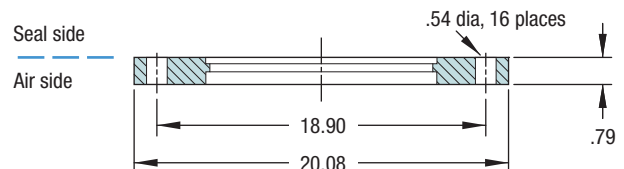
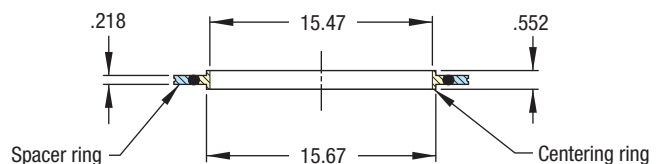


Figure 3 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.

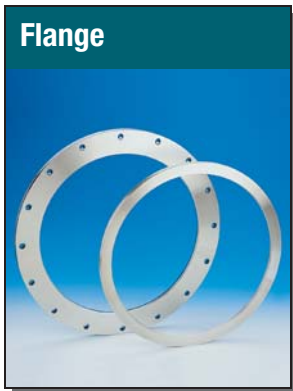


**Flange Assembly**

FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW400	16.00	L1600-W	DC-12	L1600-CR	21	L1600-CA	800006

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, eight double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



**Flange**

TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	45	L1600-B	812006
16.00	1	WELD	CLAW-CLAMP	10	L1600-W	813006
-	2	BLANK	BOLT	75	L1600-BB	852006
16.00	2	WELD	BOLT	25	L1600-BW	850006

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	30	L1600-RBF	853006
RETAINING RING, NICKEL PLATED STEEL	1/2	L1600-RR	853026

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



**Hardware**

DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L1600-CR	810006
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L1600-CRB	810026
CENTERING RING ASSEMBLY	SS	VITON	-	1	L1600-CRSS	810016
O-RING	-	VITON	-	1/4	L1600-O	811006
O-RING	-	BUNA-N	-	1/4	L1600-OB	811026
CLAMP, SINGLE CLAW	AL	STEEL	M12X50	1/4	SC-12	801005
CLAMP, DOUBLE CLAW	AL	STEEL	M12X55	1/4	DC-12	802005
BOLTS, CLEARANCE HOLE, PKG OF 16	-	STEEL	M12X60	4	LBA-1600	854006
BOLTS, TAPPED HOLE, PKG OF 16	-	STEEL	M12X45	4	LBA-1601	854026

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



Large-Flange™ ISO LF

### Features

- HV rated to  $1 \times 10^{-8}$  Torr
- High temperature rated to 200°C
- Symmetric & nonrotatable geometry
- Rotatable bolt ring available
- Elastomer O-ring seal
- Claw-clamp style or bolt style fastening
- ISO compatible design

### Specifications

#### Material

Flanges	304ss
Rotatable Bolt Ring	Aluminum
O-rings	Viton® or Buna-N® elastomer
Claw Clamps	Aluminum

#### Fastening

Claw Clamp	M12-1.75 thread, 12-16 required
Bolt Type	Hexagonal head, M12-1.75 thread
Nut Type	Hexagonal
Torque	Bolts: 7-10 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

Temperature Range	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C

**Weight** 95 lb maximum

**Dimensions** Clamp style: 21.65 OD x 19.50 ID maximum  
Bolt style: 24.02 OD x 19.50 ID maximum

## HIGH VACUUM SERIES

Figure 1 Claw-clamp style

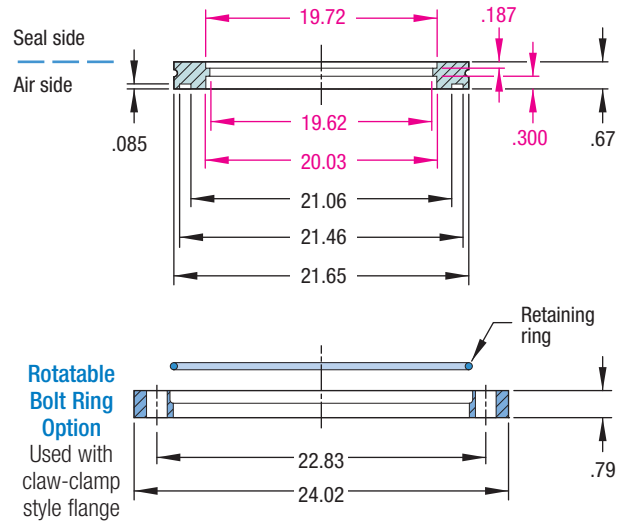


Figure 2 Bolt style

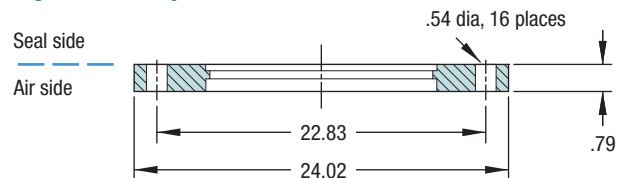
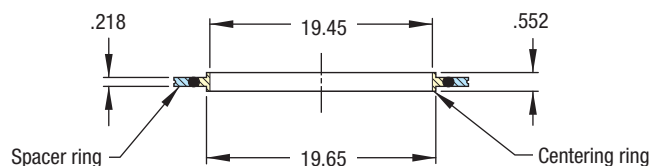


Figure 3 Centering Ring Assembly



- Magenta colored dimensions are common to all flanges.
- Centering ring locator groove on blank flanges is .250" wide.





FLANGE ISO REF.	TUBE SIZE	WELD FLANGES	CLAW-CLAMP REF.	CENTERING RING	WT LB	REFERENCE	PART NUMBER
NW500	20.00	L2000-W	DC-12	L2000-CR	25	L2000-CA	800007

A flange assembly provides all the flange components for making a single vacuum seal in a system.

Only tubing is required for welding to the flanges. One complete Large-Flange™ assembly consists of two weld flanges, twelve double claw-clamps and one aluminum centering ring assembly with a Viton® elastomer O-ring. These units are available only in the claw-clamp style configuration.



TUBE O.D. NOMINAL	FIG.	FLANGE REF.	FASTENING METHOD	WT LB	REFERENCE	PART NUMBER
-	1	BLANK	CLAW-CLAMP	69	L2000-B	812007
20.00	1	WELD	CLAW-CLAMP	12	L2000-W	813007
-	2	BLANK	BOLT	95	L2000-BB	852007
20.00	2	WELD	BOLT	55	L2000-BW	850007

OPTIONAL FLANGE CONVERTER	WT LB	REFERENCE	PART NUMBER
ROTATABLE BOLT RING ASSEMBLY (ALUMINUM)	35	L2000-RBF	853007
RETAINING RING, NICKEL PLATED STEEL	1/2	L2000-RR	853027

A rotatable bolt ring assembly is used to add bolt holes to a standard claw-clamp style Large-Flange™. An assembly consists of one aluminum bolt ring and one nickel plated spring steel retaining ring. The retaining ring fits into a groove on a claw-clamp style flange and holds the bolt ring onto the flange. Replacement retaining rings are also available separately.



DESCRIPTION	RING OR CLAMP MATL	O-RING OR BOLT MATL	THREAD	WT LB	REFERENCE	PART NUMBER
CENTERING RING ASSEMBLY	AL	VITON	-	1	L2000-CR	810007
CENTERING RING ASSEMBLY	AL	BUNA-N	-	1	L2000-CRB	810027
CENTERING RING ASSEMBLY	SS	VITON	-	1	L2000-CRSS	810017
O-RING	-	VITON	-	1/4	L2000-O	811007
O-RING	-	BUNA-N	-	1/4	L2000-OB	811027
CLAMP, SINGLE CLAW	AL	STEEL	M12X50	1/4	SC-12	801005
CLAMP, DOUBLE CLAW	AL	STEEL	M12X55	1/4	DC-12	802005
BOLTS, CLEARANCE HOLE, PKG OF 16	-	STEEL	M12X60	4	LBA-1600	854006
BOLTS, TAPPED HOLE, PKG OF 16	-	STEEL	M12X45	4	LBA-1601	854026

- Clamps sold individually
- Bolts for clearance holes included nuts and washers
- Bolts for tapped holes include washer only



45° Elbow Fittings page 121



Conical Nipple Reducers page 120



Four-Way Crosses page 126



90° Elbows page 122

## Features

- High vacuum rated to  $1 \times 10^{-8}$  Torr
- Temperature rated to 200°C maximum
- Symmetric, nonrotatable geometries
- Rotatable Bolt Rings available for LF sizes
- Viton® or Buna-N® O-rings
- Standard matte finish
- ISO compatible design for full range of KF and LF sizes, NW16 to NW500

## Specifications

### Material

Flanges	304ss
Tubing	304ss
Finish	Standard matte finish

### Vacuum

Range	$1 \times 10^{-8}$ Torr
Fittings Leak Test	$2 \times 10^{-10}$ cc/sec of He

### Temperature Range

	Minimum	Intermittent	Sustained
Viton®	-20°C	200°C	150°C
Buna-N®	-20°C	100°C	80°C
Silicone	-50°C	200°C	150°C

<b>Weight and Dimensions</b>	See table
------------------------------	-----------

## HIGH VACUUM SERIES

### Description

MDC Kwik-Flange™ ISO KF and Large-Flange™ ISO LF Tube Fittings are convenient “building-block” components. They offer great flexibility in the design and construction of high vacuum systems. All fittings are fabricated from type 304 stainless steel drawn and welded vacuum tubing. Flanges do not need to be rotatable since they are completely symmetric. If desired, Rotatable Bolt Ring Assemblies can be retrofitted to existing Claw-Clamp style flanges to add bolt holes to ISO LF fittings.

Reducers are used for a change in size of flanges within a single method of sealing, such as elastomer sealing of ISO KF and LF flanges. All ISO reducers are found in Section 1.2.

Adapters are used to change from one method of sealing to another, such as elastomer seal ISO to metal seal CF. Common configurations of Kwik-Flange™ and Large-Flange™ to various other vacuum connections are listed in Section 1.5, Hybrid Flange Adapters, page 148.

### Inch-Metric Comparison

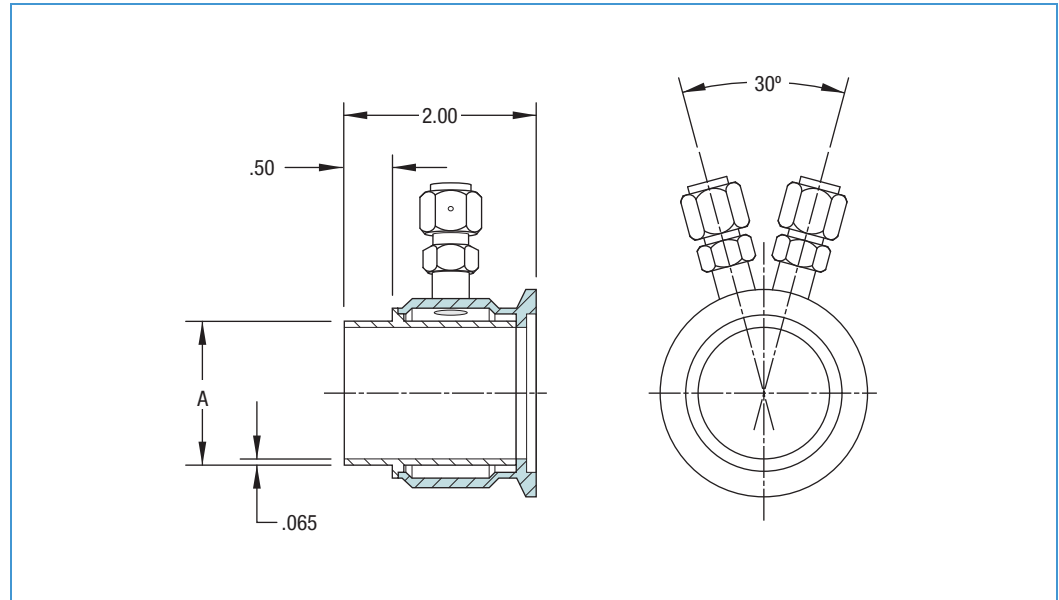
MDC	O.D.		I.D.	
	Inches		mm	Inches
K075	.75		NW16	16 .63
K100	1.00		NW25	25 .98
K150	1.50		NW40	40 1.57
K200	2.00		NW50	50 1.97
L250	2.50		NW63	63 2.48
L300	3.00		NW80	80 3.15
L400	4.00		NW100	100 3.94
L600	6.00		NW160	160 6.30
L800	8.00		NW200	200 7.87
L1000	10.00		NW250	250 9.84
L1200	12.75		NW320	320 12.60
L1600	16.00		NW400	400 15.75
L2000	20.00		NW500	500 19.69

All dimensions in this catalog are given in inches unless specified otherwise.

### KF Clamp style



- 1/4" Swagelok® fittings
- Maximum operating temperature of system surrounding flange 300°C
- Nominal water flow rate of 6 to 8 gpm at 60 psi

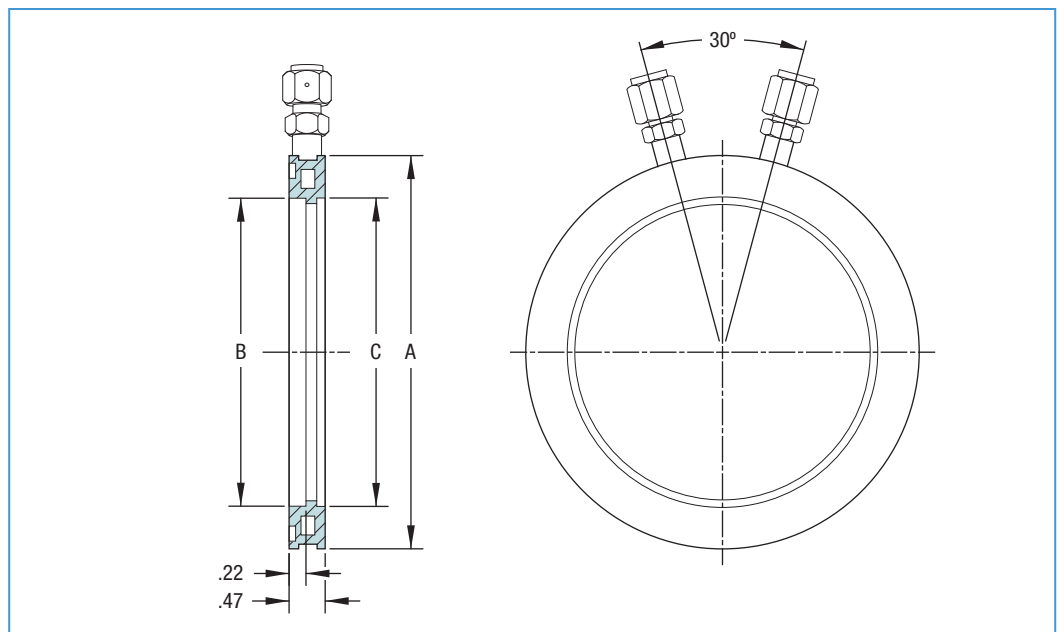


FLANGE ISO REF	FLANGE O.D.	TUBE SIZE	A	WT LB	REFERENCE	PART NUMBER
NW40	2.16	1-1/2	1.50	1/2	K150-WWC	715114
NW50	2.95	2	2.00	1/2	K200-WWC	715115

### LF Clamp style



- 1/4" Swagelok® fittings
- Maximum operating temperature of system surrounding flange 300°C
- Nominal water flow rate of 4 to 6 gpm at 60 psi



FLANGE ISO REF	TUBE SIZE	A	B	C	WT LB	REFERENCE	PART NUMBER
NW63	2.50	3.74	2.51	2.37	1/2	L250-WWC	813009
NW80	3.00	4.33	3.01	2.87	3/4	L300-WWC	813010
NW100	4.00	5.12	4.01	3.83	1	L400-WWC	813011
NW160	6.00	7.09	6.02	5.87	1-1/2	L600-WWC	813012
NW200	8.00	9.45	8.02	7.83	2	L800-WWC	813013

## KF Clamp style

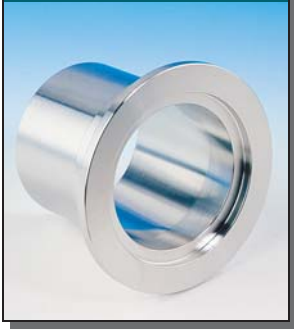


Figure 1

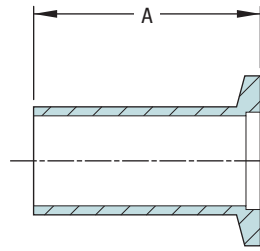
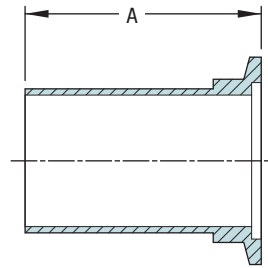


Figure 2



- NW16 through NW50 sizes
- Requires hinged clamp or bulkhead clamp - see individual flange size
- One-piece construction, except where noted
- Stainless Steel or Aluminum

FLANGE ISO REF	FLANGE O.D.	NOMINAL TUBE SIZE	FIGURE	TUBE O.D.	WALL THICKNESS	A	WT LB	REFERENCE	PART NUMBER
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### STAINLESS STEEL

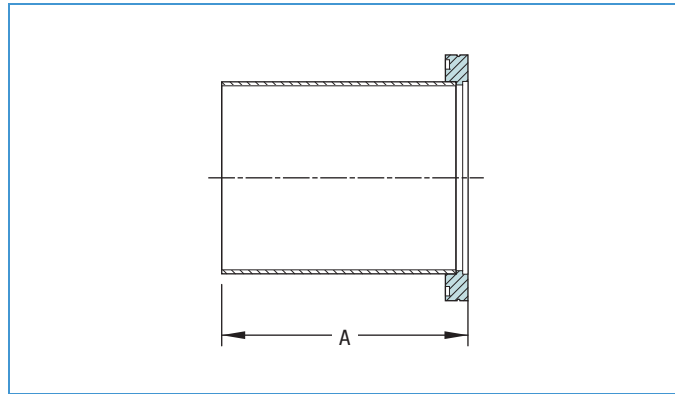
NW16	1.18	1/2	1	.50	.065	.50	1/4	K050-SWS	715100
NW16	1.18	1/2	1	.50	.065	1.58	1/4	K050-LWS	715105
NW16	1.18	3/4	1	.75	.065	.50	1/4	K075-SWS	715101
NW16	1.18	3/4	1	.75	.065	1.50	1/4	K075-1	720000
NW16	1.18	3/4	1	.75	.065	1.58	1/4	K075-LWS	715106
NW25	1.57	1	1	1.00	.065	.50	1/4	K100-SWS	715102
NW25	1.57	1	2	1.00	.065	1.58	1/4	K100-LWS	715107
NW25	1.57	1	2	1.00	.065	2.04	1/4	K100-1	720001
NW40	2.16	1	2	1.00	.065	2.04	1/4	K101-1	720002
NW40	2.16	1-1/2	1	1.50	.065	.75	1/4	K150-SWS	715103
NW40	2.16	1-1/2	2	1.50	.065	1.58	1/4	K150-LWS	715108
NW40	2.16	1-1/2	2	1.50	.065	2.46	1/4	K150-1	720003
NW50	2.95	2	1	2.00	.065	.75	1/4	K200-SWS	715104
NW50	2.95	2	1	2.00 <sup>1</sup>	.065	1.58	1/4	K200-LWS	715109
NW50	2.95	2	2	2.00 <sup>1</sup>	.065	3.21	1/4	K200-1	720004

### ALUMINUM 6061-T6

NW16	1.18	3/4	1	.75	.065	1.58	1/4	K075-LWSA	715110
NW25	1.57	1	2	1.00	.065	1.58	1/4	K100-LWSA	715111
NW40	2.16	1-1/2	2	1.50	.065	1.58	1/4	K150-LWSA	715112
NW50	2.95	2	2	2.00	.065	1.58	1/4	K200-LWSA	715113

<sup>1</sup> Welded

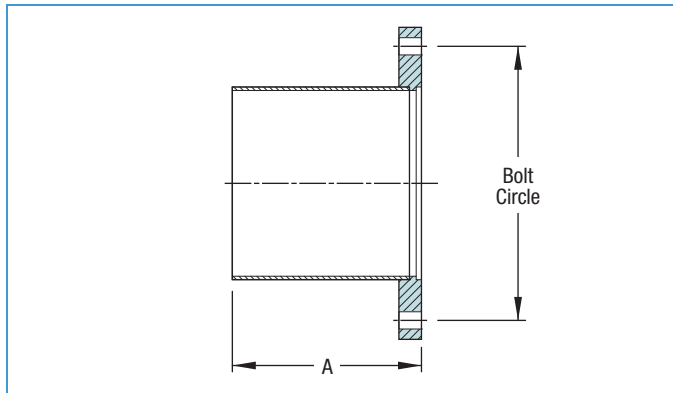
### LF Clamp style



- NW63 through NW500 sizes
- Requires claw clamps - see individual flange size

FLANGE ISO REF	FLANGE O.D.	TUBE / ROLL-UP O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
NW63	3.74	2.50	.065	4.00	1	L250-1	820000
NW80	4.33	3.00	.065	3.41	1	L300-1	820008
NW100	5.12	4.00	.083	5.12	2	L400-1	820001
NW160	7.09	6.00	.120	6.31	4	L600-1	820002
NW200	9.45	8.00	.120	7.75	5	L800-1	820003
NW250	11.42	10.00	.120	9.75	13	L1000-1	820004
NW320	14.57	12.75	.188	10.87	14	L1200-1	820005
NW400	17.72	16.00	.188	13.37	17	L1600-1	820006
NW500	21.65	20.00	.188	15.87	22	L2000-1	820007

### LF Bolt style



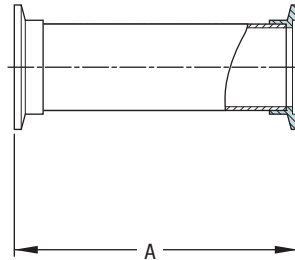
- NW63 through NW500 sizes
- Requires bolts - see individual flange size

FLANGE ISO REF	FLANGE O.D.	BOLT HOLES NO.	BOLT DIA.	B.C.	TUBE / ROLL-UP O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
NW63	5.12	4	.35	4.33	2.50	.065	3.94	4	L250-BL	851000
NW80	5.71	8	.35	4.92	3.00	.065	3.94	4	L300-BL	851008
NW100	6.50	8	.35	5.71	4.00	.083	3.94	5	L400-BL	851001
NW160	8.86	8	.43	7.87	6.00	.120	3.94	7	L600-BL	851002
NW200	11.22	12	.43	10.24	8.00	.120	3.94	12	L800-BL	851003
NW250	13.19	12	.43	12.20	10.00	.120	3.94	15	L1000-BL	851004
NW320	16.73	12	.54	15.55	12.75	.188	3.94	34	L1200-BL	851005
NW400	20.08	16	.54	18.90	16.00	.188	3.94	40	L1600-BL	851006
NW500	24.02	16	.54	22.83	20.00	.188	3.94	74	L2000-BL	851007

