



ULTRA HIGH PURITY & ULTRA HIGH VACUUM SEALS

Advanced metal sealing solutions for
critical UHP/UHV & cryogenic applications

INTRODUCTION

Today's sealing requirements for Ultra-High Purity and Ultra-High Vacuum are more demanding than ever before:

- Ultra-low Leak Rates ($< 1 \times 10^{-13}$ atm.cm³.s⁻¹ He)
- Low Outgassing
- Cryogenic Temperatures ($< 1.8^\circ$ K)
- Long Life Expectancy
- Chemical Compatibility
- Aluminum Flanges
- Odd Shapes & Sizes
- High Temperature Bake Out
- Radiation Resistance
- Remote Handling Capability
- Quartz & Ceramic Flanges
- Reduced Load

Through extensive research, Technetics Group, in conjunction with the French Atomic Energy Commission, has developed a family of high performance metal seals to solve these demanding applications:

- HELICOFLEX® DELTA
- Metal O-ring
- Quick Disconnect Systems (QDS)
- HELICOFLEX®
- Metal C-ring

The HELICOFLEX® DELTA seal is particularly suited for these extreme conditions. The DELTA seal requires less load than a regular HELICOFLEX® seal or a CF copper gasket solution, is excellent for sealing on smooth surfaces and offers the lowest Helium leak rate of any other seal.

TYPICAL APPLICATIONS

ACCELERATORS / FUSION RESEARCH

- Quartz Windows / Ceramic Flanges
- Tandem Seals: Metal and Elastomer
- RF Waveguide Connections
- Cryogenics / Superconducting Magnets
- Beam Tube Connections
- Custom Vacuum Chambers

GAS / CHEMICAL DELIVERY SYSTEMS

- Modular Gas Systems: Surface Mount Components
- Mass Flow Controllers: Inlet / Outlet Ports, Sensor Ports
- Flow Control Components: Valves, Regulators, Transducers
- Chemical Delivery Canisters / Ampoules
- Bulk Chemical: Flange Connections

PVD / CVD / ETCH EQUIPMENT

- Flange Connections: Stainless Steel to Stainless Steel, Stainless Steel to Aluminum
- UHV Pump / Chamber Connections
- Gate / Slit Valves
- Odd Shaped Chamber Ports
- Standard ISO Flanges



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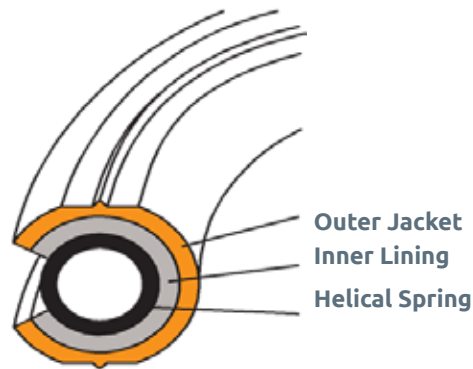
SEALING CONCEPT

The sealing principle of the HELICOFLEX® family of seals is based upon the plastic deformation of a jacket that has greater ductility than the flange materials. This occurs between the sealing face of a flange and an elastic core composed of a close-wound helical spring. The spring is selected to have a specific compression resistance. During compression, the resulting specific pressure forces the jacket to yield and ensures positive contact with the flange sealing faces. Each coil of the helical spring acts independently and allows the seal to conform to irregularities on the flange surface.

The HELICOFLEX® DELTA uses two small ridges or “Deltas” on the face of the seal. The load required to reach ultra-low Helium leak rates is reduced by concentrating the seal contact area. There is no risk of damage to the sealing surfaces as long as the minimum hardness requirements are maintained.

TECHNICAL DATA

| | |
|---------------------------|---|
| Dimensions: | (\varnothing 3.8 to \varnothing 2000mm) \varnothing 0.150 in. to \varnothing 80 in. |
| Temperature: | -272 to 700°C -458 to 1292°F +1.8 to 973K |
| Helium sealing level: | $Q \leq 10^{-13} \text{atm cm}^3 \text{s}^{-1}$ |
| Seal Classification Type: | HNV |

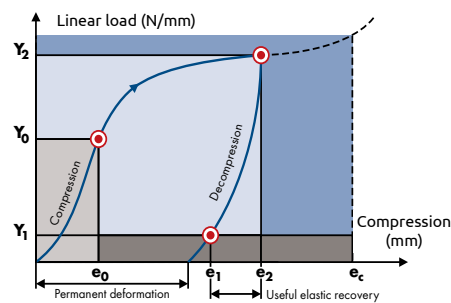


CHARACTERISTIC CURVE

The resilient characteristic of the HELICOFLEX® DELTA seal ensures useful elastic recovery during service. This elastic recovery permits the HELICOFLEX® DELTA seal to accommodate minor distortions in the flange assembly due to temperature cycling. For most sealing applications the Y_0 value will occur early in the compression curve and the Y_1 value will occur near the end of the decompression curve.

