

VACUUM QUICK-RELEASE VACUUM FITTINGS

- KF Chain Clamps, DN 16-63, light.....G 06
- KF Chain Clamps, DN 16-63, standardG 08
- ISO Chain Clamps, DN 80-250, lightG 10
- ISO Chain Clamps, DN 80-250, standardG 13

CHAIN CLAMPS

These are chains for quick connection of two tubes by means of tapered flanges. The tubes are centered by means of the inserted seals and a tight vacuum is ensured.

Due to the sturdy design, high compression strengths can be achieved and various types of metal seals used. A decisive aspect in many applications, tightening can be done evenly, with just one or two screws. Tightness is guaranteed once a certain tightening torque has been reached. When opening the chains, just one screw needs to be loosened to remove the chain - swift work ensured.

Since suitable materials are used, such connections are usually not any larger - and above all, they are lighter - than fixed flange couplings. There are various standard designs. The entire system is designed for a wide range of diameters and forces so that corresponding combination of standardized parts can cater to many special demands regarding to sealing force, excess pressure and materials.

The main advantages of this system

- High tightening forces
- Even distribution of force
- Simple and swift assembly and removal
- Assembly possible even in places that is difficult to access
- Great flexibility of design
- Versatile use of various seals

Range of applications

These chains are the preferred choice for:

- Vacuum technology and applications demanding the highest sealing tightness (metal seals)
- Locations subject to radiation (nuclear industry, accelerators, etc.) where radiation-proof seals and quick assembly are essential
- Connections that have to withstand high temperatures or baking (UHV connections, furnaces, etc.)
- Chemical industry (corrosion resistant design), petrochemical industry
- Cryogenics
- Generally for connections with medium to large diameters
- Customized designs for critical applications (restricted space, pressure, etc.)
- Securing of units or assemblies with or without sealing but respective center rings (securing of filters, valves, etc.)

The application range is virtually limitless. The maximum diameter depends on requirements and is between 500 and 700 mm.

There are various materials for various purposes, such as antimagnetic systems made from Aluminum and Stainless Steel.

MATERIALS	RANGE OF APPLICATIONS
Plastic high-temperature	-20... +100°C, (150°C short time), antimagnetic, only for elastomer seals, electric insulation, suitable for cleanrooms, for glass and metal flanges
Plastic ultra high-temperature	-20... +200°C, (220°C short time), only for elastomer seals, electric insulation, antimagnetic, suitable for cleanrooms, for glass and metal flanges
Aluminum BX Type* with knob (1 catch)	-271... +150°C, suitable for cleanrooms, antimagnetic, only for elastomer seals
Stainless Steel (1 catch)	-271... +350°C, cryogenics, antimagnetic, radiation resistant, only elastomer seals
Stainless Steel (2 screws)	-271... +350°C, cryogenics, antimagnetic, radiation resistant, metal and elastomer seals
Plastic standard	-20... +60°C, (80°C short time), antimagnetic, only for elastomer seals, electric insulation, suitable for cleanrooms, for glass and metal flanges
Cast Aluminum	-20... +100°C, antimagnetic, only for elastomer seals, suitable for cleanrooms
Forged Aluminum	-271... +150°C, cryogenics, antimagnetic, for metal and elastomer seals, radiation resistant
Nickel plated Steel	-271... +350°C, cryogenics, pressure, radiation resistant, for metal and elastomer seals
Stainless Steel (CeFiX)	-271... +350°C, cryogenics, pressure, antimagnetic, radiation resistant, for elastomer and metal seals

*BX Type (4 contact per link) patented.

SEALS

Neyco provides several types of seals, as following:

- Seals with center rings on the inside or outside made from various elastomer materials
- Seals with center rings on the inside or outside as Aluminum edge seals with various cross-sections
- Moulded seals in various shapes and sizes, Aluminum
- CeFiX seals for UHV applications in Aluminum, Copper or Nickel
- CeFiX seals in various shapes and sizes, Aluminum