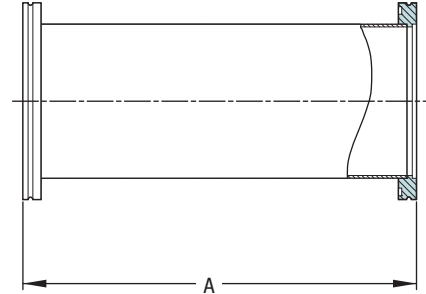
## Straight Tube



### Kwik-Flange™



### Large-Flange™



- NW16 through NW500 sizes
- Welded construction

FLANGE ISO REF	FLANGE O.D.	TUBE SIZE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>								
NW16	1.18	3/4	.75	.035	3.00	1/2	K075-2	<b>721000</b>
NW25	1.57	1	1.00	.065	4.08	1/2	K100-2	<b>721001</b>
NW40	2.16	1-1/2	1.50	.065	4.93	1/2	K150-2	<b>721002</b>
NW50	2.95	2	2.00	.065	6.43	1	K200-2	<b>721003</b>

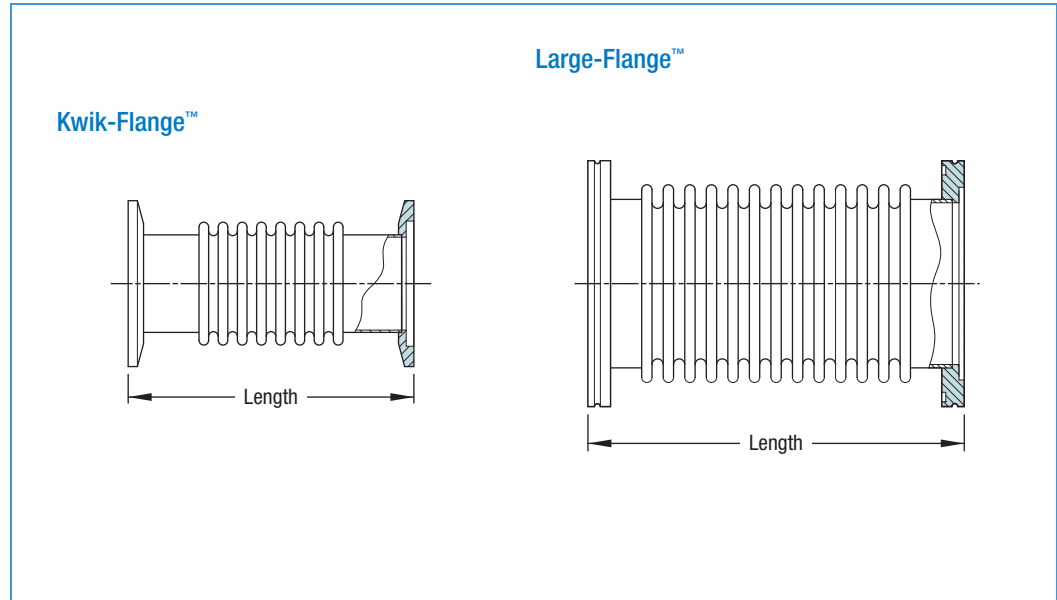
<b>LARGE-FLANGE™</b>								
NW63	3.74	2-1/2	2.50	.065	8.00	2	L250-2	<b>821000</b>
NW80	4.33	3	3.00	.065	6.81	3	L300-2	<b>821008</b>
NW100	5.12	4	4.00	.083	10.25	4	L400-2	<b>821001</b>
NW160	7.09	6	6.00	.120	12.62	10	L600-2	<b>821002</b>
NW200	9.45	8	8.00	.120	15.50	12	L800-2	<b>821003</b>
NW250	11.42	10	10.00	.120	19.50	16	L1000-2	<b>821004</b>
NW320	14.57	12-3/4	12.75	.188	21.74	19	L1200-2	<b>821005</b>
NW400	17.72	16	16.00	.188	26.74	25	L1600-2	<b>821006</b>
NW500	21.65	20	20.00	.188	31.74	31	L2000-2	<b>821007</b>

## Flexible Coupling



• For longer lengths, see Flexible Hose in Section 3.3

- NW16 through NW250 sizes
- Used for short misalignment connections
- 321ss Bellows
- Thin wall and thick wall



FLANGE ISO REF	FLANGE O.D.	BELLOWS I.D.	WALL THICKNESS	FREE LENGTH	COMPR'D LENGTH	SPRING RATE	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>									
NW16	1.18	.50	.006	3.00	2.62	68	1	K075-X	<b>722000</b>
NW16	1.18	.50	.008	10.00	-	-	2	K075-X-10	<b>722004</b>
NW16	1.18	.50	.010	10.00	-	-	2	K075-XT-10	<b>722020</b>
NW25	1.57	.75	.006	3.56	3.18	67	1	K100-X	<b>722001</b>
NW25	1.57	.75	.010	10.00	-	-	2	K100-XT-10	<b>722021</b>
NW40	2.16	1.25	.006	3.72	3.22	85	1	K150-X	<b>722002</b>
NW40	2.16	1.25	.016	10.00	-	-	3	K150-XT-10	<b>722022</b>
NW50	2.95	1.62	.006	4.22	3.72	87	2	K200-X	<b>722003</b>
NW50	2.95	1.62	.012	10.00	-	-	3	K200-XT-10	<b>722023</b>
<b>LARGE-FLANGE™</b>									
NW63	3.74	2.00	.006	6.47	5.72	43	5	L250-X	<b>822000</b>
NW80	4.33	2.50	.006	7.47	6.72	25	5	L300-X	<b>822013</b>
NW100	5.12	3.50	.008	7.84	6.84	40	8	L400-X	<b>822001</b>
NW160	7.09	5.50	.010	9.22	8.22	120	12	L600-X	<b>822002</b>
NW200	9.45	7.50	.012	10.22	9.22	132	15	L800-X	<b>822003</b>
NW250	11.42	10.00	.012	11.22	10.08	58	18	L1000-X	<b>822004</b>

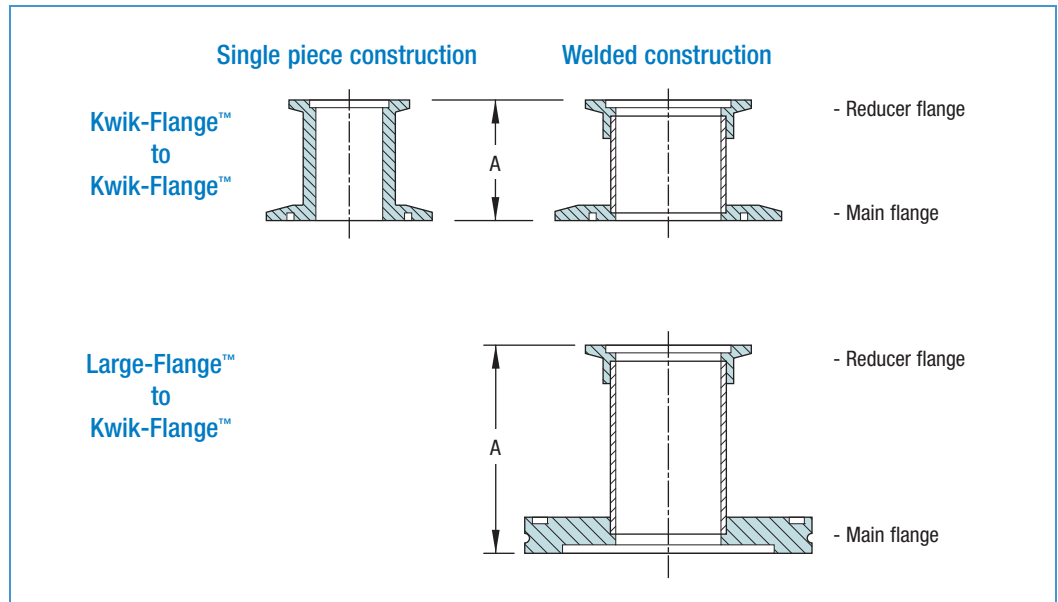
Spring rate is in pounds per inch, axial.  
Some specifications are not available for 10-inch length components.

## Straight Tube



• Kwik-Flange™ termination

- Main flange NW25 through NW160
- Single piece and welded construction
- Large-Flange™ to Large-Flange™ units on next page



MAIN FLANGE ISO REF	MAIN FLANGE O.D.	REDUCER FLANGE ISO REF	REDUCER FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™ TO KWIK-FLANGE™</b>									
NW25	1.57	NW16	1.18	.75 <sup>1</sup>	.065	1.57	1/2	K100x075	732000
NW40	2.16	NW16	1.18	.75	.035	1.57	1/2	K150x075	732001
NW40	2.16	NW25	1.57	1.20 <sup>1</sup>	.165	1.57	1/2	K150x100	732003
NW50	2.95	NW16	1.18	.75	.035	1.57	3/4	K200x075	732002
NW50	2.95	NW25	1.57	1.00	.065	1.57	3/4	K200x100	732004
NW50	2.95	NW40	2.16	1.50	.065	1.57	3/4	K200x150	732005
<b>LARGE-FLANGE™ TO KWIK-FLANGE™</b>									
NW63	3.74	NW16	1.18	.75	.035	1.75	1	L250xK075-LP	840004
NW63	3.74	NW25	1.57	1.00	.065	1.75	1	L250xK100-LP	840005
NW63	3.74	NW40	2.16	1.50	.065	1.75	1	L250xK150-LP	840006
NW63	3.74	NW40	2.16	1.50	.065	2.71	1-1/2	L250XK150	840000
NW63	3.74	NW50	2.95	2.00	.065	1.75	1-1/2	L250xK200-LP	840007
NW63	3.74	NW50	2.95	2.00	.065	3.46	2-1/2	L250XK200	840001
NW80	4.33	NW25	1.57	1.00	.065	1.75	1-1/2	L300xK100-LP	840008
NW80	4.33	NW40	2.16	1.50	.065	1.75	1-1/2	L300xK150-LP	840009
NW80	4.33	NW40	2.16	1.50	.065	2.71	3	L300XK150	840003
NW80	4.33	NW50	2.95	2.00	.065	1.75	2	L300xK200-LP	840010
NW80	4.33	NW50	2.95	2.00	.065	3.46	3	L300XK200	840002
NW100	5.12	NW25	1.57	1.00	.065	1.75	1-3/4	L400xK100-LP	840011
NW100	5.12	NW40	2.16	1.50	.065	1.75	2	L400xK150-LP	840012
NW100	5.12	NW50	2.95	2.00	.065	1.75	2-1/2	L400xK200-LP	840013
NW160	7.09	NW40	2.16	1.50	.065	1.75	5	L600xK150-LP	840014
NW160	7.09	NW50	2.95	2.00	.065	1.75	6	L600xK200-LP	840015

**LARGE-FLANGE™ TO LARGE-FLANGE™** *Continued on next page*

<sup>1</sup> Single piece construction



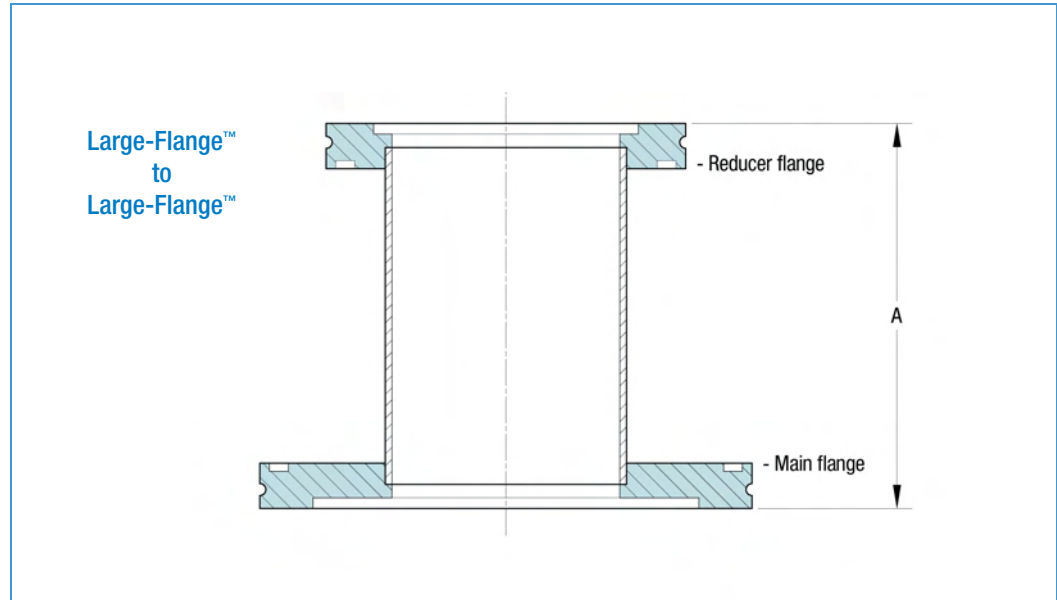
## Straight Tube (cont)



- Large-Flange™ termination

Continued from previous page

- Main flange NW80 through NW250
- Welded construction



MAIN FLANGE		REDUCER FLANGE		TUBE	TUBE	A	WT	REFERENCE	PART
ISO REF	O.D.	ISO REF	O.D.	O.D.	WALL		LB		NUMBER
<b>LARGE-FLANGE™ TO LARGE-FLANGE™</b>									
NW80	4.33	NW63	3.74	2.50	.065	4.00	3	L300xL250	<b>832005</b>
NW100	5.12	NW63	3.74	2.50	.065	4.00	4-1/2	L400xL250	<b>832000</b>
NW160	7.09	NW63	3.74	2.50	.065	4.00	6	L600xL250	<b>832001</b>
NW160	7.09	NW100	5.12	4.00	.083	4.00	10-1/2	L600xL400	<b>832002</b>
NW200	9.45	NW160	7.09	6.00	.120	4.00	13-1/2	L800xL600	<b>832003</b>
NW250	11.42	NW200	9.45	8.00	.120	4.00	18	L1000xL800	<b>832004</b>

### Application Note

Reducers are used for a reduction in size of flanges within a single method of sealing, such as ISO KF to ISO KF, or ISO LF to ISO KF. Zero-length reducers are not available in the ISO style of connection.

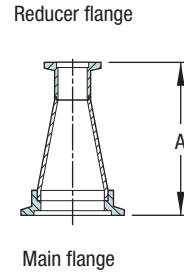
Adapters are used to change from one method of sealing to another, such as elastomer seal ISO to metal seal CF. Common configurations of ISO to various other vacuum connections are listed in Section 1.5, Hybrid Adapters, page 148.

## Conical

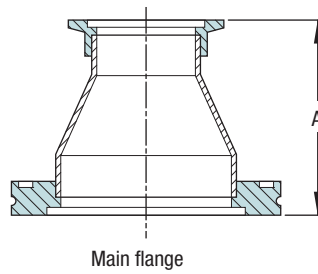


• For ISO to other vacuum connections, see Section 1.5

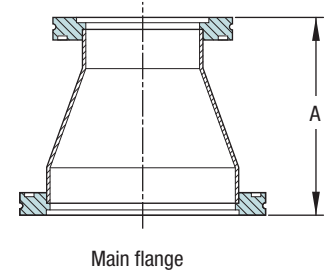
**Kwik-Flange™  
to  
Kwik-Flange™**



**Large-Flange™  
to  
Kwik-Flange™**



**Large-Flange™  
to  
Large-Flange™**



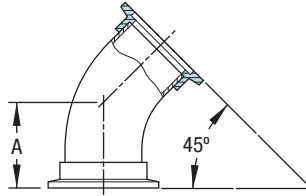
■ Main flange NW25 through NW160 sizes

MAIN FLANGE ISO REF	MAIN FLANGE O.D.	REDUCER FLANGE ISO REF	REDUCER FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™ TO KWIK-FLANGE™</b>									
NW25	1.57	NW16	1.18	1.0 - .75	.065	2.04	3/4	K100xK075FCR	<b>732006</b>
NW40	2.16	NW16	1.18	1.5 - .75	.065	3.08	1	K150xK075FCR	<b>732007</b>
NW40	2.16	NW25	1.57	1.5 - 1.0	.065	2.75	1	K150xK100FCR	<b>732010</b>
NW50	2.95	NW25	1.57	2.0 - 1.0	.065	2.75	1	K200xK100FCR	<b>732008</b>
NW50	2.95	NW40	2.16	2.0 - 1.5	.065	2.80	1	K200xK150FCR	<b>732009</b>
<b>LARGE-FLANGE™ TO KWIK-FLANGE™</b>									
NW63	3.74	NW40	2.16	2.5 - 1.5	.065	2.83	1-1/2	L250xK150FCR	<b>840016</b>
NW63	3.74	NW50	2.95	2.5 - 2.0	.065	2.85	2-1/2	L250xK200FCR	<b>840017</b>
NW80	4.33	NW40	2.16	3.0 - 1.5	.065	4.08	3	L300xK150FCR	<b>840018</b>
NW80	4.33	NW50	2.95	3.0 - 2.0	.065	4.10	3	L300xK200FCR	<b>840019</b>
NW100	5.12	NW50	2.95	4.0 - 2.0	.065	4.10	3-1/2	L400xK200FCR	<b>840020</b>
<b>LARGE-FLANGE™ TO LARGE-FLANGE™</b>									
NW80	4.33	NW63	3.74	3.0 - 2.0	.065	4.12	3-1/2	L300xL250FCR	<b>832006</b>
NW100	5.12	NW63	3.74	4.0 - 2.5	.065	4.12	4-1/2	L400xL250FCR	<b>832007</b>
NW100	5.12	NW80	4.33	4.0 - 3.0	.065	4.12	4-1/2	L400xL300FCR	<b>832008</b>
NW160	7.09	NW80	4.33	6.0 - 3.0	.120	9.35	5	L600xL300FCR	<b>832009</b>
NW160	7.09	NW100	5.12	6.0 - 4.0	.120	9.35	5	L600xL400FCR	<b>832010</b>

## 45° with Tangents

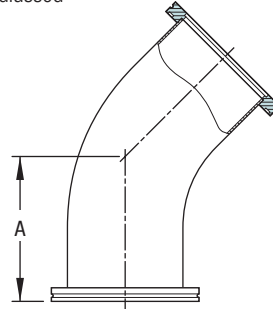


**Kwik-Flange™**



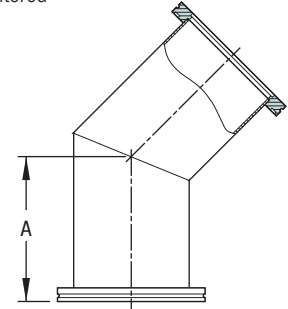
**Large-Flange™**

Radiussed



**Large-Flange™**

Mitered



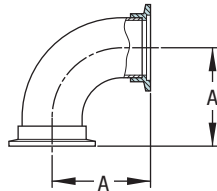
- NW16 through NW160 sizes
- Radiussed or mitered tube

FLANGE ISO REF	FLANGE O.D.	TUBE SIZE	BEND TYPE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>									
NW16	1.18	3/4	RADIUS	.75	.035	1.26	1/2	K075-45L	<b>723014</b>
NW25	1.57	1	RADIUS	1.00	.065	1.36	1/2	K100-45L	<b>723015</b>
NW40	2.16	1-1/2	RADIUS	1.50	.065	1.83	1/2	K150-45L	<b>723006</b>
NW50	2.95	2	RADIUS	2.00	.065	2.54	3/4	K200-45L	<b>723016</b>
<b>LARGE-FLANGE™</b>									
NW63	3.74	2-1/2	RADIUS	2.50	.065	3.25	2	L250-45L	<b>823008</b>
NW80	4.33	3	RADIUS	3.00	.065	3.93	4	L300-45L	<b>823011</b>
NW100	5.12	4	RADIUS	4.00	.083	5.06	6	L400-45L	<b>823009</b>
NW160	7.09	6	MITER	6.00	.120	9.71	10	L600-45L	<b>823010</b>

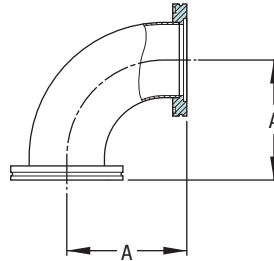
## 90 Degree



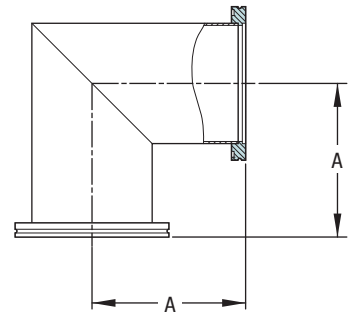
**Kwik-Flange™**



**Large-Flange™**  
Radiussed



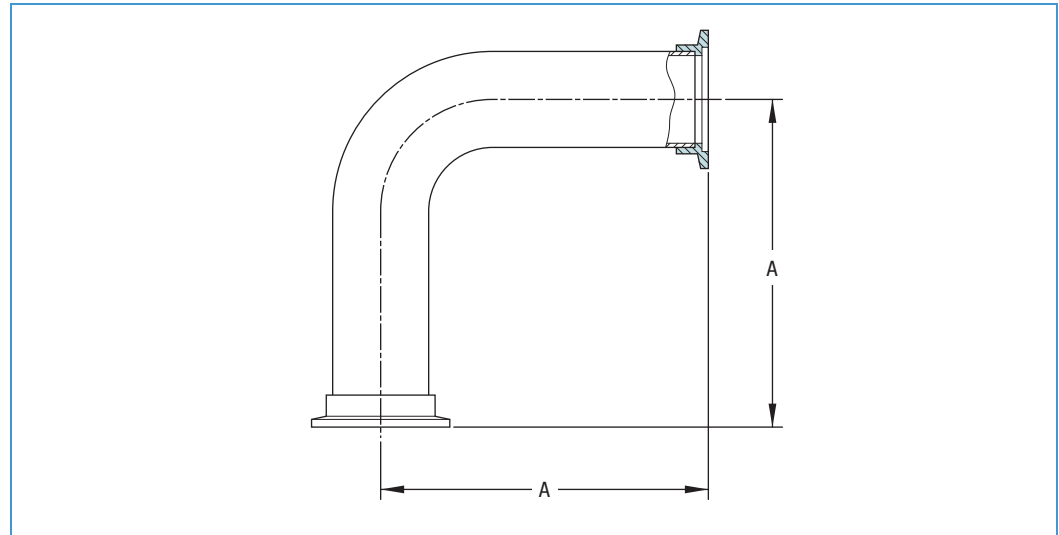
**Large-Flange™**  
Mitered



- NW16 through NW500 sizes
- Radiussed or mitered tube

FLANGE ISO REF	FLANGE O.D.	TUBE SIZE	BEND TYPE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>									
NW16	1.18	3/4	RADIUS	.75	.035	1.63	1/2	K075-2L	<b>723000</b>
NW25	1.57	1	RADIUS	1.00	.065	1.67	1/2	K100-2L	<b>723017</b>
NW40	2.16	1-1/2	RADIUS	1.50	.065	2.46	1/2	K150-2L	<b>723002</b>
NW50	2.95	2	RADIUS	2.00	.065	3.23	1	K200-2L	<b>723003</b>
<b>LARGE-FLANGE™</b>									
NW63	3.74	2-1/2	RADIUS	2.50	.065	4.00	2	L250-2L	<b>823000</b>
NW80	4.33	3	RADIUS	3.00	.065	4.75	4	L300-2LR	<b>823017</b>
NW80	4.33	3	MITER	3.00	.120	3.40	4	L300-2LM	<b>823012</b>
NW100	5.12	4	RADIUS	4.00	.083	6.25	6	L400-2LR	<b>823018</b>
NW100	5.12	4	MITER	4.00	.120	5.12	6	L400-2LM	<b>823001</b>
NW160	7.09	6	RADIUS	6.00	.109	9.25	12	L600-2LR	<b>823019</b>
NW160	7.09	6	MITER	6.00	.120	6.31	10	L600-2LM	<b>823002</b>
NW200	9.45	8	MITER	8.00	.120	7.75	14	L800-2LM	<b>823003</b>
NW250	11.42	10	MITER	10.00	.120	9.75	19	L1000-2LM	<b>823004</b>
NW320	14.57	12-3/4	MITER	12.75	.165	10.87	21	L1200-2LM	<b>823005</b>
NW400	17.72	16	MITER	16.00	.188	13.37	27	L1600-2LM	<b>823006</b>
NW500	21.65	20	MITER	20.00	.188	15.87	35	L2000-2LM	<b>823007</b>

