

Series 76

HPST™ ISO-Universal Fittings
Sizes NW 63 to NW 630
(2.5" to 25")



HPST™ Products
Vacuum Products Group
5330 Sterling Drive
Boulder, CO USA 80301
(800)345-1967 or (303)449-9861
FAX (303)442-6880
www.mksinst.com

Table of Contents

Introduction	2-5
Flanges	
Flange, Bored	6
Flange, Long Weld Stub	6
Flange, Blank-Off	6
Flange, Bolted, Bored	7
Flange, Bolted, Weld Stub	7
Flange, Bolted, Blank	8
Seals	
Centering/Seal Assembly, Aluminum/Buna-N	8
Centering/Seal Assembly, Aluminum/Viton	9
Centering/Seal Assembly, Stainless Steel/Viton	9
Replaceable O-Ring, Buna-N	10
Replaceable O-Ring, Viton	10
Fasteners	
Single Claw Clamp	11
Double Claw Clamp	11
Bolts, for joining two Bolted Flanges	11
Bolts, for joining Bolted Flange to Tapped Flange	12
Rotatable Bolt Ring	12
Retaining Ring	12
Reducers	13
Adapters	
Conic, ISO-KF	13
Step, ISO-KF	14
CF Flange	14
ASA Flange, without O-ring groove	14
ASA Flange, with O-ring groove	15
Ball Socket, without O-ring groove	15
Ball Socket, with O-ring groove	16
Elbows	
90° smooth radius	16
45° smooth radius	16
Tees	17
Crosses	17
Tubing	17
Straight Sections	18
Flexible Sections	
Braided Metal Hose	18
Bellows	19
Thick Wall Hose	19
Thin Wall Hose	20
Numerical Listing	21-23

Introduction

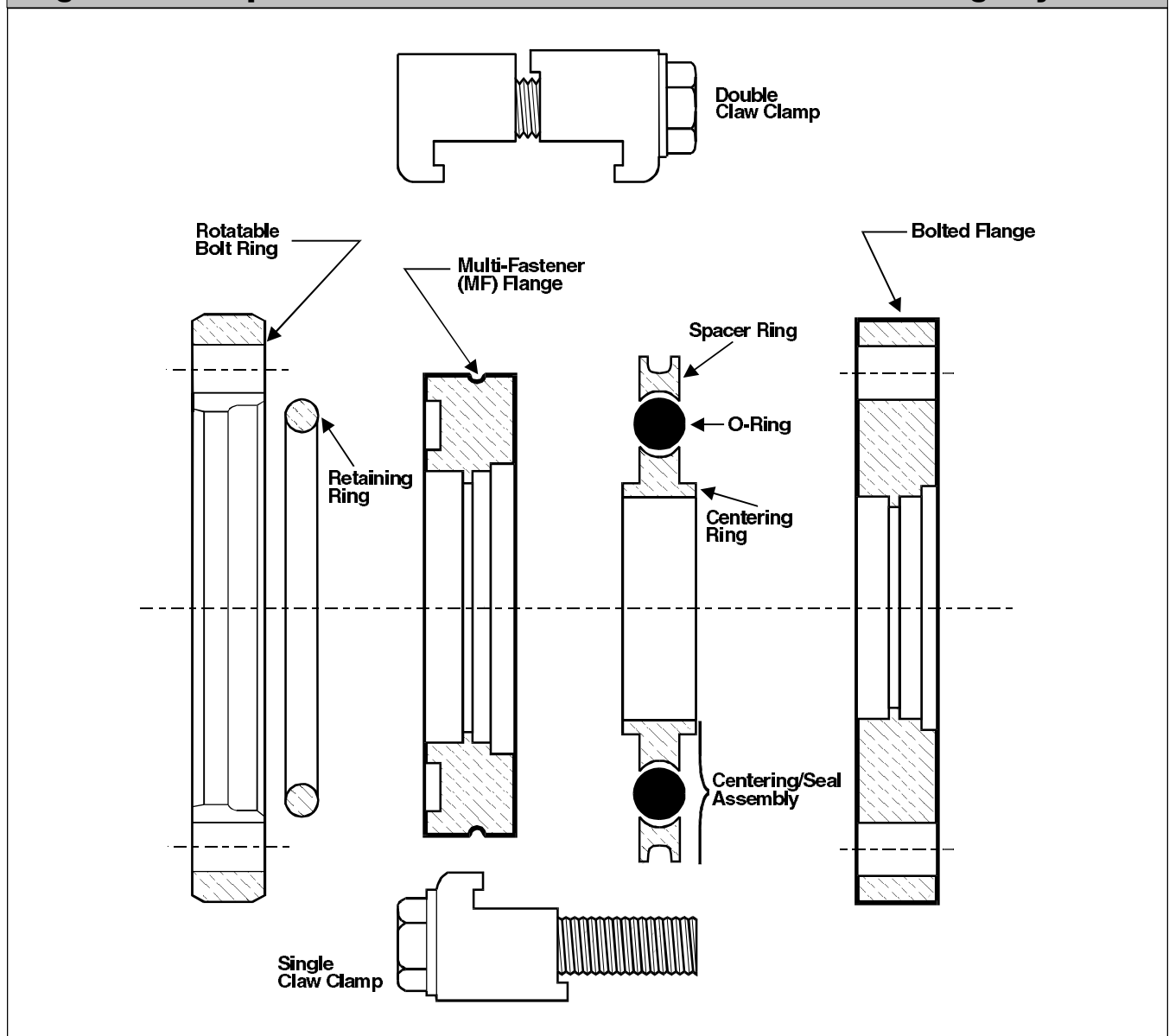
ISO-Universal is a vacuum flanging system for 63 mm to 1000 mm fittings. The dimension criteria are based on requirements established by the International Standards Organization (ISO). There are two flange styles in the ISO-Universal system: Multi-Fastener (MF) and Bolted. The flange family is also called: ISO-MF, ISO-PF or ISO-K. Figure 1 illustrates the components of this flange system.

In this catalog we feature a large variety of components such as elbows, tees, crosses, reducers and adapters having ISO-MF flanges. Currently there is no ISO standard for the

flange face to centerline distance in this system. There is however, an industry standard followed by several manufacturers. The Vacuum Products Group of MKS has followed these standards in designing the components.

There are several advantages in the use of ISO components. One advantage is that the flange is "sexless." The seal is on a symmetrical centering ring that interfaces with two identical flanges. ISO-Universal flanges are more compact than ASA flanges, which were designed for pressure and are unnecessarily massive for vacuum use. Since these flanges are an ISO standard, they can be used with components from other manufacturers.

Figure 1. Component Nomenclature for the ISO-Universal Flange System



Applications

The ISO-Universal component system is used in a variety of industries from process manufacturing to semiconductor fabrication to thin film deposition. Some uses in vacuum systems are:

1. Roughing and foreline plumbing for large vacuum systems
2. High vacuum, high conductance, interconnections
3. Modular systems which will be modified frequently
4. Experimental systems in research laboratories

ISO-Universal flange components using elastomer seals are primarily designed for use at subatmospheric pressure. When elastomer seals are used without baking, typical limiting pressures may be around 10^{-6} Torr. Baked systems using Viton can be used to 10^{-8} Torr.

Standard components can be used to a slight over pressure. MF flanges may be used at a maximum pressure of 30 psig if the metal spacer ring is used and the flange clamps are firmly retained.

Description

ISO-Universal flanges and components in this catalog are made of type 304 stainless steel. Centering ring and seal assemblies are offered with an aluminum centering ring and

spacer ring, or with a stainless centering ring and an aluminum spacer ring. Rotatable bolt rings and clamps are made of aluminum alloy. Retaining rings are made of steel.

Flange seal surfaces are carefully machined and inspected for defects. Assembled components are leak checked for high vacuum use. They are cleaned and packaged to remain clean and protected in shipping. The user should observe precaution as required to prevent seal surface harm. This is especially important for used components returned to storage.

Installation

The ISO-Universal flange components can be connected in various ways. Figure 2 illustrates some possibilities. Figure 2a shows a pair of MF flanges retained by double claw clamps. This is usually the most economical arrangement. In figure 2b an MF flange with a rotatable bolt ring is joined to a bolted flange using nuts and bolts. In figure 2c an MF flange is joined to a tapped bolt flange using single claw clamps. Tapped flanges are found on some valve bodies. Alternatively, a rotatable bolt ring could have been used with an MF flange to obtain the same result shown in figure 2c. Last, figure 2d shows a pair of bolted flanges joined in the usual way by nuts and bolts.

