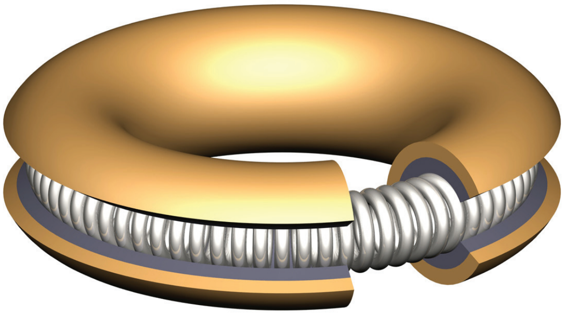
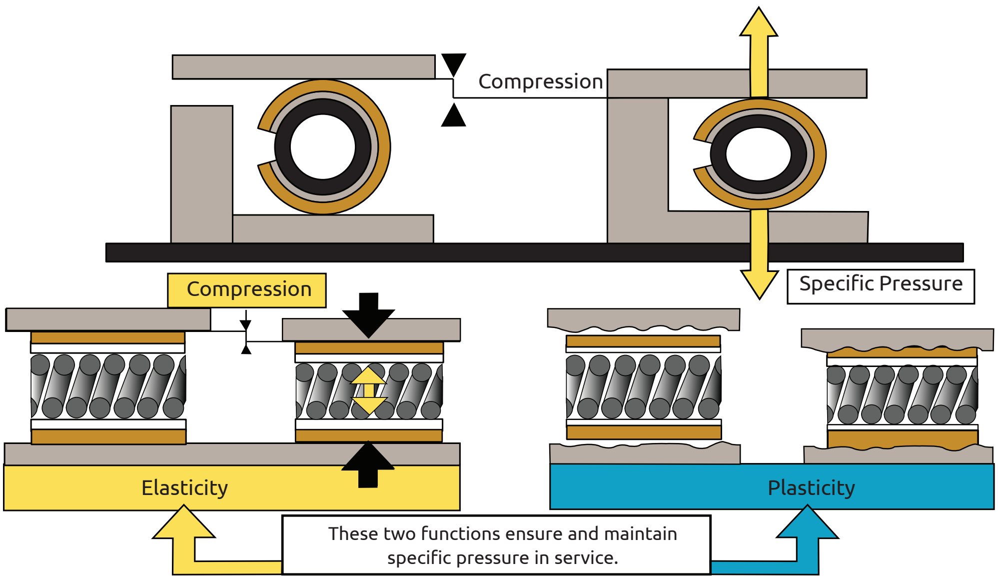
HELICOFLEX®

Spring Energized Seals

The sealing principle of the HELICOFLEX® family of seals is based upon the plastic deformation of a jacket of 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 fill the flange imperfections while ensuring positive contact with the flange sealing faces. Each coil of the helical spring acts independently and allows the seal to conform to surface irregularities on the flange surface. This combination of elasticity and plasticity makes the Helicoflex seal the best overall performing seal in the industry.





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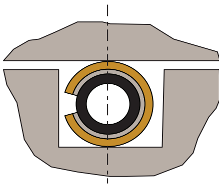
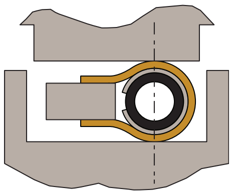
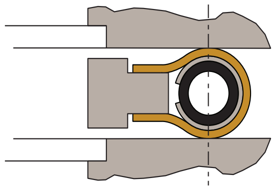
TYPICAL CONFIGURATIONS



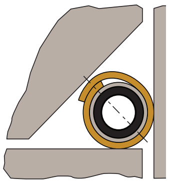
HN200
Groove Assembly



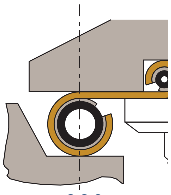
HN203
Tongue & Groove



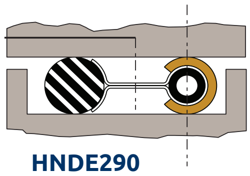
HN208
Raised face flange - ANSI B16.5



HN240
3 Face Compression



HND229
Valve Seat



HNDE290
Leak check - Insert Gas Purge

CLASSIFICATION OF SEAL TYPE

Cross Section Type	HN single section HNR ground spring for precise load control (Beta Spring) HNV low load (Delta Seal) HND tandem Helicoflex seals HNDE tandem Helicoflex and elastomer seals note: "L" indicates internal limiter (ex: HLDE)									
Jacket/ Lining	1 = jacket only					2 = jacket with inner lining				
Jacket Orientation	0	1	2	3	4	5	6	7	8	9
Orientation	0	1	2	3	4	5	6	7	8	9

EXAMPLE

HN	2	0	8
Cross Section Type	# Jackets/ Lining	Jacket Orientation	Section Orientation

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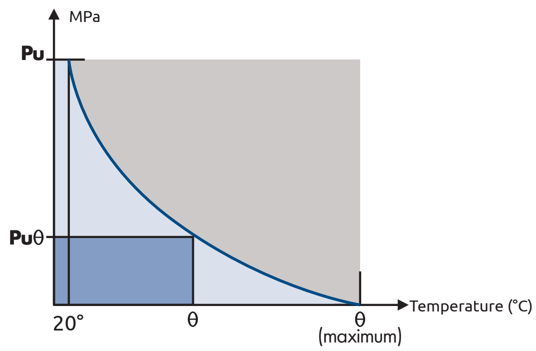
CHARACTERISTIC CURVE

The resilient characteristic of the HELICOFLEX® seal ensures useful elastic recovery during service. This elastic recovery permits the HELICOFLEX® seal to accommodate minor distortions in the flange assembly due to temperature and pressure 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.