### 90° with Tangents

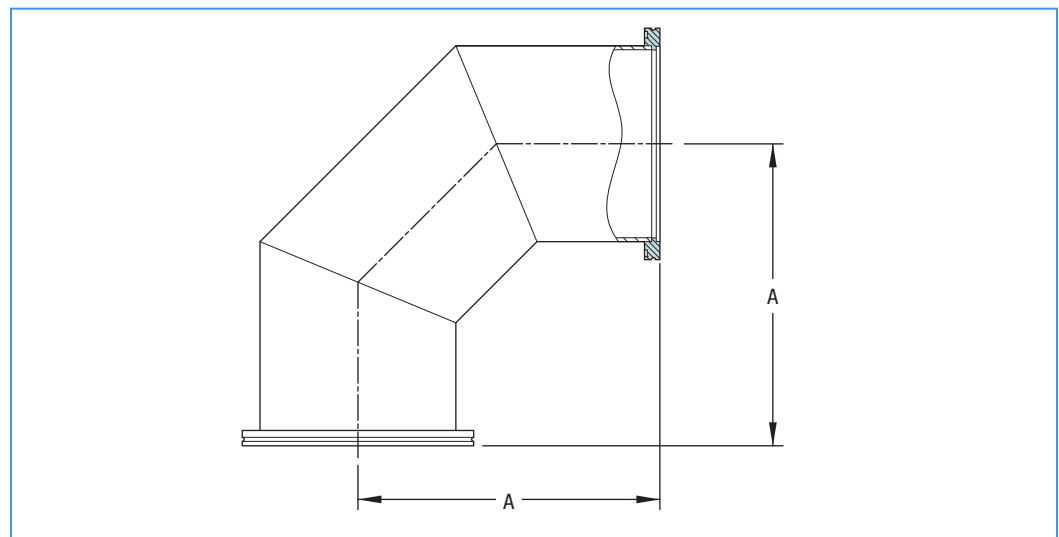


- NW16 through NW100 sizes
- Radiussed tube

FLANGE ISO REF	FLANGE O.D.	TUBE SIZE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>								
NW16	1.18	3/4	.75	.035	1.92	1/2	K075-2LL	723018
NW25	1.57	1	1.00	.065	2.23	1	K100-2LL	723019
NW40	2.16	1-1/2	1.50	.065	3.15	1-1/2	K150-2LL	723020
NW50	2.95	2	2.00	.065	4.29	2	K200-2LL	723021

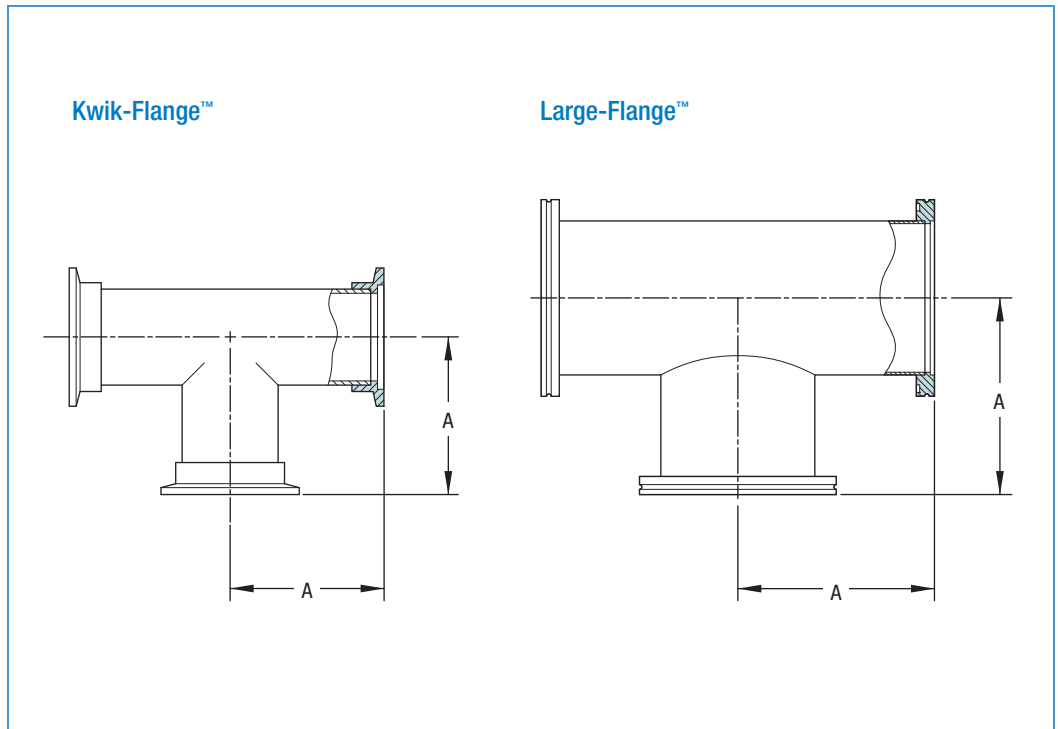
<b>LARGE-FLANGE™</b>								
FLANGE ISO REF	FLANGE O.D.	TUBE SIZE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
NW63	3.74	2-1/2	2.50	.065	5.44	3	L250-2LL	823020
NW80	4.33	3	3.00	.065	6.56	4	L300-2LL	823021
NW100	5.12	4	4.00	.083	8.56	5	L400-2LL	823022

### High Conductance



- NW160 through NW250 sizes
- Mitered tube

FLANGE ISO REF	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
NW160	7.09	6.00	.120	9.25	11	L600-2L-HC	823013
NW200	9.45	8.00	.120	12.25	14	L800-2L-HC	823014
NW250	11.42	10.00	.120	15.25	18	L1000-2L-HC	823015



■ NW16 through NW500 sizes

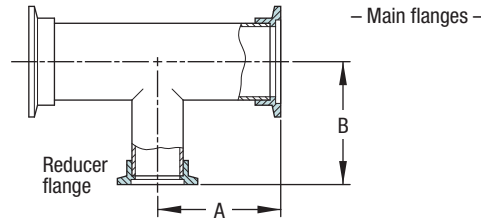
FLANGE ISO REF	FLANGE O.D.	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>							
NW16	1.18	.75	.035	1.50	1/2	K075-3	<b>724000</b>
NW25	1.57	1.00	.065	2.04	1/2	K100-3	<b>724001</b>
NW40	2.16	1.50	.065	2.46	1/2	K150-3	<b>724002</b>
NW50	2.95	2.00	.065	3.23	1	K200-3	<b>724003</b>

<b>LARGE-FLANGE™</b>							
NW63	3.74	2.50	.065	3.25	3	L250-3	<b>824036</b>
NW80	4.33	3.00	.065	3.50	5	L300-3	<b>824037</b>
NW100	5.12	4.00	.083	4.12	8	L400-3	<b>824038</b>
NW160	7.09	6.00	.120	5.87	13	L600-3	<b>824039</b>
NW200	9.45	8.00	.120	7.25	18	L800-3	<b>824040</b>
NW250	11.42	10.00	.120	9.75	24	L1000-3	<b>824004</b>
NW320	14.57	12.75	.188	10.87	33	L1200-3	<b>824005</b>
NW400	17.72	16.00	.188	13.37	41	L1600-3	<b>824006</b>
NW500	21.65	20.00	.188	15.87	52	L2000-3	<b>824007</b>

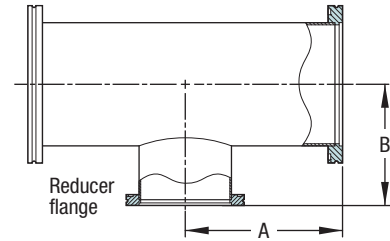
## Reducing Tees



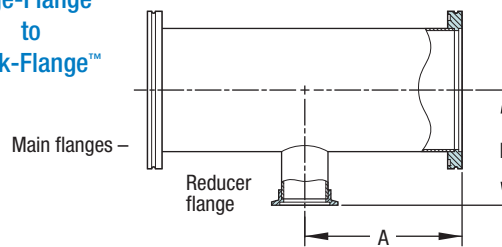
Kwik-Flange™  
to  
Kwik-Flange™



Large-Flange™  
to  
Large-Flange™



Large-Flange™  
to  
Kwik-Flange™



- Main flange NW25 through NW160 sizes

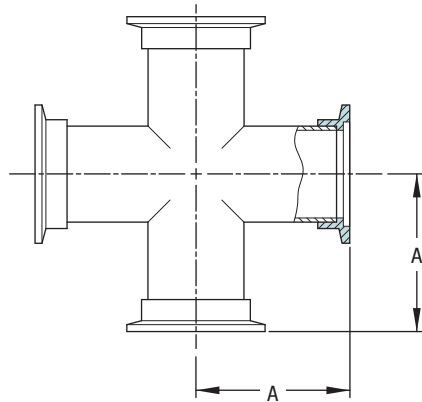
MAIN FLANGE				REDUCER FLANGE				WT LB	REFERENCE	PART NUMBER
ISO REF	TUBE O.D.	WALL	A	ISO REF	TUBE O.D.	WALL	B			
<b>KWIK-FLANGE™ TO KWIK-FLANGE™</b>										
NW25	1.00	.065	2.04	NW16	.75	.035	2.50	1	K100-3-K075	<b>724010</b>
NW40	1.50	.065	2.46	NW16	.75	.035	2.75	1	K150-3-K075	<b>724011</b>
NW40	1.50	.065	2.46	NW25	1.00	.065	2.30	1	K150-3-K100	<b>724012</b>
NW50	2.00	.065	3.23	NW25	1.00	.065	2.55	2	K200-3-K100	<b>724013</b>
NW50	2.00	.065	3.23	NW40	1.50	.065	2.71	2	K200-3-K150	<b>724014</b>
<b>LARGE-FLANGE™ TO KWIK-FLANGE™</b>										
NW63	2.50	.065	3.25	NW40	1.50	.065	2.46	2	L250-3-K150	<b>824041</b>
NW63	2.50	.065	3.25	NW50	2.00	.065	3.48	2	L250-3-K200	<b>824042</b>
NW80	3.00	.065	3.50	NW40	1.50	.065	3.21	3	L300-3-K150	<b>824043</b>
NW80	3.00	.065	3.50	NW50	2.00	.065	3.48	3	L300-3-K200	<b>824044</b>
NW100	4.00	.083	4.12	NW50	2.00	.065	4.23	5	L400-3-K200	<b>824046</b>
<b>LARGE-FLANGE™ TO LARGE-FLANGE™</b>										
NW80	3.00	.065	3.50	NW63	2.50	.065	3.50	4	L300-3-L250	<b>824045</b>
NW100	4.00	.083	4.12	NW63	2.50	.065	4.00	7	L400-3-L250	<b>824047</b>
NW100	4.00	.083	4.12	NW80	3.00	.065	4.00	7	L400-3-L300	<b>824048</b>
NW160	6.00	.120	5.25	NW80	3.00	.065	5.00	11	L600-3-L300	<b>824049</b>
NW160	6.00	.120	5.25	NW100	4.00	.120	5.12	12	L600-3-L400	<b>824050</b>

### Four-Way Crosses

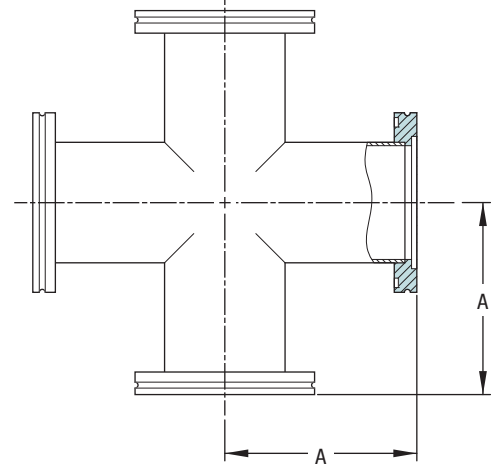


- Spherical main body on some units

Kwik-Flange™



Large-Flange™



- NW16 through NW500 sizes
- Body type dependent on tube size

FLANGE ISO REF	FLANGE O.D.	BODY TYPE	TUBE / ROLL-UP O.D.	WALL	SPHERE O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>										
NW16	1.18	TUBE	.75	.035	-	-	1.50	1/2	K075-4	725000
NW25	1.57	TUBE	1.00	.065	-	-	2.04	1	K100-4	725001
NW40	2.16	TUBE	1.50	.065	-	-	2.46	1	K150-4	725002
NW50	2.95	TUBE	2.00	.065	-	-	3.23	2	K200-4	725003

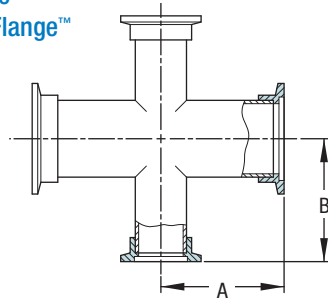
<b>LARGE-FLANGE™</b>										
NW63	3.74	TUBE	2.50	.065	-	-	3.25	6	L250-4	825036
NW80	4.33	TUBE	3.00	.065	-	-	3.50	8	L300-4	825037
NW100	5.12	TUBE	4.00	.083	-	-	4.12	10	L400-4T	825038
NW100	5.12	SPHERE	4.00	.083	6-1/4	.120	5.12	10	L400-4S	825001
NW160	7.09	TUBE	6.00	.109	-	-	5.87	15	L600-4T	825039
NW160	7.09	SPHERE	6.00	.120	9	.120	6.31	15	L600-4S	825002
NW200	9.45	TUBE	8.00	.109	-	-	7.25	21	L800-4T	825040
NW200	9.45	SPHERE	8.00	.120	12	.120	7.75	21	L800-4S	825003
NW250	11.42	SPHERE	10.00	.120	16	.120	9.75	26	L1000-4S	825004
NW320	14.57	TUBE	12.75	.165	-	-	10.87	45	L1200-4	825005
NW400	17.72	TUBE	16.00	.188	-	-	13.37	57	L1600-4	825006
NW500	21.65	TUBE	20.00	.188	-	-	15.87	74	L2000-4	825007



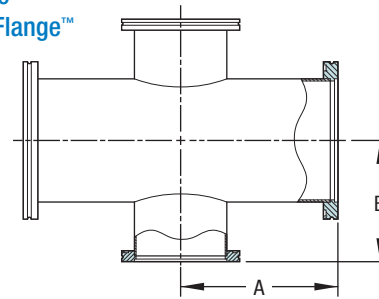
## Reducing Crosses



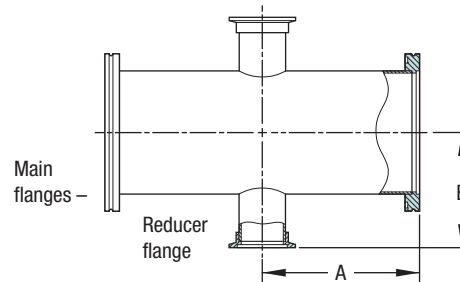
Kwik-Flange™  
to  
Kwik-Flange™



Large-Flange™  
to  
Large-Flange™



Large-Flange™  
to  
Kwik-Flange™



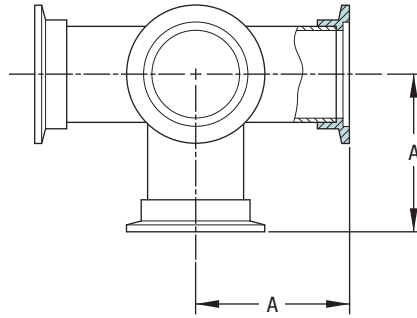
- Main flange NW25 through NW160 sizes

MAIN FLANGE				REDUCER FLANGE				WT LB	REFERENCE	PART NUMBER
ISO REF	TUBE O.D.	WALL	A	ISO REF	TUBE O.D.	WALL	B			
<b>KWIK-FLANGE™ TO KWIK-FLANGE™</b>										
NW25	1.00	.065	2.04	NW16	.75	.035	2.50	1	K100-4-K075	<b>725010</b>
NW40	1.50	.065	2.46	NW16	.75	.035	2.75	1	K150-4-K075	<b>725011</b>
NW40	1.50	.065	2.46	NW25	1.00	.065	2.30	1	K150-4-K100	<b>725012</b>
NW50	2.00	.065	3.23	NW25	1.00	.065	2.55	2	K200-4-K100	<b>725013</b>
NW50	2.00	.065	3.23	NW40	1.50	.065	2.71	2	K200-4-K150	<b>725014</b>
<b>LARGE-FLANGE™ TO KWIK-FLANGE™</b>										
NW63	2.50	.065	3.25	NW40	1.50	.065	2.96	2	L250-4-K150	<b>825041</b>
NW63	2.50	.065	3.25	NW50	2.00	.065	3.44	2	L250-4-K200	<b>825042</b>
NW80	3.00	.065	3.50	NW40	1.50	.065	3.21	3	L300-4-K150	<b>825043</b>
NW80	3.00	.065	3.50	NW50	2.00	.065	3.73	3	L300-4-K200	<b>825044</b>
NW100	4.00	.120	4.12	NW50	2.00	.065	4.23	5	L400-4-K200	<b>825046</b>
<b>LARGE-FLANGE™ TO LARGE-FLANGE™</b>										
NW80	3.00	.065	3.50	NW63	2.50	.065	3.50	6	L300-4-L250	<b>825045</b>
NW100	4.00	.120	4.12	NW63	2.50	.065	4.00	9	L400-4-L250	<b>825047</b>
NW100	4.00	.120	4.12	NW80	3.00	.065	4.00	10	L400-4-L300	<b>825048</b>
NW160	6.00	.120	5.25	NW80	3.00	.065	5.00	15	L600-4-L300	<b>825049</b>
NW160	6.00	.120	5.25	NW100	4.00	.120	5.12	15	L600-4-L400	<b>825050</b>

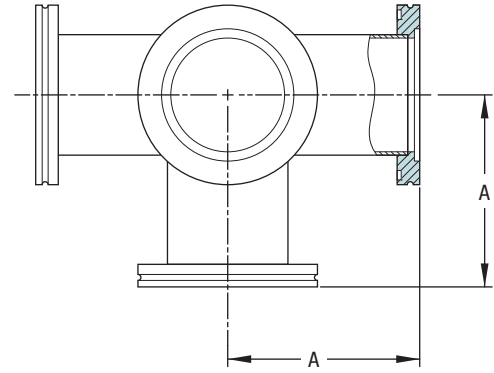
### Five-Way Crosses



Kwik-Flange™



Large-Flange™

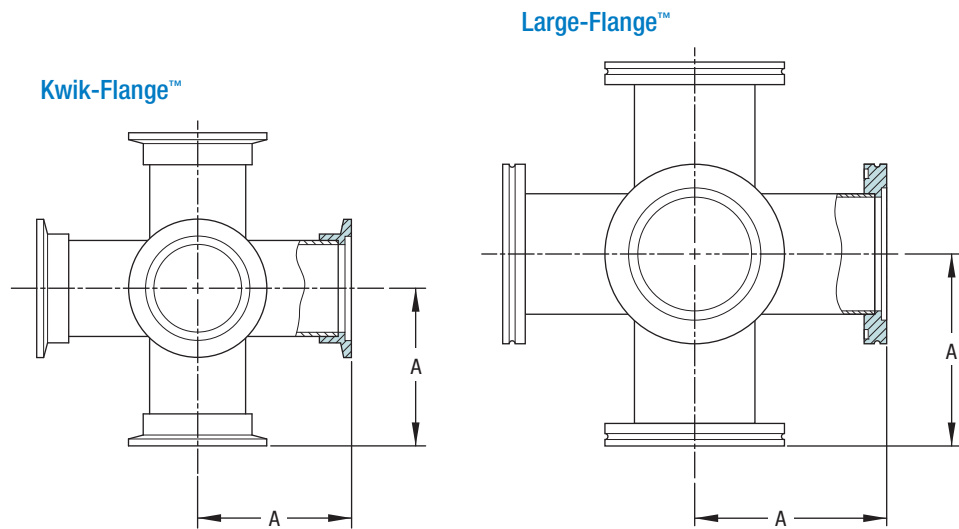


- NW16 through NW500 sizes
- Body type dependent on tube size

FLANGE ISO REF	FLANGE O.D.	TUBE / ROLL-UP O.D.	WALL	BODY TYPE	BODY DIMEN. O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>										
NW16	1.18	.75	.035	TUBE	-	-	1.50	1/2	K075-5	<b>726000</b>
NW25	1.57	1.00	.065	TUBE	-	-	2.04	1	K100-5	<b>726001</b>
NW40	2.16	1.50	.065	TUBE	-	-	2.46	1	K150-5	<b>726002</b>
NW50	2.95	2.00	.065	TUBE	-	-	3.21	2	K200-5	<b>726003</b>

<b>LARGE-FLANGE™</b>										
NW63	3.74	2.50	.120	TUBE	-	-	3.98	8	L250-5	<b>826000</b>
NW80	4.33	3.00	.120	TUBE	-	-	3.39	10	L300-5	<b>826008</b>
NW100	5.12	4.00	.120	SPHERE	6-1/4	.120	5.12	12	L400-5S	<b>826001</b>
NW160	7.09	6.00	.120	SPHERE	9	.120	6.31	18	L600-5S	<b>826002</b>
NW200	9.45	8.00	.120	SPHERE	12	.120	7.75	22	L800-5S	<b>826003</b>
NW250	11.42	10.00	.120	SPHERE	16	.120	9.75	30	L1000-5S	<b>826004</b>
NW320	14.57	12.75	.188	TUBE	-	-	10.87	57	L1200-5	<b>826005</b>
NW400	17.72	16.00	.188	TUBE	-	-	13.37	70	L1600-5	<b>826006</b>
NW500	21.65	20.00	.188	TUBE	-	-	15.87	94	L2000-5	<b>826007</b>

## Six-Way Crosses



- NW16 through NW500 sizes
- Body type dependent on tube size

FLANGE ISO REF	FLANGE O.D.	TUBE / ROLL-UP O.D.	WALL	BODY TYPE	BODY DIMEN. O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
<b>KWIK-FLANGE™</b>										
NW16	1.18	.75	.035	TUBE	-	-	1.50	1/2	K075-6	727000
NW25	1.57	1.00	.065	TUBE	-	-	2.04	1	K100-6	727001
NW40	2.16	1.50	.065	TUBE	-	-	2.46	1	K150-6	727002
NW50	2.95	2.00	.065	TUBE	-	-	3.21	2	K200-6	727003
<b>LARGE-FLANGE™</b>										
NW63	3.74	2.50	.120	TUBE	-	-	3.98	9	L250-6	827000
NW80	4.33	3.00	.120	TUBE	-	-	3.39	11	L300-6	827008
NW100	5.12	4.00	.120	SPHERE	6-1/4	.120	5.12	13	L400-6S	827001
NW160	7.09	6.00	.120	SPHERE	9	.120	6.31	19	L600-6S	827002
NW200	9.45	8.00	.120	SPHERE	12	.120	7.75	23	L800-6S	827003
NW250	11.42	10.00	.120	SPHERE	16	.120	9.75	33	L1000-6S	827004
NW320	14.57	12.75	.188	TUBE	-	-	10.87	77	L1200-6	827005
NW400	17.72	16.00	.188	TUBE	-	-	13.37	93	L1600-6	827006
NW500	21.65	20.00	.188	TUBE	-	-	15.87	119	L2000-6	827007



## HIGH VACUUM SERIES

### Features

- High vacuum rated to  $1 \times 10^{-8}$  Torr
- Temperature rated to 200°C maximum
- Viton® elastomer seal
- Smooth face or with O-ring groove
- ANSI compatible design

### Description

MDC ASA-style flanges mate with standard 150 lb. ASA-ANSI flanges. Flanges are offered with choice of smooth face or O-ring groove. Eight flange sizes are detailed in this section. They are available blank or bored to fit tube sizes 1-1/2" through 12" O.D. The vacuum seal is made by compressing an O-ring between a mating pair of flanges. The pair includes a smooth face flange and an O-ring grooved flange.