DEFINITION OF TERMS

- Y_0 = load on the compression curve above which leak rate is at required level
- Y_2 = load required to reach optimum compression e_2
- Y_1 = load on the decompression curve below which leak rate exceeds required level
- e_2 = optimum compression



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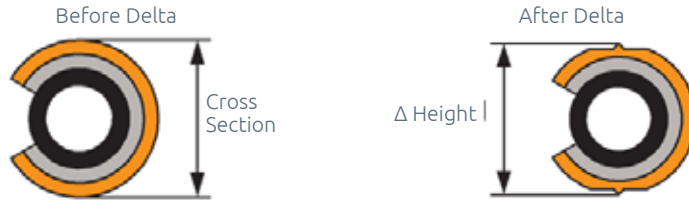
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HELICOFLEX® DELTA Δ SEAL



| JACKET | SEAL DESIGN INFORMATION | | | | | | | |
|----------|-------------------------|----------------|----------------------------|-------------------------------|------|-------------------------------|--------------|-----|
| | Seal | | Compression e2 ± 0,1 mm | Helium Sealing Y ₂ | | Flange Hardness HV minimum | Maximum Temp | |
| | Cross Section mm | Δ Height mm | | lb/in | N/mm | | °F | °C |
| Aluminum | 2,0 | 1,9 | 0,6 | 571 | 100 | 65 | 302 | 150 |
| | 2,7 | 2,6 | 0,7 | 799 | 140 | 65 | 428 | 220 |
| | 3,4 | 3,3 | 0,8 | 799 | 140 | 65 | 482 | 250 |
| | 4,1 | 4,0 | 0,9 | 799 | 140 | 65 | 536 | 280 |
| | 4,9 | 4,8 | 0,9 | 799 | 140 | 65 | 536 | 280 |
| | 5,8 | 5,6 | 1,0 | 857 | 150 | 65 | 608 | 320 |
| | 6,9 | 6,7 | 1,1 | 857 | 150 | 65 | 644 | 340 |
| Silver | 1,8 | 1,7 | 0,5 | 857 | 150 | 100 | 464 | 240 |
| | 2,5 | 2,4 | 0,6 | 914 | 160 | 100 | 536 | 280 |
| | 3,2 | 3,1 | 0,6 | 914 | 160 | 100 | 572 | 300 |
| | 4,0 | 3,9 | 0,7 | 914 | 160 | 100 | 662 | 350 |
| | 4,8 | 4,7 | 0,8 | 914 | 160 | 100 | 698 | 370 |
| | 5,6 | 5,4 | 0,8 | 971 | 170 | 110 | 752 | 400 |
| | 6,7 | 6,5 | 0,9 | 1028 | 180 | 120 | 842 | 450 |
| | Copper | 1,74 | 1,64 | 0,34 | 857 | 150 | 110 | 662 |
| 2,44 | | 2,34 | 0,44 | 1028 | 180 | 120 | 716 | 380 |
| 3,14 | | 3,04 | 0,54 | 1028 | 180 | 120 | 716 | 380 |
| 4,04 | | 3,94 | 0,64 | 1028 | 180 | 120 | 788 | 420 |
| 4,64 | | 4,54 | 0,64 | 1028 | 180 | 120 | 842 | 450 |
| 5,54 | | 5,34 | 0,64 | 1028 | 180 | 120 | 896 | 480 |
| 6,54 | | 6,34 | 0,74 | 1085 | 190 | 130 | 968 | 520 |
| Nickel | | 1,6 | 1,5 | 0,25 | 857 | 150 | 140 | 716 |
| | 2,4 | 2,3 | 0,30 | 1028 | 180 | 140 | 788 | 420 |
| | 3,3 | 3,2 | 0,35 | 1142 | 200 | 150 | 896 | 480 |
| | 4,0 | 3,9 | 0,40 | 1313 | 230 | 170 | 1022 | 550 |
| | 4,7 | 4,6 | 0,40 | 1313 | 230 | 170 | 1112 | 600 |
| | 5,2 | 5,1 | 0,45 | 1656 | 290 | 190 | 1202 | 650 |
| | 6,2 | 6,1 | 0,50 | 2056 | 360 | 210 | 1202 | 650 |

Other materials are available on request: Stainless Steel, Inconel, Tantalum, Gold, etc.

Note: Minimum temperature is 1.8K/-272°C. Maximum temperatures shown in the tables only relate to the characteristics of the seal and are to be checked for every type of fluid. In specific applications, the HELICOFLEX® DELTA can be used with a seating load as low as 80 N/mm (450 lb/in).