MATERIALS	RANGE OF APPLICATIONS
Teflon/Viton	Suitable for cleanrooms, electric insulation, leak rate: $<1.10^{-9}$ mbar.l.s ⁻¹ , antimagnetic, -20... +200°C
Teflon/FEP	Suitable for cleanrooms, electrical insulation, leak rate: $<1.10^{-6}$ mbar.l.s ⁻¹ , antimagnetic, chem./corrosion, -50... +200°C
Aluminum/Viton	Suitable for cleanrooms, pressure, antimagnetic, leak rate: $<1.10^{-9}$ mbar.l.s ⁻¹ , -20... +200°C
Stainless Steel/Viton	Pressure, suitable for cleanrooms, leak rate: $<1.10^{-9}$ mbar.l.s ⁻¹ , antimagnetic, -20... +200°C
Stainless Steel/Kalrez	Excellent chem. /corrosion, suitable for cleanrooms, antimagnetic, leak rate: $<1.10^{-9}$ mbar.l.s ⁻¹ , -10... +315°C
Aluminum	Antimagnetic, radiation resistant, cryogenics, temperature range: -271... +150°C leak rate: $<1.10^{-11}$ mbar.l.s ⁻¹
OFS* Copper / OFS* Copper Silver plated	Radiation resistant, antimagnetic, pressure, temperature range: -271... +350°C, cryogenics, leak rate: $<1.10^{-11}$ mbar.l.s ⁻¹
Nickel	Antimagnetic, radiation resistant, cryogenics, temperature range: -271... +150°C leak rate: $<1.10^{-11}$ mbar.l.s ⁻¹

*OFS: Oxygen-free, silver-alloyed copper for higher thermal stability.

FLANGES

Flanges can be used with chain clamps and elastomer seals or with metal seals for UHV applications.

Neyco provides several systems: KF, ISO-Tapered™, CeFiX

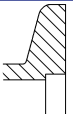


KF / ISO-Tapered™ Systems (metal)

- Materials: Stainless Steel 304 / Stainless Steel 316L

- Temperature: -271°C to +300°C (304), -271°C to +350°C (316L)
- Leak rate: $<1.10^{-9}$ mbar.l.s⁻¹
- Antimagnetic, cryogenics

Advantages

- Space-saving, quick connections
- Exceedingly high vacuum tightness
- Temperature- and radiation-resistant designs
- Antimagnetic designs
- Even distribution of force
- Rotary connection

DRAWING	FLANGE TYPE	FLANGE MATERIAL	SEALS	SEALING SURFACE	CLAMPING MEANS
	KF DN 10 to 63	Aluminum Stainless Steel Glass	Elastomer Aluminum (Copper)	Unprotected	Chain clamps (1 screw)
	ISO-Tapered DN 80 to 250	Aluminum Stainless Steel Glass	Elastomer Aluminum	Unprotected	Chain clamps (1 or 2 screws)
	EVAC-CeFiX DN 80 to 250	Aluminum Stainless Steel	Elastomer Aluminum Copper Nickel	Protected No cutting edge	Chain clamps

CeFiX systems

The most striking feature of the CeFiX flange compared to the CF flange is the lack of a cutting edge. The edge is easily damaged and requires high sealing forces and has therefore been omitted with the CeFiX system.

The seals are designed in such a way that they seal on the 20 degree taper of the flange, thereby reducing the necessary sealing force by up to 50 %. Since the dimensions of the

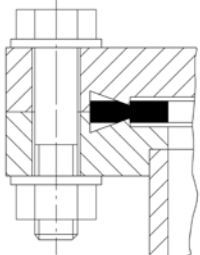
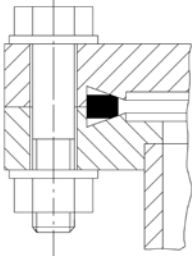
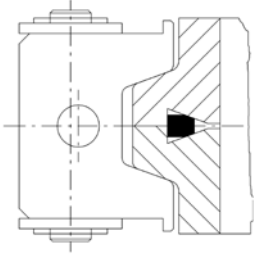
sealing groove of both systems are absolutely identical, the CeFiX seal can also be used for standard CF flanges. So the seal can also be used for flanges with slightly damaged flange edges.

Thanks to the reduced sealing force, Nickel alloys can also be used, but just for CeFiX flanges, since standard CF flanges could be damaged.

