

Flanges & Fittings

Section Two



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Flanges & Fittings

ISO Flange General Information



SPECIFICATIONS

General: Optional fastener or nonrotatable flanges with clearance bolt holes

Nominal OD sizes: ISO-63 to ISO-500

Tube OD sizes: 2 1/2 to 20 inches (63.5-508mm)

Materials

Flange: 304 or 316L stainless steel

O-rings: Viton, Buna

Bolts: 18-8 stainless steel

Vacuum range

Elastomer seal: $\geq 1 \times 10^{-8}$ mbar -High vacuum

Metal seal: $\geq 1 \times 10^{-11}$ mbar - UHV

Temperature range

Viton: -20°C to 200°C

Buna: -30°C to 110°C

Metal seal: -270°C to 150°C

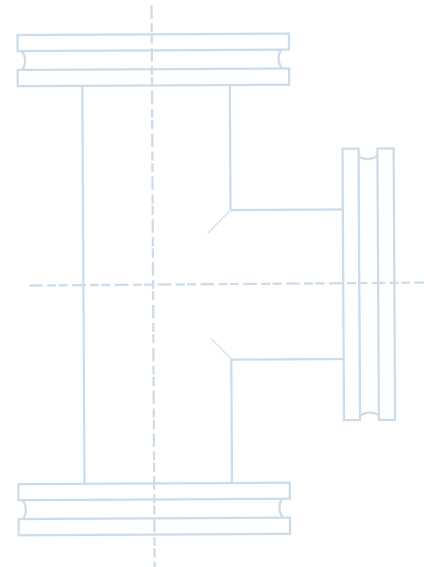
Nor-Cal ISO flanges and hardware are manufactured to the International Standards Organization specification so they can be mated to other manufacturers' ISO flanges. ISO flanges are made from Argon Oxygen Decarburization (AOD) 304 stainless steel. This material is certified to meet ASTM-240 and has less than 0.01% sulfur in order to prevent sulfur stringers. Grain size is 3 to 6 per ASTM E-112.

Maximum inclusion size is 2.5 per ASTM E-45. Normally our standard material is in the low carbon range for 304 stainless steel. For increased corrosion resistance, some sizes are available from stock in 316L stainless steel.

Optional fastener and nonrotatable ISO flanges are available from stock for 2 1/2 to 20 inch (63.5-508mm) tube sizes.

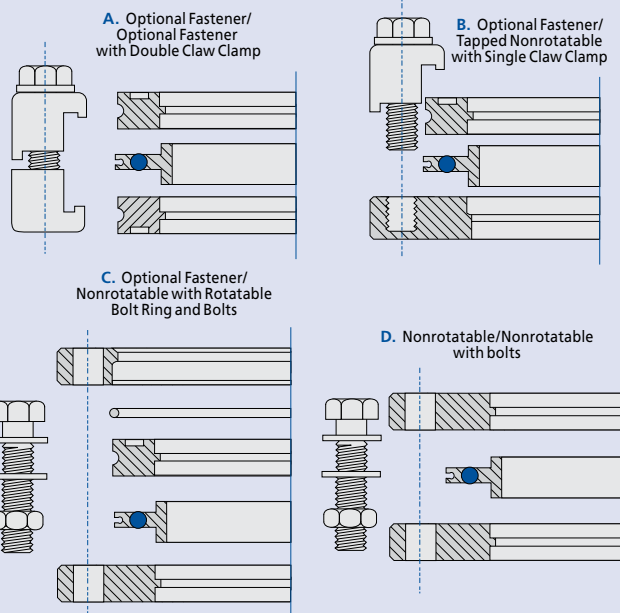
Both use a Viton O-ring, held in place by a centering ring, to effect a seal with a vacuum range of 10^{-8} mbar. ISO components can be baked to 204°C.

ISO flanges can also be used with standard clamps and aluminum seals to obtain a UHV seal bakeable to 150°C. Seals are described in detail in Section 2.1 of this catalog.

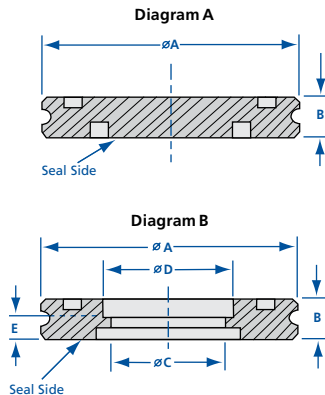


ISO Flange Assembly Instructions

Optional fastener flanges are joined around the periphery with clamps. Double claw clamps are used when a pair of OF flanges are joined (See diagram A.), or single claw clamps are used to join an OF flange to a tapped nonrotatable on a pump or gate valve. (See diagram B.) This fastening method allows the OF flange to be rotated for ease of component alignment. Additionally, a rotatable bolt ring can be used to fasten an OF flange to a nonrotatable flange using bolts. (See diagram C.) A retainer ring prevents the OF flange from slipping through the bolt ring. Nonrotatable ISO flanges are assembled with bolts. (See diagram D.) They do not allow rotation of bolt holes on mating flanges to align components.



All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.