The compression and decompression cycle of the HELICOFLEX® seal is characterized by the gradual flattening of the compression curve. The decompression curve, which is distinct from the compression curve, is the result of a hysteresis effect and permanent deformation of the spring and jacket.

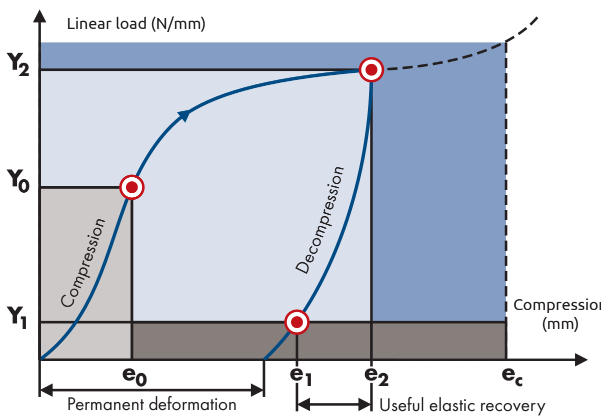
THE INTRINSIC POWER OF THE SEAL

The intrinsic power of the HELICOFLEX® seal reflects its ability to maintain and hold system pressure for a given temperature at Y_2 and e_2. This value is expressed as a specific pressure and is noted by the symbols Pu (room temperature) and Pu Ɵ (at operating temperature). The influence of temperature on Pu is shown in the graph below. The table on page 3 gives the values of Pu at 68°F (20°C), Pu Ɵ at a given temperature and the maximum temperature where Pu Ɵ = 0.



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 e2
Y_1	=	load on the decompression curve below which leak rate exceeds required level
e_2	=	optimum compression
e_c	=	compression limit beyond which there is risk of damaging the spring