Comparison of sealing force (N/mm sealing length)

	CeFiX	STANDARD
Aluminum	70	100
Copper	220	410
Nickel	400	680

- Materials: Stainless Steel 316L
- Temperature: -271°C to +350°C
- Leak rate: <math> < 1.10^{-11} \text{ mbar.l.s}^{-1} </math>
- Antimagnetic, cryogenics, suitable for UHV, excess pressure, resistant to chemicals

STANDARD CF CONNECTION	CeFiX SEAL WITH CF FLANGES	CeFiX SEAL CHAIN CLAMP WITH SPECIFIC FLANGES
Sealing force 100%	Sealing force 50%	Sealing force 50%
		

BELLOWS AND HOSES

Advantages

- Highly flexible, without annealing
- Highest bending and torsion strength
- Can be used for ultra-high vacuum to slight pressure
- Bakeable, suitable for cryogenics
- Radiation resistant, antimagnetic
- Perfect to clean (ultrasound)
- Optimum corrosion resistance
- Minimum outgassing

Behaviour under pressure

Metal bellows and tubes are used for vacuum, excess pressure and on both sides.

If subjected to excess pressure, the bellows and tubes tend to elongate or - in the case of tightly clamped flanges - to buckle.


Applications

- Compensation of axial, lateral or angular set-offs
- Prevention of vibration transfer
- Substitute for elastomer compensators
- Compensate thermal expansion

Metal bellows and hoses

- Materials: Stainless Steel 304 (flanges), Stainless Steel 316Ti (bellows), Stainless Steel 316L (hoses)
- Temperature: -200°C to +350°C
- Leak rate: $<1.10^{-9}$ mbar.l.s⁻¹
- Antimagnetic, cryogenics, radiation resistant, suitable for clean rooms, usable with metal or elastomer seals

Teflon bellows

 See Section H - Glass & Quartz Components in this catalogue.

All given dimensions are nominal in mm.



Chain clamps



Metal bellows

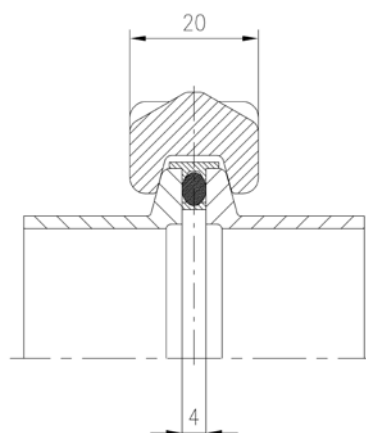
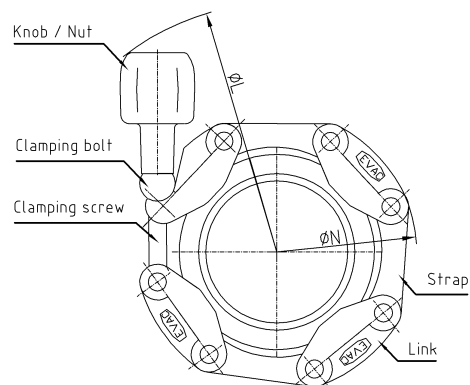
KF Chain Clamps, DN 16-63, light



DN	L	N	TORQUE (Nm)	No. OF LINKS
10/16	122	60	1.0	3
20/25	127	70	1.5	4
32/40	141	85	2.0	4
50	156	105	2.5	5
63	170	120	2.5	6

APPLICATIONS

- Cryogenics applications (Aluminum version with nut)
- Heated use (up to 200°C U-High-temperature version)
- Use of elastomer seals only
- Cost effective for use in Solar, LPCVD, and similar
- Vacuum up to 10^{-9} mbar