HELICOFLEX® DELTA Δ SEAL

| JACKET | SEAL | GROOVE DESIGN INFORMATION | | | | | | |
|----------|------|---------------------------|----------------|----------------------|---------------|------------------------------|----------------------------|----------|
| | | Δ Height mm | Depth ± 0,1 mm | Recommended Width mm | Mini Width mm | Clearance OD seal/OD seal mm | Recommended Surface Finish | |
| | | | | | | | RMS | Ra in μm |
| Aluminum | 1,9 | 1,3 | 5,0 | 2,5 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 2,6 | 1,9 | 5,6 | 3,3 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,3 | 2,5 | 6,4 | 4,1 | 0,8 | ≤ 32 | ≤ 0,8 | |
| | 4,0 | 3,1 | 7,1 | 4,9 | 0,8 | ≤ 32 | ≤ 0,8 | |
| | 4,8 | 3,9 | 8,1 | 5,7 | 0,9 | ≤ 32 | ≤ 0,8 | |
| | 5,6 | 4,6 | 8,9 | 6,6 | 1,0 | ≤ 32 | ≤ 0,8 | |
| | 6,7 | 5,6 | 10,0 | 7,8 | 1,0 | ≤ 32 | ≤ 0,8 | |
| Silver | 1,7 | 1,2 | 4,8 | 2,2 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 2,4 | 1,8 | 5,5 | 3,0 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,1 | 2,5 | 6,1 | 3,7 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,9 | 3,2 | 6,9 | 4,6 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 4,7 | 3,9 | 8,0 | 5,5 | 0,8 | ≤ 32 | ≤ 0,8 | |
| | 5,4 | 4,6 | 8,6 | 6,2 | 0,8 | ≤ 32 | ≤ 0,8 | |
| | 6,5 | 5,6 | 9,8 | 7,4 | 0,9 | ≤ 32 | ≤ 0,8 | |
| Copper | 1,64 | 1,3 | 4,7 | 2,0 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 2,34 | 1,9 | 5,3 | 2,8 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,04 | 2,5 | 6,1 | 3,6 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,94 | 3,3 | 6,9 | 4,5 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 4,54 | 3,9 | 7,9 | 5,2 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 5,34 | 4,7 | 8,6 | 6,0 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 6,34 | 5,6 | 9,7 | 7,1 | 0,8 | ≤ 32 | ≤ 0,8 | |
| Nickel | 1,5 | 1,25 | 4,7 | 1,8 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 2,3 | 2,00 | 5,3 | 2,7 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,2 | 2,85 | 6,1 | 3,6 | 0,5 | ≤ 32 | ≤ 0,8 | |
| | 3,9 | 3,50 | 6,9 | 4,4 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 4,6 | 4,20 | 7,9 | 5,2 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 5,1 | 4,65 | 8,6 | 5,7 | 0,6 | ≤ 32 | ≤ 0,8 | |
| | 6,1 | 5,60 | 9,7 | 6,7 | 0,8 | ≤ 32 | ≤ 0,8 | |

SHAPED SEALS

Groove Design: Contact our engineering staff for assistance in designing non-circular grooves.

Groove Finish: Most UHP/UHV applications will require a finish of ≤16 RMS (≤0.4 Ra μm). All machining & polishing marks must follow seal circumference.

Min. Seal Radius: The minimum seal bending radius is six times the seal cross section (CS).

Seating Load: The load (Y₂) to seat the seal is approximately 30% higher due to a slightly stiffer spring design.



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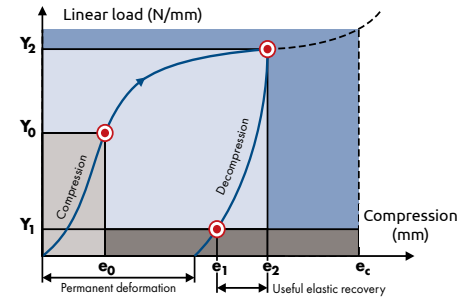
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HELICOFLEX® SEAL BASIC DESIGN

COMPRESSION AND DECOMPRESSION CYCLE

The compression and decompression cycle of the HELICOFLEX® seal is characterized by gradual flattening of the compression curve. The decompression curve is distinct from the compression curve as the result of a hysteresis phenomenon to which is added a permanent dual deformation (spring deformation and lining creep).



DEFINITION OF TERMS

Please refer to page 3.