Figure 2a

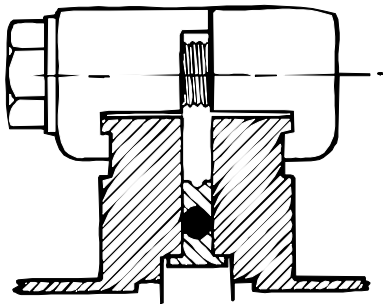


Figure 2b

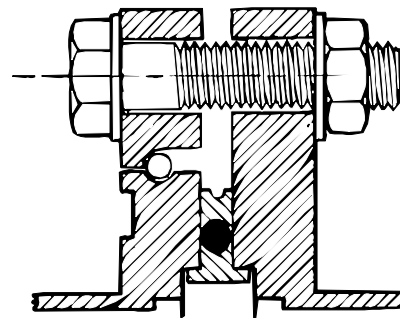


Figure 2c

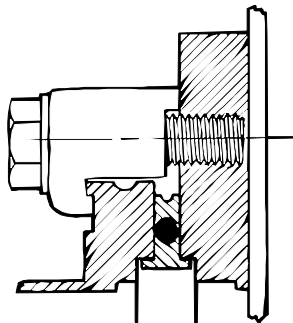
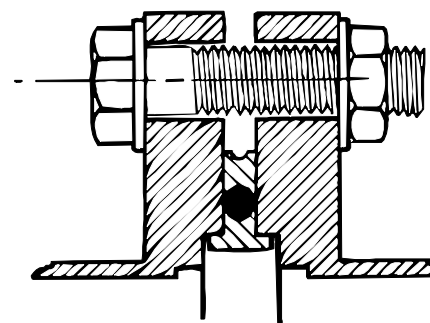
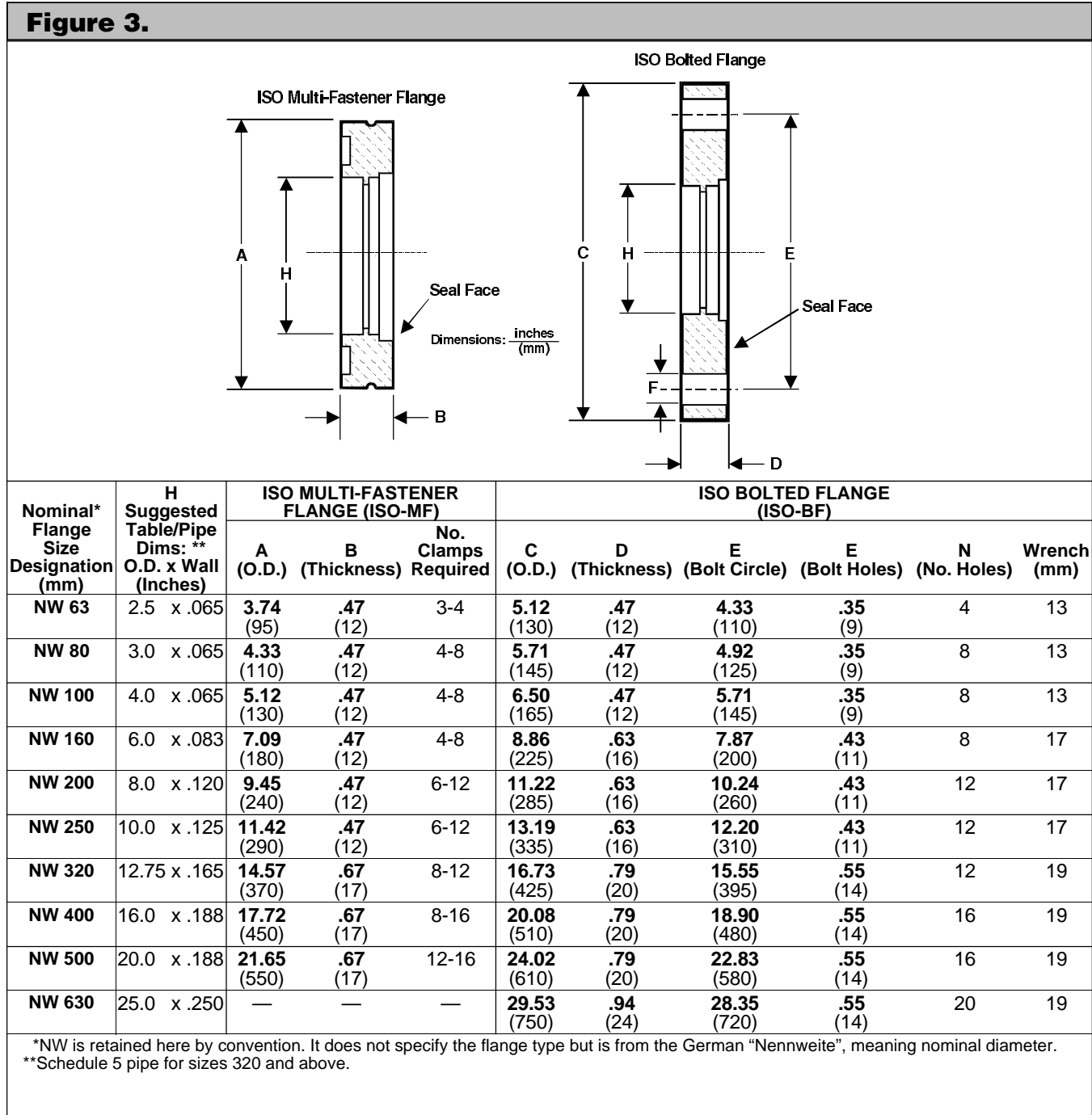


Figure 2d



In attaching a rotatable bolt ring to an MF flange as in figure 2b, the ring is first passed over the flange with the larger bore of the ring facing outward from the open port. The split retaining ring is then snapped into the groove on the periphery of the MF flange. Then the bolt ring is pulled forward into position. Pairs of bolted flanges may also be used.

Figure 3 shows the dimensions of ISO universal flange components for sizes from 63 to 630 mm, which are standard in this catalog. The maximum size for an MF flange is NW 500, while the bolted flange can run up to NW 1000. The recommended number of clamps to be used with MF flanges are also listed.



Flanges and seals are designed to be tightened to metal to metal contact. It is important that the clamps or bolts not be over tightened or warping of the flanges could result.

There are a variety of choices available when selecting centering ring assemblies. Two types of elastomers are available, Buna-N and Viton. Use Viton where temperatures, chemical resistance or long installed life make it beneficial. Use Buna-N where temperatures are moderate, and installed useful life is consistent with this material. The centering ring is available in two types of metal: stainless steel and aluminum. Use stainless steel where chemical resistance is needed.

Elastomer Comparison		
	Buna-N	Viton
Compound	N674-70	V747-75
Color	black	black
Bakeout	80°C	150°C
Benefits	Seals easier Lower cost	High temperature Lasts longer

The Vacuum Products Group of MKS presently supplies ISO-Universal flanges drilled for inch dimension tubing and pipe.

Weld assembly should be by an experienced TIG or MIG welder. Bored flanges have been designed for assembly by internal fusion welding without the use of filler metal. Tacking is advisable. A weld rotator aides in making attractive welds with minimum warping. Excessive current or non uniform rotation can cause warping of the flange face. When there is a concern about warping, use a flange with a stub. Butt welding to stubs in sizes up to 10 inch diameter with a wall thickness of 1/8 inch can also be by fusion. Internal purge gas will prevent excessive oxidation.

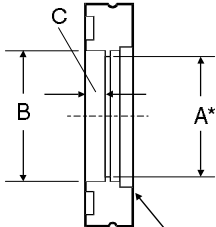
Remove any oxidation by wire brushing. This should be done while the part is still slightly warm, since the oxides are nearly impossible to remove later. Use only a stainless steel

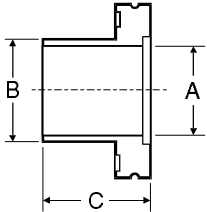
wire brush or wheel, since ordinary steel brushes leave iron residue which will then rust.

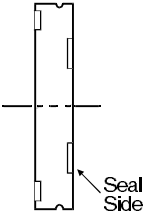
Since the centering ring grooves on the NW 100 and NW 160 flange happen to be almost exactly the diameters of the tubing to be used with these sizes, the flange can be inadvertently welded on backwards. When working with the MF flange, note that the clamp retaining groove goes to the rear (tube) side. Working with the bolted flange requires more care. Close inspection of the weld prep detail will show the recess from the tube side to have a negligible radius, while there is a small radius visible on the seal side.

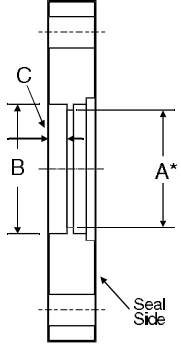
The technical staff of the Vacuum Products Group of MKS Instruments is available to help you with system design and any special needs you may encounter. Call 800-345-1967 for a quotation.