	TYPE	COMPOSITE/STEEL	COMPOSITE/SS	COMPOSITE HIGH-TEMP./SS	COMPOSITE U-HIGH-TEMP./SS
	DN	P/N			
	10/16	30.016009.111.716	30.016010.131.816	30.016012.131.916	30.016094.100.000
	20/25	30.025009.111.725	30.025010.131.825	30.025012.131.925	30.025094.100.000
	32/40	30.040009.111.740	30.040010.131.840	30.040012.131.940	30.040094.100.000
	50	30.050009.111.750	30.050010.131.850	30.050012.131.950	30.050094.100.000
	63	30.063009.111.763	30.063010.131.863	30.063012.131.963	30.063094.100.000
Materials	Links	Composite Black	Composite Black	Composite Gray	Composite
	Straps	Steel Zn Plated	Stainless Steel	Stainless Steel	Stainless Steel
	Knob/Hex Nut	Composite Knob	Composite Knob	Composite Knob	Composite Knob
	Bolt M5	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
	Clamping piece	Composite	Composite	Composite	Composite
	Tightening	By hand	By hand	By hand	By hand
Range of Application	Vacuum	Rough/High	Rough/High	Rough/High	Rough/High
	Temperature range	-20... 60°C (80°C, 5h)	-20... 60°C (150°C, 12h)	-20... 100°C (150°C, 12h)	-20... 200°C
	Cryogenics	-	-	-	-
	Pressure	-	-	-	-
	Antimagnetic	-	Yes	Yes	Yes
	Radiation resistant	-	-	-	-
	Chemistry/Corrosion	-	Depends ¹	Depends ¹	Depends ¹
	Cleanroom suitable	Yes	Yes	Yes	Yes
	Electrical isolation	Yes	Yes	Yes	Yes
	Seals	Only elastomer	Only elastomer	Only elastomer	Only elastomer

M5 = Metric thread size 5 mm, Zn = Zinc, ¹ Composite parts, SS = Stainless Steel

	TYPE	ALUMINUM/STEEL	ALUMINUM/SS	ALUMINUM/STEEL WITH HEX NUT	ALUMINUM/SS WITH HEX NUT
	DN	P/N			
	10/16	30.016002.111.216	30.016015.111.516	30.016002.114.216	30.016015.114.516
	20/25	30.025002.111.225	30.025015.111.525	30.025002.114.225	30.025015.114.525
	32/40	30.040002.111.240	30.040015.111.540	30.040002.114.240	30.040015.114.540
	50	30.050002.111.250	30.050015.111.550	30.050002.114.250	30.050015.114.550
	63	30.063002.111.263	30.063015.111.563	30.063002.114.263	30.063015.114.563
Materials	Links	Cast Aluminum	Cast Aluminum	Cast Aluminum	Cast Aluminum
	StrapS	Steel Zn plated	Stainless Steel	Steel Zn plated	Stainless Steel
	Knob/Hex Nut	Composite Knob	Composite Knob	Hex Nut Stainless Steel	Hex Nut Stainless Steel
	Bolt M5	Stainless Steel	Stainless Steel	Stainless Steel (Molykote)	Stainless Steel (Molykote)
	Clamping piece	Aluminum	Aluminum	Aluminum	Aluminum
	Tightening	By hand	By hand	By hand/Hex Key	By hand/Hex Key
Range of Application	Vacuum	Rough/High	Rough/High	Rough/High	Rough/High
	Temperature range	-20... 100°C	-20... 100°C	-271... 100°C	-271... 100°C
	Cryogenics	-	-	Yes	Yes
	Pressure	-	-	-	-
	Antimagnetic	-	Yes	-	Yes
	Radiation resistant	-	-	Yes	Yes
	Chemistry/Corrosion	-	-	-	-
	Cleanroom suitable	yes	Yes	Depends ²	Depends ²
	Electrical isolation	-	-	-	-
	Seals	Only elastomer	Only elastomer	Only elastomer	Only elastomer

M5 = Metric thread size 5 mm, Zn = Zinc, ² Bolt coating, SS = Stainless Steel

KF Chain Clamps, DN 16-63, standard

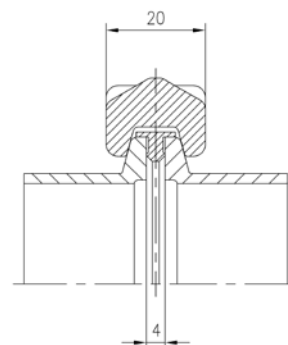
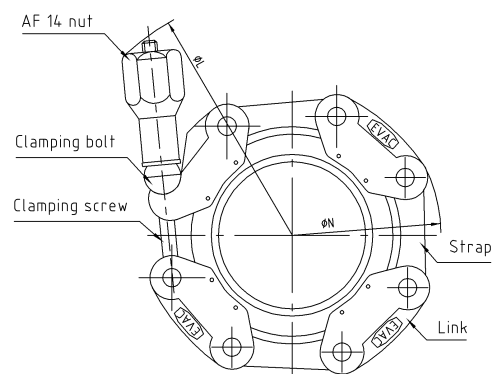


