

C-FLEX™

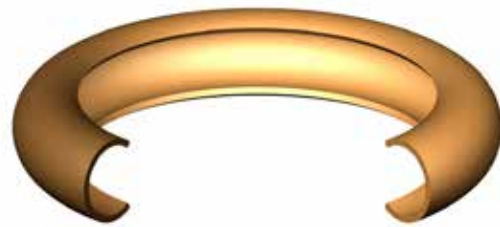
Metal C-Rings



SEALING CONCEPT

The sealing concept of C-FLEX™ metal C-rings is based on the elastic deformation of a metal “C” substrate which, during the compression cycle, gives a contact point on each sealing surface.

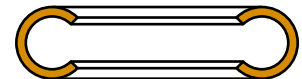
The substrate characteristics determine the compressive load of the seal. This load combined with an accurate compression rate results in a specific pressure which is directly related to the sealing level obtained. A certain specific pressure is necessary to make the seal flow into the flange imperfections. In service, this load is supplemented by the system pressure. A softer surface treatment is available to increase the plasticity of the seal and reduce the specific pressure necessary to reach the desired sealing level.



C-FLEX™ TYPES

The opening of the C-FLEX™ seal is typically oriented toward the system pressure. In service, the system pressure “energizes” the seal providing supplemental load. This energizing effect increases in direct proportion to increases in differential system pressure.

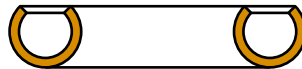
Internal Pressure



External Pressure



Axial Pressure



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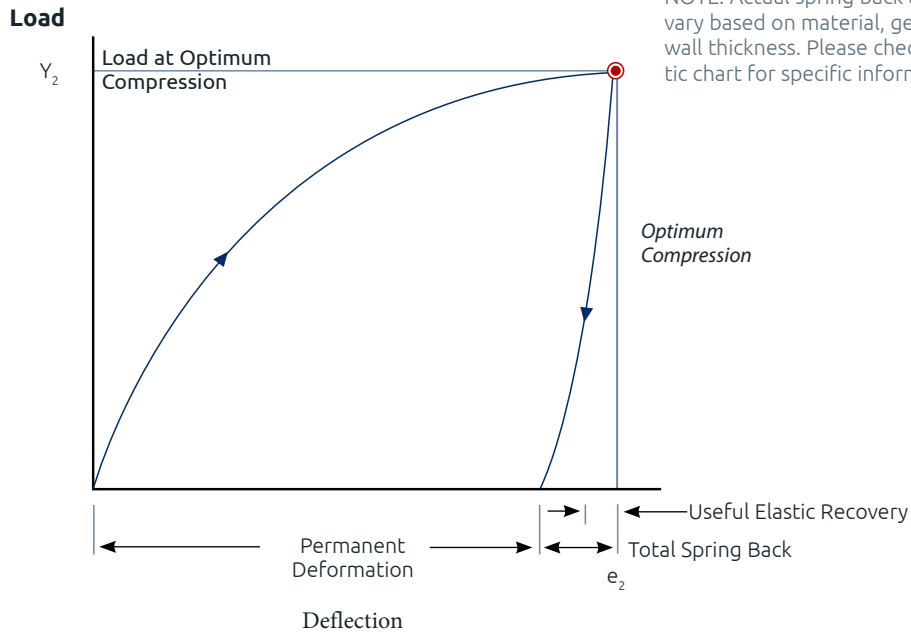
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C-FLEX™ CHARACTERISTIC CURVE



NOTE: Actual spring back and load will vary based on material, geometry, and wall thickness. Please check characteristic chart for specific information.

