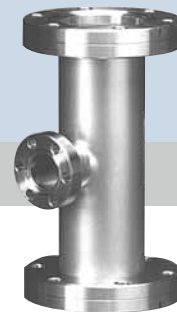


# Flanges & Fittings

## Section Two

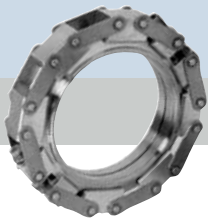


<b>2.1</b>	Chain Clamp Components & Hardware	<b>2</b>
<b>2.2</b>	NW Flanges & Fittings	
<b>2.3</b>	ISO Flanges & Fittings	
<b>2.4</b>	ASA Flanges & Fittings	
<b>2.5</b>	CF Flanges & Fittings	
<b>2.6</b>	Wire Seal Flanges	
<b>2.7</b>	Adapter Fittings	
<b>2.8</b>	Flexible Hoses & Couplings	
<b>2.9</b>	Weld Fittings	

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# Flanges & Fittings

## Chain Clamp Component General Information

### SPECIFICATIONS

**Tube OD sizes:**  $\frac{3}{4}$  to 4 inches

**Materials**

Flange: 304 stainless steel  
Seal: Aluminum

**Vacuum range:**  $\geq 1 \times 10^{-11}$  Torr - UHV

**Temperature range:** -270°C to 150°C

All dimensions are in inches unless otherwise noted



Nor-Cal Products stocks a complete line of chain clamps and aluminum metal seals for converting elastomer seal NW (KF) and ISO flanges to UHV metal seals. They provide a number of benefits over elastomer seals: reduced outgassing, no permeation, no hydrocarbons, resistance to radiation and short half-life. Aluminum seals are used in high-energy physics, other UHV applications and, in some circumstances, cryogenic applications. Aluminum seals are reliable in high vibration or temperature cycling environments. Chain clamps and NW flanges are the standard vacuum flange for many Japanese semiconductor equipment manufacturers. The advantages over using the standard ISO flange are the time and space savings during assembly and the flexibility to form high vacuum or UHV seals.

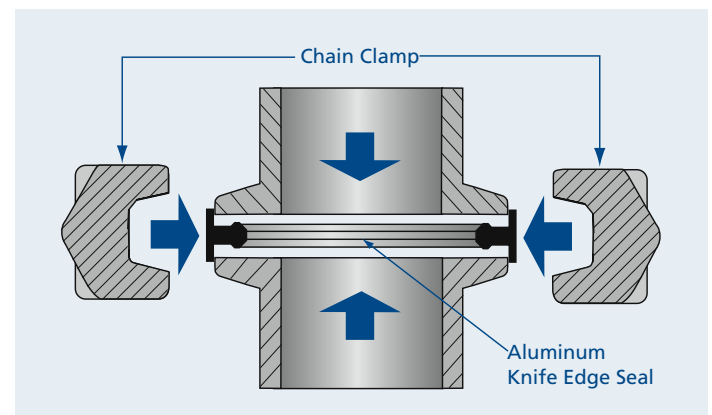
To install a metal seal on an existing NW flange, simply remove the standard clamp, centering ring and O-ring assembly. Replace them with an aluminum knife edge seal and chain clamp. (See diagram.). Standard ISO claw clamps can be used with aluminum seals to convert ISO flanges from high vacuum to UHV. Nor-Cal's large NW flanges are available in 63, 80 and 100 NW sizes from stock. Chain clamps are used to form either elastomer or metal seals with large NW flanges.

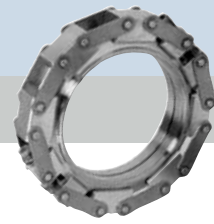
### Aluminum Metal Seals

Aluminum seals locate on the centering ring groove (inner centering) or outside edge of the flange (outer centering) depending on the size. (Inner and outer centering versions are available for all NW flange sizes.) Aluminum knife-edges are compressed by the sealing surfaces of the mating flanges when the chain clamp or ISO claw clamp is tightened. The resultant seal has a helium leak rate of less than  $1 \times 10^{-11}$  standard cc/sec. and can be baked repeatedly to 150°C. Proper sealing occurs even if the flanges are slightly scratched or misaligned. The aluminum alloy is soft enough to make a good seal with reasonable force but will not flow at moderate temperatures. Seals will even work with aluminum flanges.