ISO Optional Fastener Flanges

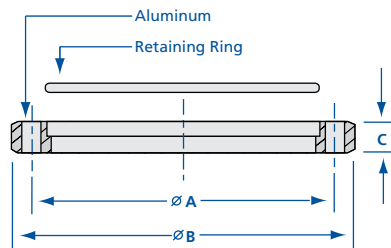
MODEL NUMBER	DIAGRAM	NOMINAL ID	A	B	C	D	E
ISO-63-000-OF	A	-	3.74 (95.00)	0.47 (11.94)	-	-	-
ISO-63-250-OF	B	2½ (63.50)	3.74 (95.00)	0.47 (11.94)	2.438 (61.93)	2.510 (63.75)	0.25 (6.35)
ISO-80-000-OF	A	-	4.331 (110.01)	0.47 (11.94)	-	-	-
ISO-80-300-OF	B	3 (76.20)	4.331 (110.01)	0.47 (11.94)	2.938 (74.63)	3.010 (76.45)	0.25 (6.35)
ISO-100-000-OF	A	-	5.118 (130.00)	0.47 (11.94)	-	-	-
ISO-100-400-OF	B	4 (101.60)	5.118 (130.00)	0.47 (11.94)	3.910 (99.31)	4.010 (101.85)	0.25 (6.35)
ISO-160-000-OF	A	-	7.087 (180.00)	0.47 (11.94)	-	-	-
ISO-160-600-OF	B	6 (152.40)	7.087 (180.01)	0.47 (11.94)	5.875 (149.23)	6.020 (152.91)	0.375 (9.53)
ISO-200-000-OF	A	-	9.449 (240.00)	0.47 (11.94)	-	-	-
ISO-200-800-OF	B	8 (203.20)	9.449 (240.00)	0.47 (11.94)	7.875 (200.03)	8.020 (203.71)	0.375 (9.53)
ISO-250-000-OF	A	-	11.417 (289.99)	0.47 (11.94)	-	-	-
ISO-250-1000-OF	B	10 (254.00)	11.417 (289.99)	0.47 (11.94)	9.875 (250.83)	10.020 (254.51)	0.375 (9.53)
ISO-320-000-OF	A	-	14.567 (370.00)	0.67 (17.02)	-	-	-
ISO-320-1200-OF	B	12 (304.80)	14.567 (370.00)	0.67 (17.02)	11.760 (298.70)	12.020 (305.31)	0.375 (9.53)
ISO-320-1275-OF	B	12 (304.80)	14.567 (370.00)	0.67 (17.02)	12.420 (315.47)	12.770 (324.36)	0.375 (9.53)
ISO-400-000-OF	A	-	17.716 (449.99)	0.67 (17.02)	-	-	-
ISO-400-1600-OF	B	16 (406.40)	17.716 (449.99)	0.67 (17.02)	15.624 (396.85)	16.020 (406.91)	0.375 (9.53)
ISO-500-000-OF	A	-	21.653 (549.99)	0.67 (17.02)	-	-	-
ISO-500-2000-OF	B	20 (508.00)	21.653 (549.99)	0.67 (17.02)	19.624 (498.45)	20.02 (508.51)	0.375 (9.53)

ISO 316L Optional Fastener Flanges

MODEL NUMBER	DIAGRAM	NOMINAL ID	A	B	C	D	E
ISO-63-250-OF-316L	B	2½ (63.05)	3.740 (95.00)	0.47 (11.94)	2.438 (61.93)	2.510 (63.75)	0.25 (6.35)
ISO-80-300-OF-316L	B	3 (76.20)	4.331 (110.01)	0.47 (11.94)	2.938 (74.63)	3.010 (76.45)	0.25 (6.35)
ISO-100-400-OF-316L	B	4 (101.60)	5.118 (130.00)	0.47 (11.94)	3.910 (99.31)	4.010 (101.85)	0.25 (6.35)

ISO Rotatable Bolt Ring and Retainer Ring

MODEL NUMBER	FLANGE SIZE	A	B	C
ISO-63-BR	ISO-63	4.331 (110.01)	5.118 (130.00)	0.472 (11.99)
ISO-80-BR	ISO-80	4.921 (124.99)	5.709 (145.01)	0.472 (11.99)
ISO-100-BR	ISO-100	5.709 (145.01)	6.496 (165.00)	0.472 (11.99)
ISO-160-BR	ISO-160	7.874 (200.00)	8.858 (224.99)	0.630 (16.00)
ISO-200-BR	ISO-200	10.236 (259.99)	11.220 (284.99)	0.630 (16.00)
ISO-250-BR	ISO-250	12.205 (310.01)	13.189 (335.00)	0.630 (16.00)
ISO-320-BR	ISO-320	15.551 (395.00)	16.732 (424.99)	0.787 (19.99)
ISO-400-BR	ISO-400	18.898 (480.01)	20.079 (510.01)	0.787 (19.99)
ISO-500-BR	ISO-500	22.835 (580.01)	24.016 (610.01)	0.787 (19.99)



Replacement Retainer Ring

MODEL NUMBER
ISO-63-RR
ISO-80-RR
ISO-100-RR
ISO-160-RR
ISO-200-RR
ISO-250-RR
ISO-320-RR
ISO-400-RR
ISO-500-RR

SPECIFICATIONS

General: Optional fastener or nonrotatable flanges with clearance bolt holes

Nominal OD sizes: ISO-63 to ISO-500

Tube OD sizes: 2½ to 20 inches (63.5-508mm)

Materials

Flange: 304 or 316L stainless steel
O-rings: Viton, Buna
Bolts: 18-8 stainless steel

Vacuum range

Elastomer seal: $\geq 1 \times 10^{-8}$ mbar - High vacuum
Metal seal: $\geq 1 \times 10^{-11}$ mbar - UHV

Temperature range

Viton: -20°C to 200°C
Silicone: -50° to 230°C
Buna: -30°C to 110°C
Metal seal: -270°C to 150°C

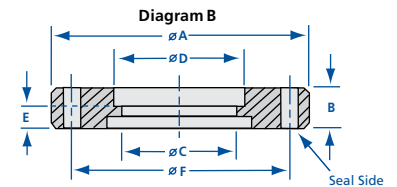
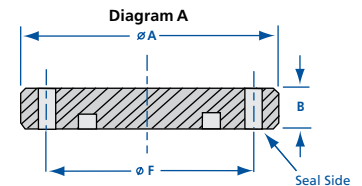
All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.