MATERIAL SELECTION

Material	Status	Temperature	Heat Treatment
Alloy X750	Standard	T < 1,100°F	Solution heat treat and precipitation harden per AMS 5598
Alloy 718	Optional	T < 1,200°F	Solution heat treat and precipitation harden per AMS 5596
Other	Contact Us at sales@technetics.com		

PLATING/COATING SELECTION

Plating/Coating	Status	Standard Thickness	Temperature	Groove Finish*
PTFE	Optional	.001/.003	T < 500°F	16 - 32 RMS
Silver	Standard	.001/.002	T < 800°F	16 - 63 RMS
Silver w/ Gold strike	Optional	.001/.002	T < 1,200°F	16 - 63 RMS
Nickel	Standard	.001/.002	T < 1,600°F	16 - 32 RMS
None	-	-	-	< 16 RMS
Other	Contact Us at sales@technetics.com			

* Groove finish must follow seal circumference (lathe turned finish)

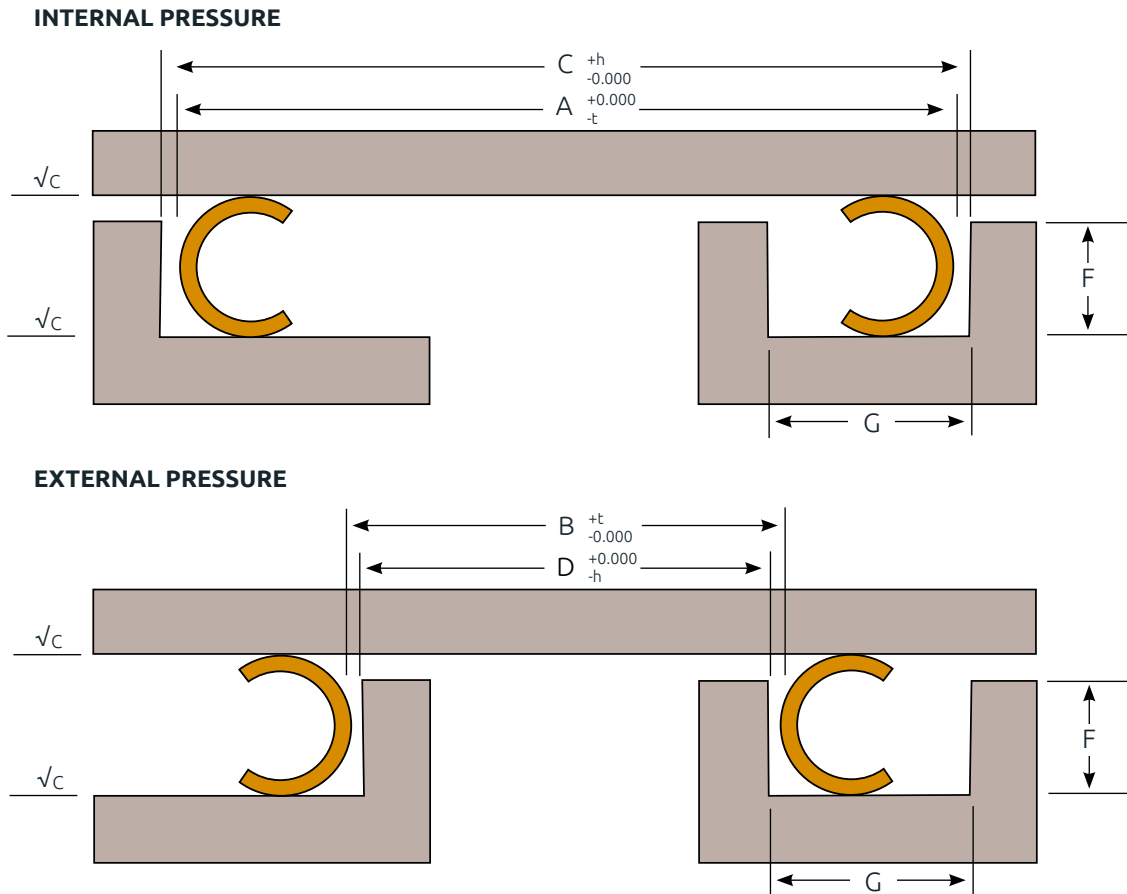
C-FLEX™ CHARACTERISTIC VALUES

Free Height	Installation Compression e_2	Seal Diameter Range	Material Thickness	Thin (T) Medium (M) Heavy (H)	CHARACTERISTIC VALUES AT 70°F	
					Alloy X-750	Alloy 718
					Seating Load (PCI) Y_2	Seating Load (PCI) Y_2
0.047	0.006	0.325 to 2.000	0.006	T	95	110
			-	M	-	-
			0.008	H	210	245
0.063	0.012	0.375 to 8.000	0.008	T	85	100
			-	M	-	-
			0.010	H	260	300
0.094	0.020	0.500 to 16.000	0.010	T	140	165
			-	M	-	-
			0.015	H	400	460
0.125	0.026	1.000 to 25.000 +	0.010	T	130	150
			0.015	M	240	280
			0.020	H	570	660
0.156	0.032	2.000 to 25.000 +	0.015	T	200	230
			-	M	-	-
			0.025	H	600	690
0.188	0.039	3.000 to 25.000 +	0.020	T	350	410
			-	M	-	-
			-	H	-	-
0.250	0.051	4.000 to 25.000 +	0.025	T	315	365
			-	M	-	-
			-	H	-	-

Dimensions in inches

NOTES:

1. PCI = Pounds force per circumferential inch
2. Seating Load (Y_2) is an approximation and may vary based on groove clearance, seal diameter, tolerance and plating thickness. It does not allow for system pressure requirements and should be verified for each application and seal size.