| | Cross Section | Compression e_2^* | Helium Sealing | | Maximum Temperature | | Surface Finish | |
|----------|---------------|---------------------|----------------|--------------|---------------------|-----|---------------------|------------|
| | | | | | | | Ra in μm | |
| | | | | | | | Recommended | Acceptable |
| Aluminum | C.S. mm | $e_2 \pm 0,1$ mm | Y_2^* N/mm | Y_1^* N/mm | °F | °C | Recommended | Acceptable |
| | 2,0 | 0,7 | 160 | 20 | 302 | 150 | 1,6 | 0,8 to 3,2 |
| | 2,6 | 0,7 | 175 | 20 | 428 | 220 | 1,6 | 0,8 to 3,2 |
| | 3,3 | 0,8 | 185 | 25 | 482 | 250 | 1,6 | 0,8 to 3,2 |
| | 4,0 | 0,9 | 200 | 25 | 536 | 280 | 1,6 | 0,8 to 3,2 |
| | 4,8 | 0,9 | 210 | 25 | 536 | 280 | 1,6 | 0,8 to 3,2 |
| | 5,6 | 0,9 | 230 | 30 | 608 | 320 | 1,6 | 0,8 to 3,2 |
| 6,7 | 1,0 | 245 | 35 | 644 | 340 | 1,6 | 0,8 to 3,2 | |
| Silver | C.S. mm | $e_2 \pm 0,1$ mm | Y_2 N/mm | Y_1 N/mm | °F | °C | Recommended | Acceptable |
| | 1,9 | 0,6 | 220 | 30 | 464 | 240 | 1,6 | 0,8 to 3,2 |
| | 2,6 | 0,7 | 240 | 45 | 536 | 280 | 1,6 | 0,8 to 3,2 |
| | 3,3 | 0,8 | 260 | 50 | 572 | 300 | 1,6 | 0,8 to 3,2 |
| | 4,0 | 0,8 | 300 | 55 | 662 | 350 | 1,6 | 0,8 to 3,2 |
| | 4,8 | 0,8 | 320 | 60 | 698 | 370 | 1,6 | 0,8 to 3,2 |
| | 5,6 | 0,8 | 360 | 65 | 752 | 400 | 1,6 | 0,8 to 3,2 |
| 6,7 | 0,9 | 400 | 70 | 842 | 450 | 1,6 | 0,8 to 3,2 | |
| Copper | C.S. mm | $e_2 \pm 0,1$ mm | Y_2 N/mm | Y_1 N/mm | °F | °C | Recommended | Acceptable |
| | 1,9 | 0,6 | 280 | 50 | 662 | 350 | 1,6 | 0,8 to 3,2 |
| | 2,6 | 0,7 | 320 | 70 | 716 | 380 | 1,6 | 0,8 to 3,2 |
| | 3,3 | 0,7 | 350 | 80 | 716 | 380 | 1,6 | 0,8 to 3,2 |
| | 4,0 | 0,8 | 430 | 90 | 788 | 420 | 1,6 | 0,8 to 3,2 |
| | 4,8 | 0,8 | 470 | 100 | 842 | 450 | 1,6 | 0,8 to 3,2 |
| | 5,6 | 0,8 | 550 | 120 | 896 | 480 | 1,6 | 0,8 to 3,2 |
| 6,7 | 0,9 | 630 | 140 | 968 | 520 | 1,6 | 0,8 to 3,2 | |

*Please refer to page 3.

IN ULTRA HIGH VACUUM APPLICATIONS

The sealing performance is very dependant on the surface finish of the flanges. It is important to meet the surface finish requirements specified on the above chart. For other materials, please consult our engineering staff.

STANDARD SIZES

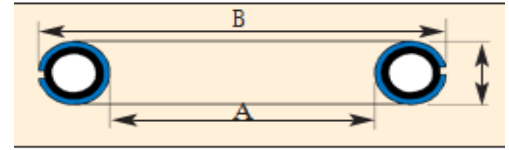
HELICOFLEX® SEAL, TYPE HN 100 AND 200

Lining: Aluminum - Silver - Copper - Armco - Nickel - Stainless steel

Spring: Ø < 250° C - Steel - Stainless steel

Ø ≥ 250° C - High Temperature Alloy

Dimensions in mm.