Flanges are fabricated from type 304 stainless steel with a surface finish of 32 micro-inches. All corners are chamfered 45°. Sealed flange assemblies are useable to  $10^{-8}$  Torr and can be baked to 200°C. The maximum temperature for sustained use is 150°C. Note that repeated bakeout to 200°C can cause deterioration of O-rings and require their periodic replacement.

Applications include use with various types of vacuum chambers, manifolds, furnaces, diffusion pump stations, valves, test equipment, pumps, special viewports, and a variety of experimental devices. Hybrid Adapters for interfacing with non-ASA flanges are located in Section 1.5.

### Specifications

#### Material

Flanges	304ss
O-rings	Viton®Bolts
300ss	

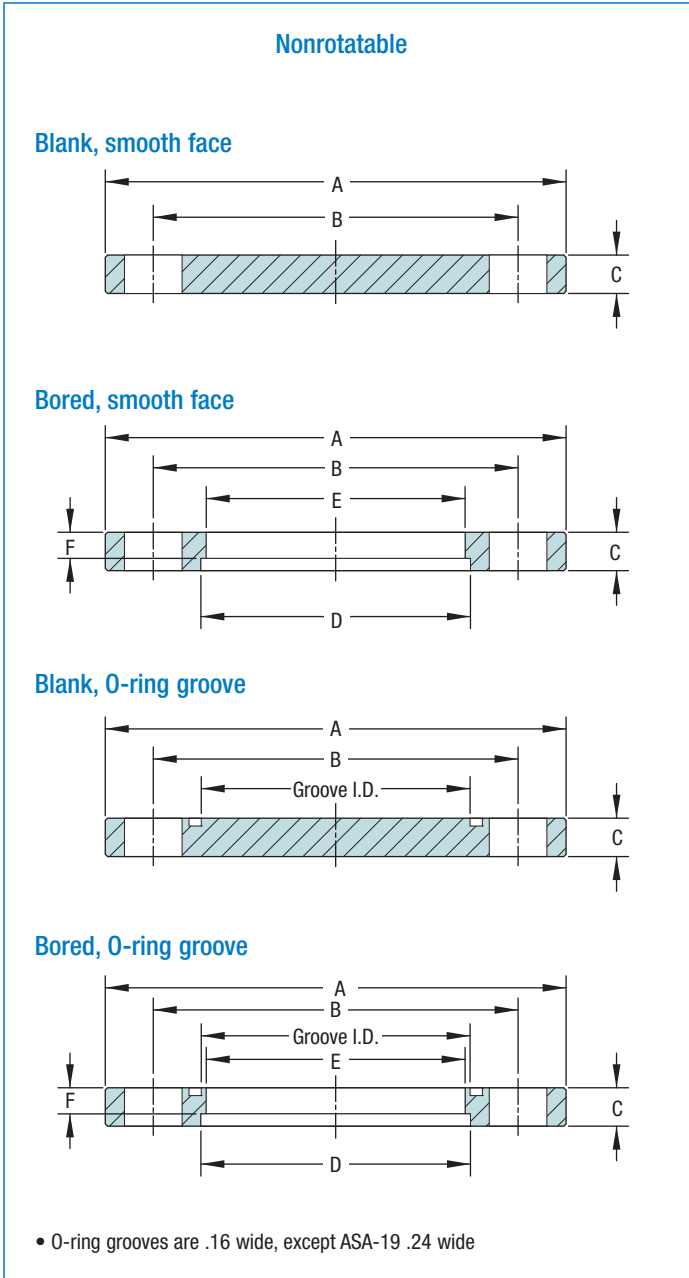
#### Fastening

Bolt Type	Hexagonal head
Nut Type	Hexagonal
Size	.500-13, .625-11 and .750-10 UNC
Torque	ASA-4 through ASA-9 14 lb-ft ASA-11 through ASA-19 24 lb-ft

**Vacuum Range**  $1 \times 10^{-8}$  Torr

**Temperature Range** Maximum: 200°C  
Sustained: -20°C to 150°C

**Weight & Dimensions** See table



### ASA Smooth Face



### ASA O-ring Groove



Dimensions given in the table below apply to both the smooth face flanges on the left and the O-ring grooved flanges on the right.

#### Smooth Face Type

PART NUMBER	REFERENCE	ANSI SIZE	A	B	BOLT HOLES		C	D	E	F	WT LB
					NO.	DIA					
160000	ASA-4	1	4.25	3.125	4	.62	.50	-	-	-	1
160001	ASA-4B	1	4.25	3.125	4	.62	.50	1.51	1.37	.34	1
160002	ASA-5	1-1/2	5.00	3.875	4	.62	.50	-	-	-	2
160040	ASA-5B1	1-1/2	5.00	3.875	4	.62	.50	2.01	1.87	.34	2
160042	ASA-5B2	1-1/2	5.00	3.875	4	.62	.50	2.51	2.37	.34	2
160004	ASA-6	2	6.00	4.750	4	.75	.50	-	-	-	3
160044	ASA-6B2	2	6.00	4.750	4	.75	.50	3.01	2.87	.34	2
160005	ASA-6B	2	6.00	4.750	4	.75	.50	3.51	3.37	.34	2
160006	ASA-7	3	7.50	6.000	4	.75	.50	-	-	-	6
160007	ASA-7B	3	7.50	6.000	4	.75	.50	4.01	3.83	.34	4
160008	ASA-9	4	9.00	7.500	8	.75	.50	-	-	-	9
160046	ASA-9B2	4	9.00	7.500	8	.75	.50	5.01	4.84	.34	5
160048	ASA-9B3	4	9.00	7.500	8	.75	.50	6.02	5.83	.34	5
160010	ASA-11	6	11.00	9.500	8	.81	.75	-	-	-	19
160036	ASA-11ST	6	11.00	9.500	8	.81	.75	6.02	5.83	.34	10
160014	ASA-11B1	6	11.00	9.500	8	.81	.75	8.02	7.83	.34	9
160012	ASA-16	10	16.00	14.250	12	.81	1.00	-	-	-	55
160053	ASA-16B1	10	16.00	14.250	12	.81	1.00	10.03	9.76	.34	23
160055	ASA-16B2	10	16.00	14.250	12	.81	1.00	10.76	10.50	.34	23
160018	ASA-19	12	19.00	17.000	12	1.00	1.06	-	-	-	84
160019	ASA-19B	12	19.00	17.000	12	1.00	1.06	12.03	11.62	.34	52

#### O-ring Groove Type

REFERENCE	PART NUMBER
ASA-4-OR	160020
ASA-4B-OR	160021
ASA-5-OR	160022
ASA-5B1-OR	160041
ASA-5B2-OR	160043
ASA-6-OR	160024
ASA-6B2-OR	160045
ASA-6B-OR	160025
ASA-7-OR	160026
ASA-7B-OR	160027
ASA-9-OR	160028
ASA-9B2-OR	160047
ASA-9B3-OR	160049
ASA-11-OR	160030
ASA-11ST-OR	160037
ASA-11B1-OR	160032
ASA-16-OR	160033
ASA-16B1-OR	160054
ASA-16B2-OR	160056
ASA-19-OR	160038
ASA-19B-OR	160039

### Hardware



- Bolt Sets include bolts, nuts and flat washers.
- Bolt Hole Bushings used on ASA-6 through ASA-9 flanges when mating to 2-1/2" through 5" Gate Valves with ASA port flanges, see pages 175-181.

USE ON FLANGE	DESCRIPTION	THREAD SIZE / GROOVE I.D.	LENGTH / O-RING W	QUANTITY PER PACK	WT LB	REFERENCE	PART NUMBER
ASA-4	HEX HEAD BOLT	.500-13	1-3/4	4	3/4	ASABA-4	190100
ASA-4	O-RING, VITON	1.870	1/8	1	1/4	ASAOOR-4	540016
ASA-5	HEX HEAD BOLT	.500-13	1-3/4	4	3/4	ASABA-5	190100
ASA-5	O-RING, VITON	2.500	1/8	1	1/4	ASAOOR-5	540017
ASA-6	HEX HEAD BOLT	.625-11	1-3/4	4	3/4	ASABA-6	190101
ASA-6	O-RING, VITON	3.500	1/8	1	1/4	ASAOOR-6	540018
ASA-7	HEX HEAD BOLT	.625-11	1-3/4	4	3/4	ASABA-7	190101
ASA-7	O-RING, VITON	4.625	1/8	1	1/4	ASAOOR-7	540020
ASA-9	HEX HEAD BOLT	.625-11	1-3/4	8	1-1/2	ASABA-9	190102
ASA-9	O-RING, VITON	6.168	1/8	1	1/4	ASAOOR-9	540022
ASA-11	HEX HEAD BOLT	.750-10	2-1/2	8	2	ASABA-11	190103
ASA-11	O-RING, VITON	8.000	1/8	1	1/4	ASAOOR-11	540024
ASA-16	HEX HEAD BOLT	.750-10	3	12	2-1/2	ASABA-16	190104
ASA-16	O-RING, VITON	12.000	1/8	1	1/4	ASAOOR-16	540027
ASA-19	HEX HEAD BOLT	.750-10	3	12	2-1/2	ASABA-19	190104
ASA-19	O-RING, VITON	15.000	3/16	1	1/4	ASAOOR-19	540028



Vacuum Tubing page 133



High Conductance Elbows page 139



Conical Reducers page 134



Six-Way Crosses page 145

## Features

- Mating Del-Seal™, ISO and ASA flanges available
- UHV rated to  $1 \times 10^{-10}$  Torr
- High temperature rated to 450°C
- Standard matte finish

## Description

MDC Del-Weld™ Tube Fittings are convenient “building-block” components offering great flexibility in the design and construction of vacuum systems. All fittings are fabricated from type 304 stainless steel tubing.

Del-Weld™ Tube Fittings include elbows, tees and multiple crosses which are supplied without flanges. The vacuum connection is made by welding, brazing, or soldering to the vacuum system.

MDC Del-Weld™ fittings are supplied in vacuum shrink wrapped packages, ready for high vacuum service. Interior surfaces of components should not be touched with bare hands when opening packages.

Vacuum tubing is welded and drawn over a mandrel when hot. A slight seam is visible.

Vacuum tubing is specified by tube O.D. and wall thickness. The I.D. of vacuum tubing is theoretical, calculated as the tube O.D. less twice the wall thickness. Vacuum tubing does not have tolerances relating to concentricity, ovality, triangulation or other specifications.

Tubing or fittings requiring a machined length, an electropolished or special finish must be specified and quoted as a special order.

## Specifications

### Material

Tubing	304ss, ASTM-269
Finish	Up to 4" O.D., bright annealed
	Over 4" O.D., white pickled annealed

### Vacuum

Range	$1 \times 10^{-13}$ Torr
Fittings Leak Test	$2 \times 10^{-10}$ cc/sec of He

**Temperature Range** -200°C to 450°C

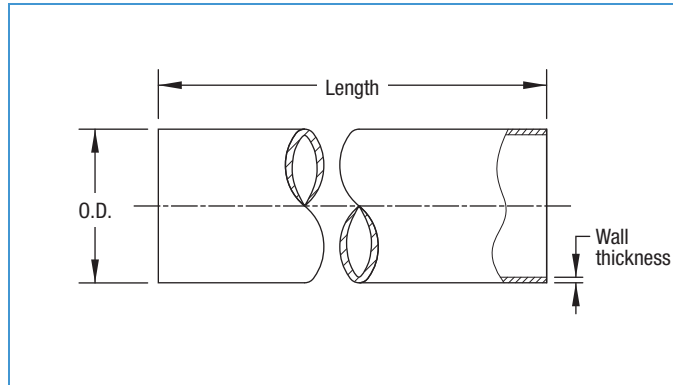
**Weight and Dimensions** See table

All dimensions in this catalog are given in inches unless specified otherwise.

### Vacuum Tubing



- Contact factory for quotes on machined lengths, bead blast or electropolished finishes
- Lengths are saw cut at  $\pm 1/8"$  and deburred
- Lengths greater than 18-ft are random length  $\pm 6"$
- Price is per foot or any fraction of a foot

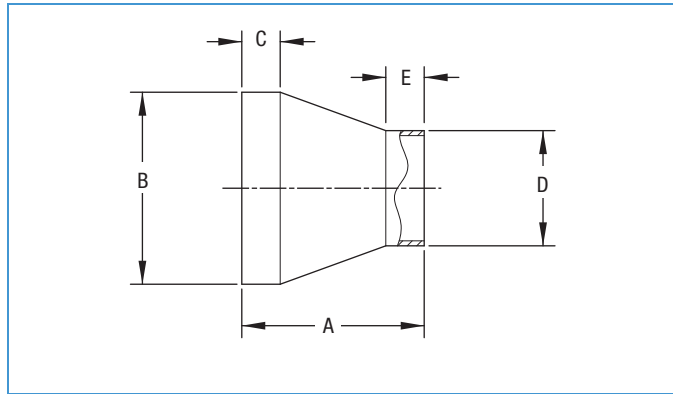


- 304 stainless steel
- 1/4" through 10-3/4" O.D. sizes
- Saw cut and deburred
- Custom lengths available

NOMINAL SIZE	TUBE O.D.	TUBE WALL	THEORETICAL I.D.	WT PER FT LB	REFERENCE	PART NUMBER
1/4	.25	.035	.18	1/8	ST-025	480000
3/8	.37	.035	.30	1/8	ST-037	480001
1/2	.50	.035	.43	1/8	ST-050	480002
3/4	.75	.035	.68	1/8	ST-075	480003
1	1.00	.065	.87	1/2	ST-100	480004
1-1/4	1.25	.065	1.12	3/4	ST-125	480005
1-1/2	1.50	.065	1.37	1	ST-150	480006
2	2.00	.065	1.87	1-1/2	ST-200	480007
2-1/2	2.50	.065	2.37	1-3/4	ST-250	480008
3	3.00	.065	2.87	2	ST-300	480009
4	4.00	.083	3.83	3-1/2	ST-400	480010
5	5.00	.083	4.83	4-1/2	ST-500	480011
6	6.00	.120	5.76	5	ST-600	480012
8	8.00	.120	7.76	10-1/2	ST-800	480013
10	10.00	.120	9.76	12-1/2	ST-1000	480014
10-3/4	10.75	.134	10.48	15	ST-1075	480015

Note: There is no cutting charge

Conical Reducer

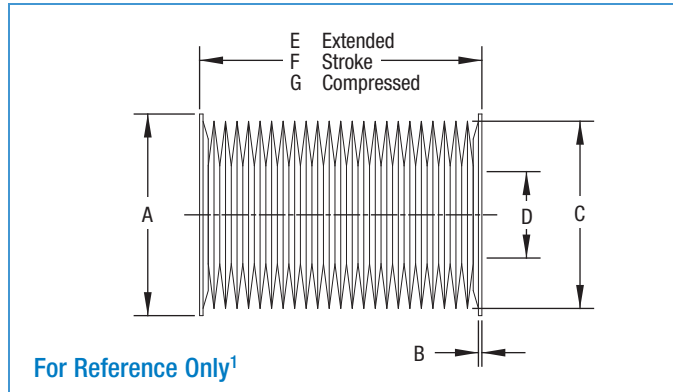


- 304 stainless steel
- Main end 1" through 6" O.D. sizes

NOMINAL SIZE	A	B	C	D	E	WALL	WT LB	REFERENCE	PART NUMBER
1.0 - .75	1.375	1.00	.44	.75	.62	.065	1/4	100-075CRNF	402500
1.5 - .75	2.375	1.50	.50	.75	.50	.065	1/4	150-075CRNF	402501
1.5 - 1.0	2.375	1.50	.50	1.00	.50	.065	1/4	150-100CRNF	402502
2.0 - 1.0	2.375	2.00	.50	1.00	.50	.065	1/2	200-100CRNF	402503
2.0 - 1.5	2.375	2.00	.50	1.50	.50	.065	1/2	200-150CRNF	402504
2.5 - 1.5	2.375	2.50	.38	1.50	.50	.065	1/2	250-150CRNF	402505
2.5 - 2.0	2.375	2.50	.38	2.00	.56	.065	1/2	250-200CRNF	402506
3.0 - 1.5	3.625	3.00	.50	1.50	.56	.065	1	300-150CRNF	402507
3.0 - 2.0	3.625	3.00	.38	2.00	.56	.065	1	300-200CRNF	402508
3.0 - 2.5	3.625	3.00	.50	2.50	.56	.065	1	300-250CRNF	402509
4.0 - 2.0	3.625	4.00	.38	2.00	.56	.065	2	400-200CRNF	402510
4.0 - 2.5	3.625	4.00	.38	2.50	.56	.065	2	400-250CRNF	402511
4.0 - 3.0	3.625	4.00	.50	3.00	.38	.065	2	400-300CRNF	402512
6.0 - 3.0	8.850	6.00	1.00	3.00	1.25	.120	4	600-300CRNF	402513
6.0 - 4.0	8.850	6.00	1.06	4.00	1.12	.120	4	600-400CRNF	402514



### Welded Bellows

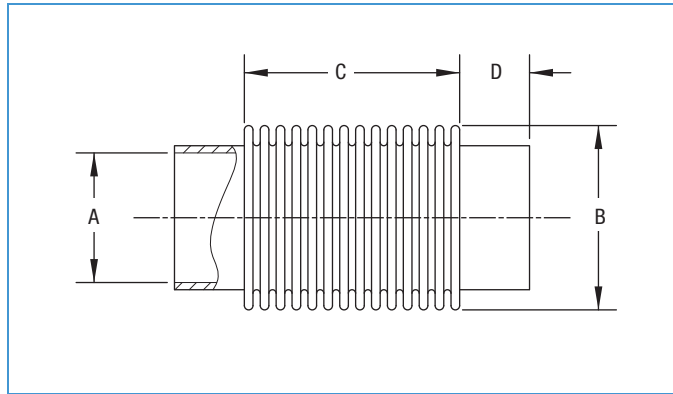


- AM-350 bellows material
- 304ss end plate material

A	B	C	D	LENGTH				WT LB	REFERENCE	PART NUMBER
				Extended	Stroke	Compr.	Free			
.500	.008	.396	.200	.58	.42	.16	.44	1/2	WB-817	471017
.500	.008	.396	.200	1.16	.84	.32	.87	1/2	WB-815	471015
.500	.008	.396	.200	2.32	1.68	.64	1.69	1/2	WB-816	471016
.750	.010	.638	.338	.68	.46	.23	.63	1/2	WB-812	471012
1.070	.015	1.030	.540	1.05	.75	.30	1.00	1/2	WB-800	471000
1.070	.015	1.030	.540	1.38	1.00	.38	1.10	1/2	WB-801	471001
1.070	.020	1.030	.550	.50	.36	.14	.44	1/2	WB-811	471011
1.375	.012	1.250	.750	1.15	.74	.41	.87	1/2	WB-814	471014
1.750	.015	1.625	.750	1.89	1.50	.39	1.88	1/2	WB-802	471002
1.750	.015	1.625	.750	2.19	1.90	.29	2.13	1/2	WB-803	471003
1.750	.015	1.625	.750	3.16	2.50	.66	3.06	1/2	WB-804	471004
1.750	.015	1.625	.750	3.78	3.00	.78	3.63	1/2	WB-805	471005
1.750	.015	1.625	.750	5.02	4.00	1.02	4.88	1/2	WB-806	471006
1.500	.012	1.375	.830	7.80	6.20	1.60	6.38	1/2	WB-823	471023
1.820	.015	1.625	.937	3.30	2.50	.80	3.00	1/2	WB-809	471009
1.750	.015	1.625	.937	7.62	6.00	1.62	5.75	3/4	WB-808	471008
1.750	.015	1.625	.937	10.12	8.38	1.75	9.75	3/4	WB-807	471007
2.250	.015	2.200	1.040	2.54	2.00	.54	1.88	3/4	WB-824	471024
2.125	.015	1.992	1.250	7.53	6.00	1.53	5.13	3/4	WB-820	471020
2.250	.018	2.250	1.500	1.57		.57	1.00	3/4	WB-821	471021
2.250	.018	2.250	1.500	2.98	2.00	.98	2.50	3/4	WB-822	471022
3.687	.015	3.500	2.500	2.59	1.92	.67	1.94	3/4	WB-825	471025

<sup>1</sup> Some units may be constructed of two or more segments.