Dimensions in mm

	HELIUM SEALING							BUBBLE SEALING				
Jacket Material	Cross Section	e_2	e_c	Y_2 N/mm	Y_1 N/mm	Pu20°C MPa	PuΘ200°C MPa	Y_2 N/mm	Y_1 N/mm	Pu20°C MPa	PuΘ200°C MPa	Max Temp °C
Aluminum	1.60	0.60	0.70	150	20	50	n/a	90	20	35	n/a	150
	1.90	0.70	0.85	160	20	52	n/a	100	20	40	n/a	150
	2.20	0.70	0.90	165	20	53	n/a	105	20	40	n/a	180
	2.50	0.70	0.90	175	20	55	5	115	20	42	5	220
	3.00	0.80	1.00	185	25	55	10	130	20	45	10	250
	3.50	0.80	1.00	190	25	55	14	140	20	47	14	250
	4.00	0.90	1.10	200	25	60	17	150	20	50	17	280
	4.50	0.90	1.20	210	25	60	20	160	20	52	20	280
	5.00	0.90	1.40	220	30	63	22	170	25	55	22	300
	5.50	0.90	1.60	230	30	65	24	180	25	57	24	320
	6.00	1.00	1.80	245	35	67	25	195	30	60	25	340
	7.00	1.00	2.20	270	40	70	28	205	35	65	28	340
	8.00	1.00	2.60	290	50	72	32	225	40	68	31	360
							PuΘ250°C				PuΘ250°C	
Silver	1.60	0.50	0.60	200	30	65	n/a	150	30	40	n/a	240
	1.90	0.60	0.70	220	30	65	n/a	150	30	40	n/a	240
	2.20	0.60	0.80	230	35	70	n/a	160	30	40	4	280
	2.50	0.70	0.90	240	45	75	8	170	40	45	5	280
	3.00	0.80	1.00	260	50	85	14	180	45	50	9	300
	3.50	0.80	1.00	280	50	95	22	190	45	55	13	300
	4.00	0.80	1.10	300	55	105	27	200	50	60	16	350
	4.50	0.80	1.10	320	60	115	31	220	50	70	19	370
	5.00	0.80	1.30	340	60	125	36	230	50	80	22	370
	5.50	0.80	1.40	360	65	135	40	250	60	90	25	400
	6.00	0.90	1.70	400	70	150	47	270	60	110	30	450
	7.00	0.90	2.00	440	80	160	54	300	65	125	36	450
	8.00	0.90	2.40	490	90	170	60	350	70	140	42	500
							PuΘ300°C				PuΘ300°C	
Copper, Soft Iron, Mild Steels and Annealed Nickel	1.60	0.50	0.60	260	40	50	10	190	30	35	5	350
	1.90	0.60	0.70	280	50	50	11	200	40	35	6	350
	2.20	0.60	0.80	300	60	55	13	220	50	35	8	360
	2.50	0.70	0.90	320	70	60	17	230	60	40	10	380
	3.00	0.70	1.00	350	80	65	20	250	70	40	12	380
	3.50	0.70	1.00	390	80	70	23	270	70	45	15	400
	4.00	0.80	1.10	430	90	70	27	290	80	45	17	420
	4.50	0.80	1.10	470	100	80	30	320	80	45	19	450
	5.00	0.80	1.30	510	110	85	33	330	90	50	21	450
	5.50	0.80	1.40	550	120	90	36	360	100	50	23	480
	6.00	0.90	1.70	630	140	95	40	400	100	55	26	520
	7.00	0.90	2.00	740	160	100	45	460	110	60	29	520
	8.00	0.90	2.40	860	190	110	49	530	130	65	32	550
							PuΘ350°C				PuΘ350°C	
Nickel, Monel, Tantalum	1.60	0.40	0.50	320	80	70	11	200	60	40	7	380
	1.90	0.50	0.60	350	80	72	16	220	60	42	9	380
	2.20	0.50	0.70	390	90	76	21	230	70	44	12	420
	2.50	0.60	0.80	440	100	82	27	270	70	47	16	450
	3.00	0.60	0.90	440	110	87	34	300	80	50	20	480
	3.50	0.60	0.90	490	120	93	40	340	90	54	23	500
	4.00	0.70	1.00	580	140	96	45	380	100	57	27	550
	4.50	0.70	1.00	720	150	105	52	420	110	60	30	600
	5.00	0.70	1.00	780	180	110	57	460	110	65	33	650
	5.50	0.70	1.30	810	200	115	62	500	120	67	37	650
	6.00	0.80	1.60	n/a	n/a	n/a	n/a	560	130	72	41	650
	7.00	0.80	1.80	n/a	n/a	n/a	n/a	650	150	78	45	650
	8.00	0.80	2.10	n/a	n/a	n/a	n/a	730	160	83	50	650
							PuΘ400°C				PuΘ400°C	
Stainless Steel, Inconel, Titanium	1.60	0.40	0.50	350	100	90	25	300	80	47	6	420
	1.90	0.50	0.60	400	100	91	27	320	80	50	8	420
	2.20	0.50	0.70	450	110	92	29	350	90	52	11	480
	2.50	0.60	0.80	500	120	97	32	380	100	57	15	500
	3.00	0.60	0.90	575	130	100	36	425	110	62	20	500
	3.50	0.60	0.90	660	150	104	39	470	130	67	25	550
	4.00	0.70	1.00	750	170	107	42	520	150	72	30	600
	4.50	0.70	1.00	825	220	110	45	560	180	77	34	650
	5.00	0.70	1.10	n/a	n/a	n/a	n/a	600	190	82	37	700
	5.50	0.70	1.30	n/a	n/a	n/a	n/a	650	200	87	42	700
	6.00	0.80	1.60	n/a	n/a	n/a	n/a	720	220	94	47	700
	7.00	0.80	1.80	n/a	n/a	n/a	n/a	800	260	102	52	700
	8.00	0.80	2.10	n/a	n/a	n/a	n/a	900	290	108	58	700

DEFINITION OF CHARACTERISTIC VALUES

Dj	Mean reaction diameter of the seal. (For a double section seal, $Dj = Dj_1 + Dj_2$)	________	mm
Y_2	Linear load corresponding to e_2 compression	________	N/mm
Y_1	Linear load on the seal to maintain sealing in service at low pressure (=Ym1)	________	N/mm
Pu	Intrinsic power of the seal under pressure at 68°F (20°C) when the reaction force of the seal is maintained at Y_2 , regardless of the operating conditions.	________	MPa
Pu	Value of Pu at temperature	________	MPa
P	Operating or proof pressure Note: if $\frac{P}{Pu \text{ or } Pu\Theta}$ >1, the definition of the seal must be modified This ratio must never exceed 1	________	MPa
Y_{m2}	Linear tightening load on the seal at room temperature to maintain sealing under pressure. $Y_{m2} = Y_2 \frac{P}{Pu}$	________	N/mm
Y_{m2}	Value of Y_{m2} at temperature . $Y_{m2} = Y_2 \frac{P}{Pu\Theta}$	________	N/mm
Et	Young's modulus of bolt material at 68°F (20°C)	________	MPa
Et_s	Young's modulus of bolt material at operating temperature	________	MPa