| REF | A | B | C | REF | A | B | C | REF | A | B | C | REF | A | B | C |
|---------|--------------|------|-----|---------|------|------|-----|---------|-------|-------|-----|---------|-------|-------|-----|
| H 15001 | Upon request | | | H 15023 | 31,1 | 37,7 | 3,3 | H 15045 | 92,3 | 101,3 | 4,5 | H 15067 | 165,8 | 177 | 5,6 |
| H 15002 | | | | H 15024 | 32,8 | 39,4 | 3,3 | H 15046 | 95,5 | 104,5 | 4,5 | H 15068 | 172,2 | 183,4 | 5,6 |
| H 15003 | | | | H 15025 | 34,4 | 41 | 3,3 | H 15047 | 98,6 | 107,6 | 4,5 | H 15069 | 178,6 | 189,8 | 5,6 |
| H 15004 | | | | H 15026 | 35,9 | 42,5 | 3,3 | H 15048 | 101,8 | 110,8 | 4,5 | H 15070 | 184,9 | 196,1 | 5,6 |
| H 15005 | | | | H 15027 | 37,6 | 44,2 | 3,3 | H 15049 | 105 | 114 | 4,5 | H 15071 | 191,3 | 202,5 | 5,6 |
| H 15006 | | | | H 15028 | 38,3 | 47,3 | 4,5 | H 15050 | 108,2 | 117,2 | 4,5 | H 15072 | 197,6 | 208,8 | 5,6 |
| H 15007 | 8,9 | 12,7 | 1,9 | H 15029 | 41,5 | 50,5 | 4,5 | H 15051 | 111,3 | 120,3 | 4,5 | H 15073 | 204 | 215,2 | 5,6 |
| H 15008 | 9 | 14,2 | 2,6 | H 15030 | 44,7 | 53,7 | 4,5 | H 15052 | 114,5 | 123,5 | 4,5 | H 15074 | 216,7 | 227,9 | 5,6 |
| H 15009 | 10,6 | 15,8 | 2,6 | H 15031 | 47,9 | 56,9 | 4,5 | H 15053 | 115,1 | 126,3 | 5,6 | H 15075 | 229,4 | 240,6 | 5,6 |
| H 15010 | 12,2 | 17,4 | 2,6 | H 15032 | 51 | 60 | 4,5 | H 15054 | 118,2 | 129,4 | 5,6 | H 15076 | 242 | 253,2 | 5,6 |
| H 15011 | 13,7 | 18,9 | 2,6 | H 15033 | 54,2 | 63,2 | 4,5 | H 15055 | 121,4 | 132,6 | 5,6 | H 15077 | 254,8 | 266 | 5,6 |
| H 15012 | 15,2 | 20,4 | 2,6 | H 15034 | 57,4 | 66,4 | 4,5 | H 15056 | 124,6 | 135,8 | 5,6 | H 15078 | 267,5 | 278,7 | 5,6 |
| H 15013 | 17 | 22,2 | 2,6 | H 15035 | 60,5 | 69,5 | 4,5 | H 15057 | 127,8 | 139 | 5,6 | H 15079 | 280,2 | 291,4 | 5,6 |
| H 15014 | 18,5 | 23,7 | 2,6 | H 15036 | 63,7 | 72,7 | 4,5 | H 15058 | 130,9 | 142,1 | 5,6 | H 15080 | 292,9 | 304,1 | 5,6 |
| H 15015 | 18,6 | 25,2 | 3,3 | H 15037 | 66,9 | 75,9 | 4,5 | H 15059 | 134,1 | 145,3 | 5,6 | H 15081 | 305,6 | 316,8 | 5,6 |
| H 15016 | 20,1 | 26,7 | 3,3 | H 15038 | 70,1 | 79,1 | 4,5 | H 15060 | 137,3 | 148,5 | 5,6 | H 15082 | 318,3 | 329,5 | 5,6 |
| H 15017 | 21,6 | 28,2 | 3,3 | H 15039 | 73,2 | 82,2 | 4,5 | H 15061 | 140,5 | 151,7 | 5,6 | H 15083 | 331 | 342,2 | 5,6 |
| H 15018 | 23,3 | 29,9 | 3,3 | H 15040 | 76,4 | 85,4 | 4,5 | H 15062 | 143,6 | 154,8 | 5,6 | H 15084 | 343,7 | 354,9 | 5,6 |
| H 15019 | 24,9 | 31,5 | 3,3 | H 15041 | 79,6 | 88,6 | 4,5 | H 15063 | 146,8 | 158 | 5,6 | H 15085 | 356,4 | 367,6 | 5,6 |
| H 15020 | 26,5 | 33,1 | 3,3 | H 15042 | 82,8 | 91,8 | 4,5 | H 15064 | 150 | 161,2 | 5,6 | H 15086 | 369,1 | 380,3 | 5,6 |
| H 15021 | 28,1 | 34,7 | 3,3 | H 15043 | 85,9 | 94,9 | 4,5 | H 15065 | 153,1 | 164,3 | 5,6 | H 15087 | 381,8 | 393 | 5,6 |
| H 15022 | 29,6 | 36,2 | 3,3 | H 15044 | 89,1 | 98,1 | 4,5 | H 15066 | 159,5 | 170,7 | 5,6 | H 15088 | 394,5 | 405,7 | 5,6 |

Tolerances ø A : H15007 to H 15027 = ± 0,2 - H15028 to H15064 = ± 0,25 - H15065 to H 15088 = ± 0,3

Permanent stock, HN100 aluminum lining, High Temperature Alloy spring up to 15052.

FKM O-RING

O-rings are made by synthetic elastomer molding in the shape of a circular section torus. They are assembled in a groove or with a center ring.



TECHNICAL DATA

| | |
|-----------------------------------|---|
| Dimensions: | 1.575 to 40 in. (40 to 1.000 mm) |
| Temperature: | - 4 to 392°F (- 20 to + 200°C) |
| Shore A hardness: | 75 |
| Helium sealing level: | $Q \leq 1,10^{-7}$ atm cm ³ s. ⁻¹ |
| Relative permeability | |
| Sensitive to aging and radiations | |

ALUMINIUM DIAMOND SEAL

The diamond seal, in the shape of a lozenge, has 2 knives opposed to one another which are plastically deformed during tightening to provide sealing. It is limited by its relative lack of elasticity and is therefore not recommended for bake-out temperatures.



TECHNICAL DATA

| | |
|-----------------------|---|
| Dimensions: | 394 to 40 in. (10 to 1.000 mm) |
| Temperature: | 68 to 176°F (20 to + 80°C) |
| Helium sealing level: | $Q \leq 1,10^{-9}$ atm cm ³ s. ⁻¹ |
| No elasticity | |

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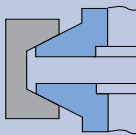
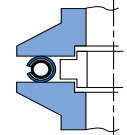
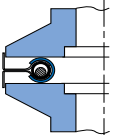
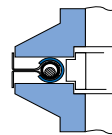
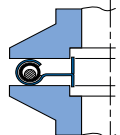
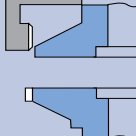
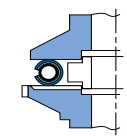
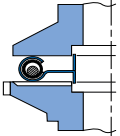
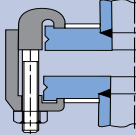
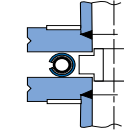
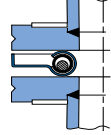
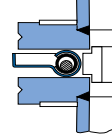
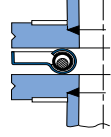