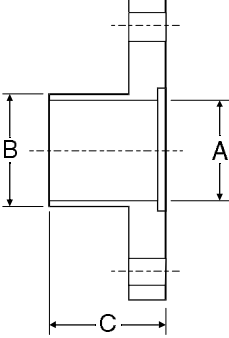
Specifications	
Maximum Pressure (with spacer ring)	30 psig
Minimum Pressure	10 ⁻⁸ Torr
Leak Check	>10 ⁻⁹ std-cc/s
Materials	
Fittings	304 stainless steel
Retaining Rings	steel
Clamps	aluminum alloy
Rotatable Bolt Rings	aluminum alloy
Seal Assembly	aluminum spacer ring, choice of aluminum or stainless steel centering ring, choice of Viton or Buna-N elastomer seal

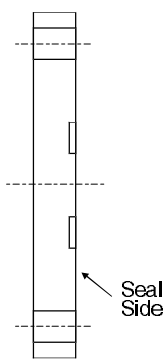
Flange, Bored							in/(mm)	
 <p>* Given as I.D. of suggested tubing</p> <p>Seal Side</p> <ul style="list-style-type: none"> Stainless steel type 304 For internal weld Infinitely rotatable Made for inch tube and pipe diameters Use with clamps or rotatable bolt ring 	Flange Size (ISO)	Nominal Bore	A	B	C	Part Number	Price	
	NW 63	2½"	2.37 (60)	2.50 (64)	0.22 (6)	100760206		
	NW 80	3"	2.87 (73)	3.00 (76)	0.22 (6)	100760208		
	NW 100	4"	3.87 (98)	4.00 (102)	0.22 (6)	100760210		
	NW 160	6"	5.83 (148)	6.00 (152)	0.22 (6)	100760216		
	NW 200	8"	7.76 (197)	8.00 (203)	0.22 (6)	100760220		
	NW 250	10"	9.75 (248)	10.00 (254)	0.22 (6)	100760225		
	NW 320	12"	12.42 (315)	12.75 (324)	0.30 (8)	100760232		
	NW 400	16"	15.62 (397)	16.00 (406)	0.30 (8)	100760240		
	NW 500	20"	19.62 (498)	20.00 (508)	0.30 (8)	100760250		

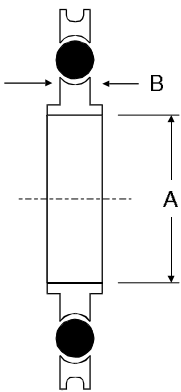
Flange, Long Weld Stub							in/(mm)	
 <ul style="list-style-type: none"> Stainless steel type 304 For butt weld Standard inch diameters Use with clamps or rotatable bolt ring 	Flange Size (ISO)	For Tubing O.D.	A	B	C	Part Number	Price	
	NW 63	2½"	2.37 (60)	2.50 (64)	3.94 (100)	100760406		
	NW 80	3"	2.87 (73)	3.00 (76)	3.94 (100)	100760408		
	NW 100	4" (.065" wall)	3.87 (98)	4.00 (102)	3.94 (100)	100760410		
	NW 100	4" (.083" wall)	3.87 (98)	4.00 (102)	3.94 (100)	100760411		
	NW 160	6"	5.83 (148)	6.00 (152)	3.94 (100)	100760416		
	NW 200	8"	7.76 (197)	8.00 (203)	3.94 (100)	100760420		
	NW 250	10"	9.75 (248)	10.00 (254)	3.94 (100)	100760425		
	NW 320	12"	12.42 (316)	12.75 (324)	3.94 (100)	100760432		
	NW 400	16"	15.62 (397)	16.00 (407)	3.94 (100)	100760440		
NW 500	20"	19.62 (498)	20.00 (508)	3.94 (100)	100760450			

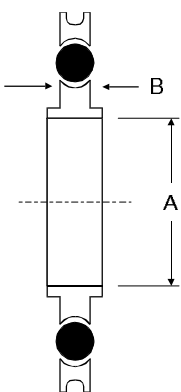
Flange, Blank-Off							in/(mm)	
 <p>Seal Side</p> <ul style="list-style-type: none"> Infinitely rotatable Stainless steel type 304 To close off unused ports Use with clamps or rotatable bolt ring 	Flange Size (ISO)					Part Number	Price	
	NW 63						100760106	
	NW 80						100760108	
	NW 100						100760110	
	NW 160						100760116	
	NW 200						100760120	
	NW 250						100760125	
	NW 320						100760132	
NW 400						100760140		
NW 500						100760150		

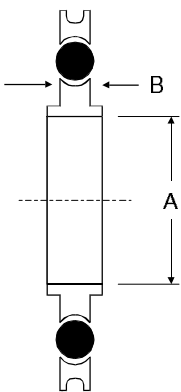
Flange, Bolted, Bored						in/(mm)	
	Flange Size (ISO)	Nominal Bore	A	B	C	Part Number	Price
<p>*given as ID of suggested tubing</p> <ul style="list-style-type: none"> • Stainless steel type 304 • For internal weld • Made for inch tube and pipe diameters • For use with bolts only • Tapped bolt holes on special order 	NW 63	2½"	2.37 (60)	2.50 (64)	.22 (6)	100762406	
	NW 80	3"	2.87 (73)	3.00 (76)	.22 (6)	100762408	
	NW 100	4"	3.87 (98)	4.00 (102)	.22 (6)	100762410	
	NW 160	6"	5.83 (148)	6.00 (152)	.37 (10)	100762416	
	NW 200	8"	7.76 (197)	8.00 (203)	.37 (10)	100762420	
	NW 250	10"	9.75 (248)	10.00 (254)	.41 (11)	100762425	
	NW 320	12"	12.42 (315)	12.75 (406)	.41 (11)	100762432	
	NW 400	16"	15.62 (397)	16.00 (406)	.41 (11)	100762440	
	NW 500	20"	19.62 (498)	20.00 (508)	.41 (11)	100762450	
	NW 630	24"	23.50 (597)	24.00 (610)	.45 (12)	100762463	

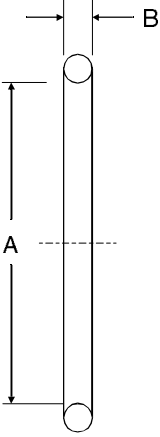
Flange, Bolted, Weld Stub						in/(mm)	
	Flange Size (ISO)	Nominal Bore	A	B	C	Part Number	Price
<ul style="list-style-type: none"> • Stainless steel type 304 • For butt weld • Made for inch tube and pipe diameters • For use with bolts only 	NW 63	2½"	2.37 (60)	2.50 (64)	3.94 (100)	100762706	
	NW 80	3"	2.87 (73)	3.00 (76)	3.94 (100)	100762708	
	NW 100	4"	3.87 (98)	4.00 (102)	3.94 (100)	100762710	
	NW 160	6"	5.83 (148)	6.00 (152)	3.94 (100)	100762716	
	NW 200	8"	7.76 (197)	8.00 (203)	3.94 (100)	100762720	
	NW 250	10"	9.75 (248)	10.00 (254)	3.94 (100)	100762725	
	NW 320	12"	12.42 (315)	12.75 (406)	3.94 (100)	100762732	
	NW 400	16"	15.62 (397)	16.00 (406)	3.94 (100)	100762740	
	NW 500	20"	19.62 (498)	20.00 (508)	3.94 (100)	100762750	
	NW 630	24"	23.50 (597)	24.00 (610)	3.94 (100)	100762763	

Flange, Bolted, Blank							in/(mm)	
 <p>Seal Side</p> <ul style="list-style-type: none"> • Stainless steel type 304 • For use with bolts only • Tapped bolt holes on special order • To blank off unused ports or for special boring 	Flange Size (ISO)					Part Number	Price	
	NW 63						100760306	
	NW 80						100760308	
	NW 100						100760310	
	NW 160						100760316	
	NW 200						100760320	
	NW 250						100760325	
	NW 320						100760332	
	NW 400						100760340	
	NW 500						100760350	
NW 630						100760363		

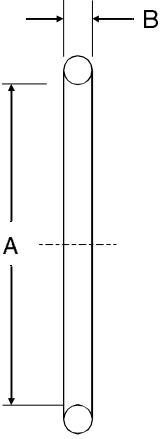
Seal, Centering Ring Assembly, Aluminum/Buna-N							in/(mm)	
 <p>A</p> <p>B</p> <ul style="list-style-type: none"> • Aluminum centering ring • Replaceable Buna-N O-ring • Aluminum spacer ring • Rated 80 C max. 	Flange Size (ISO)		A	B		Part Number	Price	
	NW 63			2.63 (67)	.15 (4)		100760706	
	NW 80			3.14 (80)	.15 (4)		100760708	
	NW 100			3.89 (99)	.15 (4)		100760710	
	NW 160			5.90 (150)	.15 (4)		100760716	
	NW 200			8.26 (210)	.15 (4)		100760720	
	NW 250			10.14 (258)	.15 (4)		100760725	
	NW 320			12.30 (312)	.22 (6)		100760732	
	NW 400			15.53 (395)	.22 (6)		100760740	
	NW 500			19.51 (496)	.22 (6)		100760750	
NW 630			25.41 (645)	.22 (6)		100760763		