LOAD CALCULATIONS

Fj	Total tightening load to compress the seal to the operating point (Y_2; e_2) $Fj = \pi \times Dj \times Y_2$	________	N
F_F	Total hydrostatic end force $F_F = \pi/4\ Dj_1^2 \times P$ (Dj_1 = Dj in case of a single section seal)	________	N
Fm	Minimum total load to be maintained on the seal in service to preserve sealing, i.e. $Fm = \pi\ Dj\ Y_m$ where: Y_m = the greater of the two values: Y_{m1} or Y_{m2} (see note 1 below)	________	N
Fs	Total load to be applied on the bolts to maintain sealing in service $Fs = F_F + F_m$	________	N
Fs*	Increased value of Fs to compensate for Young's modulus at temperature $Fs^* = Fs\ Et / Et_s$	________	N
F_B	LOAD TO BE APPLIED: If Fs* > Fj then Fb = Fs* If Fj > Fs* then Fb = Fj	________	N

NOTE 1: wherever the working pressure is high and/or seal diameter is big, to such an extent that $P \cdot Dj \geq 32\ Y_m$, in order to remain on the safe side, whatever the inaccuracy on the tightening load may be, it is recommended to take the Fj value in lieu of F_m for the calculation of Fs so that $Fs = F_F + Fj$.

NOTE 2: this information is provided as a reference only.

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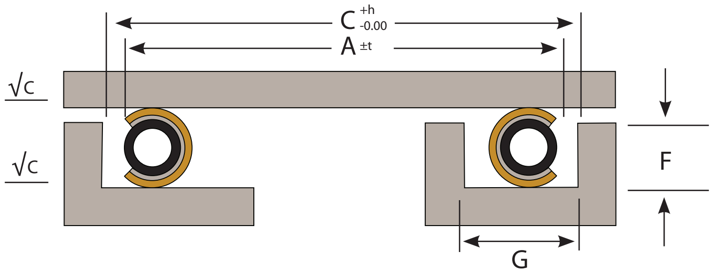
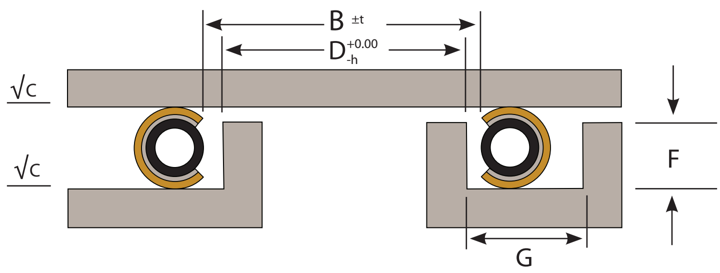
INTERNAL PRESSURE: SEAL TYPE HN200



EXTERNAL PRESSURE: SEAL TYPE HN220



SEAL AND GROOVE SIZING CALCULATIONS

The equations below can be used for basic groove calculations. Applications that have significant thermal expansion may require additional clearance. Please contact Applications Engineering for design assistance.

Determining Seal Diameter:

Internal
A = C-X

External
B = D + X

Determining Groove Diameter:

Internal
C = A + X

External
D = B – X

Tolerancing: See chart

Where:
A = Seal Outer Diameter
B = Seal Inner Diameter
C = Groove Outer Diameter
D = Groove Inner Diameter
X = Diametrical Clearance (see table)

Groove Finish √C: See groove dimensioning chart on page 6

SEAL/GROOVE TOLERANCES

Seal Diameter Range	Pressure <300psi (20 bar)		Pressure ≥300 psi (20 bar)	
	Seal tolerance t	Groove tolerance h	Seal tolerance t	Groove tolerance h
8.90 to 50.80	0.13	0.13	0.10	0.10
50.81 to 304.80	0.25	0.25	0.10	0.10
304.81 to 635.00	0.25	0.25	0.15	0.15
635.01 to 1220.00	0.38	0.38	0.20	0.20
1220.01 to 1830.00	0.51	0.38	0.25	0.20
>1830.00	Contact Applications Engineering			

FLATNESS

Seal Diameter Range	Amplitude	Tangential Slope	Radial Slope
10 to 500	0.20	1:1000	1:100
501 to 2000	0.40	2:1000	2:100

Dimensions in mm

SHAPED SEALS

Groove design: Contact Applications Engineering for assistance in designing non-circular grooves.

Groove finish: Most applications will require a finish of 16-32 RMS (0.4 to 0.8 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.