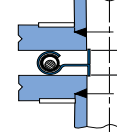
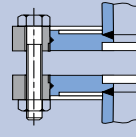
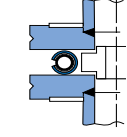
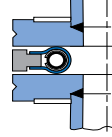
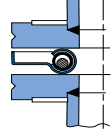
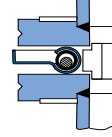
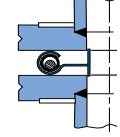
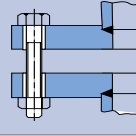
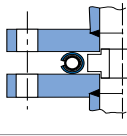
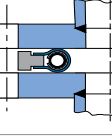
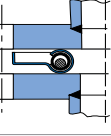
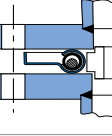
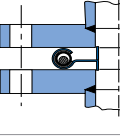
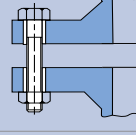
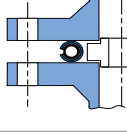
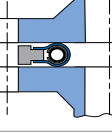
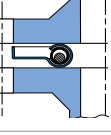
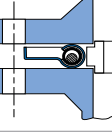
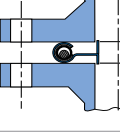
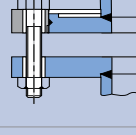
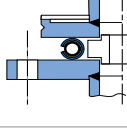
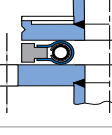
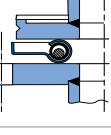
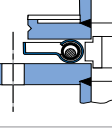
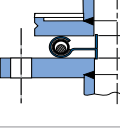
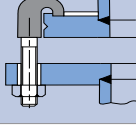
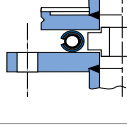
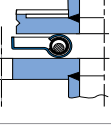
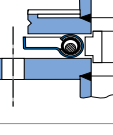
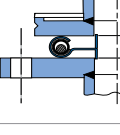
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KF/ISO/PNEUROF STANDARD

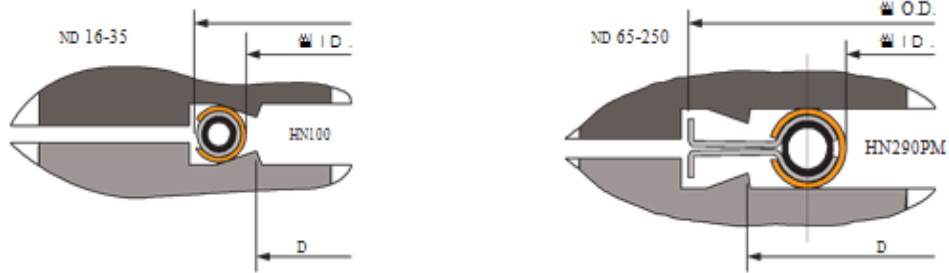
Typical assembly examples with HELICOFLEX® or HELICOFLEX® Delta

Different types of seal

| TYPICALS ASSEMBLY EXAMPLES | HNV 200 | | HNV 208 A | | HLV 290 B | | HL 290 P or HLV 290 P | | HLV 270 P |
|--|---|---|---|---|--|--|--|---|---|
| | with spacer | without spacer | without spacer | with spacer | without spacer | with spacer | without spacer | with spacer | without spacer |
|  Collar coupling |  | | | | | |  |  |  |
|  Threaded coupling |  | | | | | | | |  |
|  Clamped flanges |  | |  |  |  |  |  |  | |
|  Slip on flanges |  |  |  |  | | | |  | |
|  Bolted flanges |  |  |  |  | | | |  | |
|  Bolted flanges |  |  |  |  | | | |  | |
|  Mixed bolted & clamped flanges |  |  |  |  | | | |  | |
|  Mixed bolted & clamped flanges |  | |  |  | | | |  | |

HELICOFLEX® SEALS FOR CF FLANGE UPGRADE

HELICOFLEX® seals can upgrade the performance of your CF flange - even with damaged knife edges.



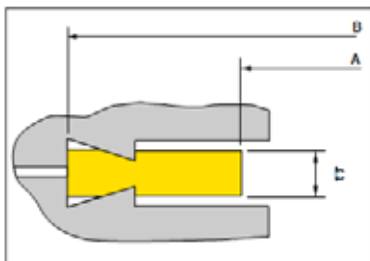
| JACKET | GROOVE DESIGN INFORMATION | | | | | | | |
|------------------------------------|---------------------------|-----|-----------------------|-------------------------------|------------------------------------|--------------------|---------------------|--------------------------|
| | Nominal Diameter ND | | Cross Section C.S. mm | Compression e ₂ mm | Helium Sealing Y ₂ N/mm | Seal Dimensions | | Knife Edge Diameter D mm |
| | | | | | | Inside Diameter mm | Outside Diameter mm | |
| Aluminum Maximum 200°C/392°F | 1 1/8" | 16 | 2,2 | 0,6 | 180 | 17,0 | 21,4 | 18,3 |
| | 2 3/4" | 35 | 2,8 | 0,6 | 180 | 42,5 | 48,1 | 42,0 |
| | 4 1/2" | 63 | 3,0 | 0,6 | 180 | 68,1 | 82,2 | 77,2 |
| | 6" | 100 | 3,0 | 0,7 | 180 | 106,2 | 120,2 | 115,3 |
| | 8" | 150 | 3,0 | 0,7 | 180 | 157,0 | 171,0 | 166,1 |
| | 10" | 200 | 3,0 | 0,7 | 180 | 207,8 | 221,8 | 216,9 |
| | 12" | 250 | 3,0 | 0,7 | 180 | 258,9 | 273,0 | 268,0 |
| Copper Maximum 450°C/842°F | 1 1/8" | 16 | 2,14 | 0,6 | 300 | 17,06 | 21,3 | 18,3 |
| | 2 3/4" | 35 | 2,74 | 0,6 | 320 | 42,56 | 48,0 | 42,0 |
| | 4 1/2" | 63 | 2,94 | 0,7 | 320 | 68,16 | 82,2 | 77,2 |
| | 6" | 100 | 2,94 | 0,7 | 320 | 106,26 | 120,2 | 115,3 |
| | 8" | 150 | 2,94 | 0,7 | 320 | 157,06 | 171,0 | 166,1 |
| | 10" | 200 | 2,94 | 0,7 | 320 | 207,86 | 221,8 | 216,9 |
| | 12" | 250 | 2,94 | 0,7 | 320 | 258,96 | 273,0 | 268,0 |