### Large NW Flanges

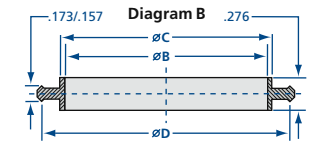
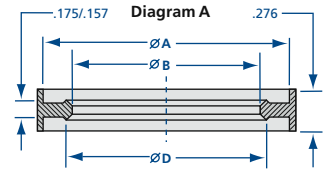
Nor-Cal offers blank and bored NW-63, NW-80 and NW-100 flanges that are compatible with other manufacturers' large QF, KF flanges made to the ISO 2961 specification. They can be used with chain clamps to form elastomer or aluminum metal seals. Elastomer seals are formed with standard ISO centering ring/O-ring assemblies and elastomer chain clamps. UHV connections are formed with aluminum metal seals and chain clamps intended for use with them. NW flanges are made from 304 stainless steel for 2.5 to 4.0 inch OD tube sizes. Flanges for tube sizes up to 28 inches OD or metric tube sizes can be supplied.





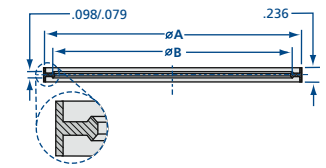
### Aluminum Metal Seals for NW 16-63 Flanges

MODEL NUMBER	DIAGRAM	FLANGE	A	B	C	D
NW-16-MS-A	A	NW-16	1.18	0.63	-	0.91
NW-25-MS-A	A	NW-25	1.58	0.96	-	1.30
NW-40-MS-A	A	NW-40	2.16	1.58	-	1.89
NW-50-MS-A	B	NW-50	-	1.97	2.05	2.32
NW-63-MS-A	B	NW-63	-	2.68	2.76	3.03



### Aluminum Metal Seals for NW 80-100 Flanges

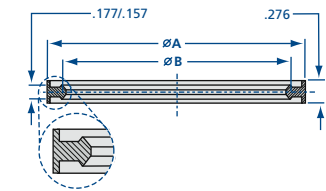
MODEL NUMBER	FLANGE	A	B
NW-80-MS-A	NW-80 Tapered	4.49	4.25
NW-100-MS-A	NW-100 Tapered	5.28	5.04



### Aluminum Metal Seals for ISO Flanges

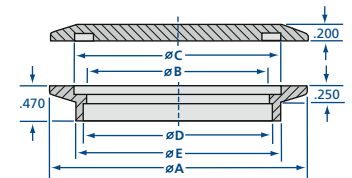
MODEL NUMBER	FLANGE	A	B	TORQUE (LB. IN.)	NUMBER CLAMPS*
ISO-63-MS-A	ISO-63	3.74	3.47	100	4
ISO-80-MS-A	ISO-80	4.33	4.06	100	6
ISO-100-MS-A	ISO-100	5.12	4.84	100	8

\*Use with Nor-Cal ISO double or single claw clamps.



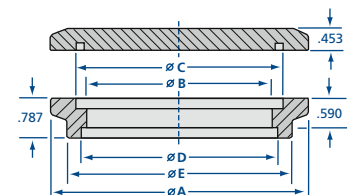
### NW-63 Flanges

MODEL NUMBER	DESCRIPTION	A	B	C	D	E
NW-63-250	Bored for 2 1/2 inch tube OD	3.43	2.44	2.76	2.51	2.71
NW-63B	Blank	3.43	-	2.76	-	-



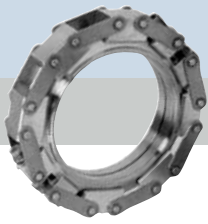
### NW 80-100 Flanges

MODEL NUMBER	DESCRIPTION	A	B	C	D	E
NW-80-300	Bored for 3 inch tube OD	4.49	2.87	3.27	3.01	3.82
NW-80B	Blank	4.49	-	3.27	-	-
NW-100-400	Bored for 4 inch tube OD	5.28	3.87	4.02	4.01	4.61
NW-100B	Blank	5.28	-	4.02	-	-

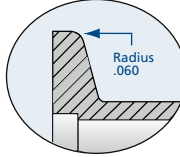


# Flanges & Fittings

## Chain Clamps



Nor-Cal Products stocks chain clamps for NW flanges in two styles: one with Teflon coated aluminum links and an uncoated version. The less expensive uncoated version is the preferred choice for sealing standard NW flanges with aluminum metal seals. The uncoated chain clamps can be used with Nor-Cal or other manufacturers' NW flanges with a radius of approximately .060 of an inch on the outer edge of the