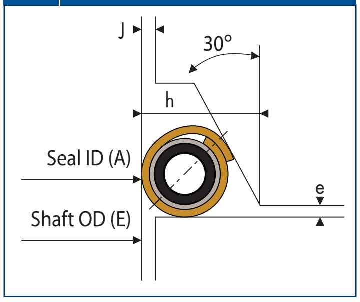
SEAL AND GROOVE DIMENSIONS

Dimensions in mm

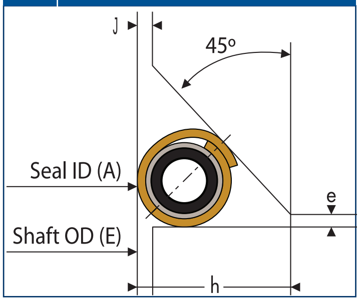
	SEAL			Pressure < 20 bar	Pressure ≥ 20 bar	GROOVE		
Jacket Material	Free Height	Installation Compression e2	Seal Diameter Range	Diametrical Clearance X	Diametrical Clearance X	Groove Depth F	Groove Width (Min.) G	Groove Finish Ra µm
Aluminum	1.60	0.60	12.70 to 101.60	0.60	0.30	1.00 ± 0.07	2.82	0.8 - 3.2 Contact Applications Engineering for Recommendation
	1.90	0.70	15.88 to 152.40	0.70	0.30	1.20 ± 0.09	3.33	
	2.20	0.70	19.05 to 254.00	0.70	0.30	1.50 ± 0.09	3.63	
	2.50	0.70	22.23 to 381.00	0.70	0.30	1.80 ± 0.09	3.91	
	3.00	0.80	25.40 to 508.00	0.80	0.30	2.20 ± 0.09	4.57	
	3.50	0.80	31.75 to 635.00	0.80	0.50	2.70 ± 0.09	5.08	
	4.00	0.90	44.45 to 762.00	0.90	0.50	3.10 ± 0.11	5.77	
	4.50	0.90	50.80 to 1016.00	0.90	0.50	3.60 ± 0.11	6.27	
	5.00	0.90	76.20 to 1270.00	0.90	0.50	4.10 ± 0.11	6.78	
	5.50	0.90	101.60 to 1270.00	0.90	0.50	4.60 ± 0.11	7.29	
	6.00	1.00	127.00 to 1270.00	1.00	0.50	5.00 ± 0.12	7.98	
	7.00	1.00	152.40 to 1270.00	1.00	0.70	6.00 ± 0.12	8.99	
	8.00	1.00	203.20 to 1270.00	1.00	0.70	7.00 ± 0.12	9.98	
Silver	1.60	0.50	12.70 to 101.60	0.50	0.30	1.10 ± 0.06	2.62	1.6 - 3.2 Contact Applications Engineering for Recommendation
	1.90	0.60	15.88 to 152.40	0.60	0.30	1.30 ± 0.07	3.12	
	2.20	0.60	19.05 to 254.00	0.60	0.30	1.60 ± 0.07	3.43	
	2.50	0.70	22.23 to 381.00	0.70	0.30	1.80 ± 0.09	3.91	
	3.00	0.80	25.40 to 508.00	0.80	0.30	2.20 ± 0.09	4.57	
	3.50	0.80	31.75 to 635.00	0.80	0.50	2.70 ± 0.09	5.08	
	4.00	0.80	44.45 to 762.00	0.80	0.50	3.20 ± 0.09	5.56	
	4.50	0.80	50.80 to 1016.00	0.80	0.50	3.70 ± 0.09	6.07	
	5.00	0.80	76.20 to 1270.00	0.80	0.50	4.20 ± 0.09	6.58	
	5.50	0.80	101.60 to 1270.00	0.80	0.50	4.70 ± 0.09	7.09	
	6.00	0.90	127.00 to 1270.00	0.90	0.50	5.10 ± 0.11	7.77	
	7.00	0.90	152.40 to 1270.00	0.90	0.70	6.10 ± 0.11	8.79	
	8.00	0.90	203.20 to 1270.00	0.90	0.70	7.10 ± 011	9.78	
Copper, Soft Iron, Mild Steels and Annealed Nickel	1.60	0.50	12.70 to 101.60	0.50	0.30	1.10 ± 0.06	2.62	1.6 - 3.2 Contact Applications Engineering for Recommendation
	1.90	0.60	15.88 to 152.40	0.60	0.30	1.30 ± 0.07	3.12	
	2.20	0.60	19.05 to 254.00	0.60	0.30	1.60 ± 0.07	3.43	
	2.50	0.70	22.23 to 381.00	0.70	0.30	1.80 ± 0.09	3.91	
	3.00	0.70	25.40 to 508.00	0.70	0.30	2.30 ± 0.09	4.42	
	3.50	0.70	31.75 to 635.00	0.70	0.50	2.80 ± 0.09	4.93	
	4.00	0.80	44.45 to 762.00	0.80	0.50	3.20 ± 0.09	5.56	
	4.50	0.80	50.80 to 1016.00	0.80	0.50	3.70 ± 0.09	6.07	
	5.00	0.80	76.20 to 1270.00	0.80	0.50	4.20 ± 0.09	6.58	
	5.50	0.80	101.60 to 1270.00	0.80	0.50	4.70 ± 0.09	7.09	
	6.00	0.90	127.00 to 1270.00	0.90	0.50	5.10 ± 0.11	7.77	
	7.00	0.90	152.40 to 1270.00	0.90	0.70	6.10 ± 0.11	8.79	
	8.00	0.90	203.20 to 1270.00	0.90	0.70	7.10 ± 0.11	9.78	
Nickel, Monel, Tantalum	1.60	0.40	12.70 to 101.60	0.40	0.30	1.20 ± 0.05	2.41	0.8 - 1.6 Contact Applications Engineering for Recommendation
	1.90	0.50	15.88 to 152.40	0.50	0.30	1.40 ± 0.06	2.92	
	2.20	0.50	19.05 to 254.00	0.50	0.30	1.70 ± 0.06	3.23	
	2.50	0.60	22.23 to 381.00	0.60	0.30	1.90 ± 0.07	3.71	
	3.00	0.60	25.40 to 508.00	0.60	0.30	2.40 ± 0.07	4.22	
	3.50	0.60	31.75 to 635.00	0.60	0.50	2.90 ± 0.07	4.72	
	4.00	0.70	44.45 to 762.00	0.70	0.50	3.30 ± 0.09	5.41	
	4.50	0.70	50.80 to 1016.00	0.70	0.50	3.80 ± 0.09	5.92	
	5.00	0.70	76.20 to 1270.00	0.70	0.50	4.30 ± 0.09	6.43	
	5.50	0.70	101.60 to 1270.00	0.70	0.50	4.80 ± 0.09	6.93	
	6.00	0.80	127.00 to 1270.00	0.80	0.50	5.20 ± 0.09	7.57	
	7.00	0.80	152.40 to 1270.00	0.80	0.70	6.20 ± 0.09	8.59	
	8.00	0.80	203.20 to 1270.00	0.80	0.70	7.20 ± 0.09	9.58	
Stainless Steel, Inconel, Titanium	1.60	0.40	12.70 to 101.60	0.40	0.30	1.20 ± 0.05	2.41	0.8 - 1.6 Contact Applications Engineering for Recommendation
	1.90	0.50	15.88 to 152.40	0.50	0.30	1.40 ± 0.06	2.92	
	2.20	0.50	19.05 to 254.00	0.50	0.30	1.70 ± 0.06	3.23	
	2.50	0.60	22.23 to 381.00	0.60	0.30	1.90 ± 0.07	3.71	
	3.00	0.60	25..40 to 508.00	0.60	0.30	2.40 ± 0.07	4.22	
	3.50	0.60	31.75 to 635.00	0.60	0.50	2.90 ± 0.07	4.72	
	4.00	0.70	44.45 to 762.00	0.70	0.50	3.30 ± 0.09	5.41	
	4.50	0.70	50.80 to 1016.00	0.70	0.50	3.80 ± 0.09	5.92	
	5.00	0.70	76.20 to 1270.00	0.70	0.50	4.30 ± 0.09	6.43	
	5.50	0.70	101.60 to 1270.00	0.70	0.50	4.80 ± 0.09	6.93	
	6.00	0.80	127.00 to 1270.00	0.80	0.50	5.20 ± 0.09	7.57	
	7.00	0.80	152.40 to 1270.00	0.80	0.70	6.20 ± 0.09	8.59	
	8.00	0.80	203.20 to 1270.00	0.80	0.70	7.20 ± 0.09	9.58	