See Section 2.1 for metal seals



ISO Nonrotatable Flanges

MODEL NUMBER	DIAGRAM	NOMINAL ID	A	B	C	D	E	F	BOLT HOLES	BOLT DIAMETER
ISO-63-000N	A	-	5.118 (130.00)	0.472 (11.99)	-	-	-	4.331 (110.01)	4	0.359 (9.12)
ISO-63-250N	B	2 1/2 (63.50)	5.118 (130.00)	0.472 (11.99)	2.438 (61.93)	2.510 (63.75)	0.250 (6.35)	4.331 (110.01)	4	0.359 (9.12)
ISO-80-000N	A	-	5.709 (145.01)	0.472 (11.99)	-	-	-	4.921 (124.99)	8	0.359 (9.12)
ISO-80-300N	B	3 1/2 (88.90)	5.709 (145.01)	0.472 (11.99)	2.938 (74.63)	3.010 (76.45)	0.250 (6.35)	4.921 (124.99)	8	0.359 (9.12)
ISO-100-000N	A	-	6.496 (165.00)	0.472 (11.99)	-	-	-	5.709 (145.01)	8	0.359 (9.12)
ISO-100-400N	B	4 (101.06)	6.496 (165.00)	0.472 (11.99)	3.910 (99.32)	4.010 (101.85)	0.250 (6.35)	5.709 (145.01)	8	0.359 (9.12)
ISO-160-000N	A	-	8.858 (224.99)	0.630 (16.00)	-	-	-	7.874 (200.00)	8	0.438 (11.13)
ISO-160-600N	B	6 (152.40)	8.858 (224.99)	0.630 (16.00)	5.875 (149.23)	6.020 (152.91)	0.375 (9.53)	7.874 (200.00)	8	0.438 (11.13)
ISO-200-000N	A	-	11.220 (284.99)	0.630 (16.00)	-	-	-	10.236 (259.99)	12	0.438 (11.13)
ISO-200-800N	B	8 (203.20)	11.220 (284.99)	0.630 (16.00)	7.875 (200.03)	8.020 (203.71)	0.375 (9.53)	10.236 (259.99)	12	0.438 (11.13)
ISO-250-000N	A	-	13.189 (335.00)	0.630 (16.00)	-	-	-	12.205 (310.01)	12	0.438 (11.13)
ISO-250-1000N	B	10 (254.00)	13.189 (335.00)	0.630 (16.00)	9.875 (250.83)	10.020 (254.51)	0.375 (9.53)	12.205 (310.01)	12	0.438 (11.13)
ISO-320-000N	A	-	16.732 (424.99)	0.787 (19.99)	-	-	-	15.551 (395.00)	12	0.551 (14.00)
ISO-320-1200N	B	12 (304.80)	16.732 (424.99)	0.787 (19.99)	11.760 (298.70)	12.020 (305.31)	0.375 (9.53)	15.551 (395.00)	12	0.551 (14.00)
ISO-320-1275N	B	12 (304.80)	16.732 (424.99)	0.787 (19.99)	12.420 (315.47)	12.770 (324.36)	0.375 (9.53)	15.551 (395.00)	12	0.551 (14.00)
ISO-400-000N	A	-	20.079 (510.01)	0.787 (19.99)	-	-	-	18.898 (480.01)	16	0.551 (14.00)
ISO-400-1600N	B	16 (406.80)	20.079 (510.01)	0.787 (19.99)	15.642 (397.31)	16.020 (406.91)	0.375 (9.53)	18.898 (480.01)	16	0.551 (14.00)
ISO-500-000N	A	-	24.016 (610.01)	0.787 (19.99)	-	-	-	22.835 (580.01)	16	0.551 (14.00)
ISO-500-2000N	B	20 (508.00)	24.016 (610.01)	0.787 (19.99)	19.642 (498.91)	20.020 (508.51)	0.375 (9.53)	22.835 (580.01)	16	0.551 (14.00)



SPECIFICATIONS

General: Optional fastener or nonrotatable flanges with clearance bolt holes

Nominal OD sizes: ISO-63 to ISO-500

Tube OD sizes: 2 1/2 to 20 inches (63.5-508mm)

Materials

Flange: 304 or 316L stainless steel

O-rings: Viton, Buna

Bolts: 18-8 stainless steel

Vacuum range

Elastomer seal: $\geq 1 \times 10^{-8}$ mbar - High vacuum

Metal seal: $\geq 1 \times 10^{-11}$ mbar - UHV

Temperature range

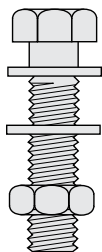
Viton: -20°C to 200°C

Buna: -30°C to 110°C

Metal seal: -270°C to 150°C

All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.

See Section 2.1 for metal seals

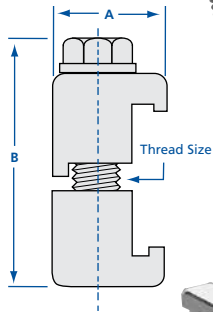
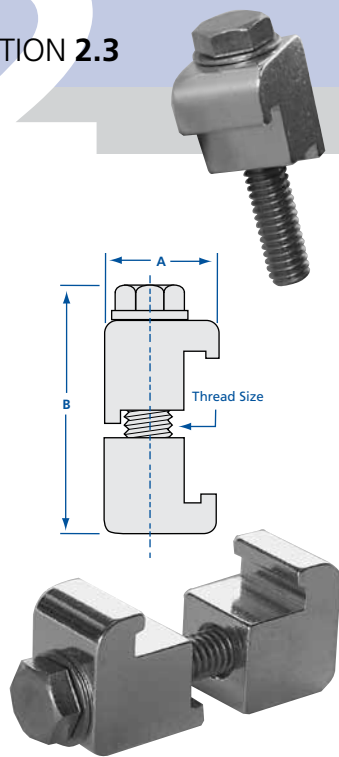


ISO Bolt Kits-Metric

MODEL NUMBER	DESCRIPTION
B-ISO-63	(4) SS bolts, nuts & washers, M8 x 40mm
B-ISO-80	(8) SS bolts, nuts & washers, M8 x 40mm
B-ISO-100	(8) SS bolts, nuts & washers, M8 x 40mm
B-ISO-160	(8) SS bolts, nuts & washers, M10 x 50mm
B-ISO-200	(12) SS bolts, nuts & washers, M10 x 50mm
B-ISO-250	(12) SS bolts, nuts & washers, M10 x 50mm
B-ISO-320	(12) SS bolts, nuts & washers, M12 x 60mm
B-ISO-400	(16) SS bolts, nuts & washers, M12 x 60mm
B-ISO-500	(16) SS bolts, nuts & washers, M12 x 60mm