3. The customer must verify that system bolts and flanges can generate the required seating load without warping or distorting.
4. The customer must test and verify that the seal design meets customer designated performance requirements.



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 us at sales@technetics.com for design assistance.

DETERMINING SEAL DIAMETER:

Internal
 $A = C - X - 2P_{max}$

External
 $B = D + X + 2P_{max}$

DETERMINING GROOVE DIAMETER:

Internal
 $C = A + X + 2P_{max}$

External
 $D = B - X - 2P_{max}$

Tolerancing: See chart

- Where:
- A = Seal Outer Diameter
 - B = Seal Inner Diameter
 - C = Groove Outer Diameter
 - D = Groove Inner Diameter
 - Pmax = Maximum Plating or Coating Thickness
 - X = Diametrical Clearance

Groove Finish √c: See Plating/Coating Section

SEAL AND GROOVE DIMENSIONS

SEAL		GROOVE		
Free Height	Seal Diameter Range	Diametrical Clearance x	Groove Depth F	Groove Width (Min.) G
0.047	0.325 to 2.000	0.006	0.038 ±0.001	0.055
0.063	0.375 to 8.000	0.007	0.050 ±0.001	0.075
0.094	0.500 to 16.000	0.008	0.074 ±0.002	0.105
0.125	1.000 to 25.000 +	0.012	0.100 ±0.002	0.135
0.156	2.000 to 25.000 +	0.016	0.127 ±0.002	0.170
0.188	3.000 to 25.000 +	0.018	0.151 ±0.002	0.200
0.250	4.000 to 25.000 +	0.020	0.200 ±0.003	0.260

Dimensions in inches

NOTE: Contact Us at sales@technetics.com for additional sizes.

TOLERANCES

Seal Diameter Range	Seal Tolerance t	Groove Tolerance h
0.250 to 0.999	0.002	0.001
1.000 to 1.999	0.002	0.002
2.000 to 2.999	0.003	0.003
3.000 to 3.999	0.003	0.003
4.000 to 4.999	0.004	0.004
5.000 to 6.999	0.006	0.006
7.000 to 9.999	0.007	0.007
10.000 to 14.999	0.012	0.012
15.000 to 19.999	0.015	0.015
20.000 +	Contact Us at sales@technetics.com	