### Standard Cuffs



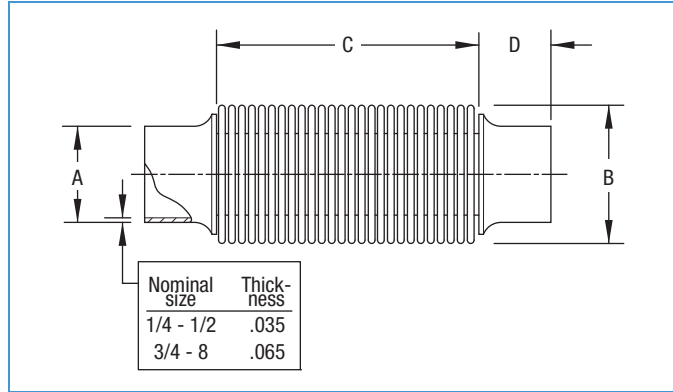
- Type 321 stainless steel
- 1/4" through 12" sizes
- Highly flexible short length bellows for alignment

NOMINAL SIZE	WALL	A <sup>1</sup>	B	C	D	AXIAL DEFLECTION <sup>2</sup>	WT LB	REFERENCE	PART NUMBER
1/4	.005	.25	.37	1.00	.50	+.10 / -.25	1/4	FB-6502	470000
5/16	.005	.31	.46	1.00	.50	+.10 / -.25	1/4	FB-6503	470001
3/8	.005	.37	.57	1.50	.50	+.15 / -.37	1/4	FB-6504	470002
1/2	.006	.50	.75	1.50	.50	+.15 / -.37	1/4	FB-6506	470003
5/8	.006	.62	.87	1.50	.50	+.15 / -.37	1/4	FB-6508	470004
3/4	.006	.75	1.04	1.50	.50	+.15 / -.37	1/4	FB-6510	470005
7/8	.006	.87	1.25	2.00	.50	+.20 / -.50	1/2	FB-6512	470006
1	.006	1.00	1.37	2.00	.75	+.20 / -.50	1/2	FB-6513	470007
1-1/8	.006	1.12	1.46	2.00	.75	+.20 / -.50	1/2	FB-6516	470008
1-1/4	.006	1.25	1.60	2.00	.75	+.20 / -.50	1/2	FB-6518	470009
1-3/8	.006	1.37	1.81	2.00	.75	+.20 / -.50	1/2	FB-6520	470010
1-1/2	.006	1.50	1.90	2.00	.75	+.20 / -.50	1/2	FB-6522	470011
1-5/8	.006	1.62	2.05	2.00	.75	+.20 / -.50	1/2	FB-6523	470012
1-3/4	.006	1.75	2.24	2.00	.75	+.20 / -.50	1/2	FB-6525	470013
2	.006	2.00	2.49	2.50	.75	+.25 / -.62	1	FB-6528	470014
2-1/4	.006	2.25	2.81	2.50	.75	+.25 / -.62	1	FB-6530	470015
2-1/2	.006	2.50	2.98	2.50	.75	+.25 / -.62	1	FB-6532	470016
3	.008	3.00	3.77	3.00	1.00	+.30 / -.75	1	FB-6536	470017
3-1/2	.008	3.50	4.30	3.50	1.00	+.35 / -.87	1	FB-6540	470018
4	.008	4.00	4.78	4.00	1.00	+.40 / -1.00	2	FB-6544	470019
4-1/2	.008	4.50	5.28	4.00	1.00	+.40 / -1.00	2	FB-6548	470020
5	.008	5.00	5.75	5.00	1.00	+.50 / -1.25	2	FB-6552	470021
6	.010	6.00	6.85	5.00	1.25	+.50 / -1.25	2	FB-6557	470022
8	.020	8.00	9.25	6.00	1.25	+.60 / -1.50	3	FB-6564	470023
10	.020	10.00	11.31	6.00	1.25	+.60 / -1.50	3	FB-6571	470024
12	.020	12.00	13.88	6.00	1.25	+.60 / -1.50	3	FB-6577	470025

<sup>1</sup> Through I.D. approximately 95% of cuff I.D. due to roll-in of bellows.

<sup>2</sup> Axial deflection approximately +10% and -25% of live length. Lateral deflection approximately 10% of live length.

### Weld Cuffs



- Type 300 stainless steel bellows
- Type 316 stainless steel weldable tube end cuffs
- 1/4" through 8" sizes
- Highly flexible short length bellows for alignment

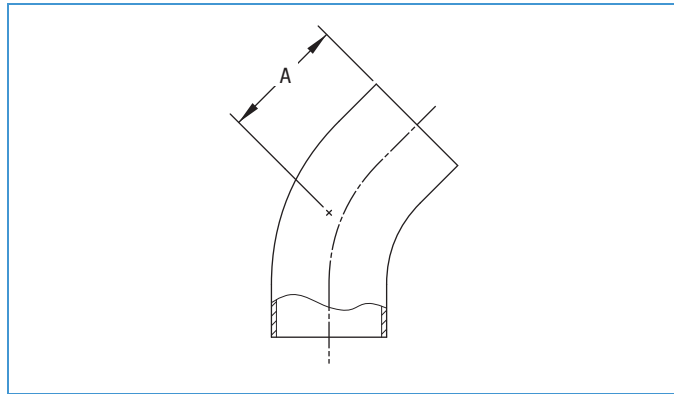
NOMINAL SIZE	WALL	A	B	C	D	AXIAL DEFLECTION <sup>1</sup>	WT LB	REFERENCE	PART NUMBER
1/4	.006	.25	.39	1.0	.50	+ .10 / - .25	1/4	FBW-6502	470500
1/2	.005	.50	.78	1.5	.50	+ .15 / - .37	1/4	FBW-6506	470501
3/4	.005	.75	1.14	1.5	.50	+ .15 / - .37	1/4	FBW-6510	470502
1	.005	1.00	1.44	2.0	.75	+ .20 / - .50	1/2	FBW-6513	470503
1-1/4	.006	1.25	1.77	2.0	.75	+ .20 / - .50	1/2	FBW-6518	470504
1-1/2	.006	1.50	2.16	2.0	.75	+ .20 / - .50	1/2	FBW-6522	470505
2	.006	2.00	2.60	2.0	.75	+ .20 / - .50	1/2	FBW-6528	470506
2-1/2	.006	2.50	3.14	2.5	.75	+ .25 / - .62	1	FBW-6532	470507
3	.008	3.00	3.74	3.0	1.00	+ .30 / - .75	1	FBW-6536	470508
3-1/2	.008	3.50	4.32	3.5	1.00	+ .35 / - .87	1	FBW-6540	470509
4	.008	4.00	4.91	4.0	1.00	+ .40 / - 1.00	2	FBW-6544	470510
4-1/2	.008	4.50	5.52	4.0	1.00	+ .40 / - 1.00	2	FBW-6548	470511
5	.008	5.00	6.03	5.0	1.00	+ .50 / - 1.25	2	FBW-6552	470512
6	.010	6.00	7.03	5.0	1.25	+ .50 / - 1.25	2	FBW-6557	470513
8	.012	8.00	9.29	6.0	1.25	+ .60 / - 1.50	3	FBW-6564	470514

<sup>1</sup> Axial deflection approximately +10% and -25% of live length. Lateral deflection approximately 10% of live length.

### Note:

- Longer length flexible hose available in Section 3, Roughing Components

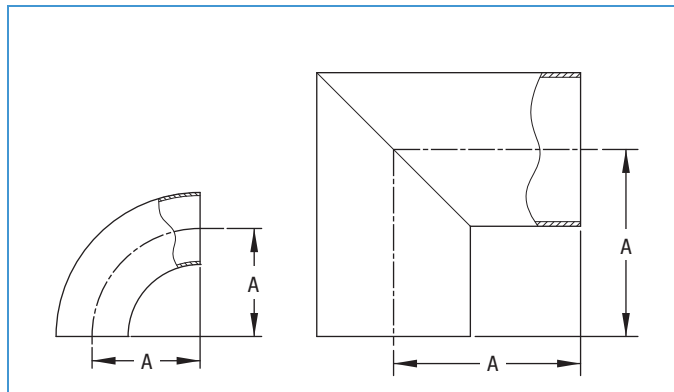
### 45° with Tangents



- 3/4" through 4" sizes
- Radiussed tube

NOMINAL SIZE	A	TUBE O.D.	TUBE WALL	WT LB	REFERENCE	PART NUMBER
3/4	.76	.75	.035	1/4	075-45L-NF	403515
1	1.19	1.00	.065	1/4	100-45L-NF	403516
1-1/2	1.62	1.50	.065	1/4	150-45L-NF	403521
2	2.31	2.00	.065	3/4	200-45L-NF	403517
2-1/2	3.00	2.50	.065	1	250-45L-NF	403523
3	3.68	3.00	.065	2	300-45L-NF	403524
4	4.81	4.00	.083	3	400-45L-NF	403525

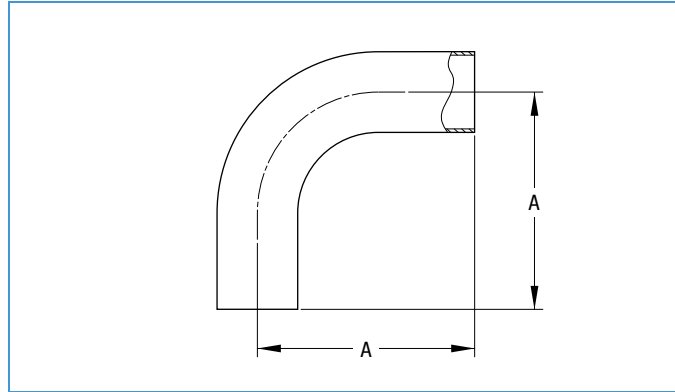
### 90 Degree



- 3/4" through 10" sizes
- Radiussed or mitered tube

NOMINAL SIZE	BEND TYPE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
3/4	RADIUS	.75	.035	1.13	1/4	075-2L-NF	403500
1	RADIUS	1.00	.065	1.50	1/4	100-2L-NF	403511
1-1/2	RADIUS	1.50	.065	2.25	1/2	150-2L-NF	403502
2	RADIUS	2.00	.065	3.00	1/2	200-2L-NF	403503
2-1/2	RADIUS	2.50	.065	3.75	3/4	250-2L-NF	403504
3	RADIUS	3.00	.065	4.50	1-1/2	300-2LR-NF	403512
3	MITER	3.00	.120	3.15	2	300-2LM-NF	403505
4	RADIUS	4.00	.083	6.00	4	400-2LR-NF	403513
4	MITER	4.00	.120	4.87	4-1/2	400-2LM-NF	403506
5	MITER	5.00	.120	4.47	5	500-2LM-NF	403507
6	RADIUS	6.00	.109	9.00	8	600-2LR-NF	403514
6	MITER	6.00	.120	6.06	8	600-2LM-NF	403508
8	MITER	8.00	.120	7.50	13	800-2LM-NF	403509
10	MITER	10.00	.120	9.50	19	1000-2LM-NF	403510

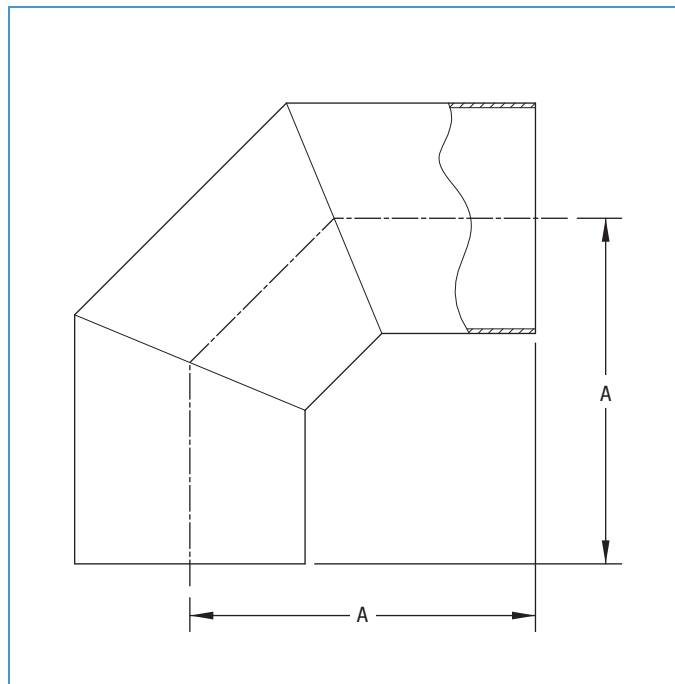
### 90° with Tangents



- 3/4" through 4" sizes
- Radiussed tube

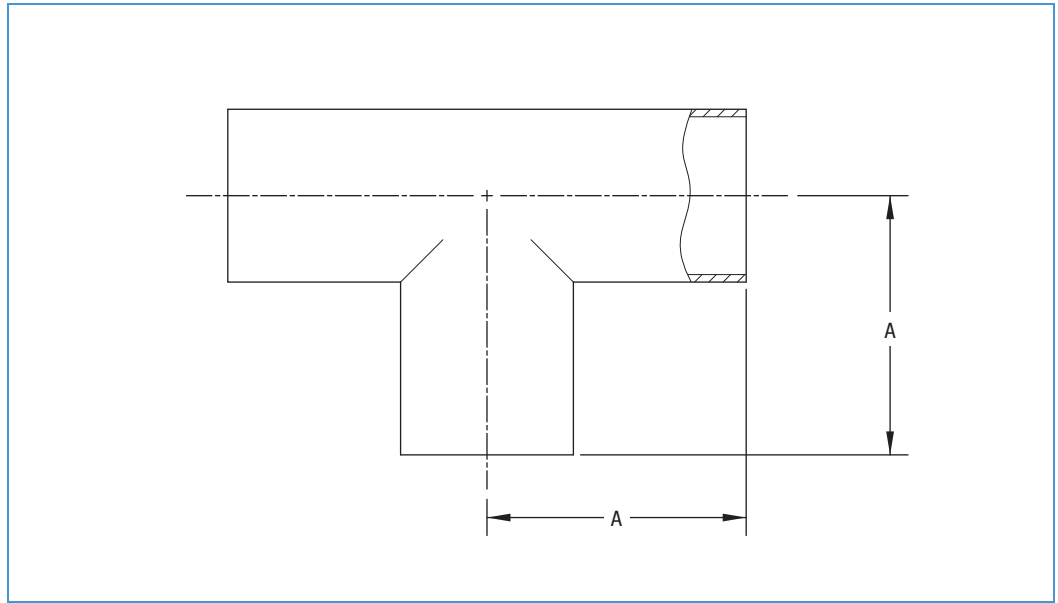
NOMINAL SIZE	A	TUBE O.D.	TUBE WALL	WT LB	REFERENCE	PART NUMBER
3/4	1.42	.75	.035	1/4	075-2LL-NF	403540
1	2.06	1.00	.065	1/2	100-2LL-NF	403541
1-1/2	2.94	1.50	.065	3/4	150-2LL-NF	403542
2	4.06	2.00	.065	3/4	200-2LL-NF	403543
2-1/2	5.19	2.50	.065	1	250-2LL-NF	403544
3	6.31	3.00	.065	2	300-2LL-NF	403545
4	8.31	4.00	.083	4-1/2	400-2LL-NF	403546

### High Conductance



- 6" through 10" sizes
- Mitered tube

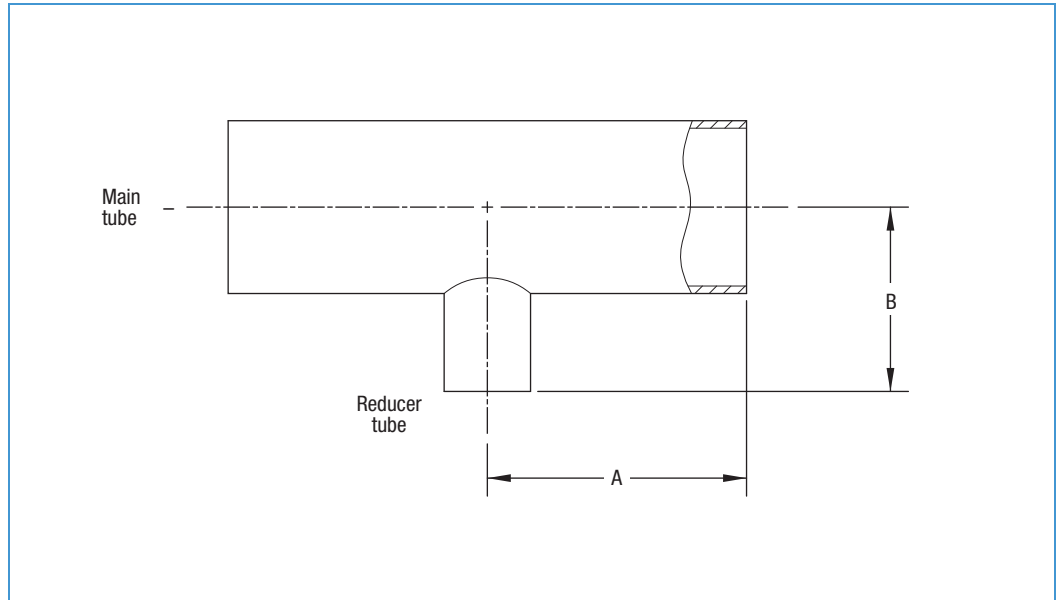
NOMINAL SIZE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
6	6.00	.120	9.00	9-1/2	600-2LHCNF	403530
8	8.00	.120	12.00	11	800-2LHCNF	403531
10	10.00	.120	15.00	15	1000-2LHCNF	403532



■ 3/4" through 10" sizes

NOMINAL SIZE	TUBE O.D.	TUBE WALL	A	WT LB	REFERENCE	PART NUMBER
3/4	.75	.035	1.00	1/4	075-3-NF	404500
1	1.00	.065	1.87	1/4	100-3-NF	404501
1-1/2	1.50	.065	2.25	1/2	150-3-NF	404502
2	2.00	.065	3.00	1	200-3-NF	404503
2-1/2	2.50	.065	3.00	3	250-3-NF	404539
3	3.00	.065	3.25	2	300-3-NF	404540
4	4.00	.083	3.87	5	400-3-NF	404541
5	5.00	.120	4.47	5-1/4	500-3-NF	404507
6	6.00	.109	5.62	7	600-3-NF	404542
8	8.00	.109	7.00	15	800-3-NF	404543
10	10.00	.120	9.50	23-1/2	1000-3-NF	404510

### Reducing Tees



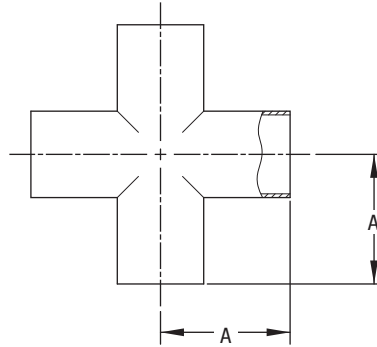
■ Main tube 1" through 6" sizes

MAIN TUBE NOM.	O.D.	WALL	A	REDUCER TUBE			B	WT LB	REFERENCE	PART NUMBER
				NOM.	O.D.	WALL				
1	1.00	.065	1.87	3/4	.75	.035	2.00	1/2	100-3-075NF	404544
1-1/2	1.50	.065	2.25	3/4	.75	.035	2.25	1/2	150-3-075NF	404545
1-1/2	1.50	.065	2.25	1	1.00	.065	2.12	1/2	150-3-100NF	404546
2	2.00	.065	3.00	1	1.00	.065	2.37	1	200-3-100NF	404547
2	2.00	.065	3.00	1-1/2	1.50	.065	2.50	1	200-3-150NF	404548
2-1/2	2.50	.065	3.00	1-1/2	1.50	.065	2.25	2-3/4	250-3-150NF	404549
2-1/2	2.50	.065	3.00	2	2.00	.065	3.25	2-3/4	250-3-200NF	404550
3	3.00	.065	3.25	1-1/2	1.50	.065	3.00	2	300-3-150NF	404551
3	3.00	.065	3.25	2	2.00	.065	3.25	2	300-3-200NF	404552
3	3.00	.065	3.25	2-1/2	2.50	.065	3.25	2	300-3-250NF	404553
4	4.00	.083	3.87	2	2.00	.065	4.00	4	400-3-200NF	404554
4	4.00	.083	3.87	2-1/2	2.50	.065	3.75	4	400-3-250NF	404555
4	4.00	.083	3.87	3	3.00	.065	3.75	4	400-3-300NF	404556
6	6.00	.109	5.00	3	3.00	.065	4.75	8	600-3-300NF	404557
6	6.00	.109	5.00	4	4.00	.083	4.87	8	600-3-400NF	404558

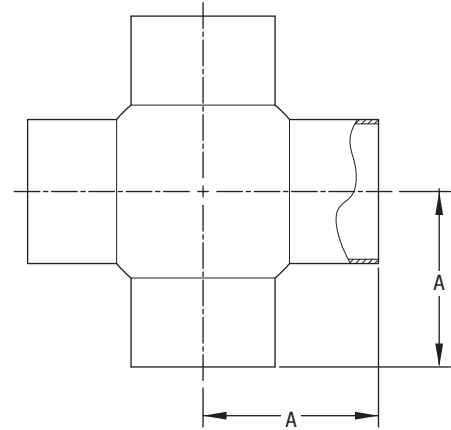
### Four-Way Crosses



Tube body



Spherical body

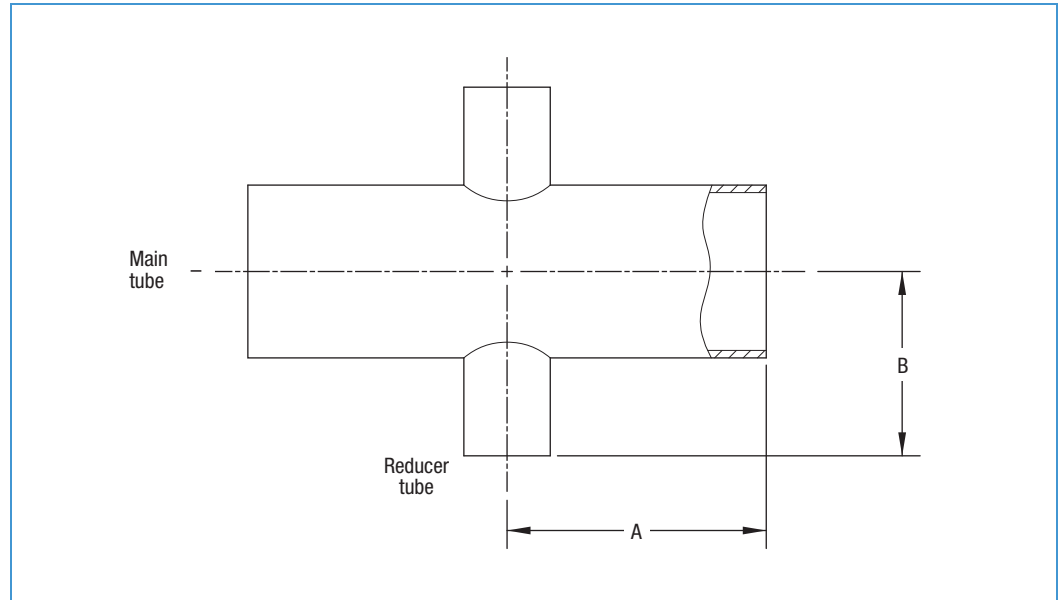


- 3/4" through 10" sizes
- Tube or spherical main body

NOMINAL SIZE	TUBE O.D.	TUBE WALL	BODY TYPE	SPHERE O.D.	SPHERE WALL	A	WT LB	REFERENCE	PART NUMBER
3/4	.75	.035	TUBE	-	-	1.00	1/4	075-4-NF	405500
1	1.00	.065	TUBE	-	-	1.87	1/4	100-4-NF	405501
1-1/2	1.50	.065	TUBE	-	-	2.25	3/4	150-4-NF	405502
2	2.00	.065	TUBE	-	-	3.00	1	200-4-NF	405503
2-1/2	2.50	.065	TUBE	-	-	3.00	3	250-4-NF	405539
3	3.00	.065	TUBE	-	-	3.25	4	300-4-NF	405540
4	4.00	.083	TUBE	-	-	3.87	6	400-4T-NF	405541
4	4.00	.120	SPHERE	6-1/4	.120	4.87	6	400-4S-NFS	405506
5	5.00	.120	SPHERE	9	.120	4.47	6	500-4S-NFS	405507
6	6.00	.109	TUBE	-	-	5.62	10-1/2	600-4T-NF	405542
6	6.00	.120	SPHERE	9	.120	6.06	10-1/2	600-4S-NFS	405508
8	8.00	.109	TUBE	-	-	7.00	16-3/4	800-4T-NF	405543
8	8.00	.120	SPHERE	12	.120	7.50	16-3/4	800-4S-NFS	405509
10	10.00	.120	SPHERE	16	.120	9.50	20	1000-4S-NFS	405510