Flanges & Fittings

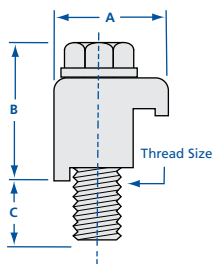
ISO Clamps



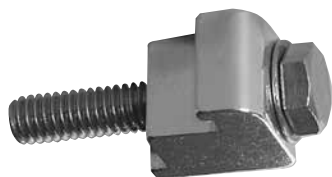
ISO Double Claw Aluminum Clamps

MODEL NUMBER	FLANGE SIZE	A	B	THREAD SIZE	CLAMPS REQUIRED
ISO-63-DCP	ISO-63	0.94 (23.88)	1.96 (49.78)	5/16-18	4
ISO-80-DCP	ISO-80	0.94 (23.88)	1.96 (49.78)	5/16-18	8
ISO-100-DCP	ISO-100	0.94 (23.88)	1.96 (49.78)	5/16-18	8
ISO-160-DCP	ISO-160	1.10 (27.94)	1.96 (49.78)	5/16-18	8
ISO-200-DCP	ISO-200	1.10 (27.94)	1.96 (49.78)	5/16-18	12
ISO-250-DCP	ISO-250	1.10 (27.94)	1.96 (49.78)	5/16-18	12
ISO-320-DCP	ISO-320	1.34 (34.04)	2.50 (63.50)	7/16-14	12
ISO-400-DCP	ISO-400	1.34 (34.04)	2.50 (63.50)	7/16-14	16
ISO-500-DCP	ISO-500	1.34 (34.04)	2.50 (63.50)	7/16-14	16

ISO Single Claw Aluminum Clamps



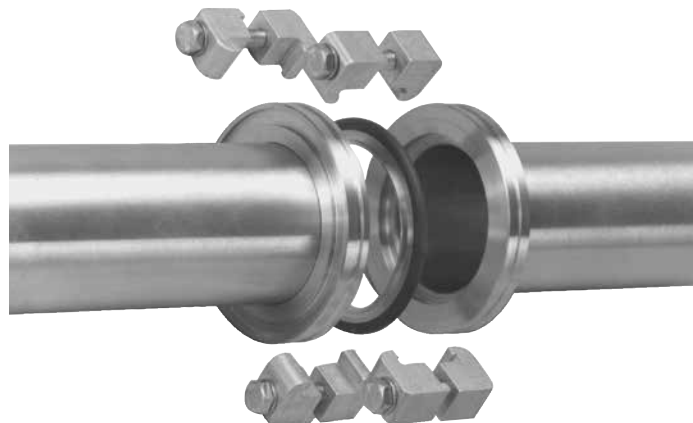
MODEL NUMBER	FLANGE SIZE	A	B	C	THREAD SIZE	CLAMPS REQUIRED
ISO-63-SCP	ISO-63	0.94 (23.88)	1.18 (29.97)	0.52 (13.21)	5/16-18	4
ISO-80-SCP	ISO-80	0.94 (23.88)	1.18 (29.97)	0.52 (13.21)	5/16-18	8
ISO-100-SCP	ISO-100	0.94 (23.88)	1.18 (29.97)	0.52 (13.21)	5/16-18	8
ISO-160-SCP	ISO-160	1.10 (27.94)	1.18 (29.97)	0.52 (13.21)	5/16-18	8
ISO-200-SCP	ISO-200	1.10 (27.94)	1.18 (29.97)	0.52 (13.21)	5/16-18	12
ISO-250-SCP	ISO-250	1.10 (27.94)	1.18 (29.97)	0.52 (13.21)	5/16-18	12
ISO-320-SCP	ISO-320	1.34 (34.04)	1.46 (37.08)	0.88 (22.35)	7/16-14	12
ISO-400-SCP	ISO-400	1.34 (34.04)	1.46 (37.08)	0.88 (22.35)	7/16-14	16
ISO-500-SCP	ISO-500	1.34 (34.04)	1.46 (37.08)	0.88 (22.35)	7/16-14	16

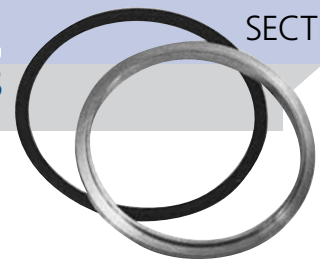


ISO Single Claw Aluminum Clamps – Metric

MODEL NUMBER	FLANGE SIZE	A	B	C	METRIC THREAD SIZE	CLAMPS REQUIRED
ISO-63-SCP-M	ISO-63	0.94 (23.88)	1.20 (30.48)	0.40 (10.16)	M8 x 1.25	4
ISO-80-SCP-M	ISO-80	0.94 (23.88)	1.20 (30.48)	0.40 (10.16)	M8 x 1.25	8
ISO-100-SCP-M	ISO-100	0.94 (23.88)	1.20 (30.48)	0.40 (10.16)	M8 x 1.25	8
ISO-160-SCP-M	ISO-160	1.10 (27.94)	1.20 (30.48)	0.40 (10.16)	M10 x 1.50	8
ISO-200-SCP-M	ISO-200	1.10 (27.94)	1.20 (30.48)	0.40 (10.16)	M10 x 1.50	12
ISO-250-SCP-M	ISO-250	1.10 (27.94)	1.20 (30.48)	0.40 (10.16)	M10 x 1.50	12
ISO-320-SCP-M	ISO-320	1.34 (34.04)	1.48 (37.59)	0.79 (20.07)	M12 x 1.75	12
ISO-400-SCP-M	ISO-400	1.34 (34.04)	1.48 (37.59)	0.79 (20.07)	M12 x 1.75	16
ISO-500-SCP-M	ISO-500	1.34 (34.04)	1.48 (37.59)	0.79 (20.07)	M12 x 1.75	16

All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.