DN	L	TORQUE (Nm)		No. OF LINKS	P max* [bar]
		ELAST.	METAL		
10/16	115	1.0	2.5	3	100
20/25	125	1.5	3.0	3	80
32/40	135	2.0	4.5	4	40
50	152	2.5	5.0	5	20
63	160	2.5	5.0	6	10

*Max pressure only with chain clamp 30.xxx005.151.4xx and 30.xxx006.151.6xx

APPLICATIONS

- Food and beverage applications (Stainless Steel)
- Cryogenics applications (all versions)
- Heated use (up to 350°C with Nickel and Steel)
- Use of elastomer and metal seals
- Especially for UHV applications
- Vacuum up to 10^{-11} mbar



	TYPE	ALUMINUM / STEEL	ALUMINUM / SS	ALU TEFLON COATED / SS
	DN	P/N		
	10/16	30.016002.151.216	30.016015.151.516	30.016019.159.516
	20/25	30.025002.151.225	30.025015.151.523	30.025019.159.523
	32/40	30.040002.151.240	30.040015.151.540	30.040019.159.540
	50	30.050002.151.250	30.050015.151.550	30.050019.159.550
	63	30.063002.151.263	30.063015.151.563	30.063019.159.563
Materials	Links	Alu (forged)	Alu (forged)	Alu (forged)
	Straps	Steel Zn plated	Stainless Steel	Stainless Steel
	Hex Nut	Stainless Steel	Stainless Steel	Stainless Steel
	Bolt (Molykote)	Stainless Steel M5	Stainless Steel M5	Stainless Steel M5
	Clamping piece	Aluminum	Aluminum	Aluminum
	Tightening	Hex Key	Hex Key	Hex Key
Range of Application	Vacuum	Rough / High	Rough / High	Rough / High
	Temperature range	-271... 150°C	-271... 150°C	-271... 150°C
	Cryogenics	Yes	Yes	Yes
	Pressure	-	-	-
	Antimagnetic	-	Yes	Yes
	Radiation resistant	Yes	Yes	-
	Chemistry / Corrosion	-	-	Yes
	Cleanroom suitable	Depends ²	Depends ²	Depends ²
	Electrical isolation	-	-	-
	Seals	Metal / Elastomer	Metal / Elastomer	Metal / Elastomer

Chain clamp with 5 links for Aluminum flanges or special conditions, ² Bolt coating, M5 = Metric thread size 5 mm

	TYPE	STEEL NICKEL PLATED	STAINLESS STEEL
	DN	P/N	
	10/16	30.016006.151.616	30.016005.151.416
	20/25	30.025006.151.623	30.025005.151.423
	32/40	30.040006.151.640	30.040005.151.440
	50	30.050006.151.650	30.050005.151.450
	63	30.063006.151.663	30.063005.151.463
Materials	Links	Steel Nickel plated	Stainless Steel
	Straps	Stainless Steel	Stainless Steel
	Hex Nut	Stainless Steel	Stainless Steel
	Bolt (Molykote)	Stainless Steel M6	Stainless Steel M6
	Clamping piece	Stainless Steel	Stainless Steel
	Tightening	Hex Key	Hex Key
Range of Application	Vacuum	Rough / High / UHV	Rough / High / UHV
	Temperature range	-271... 150°C	-271... 350°C
	Cryogenics	Yes	Yes
	Pressure	Yes	Yes
	Antimagnetic	-	Yes
	Radiation resistant	Yes	Yes
	Chemistry / Corrosion	Depends ⁴	Yes
	Cleanroom suitable	Depends ²	Depends ²
	Electrical isolation	-	-
	Seals	Metal / Elastomer	Metal / Elastomer

Chain clamp with 5 links for Aluminum flanges or special conditions, ² Bolt coating, ⁴Nickel plating, M6 = Metric thread size 6 mm

