

Daemar® Metallic O-Rings are designed to prevent leakage of gases or liquids under adverse sealing conditions. These static, metal-to-metal seals can withstand pressures from high vacuum to 100,000 psi (6,804 atm). They can endure continuous temperatures from - 425°F up to 1,800°F.

(-269°C to 982°C.), or intermittent temperatures up to 3,000°F. (1,650°C.). They resist radiation, chlorides, corrosives, and other hostile environments. They will not deteriorate with age, either in use or in storage.

### Design, Materials, Coatings, Sizes

Daemar® Metallic O-Rings, designated MOR, are made of metal tubing (or solid rod) which is formed into circular or other shapes and the two ends welded together. The O-Ring metal is stainless steel or other alloys. The O-Ring can be electroplated with silver, copper, indium, nickel, gold, lead or other metals, or it can be coated with Teflon. The flow of the finish material improves the sealing, especially under high pressure and/or vacuum. Since tensile strength and resilience of the seal are determined in part by metal temper, Daemar® Components offers

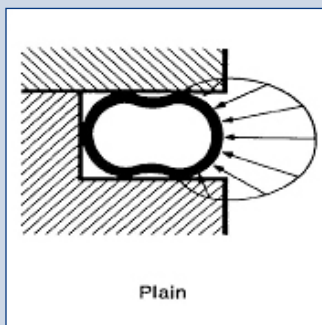
a choice of heat treating to material specification or tempering to customer specifications.

### Application Characteristics

The typical application places a Metallic O-Ring in axial compression between parallel faces, which are square to the fluid passage or vessel axis. The seal is usually located in an open or closed groove in one face. It can also be located in a retainer, which eliminates the need for machining a groove.

Upon compression to a predetermined fixed height, the seal tubing buckles slightly, resulting in two contact areas on the seal face and maximum contact stress between the seal and the mating faces. When the flange faces are closed, the O-Ring is under compression and tends to spring back against the flanges, thus exerting a positive sealing force. If the O-Ring is the self-energizing type, the pressure of the gas or liquid on the vented side energizes the seal and further increases the sealing force by pushing the seal against the flange face.

## TYPES OF METALLIC O-RINGS



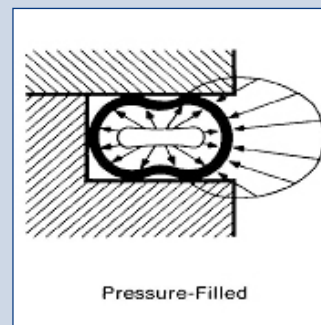
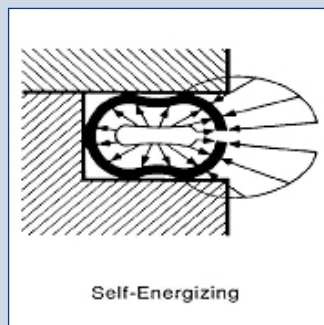
### Plain

(Not Self-Energizing or Pressure-Filled)

Made of metal tubing (or solid rod) in most metals. This type is the most economical O-Ring. It is designed for low to moderate pressure and vacuum conditions.

### Self-Energizing

The inner periphery of the O-Ring is vented by small holes or a slot. The pressure inside the ring becomes the same as in



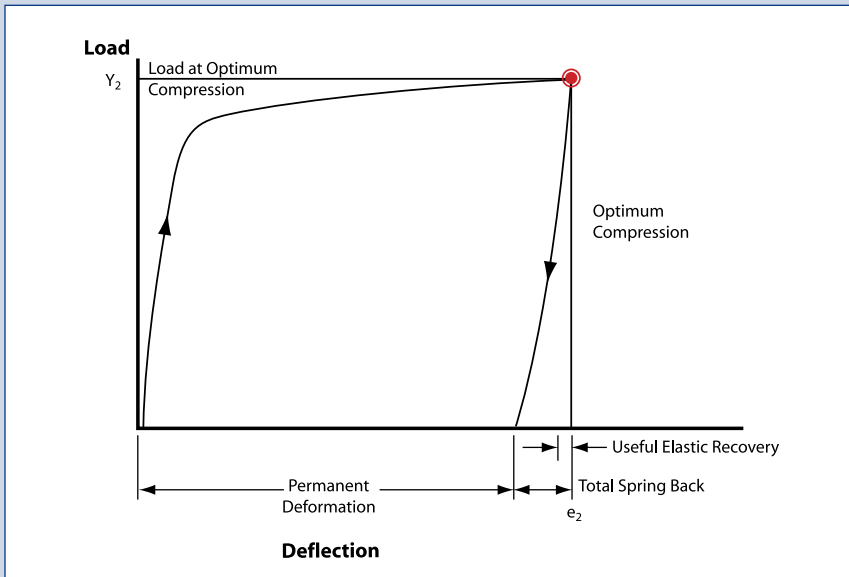
the system. Increasing the internal pressure increases sealing effectiveness.