### Reducing Crosses



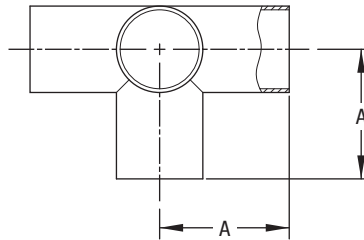
■ Main tube 1" through 6" sizes

MAIN TUBE NOM.	O.D.	WALL	A	REDUCER TUBE			B	WT LB	REFERENCE	PART NUMBER
				NOM.	O.D.	WALL				
1	1.00	.065	1.87	3/4	.75	.035	2.00	3/4	100-4-075NF	405544
1-1/2	1.50	.065	2.25	3/4	.75	.035	2.25	3/4	150-4-075NF	405545
1-1/2	1.50	.065	2.25	1	1.00	.065	2.13	3/4	150-4-100NF	405546
2	2.00	.065	3.00	1	1.00	.065	2.38	1	200-4-100NF	405547
2	2.00	.065	3.00	1-1/2	1.50	.065	2.50	1	200-4-150NF	405548
2-1/2	2.50	.065	3.00	1-1/2	1.50	.065	2.75	3	250-4-150NF	405549
2-1/2	2.50	.065	3.00	2	2.00	.065	3.25	3	250-4-200NF	405550
3	3.00	.065	3.25	1-1/2	1.50	.065	3.00	2-1/2	300-4-150NF	405551
3	3.00	.065	3.25	2	2.00	.065	3.50	2-1/2	300-4-200NF	405552
3	3.00	.065	3.25	2-1/2	2.50	.065	3.25	2-1/2	300-4-250NF	405553
4	4.00	.083	3.87	2	2.00	.065	4.00	5	400-4-200NF	405554
4	4.00	.083	3.87	2-1/2	2.50	.065	3.75	5	400-4-250NF	405555
4	4.00	.083	3.87	3	3.00	.065	3.75	5	400-4-300NF	405556
6	6.00	.109	5.00	3	3.00	.065	4.75	9	600-4-300NF	405557
6	6.00	.109	5.00	4	4.00	.083	4.87	9	600-4-400NF	405558

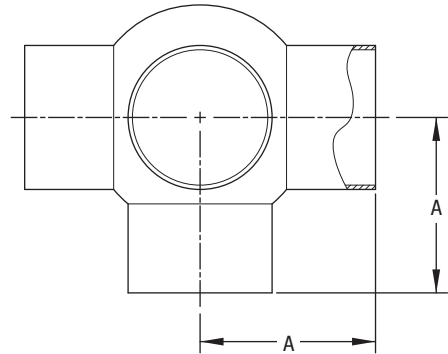
### Five-Way Crosses



**Tube body**  
3/4" to 3" tube



**Spherical body**  
4" to 10" tube



- 3/4" through 10" sizes
- Body type dependent on tube size

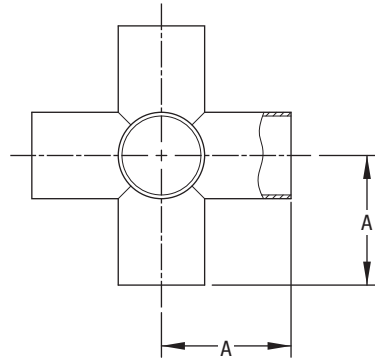
NOMINAL SIZE	TUBE O.D.	TUBE WALL	BODY TYPE	BODY DIMEN.		A	WT LB	REFERENCE	PART NUMBER
				O.D.	WALL				
3/4	.75	.035	TUBE	-	-	1.00	1/4	075-5-NF	<b>406500</b>
1	1.00	.065	TUBE	-	-	1.87	1/2	100-5-NF	<b>406501</b>
1-1/2	1.50	.065	TUBE	-	-	2.25	3/4	150-5-NF	<b>406502</b>
2	2.00	.065	TUBE	-	-	2.98	1-1/4	200-5-NF	<b>406503</b>
2-1/2	2.50	.120	TUBE	-	-	3.74	3-1/2	250-5-NF	<b>406504</b>
3	3.00	.120	TUBE	-	-	3.15	3	300-5-NF	<b>406505</b>
4	4.00	.120	SPHERE	6-1/4	.120	4.87	6-3/4	400-5S-NFS	<b>406506</b>
5	5.00	.120	SPHERE	9	.120	4.47	6-1/2	500-5S-NFS	<b>406507</b>
6	6.00	.120	SPHERE	9	.120	6.06	12-1/2	600-5S-NFS	<b>406508</b>
8	8.00	.120	SPHERE	12	.120	7.50	18-1/4	800-5S-NFS	<b>406509</b>
10	10.00	.120	SPHERE	16	.120	9.50	24	1000-5S-NFS	<b>406510</b>

### Six-Way Crosses



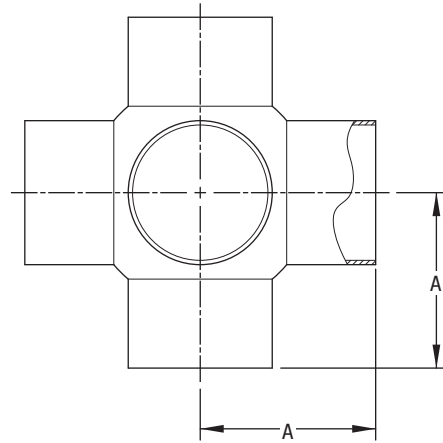
Tube body

3/4" to 3" tube



Spherical body

4" to 10" tube



- 3/4" through 10" sizes
- Body type dependent on tube size

NOMINAL SIZE	TUBE O.D.	TUBE WALL	BODY TYPE	BODY DIMEN. O.D.		WALL	A	WT LB	REFERENCE	PART NUMBER
3/4	.75	.035	TUBE	-	-	-	1.00	1/4	075-6-NF	407500
1	1.00	.065	TUBE	-	-	-	1.87	1/2	100-6-NF	407501
1-1/2	1.50	.065	TUBE	-	-	-	2.25	3/4	150-6-NF	407502
2	2.00	.065	TUBE	-	-	-	2.98	1-1/2	200-6-NF	407503
2-1/2	2.50	.120	TUBE	-	-	-	3.74	4	250-6-NF	407504
3	3.00	.120	TUBE	-	-	-	3.15	3	300-6-NF	407505
4	4.00	.120	SPHERE	6-1/4	.120	-	4.87	7-3/4	400-6S-NFS	407506
5	5.00	.120	SPHERE	9	.120	-	4.47	7	500-6S-NFS	407507
6	6.00	.120	SPHERE	9	.120	-	6.06	14	600-6S-NFS	407508
8	8.00	.120	SPHERE	12	.120	-	7.50	20	800-6S-NFS	407509
10	10.00	.120	SPHERE	16	.120	-	9.50	28	1000-6S-NFS	407510



### Features

- High vacuum rated to  $1 \times 10^{-8}$  Torr
- Temperature rated to 200°C maximum
- Symmetric, nonrotatable geometries
- Viton® O-rings
- Fast coupling
- Seventeen fractional tube sizes
- Weldable, Conflat® and ISO compatible designs
- Flanged versions available, see pages 156-157

### Description

MDC Quick-Disconnects provide a fast and convenient method for coupling and uncoupling metal and glass tubing. They can be welded, brazed, or soldered to flanges, manifolds, chambers, and other vacuum equipment. Quick-Disconnects are ideal for mounting ion gauges, thermocouple gauges, special test ports, and feed-throughs.

Components are fabricated from type 304 stainless steel or brass with a surface finish of 32 micro-inches. Assemblies are useable to  $10^{-8}$  Torr and can be baked to 200°C. The maximum temperature for sustained use is 150°C. Note that repeated bakeout to 200°C can cause deterioration of O-rings and require their periodic replacement.

The compression of a Viton® O-ring can accommodate variations in a tube up to .005 inch. It is essential that all inserted tubes have accurate fractional inch diameters.

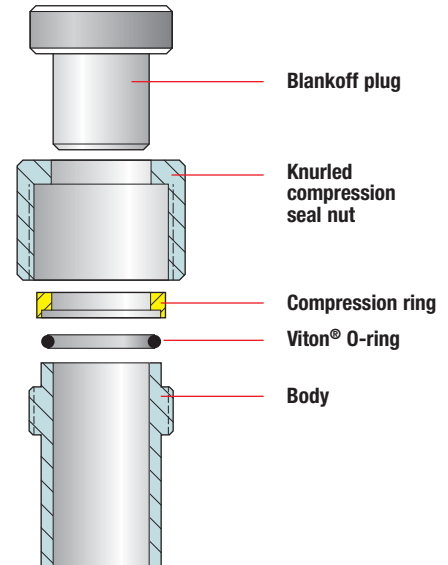
Quick-Disconnects have a bore clear through the body and do not restrict a tube from entering as far as desired into a chamber. Care must be taken when loosening the knurled compression seal nut for adjustment while the unit is under vacuum.

These fittings are also supplied mounted on Del-Seal™ CF and Kwik-Flange™ ISO KF for use on flanged ports. Refer to Section 1.5 for Hybrid Adapters, page 148.

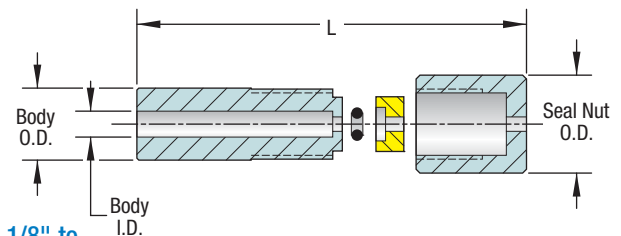
### Specifications

<b>Material</b>	
Fittings	304ss or brass
O-rings	Viton®
Flanges	304ss
<b>Fastening</b>	
Thread Size	See table
Torque	Finger-tight
<b>Vacuum Range</b>	
	$1 \times 10^{-8}$ Torr
<b>Temperature Range</b>	
	-20°C to 150°C
<b>Weight and Dimensions</b>	
	See table

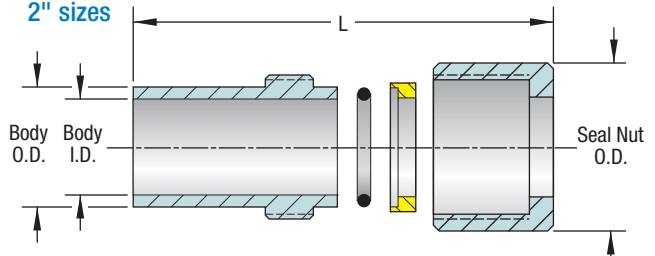
### Parts Identification



### 1/16" size



### 1/8" to 2" sizes



### Stainless Steel



### Brass



Dimensions given in the table below apply to both the stainless steel fittings on the left and the brass fittings on the right.

PART NUMBER	REFERENCE	ACCEPTS TUBE SIZE	BODY I.D.	BODY O.D.	NUT O.D.	THREAD	NOM. L	WT LB	REFERENCE	PART NUMBER
410000	DS-06	1/16	.07	3/8	1/2	.375-20	1-5/16	1	DB-06	411000
410001	DS-12	1/8	.13	3/8	1/2	.375-20	1-5/16	1	DB-12	411001
410002	DS-18	3/16	.19	3/8	5/8	.500-20	1-5/16	1	DB-18	411002
410003	DS-25	1/4	.26	3/8	5/8	.500-20	1-5/16	1	DB-25	411003
410004	DS-31	5/16	.32	1/2	7/8	.688-20	1-5/16	1	DB-31	411004
410005	DS-38	3/8	.38	1/2	7/8	.688-20	1-5/16	1	DB-38	411005
410006	DS-50	1/2	.51	5/8	7/8	.750-20	1-3/8	1	DB-50	411006
410007	DS-62	5/8	.63	3/4	1-3/16	1-20	1-1/2	1	DB-62	411007
410008	DS-75	3/4	.76	7/8	1-3/8	1.188-20	1-5/8	1	DB-75	411008
410009	DS-87	7/8	.88	1	1-3/8	1.250-20	1-5/8	1	DB-87	411009
410010	DS-100	1	1.01	1-1/8	1-5/8	1.375-20	1-7/8	1	DB-100	411010
410011	DS-112	1-1/8	1.13	1-1/4	1-7/8	1.625-20	1-7/8	2	DB-112	411011
410012	DS-125	1-1/4	1.26	1-1/2	1-7/8	1.688-20	2	2	DB-125	411012
410013	DS-138	1-3/8	1.39	1-5/8	2	1.812-20	2-1/8	2	DB-138	411013
410014	DS-150	1-1/2	1.51	1-3/4	2-1/4	2-20	2-1/4	2	DB-150	411014
410015	DS-162	1-5/8	1.63	1-7/8	2-3/8	2.125-20	2-1/4	2	DB-162	411015
410016	DS-200	2	2.01	2-1/4	2-3/4	2.500-20	2-1/4	2	DB-200	411016

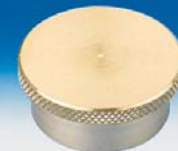
### Blankoff, Stainless Steel



### O-rings



### Blankoff, Brass



NOMINAL SIZE	REFERENCE	PART NUMBER
1/16	S-06	410100
1/8	S-12	410101
3/16	S-18	410102
1/4	S-25	410103
5/16	S-31	410104
3/8	S-38	410105
1/2	S-50	410106
5/8	S-62	410107
3/4	S-75	410108
7/8	S-87	410109
1	S-100	410110
1-1/8	S-112	410111
1-1/4	S-125	410112
1-3/8	S-138	410113
1-1/2	S-150	410114
1-5/8	S-162	410115
2	S-200	410116

NOMINAL SIZE	PART NUMBER
1/16	041003
1/8	041006
3/16	041008
1/4	041010
5/16	041011
3/8	041012
1/2	041014
5/8	041114
3/4	041116
7/8	041118
1	041120
1-1/8	041216
1-1/4	041218
1-3/8	041220
1-1/2	041222
1-5/8	041223
2	041226

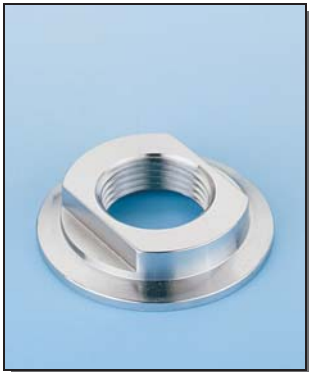
NOMINAL SIZE	REFERENCE	PART NUMBER
1/16	B-06	411100
1/8	B-12	411101
3/16	B-18	411102
1/4	B-25	411103
5/16	B-31	411104
3/8	B-38	411105
1/2	B-50	411106
5/8	B-62	411107
3/4	B-75	411108
7/8	B-87	411109
1	B-100	411110
1-1/8	B-112	411111
1-1/4	B-125	411112
1-3/8	B-138	411113
1-1/2	B-150	411114
1-5/8	B-162	411115
2	B-200	411116



Quick-Disconnect to Del-Seal page 156



Baseplate to Kwik-Flange page 161



Female NPT to Kwik-Flangepage 158



Del-Seal CF to Kwik Flange page 150



Swagelok to Del-Seal CF page 154



Kwik-Flange to Welch Pump page 160

## ULTRAHIGH & HIGH VACUUM SERIES

### Features

- High vacuum rated to  $1 \times 10^{-8}$  Torr
- Temperature rated to 200°C maximum
- Del-Seal™ CF to Swagelok® or VCR® provides UHV pressure and temperature ranges
- Nonrotatable and symmetric geometries
- Viton® elastomer O-rings
- Conflat®, ISO and ANSI compatible flanges
- Custom adapters available upon request

### Description

MDC Hybrid Adapters provide a transition from one method of sealing to another. The hybrid feature of these adapters is that the geometries at each end of any component are different. This is more than a change in size within a particular sealing method. They are available in most of the common interface transition pairs.

There are two major categories of adapters: one combines pairs of standard vacuum flanges and the other combines standard fittings with flanges.

A frequent transition is from a metal seal flange to an O-ring sealed flange or fitting. Specifications are generally limited by the introduction of an O-ring seal. All Hybrid Adapters, except the Del-Seal™ CF to Swagelok® or VCR® adapters, include at least one non-metal seal and are therefore limited to high vacuum applications. Refer to individual component sections for specifications.

Reducers are a change in size within a particular flange sealing method, such as metal-seal to metal-seal. Reducers within a specific sealing method can be found in the fittings portion of each flange section. Note that the full range of ISO to ISO reducers are found in Section 1.2 — this includes ISO LF to ISO KF fittings.

Combinations that are not found in the off-the-shelf standard configurations may be discussed with the MDC technical sales engineers.

### Specifications

#### Material

Fittings 304ss & 316ss

Flanges 304ss

#### Fastening

Method & size See individual flange specs, Sections 1.1 through 1.3

Vacuum Range  $1 \times 10^{-8}$  Torr

Fittings Leak Test  $2 \times 10^{-10}$  cc/sec He

Temperature Range -20°C to 150°C

Weight and Dimensions See table

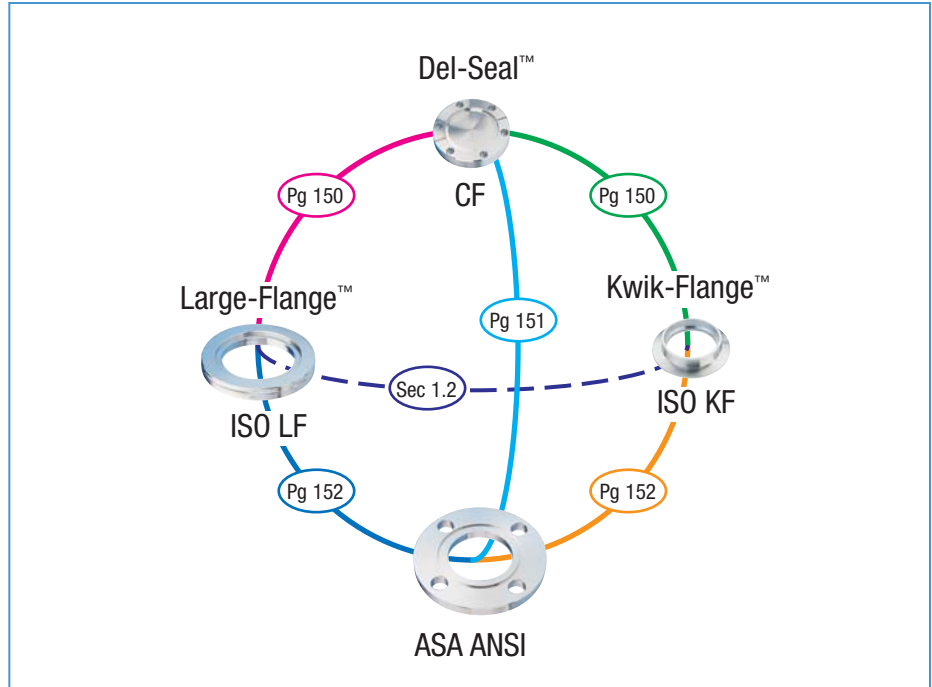
All dimensions in this catalog are given in inches unless specified otherwise.

## Flange to Flange

Chambers with existing flanges may sometimes require creative solutions for attaching a desired piece of equipment. If two flanges to be joined are not of the identical mating geometry, an adapter containing the two dissimilar flanges must be used.

The three commonly used flanges in vacuum applications are metal seal flanges, ISO elastomer seal flanges and ASA ANSI elastomer seal flanges. For those geometries, MDC offers a range of adapters to provide connections between most of the standard flange sizes.

The graph at the right pinpoints the catalog location for each pair of adapter flanges. Note that ISO to ISO pairs are reducers and found in the standard ISO fittings section.

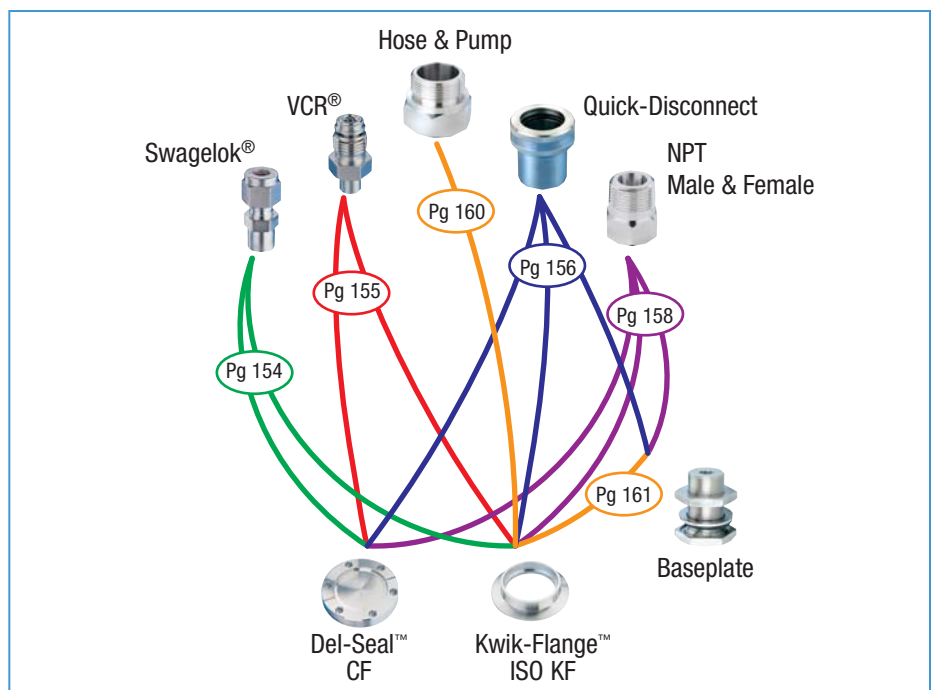


## Fitting to Flange

Chambers with flanges frequently require a special fitting for introduction of additional equipment into the vacuum. Since the two end pieces are not of the identical mating geometry, an adapter containing the two dissimilar connections must be used.

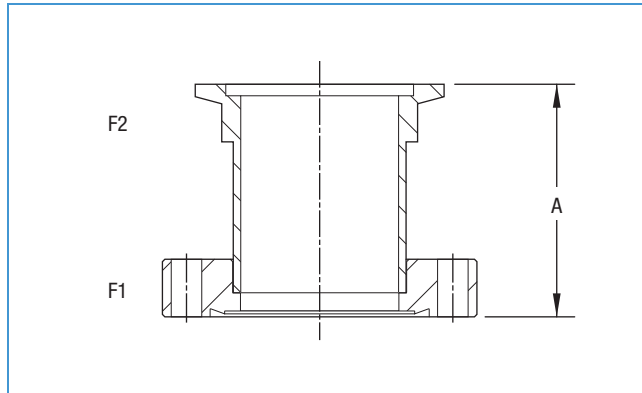
The two most common flanges in vacuum applications are metal seal flanges and ISO elastomer seal flanges. For those geometries, MDC offers a range of adapters to provide connections between most of the standard vacuum fittings and flanges.

The graph at the right pinpoints the catalog location for each pair of fitting and flange. The fittings at the top are combined with the flanges at the bottom.