Silver lining available upon request.

Note: Flange dimensions, especially groove depth, can vary among manufacturers.

Please check with our engineering staff to confirm before ordering.

COPPER SEAL



Our oxygen-free copper seals are manufactured according to a specific process which provides very good parallelism and good oxidation resistance. They can be used on bolted, welded or slip-on flanges.

Note: Other dimensions available on request.

| ND | Dimensions mm | | | Code |
|-----|---------------|-------|---|--------|
| | A | B | C | |
| 16 | 16,2 | 21,3 | 2 | 157414 |
| 25 | 25,4 | 32,8 | 2 | 157447 |
| 35 | 36,8 | 48,1 | 2 | 157413 |
| 36 | 39,2 | 48,1 | 2 | 157412 |
| 50 | 50,8 | 61,6 | 2 | 157452 |
| 63 | 63,6 | 82,4 | 2 | 157435 |
| 64 | 72 | 82,4 | 2 | 157436 |
| 75 | 76,2 | 91,4 | 2 | 157453 |
| 100 | 101,7 | 120,4 | 2 | 157454 |
| 125 | 127 | 141,4 | 2 | 157437 |
| 150 | 152,5 | 171,3 | 2 | 157455 |
| 200 | 203,3 | 222,1 | 2 | 157456 |
| 250 | 254 | 273 | 2 | 157438 |

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QUICK DISCONNECT SYSTEMS (QDS)

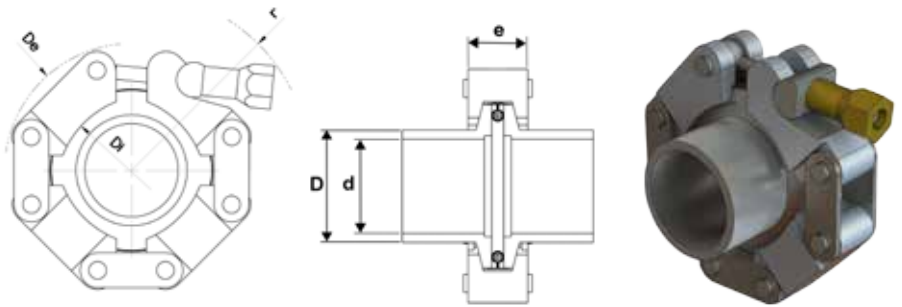
QDS CLASS 150

Material:

- Aluminum
- Non-magnetic side-plates
- Non-magnetic stainless steel screws

Technical Data:

- Clamping load: 150 N/mm (860 lb/in)
- Temperature: 200°C (392°F) max.



| CLAMP DIMENSIONS | | | | | | | | | |
|----------------------|-------------|-------|-------|------|------|--------------|-----|------------|----|
| ISO Nominal Diameter | Part Number | De mm | Di mm | r mm | e mm | Max Pressure | | Max Torque | |
| | | | | | | psi | bar | in.lb | Nm |
| 10/16 | 150 L 30 | 58 | 21 | 61 | 23 | 290 | 20 | 35 | 4 |
| 20/25 | 150 L 40 | 71 | 30 | 58 | 23 | 174 | 12 | 62 | 7 |
| 32/40 | 150 L 55 | 85 | 45 | 65 | 23 | 145 | 10 | 80 | 9 |
| 50 | 150 L 75 | 102 | 65 | 71 | 23 | 73 | 5 | 89 | 10 |