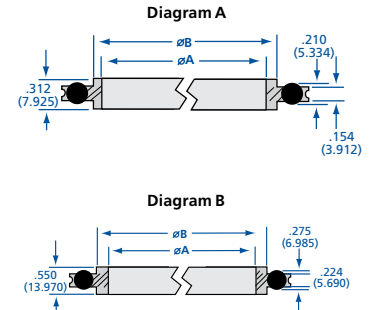




ISO Aluminum Centering Rings with O-ring and Aluminum Spacer Ring

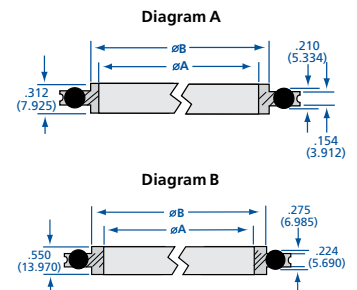
MODEL NUMBER	DIAGRAM	O-RING MATERIAL	A	B
ISO-63-CR-AV*	A	Viton	2.63 (66.80)	2.74 (69.60)
ISO-63-CR-AB*	A	Buna	2.63 (66.80)	2.74 (69.60)
ISO-80-CR-AV	A	Viton	3.14 (79.76)	3.25 (82.55)
ISO-80-CR-AB	A	Buna	3.14 (79.76)	3.25 (82.55)
ISO-100-CR-AV	A	Viton	3.89 (98.81)	4.00 (101.60)
ISO-100-CR-AB	A	Buna	3.89 (98.81)	4.00 (101.60)
ISO-160-CR-AV	A	Viton	5.90 (149.86)	6.01 (152.65)
ISO-160-CR-AB	A	Buna	5.90 (149.86)	6.01 (152.65)
ISO-200-CR-AV	A	Viton	8.26 (209.80)	8.37 (212.60)
ISO-200-CR-AB	A	Buna	8.26 (209.80)	8.37 (212.60)
ISO-250-CR-AV	A	Viton	10.14 (257.56)	10.25 (260.35)
ISO-250-CR-AB	A	Buna	10.14 (257.56)	10.25 (260.35)
ISO-320-CR-AV	B	Viton	12.32 (312.93)	12.51 (317.75)
ISO-320-CR-AB	B	Buna	12.32 (312.93)	12.51 (317.75)
ISO-400-CR-AV	B	Viton	15.55 (394.97)	15.75 (400.05)
ISO-400-CR-AB	B	Buna	15.55 (394.97)	15.75 (400.05)
ISO-500-CR-AV	B	Viton	19.53 (496.06)	19.72 (500.89)
ISO-500-CR-AB	B	Buna	19.53 (496.06)	19.72 (500.89)

*Machined centering ring.



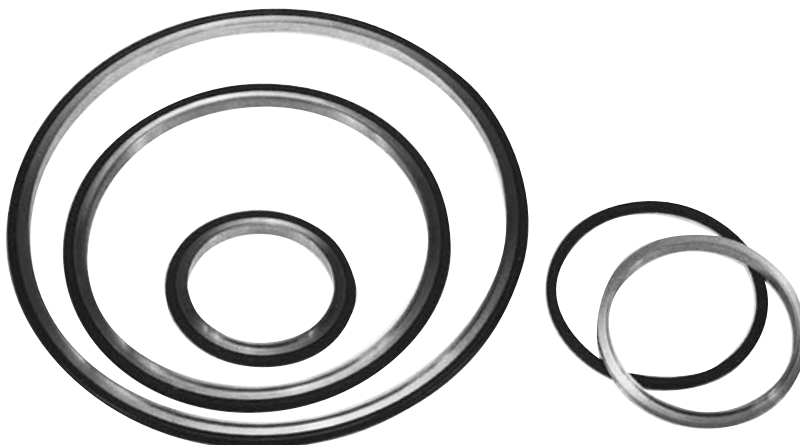
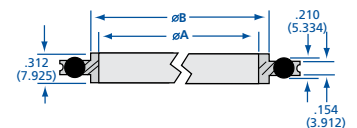
ISO Stainless Steel Centering Rings with O-ring and Aluminum Spacer Ring

MODEL NUMBER	DIAGRAM	O-RING MATERIAL	A	B
ISO-63-CR-SV	A	Viton	2.63 (66.80)	2.74 (69.60)
ISO-80-CR-SV	A	Viton	3.14 (79.76)	3.25 (82.55)
ISO-100-CR-SV	A	Viton	3.89 (98.81)	4.00 (101.60)
ISO-160-CR-SV	A	Viton	5.90 (149.86)	6.01 (152.65)
ISO-200-CR-SV	A	Viton	8.26 (209.80)	8.37 (212.60)
ISO-250-CR-SV	A	Viton	10.14 (257.56)	10.25 (260.35)
ISO-320-CR-SV	B	Viton	12.36 (313.94)	12.52 (318.01)
ISO-400-CR-SV	B	Viton	15.55 (394.97)	15.75 (400.05)



ISO 316L Stainless Steel Centering Rings with O-ring and Aluminum Spacer Ring

MODEL NUMBER	O-RING MATERIAL	A	B
ISO-63-CR-SV-316L	Viton	2.63 (66.80)	2.74 (69.60)
ISO-80-CR-SV-316L	Viton	3.14 (79.76)	3.25 (82.55)
ISO-100-CR-SV-316L	Viton	3.89 (98.81)	4.00 (101.60)



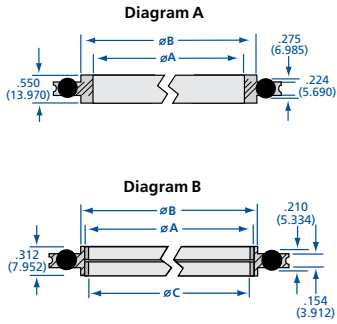
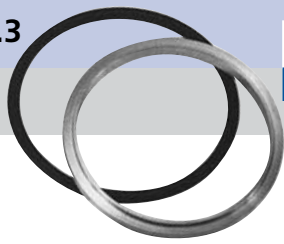
All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.

See next page for replacement O-rings

See Section 2.1 for metal seals

Flanges & Fittings

ISO Centering Rings

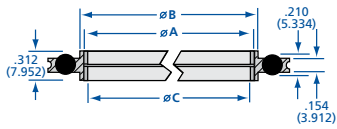


ISO Stainless Steel Centering Rings with O-ring

MODEL NUMBER	DIAGRAM	O-RING MATERIAL	A	B
ISO-63-CR	A	Viton	2.63 (66.80)	2.74 (69.60)
ISO-80-CR	A	Viton	3.14 (79.76)	3.25 (82.55)
ISO-100-CR	A	Viton	3.89 (98.81)	4.00 (101.60)
ISO-160-CR	A	Viton	5.90 (149.86)	6.01 (152.65)
ISO-200-CR	A	Viton	8.26 (209.80)	8.37 (212.60)
ISO-250-CR	A	Viton	10.14 (257.56)	10.25 (260.35)
ISO-320-CR	B	Viton	12.32 (312.93)	12.52 (318.01)
ISO-400-CR	B	Viton	15.55 (394.97)	15.74 (399.80)

See below for replacement O-rings.