Seal, Centering Ring Assembly, Aluminum/Viton®							in/(mm)	
 <ul style="list-style-type: none"> • Aluminum centering ring • Replaceable O-ring • Aluminum spacer ring • Rated 150 C max. 	Flange Size (ISO)		A	B		Part Number	Price	
	NW 63		2.63 (67)	.15 (4)		100760606		
	NW 80		3.14 (80)	.15 (4)		100760608		
	NW 100		3.89 (99)	.15 (4)		100760610		
	NW 160		5.90 (150)	.15 (4)		100760616		
	NW 200		8.26 (210)	.15 (4)		100760620		
	NW 250		10.14 (258)	.15 (4)		100760625		
	NW 320		12.30 (312)	.22 (6)		100760632		
	NW 400		15.53 (395)	.22 (6)		100760640		
	NW 500		19.51 (496)	.22 (6)		100760650		
	NW 630		25.41 (645)	.22 (6)		100760663		

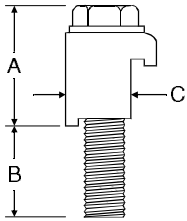
Seal, Centering Ring Assembly, Stainless Steel/Viton®							in/(mm)	
 <ul style="list-style-type: none"> • Stainless steel centering ring • Replaceable Viton O-ring • Aluminum spacer ring • Rated 150 C max. 	Flange Size (ISO)		A	B		Part Number	Price	
	NW 63		2.63 (67)	.15 (4)		100760506		
	NW 80		3.14 (80)	.15 (4)		100760508		
	NW 100		3.89 (99)	.15 (4)		100760510		
	NW 160		5.90 (150)	.15 (4)		100760516		
	NW 200		8.26 (210)	.15 (4)		100760520		
	NW 250		10.14 (258)	.15 (4)		100760525		
	NW 320		12.30 (312)	.22 (6)		100760532		
	NW 400		15.53 (395)	.22 (6)		100760540		
	NW 500		19.51 (496)	.22 (6)		100760550		
	NW 630		25.41 (645)	.22 (6)		100760563		

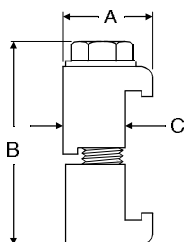
Seal, Replacement O-Ring, Buna-N						in/(mm)	
	Flange Size (ISO)	Standard Number	A	B		Part Number	Price
	NW 63	2-336	2.85 (72)	.21 (5)		100761906	
	NW 80	2-340	3.35 (85)	.21 (5)		100761908	
	NW 100	2-346	4.10 (104)	.21 (5)		100761910	
	NW 160	2-361	5.98 (152)	.21 (5)		100761916	
	NW 200	2-371	8.48 (215)	.21 (5)		100761920	
	NW 250	2-378	10.48 (266)	.21 (5)		100761925	
	NW 320	2-454	12.48 (317)	.28 (7)		100761932	
	NW 400	2-460	15.48 (393)	.28 (7)		100761940	
	NW 500	2-468	19.46 (494)	.28 (7)		100761950	
	NW 630	2-474	24.94 (634)	.28 (7)		100761963	

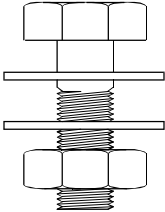
- Buna-N
- Standard U.S. O-ring sizes
- Bakeable to 80°C
- Replaceable seal for centering ring assembly

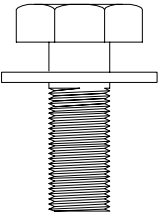
Seal, Replacement O-Ring, Viton®						in/(mm)	
	Flange Size (ISO)	Standard Number	A	B		Part Number	Price
	NW 63	2-336	2.85 (72)	.21 (5)		100762006	
	NW 80	2-340	3.35 (85)	.21 (5)		100762008	
	NW 100	2-346	4.10 (104)	.21 (5)		100762010	
	NW 160	2-361	5.98 (152)	.21 (5)		100762016	
	NW 200	2-371	8.48 (215)	.21 (5)		100762020	
	NW 250	2-378	10.48 (266)	.21 (5)		100762025	
	NW 320	2-454	12.48 (317)	.28 (7)		100762032	
	NW 400	2-460	15.48 (393)	.28 (7)		100762040	
	NW 500	2-468	19.46 (494)	.28 (7)		100762050	
	NW 630	2-474	24.94 (634)	.28 (7)		100762063	


- Viton
- Standard U.S. O-ring sizes
- Bakeable to 150°C
- Replaceable seal for centering ring assembly

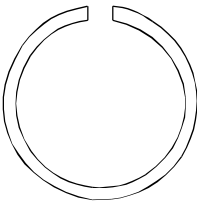
Clamp, Single Claw							in/(mm)	
 <ul style="list-style-type: none"> • Aluminum clamp • Stainless steel bolt • Stainless steel washer • To join an MF flange to a tapped bolted flange 	Flange Size (ISO)	Bolt Size	A	B	C	Part Number	Price	
	NW 63	M 8	1.20 (30)	.39 (10)	.62 (16)	100761006		
	NW 80	M 8	1.20 (30)	.39 (10)	.62 (16)	100761006		
	NW 100	M 8	1.20 (30)	.39 (10)	.62 (16)	100761006		
	NW 160	M 10	1.25 (32)	.39 (10)	.80 (20)	100761016		
	NW 200	M 10	1.25 (32)	.39 (10)	.80 (20)	100761016		
	NW 250	M 10	1.25 (32)	.39 (10)	.80 (20)	100761016		
	NW 320	M 12	1.57 (40)	.72 (18)	1.04 (26)	100761032		
	NW 400	M 12	1.57 (40)	.72 (18)	1.04 (26)	100761040		
NW 500	M 12	1.57 (40)	.72 (18)	1.04 (26)	100761040			

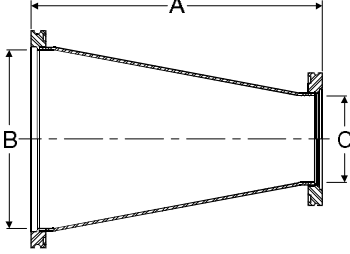
Clamp, Double Claw							in/(mm)	
 <ul style="list-style-type: none"> • Aluminum clamp • Stainless steel bolt • Stainless steel washer • To join a pair of MF flanges 	Flange Size (ISO)		A	B	C	Part Number	Price	
	NW 63		.95 (24)	1.98 (50)	.63 (16)	100761106		
	NW 80		.95 (24)	1.98 (50)	.63 (16)	100761106		
	NW 100		.95 (24)	1.98 (50)	.63 (16)	100761106		
	NW 160		1.10 (28)	2.05 (52)	.80 (20)	100761116		
	NW 200		1.10 (28)	2.05 (52)	.80 (20)	100761116		
	NW 250		1.10 (28)	2.05 (52)	.80 (20)	100761116		
	NW 320		1.34 (34)	2.56 (65)	1.04 (26)	100761132		
	NW 400		1.34 (34)	2.56 (65)	1.04 (26)	100761140		
NW 500		1.34 (34)	2.56 (65)	1.04 (26)	100761140			

Bolt and Nut Set								
 <ul style="list-style-type: none"> • Stainless steel • To join two bolted flanges • Nuts & washers included 	Flange Size (ISO)	Bolt Size	No. in Set	Pitch (mm)		Part Number	Price	
	NW 63	M8x40	4	1.25		100761206		
	NW 80	M8x40	8	1.25		100761208		
	NW 100	M8x40	8	1.25		100761208		
	NW 160	M10x50	8	1.50		100761216		
	NW 200	M10x50	12	1.50		100761220		
	NW 250	M10x50	12	1.50		100761220		
	NW 320	M12x60	12	1.75		100761232		
	NW 400	M12x60	16	1.75		100761240		
NW 500	M12x60	16	1.75		100761240			
NW 630	M12x65	20	1.75		100761263			

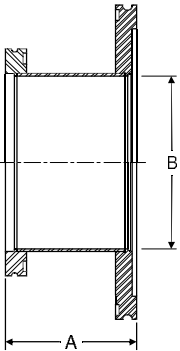
Bolt Set							
 <ul style="list-style-type: none"> • Stainless steel • Bolted flange to tapped flange • Includes washer 	Flange Size (ISO)	Bolt Size	No. in Set	Pitch (mm)		Part Number	Price
	NW 63	M8x30	4	1.25		100761306	
	NW 80	M8x30	8	1.25		100761308	
	NW 100	M8x30	8	1.25		100761308	
	NW 160	M10x35	8	1.50		100761316	
	NW 200	M10x35	12	1.50		100761320	
	NW 250	M10x35	12	1.50		100761320	
	NW 320	M12x45	12	1.75		100761332	
	NW 400	M12x45	16	1.75		100761340	
	NW 500	M12x45	16	1.75		100761340	
NW 630	M12x55	20	1.75		100761363		