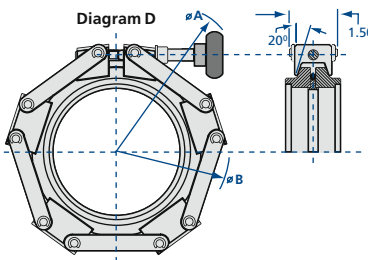
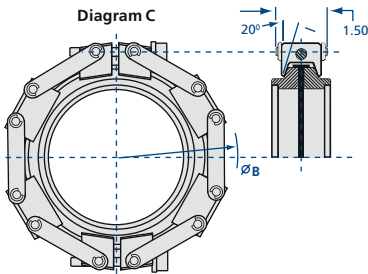
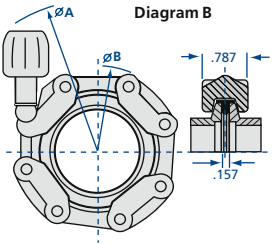
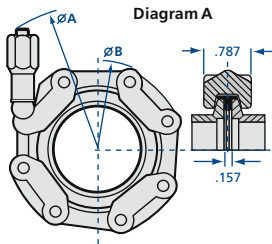


non-sealing side. Most manufacturers' NW flanges have this feature. If the flanges to be sealed have a sharp edge, the Teflon coated chain clamps are required to ensure adequate sealing force for aluminum metal seals. Both versions use a single, hex head nut for closure. Stainless steel chain clamps and low cost composite chain clamps are available for elastomer NW connections.

Chain clamps for NW-63 flanges are similar to the NW-16 to 50 sizes. The style to use with NW-63 elastomer seals has a single knob for tightening. The clamp

used for sealing aluminum metal seals has a single hex head nut. Both have uncoated aluminum links, although Teflon coated aluminum versions are available.

Chain clamps for 80 to 100mm flanges are stocked in two styles: one with a single knob for elastomer seals and another with two allen head bolts for aluminum metal seals. Although chain clamps are bakeable to 150°C, the knobs should not be baked above 60°C. Chain clamps for tube sizes up to 28 inch OD can be supplied on request.



### Chain Clamps for NW-16 to 50 Flanges – Aluminum Links

MODEL NUMBER	DIAGRAM	APPLICATION	A	B	MAXIMUM TEMPERATURE	TORQUE (LB. IN.) ELASTOMER / METAL
NW-16-CC-AN	A	Metal or Elastomer Seals	4.53	2.36	150°C	9 / 22
NW-25-CC-AN	A	Metal or Elastomer Seals	4.92	2.76	150°C	13 / 26
NW-40-CC-AN	A	Metal or Elastomer Seals	5.32	3.35	150°C	18 / 39
NW-50-CC-AN	A	Metal or Elastomer Seals	5.98	4.13	150°C	22 / 44

### Chain Clamps for NW-16 to 50 Flanges - Teflon Coated Links\*

MODEL NUMBER	DIAGRAM	APPLICATION	A	B	MAXIMUM TEMPERATURE	TORQUE (LB. IN.) ELASTOMER / METAL
NW-16-CC-TN	A	No radius, metal/elastomer	4.53	2.36	150°C	9 / 22
NW-25-CC-TN	A	No radius, metal/elastomer	4.92	2.76	150°C	13 / 26
NW-40-CC-TN	A	No radius, metal/elastomer	5.32	3.35	150°C	18 / 39
NW-50-CC-TN	A	No radius, metal/elastomer	5.98	4.13	150°C	22 / 44

\*Not radiation resistant

### Chain Clamps for NW-63 Flanges

MODEL NUMBER	DIAGRAM	APPLICATION	A	B	MAXIMUM TEMPERATURE	TORQUE (LB. IN.) ELASTOMER / METAL
NW-63-CCV-AN	B	Elastomer seals only	6.69	4.72	100°C	-
NW-63-CC-AN	A	Metal or elastomer seals	6.30	4.72	150°C	22 / 44

### Chain Clamps for NW-80 to 100 Flanges

MODEL NUMBER	DIAGRAM	APPLICATION	A	B	MAXIMUM TEMPERATURE	TORQUE (LB. IN.)
NW-80-CCV-AS	D	Elastomer seals only	9.61	6.06	150°C	-
NW-80-CC-TS	C	Metal seals only	-	6.30	150°C	75
NW-100-CCV-AS	D	Elastomer seals only	10.08	6.77	150°C	-
NW-100-CC-TS	C	Metal seals only	-	7.09	150°C	88