ISO Screened Stainless Steel Centering Rings with O-ring and Aluminum Spacer Ring



MODEL NUMBER	O-RING MATERIAL	A	B	C	MESH (sq./in.)
ISO-63-CR-SV-16	Viton	2.63 (66.80)	2.74 (69.60)	2.38 (60.45)	16
ISO-80-CR-SV-16	Viton	3.14 (79.76)	3.25 (82.55)	2.87 (72.90)	16
ISO-100-CR-SV-16	Viton	3.89 (98.81)	4.00 (101.60)	3.50 (88.90)	16
ISO-160-CR-SV-16	Viton	5.90 (149.86)	6.01 (152.65)	5.50 (139.70)	16

Includes O-ring. See below for replacement O-rings.

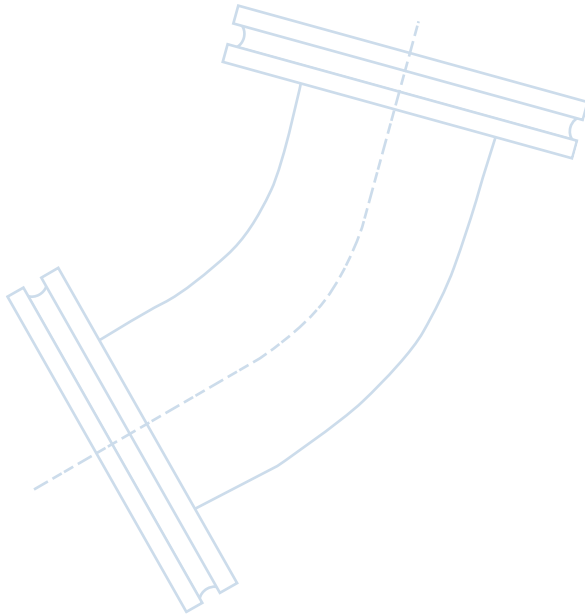


Viton O-Rings

MODEL NUMBER	FLANGE TYPE
ISO-63-OR-V	ISO-63
ISO-80-OR-V	ISO-80
ISO-100-OR-V	ISO-100
ISO-160-OR-V	ISO-160
ISO-200-OR-V	ISO-200
ISO-250-OR-V	ISO-250
ISO-320-OR-V	ISO-320
ISO-400-OR-V	ISO-400
ISO-500-OR-V	ISO-500

Buna O-Rings

MODEL NUMBER	FLANGE TYPE
ISO-63-OR-B	ISO-63
ISO-80-OR-B	ISO-80
ISO-100-OR-B	ISO-100
ISO-160-OR-B	ISO-160
ISO-200-OR-B	ISO-200
ISO-250-OR-B	ISO-250
ISO-320-OR-B	ISO-320
ISO-400-OR-B	ISO-400
ISO-500-OR-B	ISO-500



All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.

See Section 2.1 for metal seals



Nor-Cal Products manufactures a complete line of ISO vacuum fittings with optional fastener or nonrotatable flanges. The tube portions are fabricated from 304 stainless steel. For increased resistance to corrosion in downstream semiconductor processes, some ISO flanges and fittings are available in 316L stainless steel. Nor-Cal makes its own elbows, and all tees and crosses are made with the pulled-port technique. This allows smooth, crevice-free butt welds to provide the maximum in cleanliness for UHV applications. Fittings are shown with OF flanges only. To order a fitting with nonrotatable flanges substitute “-N” for “-OF” in the model number. Fittings are also available with CF (Conflat style), NW (ISO-KF compatible) and ASA flanges. Standard finish is bead blasted. Electropolished finish also available. Call for pricing.



SPECIFICATIONS

General: Optional fastener or nonrotatable flanges with clearance bolt holes

Nominal OD sizes: ISO-63 to ISO-500

Tube OD sizes: 2½ to 20 inches (63.5-508mm)

Tube finish: Beadblast, tumbled, or electropolish

Materials

Flange: 304 or 316L stainless steel

O-rings: Viton, Buna

Bolts: 18-8 stainless steel

Vacuum range

Elastomer seal: ≥1 x 10⁻⁸ mbar - High vacuum

Metal seal: ≥1 x 10⁻¹¹ mbar - UHV

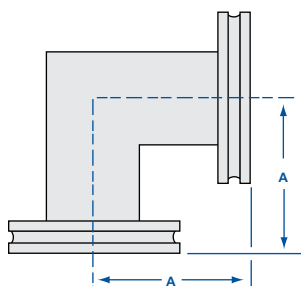
Temperature range

Viton: -20°C to 200°C

Buna: -30°C to 110°C

Metal seal: -270°C to 150°C

See Section 2.1 for metal seals



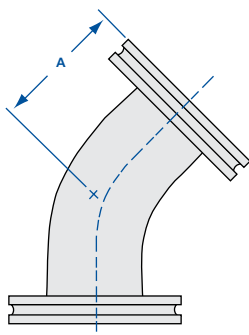
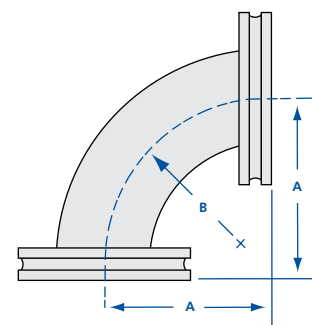
ISO 90° Mitered Elbows

MODEL NUMBER	TUBE OD	A
2E-ISO-63-OF-M	2½ (63.50)	3.25 (82.55)
2E-ISO-80-OF-M	3 (76.20)	3.50 (88.90)
2E-ISO-100-OF-M	4 (101.60)	4.13 (104.90)
2E-ISO-160-OF-M	6 (152.40)	5.38 (136.65)
2E-ISO-200-OF-M	8 (203.20)	7.38 (187.45)
2E-ISO-250-OF-M	10 (254.00)	9.88 (250.95)



ISO 90° Radius Elbows

MODEL NUMBER	TUBE OD	A	B
2E-ISO-63-OF	2½ (63.50)	4.00 (101.60)	3.75 (95.25)
2E-ISO-80-OF	3 (76.20)	4.75 (120.65)	4.50 (114.30)
2E-ISO-100-OF	4 (101.60)	6.25 (158.75)	6.00 (152.40)
2E-ISO-160-OF	6 (152.40)	9.38 (238.25)	9.00 (228.60)
2E-ISO-200-OF	8 (203.20)	12.38 (314.45)	12.00 (304.80)
2E-ISO-250-OF	10 (254.00)	15.38 (390.65)	15.00 (381.00)



ISO 45° Elbows with Tangents

MODEL NUMBER	TUBE OD	A
2KL-ISO-63-OF	2½ (63.50)	3.25 (82.55)
2KL-ISO-80-OF	3 (76.20)	3.93 (99.82)
2KL-ISO-100-OF	4 (101.60)	5.03 (127.76)



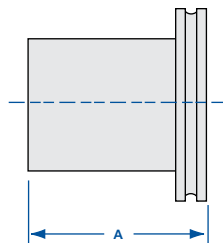
All dimensions are in inches (mm) & weights are in pounds (kg), unless otherwise noted.