Ring, Rotatable Bolt								
 <ul style="list-style-type: none"> • Aluminum • Used with MF flange • Steel Retaining ring included • O.D. and bolt pattern same as bolted flange 	Flange Size (ISO)					Part Number	Price	
	NW 63						100762806	
	NW 80						100762808	
	NW 100						100762810	
	NW 160						100762816	
	NW 200						100762820	
	NW 250						100762825	
	NW 320						100762832	
	NW 400						100762840	
	NW 500						100762850	

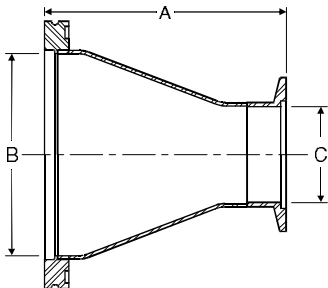
Ring, Retaining								
 <ul style="list-style-type: none"> • Stainless steel • Retains bolt ring 	Flange Size (ISO)					Part Number	Price	
	NW 63						100762906	
	NW 80						100762908	
	NW 100						100762910	
	NW 160						100762916	
	NW 200						100762920	
	NW 250						100762925	
	NW 320						100762932	
	NW 400						100762940	
	NW 500						100762950	

Conic Reducers						in/(mm)	
	Flange Size (ISO)	A	B	C	Part Number	Price	
	NW 63 to NW 80	4.14 (105)	2.87 (73)	2.37 (60)	100764906		
	NW 63 to NW 100	4.14 (105)	3.83 (97)	2.37 (60)	100764917		
	NW 80 to NW 100	4.14 (105)	3.83 (97)	2.87 (73)	100764908		
	NW 80 to NW 160	9.52 (242)	5.78 (147)	2.87 (73)	100764927		
	NW 100 to NW 160	9.52 (242)	5.78 (147)	3.83 (97)	100764910		

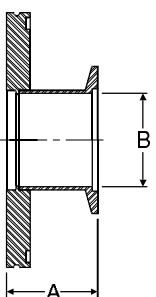
- Stainless steel type 304
- Unlisted combinations available upon request
- High conductance adapter

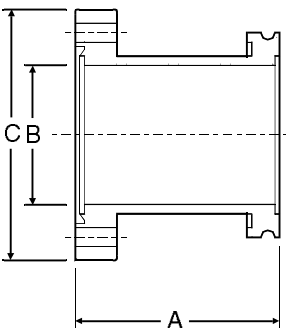
Step Reducers						in/(mm)	
	Flange Size (ISO)	A	B		Part Number	Price	
	NW 63 to NW 80	2.95 (75)	2.31 (59)		100762506		
	NW 63 to NW 100	2.95 (75)	2.31 (59)		100762517		
	NW 63 to NW 160	2.95 (75)	2.31 (59)		100762527		
	NW 80 to NW 100	2.95 (75)	2.87 (73)		100762508		
	NW 100 to NW 160	2.95 (75)	3.87 (97)		100762510		

- Stainless steel type 304
- Short overall length

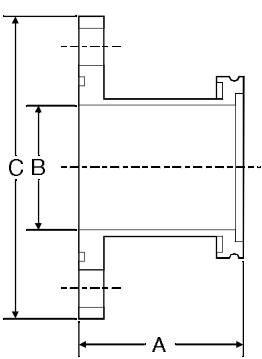
Conic Adapter, ISO-MF Flange to ISO-KF Flange						in/(mm)	
	Flange Size (ISO)	A	B	C	Part Number	Price	
	NW 63 to NW 40	3.39 (86)	2.37 (60)	1.37 (35)	100765006		
	NW 63 to NW 50	3.39 (86)	2.37 (60)	1.87 (47)	100765017		
	NW 80 to NW 40	4.64 (118)	2.87 (73)	1.37 (35)	100765016		
	NW 80 to NW 50	4.64 (118)	2.87 (73)	1.87 (47)	100765008		
	NW 100 to NW 50	4.64 (118)	3.83 (97)	1.87 (47)	100765018		

- Stainless steel type 304
- Special adapters available upon request
- High conductance adapter

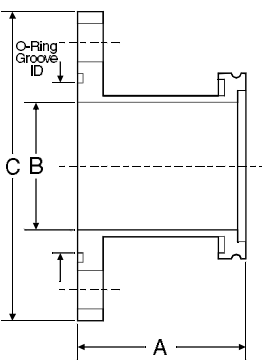
Step Adapters, ISO-MF Flange to ISO-KF Flange						in/(mm)	
	Flange Size (ISO)	A	B		Part Number	Price	
	NW 63 to NW 40	1.77 (45)	1.37 (35)		100762606		
	NW 63 to NW 50	1.77 (45)	1.87 (47)		100762617		
	NW 80 to NW 40	1.77 (45)	1.87 (47)		100762616		
	NW 80 to NW 50	1.77 (45)	1.87 (47)		100762608		
	NW 100 to NW 50	1.77 (45)	1.87 (47)		100762618		

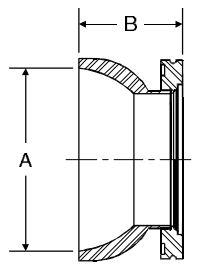
Adapter, ISO-MF Flange to CF Flange						in/(mm)	
	Flange Size (ISO)	A	B	C	Part Number	Price	
	NW 63 to 4½" CF	4.33 (110)	2.37 (60)	4.50 (114)	100762206		
	NW 80 to 6" CF	4.33 (110)	2.87 (73)	6.00 (152)	100762208		
	NW 100 to 6" CF	4.37 (111)	3.87 (98)	6.00 (152)	100762210		
	NW 160 to 8" CF	4.45 (113)	5.83 (148)	8.00 (203)	100762216		
	NW 200 to 10" CF	4.45 (113)	7.76 (197)	10.00 (254)	100762220		

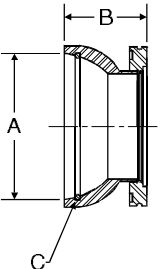
- Stainless steel type 304
- Special adaptors available upon request

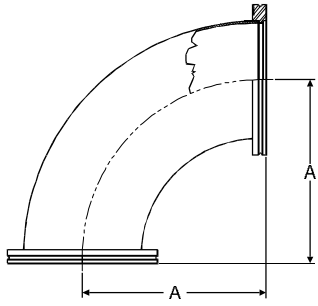
Adapter, ISO-MF Flange to ASA Flange						in/(mm)	
	Flange Size (ISO)	A	B	C	Part Number	Price	
	NW 63 to 2" ASA	4.18 (106)	2.37 (60)	6.00 (152)	100762306		
	NW 80 to 2" ASA	4.18 (106)	2.87 (73)	6.00 (152)	100762308		
	NW 100 to 2" ASA	4.18 (106)	3.12 (79)	6.00 (152)	100762310		
	NW 63 to 3" ASA	4.18 (106)	2.37 (60)	7.50 (190)	100762326		
	NW 80 to 3" ASA	4.18 (106)	2.87 (73)	7.50 (190)	100762328		
	NW 100 to 3" ASA	4.18 (106)	3.87 (98)	7.50 (190)	100762360		
	NW 100 to 4" ASA	4.18 (106)	3.87 (98)	9.00 (229)	100762370		
	NW 160 to 4" ASA	4.18 (106)	5.34 (136)	9.00 (229)	100762316		
	NW 160 to 6" ASA	4.42 (112)	5.83 (148)	11.00 (279)	100762336		
NW 200 to 6" ASA	4.42 (112)	7.76 (197)	11.00 (279)	100762320			

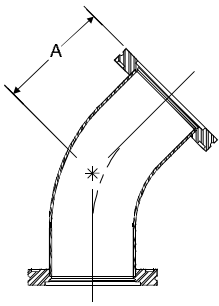
- Without O-ring groove for ASA flange
- Stainless steel type 304
- Special adaptors available upon request