THREE FACE COMPRESSION

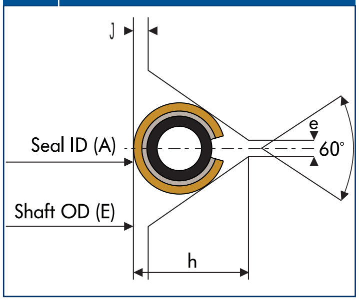
30° Type HN140-240



45° Type HN140-240



60° Type HN100-200



E = Shaft OD $^{+0.00}_{-0.05}$ **A = Seal ID** $^{+0.05}_{-0.00}$

CALCULATIONS

Axial Load (Ya)	= K • Y_2
Shaft OD (E)	= Seal ID (A)
Clearance (J)	< CS / 10
Axial Compression (e)	= a • e_2
Cavity Finish	< 32 RMS

COEFFICIENT VALUES

Coefficient	30°	45°	60°
a	2.0	1.4	1.15
K	0.9	1.2	1.4

TARGET SEALING CRITERIA

The ultimate leak rate of a joint is a function of the seal design, flange design, bolting, surface finish and other factors. HELICO-FLEX® seals are designed to provide two levels of service: Helium Sealing or Bubble Sealing.

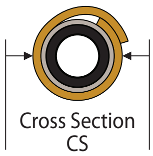
Helium Sealing: These HELICOFLEX® seals are designed with a target Helium leak rate not to exceed 1x10^{-9} cc/sec.atm under a ΔP of 1 atmosphere. The ultimate leak rate will depend on the factors listed above.

Bubble Sealing: These HELICOFLEX® seals are designed with a target air leak rate not to exceed 1x10^{-4} cc/sec.atm under a ΔP of 1 atmosphere.