Dimensions in inches

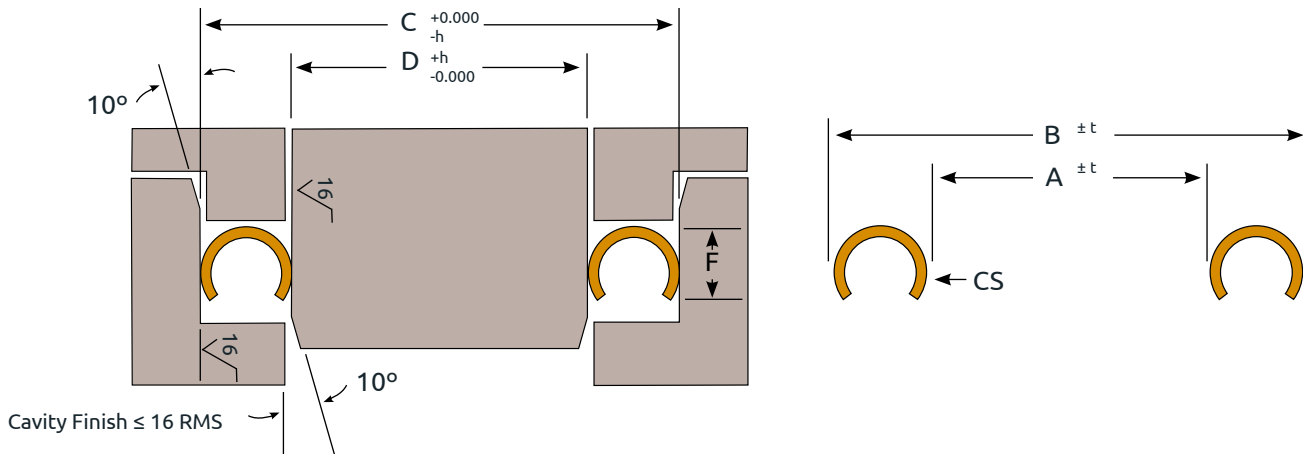
SHAPED SEALS

C-FLEX™ seals can be made in a variety of shapes and sizes. Typical Internal and External pressure seals can be formed into racetrack, square, triangular and rectangular shapes. Contact Applications Engineering for more information regarding shaped seal capabilities.

Minimum Corner Radii for Shaped C-FLEX™ Seals						
Cross Section	0.063	0.094	0.125	0.157	0.188	0.250
Minimum Inner Radius	0.375	0.565	1.000	2.000	3.000	4.000

Dimensions in inches

AXIAL PRESSURE APPLICATIONS



SEAL						CAVITY DIMENSIONS				
Cross Section CS	Material Thickness (Prior to Forming)	Seal ID Range	Axial Length (Max. Ref)	Axial Load PCI	Seal Tolerance t	Cavity OD C	Cavity ID D	Cavity Tolerance h	Cavity Depth F (Min)	Cavity OD/ID Eccentricity (Max.)
0.063	0.008	0.375 to 1.249	0.050	110	0.001	B - 0.003	A + 0.003	0.001	0.075	0.0005
	0.008	1.250 to 2.500	0.050	110	0.001	B - 0.004	A + 0.004	0.001	0.075	0.0005
	0.010	0.375 to 1.249	0.050	130	0.001	B - 0.003	A + 0.003	0.001	0.075	0.0005
	0.010	1.250 to 2.500	0.050	130	0.001	B - 0.004	A + 0.004	0.001	0.075	0.0005
0.094	0.010	0.500 to 1.249	0.075	80	0.001	B - 0.003	A + 0.003	0.001	0.105	0.0010
	0.010	1.250 to 3.000	0.075	80	0.001	B - 0.004	A + 0.004	0.001	0.105	0.0010
	0.015	0.500 to 1.249	0.075	190	0.001	B - 0.003	A + 0.003	0.001	0.105	0.0010
	0.015	1.250 to 3.000	0.075	190	0.001	B - 0.004	A + 0.004	0.001	0.105	0.0010
0.125	0.015	0.750 to 2.499	0.100	165	0.001	B - 0.003	A + 0.003	0.001	0.135	0.0010
	0.015	2.500 to 8.000	0.100	165	0.002	B - 0.006	A + 0.006	0.002	0.135	0.0010
	0.020	0.750 to 2.499	0.100	210	0.001	B - 0.003	A + 0.003	0.001	0.135	0.0010
	0.020	2.500 to 8.000	0.100	210	0.002	B - 0.006	A + 0.006	0.002	0.135	0.0010
0.157	0.015	2.000 to 5.999	0.125	240	0.002	B - 0.006	A + 0.006	0.002	0.170	0.0015
	0.015	6.000 to 10.000	0.125	240	0.002	B - 0.007	A + 0.007	0.002	0.170	0.0015
	0.025	2.000 to 5.999	0.125	360	0.002	B - 0.006	A + 0.006	0.002	0.170	0.0015
	0.025	6.000 to 10.000	0.125	360	0.002	B - 0.007	A + 0.007	0.002	0.170	0.0015
0.188	0.020	3.000 to 5.999	0.150	280	0.002	B - 0.007	A + 0.007	0.002	0.200	0.0015
	0.020	6.000 to 10.000	0.150	280	0.002	B - 0.008	A + 0.008	0.002	0.200	0.0015
0.250	0.025	4.000 to 6.499	0.200	360	0.002	B - 0.008	A + 0.008	0.002	0.260	0.0015
	0.025	6.500 to 10.000	0.200	360	0.002	B - 0.009	A + 0.009	0.002	0.260	0.0015