Flanges & Fittings

ISO Fittings

ISO Half Nipples



MODEL NUMBER	TUBE OD	A
1N-ISO-63-OF	2½ (63.50)	3.25 (82.55)
1N-ISO-63-OF-V	2½ (63.50)	4.00 (101.60)
1N-ISO-63-OF-H	2½ (63.50)	3.94 (100.08)
1N-ISO-80-OF	3 (76.20)	3.50 (88.90)
1N-ISO-80-OF-H	3 (76.20)	3.94 (100.08)
1N-ISO-100-OF	4 (101.60)	4.13 (104.90)
1N-ISO-100-OF-V	4 (101.60)	5.12 (130.05)
1N-ISO-100-OF-H	4 (101.60)	3.94 (100.08)
1N-ISO-160-OF	6 (152.40)	5.38 (136.65)
1N-ISO-160-OF-V	6 (152.40)	6.44 (163.58)
1N-ISO-160-OF-H	6 (152.40)	3.94 (100.08)
1N-ISO-200-OF	8 (203.20)	7.38 (187.45)
1N-ISO-250-OF	10 (254.00)	9.88 (250.95)
1N-ISO-320-OF	12 (304.80)	9.88 (250.95)
1N-ISO-400-OF	16 (406.40)	9.88 (250.95)
1N-ISO-500-OF	20 (508.00)	9.88 (250.95)



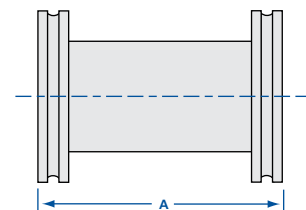
ISO 316L Half Nipples

MODEL NUMBER	TUBE OD	A
1N-ISO-63-OF-316L	2½ (63.50)	3.25 (82.55)
1N-ISO-80-OF-316L	3 (76.20)	3.50 (88.90)
1N-ISO-100-OF-316L	4 (101.60)	4.13 (104.90)



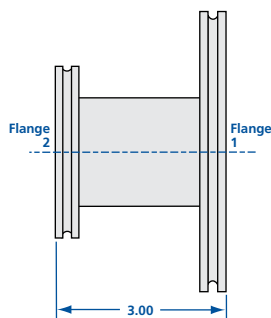
ISO Full Nipples

MODEL NUMBER	TUBE OD	A
2N-ISO-63-OF	2½ (63.50)	6.50 (165.10)
2N-ISO-80-OF	3 (76.20)	7.00 (177.80)
2N-ISO-100-OF	4 (101.60)	8.26 (209.80)
2N-ISO-160-OF	6 (152.40)	10.76 (273.30)
2N-ISO-200-OF	8 (203.20)	14.76 (374.90)
2N-ISO-250-OF	10 (254.00)	19.76 (501.90)
2N-ISO-320-OF	12 (304.80)	19.76 (501.90)
2N-ISO-400-OF	16 (406.40)	19.76 (501.90)
2N-ISO-500-OF	20 (508.00)	19.76 (501.90)



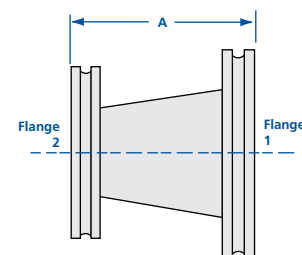
ISO Reducer Nipples

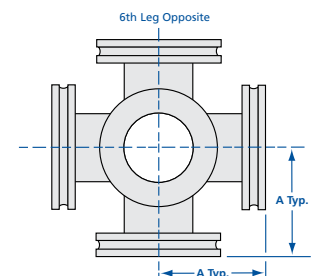
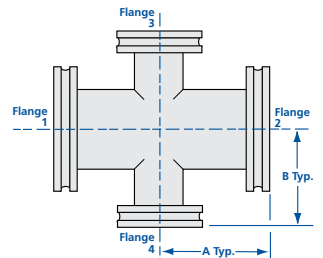
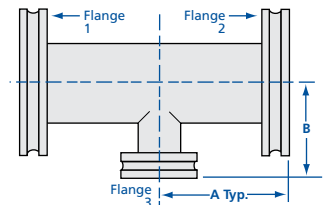
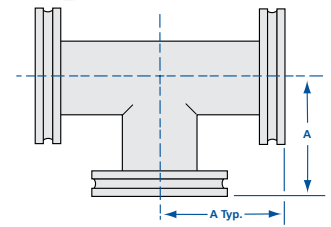
MODEL NUMBER	FLANGE 1	FLANGE 2	TUBE OD
2NR-ISO-80-63-OF	ISO-80	ISO-63	2½ (63.50)
2NR-ISO-100-63-OF	ISO-100	ISO-63	2½ (63.50)
2NR-ISO-100-80-OF	ISO-100	ISO-80	3 (76.20)
2NR-ISO-160-63-OF	ISO-160	ISO-63	2½ (63.50)
2NR-ISO-160-80-OF	ISO-160	ISO-80	3 (76.20)
2NR-ISO-160-100-OF	ISO-160	ISO-100	4 (101.60)
2NR-ISO-200-63-OF	ISO-200	ISO-63	2½ (63.50)
2NR-ISO-200-80-OF	ISO-200	ISO-80	3 (76.20)
2NR-ISO-200-100-OF	ISO-200	ISO-100	4 (101.60)
2NR-ISO-200-160-OF	ISO-200	ISO-160	6 (152.40)
2NR-ISO-250-63-OF	ISO-250	ISO-63	2½ (63.50)
2NR-ISO-250-80-OF	ISO-250	ISO-80	3 (76.20)
2NR-ISO-250-100-OF	ISO-250	ISO-100	4 (101.60)
2NR-ISO-250-160-OF	ISO-250	ISO-160	6 (152.40)
2NR-ISO-250-200-OF	ISO-250	ISO-200	8 (203.20)