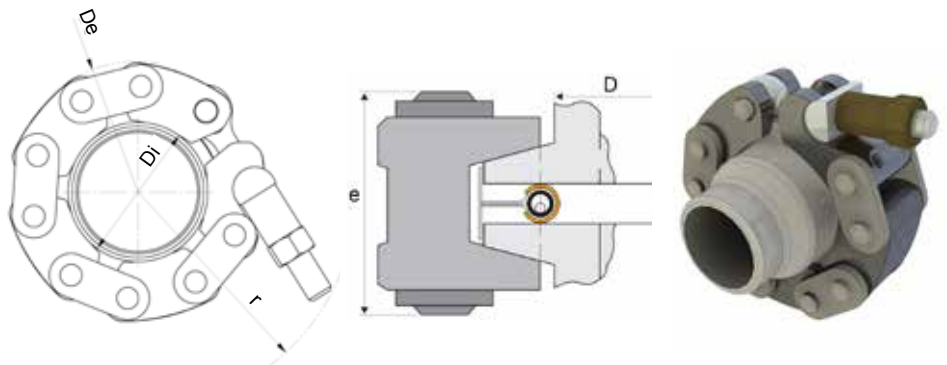
QDS CLASS 300

Material:

- Stainless Steel
- Stainless steel side-plates
- Steel screw (stainless steel on request)

Technical Data:

- Clamping load: 300 N/mm (1715 lb/in)
- Temperature: 300°C (572°F) max.



| CLAMP DIMENSIONS | | | | | | | | | |
|----------------------|-------------|-------|-------|------|------|--------------|-----|------------|----|
| ISO Nominal Diameter | Part Number | De mm | Di mm | r mm | e mm | Max Pressure | | Max Torque | |
| | | | | | | psi | bar | in.lb | Nm |
| 10/16 | 300 A 30 | 60 | 20 | 55 | 32 | 870 | 60 | 53 | 6 |
| 20/25 | 300 A 40 | 70 | 30 | 58 | 32 | 580 | 40 | 89 | 10 |
| 32/40 | 300 A 55 | 84 | 45 | 62 | 32 | 580 | 40 | 124 | 14 |
| 50 | 300 A 75 | 100 | 65 | 70 | 32 | 290 | 20 | 159 | 18 |

Consult our Engineering Staff for QDS clamps and flanges up to 400 mm in diameter.

QDS components can be specially modified for remote control handling requirements.

Contact our engineering staff for more information.

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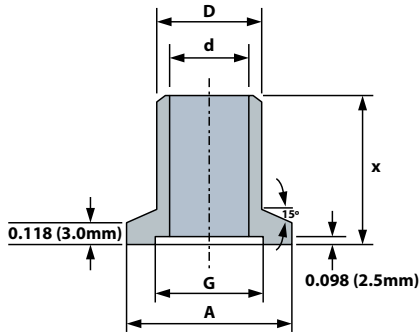
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ISO STANDARD FLANGES



Example reference for flange part number: 150 KF 40 ND 25 S:

1. Description of the junction class: 150
 2. Name of the conical flange: KF
 3. Outside diameter of the flange: 40
 4. Description of the tube: ND 25
 5. Length of the flange: Short (25mm) or Long (50mm)
 6. Blind flanges are described by the flange reference preceded by a T.
- Example: T 150 KF 40.

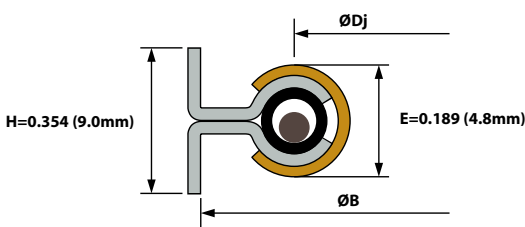
Compatible with class 150 and class 300 QDS clamps for ISO sizes up to ND 50.
Consult our engineering staff for larger sizes. Standard material Z2CN18.10 (304 L)

| FLANGE DIMENSIONS | | | | | | | |
|----------------------|------|------|------|------|------------|-----------|--------------------|
| ISO Nominal Diameter | A mm | D mm | d mm | G mm | X-short mm | X-long mm | Flange Part Number |
| 10 | 30 | 14 | 10 | 12,2 | 20 | 50 | 150 KF 30 ND 10 |
| 16 | 30 | 19,8 | 16 | 17,2 | 20 | 50 | 150 KF 30 ND 16 |
| 20 | 40 | 25 | 21 | 22,2 | 25 | 50 | 150 KF 40 ND 20 |
| 25 | 40 | 28 | 24 | 26,2 | 25 | 50 | 150 KF 40 ND 25 |
| 32 | 55 | 38 | 32 | 34,2 | 30 | 60 | 150 KF 55 ND 32 |
| 40 | 55 | 44 | 40 | 41,2 | 30 | 60 | 150 KF 55 ND 40 |
| 50 | 75 | 57 | 50 | 52,2 | 30 | 60 | 150 KF 75 ND 50 |



Flange class 150 NF E 29-724/ISO 2861

HELICOFLEX® SEALS FOR QDS



| SEAL DIMENSIONS - ALUMINUM JACKET | | | |
|-----------------------------------|-------|-------|--------------------|
| ISO Nominal Diameter | Dj mm | ØB mm | Seal Part Number |
| 10/16 | 22,0 | 30,1 | HL290P-4,8Al ND 16 |
| 20/25 | 32,2 | 40,1 | HL290P-4,8Al ND 25 |
| 32/40 | 47,7 | 55,1 | HL290P-4,8Al ND 40 |
| 50 | 62,2 | 75,1 | HL290P-4,8Al ND 50 |

Other jacket materials available upon request.

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