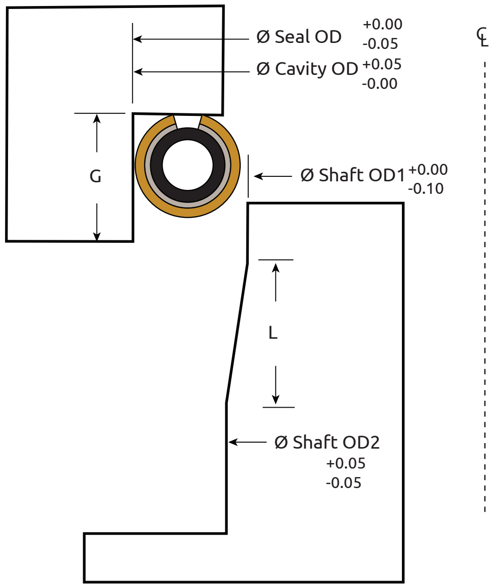
"h" VALUES

Seal Cross Section CS	30°		45°		60°	
	Aluminum Jacket	Other Jackets	Aluminum Jacket	Other Jackets	Aluminum Jacket	Other Jackets
2.60	3.30	3.20	4.15	4.00	3.20	3.40
3.20	4.00	4.00	5.05	5.05	4.00	4.20
4.20	5.25	5.25	6.60	6.60	5.40	5.60
5.20	6.60	6.60	8.30	8.30	6.90	7.10
6.40	8.15	8.15	10.20	10.20	8.60	8.80

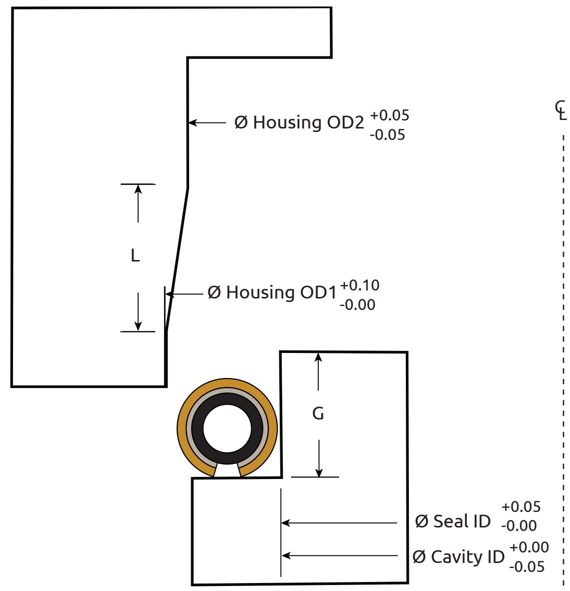
Dimensions in mm



AXIAL PRESSURE



Internal Compression



External Compression

SEAL CONFIGURATION = HN110 OR HN210

Aluminum			Silver			Copper			Nickel		
Cross Section CS	e_3	Ya N/mm	Cross Section CS	e_3	Ya N/mm	Cross Section CS	e_3	Ya N/mm	Cross Section CS	e_3	Ya N/mm
1.60	0.30	19	1.60	0.25	30	1.70	0.20	38	1.60	0.20	40
2.60	0.35	24	2.60	0.30	34	2.34	0.25	44	2.60	0.25	54
3.00	0.40	27	3.10	0.35	36	3.24	0.30	50	3.20	0.30	60
4.00	0.50	32	4.20	0.45	40	4.34	0.40	58	4.20	0.40	76
5.08	0.50	36	5.20	0.45	46	5.34	0.40	66	5.20	0.40	92
6.60	0.60	41	6.20	0.50	54	6.34	0.45	80	6.40	0.45	112

Dimensions in mm

CALCULATIONS		
	Internal Compression	External Compression
G min = CS + e_3 + 0.20	Seal OD = Cavity OD	Seal ID = Cavity ID
L min = 10 x e_3	Seal ID = Seal OD - 2 CS	Seal OD = Seal ID + 2 CS
Cavity Finish: ≤ 0.8 Ra µm	Shaft OD1 ≤ Seal ID	Housing OD1 ≥ Seal OD
Ya = Axial Seating Load	Shaft OD2 = Seal ID + 2e_3	Housing OD2 = SealOD - 2e_3

SEAL TYPE HN208

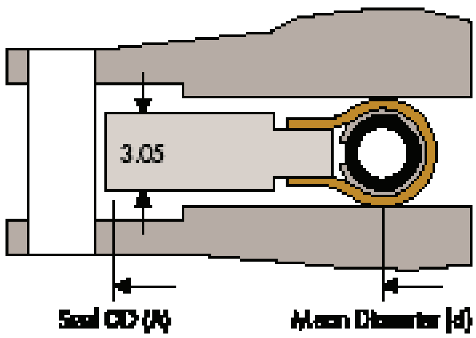
Jacket	Availability	Cross Section (mm)	Seating Load (N/mm)*	Recommended Flange Finish (RMS)
Aluminum	Standard	4.06	201	1.6 - 3.2
Silver	Standard	4.06	302	1.6 - 3.2
Copper	Standard	3.94	394	1.6 - 3.2
Soft Iron	Optional	3.94	394	0.8 - 1.6
Nickel	Standard	3.81	490	0.8 - 1.6
Monel	Optional	3.81	490	0.8 - 1.6
Hastelloy C	Optional	3.81	665	0.8 - 1.6
Stainless Steel	Standard	3.81	665	0.8 - 1.6
Alloy 600	Optional	3.81	665	0.8 - 1.6
Alloy X750	Optional	3.81	701	0.8 - 1.6
Titanium	Optional	3.81	701	0.8 - 1.6

Dimensions in mm

*NOTE: Seating load only! Does not allow for hydrostatic end force.