Dimensions in inches

NOTES:

1. PCI = Pounds force per circumferential inch
2. Axial load is an approximate value. Actual value will vary based on diameter, interferences, friction coefficients, finish, platings, lubrication, etc.
3. Load values are for Alloy 718 at 70°F

APPLICATIONS DATA SHEET

Tel: 800-233-1722 Fax: 803-783-4279

E-Mail: sales@technetics.com



EnPro Industries companies

COMPANY:	PHONE:
CONTACT:	FAX:
ADDRESS:	E-MAIL:
DATE:	

APPLICATION: (please attach customer drawing / sketch)

Brief Description: _____

Annual quantities: _____ RFQ Quantities: _____

Is This a New Design? Yes No Are Modifications Possible? Yes No

Drawing or Sketch Attached? Yes No What is the Seal Type? Shaped Circular

SERVICE CONDITIONS:

Media: _____	Life Expectancy: _____
Working Temperature: _____	Max/Proof Pressure: _____ @ Temp. = _____
Working Pressure: _____	Max Temperature: _____ @ Pressure = _____
Pressure Direction: <small>(Internal/External/Axial)</small> _____	Target Sealing Level: Helium: _____ Std.cc/sec
Pressure Cycles: _____	Flow Rate: _____ cc/minute
Temperature Cycles: _____	Other: _____

FLANGE DETAILS: (Please Provide Drawing)

Amount of Flange Movement in Service: (Inches) Radial: _____ Axial: _____ #Cycles: _____

Material: _____ Thickness: _____

Groove / Counter Bore: _____ Please list dimensions in Groove Details section

ANSI Raised Face Size: _____ # Rating: _____ Face Surface Finish: _____ (RMS)

Flange(s) with Clamping System: (ISO,KF, etc) Standard: _____ Size: _____

Other: _____ Description: _____ (Please Provide Drawing)

GROOVE DETAILS: (Please Provide Drawing)

Type (Rectangular, Dovetail, etc.): _____

Outer Diameter: _____ Tolerance: _____	Depth: _____ Tolerance: _____
Inner Diameter: _____ Tolerance: _____	Finish (RMS) _____ Type: _____

Finish Type: lathe (circular), endmill (multi-directional), other

BOLTING DETAILS: (Please Provide Drawing)

Size: _____	Type / Grade: _____
Number: _____ Bolt Circle _____	Tapped / Through: _____

OTHER:

Special coating / plating specification: _____

Special quality / inspection specifications: _____

Other: _____