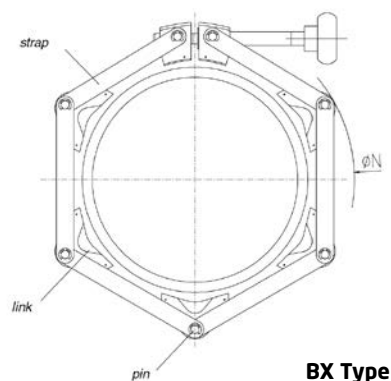
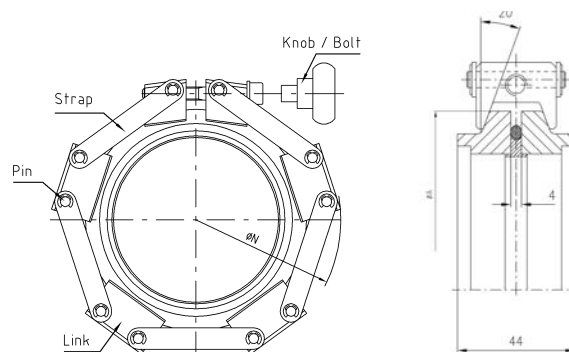
ISO Chain Clamps, DN 80-250, light



APPLICATIONS

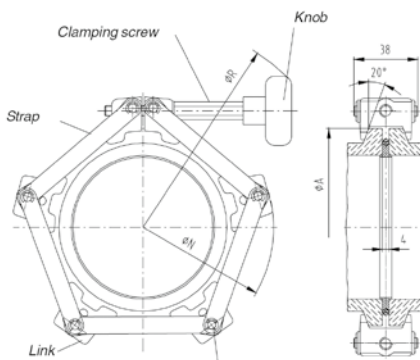
- Cryogenics applications (Aluminum version with nut)
- Heated use (up to 200°C U-High temp. version)
- Use of elastomer seals only
- Cost effective for use in Solar, LPCVD, and similar
- Vacuum up to 10^{-9} mbar

DN	A	N	TORQUE (Nm)
80	114	165	3.5
100	134	185	4.0
125	161	210	5.0
160	190	235	7.0
200	252	300	9.5
250	301	350	12



TYPE	ALU/SS (DN 80... 125 WITH PLASTIC KNOB)	ALU/SS WITH BOLT	STAINLESS STEEL	BX TYPE		
				ALUMINUM (DN 80... 125 WITH PLASTIC KNOB)	ALUMINUM/SS	
DN	P/N					
80	30.080015.211.508	30.080015.213.408	30.080003.211.308	30.080015.212.408	30.080015.211.408	
100	30.100015.211.510	30.100015.213.410	30.100003.211.310	30.100015.212.410	30.100015.211.410	
125	30.125015.211.512	30.125015.213.412	30.125003.211.312	30.125015.212.412	30.125015.211.412	
160	30.160015.211.516	-	30.160003.211.316	30.160015.212.416	30.160015.211.416	
200	30.200015.211.520	-	30.200003.211.320	-	-	
250	30.250015.211.525	-	30.250003.211.325	-	-	
Materials	Links	Aluminum Teflon coated	Aluminum Teflon coated	304	Aluminum Teflon coated	Aluminum Teflon coated
	Straps	316L	316L	316L	316L	316L
	Knob/Hex Nut	Composite (DN 80... 125)	-	-	GRP	-
	Bolt M5	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
	Pin	304	304	304	304	304
	Tightening	By hand/Hex key	Hex Key	Hex Key	By hand/Hex key	Hex Key
Range of Application	Vacuum	Rough/High	Rough/High	Rough/High	Rough/High	Rough/High
	Temperature range	-20... 100°C	-271... 150°C	-271... 315°C	-20... 100°C	-271... 150°C
	Cryogenics	-	Yes	Yes	-	Yes
	Pressure	-	-	Yes	-	-
	Antimagnetic	Yes	Yes	Yes	Yes	Yes
	Radiation resistant	-	-	yes	-	-
	Chemistry/ Corrosion	Depends ¹	Depends	Yes	Limited	Depends ²
	Cleanroom suitable	Yes	Yes	Depends ²	Yes	Yes
	Electrical isolation	-	-	-	-	-
Seals	Only elastomer	Only elastomer	Only elastomer	Only elastomer	Only elastomer	