ANSI B16.5 RAISED FACE FLANGE

The HELICOFLEX® HN208 is ideally suited for standard raised face flanges. The resilient nature of the seal allows it to compensate for the extremes of high temperature and pressure where traditional spiral wounds and double jacketed seals fail. The jacket and spring combination can be modified to meet most requirements of temperature and pressure. In addition, a large selection of jacket materials ensures chemical compatibility in corrosive and caustic media.



SEAL DIMENSIONS

Nominal Diameter (Inches)	Mean Diameter (d)	Seal OD (A)						
		150lb	300lb	400lb	600lb	900lb	1500lb	2500lb
1/2	21.00	47.60	54.00	54.00	54.00	63.50	63.50	69.90
3/4	28.00	57.20	66.70	66.70	66.70	69.90	69.90	76.20
1	36.00	66.70	73.00	73.00	73.00	79.30	79.30	85.70
1-1/4	48.00	76.20	82.60	82.60	82.60	88.90	88.90	104.80
1-1/2	58.00	85.70	95.30	95.30	95.30	98.40	98.40	117.50
2	74.00	104.80	111.10	111.10	111.10	142.90	142.90	146.10
2-1/2	87.00	123.80	130.20	130.20	130.20	165.10	165.10	168.30
3	106.00	136.50	149.20	149.20	149.20	168.30	174.60	196.90
3-1/2	119.00	161.90	165.10	165.10	161.90	N/A	N/A	N/A
4	133.50	174.60	181.00	177.80	193.70	206.40	209.60	235.00
5	162.00	196.90	215.90	212.70	241.30	247.70	254.00	279.40
6	190.50	222.30	250.80	247.70	266.70	289.89	282.60	317.50
8	243.00	279.30	308.00	304.80	320.70	358.80	352.40	387.40
10	297.00	339.70	362.00	358.80	400.10	435.00	435.00	476.50
12	352.00	409.60	422.30	419.10	457.20	498.50	520.70	549.30
14	383.50	450.90	485.80	482.60	492.10	520.70	577.90	N/A
16	437.00	514.40	539.80	536.60	565.20	574.70	641.40	N/A
18	497.00	549.30	596.90	593.70	612.80	638.20	704.90	N/A
20	548.00	606.40	654.10	647.70	682.60	698.50	755.70	N/A
24	653.50	717.60	774.70	768.40	790.60	838.10	901.70	N/A

NOTE: For ANSI Standard Bols

Dimensions in mm

NOTE: Contact Applications Engineering for other available sizes and materials

TECHNETICS GROUP
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CALCULATIONS ACCORDING TO CODES

	A.S.M.E. Section VIII Division I	Technetics Group
Operating load	$Wm2 = \pi.b.G.y$	$Fj = \pi.Dj.Y_2$
Hydrostatic force	$H = \pi.\frac{G^2}{4}.P$	$F_F = \pi.\frac{(Dj)^2}{4}.P$
Minimum service load	$H_P = 2.b.\pi.G.m.P$	$Fm = \pi.Dj.Ym$ $Ym = \begin{cases} Ym_1 = Y_1 \\ Ym_2 = Y_2 \frac{P}{Pu\,\Theta} \end{cases}$ Use the greater of the two
Minimum tightening load to apply on bolts	$W = \begin{cases} (1)\ W_{m2} \\ (2)\ H + Hp = W_{m1} \end{cases}$	$F_B = \begin{cases} (1)\ Fj \\ (2)\ F_F + F_m = Fs \end{cases}$
	Use the greater of the two (1) or (2)	Use the greater of the two (1) or (2)

NOTE: Due to its circular section, the HELICOFLEX® seal exhibits a "line" load instead of an "area load" typical of traditional gaskets. As a result, "m", "b" and "y" factors are not pertinent when applied to the Helicoflex seal. These equivalent equations were developed to assist flange designers with their calculations.

EQUIVALENT SYMBOLS

	A.S.M.E. Section VIII Division I
Operating load	$W_{m2} = Fj$ $b = 1$ $G = Dj$ $Y = Y_2$ ↓ $W_{m2} = \pi.Dj.Y_2$
Hydrostatic force	$H = F_F$ $G = Dj$ ↓ $H = \pi.\frac{(Dj)^2}{4}.P$
Minimum service load	$H_P = F_m$ $b = 1$ $G = Dj$ $2.m.P = Y_m$ $m = \frac{Ym}{2.P}$ ↓ $H_P = \pi.Dj.Ym$
Minimum bolt load	$W = F_B$ $W = (1)\ Fj$ $(2)\ F_F + F_m = Fs$ Use the greater of the two (1) or (2)

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