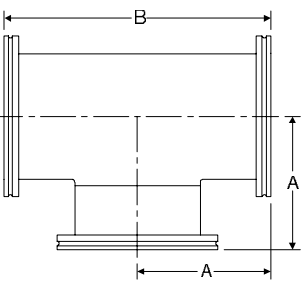
Adapter, ISO-MF Flange to ASA Flange						in/(mm)	
 <ul style="list-style-type: none"> • With O-ring groove • Special adapters available upon request • Stainless steel type 304 	Flange Size (ISO)	A	B	C	Part Number	Price	
	NW 63 to 2" ASA	4.18 (106)	2.37 (60)	6.00 (152)	100764306		
	NW 80 to 2" ASA	4.18 (106)	2.87 (73)	6.00 (152)	100764308		
	NW 100 to 2" ASA	4.18 (106)	3.12 (79)	6.00 (152)	100764310		
	NW 63 to 3" ASA	4.18 (106)	2.37 (60)	7.50 (190)	100764326		
	NW 80 to 3" ASA	4.18 (106)	2.87 (73)	7.50 (190)	100764328		
	NW 100 to 3" ASA	4.18 (106)	3.87 (98)	7.50 (190)	100764360		
	NW 100 to 4" ASA	4.18 (106)	3.87 (98)	9.00 (229)	100764370		
	NW 160 to 4" ASA	4.18 (106)	5.34 (136)	9.00 (229)	100764316		
	NW 160 to 6" ASA	4.42 (112)	5.83 (148)	11.00 (279)	100764336		
NW 200 to 6" ASA	4.42 (112)	7.76 (197)	11.00 (279)	100764320			
O-ring groove 2" ASA 3.42" ID O-ring size 2-237 O-ring groove 3" ASA 4.69" ID O-ring size 2-247 O-ring groove 4" ASA 6.10" ID O-ring size 2-258 O-ring groove 6" ASA 7.90" ID O-ring size 2-265							

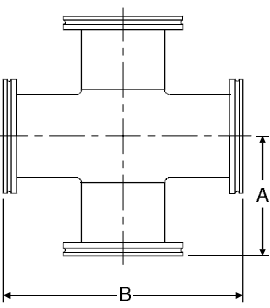
Adapter, ISO-MF Flange to Ball Socket						in/(mm)	
 <ul style="list-style-type: none"> • Stainless steel type 304 • Without O-ring groove for ball socket • Mates to a standard quartz ball coupling 	Flange Size (ISO)	A	B		Part Number	Price	
	NW 63 to 102/75	4.00 (102)	2.25 (57)			100764706	
	NW 80 to 102/75	4.00 (102)	2.25 (57)			100764708	
	NW 100 to 102/75	4.00 (102)	2.25 (57)			100764710	

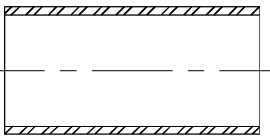
Adapter, ISO-MF Flange to Ball Socket						in/(mm)	
	Flange Size (ISO)	A	B	O-ring Size	Part Number	Price	
	NW 63 to 102/75	4.00 (102)	2.25 (57)	2-240	100764806		
	NW 80 to 102/75	4.00 (102)	2.25 (57)	2-240	100764808		
	NW 100 to 102/75	4.00 (102)	2.25 (57)	2-240	100764810		
<ul style="list-style-type: none"> • Stainless steel type 304 • With O-ring groove for ball socket • O-ring provided • Mates to a standard quartz ball coupling 							

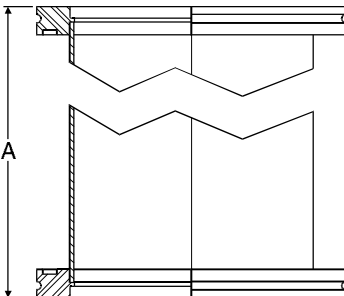
Elbows, 90°, Smooth Radius						in/(mm)	
	Flange Size (ISO)	A			Part Number	Price	
	NW 63	4.00 (102)			100764606		
	NW 80	4.74 (120)			100764608		
	NW 100	6.24 (158)			100764610		
	NW 160	9.24 (235)			100764616		
<ul style="list-style-type: none"> • Stainless steel type 304 • ISO-MF flanges, same size both ports 							

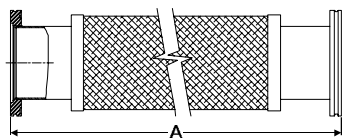
Elbows, 45° Bend						in/(mm)	
	Flange Size (ISO)	A			Part Number	Price	
	NW 63	3.25 (83)			100764406		
	NW 80	3.93 (100)			100764408		
	NW 100	5.03 (128)			100764410		
	NW 160	5.49 (139)			100764416		
<ul style="list-style-type: none"> • Stainless steel type 304 • ISO-MF flanges, same size both ports 							

Tees		in/(mm)					
 <ul style="list-style-type: none"> • ISO-MF flanges same size all ports • Stainless steel type 304 • Standard flange face to centerline dimensions • Larger sizes available on request 	Flange Size (ISO)		A	B		Part Number	Price
	NW 63		3.46 (88)	6.92 (176)		100761406	
	NW 80		3.86 (98)	7.72 (196)		100761408	
	NW 100		4.25 (108)	8.50 (216)		100761410	
	NW 160		5.43 (138)	10.86 (276)		100761416	
	NW 200		6.61 (168)	13.22 (336)		100761420	
	NW 250		8.19 (208)	16.38 (416)		100761425	
	NW 320		12.60 (320)	25.20 (640)		100761432	

Crosses		in/(mm)					
 <ul style="list-style-type: none"> • ISO-MF flanges same size all ports • Stainless steel type 304 • Standard flange face to centerline dimensions • Larger sizes available on request 	Flange Size (ISO)		A	B		Part Number	Price
	NW 63		3.46 (88)	6.92 (176)		100761506	
	NW 80		3.86 (98)	7.72 (196)		100761508	
	NW 100		4.25 (108)	8.50 (216)		100761510	
	NW 160		5.43 (138)	10.86 (276)		100761516	
	NW 200		6.61 (168)	13.22 (336)		100761520	
	NW 250		8.19 (208)	16.38 (416)		100761525	
	NW 320		12.60 (320)	25.20 (640)		100761532	

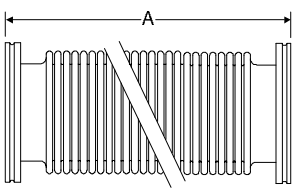
Tubing		in/(mm)				
 <ul style="list-style-type: none"> • Stainless steel type 304 • Cut to length • cutting charge per cut • Tube ends deburred 	Flange Size (ISO)		OD	Wall Thickness	Part Number	Price
	NW 63		2½	.065	100764506	
	NW 80		3	.065	100764508	
	NW 100		4	.065	100764510	
	NW 160		6	.083	100764516	
	NW 200		8	.120	100764520	
NW 250		10	.125	100764525		

Straight Section		in/(mm)					
 <p>• Stainless steel type 304 • Special lengths to order • MF type flanges</p>	Flange Size (ISO)		A	B		Part Number	Price
	NW 63		6.92 (176)			100761706	
	NW 63			4.18 (106)		100761707	
	NW 80		7.72 (196)			100761708	
	NW 80			4.18 (106)		100761709	
	NW 100		8.50 (216)			100761710	
	NW 100			4.18 (106)		100761711	
	NW 160		10.86 (276)			100761716	
	NW 160			4.18 (106)		100761717	
	NW 200		13.22 (336)			100761720	
	NW 200			4.18 (106)		100761721	
	NW 250		16.38 (416)			100761725	
	NW 250			4.18 (106)		100761726	

Braided Metal Hose		in/(mm)					
	Flange Size (ISO)		A	Static Bend Radius		Part Number	Price
	NW 63		10.74 (273)	7.50 (191)		100766006	
	NW 63		20.74 (527)	7.50 (191)		100766106	
	NW 63		40.74 (1035)	7.50 (191)		100766206	
	NW 80		10.74 (273)	8.75 (222)		100766008	
	NW 80		20.74 (527)	8.75 (222)		100766108	
	NW 80		40.74 (1035)	8.75 (222)		100766208	
	NW 100		10.74 (273)	10.00 (254)		100766010	
	NW 100		20.74 (527)	10.00 (254)		100766110	
	NW 100		40.74 (1035)	10.00 (254)		100766210	

Bellows, Sections						in/(mm)	
<ul style="list-style-type: none"> • Stainless steel • Formed bellows • Bellows butt welded • Thin wall • Flexible • CAUTION: Flanges must be supported to prevent collapsing when subjected to vacuum 	Flange Size (ISO)		A	B		Part Number	Price
	NW 63		5.90 (150)	4.50 (115)		100763506	
	NW 80		5.90 (150)	4.50 (115)		100763508	
	NW 100		5.90 (150)	4.50 (115)		100763510	
	NW 160		7.90 (200)	5.70 (145)		100763516	
	NW 200		9.80 (250)	6.90 (175)		100763520	
	NW 250		11.80 (300)	8.10 (205)		100763525	