Del-Seal™ CF to ↗

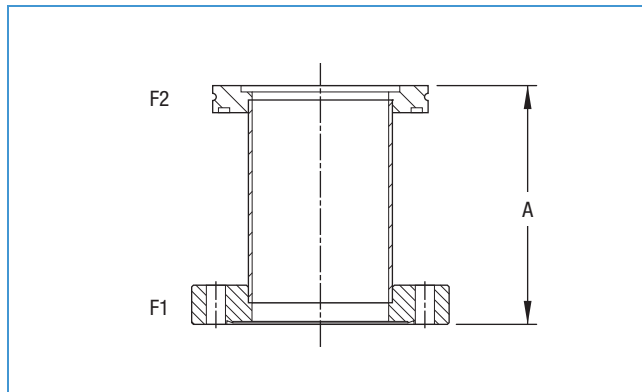
### Kwik-Flange™ KF



- Del-Seal™ CF flange to Kwik-Flange™ ISO KF

FLANGE F1 NOMINAL	O.D.	FLANGE F2 ISO REF	O.D.	TUBE O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
1-1/3	1.33	NW16	1.18	.75	.035	2.00	1/2	K075x133	730000
2-3/4	2.73	NW16	1.18	.75	.035	2.00	1/2	K075x275	730001
2-3/4	2.73	NW25	1.57	1.00	.065	2.00	1	K100x275	730002
2-3/4	2.73	NW40	2.16	1.50	.065	2.00	1	K150x275	730003
3-3/8	3.37	NW40	2.16	1.50	.065	2.00	3	K150x338	730004
4-1/2	4.47	NW40	2.16	1.50	.065	2.00	3	K150x450	730006
4-1/2	4.47	NW50	2.95	2.00	.065	2.00	3	K200x450	730005

### Large-Flange™ LF

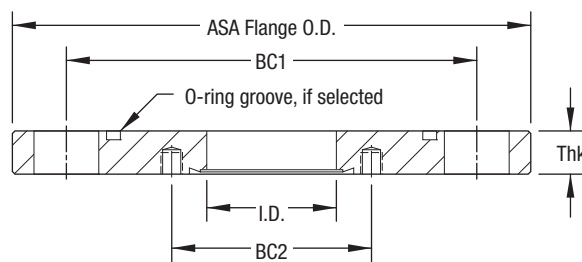


- Del-Seal™ CF flange to Large-Flange™ ISO LF

FLANGE F1 NOMINAL	O.D.	FLANGE F2 ISO REF	O.D.	TUBE O.D.	WALL	A	WT LB	REFERENCE	PART NUMBER
4-1/2	4.47	NW63	3.74	2.50	.065	4.13	3	L250x450	830000
6	5.97	NW80	4.33	3.00	.065	4.19	4	L300x600	830006
6	5.97	NW100	5.12	4.00	.083	4.19	5	L400x600	830001
8	7.97	NW160	7.09	6.00	.120	4.25	9	L600x800	830002
10	9.97	NW200	9.45	8.00	.120	4.25	16	L800x1000	830003
13-1/4	13.25	NW250	11.42	10.00	.120	4.25	20	L1000x1325	830004
14	14.00	NW320	14.57	12.00	.187	4.37	29	L1200x1400	830005



### CF to ASA smooth face



Dimensions given in the table below apply to both the smooth face flanges on the left and the O-ring grooved flanges on the right.  
Note: O-ring not included, see Section 1.3, page 131.

### CF to ASA with groove



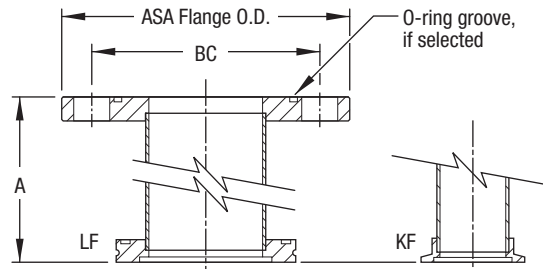
### Smooth Face Type

PART NUMBER	REFERENCE	ASA FLANGE			DEL-SEAL FLANGE			THREAD	THK	WT LB	
		ANSI	O.D.	BC1	HOLES	NOM.	I.D.				BC2
170023	ASA4-133	1	4.25	3.125	4	1-1/3	.62	1.062	8-32	.50	1-1/2
170024	ASA4-218	1	4.25	3.125	4	2-1/8	1.00	1.625	.250-28	.50	1-1/2
170000	ASA5-133	1-1/2	5.00	3.875	4	1-1/3	.62	1.062	8-32	.50	3
170001	ASA5-218	1-1/2	5.00	3.875	4	2-1/8	1.00	1.625	.250-28	.50	2-1/2
170002	ASA5-275	1-1/2	5.00	3.875	4	2-3/4	1.50	2.312	.250-28	.50	2
170003	ASA6-133	2	6.00	4.750	4	1-1/3	.62	1.062	8-32	.50	3
170004	ASA6-218	2	6.00	4.750	4	2-1/8	1.00	1.625	.250-28	.50	3-1/2
170005	ASA6-275	2	6.00	4.750	4	2-3/4	1.50	2.312	.250-28	.50	3
170006	ASA6-338	2	6.00	4.750	4	3-3/8	2.00	2.850	.312-24	.50	3
170025	ASA7-133	3	7.50	6.000	4	1-1/3	.62	1.062	8-32	.50	5
170026	ASA7-218	3	7.50	6.000	4	2-1/8	1.00	1.625	.250-28	.50	5
170027	ASA7-275	3	7.50	6.000	4	2-3/4	1.50	2.312	.250-28	.50	4
170028	ASA7-338	3	7.50	6.000	4	3-3/8	2.00	2.850	.312-24	.50	4
170007	ASA9-133	4	9.00	7.500	8	1-1/3	.62	1.062	8-32	.50	9
170008	ASA9-218	4	9.00	7.500	8	2-1/8	1.00	1.625	.250-28	.50	9
170009	ASA9-275	4	9.00	7.500	8	2-3/4	1.50	2.312	.250-28	.50	8
170010	ASA9-338	4	9.00	7.500	8	3-3/8	2.00	2.850	.312-24	.50	8
170011	ASA9-450	4	9.00	7.500	8	4-1/2	2.50	3.628	.312-24	.50	8
170012	ASA9-458	4	9.00	7.500	8	4-5/8	3.00	4.030	.312-24	.50	8
170013	ASA9-600	4	9.00	7.500	8	6	4.00	5.128	.312-24	.50	6-1/2
170014	ASA11-133	6	11.00	9.500	8	1-1/3	.62	1.062	8-32	.75	19
170015	ASA11-218	6	11.00	9.500	8	2-1/8	1.00	1.625	.250-28	.75	19
170016	ASA11-275	6	11.00	9.500	8	2-3/4	1.50	2.312	.250-28	.75	19
170017	ASA11-338	6	11.00	9.500	8	3-3/8	2.00	2.850	.312-24	.75	19
170018	ASA11-450	6	11.00	9.500	8	4-1/2	2.50	3.628	.312-24	.75	18
170019	ASA11-458	6	11.00	9.500	8	4-5/8	3.00	4.030	.312-24	.75	18
170020	ASA11-600	6	11.00	9.500	8	6	4.00	5.128	.312-24	.75	15
170021	ASA11-675	6	11.00	9.500	8	6-3/4	5.00	5.969	.312-24	.75	15
170022	ASA11-800	6	11.00	9.500	8	8	6.00	7.128	.312-24	.75	13
170029	ASA16-133	10	16.00	14.250	12	1-1/3	.62	1.062	8-32	1.00	54
170030	ASA16-218	10	16.00	14.250	12	2-1/8	1.00	1.625	.250-28	1.00	54
170031	ASA16-275	10	16.00	14.250	12	2-3/4	1.50	2.312	.250-28	1.00	54
170032	ASA16-338	10	16.00	14.250	12	3-3/8	2.00	2.850	.312-24	1.00	53
170033	ASA16-450	10	16.00	14.250	12	4-1/2	2.50	3.628	.312-24	1.00	53
170034	ASA16-458	10	16.00	14.250	12	4-5/8	3.00	4.030	.312-24	1.00	52
170035	ASA16-600	10	16.00	14.250	12	6	4.00	5.128	.312-24	1.00	50
170036	ASA16-675	10	16.00	14.250	12	6-3/4	5.00	5.969	.312-24	1.00	45
170037	ASA16-800	10	16.00	14.250	12	8	6.00	7.128	.312-24	1.00	40
170038	ASA16-1000	10	16.00	14.250	12	10	8.00	9.128	.312-24	1.00	37

### O-ring Groove Type

REFERENCE	PART NUMBER
ASA4-OR-133	170078
ASA4-OR-218	170079
ASA5-OR-133	170080
ASA5-OR-218	170081
ASA5-OR-275	170082
ASA6-OR-133	170083
ASA6-OR-218	170084
ASA6-OR-275	170085
ASA6-OR-338	170086
ASA7-OR-133	170087
ASA7-OR-218	170088
ASA7-OR-275	170089
ASA7-OR-338	170090
ASA9-OR-133	170091
ASA9-OR-218	170092
ASA9-OR-275	170093
ASA9-OR-338	170094
ASA9-OR-450	170095
ASA9-OR-458	170096
ASA9-OR-600	170097
ASA11-OR-133	170098
ASA11-OR-218	170099
ASA11-OR-275	170100
ASA11-OR-338	170101
ASA11-OR-450	170102
ASA11-OR-458	170103
ASA11-OR-600	170104
ASA11-OR-675	170105
ASA11-OR-800	170106
ASA16-OR-133	170107
ASA16-OR-218	170108
ASA16-OR-275	170109
ASA16-OR-338	170110
ASA16-OR-450	170111
ASA16-OR-458	170112
ASA16-OR-600	170113
ASA16-OR-675	170114
ASA16-OR-800	170115
ASA16-OR-1000	170116

### ISO to ASA smooth face



Dimensions given in the table below apply to both the smooth face flanges on the left and the O-ring grooved flanges on the right.  
Note: O-ring not included, see Section 1.3, page 131

### ISO to ASA with groove



#### Smooth Face Type

PART NUMBER	REFERENCE
733000	K075xASA4
733014	K100xASA4
733028	K150xASA4
733002	K075xASA5
733016	K100xASA5
733030	K150xASA5
733042	K200xASA5
733004	K075xASA6
733018	K100xASA6
733032	K150xASA6
733044	K200xASA6
733006	K075xASA7
733020	K100xASA7
733034	K150xASA7
733046	K200xASA7
733008	K075xASA9
733022	K100xASA9
733036	K150xASA9
733048	K200xASA9
733010	K075xASA11
733024	K100xASA11
733038	K150xASA11
733050	K200xASA11
733012	K075xASA16
733026	K100xASA16
733040	K150xASA16
733052	K200xASA16

#### O-ring Groove Type

REFERENCE	PART NUMBER
K075xASA4-OR	733001
K100xASA4-OR	733015
K150xASA4-OR	733029
K075xASA5-OR	733003
K100xASA5-OR	733017
K150xASA5-OR	733031
K200xASA5-OR	733043
K075xASA6-OR	733005
K100xASA6-OR	733019
K150xASA6-OR	733033
K200xASA6-OR	733045
K075xASA7-OR	733007
K100xASA7-OR	733021
K150xASA7-OR	733035
K200xASA7-OR	733047
K075xASA9-OR	733009
K100xASA9-OR	733023
K150xASA9-OR	733037
K200xASA9-OR	733049
K075xASA11-OR	733011
K100xASA11-OR	733025
K150xASA11-OR	733039
K200xASA11-OR	733051
K075xASA16-OR	733013
K100xASA16-OR	733027
K150xASA16-OR	733041
K200xASA16-OR	733053

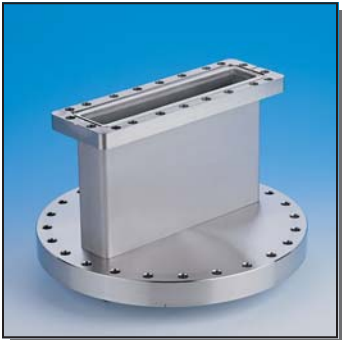
#### Smooth Face Type

PART NUMBER	REFERENCE
833000	L250xASA6
833001	L250xASA9
833012	L300xASA9
833002	L400xASA9
833003	L600xASA9
833004	L600xASA11
833005	L800xASA11

#### O-Ring Type

REFERENCE	PART NUMBER
L250xASA6-OR	833006
L250xASA9-OR	833007
L300xASA9-OR	833013
L400xASA9-OR	833008
L600xASA9-OR	833009
L600xASA11-OR	833010
L800xASA11-OR	833011

## Custom Interfaces



Rectangular flange adapter page 435



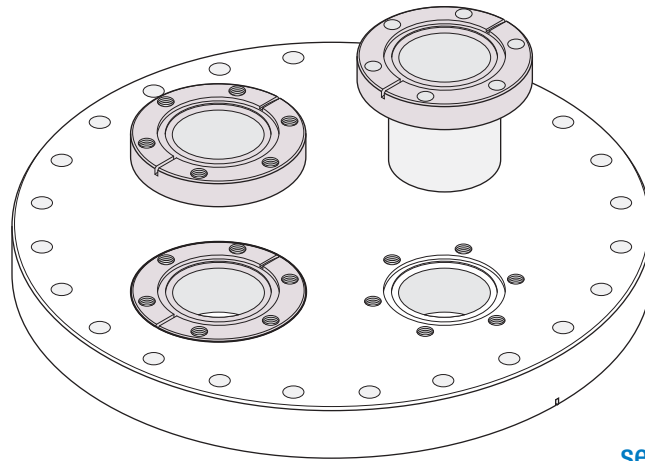
Multiport adapter page 74



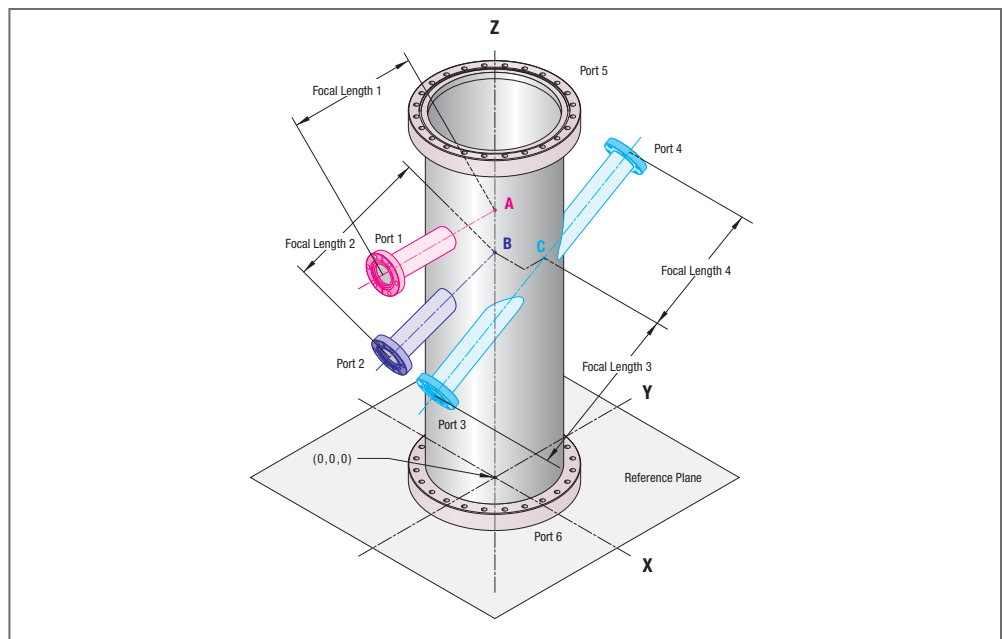
Quick-Disconnect adapter page 156

MDC manufactures a wide range of custom parts, including half nipples and adapters between custom size gate valves and chambers. Section 10 of this catalog provides additional custom fabrication information. Contact MDC's technical sales staff to discuss your design requirements.

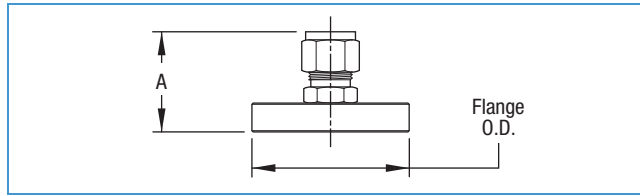
### Specifying Custom Interfaces...



...see Section 10



### Swagelok® to ↗



- 304ss flange material
- 316ss Swagelok® material

### Del-Seal™ CF



• 450°C maximum

SWAGelok® NOM. SIZE	TUBE O.D.	FLANGE NOM.	FLANGE O.D.	A NOM.	WT LB	REFERENCE	PART NUMBER
1/4	.25	1-1/3	1.33	1.33	1/4	---SWG25-133	<b>414000</b>
1/4	.25	2-3/4	2.73	1.41	1	SWG25-275	<b>414001</b>
1/2	.50	1-1/3	1.33	1.70	1/4	SWG50-133	<b>414002</b>
1/2	.50	2-3/4	2.73	1.70	1	SWG50-275	<b>414003</b>
3/4	.75	2-3/4	2.73	2.04	1	SWG75-275	<b>414004</b>
1	1.00	2-3/4	2.73	2.38	1	SWG100-275	<b>414005</b>

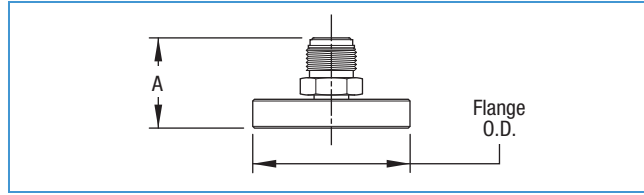
### Kwik-Flange™ KF



• 150°C maximum

SWAGelok® NOM. SIZE	TUBE O.D.	NOMINAL REF ISO	FLANGE O.D.	A NOM.	WT LB	REFERENCE	PART NUMBER
1/4	.25	NW16	1.18	1.28	1/4	K075-SWG25	<b>414012</b>
1/4	.25	NW25	1.57	1.28	1/4	K100-SWG25	<b>414013</b>
1/4	.25	NW40	2.16	1.28	1/4	K150-SWG25	<b>414014</b>
1/4	.25	NW50	2.95	1.28	1/4	K200-SWG25	<b>414015</b>
1/2	.50	NW25	1.57	1.72	1/4	K100-SWG50	<b>414016</b>
1/2	.50	NW40	2.16	1.65	1/4	K150-SWG50	<b>414017</b>
1/2	.50	NW50	2.95	1.65	1/4	K200-SWG50	<b>414018</b>
3/4	.75	NW40	2.16	1.91	1/2	K150-SWG75	<b>414019</b>
3/4	.75	NW50	2.95	1.91	1/2	K200-SWG75	<b>414020</b>
1	1.00	NW40	2.16	2.33	1/2	K150-SWG100	<b>414021</b>
1	1.00	NW50	2.95	2.33	1/2	K200-SWG100	<b>414022</b>

Male VCR® to ↗



- 304ss flange material
- 316ss VCR® material

**Del-Seal™ CF**



• 450°C maximum

MALE VCR® NOM. SIZE	TUBE O.D.	FLANGE NOM.	FLANGE O.D.	A NOM.	WT LB	REFERENCE	PART NUMBER
1/4	.25	1-1/3	1.33	1.36	1/4	VCR25-133	414006
1/4	.25	2-3/4	2.73	1.50	1	VCR25-275	414007
1/2	.50	1-1/3	1.33	1.55	1/4	VCR50-133	414008
1/2	.50	2-3/4	2.73	1.55	1	VCR50-275	414009
3/4	.75	2-3/4	2.73	2.05	1	VCR75-275	414010
1	1.00	2-3/4	2.73	2.27	1	VCR100-275	414011

**Kwik-Flange™ KF**



• 150°C maximum

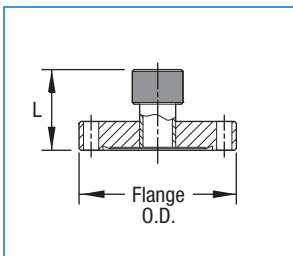
MALE VCR® NOM. SIZE	TUBE O.D.	NOMINAL REF ISO	FLANGE O.D.	A NOM.	WT LB	REFERENCE	PART NUMBER
1/4	.25	NW16	1.18	1.31	1/4	K075-VCR25	414055
1/4	.25	NW25	1.57	1.31	1/4	K100-VCR25	414056
1/4	.25	NW40	2.16	1.31	1/4	K150-VCR25	414057
1/4	.25	NW50	2.95	1.31	1/4	K200-VCR25	414058
1/2	.50	NW25	1.57	1.50	1/4	K100-VCR50	414059
1/2	.50	NW40	2.16	1.50	1/4	K150-VCR50	414060
1/2	.50	NW50	2.95	1.50	1/4	K200-VCR50	414061
3/4	.75	NW40	2.16	2.00	1/2	K150-VCR75	414062
3/4	.75	NW50	2.95	2.00	1/2	K200-VCR75	414063
1	1.00	NW40	2.16	2.22	1/2	K150-VCR100	414064
1	1.00	NW50	2.95	2.22	1/2	K200-VCR100	414065

### Quick-Disconnect to

MDC Flanged Quick-Disconnects provide rapid access into vacuum chambers through flanged ports. They offer all the convenience and flexibility of standard Quick-Disconnects when mated with Del-Seal™ CF, Baseplate or Kwik-Flange™ KF ports on a vacuum system. Quick-Disconnects are a fast and convenient method for coupling and uncoupling metal and glass tubing. They permit the speedy interchange of feedthroughs, adapters, thermocouple gauges and a variety of other special purpose devices. A positive seal is provided by O-ring compression. Fractional tubing O.D. must be circular within .005". Note that I.D.s are through and do not include a stop to restrict tubing insertion. Material is 300 series stainless steel. Maximum bakeout temperature is 200°C. Quick-Disconnects are easily sealed with blankoffs when not in use. Blankoffs are not included unless stated otherwise. Stainless steel and brass blankoffs are detailed on page 146.