ISO Conical Reducer Nipples

MODEL NUMBER	FLANGE 1 TYPE	TUBE OD	FLANGE 2 TYPE	TUBE OD	A
2NRC-ISO-80-63-OF	ISO-80	3 (76.2)	ISO-63	2½ (63.50)	4.12 (104.65)
2NRC-ISO-100-63-OF	ISO-100	4 (101.6)	ISO-63	2½ (63.50)	4.12 (104.65)
2NRC-ISO-100-80-OF	ISO-100	4 (101.6)	ISO-80	3 (76.20)	4.12 (104.65)



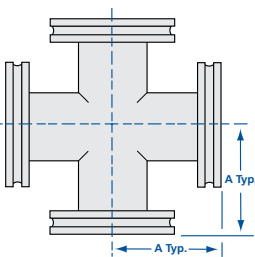


ISO Tees

MODEL NUMBER	TUBE OD	A
3T-ISO-63-OF	2 1/2 (63.50)	3.25 (82.55)
3T-ISO-80-OF	3 (76.20)	3.50 (88.90)
3T-ISO-100-OF	4 (101.60)	4.13 (104.90)
3T-ISO-160-OF	6 (152.40)	5.38 (136.65)
3T-ISO-200-OF	8 (203.20)	7.38 (187.45)
3T-ISO-250-OF	10 (254.00)	9.88 (250.95)

ISO Reducer Tees

MODEL NUMBER	FLANGE 1 & 2		FLANGE 3		A	B
	TYPE	ARM OD	TYPE	LEG OD		
3TR-ISO-80-63-OF	ISO-80	3 (76.2)	ISO-63	2 1/2 (63.50)	3.50 (88.90)	3.50 (88.90)
3TR-ISO-100-63-OF	ISO-100	4 (101.6)	ISO-63	2 1/2 (63.50)	4.13 (104.90)	4.00 (101.60)
3TR-ISO-100-80-OF	ISO-100	4 (101.6)	ISO-80	3 (76.20)	4.13 (104.90)	4.00 (101.60)
3TR-ISO-160-63-OF	ISO-160	6 (152.4)	ISO-63	2 1/2 (63.50)	5.38 (136.65)	5.00 (127.00)
3TR-ISO-160-80-OF	ISO-160	6 (152.4)	ISO-80	3 (76.20)	5.38 (136.65)	5.00 (127.00)
3TR-ISO-160-100-OF	ISO-160	6 (152.4)	ISO-100	4 (101.60)	5.38 (136.65)	5.13 (130.30)
3TR-ISO-200-63-OF	ISO-200	8 (203.2)	ISO-63	2 1/2 (63.50)	7.38 (187.45)	6.00 (152.40)
3TR-ISO-200-80-OF	ISO-200	8 (203.2)	ISO-80	3 (76.20)	7.38 (187.45)	6.00 (152.40)
3TR-ISO-200-100-OF	ISO-200	8 (203.2)	ISO-100	4 (101.60)	7.38 (187.45)	6.13 (155.70)
3TR-ISO-200-160-OF	ISO-200	8 (203.2)	ISO-160	6 (152.40)	7.38 (187.45)	6.38 (162.05)

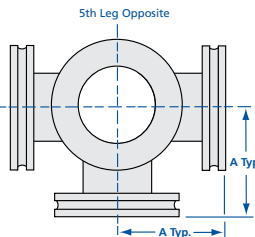


ISO 4-Way Crosses

MODEL NUMBER	TUBE OD	A
4C-ISO-63-OF	2 1/2 (63.50)	3.25 (82.55)
4C-ISO-80-OF	3 (76.20)	3.50 (88.90)
4C-ISO-100-OF	4 (101.60)	4.13 (104.90)
4C-ISO-160-OF	6 (152.40)	5.38 (136.65)
4C-ISO-200-OF	8 (203.20)	7.38 (187.45)
4C-ISO-250-OF	10 (254.00)	9.88 (250.95)

ISO 4-Way Reducer Crosses

MODEL NUMBER	FLANGES 1 & 2		FLANGES 3 & 4		A	B
	TYPE	ARM OD	TYPE	LEG OD		
4CR-ISO-80-63-OF	ISO-80	3	ISO-63	2 1/2 (63.50)	3.50 (88.90)	3.50 (88.90)
4CR-ISO-100-63-OF	ISO-100	4	ISO-63	2 1/2 (63.50)	4.13 (104.90)	4.00 (101.60)
4CR-ISO-100-80-OF	ISO-100	4	ISO-80	3 (76.20)	4.13 (104.90)	4.00 (101.60)
4CR-ISO-160-63-OF	ISO-160	6	ISO-63	2 1/2 (63.50)	5.38 (136.65)	5.00 (127.00)
4CR-ISO-160-80-OF	ISO-160	6	ISO-80	3 (76.20)	5.38 (136.65)	5.00 (127.00)
4CR-ISO-160-100-OF	ISO-160	6	ISO-100	4 (101.60)	5.38 (136.65)	5.13 (130.30)
4CR-ISO-200-160-OF	ISO-200	8	ISO-160	6 (152.40)	7.38 (187.45)	6.38 (162.05)



ISO 5-Way Crosses

MODEL NUMBER	TUBE OD	A
5C-ISO-63-OF	2 1/2 (63.50)	3.25 (82.55)
5C-ISO-80-OF	3 (76.20)	3.50 (88.90)
5C-ISO-100-OF	4 (101.60)	4.13 (104.90)
5C-ISO-160-OF	6 (152.40)	5.38 (136.65)
5C-ISO-200-OF	8 (203.20)	7.38 (187.45)
5C-ISO-250-OF	10 (254.00)	9.88 (250.95)



ISO 6-Way Crosses

MODEL NUMBER	TUBE OD	A
6C-ISO-63-OF	2 1/2 (63.50)	3.25 (82.55)
6C-ISO-80-OF	3 (76.20)	3.50 (88.90)
6C-ISO-100-OF	4 (101.60)	4.13 (104.90)
6C-ISO-160-OF	6 (152.40)	5.38 (136.65)
6C-ISO-200-OF	8 (203.20)	7.38 (187.45)
6C-ISO-250-OF	10 (254.00)	9.88 (250.95)