Metal Hose, Thick Wall						in/(mm)		
<ul style="list-style-type: none"> • Unsheathed • Stainless steel • Formed metal • Hose butt welded • Special lengths on request • CAUTION: Flanges must be supported to prevent collapsing when subjected to vacuum 	Flange Size (ISO)	Static Bend Radius (to CL)	A			Part Number	Price	
	NW 63	6½"	19.69 (500)				100763606	
	NW 63	6½"	39.40 (1000)				100763706	
	NW 80	7"	19.69 (500)				100763608	
	NW 80	7"	39.40 (1000)				100763708	
	NW 100	11"	19.69 (500)				100763610	
	NW 100	11"	39.40 (1000)				100763710	
	NW 160	17"	19.69 (500)				100763616	
	NW 160	17"	39.40 (1000)				100763716	
	NW 200	18"	19.69 (500)				100763620	
	NW 200	18"	39.40 (1000)				100763720	
NW 250	24"	19.69 (500)				100763625		
NW 250	24"	39.40 (1000)				100763725		

Metal Hose, Thin Wall							in/(mm)	
 <ul style="list-style-type: none"> • Unsheathed • Stainless steel • Formed metal • Hose butt welded • Flexible • CAUTION: Flanges must be supported to prevent collapsing when subjected to vacuum 	Flange Size (ISO)		A			Part Number	Price	
	NW 63		9.84 (250)			100763806		
	NW 63		19.69 (500)			100763906		
	NW 63		39.40 (1000)			100764006		
	NW 80		9.84 (250)			100763808		
	NW 80		19.69 (500)			100763908		
	NW 80		39.40 (1000)			100764008		
	NW 100		9.84 (250)			100763810		
NW 100		19.69 (500)			100763910			

Flange Protector Caps							
<ul style="list-style-type: none"> • Protects flange faces • Plastic 	Flange Size (ISO)					Part Number	Price
	NW 63					100001862	
	NW 80					100001938	
	NW 100					100003615	
	NW 160					100005788	

Numerical Listing

100001862	Flange protector, NW 63	100760516	Centering ring assembly, NW160, SS/Viton
100001938	Flange protector, NW 80	100760520	Centering ring assembly, NW200, SS/Viton
100003615	Flange protector, NW 100	100760525	Centering ring assembly, NW250, SS/Viton
100005788	Flange protector, NW 160	100760532	Centering ring assembly, NW320, SS/Viton
100760106	Flange, blank, NW63	100760540	Centering ring assembly, NW400, SS/Viton
100760108	Flange, blank, NW80	100760550	Centering ring assembly, NW500, SS/Viton
100760110	Flange, blank, NW100	100760563	Centering ring assembly, NW630, SS/Viton
100760116	Flange, blank, NW160	100760606	Centering ring assembly, NW63, Al/Viton
100760120	Flange, blank, NW200	100760608	Centering ring assembly, NW80, Al/Viton
100760125	Flange, blank, NW250	100760610	Centering ring assembly, NW100, Al/Viton
100760132	Flange, blank, NW320	100760616	Centering ring assembly, NW160, Al/Viton
100760140	Flange, blank, NW400	100760620	Centering ring assembly, NW200, Al/Viton
100760150	Flange, blank, NW500	100760625	Centering ring assembly, NW250, Al/Viton
100760206	Flange, bored, NW63	100760632	Centering ring assembly, NW320, Al/Viton
100760208	Flange, bored, NW80	100760640	Centering ring assembly, NW400, Al/Viton
100760210	Flange, bored, NW100	100760650	Centering ring assembly, NW500, Al/Viton
100760216	Flange, bored, NW160	100760663	Centering ring assembly, NW630, Al/Viton
100760220	Flange, bored, NW200	100760706	Centering ring assembly, NW63, Al/Buna
100760225	Flange, bored, NW250	100760708	Centering ring assembly, NW80, Al/Buna
100760232	Flange, bored, NW320	100760710	Centering ring assembly, NW100, Al/Buna
100760240	Flange, bored, NW400	100760716	Centering ring assembly, NW160, Al/Buna
100760250	Flange, bored, NW500	100760720	Centering ring assembly, NW200, Al/Buna
100760306	Flange, bolted, blank, NW63	100760725	Centering ring assembly, NW250, Al/Buna
100760308	Flange, bolted, blank, NW80	100760732	Centering ring assembly, NW320, Al/Buna
100760310	Flange, bolted, blank, NW100	100760740	Centering ring assembly, NW400, Al/Buna
100760316	Flange, bolted, blank, NW160	100760750	Centering ring assembly, NW500, Al/Buna
100760320	Flange, bolted, blank, NW200	100760763	Centering ring assembly, NW630, Al/Buna
100760325	Flange, bolted, blank, NW250	100761006	Single claw clamp, NW63-100, Al
100760332	Flange, bolted, blank, NW320	100761016	Single claw clamp, NW160-250, Al
100760340	Flange, bolted, blank, NW400	100761032	Single claw clamp, NW320, Al
100760350	Flange, bolted, blank, NW500	100761040	Single claw clamp, NW400-500, Al
100760363	Flange, bolted, blank, NW630	100761106	Double claw clamp, NW63-100, Al
100760406	Flange, long weld, NW63	100761116	Double claw clamp, NW160-250, Al
100760408	Flange, long weld, NW80	100761132	Double claw clamp, NW320, Al
100760410	Flange, long weld, NW100, .065 wall	100761140	Double claw clamp, NW400-500, Al
100760411	Flange, long weld, NW100, .083 wall	100761206	Bolt and nut set, NW63
100760416	Flange, long weld, NW160	100761208	Bolt and nut set, NW80-100
100760420	Flange, long weld, NW200	100761216	Bolt and nut set, NW160
100760425	Flange, long weld, NW250	100761220	Bolt and nut set, NW200-250
100760432	Flange, long weld, NW320	100761232	Bolt and nut set, NW320
100760440	Flange, long weld, NW400	100761240	Bolt and nut set, NW400-500
100760450	Flange, long weld, NW500	100761263	Bolt and nut set, NW630
100760506	Centering ring assembly, NW63, SS/Viton	100761306	Bolt set, for tapped bolted flanges, NW63
100760508	Centering ring assembly, NW80, SS/Viton	100761308	Bolt set, for tapped bolted flanges, NW80-100
100760510	Centering ring assembly, NW100, SS/Viton	100761316	Bolt set, for tapped bolted flanges, NW160

100761320 Bolt set, for tapped bolted flanges, NW200-250
100761332 Bolt set, for tapped bolted flanges, NW320
100761340 Bolt set, for tapped bolted flanges, NW400-500
100761363 Bolt set, for tapped bolted flanges, NW630

100761406 Tee, NW63
100761408 Tee, NW80
100761410 Tee, NW100
100761416 Tee, NW160
100761420 Tee, NW200
100761425 Tee, NW250
100761432 Tee, NW320

100761506 Cross, NW63
100761508 Cross, NW80
100761510 Cross, NW100
100761516 Cross, NW160
100761520 Cross, NW200
100761525 Cross, NW250
100761532 Cross, NW320

100761706 Straight section, NW63, 6.9" length
100761707 Straight section, NW63, 4.2" length
100761708 Straight section, NW80, 7.7" length
100761709 Straight section, NW80, 4.2" length
100761710 Straight section, NW100, 8.5" length
100761711 Straight section, NW100, 4.2" length
100761716 Straight section, NW160, 10.9" length
100761717 Straight section, NW160, 4.2" length
100761720 Straight section, NW200, 13.2" length
100761721 Straight section, NW200, 4.2" length
100761725 Straight section, NW250, 16.4" length
100761726 Straight section, NW250, 4.2" length

100761906 O-Ring, NW63, Buna-N
100761908 O-Ring, NW80, Buna-N
100761910 O-Ring, NW100, Buna-N
100761916 O-Ring, NW160, Buna-N
100761920 O-Ring, NW200, Buna-N
100761925 O-Ring, NW250, Buna-N
100761932 O-Ring, NW320, Buna-N
100761940 O-Ring, NW400, Buna-N
100761950 O-Ring, NW500, Buna-N
100761963 O-Ring, NW630, Buna-N

100762006 O-Ring, NW63, Viton
100762008 O-Ring, NW80, Viton
100762010 O-Ring, NW100, Viton
100762016 O-Ring, NW160, Viton
100762020 O-Ring, NW200, Viton
100762025 O-Ring, NW250, Viton
100762032 O-Ring, NW320, Viton

100762040 O-Ring, NW400, Viton
100762050 O-Ring, NW500, Viton
100762063 O-Ring, NW630, Viton

100762206 Adapter, NW63 to 4.5" CF
100762208 Adapter, NW80 to 6" CF
100762210 Adapter, NW100 to 6" CF
100762216 Adapter, NW160 to 8" CF
100762220 Adapter, NW200 to 10" CF

100762306 Adapter, NW63 to 2" ASA w/o groove
100762308 Adapter, NW80 to 2" ASA w/o groove
100762310 Adapter, NW100 to 2" ASA w/o groove
100762316 Adapter, NW160 to 4" ASA w/o groove
100762320 Adapter, NW200 to 6" ASA w/o groove
100762326 Adapter, NW63 to 3" ASA w/o groove
100762328 Adapter, NW80 to 3" ASA w/o groove
100762336 Adapter, NW160 to 6" ASA w/o groove
100762360 Adapter, NW100 to 3" ASA w/o groove
100762370 Adapter, NW100 to 4" ASA w/o groove