- Blankoff plug not included
- For weldable, brass and blankoff components, see Section 1.4, page 146

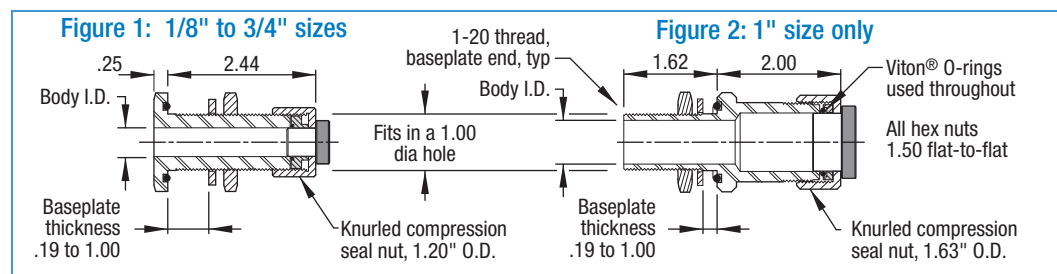


TUBE DIA.	FLANGE NOM.	FLANGE O.D.	NOM. L	NUT THREAD	WT LB	REFERENCE	PART NUMBER
1/16	1-1/3	1.33	1-3/8	.375-20	1	MFDS-06	413000
1/8	1-1/3	1.33	1-3/8	.375-20	1	MFDS-12	413001
3/16	1-1/3	1.33	1-3/8	.500-20	1	MFDS-18	413002
1/4	1-1/3	1.33	1-3/8	.500-20	1	MFDS-25	413003
5/16	1-1/3	1.33	1-3/8	.688-20	1	MFDS-31	413004
3/8	1-1/3	1.33	1-3/8	.688-20	1	MFDS-38	413005
1/2	1-1/3	1.33	1-7/16	.750-20	2	MFDS-50	413006
5/8	1-1/3	1.33	1-11/16	1-20	2	MFDS-62	413007
1/16	2-3/4	2.73	1-3/8	.375-20	1	FDS-06	412000
1/8	2-3/4	2.73	1-3/8	.375-20	1	FDS-12	412001
3/16	2-3/4	2.73	1-3/8	.500-20	1	FDS-18	412002
1/4	2-3/4	2.73	1-3/8	.500-20	1	FDS-25	412003
5/16	2-3/4	2.73	1-3/8	.688-20	1	FDS-31	412004
3/8	2-3/4	2.73	1-3/8	.688-20	1	FDS-38	412005
1/2	2-3/4	2.73	1-7/16	.750-20	2	FDS-50	412006
5/8	2-3/4	2.73	1-3/4	1-20	2	FDS-62	412007
3/4	2-3/4	2.73	1-7/8	1.188-20	2	FDS-75	412008
7/8	2-3/4	2.73	1-3/4	1.250-20	2	FDS-87	412009
1	2-3/4	2.73	2-1/8	1.375-20	2	FDS-100	412010
1-1/8	2-3/4	2.73	2-1/8	1.625-20	2	FDS-112	412011
1-1/4	2-3/4	2.73	2-1/4	1.688-20	2	FDS-125	412012
1-3/8	2-3/4	2.73	2-3/8	1.812-20	2	FDS-138	412013
1-1/2	2-3/4	2.73	2-1/2	2-20	2	FDS-150	412014



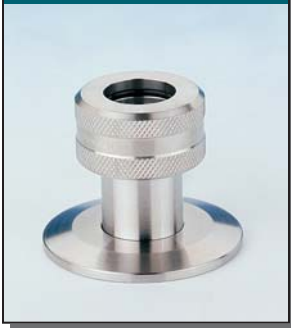
- Blankoff plug included

TUBE DIA.	FIGURE	BODY I.D.	SEAL NUT NOM. O.D.	SEAL NUT THREAD	WT LB	REFERENCE	PART NUMBER
1/8	1	.135	1-3/16	1-20	2	DBF-12	650000
1/4	1	.265	1-3/16	1-20	2	DBF-25	650001
3/8	1	.382	1-3/16	1-20	2	DBF-38	650002
1/2	1	.520	1-3/16	1-20	2	DBF-50	650003
5/8	1	.656	1-3/16	1-20	2	DBF-62	650004
3/4	1	.769	1-3/16	1-20	2	DBF-75	650005
1	2	.760	1-5/8	1.375-20	2	DBF-100	650006

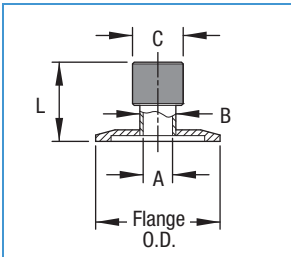


### Quick-Disconnect to ↗

#### Kwik-Flange™ KF



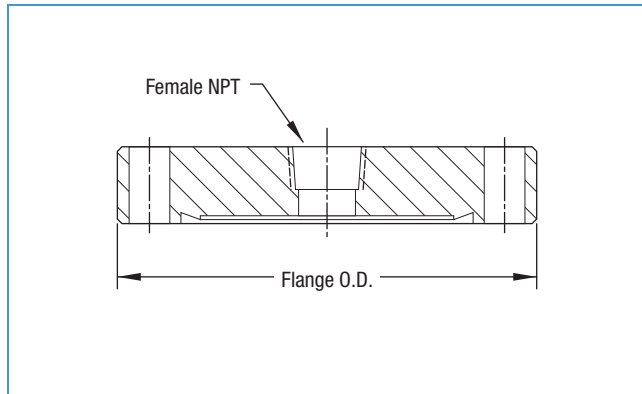
- Blankoff plug not included
- For weldable, brass and blankoff components, see Section 1.4, page 146



TUBE SIZE	NOMINAL REF ISO	FLANGE O.D.	A	B	C	NOM. L	WT LB	REFERENCE	PART NUMBER
1/16	NW16	1.18	.07	.37	.51	1-5/16	1/2	K075xDS-06	734000
1/16	NW25	1.57	.07	.37	.51	1-5/16	1/2	K100xDS-06	734008
1/16	NW40	2.16	.07	.37	.51	1-5/16	1/2	K150xDS-06	734019
1/16	NW50	2.95	.07	.37	.51	1-5/16	1/2	K200xDS-06	734034
1/8	NW16	1.18	.13	.37	.51	1-5/16	1/2	K075xDS-12	734001
1/8	NW25	1.57	.13	.37	.51	1-5/16	1/2	K100xDS-12	734009
1/8	NW40	2.16	.13	.37	.51	1-5/16	1/2	K150xDS-12	734020
1/8	NW50	2.95	.13	.37	.51	1-5/16	1/2	K200xDS-12	734035
3/16	NW16	1.18	.19	.37	.63	1-5/16	1/2	K075xDS-18	734002
3/16	NW25	1.57	.19	.37	.63	1-5/16	1/2	K100xDS-18	734010
3/16	NW40	2.16	.19	.37	.63	1-5/16	1/2	K150xDS-18	734021
3/16	NW50	2.95	.19	.37	.63	1-5/16	1/2	K200xDS-18	734036
1/4	NW16	1.18	.26	.37	.64	1-5/16	1/2	K075xDS-25	734003
1/4	NW25	1.57	.26	.37	.64	1-5/16	1/2	K100xDS-25	734011
1/4	NW40	2.16	.26	.37	.64	1-5/16	1/2	K150xDS-25	734022
1/4	NW50	2.95	.26	.37	.64	1-5/16	1/2	K200xDS-25	734037
5/16	NW16	1.18	.32	.50	.88	1-7/16	1/2	K075xDS-31	734004
5/16	NW25	1.57	.32	.50	.88	1-5/16	1/2	K100xDS-31	734012
5/16	NW40	2.16	.32	.50	.88	1-5/16	1/2	K150xDS-31	734023
5/16	NW50	2.95	.32	.50	.88	1-5/16	1/2	K200xDS-31	734038
3/8	NW16	1.18	.38	.50	.88	1-7/16	1/2	K075xDS-38	734005
3/8	NW25	1.57	.38	.50	.88	1-7/16	1/2	K100xDS-38	734013
3/8	NW40	2.16	.38	.50	.88	1-7/16	1/2	K150xDS-38	734024
3/8	NW50	2.95	.38	.50	.88	1-7/16	1/2	K200xDS-38	734039
1/2	NW16	1.18	.51	.62	.88	1-1/2	1/2	K075xDS-50	734006
1/2	NW25	1.57	.51	.62	.88	1-3/8	1/2	K100xDS-50	734014
1/2	NW40	2.16	.51	.62	.88	1-3/8	1/2	K150xDS-50	734025
1/2	NW50	2.95	.51	.62	.88	1-3/8	1/2	K200xDS-50	734040
5/8	NW16	1.18	.63	.75	1.20	1-5/8	1/2	K075xDS-62	734007
5/8	NW25	1.57	.63	.75	1.20	1-5/8	1/2	K100xDS-62	734015
5/8	NW40	2.16	.63	.75	1.20	1-5/8	1/2	K150xDS-62	734026
5/8	NW50	2.95	.63	.75	1.20	1-5/8	1/2	K200xDS-62	734041
3/4	NW25	1.57	.76	.87	1.39	1-3/4	1/2	K100xDS-75	734016
3/4	NW40	2.16	.76	.87	1.39	1-3/4	1/2	K150xDS-75	734027
3/4	NW50	2.95	.76	.87	1.39	1-3/4	1/2	K200xDS-75	734042
7/8	NW25	1.57	.88	1.00	1.39	1-3/4	1	K100xDS-87	734017
7/8	NW40	2.16	.88	1.00	1.39	1-3/4	1	K150xDS-87	734028
7/8	NW50	2.95	.88	1.00	1.39	1-3/4	1	K200xDS-87	734043
1	NW25	1.57	1.01	1.12	1.63	2	1	K100xDS-100	734018
1	NW40	2.16	1.01	1.12	1.63	2	1	K150xDS-100	734029
1	NW50	2.95	1.01	1.12	1.63	2	1	K200xDS-100	734044
1-1/8	NW40	2.16	1.13	1.25	1.88	2	1	K150xDS-112	734030
1-1/8	NW50	2.95	1.13	1.25	1.88	2	1	K200xDS-112	734045
1-1/4	NW40	2.16	1.26	1.50	1.88	2-1/8	1	K150xDS-125	734031
1-1/4	NW50	2.95	1.26	1.50	1.88	2-1/8	1	K200xDS-125	734046
1-3/8	NW40	2.16	1.39	1.62	2.01	2-1/4	1	K150xDS-138	734032
1-3/8	NW50	2.95	1.39	1.62	2.01	2-1/4	1	K200xDS-138	734047
1-1/2	NW40	2.16	1.51	1.75	2.26	2-3/8	1	K150xDS-150	734033
1-1/2	NW50	2.95	1.51	1.75	2.26	2-3/8	1	K200xDS-150	734048
1-5/8	NW50	2.95	1.63	1.87	2.38	2-1/2	1	K200xDS-162	734049
2	NW50	2.95	2.01	2.25	2.76	2-1/2	1	K200xDS-200	734050

### Female NPT to

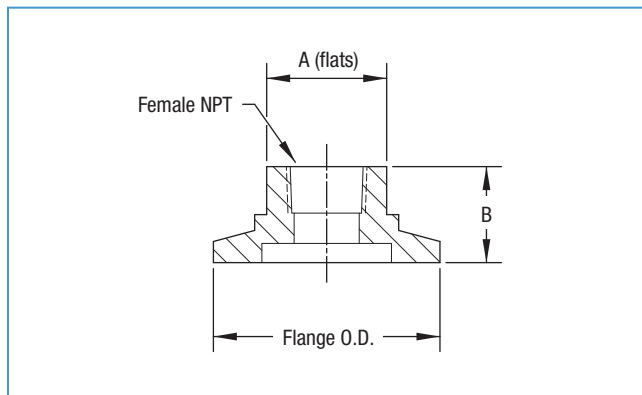
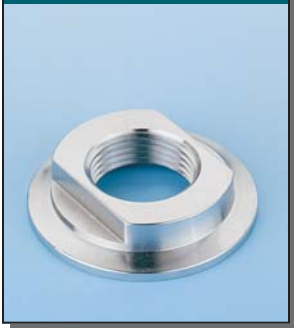
#### Del-Seal™ CF



- Use with Bourdon type pressure gauge, part number 432020, page 290
- Use with thermocouple gauge tubes, page 293
- Stainless steel
- Use Teflon tape on threads

FEMALE NPT SIZE	FLANGE NOM.	FLANGE O.D.	WT LB	REFERENCE	PART NUMBER
1/8	1-1/3	1.33	1/4	1/8FPT-133	432041
1/8	2-1/8	2.11	1/2	1/8FPT-218	432042
1/8	2-3/4	2.73	1	1/8FPT-275	432043
1/4	1-1/3	1.33	1/4	1/4FPT-133	432044
1/4	2-1/8	2.11	1/2	1/4FPT-218	432045
1/4	2-3/4	2.73	1	1/4FPT-275	432046

#### Kwik-Flange™ KF



- Use with Bourdon type pressure gauge, part number 432020, page 290
- Use with thermocouple gauge tubes, page 293
- Stainless steel
- Use Teflon tape on threads

FEMALE NPT SIZE	NOMINAL REF ISO	FLANGE O.D.	A	B	WT LB	REFERENCE	PART NUMBER
1/8	NW16	1.18	.62	.50	1/4	K075x1/8FPT	731000
1/8	NW25	1.57	.88	.50	1/4	K100x1/8FPT	731001
1/8	NW40	2.16	1.25	.50	1/4	K150x1/8FPT	731002
1/8	NW50	2.95	1.75	.62	1/2	K200x1/8FPT	731034
1/4	NW16	1.18	.62	.50	1/4	K075x1/4FPT	731004
1/4	NW25	1.57	.88	.50	1/4	K100x1/4FPT	731005
1/4	NW40	2.16	1.25	.50	1/4	K150x1/4FPT	731008
1/4	NW50	2.95	1.75	.62	1/2	K200x1/4FPT	731003
1/2	NW25	1.57	.88	.50	1/4	K100x1/2FPT	731006
1/2	NW40	2.16	1.25	.50	1/4	K150x1/2FPT	731009
1/2	NW50	2.95	1.75	.62	1/2	K200x1/2FPT	731011
3/4	NW40	2.16	1.25	.50	1/4	K150x3/4FPT	731010
3/4	NW50	2.95	1.75	.62	1/2	K200x3/4FPT	731012

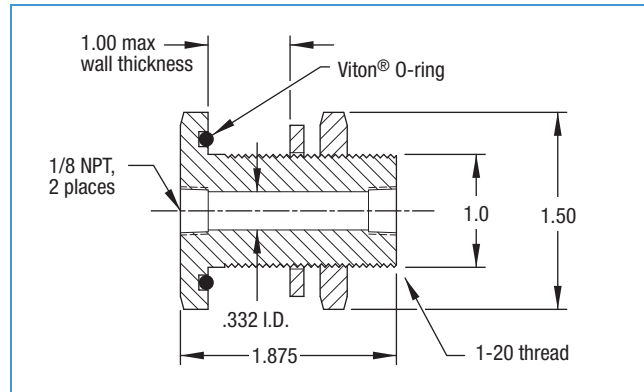


### Female NPT to ↗

#### Baseplate



- O-ring, washer and nut included
- Replacement O-ring MDC part number 041216

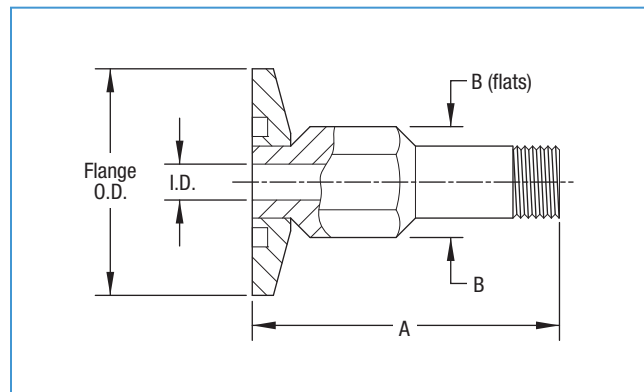


- Use with thermocouple gauge or for gas backfilling
- 1/8" NPT accommodates gauges or tubing
- Fits standard 1" diameter mounting hole
- Seal is by Viton® O-ring
- Stainless steel
- Use Teflon tape on threads

DESCRIPTION	REFERENCE	PART NUMBER
GAS BACKFILL FEEDTHROUGH	FGT-1125	653000

### Male NPT to ↗

#### Kwik-Flange™ KF

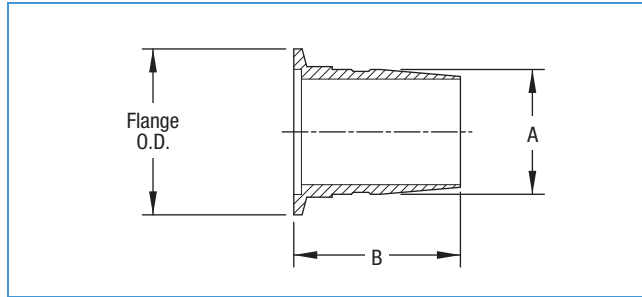


- Stainless steel
- Use Teflon tape on threads

MALE NPT SIZE	NOMINAL REF ISO	FLANGE O.D.	I.D.	A	B	WT LB	REFERENCE	PART NUMBER
1/8	NW16	1.18	.19	1.6	.50	1/4	K075x1/8MPT	731020
1/8	NW25	1.57	.19	1.6	.50	1/4	K100x1/8MPT	731022
1/8	NW40	2.16	.19	1.6	.50	1/4	K150x1/8MPT	731026
1/8	NW50	2.95	.19	1.6	.50	1/2	K200x1/8MPT	731035
1/4	NW16	1.18	.28	1.6	.62	1/4	K075x1/4MPT	731021
1/4	NW25	1.57	.28	1.6	.62	1/4	K100x1/4MPT	731023
1/4	NW40	2.16	.28	1.6	.62	1/4	K150x1/4MPT	731027
1/4	NW50	2.95	.28	1.6	.62	1/2	K200x1/4MPT	731030
1/2	NW25	1.57	.47	1.7	.88	1/4	K100x1/2MPT	731024
1/2	NW40	2.16	.47	1.6	.88	1/4	K150x1/2MPT	731028
1/2	NW50	2.95	.47	1.6	.88	1/2	K200x1/2MPT	731031
3/4	NW25	1.57	.62	1.6	1.12	1/4	K100x3/4MPT	731025
3/4	NW40	2.16	.62	1.6	1.12	1/4	K150x3/4MPT	731029
3/4	NW50	2.95	.62	1.6	1.12	1/2	K200x3/4MPT	731032
1	NW50	2.95	.87	1.6	1.38	1/2	K200x1MPT	731033

### Kwik-Flange™ KF to ↗

#### Rubber Hose

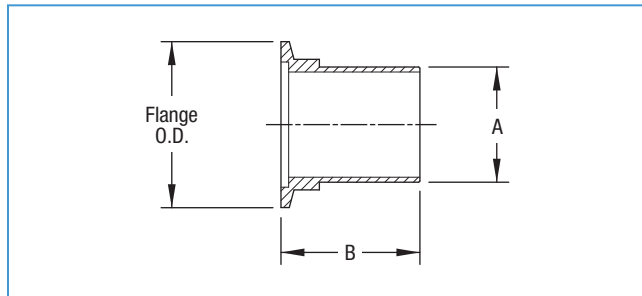


- Each adapter fits a range of hose sizes
- Hose clamp recommended Aluminum 2011-T3

HOSE SIZE	NOMINAL REF ISO	FLANGE O.D.	A	B	WT LB
1/2 OR 5/8	NW16	1.18	.62	1.65	1/4
5/8 OR 3/4	NW16	1.18	.75	1.65	1/4
3/4 OR 7/8	NW25	1.57	.87	1.73	1/4
1-1/2 OR 1-5/8	NW40	2.16	1.63	2.17	1/4
1-1/2 OR 1-5/8	NW50	2.95	1.63	2.17	1/4

REFERENCE	PART NUMBER
K050-RHA	735000
K075-RHA	735001
K100-RHA	735002
K150-RHA	735003
K200-RHA	735004

#### PVC Hose



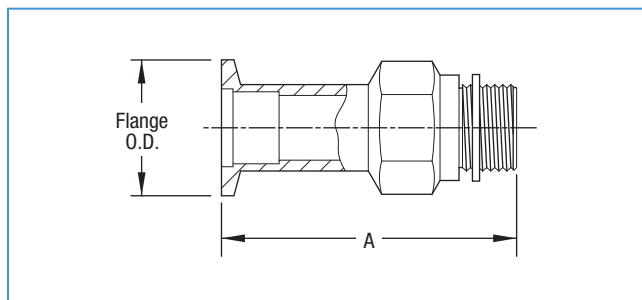
- Beveled edge for use with MDC reinforced PVC flexible hose, Roughing Components, Section 3.3

- Shown with hose clamp, which is sold separately
- PVC hose and hose clamps in Section 3.3, page 262

HOSE SIZE	NOMINAL REF ISO	FLANGE O.D.	A	B	WT LB
1/2	NW16	1.18	.50	1.25	1/4
3/4	NW16	1.18	.75	1.25	1/4
1	NW25	1.57	1.00	1.67	1/4
1-1/2	NW40	2.16	1.50	1.81	1/4
2	NW50	2.95	2.00	2.00	1/4

REFERENCE	PART NUMBER
K050-HPV	736000
K075-HPV	736001
K100-HPV	736002
K150-HPV	736003
K200-HPV	736004

#### Welch Pump



- Adapts straight pipe thread to Kwik-Flange™ KF flanges
- Use with standard Welch mechanical pumps
- Includes aluminum washer

- Refer to pump manufacturer for current thread sizes
- Check threads before ordering

STRAIGHT PIPE THREAD	USE WITH WELCH PUMP NO.	NOMINAL REF ISO	FLANGE O.D.	A	WT LB
.375-18	1410	NW16	1.18	1.77	1
.750-20	1399, 1400, 1403	NW16	1.18	2.56	1
1-20	1373, 1376, 1380, 1402	NW25	1.57	2.76	1
1.500-12	-	NW40	2.16	2.56	2
1.750-20	1374, 1397	NW40	2.16	2.56	2

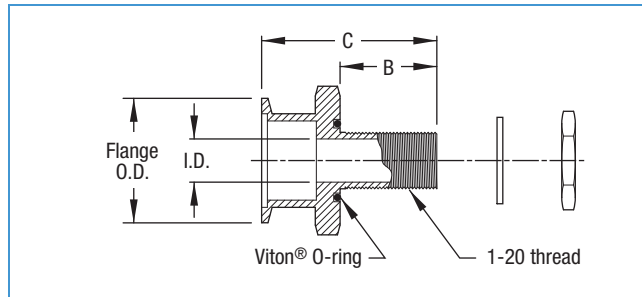
REFERENCE	PART NUMBER
K075-1399	737000
K075-1405	737001
K100-1402	737002
K150-1376	737003
K150-1397	737004

### Baseplate to ↗

#### Kwik-Flange™ KF



- O-ring, washer and nut included
- Replacement O-ring MDC part number 041216



- For use with plates up to 1" thick
- Fits through standard 1" diameter holes
- Seal is by Viton® O-ring
- Stainless steel body, washer and nut

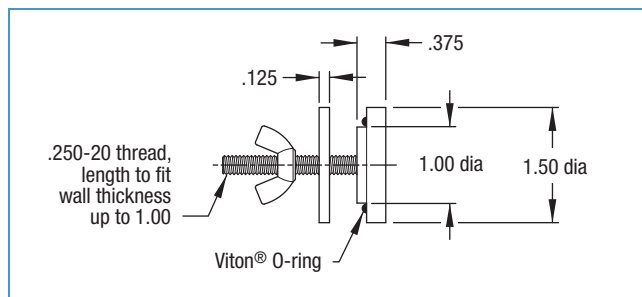
NOMINAL REF ISO	FLANGE O.D.	REQUIRED HOLE DIA.	I.D. A	B	C	WT LB
NW25	1.57	1	.75	1.62	2.88	1/2
NW40	2.16	1	.75	1.62	3.23	1

REFERENCE	PART NUMBER
K100-BPFT	650007
K150-BPFT	650008

#### Blank Plug



- O-ring, washer and wing nut included
- Replacement O-ring MDC part number 041216



- For sealing standard 1" diameter mounting holes when not in use
- Seal is by Viton® O-ring
- Stainless steel or brass plug

DESCRIPTION	REFERENCE	PART NUMBER
BRASS BLANK PLUG	FBB-101	654000
STAINLESS STEEL BLANK PLUG	FBS-101	654002

### Del-Base™ Baseplate Mounts

Baseplate fittings mount through one inch diameter ports and require a flat, scratch-free sealing surface of at least 1-3/4 inches diameter. A vacuum seal is achieved by uniform compression of an elastomer gasket on the vacuum side of the chamber. A sealing nut and washer are typically fastened on the atmosphere side of the chamber. Hand tightening will usually provide adequate seal compression.

Elastomer seals limit the operating temperature range and bakeout temperature. For DuPont Dow Elastomers Viton® O-rings, the maximum intermittent bakeout temperature is 200°C with a sustained use to 150°C. Repeated bakeout cycling can result in the deterioration of the O-ring and require its periodic replacement.

### Other fittings with baseplate style mounting...

- Quick-Disconnect Hybrid Adapters. . . . . page 156-157
- NPT Hybrid Adapters. . . . . page 158-159
- High Current Electrical Feedthroughs. . . . . page 334-335
- Liquid Feedthroughs. . . . . page 357-365
- Direct Drive Rotary Motion Feedthrough . . . . . page 384-385