### Pressure-Filled

Pressure-filled O-Rings are designed for a temperature range of 800°F to 2,000°F (425°C to 1,093°C). They cannot tolerate pressures as high as the self-energizing type. The ring is filled with an inert gas at about 600 psi (41 atm). At elevated temperatures, gas pressure increases, offsetting loss of strength in tubing and increasing sealing stress.

## 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	Temperature	Heat Treatment
SS321	T < 700°F	NA
Alloy 600	T < 1,000°F	NA
Alloy X750	T < 1,100°F	NA
Alloy 718	T < 1,200°F	NA
Other	Contact a Daemar Technical Representative	

## PLATING/COATING SELECTION

Plating/Coating	Standard Thickness	Temperature	Groove Finish*
PTFE	.001/.003	T < 500°F	16 –32 RMS
Silver	.001/.002	T < 800°F	16 –63 RMS
Silver w/ Gold Strike	.001/.002	T < 1,200°F	16 –63 RMS
Nickel	.001/.002	T < 1,600°F	16 –32 RMS
None	-	-	<16 RMS
Other	Contact a Daemar Technical Representative		

Dimensions in inches

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

Contact Daemar technical sales representative for non-standard thicknesses.

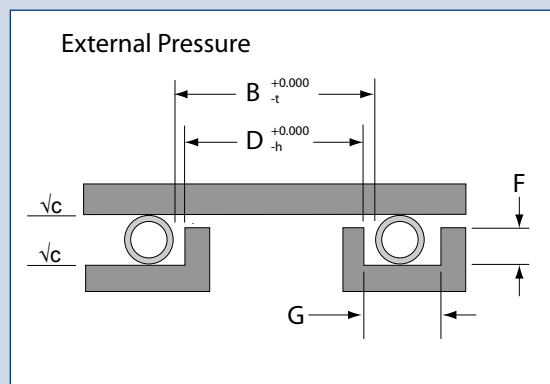
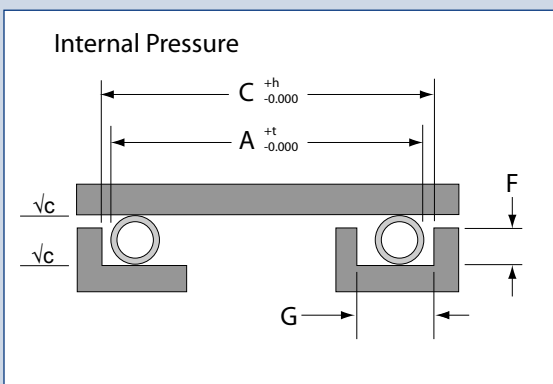
## CHARACTERISTIC VALUES

Free Height	Compression $e^2$	Seal Diameter Range	Material Thickness	Thin (T) Medium (M) Heavy (H)	Characteristic Values at 70°F		
					SS321	Alloy 600	Alloy X-750
					Seating Load (PCI) Y2	Seating Load (PCI) Y2	Seating Load (PCI) Y2
0.032	0.006	0.500 to 4,000+	0.006	T	457	503	594
			0.010	M	1028	1131	1336
			-	H	-	-	-
0.063	0.012	2,000 to 40,000+	0.010	T	571	628	742
			0.012	M	799	879	1039
			0.014	H	1256	1382	1633
0.094	0.020	5,000 to 50,000+	0.010	T	343	377	446
			0.012	M	514	565	668
			0.018	H	1313	1444	1707
0.125	0.026	3,000 to 50,000+	0.010	T	343	377	446
			0.020	M	1142	1256	1485
			0.025	H	2056	2262	2673
0.156	0.031	5,000 to 50,000+	-	T	-	-	-
			0.020	M	857	943	1114
			0.025	H	1428	1571	1856
0.188	0.039	4,000 to 50,000+	-	T	-	-	-
			0.020	M	657	723	854
			0.032	H	2113	2324	2747
0.250	0.051	5,000 to 50,000+	0.025	T	799	879	1039
			0.032	M	1370	1507	1781
			0.049	H	3026	3329	3934

Dimensions in inches

Notes:

- 1) PCI = pounds force per circumferential inch
- 2) Seating Load (Y2) is an approximation and may vary based on groove clearance, sea; 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 distortion.
- 4) The customer must test and verify that the seal design meets the 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 Daemar for design assistance.

### Determining Seal Diameter:

#### Internal

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

#### External

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

### Determining Seal 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

P<sub>max</sub> = 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	Seal Tolerance t	Diametrical Clearance x	Groove Tolerance h	Groove Depth F	Groove Width (Min.) G
0.032	0.500 to 4.000	0.005	0.006	0.004	0.026±0.001	0.055
0.063	0.500 to 10.000	0.005	0.006	0.004	0.051±0.001	0.090
0.094	1.000 to 20.000	0.005	0.008	0.004	0.073±0.002	0.125
0.125	2.000 to 40.000	0.005	0.008	0.004	0.099±0.002	0.160
0.156	3.000 to 50.000+	0.005	0.014	0.006	0.125±0.002	0.200
0.188	4.000 to 50.000+	0.005	0.014	0.006	0.149±0.002	0.250
0.250	5.000 to 50.000+	0.008	0.019	0.008	0.199±0.002	0.350

Dimensions in inches