GRP = Glass-fibre reinforced plastic, ¹ Aluminum parts, ² Bolt coating



DN	A	N	R	TORQUE (Nm)
80	122	154	244	3.5
100	127	172	256	4.0
125	141	200	278	5.0
160	156	220	360	7.0

	TYPE	COMPOSITE / SS	COMPOSITE / SS HIGH-TEMP.	COMPOSITE/SS U-HIGH-TEMP.
	DN	P/N		
	80	30.080010.221.808	30.080012.221.908	30.080094.200.000
	100	30.100010.221.810	30.100012.221.910	30.100094.200.000
	125	30.125010.221.812	30.125012.221.912	30.125094.200.000
	160	30.160010.221.816	30.160012.221.916	30.160094.200.000
Materials	Links	Composite	Composite	Composite
	Straps	316L	316L	316L
	Knob/Hex Nut	Composite	Composite	Composite
	Bolt	-	-	-
	Pin	304	304	304
	Tightening	By hand	By hand	By hand
Range of Application	Vacuum	Rough/High	Rough/High	Rough/High
	Temperature range	0... 60°C (80°C, 5h)	0... 100°C (150°C, 12h)	0... 200°C
	Cryogenics	-	-	-
	Pressure	-	-	-
	Antimagnetic	Yes	Yes	Yes
	Radiation resistant	-	-	-
	Chemistry/Corrosion	Depends	Depends	Depends
	Cleanroom suitable	Yes	Yes	Yes
	Electrical isolation	Yes	Yes	Yes
Seals	Only elastomer	Only elastomer	Only elastomer	

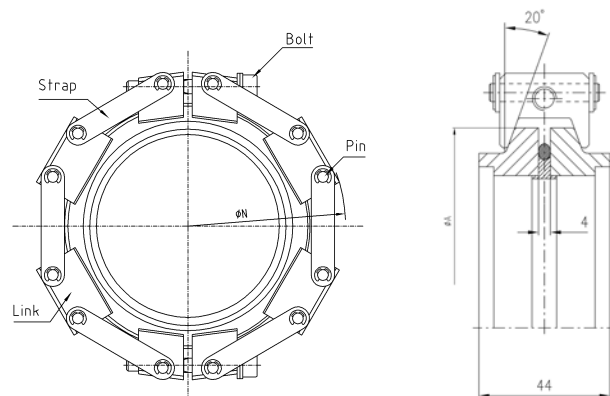
ISO Chain Clamps, DN 80-250, standard



APPLICATIONS

- High performance applications
- Cryogenics applications (Aluminum version with nut)
- Heated use (up to 350°C Stainless Steel version)
- Use in CVD applications, UHV, Accelerator, LPG, LNG, and similar
- Vacuum up to 10^{-11} mbar with metal seals

DN	A	N	TORQUE (Nm)	
			ELAST.	METAL
80	114	160	3.5	8.5
100	134	180	4.0	10
125	161	205	5.0	12.5
160	190	250	7.0	18
200	252	310	9.5	24
250	301	355	12	30



	TYPE	ALU/SS	ALU TEFLON COATED/SS	STAINLESS STEEL	ALU TEFLON COATED / SS, BX TYPE
	DN	P/N			
	80	30.080015.242.508	30.080019.249.508	30.080003.242.308	30.080015.242.408
	100	30.100015.242.510	30.100019.249.510	30.100003.242.310	30.100015.242.410
	125	30.125015.242.512	30.125019.249.512	30.125003.242.312	30.125015.242.412
	160	30.160015.242.516	30.160019.249.516	30.160003.242.316	30.160015.242.416
	200	30.200015.242.520	30.200019.249.520	30.200003.242.320	-
	250	30.250015.242.525	30.250019.249.525	30.250003.242.325	-
Materials	Links	Aluminum	Aluminum	Stainless Steel	Aluminum
	Straps	316L	316L	316L	316L
	Bolts (2x)	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
	Pins	304	304	304	304
	Tightening	Hex Key	Hex Key	Hex Key	Hex Key
Range of Application	Vacuum	Rough-/High-/UHV	Rough-/High-/UHV	Rough-/High-/UHV	Rough-/High-/UHV
	Temperature range	-271... 150°C	-271... 150°C	-271... 350°C	-271... 150°C
	Cryogenics	Yes	Yes	Yes	Yes
	Pressure	-	-	Yes	-
	Antimagnetic	Yes	Yes	Yes	Yes
	Radiation resistant	Yes	-	Yes	-
	Chemistry / Corrosion	Depends	Yes	Yes	Yes
	Cleanroom suitable	Depends	Depends	Depends	Depends
Electrical isolation	-	-	-	-	
	Seals	Metal/2mm	Metal/2mm	Metal/2mm	Metal/4-4.5mm



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