100762406 Flange, bolted, bored, NW63
100762408 Flange, bolted, bored, NW80
100762410 Flange, bolted, bored, NW100
100762416 Flange, bolted, bored, NW160
100762420 Flange, bolted, bored, NW200
100762425 Flange, bolted, bored, NW250
100762432 Flange, bolted, bored, NW320
100762440 Flange, bolted, bored, NW400
100762450 Flange, bolted, bored, NW500
100762463 Flange, bolted, bored, NW630

100762506 Step Reducer, NW63-80
100762508 Step Reducer, NW80-100
100762510 Step Reducer, NW100-160
100762517 Step Reducer, NW63-100
100762527 Step Reducer, NW63-160

100762606 Step Adapter, NW63-KF40
100762608 Step Adapter, NW80-KF50
100762616 Step Adapter, NW80-KF40
100762617 Step Adapter, NW63-KF50
100762618 Step Adapter, NW100-KF50

100762706 Long weld flange, bolted, NW63
100762708 Long weld flange, bolted, NW80
100762710 Long weld flange, bolted, NW100
100762716 Long weld flange, bolted, NW160
100762720 Long weld flange, bolted, NW200
100762725 Long weld flange, bolted, NW250
100762732 Long weld flange, bolted, NW320
100762740 Long weld flange, bolted, NW400

100762750	Long weld flange, bolted, NW500	100764306	Adapter, NW63 to 2" ASA w/groove
100762763	Long weld flange, bolted, NW630	100764308	Adapter, NW80 to 2" ASA w/groove
100762806	Rotatable, bolted ring assembly, NW63	100764310	Adapter, NW100 to 2" ASA w/groove
100762808	Rotatable, bolted ring assembly, NW80	100764316	Adapter, NW160 to 4" ASA w/groove
100762810	Rotatable, bolted ring assembly, NW100	100764320	Adapter, NW200 to 6" ASA w/groove
100762816	Rotatable, bolted ring assembly, NW160	100764326	Adapter, NW63 to 3" ASA w/groove
100762820	Rotatable, bolted ring assembly, NW200	100764328	Adapter, NW80 to 3" ASA w/groove
100762825	Rotatable, bolted ring assembly, NW250	100764336	Adapter, NW160 to 6" ASA w/groove
100762832	Rotatable, bolted ring assembly, NW320	100764360	Adapter, NW100 to 3" ASA w/groove
100762840	Rotatable, bolted ring assembly, NW400	100764370	Adapter, NW100 to 4" ASA w/groove
100762850	Rotatable, bolted ring assembly, NW500		
100762906	Retaining ring, NW63	100764406	Smooth elbow, 45°, NW63
100762908	Retaining ring, NW80	100764408	Smooth elbow, 45°, NW80
100762910	Retaining ring, NW100	100764410	Smooth elbow, 45°, NW100
100762916	Retaining ring, NW160	100764416	Smooth elbow, 45°, NW160
100762920	Retaining ring, NW200		
100762925	Retaining ring, NW250	100764506	Tubing, NW63, per foot
100762932	Retaining ring, NW320	100764508	Tubing, NW80, per foot
100762940	Retaining ring, NW400	100764510	Tubing, NW100, .065 wall, per foot
100762950	Retaining ring, NW500	100764511	Tubing, NW100, .083 wall, per foot
		100764516	Tubing, NW160, per foot
100763506	Bellows, NW63, 5.9" length	100764520	Tubing, NW200, per foot
100763508	Bellows, NW80, 5.9" length	100764525	Tubing, NW250, per foot
100763510	Bellows, NW100, 5.9" length		
100763516	Bellows, NW160, 7.9" length	100764606	Smooth elbow, 90°, NW63
100763520	Bellows, NW200, 9.8" length	100764608	Smooth elbow, 90°, NW80
100763525	Bellows, NW250, 11.8" length	100764610	Smooth elbow, 90°, NW100
		100764616	Smooth elbow, 90°, NW160
100763606	Thick wall metal hose, NW63, 20" length		
100763608	Thick wall metal hose, NW80, 20" length	100764706	Ball socket adapter, NW63-4", w/o groove
100763610	Thick wall metal hose, NW100, 20" length	100764708	Ball socket adapter, NW80-4", w/o groove
100763616	Thick wall metal hose, NW160, 20" length	100764710	Ball socket adapter, NW100-4", w/o groove
100763620	Thick wall metal hose, NW200, 20" length	100764806	Ball socket adapter, NW63-4", w/groove
100763625	Thick wall metal hose, NW250, 20" length	100764808	Ball socket adapter, NW80-4", w/groove
		100764810	Ball socket adapter, NW100-4", w/groove
100763706	Thick wall metal hose, NW63, 40" length		
100763708	Thick wall metal hose, NW80, 40" length	100764906	Conical reducer, NW63-80
100763710	Thick wall metal hose, NW100, 40" length	100764908	Conical reducer, NW80-100
100763716	Thick wall metal hose, NW160, 40" length	100764910	Conical reducer, NW100-160
100763720	Thick wall metal hose, NW200, 40" length	100764917	Conical reducer, NW63-100
100763725	Thick wall metal hose, NW250, 40" length	100764927	Conical reducer, NW80-160
		100765006	Conical reducer, NW63-40
100763806	Thin wall metal hose, NW63, 10" length	100765008	Conical reducer, NW80-50
100763808	Thin wall metal hose, NW80, 10" length	100765016	Conical reducer, NW80-40
100763810	Thin wall metal hose, NW100, 10" length	100765017	Conical reducer, NW63-50
100763906	Thin wall metal hose, NW63, 20" length	100765018	Conical reducer, NW100-50
100763908	Thin wall metal hose, NW80, 20" length		
100763910	Thin wall metal hose, NW100, 20" length	100766006	Braided Metal Hose, NW63, 10" length
100764006	Thin wall metal hose, NW63, 40" length	100766008	Braided Metal Hose, NW80, 10" length
100764008	Thin wall metal hose, NW80, 40" length	100766010	Braided Metal Hose, NW100, 10" length
		100766106	Braided Metal Hose, NW63, 20" length
		100766108	Braided Metal Hose, NW80, 20" length

-
- 100766110** Braided Metal Hose, NW100, 20" length
 - 100766206** Braided Metal Hose, NW63, 40" length
 - 100766208** Braided Metal Hose, NW80, 40" length
 - 100766210** Braided Metal Hose, NW100, 40" length



MKS Instruments HPS™ Products

Providing Process Solutions
Around the World

HPS™ Products are a line of vacuum components, valves and gauges. Some of the many applications where HPS™ Products are used include: manufacturing of semiconductors, flat panel displays, high-energy research laboratories, light bulb manufacturing, pharmaceutical processes, and automotive component manufacturing.

Vacuum Gauges

- High Vacuum Gauges - measurement range of 10^{-2} to 10^{-11} Torr
 - Cold Cathode - Series 943, Series 941 and Series 937 Gauge Controllers, Series 421 and I-Mag™ Sensors, Series 903 Transducer
 - Hot Cathode - Series 919 and Series 929 Gauge Systems
- Medium Vacuum Gauges - measurement range of Atmosphere to 10^{-3} Torr
 - Standard Pirani - Series 945 and Series 917 Gauge Controllers, Series 315 and Series 345 Sensors, Series 325 MODUCELL® Transducer
 - Convection-Enhanced Pirani - Series 947 Controller, Series 317 Sensor, Series 907 ACT Transducer

Vacuum Valves

- Vacuum Poppet Valves - Sizes $\frac{1}{2}$ " to 6", angle, inline, manual, pneumatic and electropneumatic models available
- Multiple Stage Valves - Slows system evacuation, reducing turbulence and abrupt pressure change
- Gauge Isolation Valves - Cv™ Valve and IDA™ Valve
- Specialty Valves - VACUUM SENTRY® and AUTO-SOFT®

Sublimation Traps

A line of specialty components that removes process by-products from the vacuum system, preventing contamination and product damage.

Piping Heater Jackets

The Series 45 line of high-quality heater jackets consistently elevate the process system temperature, while remaining cool to the touch on the outside.

Vacuum Fittings

- Series 31 ISO-KF, sizes NW 10 to NW 100 ($\frac{1}{2}$ " to 4")
- Series 88 CF Components, sizes $1\frac{1}{3}$ " to 10" (34 -254 mm) for use down to 10^{-13} Torr
- Series 23 ButtWeld, sizes $\frac{1}{2}$ " to 10"



Vacuum Products Group
5330 Sterling Drive
Boulder, CO 80301
(303) 449-9861 or (800) 345-1967
FAX (303) 442-6880
www.mksinst.com